APPENDIX E

Mitigation Measures and Commitments

1. Wetland Mitigation Plan

Conceptual Wetland Mitigation Plan for the Hunter Lake Project

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List of Abbreviations and Acronyms

BMP	Best management practice
CFR	Code of Federal Regulations
DBH	Diameter at breast height
FQI	Floristic quality index
FY	Fiscal year
HEP	Hunter Lake Habitat Evaluation Procedures
HUC	Hydrologic unit code
NWI	National Wetland Inventory
PEM	Palustrine emergent marsh
PFO	Palustrine forest
Plan	Compensatory Wetland Mitigation Plan
PLS	Pure live seed
RM	River mile
RPM	Root Production Method
sq mi	Square mile
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service

1. Introduction

This Compensatory Wetland Mitigation Plan (Plan) has been prepared to satisfy the mitigation requirements associated with proposed impacts to jurisdictional wetland habitat for the construction of Hunter Lake on Horse Creek and Brush Creek located in Sangamon County, Illinois. This Plan has been written to satisfy Clean Water Act wetland mitigation requirements codified in 33 CFR 332.4 (Planning and Documentation).

The City of Springfield (City) anticipates that construction of the proposed Hunter Lake Reservoir project will impact approximately 73.63 acres of jurisdictional wetland habitat (includes 2.53 acres of open water/pond habitat) within the proposed project area as depicted in Table 1-1.

Table 1-1. Summary of Proposed Project Impacts to Jurisdictional Wetland Habitat

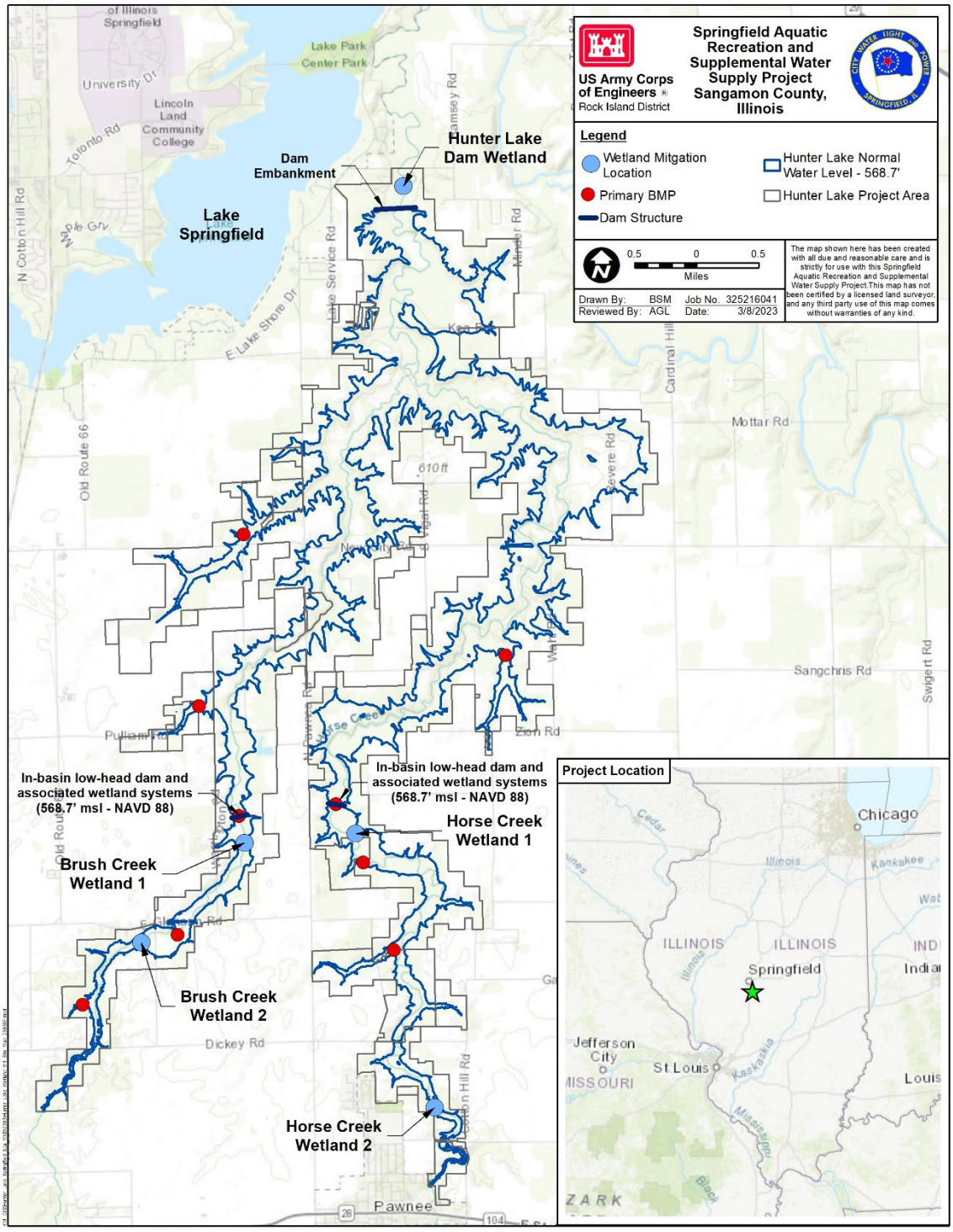
Wetland Type	Status	Acres Impacted
Emergent-	Jurisdictional	16.00
Forested	Jurisdictional	55.10
Open Water (ponds)	Jurisdictional	2.53
	Total	**73.63**

Compensation for the 71.1 acres of proposed jurisdictional wetland impacts (mitigation for impacts to jurisdictional open water/pond habitat is not currently anticipated) will be accomplished by an anticipated combination of the purchase of wetland mitigation bank credits and creation of onsite permittee-responsible mitigation within the Hunter Lake project area. Available wetland mitigation bank credits located within the 8-digit project area HUC (South Fork Sangamon River, 07130007) will be purchased and prioritized for project compensatory mitigation requirements per the USACE Compensatory Mitigation for Losses of Aquatic Resources Final Rule guidance (April 2008); before development of onsite permittee-responsible mitigation. Currently, one (1) mitigation bank services the project area HUC, the Sangamon River Wetland and Stream Mitigation Bank.

Overall, the main intent of this Plan will generally focus on the proposed permittee-responsible mitigation and associated mitigation site selection within City property (adjacent to the proposed reservoir). Further development of permittee-responsible mitigation acreage at the proposed site locations is anticipated to be further determined after purchase of available wetland mitigation bank credits which will occur near or at the time of 404/401 permit issuance decision.

Figure 1-1 shows the location of the proposed permittee-responsible mitigation sites in relation to the overall Hunter Lake project area.

Figure 1-1. Location of Proposed Mitigation Site in Relation to the Hunter Lake Project



2. Objectives

In accordance with this Plan, the City commits to a combination of purchasing up to 71.1 wetland mitigation bank credits (emergent and forested wetland credits, if available), or creating up to 134.2 acres of onsite permittee-responsible mitigation to mitigate the permanent impacts on existing jurisdictional wetland resources within the Hunter Lake Reservoir project area. The noted wetland mitigation credits are based upon the actual anticipated wetland mitigation acreage required to offset proposed jurisdictional wetland habitat impacts per the USACE Rock Island District Mitigation and Monitoring Guidelines (May 2019), which is further discussed in Section 6. Proposed wetland habitat to be created onsite will consist of a combination of palustrine emergent (PEM) and palustrine forested (PFO) wetland types and will be located at five (5) distinct mitigation locations within the project area.

The mitigative work in this Plan is intended to compensate for the wetland, wildlife habitat, and natural heritage functional values lost at the impacted wetland sites within the Hunter Lake Reservoir project area. It is anticipated that the creation of wetland habitat distributed within the project area, along with the conversion of intensely-managed croplands to native prairie grassland habitats in adjacent uplands will provide several ecological benefits related to fish and wildlife habitats, water quality, and biodiversity. These benefits include provision and expansion of permanent and seasonal habitats for fishes, residential and migratory birds, amphibians, reptiles, and pollinators. Mitigation sites are expected to have a positive impact on wildlife habitat diversity, wetland quality, and natural heritage functional values within Sangamon County and will develop into one of the best examples of public property supporting rare upland prairies, forested and emergent wetlands, and lacustrine ecosystems in central Illinois. The benefits obtained from this Plan are in alignment with the Resource Goals and Objectives identified in the Hunter Lake Habitat Evaluation Procedures report (Hunter Lake HEP Team et al. 1992).

Specific project objectives of the Hunter Lake Mitigation Site are listed below. Performance standards used to measure each objective are provided in Section 9.

- Wetland Creation
  - Creation of up to 110.2 acres of forested wetland habitat with several hard mast tree species to provide increased vegetation diversity and wildlife food sources.
  - Creation of up to 24.0 acres of emergent wetlands habitat providing seasonal habitats for a variety of species, including amphibians and shorebirds, and increased plant species diversity.
- Control of Aggressive Adventive and Native Species
  - Control non-native species, including, but not limited to Johnson grass (*Sorghum halepense*) and reed canary grass (*Phalaris arundinacea*).
  - Reduce cover and density of aggressive native plant species in selected areas. Species may include giant ragweed (*Ambrosia trifida*), cocklebur (*Xanthium strumarium*), and cattail (*Typha spp.*).
- Predominance of Appropriate Native Vegetation

- Increase the cover and density of native plant species within the wetland mitigation sites.

- Survival
  - Ensure survival of the planted trees within the planned forested wetland communities.

3. Mitigation Site Selection

This section provides information relative to the selection of the permittee-responsible mitigation sites and their suitability for establishment of compensatory mitigation areas for wetlands and riparian zones.

Overall permittee-responsible site selection and proposed design, operation, and species composition was based on the commitment to develop high quality wetland habitat that will adequately provide functions to replace those lost by the impacted wetland areas as a result of the proposed project.

The proposed permittee-responsible mitigation sites are located within the same watershed and on the same City-owned property where wetland habitat would be impacted by the proposed project; while the mitigation bank anticipated for credit use is also located within the project area HUC-8. The 131-square mile (sq mi) Horse Creek watershed (HUC-10 that encompasses Hunter Lake shares a boundary with the Lake Springfield watershed, both of which are part of the Sangamon River basin. The Sangamon River is a tributary of the Illinois River which drains into the Mississippi River and empties into the Gulf of Mexico.

By protecting the proposed permittee- responsible mitigation sites from future incompatible uses and/or development in perpetuity, implementation of this Plan will be compatible with regional watershed goals by protecting and further enhancing natural resources within the watershed.

3.1 Contribution to Aquatic Resource Functions

The mitigative work in this Plan is intended to compensate for the wetland, wildlife habitat, and natural heritage functional values lost at the impacted wetland sites within the Hunter Lake project area. It is anticipated that the conversion of land from current row crop land uses to emergent and forested wetlands within the mitigation areas will provide seasonal habitats for several species of migratory songbirds, shorebirds, waterfowl, amphibians, and reptiles. It is anticipated that the creation and enhancement of wetland and surrounding upland buffer areas in Hunter Lake will improve wildlife habitat. Overall, the mitigation sites are expected to have a positive impact on wildlife habitat diversity, wetland quality, and natural heritage functional values within Hunter Lake.

3.2 Likely Future Adjacent Land Uses and Compatibility

The Hunter Lake project area has a long-established history of agricultural use, which is characteristic of central Illinois. Upon development of Hunter Lake, the lands immediately adjacent to the lake would be planted with a mixture of forested buffer and upland prairie species. The forested and emergent wetlands, along with the grassland prairie buffer surrounding Hunter Lake, will help to filter agricultural nutrients and other contaminants that may enter the site from precipitation runoff from adjacent areas outside the City-owned property. It is expected that these adjacent areas will continue with the current

agricultural land use. If any additional development were to occur in adjacent areas, the mitigation site should not be substantially impacted in terms of surface water runoff, sedimentation and water quality because of the BMPs and vegetative buffers that will be installed.

Planned aquatic recreational uses of Hunter Lake are compatible with development of wetland habitat within the proposed permittee-responsible mitigation sites. The establishment of a grassland prairie buffer surrounding the proposed lake and mitigation areas will ensure that the immediately adjacent lands will be taken out of row crop production, thereby further protecting the mitigation site buffer area. Development of aquatic recreation access areas around the lake are not anticipated to negatively affect or impact the planned wetland mitigation areas or upland buffer areas as any recreational development will stay well outside of any boundaries, and mitigation areas will also be marked accordingly with appropriate signage.

3.3 Sustainable Design

The mitigation sites will be designed to be sustainable in the long term, allowing the sites to continue to function as wetland habitat. As part of this design, the mitigation areas are designed to make full use of available natural hydrology including both surface water and groundwater from Hunter Lake.

The proposed grading for some of the mitigation areas will allow the groundwater connections to occur more often, and for longer periods. The increased duration of groundwater near the surface of the wetland is expected to promote further development of hydric soils and further support growth of hydrophytic vegetation.

In addition to providing sustainable hydrology conditions, the areas will be actively managed to promote establishment of native vegetation through early and continued control of undesired invasive species and aggressive native species. Short-term management activities may include mowing and targeted spraying of undesirable vegetation. However, once the native species become well established and capable of outcompeting most invasive species, the long-term maintenance activities may be reduced in frequency and include other management methods, such as prescribed burns.

4. Site Protection Instrument

The land located within the project area has previously been acquired by the City of Springfield. Management of the Hunter Lake property emphasizes objectives related to providing a supplemental water supply, aquatic habitat creation in support of recreation, and the development and enhancement of a range of upland habitats including tallgrass prairie, forested upland and bottomland habitat, and successional habitats.

The proposed mitigation sites will be protected as part of the long-term planning mechanism for the area. Virtually all of the approximately 7,900 acres of lands and waters within the project area will be protected by covenants that establish the lands as protected open space. Mitigation lands and all other lands owned by the City surrounding Hunter Lake will be managed in cooperation with the IDNR to enhance aquatic and terrestrial resources of the project site. Wetland mitigation areas are anticipated to be protected by a conservation easement or deed restriction as a requirement of compensatory mitigation in accordance with 33 CFR 332.4, and would establish an appropriate third party (e.g. governmental or non-profit resource management agency), approved by the USACE, the right to enforce site protection and provide the third party the resources necessary to monitor and ensure these site protections. Additionally, the protection instrument (and 404/401 permits and mitigation plan, if applicable) will be filed and records with the Sangamon County Recorder of Deeds. Although not anticipated, if the City were to sell or transfer the property to a third party, the City would be required to further coordinate with the USACE and IEPA regarding transfer permissions and permitting obligations.

The boundaries of the mitigation sites will be marked with signs, and if needed barriers may be placed along roads or other points currently readily accessible to equipment or vehicles to avoid any unauthorized vehicles or equipment from entering the site and rutting or compacting the site, and/or degrading wetland areas.

5. Baseline Information

5.1 Location

The proposed mitigation sites are located on lands owned by the City within the Hunter Lake project area in Sangamon County, Illinois, approximately 8 miles southeast of Springfield, Illinois (Figure 5-1). The proposed Hunter Lake reservoir would be formed by construction of an earthen dam on Horse Creek, and would impound water on both Horse Creek and Brush Creek, which are both tributaries to the South Fork of the Sangamon River in Section 31 of Rochester Township. The mitigation sites include proposed wetlands created above and below the proposed dam.

5.2 Classification

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; and are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components (Omernik and Griffith 2014).

The Hunter Lake project area is located within the Illinois/Indiana Prairie Ecoregion, a sub ecoregion of the Central Corn Belt Plains Ecoregion. This region is characterized by glaciated flat to rolling plains made up of loess, glacial till, and alluvium. Before this region was converted to cropland, the natural vegetation of this area consisted of a mosaic of bluestem prairie and oak-hickory forest. The bluestem prairies consisted of a mix of mesic, wet, and dry upland prairies that were dominated by plant species such as big bluestem, Indian grass, switch grass, prairie cord grass, sedges, little bluestem, and side-oats grama. In the oak-hickory forest, the dominant plant species were black oak, white oak, and shagbark hickory (Woods et al. 2006).

At the time of settlement, poorly drained land, ponds, and swamps were common. Poor drainage was especially pronounced in the youngest, most recently glaciated parts of the Wisconsinan till plain. However, even on much older, more dissected till plains in the west where drainage systems are comparatively well integrated, many lowlands between moraines were naturally wet or seasonally covered by standing water (Nelson, 1978). Subsequently, extensive parts of the Illinoian and Wisconsinan till plains have been tiled, ditched, and tied into the existing drainage system to make the land more suitable for cropland and settlement. In the process, marshes and pothole lakes were drained, and once abundant waterfowl were displaced (Schwegman, 1973). Nearly all of the original prairies have now been replaced by agriculture (Woods et al. 2006). Western streams on the Illinoian till plain have fewer species, tend to dry up soon during drought periods, and have lower gradients, more clayey beds, and fewer gravel riffles than eastern streams on the Wisconsinan till plain (Wood et al. 2006).

5.3 Quantification of Waters of the United States

Stream and wetland surveys were conducted in the Fall of 2016 and 2022 within the Hunter Lake project area, including the potential inundation area, adjacent shoreline, and adjacent lands anticipated to be used for recreational amenities. Aquatic resources were delineated in accordance with the August 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0). Detailed information on each assumed jurisdictional resource can be found in the Waters of the US Delineation Report prepared for the project (February 2023). Two (2) main wetland habitat types were found throughout the project area including emergent (PEM) and forested (PFO) wetland habitat; no scrub-shrub wetland habitat was identified or delineated as occurring within the project area. Jurisdictional streams and associated proposed impacts for the project are addressed in the Conceptual Stream Mitigation Plan, which is currently being prepared and will be submitted under separate cover.

Emergent Wetlands: Twenty-two (22) emergent jurisdictional wetlands (16.00 acres) were delineated within the Hunter Lake alternative project area during the field evaluation. These wetlands were generally observed as located at higher elevations within or at the end of ephemeral grassland drainages in agricultural settings. Cultivated fields in low topographic positions that had been identified as having hydric soils have a hydrology that is typically modified by the prior installation of drainage tiles, resulting in limited wetland habitat being identified within active agricultural areas.

Forested Wetlands: Forty-five (45) jurisdictional forested wetlands totaling 55.10 acres were identified within the normal pool elevation limits of the survey area. These wetlands were generally observed as being large areas located in lower elevations of micro-topography within the floodplains of Horse and Brush creeks. Much of the forested wetland areas identified were generally second-growth forests that have developed in locations that were previously cleared for agricultural uses. Floristic quality (Adamus, 1983) of these wetlands was noted to be relatively low (mean C value of less than 3). Dominant tree species include silver maple (*Acer saccharinum*), common hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), American elm (*Ulmus americana*), box elder (*Acer negundo*), honey locust (*Gleditsia triacanthos*), Osage orange (*Maclura pomifera*), bur oak (*Quercus macrocarpa*), white and red mulberry (*Morus spp.*), sugar maple (*Acer saccharum*), sycamore (*Platanus occidentalis*), and Eastern cottonwood (*Populus deltoides*). In addition, shrubs and herbaceous species including coral berry (*Symphoricarpos orbiculatus*), amur honeysuckle (*Lonicera maackii*), multiflora rose (*Rosa multiflora*), stinging nettle (*Urtica dioca*), and Virginia wild rye (*Elymus virginicus*) often dominated the understory in the upland riparian corridors. At lower elevations, American elm, silver maple, Eastern cottonwood, honey locust and hackberry were the dominant species (Amec Foster Wheeler 2017, WSP 2022).

5.4 Aquatic Resource Functions Impacted

Potentially impacted wetland habitat at the proposed Hunter Lake project site were delineated in accordance with the August 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0). Detailed information on each impacted wetland can be found in the City permit application package and below.

All jurisdictional wetlands are located within the floodplain of either Horse Creek or Brush Creek. On an individual basis, many of these wetlands are small and isolated (typically <1.0 acre) and as such, the majority of them are too small in size to provide beneficial flood abatement, retention of sediments and nutrients, and habitat support. Therefore, these small wetlands would provide low functional quality with respect to water quality enhancement. However, in a broader context, the larger wetlands located within the project area would provide moderate functional quality with respect to flood abatement and sediment and nutrient retention due to their topographic position and potential to store stormwater and sediments from runoff or adjacent stream flooding. The incised nature of both Horse and Brush creeks has the effect of disconnecting the stream from its associated floodplain, thereby diminishing floodplains and their associated wetlands. In addition, the larger wetlands located within the survey area retain water for a longer period and, therefore, provide moderate functional quality.

For wildlife habitat, wetlands that are larger in size and mostly forested were determined to provide moderate functional quality as they provide valuable foraging and nesting habitat and corridors for movement along the streams. In addition, the larger emergent wetlands provide valuable cover for wildlife in the predominately agricultural landscape. Because the wetlands within the project area are only temporarily inundated on an ephemeral or intermittent basis during periods of flooding, they are considered to have low functional quality with respect to aquatic ecosystem support.

Various techniques have been used for assessing wetland functions: Wetland Evaluation Technique (WET) (Adamus, 1983) and the Hydrogeomorphic Method (HGM) approach (USACE, 1995a and 1995b). Currently, there is no standard or required approach for performing functional assessments in the USACE Rock Island District. The HGM assessment requires detailed site-specific information that is compared to a regional reference wetland (USACE, 1995a). While there are regional guidebooks available for other parts of the Midwest, including northern Illinois, none are directly applicable to this project area as the habitat types are not the same.

Several of the parameters cannot be determined (e.g., nutrient cycling, organic carbon export, etc.) without detailed site-specific information and long-term monitoring that is not available. Several of the other parameters (water storage, wildlife habitat, etc.) may be evaluated in qualitative terms. As an example, a wetland located in a floodplain with the presence of watermarks on trees and sediment deposits may be inferred as having high surface water storage and water quality improvement functions. Similarly, a wetland with a variety of community types (i.e., open water, emergent, and forested wetlands), and high plant diversity may be inferred as having a high wildlife functional value.

Given the level of site-specific information needed to perform a quantitative functional assessment, a practical wetland assessment for the project area focuses on key functions that can be rated qualitatively (e.g., low, medium, high). The functional value of each wetland has been assessed in the context of a broader landscape perspective. On the landscape level the functional value is dependent on size, position, and quality. As an example, a wetland which is defined as having high hydrologic functions is based on a qualitative comparison of the size, position, and quality of the wetland to other wetlands in the associated landscape.

- **Flood abatement**. The capacity and effectiveness of wetlands to provide value in flood abatement is often related to its landscape position and potential for storing stormwater that is

conveyed by runoff or by adjacent stream flooding. Wetlands located on floodplains of larger streams generally have higher functional value than those located along smaller intermittent streams, provided the wetland's topographic position allows for a relatively frequent connection between the wetland and stream.

- **Sediment retention**. As is the case with flood abatement, the capacity of a wetland to trap and detain sediments is often related to such factors as erodibility of the surrounding landscape, velocity of water moving through the wetland, nature and extent of vegetation within the wetland, and the availability of a topographic "sink" that can effectively contain sediments that are deposited by in-coming flow.

- **Nutrient retention and removal**. This function reflects the capacity of wetlands to retain nutrients carried by sheet or channel flow and retain and remove those nutrients within the wetland. Nutrients may either be deposited within "sinks", bound up by absorption/adsorption with soils or may be incorporated as part of the biomass of wetland vegetation.

- **Water quality enhancement**. The capacity for wetlands to perform water quality enhancement is linked to their vegetative characteristics, residence time of the water passing through the wetland (hydroperiod), and geochemical composition of the substrates.

- **Wildlife habitat**. Wetlands often give abundant support to wildlife by providing foraging habitat, nesting habitat, escape cover, and corridors for movement and dispersal. Structural complexity of the plant communities of the wetland area are often directly linked to the relative value of this wetland function. The forested wetland systems along the Horse and Brush creeks provide important habitat for several wildlife species, potentially including some listed rare, threatened or endangered species. Ephemeral pools and wetlands may provide temporary breeding areas for semi-aquatic species (frogs and toads) that may use fishless depressional habitats for breeding and life stage maturation.

- **Aquatic ecosystem support**. Wetlands provide value in supporting aquatic ecosystems by serving as persistent aquatic environments that support fish and aquatic invertebrates, and by providing temporary aquatic habitats during periods of flooding. Open water habitats generally act as perennial aquatic habitats and may be expected to support full life cycles of aquatic biota. In contrast, wetlands with temporary or seasonal hydroperiods may only be expected to provide intermittent support to aquatic biota.

In addition, wetland function can be inferred through the use of a Floristic Quality Assessment (FQA), which is a tool used to assist decision-makers in assessing the floristic quality, and implicitly, natural significance of a given area. FQA methodology followed the protocol developed by Swink and Wilhelm (1994) in the Plants of the Chicago Region. The concept of species conservatism is the foundation for FQA. Each native species is assigned a coefficient of conservatism (C). The coefficient of conservatism values for a plant represents two ecological principals: That plant species differ in their tolerance to disturbance and disturbance types, and that plant species display varying degrees of fidelity to habitat integrity. The C value applied to each taxon represents an estimate of a plant's tendency to be restricted to a "natural area." The values assigned to each taxon in the Illinois vascular

flora range from 0 to 10. Coefficient of conservatism values were updated by Taft et al. (1997) and are used in this assessment. A C value of 0 represents native species that demonstrate little fidelity to any remnant natural community and thus can be found anywhere, especially in disturbed areas and a C value of 10 represents native species that are restricted to pre-settlement remnant or high-quality natural areas. Those species that are adventive and not native to Illinois are assigned a C value of 0 (Taft et al. 1997). Therefore, the average, or mean, C value for a wetland is a good indicator of its quality and overall function.

The below existing wetland functional values were primarily determined based on a wetlands size and location within the landscape. For the wetlands within the project area, most have a mean C value less than 3.0 (**Table 5-1**). These moderate to low scores indicate that the wetlands are comprised of species that are more tolerant of disturbance, which can include non-native and tolerant native species that commonly grow in highly degraded areas. While the plant species found in an area doesn't directly relate to the functionality of the wetland, it does represent the quality of habitat available and therefore an indicator of the quality of wetland.

Table 5-1. Existing Wetland Functional Assessment Table

Wetland ID	Size (ac)	Flood Abatement	Sediment Retention	Nutrient Retention	Water Quality	Wildlife Habitat	Aquatic Ecosystem Support	Mean C Value
WET-010	0.52	Low	Low	Low	Low	Low	Low	3.2
WET-020	2.62	Moderate	Moderate	Moderate	Moderate	Moderate	Low	0.8
WET-030	0.35	Low	Low	Low	Low	Low	Low	3.2
WET-040	4.24	Moderate	Moderate	Low	Low	Moderate	Low	1.8
WET-045	2.52	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.8
WET-050	0.41	Low	Low	Low	Low	Low	Low	4.0
WET-060	0.63	Low	Low	Low	Low	Low	Low	2.4
WET-070	0.22	Low	Low	Low	Low	Low	Low	2.8
WET-080	0.37	Low	Low	Low	Low	Low	Low	2.1
WET-090	0.68	Low	Low	Low	Low	Low	Low	2.4
WET-100	3.35	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.8
WET-110	0.53	Low	Low	Low	Low	Low	Low	2.4
WET-120	0.20	Low	Low	Low	Low	Low	Low	2.6
WET-130	0.06	Low	Low	Low	Low	Low	Low	3.1
WET-140	7.77	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.1
WET-145	0.60	Low	Low	Low	Low	Low	Low	1.0

Wetland ID	Size (ac)	Flood Abatement	Sediment Retention	Nutrient Retention	Water Quality	Wildlife Habitat	Aquatic Ecosystem Support	Mean C Value
WET-150	0.09	Low	Low	Low	Low	Low	Low	2.8
WET-155	4.42	Low	Low	Moderate	Low	Moderate	Low	2.3
WET-160	0.26	Low	Low	Low	Low	Low	Low	3.3
WET-170	0.62	Low	Low	Low	Low	Low	Low	1.7
WET-180	0.13	Low	Low	Low	Low	Low	Low	1.5
WET-190	0.15	Low	Low	Low	Low	Low	Low	2.0
WET-200	0.22	Low	Low	Low	Low	Low	Low	0.7
WET-204	0.06	Low	Low	Low	Low	Low	Low	0.0
WET-205	0.10	Low	Low	Low	Low	Low	Low	1.5
WET-210	0.26	Low	Low	Low	Low	Low	Low	2.5
WET-220	0.17	Low	Low	Low	Low	Low	Low	2.5
WET-230	0.12	Low	Low	Low	Low	Low	Low	0.0
WET-230b	2.14	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.5
WET-235	0.08	Low	Low	Low	Low	Low	Low	1.5
WET-240	0.12	Low	Low	Low	Low	Low	Low	2.5
WET-250	1.03	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.5
WET-260	0.32	Low	Low	Low	Low	Low	Low	2.7
WET-270	0.28	Low	Low	Low	Low	Low	Low	1.2
WET-280	0.14	Low	Low	Low	Low	Low	Low	1.0
WET-290	0.92	Low	Low	Low	Low	Low	Low	3.0
WET-300	0.25	Low	Low	Low	Low	Low	Low	2.6
WET-310	0.16	Low	Low	Low	Low	Low	Low	1.3
WET-320	0.15	Low	Low	Low	Low	Low	Low	1.6
WET-330	0.21	Low	Low	Low	Low	Low	Low	1.3
WET-340	0.20	Low	Low	Low	Low	Low	Low	1.0
WET-350	2.01	Low	Low	Low	Low	Moderate	Low	1.3
WET-360	0.04	Low	Low	Low	Low	Low	Low	2.1
WET-370	0.25	Low	Low	Low	Low	Low	Low	1.0

Wetland ID	Size (ac)	Flood Abatement	Sediment Retention	Nutrient Retention	Water Quality	Wildlife Habitat	Aquatic Ecosystem Support	Mean C Value
WET-380	0.26	Low	Low	Low	Low	Low	Low	2.2
WET-390	0.07	Low	Low	Low	Low	Low	Low	2.0
WET-400	1.56	Moderate	Moderate	Moderate	Moderate	Moderate	Low	1.8
WET-410	0.18	Low	Low	Low	Low	Low	Low	0.3
WET-420	2.27	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.2
WET-430	0.21	Low	Low	Low	Low	Low	Low	1.5
WET-440	0.39	Low	Low	Low	Low	Low	Low	2.2
WET-450	0.22	Low	Low	Low	Low	Low	Low	2.0
WET-460	0.26	Low	Low	Low	Low	Low	Low	1.3
WET-470	0.22	Low	Low	Low	Low	Low	Low	3.0
WET-480	1.92	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.3
WET-490	0.39	Low	Low	Low	Low	Low	Low	1.0
WET-500	3.73	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.3
WET-500b	7.48	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.7
WET-502	0.69	Low	Low	Low	Low	Low	Low	1.8
WET-510	7.01	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.3
WET-520	0.22	Low	Low	Low	Low	Low	Low	1.3
WET-530	0.78	Low	Low	Low	Low	Low	Low	1.7
WET-540	0.07	Low	Low	Low	Low	Low	Low	1.8
WET-545	0.10	Low	Low	Low	Low	Low	Low	0.8
WET-550	0.32	Low	Low	Low	Low	Low	Low	2.8
WET-560	1.82	Moderate	Moderate	Moderate	Moderate	Moderate	Low	2.3
WET-562	0.13	Low	Low	Low	Low	Low	Low	1.3
WET-563	0.47	Low	Low	Low	Low	Low	Low	2.5
WET-570	0.03	Low	Low	Low	Low	Low	Low	4.0
WET-580	0.15	Low	Low	Low	Low	Low	Low	1.5
WET-590	1.11	Moderate	Moderate	Moderate	Moderate	Moderate	Low	1.7

5.5 Existing Hydrology

Hydrology within the survey area is dominated by direct precipitation and stormwater runoff from within the watershed. As such, the hydro-period of wetlands located within the floodplain is dominated by overbank flooding. In headwater areas where the tributaries to Horse and Brush creeks originate, the watersheds are smaller and have shallower soils, therefore, the hydroperiods in these areas may be shorter due to the rapid rise and fall of water levels in response to runoff from localized storm events. Some wetlands were noted to have a high-water table that may also contribute to localized wetland hydrology.

5.6 Existing Vegetation

During the wetland surveys, vegetation in the emergent and forested wetlands were identified and recorded. The dominant vegetation found throughout these wetland types is described below.

Emergent Wetlands: Common species observed within the emergent wetlands include reed canary grass (*Phalaris arundinacea)*, jewelweed (*Impatiens capensis)*, arrowhead (*Sagittaria latifolia*), fall panicgrass (*Panicum dichotomiflorum*), water pepper (*Persicaria hydropiper*), cocklebur (*Xanthium strumarium*), wingstem (*Verbesina alternifolia*), Virginia wild rye (*Elymus virginicus)*, and stinging nettle (*Urtica dioica).*

Forested Wetlands: Dominant canopy tree species in the forested wetlands include box elder (*Acer negundo)*, American elm (*Ulmus americana)*, cottonwood (*Populus deltoides)*, silver maple (*Acer saccharinum)*, hackberry *(Celtis occidentalis)*, and honey locust (*Gleditsia triacanthos)*. Other commonly observed tree species include burr oak (*Quercus macrocarpa)*, white mulberry (*Morus alba*), Osage orange (*Maclura pomifera)*, bitternut hickory (*Carya cordiformis*), and sycamore (Platanus occidentalis). In areas that contained a sapling/shrub understory, box elder, silver maple, American elm, and hackberry saplings dominated. Along the edges of the wetland areas and at slightly higher elevations, amur honeysuckle *(Lonicera maackii)* and multiflora rose (*Rosa multiflora)* densities increased. Stinging nettle dominated the herbaceous stratum throughout the majority of the forested areas within the project area; however, within the areas identified as forested wetlands, its species density rapidly declined while the densities of other facultative wet species increased. Herbaceous species commonly observed within the forested wetlands include Virginia wild rye, giant goldenrod (*Solidago gigantea*), moneywort (*Lysimachia nummularia*), honewort (*Cryptotaenia canadensis*) Gray's sedge (*Carex grayi*), sweet woodreed (*Cinna arundinacea*) and jewelweed.

5.7 Existing Soils

5.7.1 General Overview

The region that encompasses Sangamon County consists of thin to thick loess, glacial till, outwash deposits, lacustrine sediments, and alluvium. Loess is thickest downward of major floodplains and thins eastward. In upland area, soils are typically high in organic content. Soils derived from loess are primarily occur in the west over till deposits. Younger soils derived primarily from drift are found in

central and eastern areas on the till plains. In the floodplain and low terraces areas, natural drainage is usually poor (Wood et al., n.d.).

5.7.2 Site Specific

A total of 33 soil map units of 25 soil series are located within the project area. All soil descriptions are taken from the Natural Resources Conservation Service (NRCS) Official Soil Series Descriptions and the Sangamon County soil survey (NRCS 2016). Fayette, Elco, Tama, and Hickory soil map units are located in the upland regions of the project area while Sawmill, Radford, Vesser, and Lawson soil map units dominate the bottomlands and floodplains. Three soil map units, Sawmill silty clay loam, 0 to 2 percent slopes, frequently flooded; Zook silty clay loam, 0 to 2 percent slopes, frequently flooded; and Vesser silt loam, 0 to 2 percent slopes, occasionally flooded are listed on the NRCS National Hydric Soil List (revised December 2015, Sangamon County) (Table 5-1). Hydric soils are described as those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season. Field examination of soils in conjunction with the wetland investigation generally confirmed mapped soil type.

Table 5-2. Soils in the Hunter Lake Project Area

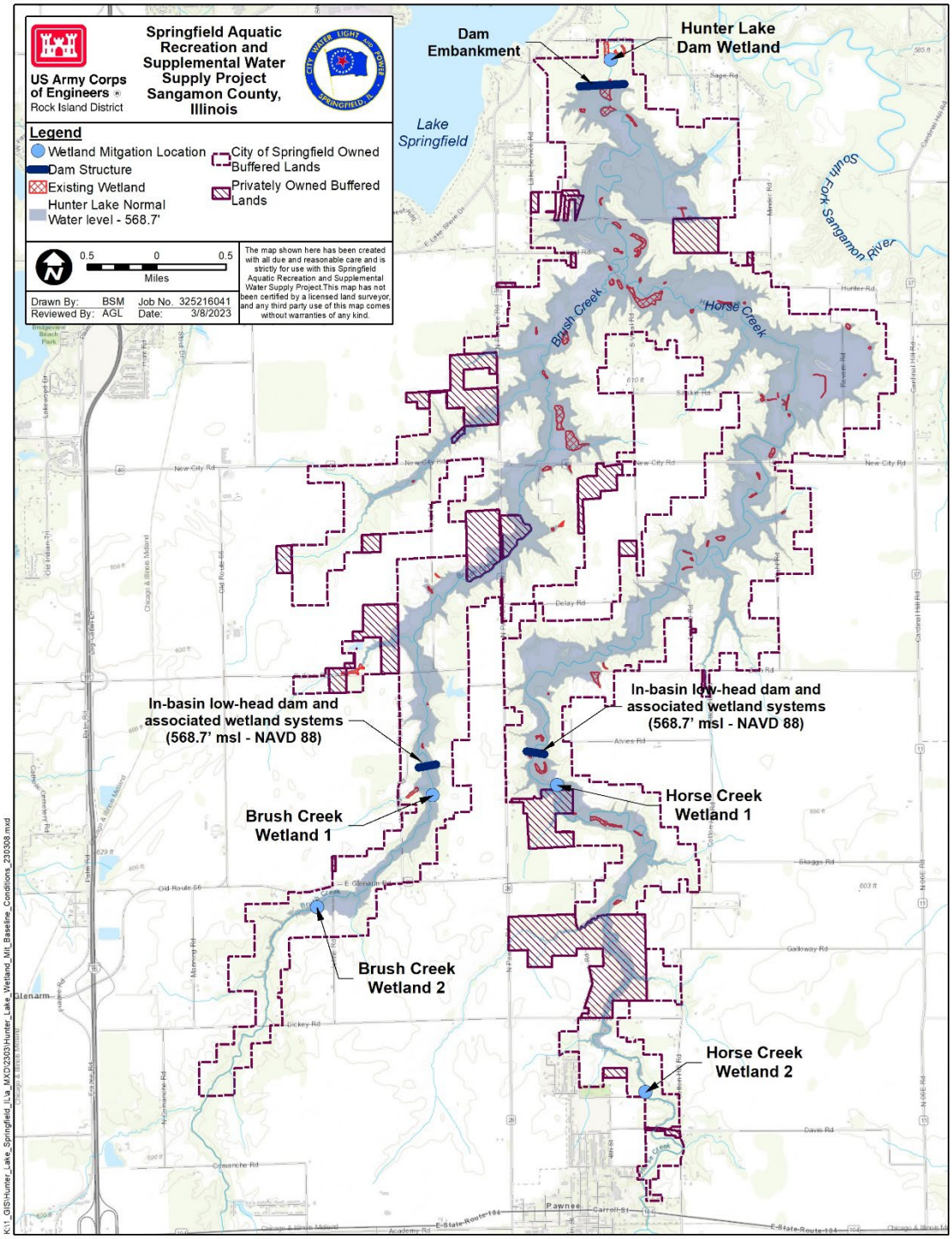
Map ID	Soil Map Unit	Acres	Hydric
119C2	Elco silt loam, 5 to 10 percent slopes, eroded	7.8	No
119D	Elco silt loam, 10 to 18 percent slopes	98.4	No
119D2	Elco silt loam, 10 to 18 percent slopes, eroded	56.0	No
119D3	Elco silty clay loam, 10 to 18 percent slopes, severely eroded	90.0	No
127C2	Harrison silt loam, 5 to 10 percent slopes, eroded	6.9	No
134C2	Camden silt loam, 5 to 10 percent slopes, eroded	21.9	No
17A	Keomah silt loam, 0 to 2 percent slopes	2.1	No
199B	Plano silt loam, 2 to 5 percent slopes	9.4	No
212C2	Thebes silt loam, 5 to 10 percent slopes, eroded	3.6	No
259D2	Assumption silt loam, 10 to 18 percent slopes, eroded	28.6	No
279B	Rozetta silt loam, 2 to 5 percent slopes	50.5	No
280C2	Fayette silt loam, 5 to 10 percent slopes, eroded	96.3	No
3074A	Radford silt loam, 0 to 2 percent slopes, frequently flooded	1,272.7	No
3077A	Huntsville silt loam, 0 to 2 percent slopes, frequently flooded	1.7	No
3107A	Sawmill silty clay loam, 0 to 2 percent slopes, frequently flooded	40.9	Yes
3284A	Tice silty clay loam, 0 to 2 percent slopes, frequently flooded	7.6	No
3405A	Zook silty clay loam, 0 to 2 percent slopes, frequently flooded	84.1	Yes
3451A	Lawson silt loam, 0 to 2 percent slopes, frequently flooded	605.8	No
43A	Ipava silt loam, 0 to 2 percent slopes	0.3	No
567C2	Elkhart silt loam, 5 to 10 percent slopes, eroded	0.6	No
567D2	Elkhart silt loam, 10 to 18 percent slopes, eroded	0.5	No
630C2	Navlys silt loam, 5 to 10 percent slopes, eroded	2.2	No

Map ID	Soil Map Unit	Acres	Hydric
7075B	Drury silt loam, 2 to 5 percent slopes, rarely flooded	93.5	No
7148A	Proctor silt loam, 0 to 2 percent slopes, rarely flooded	2.5	No
7242A	Kendall silt loam, 0 to 2 percent slopes, rarely flooded	18.1	No
8396A	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded	36.3	Yes
862	Pits, sand	4.4	No
86B	Osco silt loam, 2 to 5 percent slopes	1.3	No
86C2	Osco silt loam, 5 to 10 percent slopes, eroded	3.8	No
8D	Hickory silt loam, 10 to 18 percent slopes	80.9	No
8D2	Hickory loam, 10 to 18 percent slopes, eroded	20.3	No
8D3	Hickory clay loam, 10 to 18 percent slopes, severely eroded	105.6	No
8F	Hickory silt loam, 18 to 35 percent slopes	179.9	No

5.8 Historic and Current Land Use

Historically, the land use in Sangamon County was dominated by prairie grassland and forest land, but by the 1900s, the development of high-yield mechanical and chemical cultivation practices converted a majority of the land to row crop agriculture (Mac et al. 1998). Today, row crop agriculture dominates the landscape within Sangamon County and throughout the project area. Within the proposed wetland mitigation areas, small patches of bottomland forest were delineated adjacent to Brush Creek and Horse Creek, however no native grasslands or prairie land were observed during the field survey, while row crop agriculture remained the dominant use of these areas. Although agricultural land use may continue in areas surrounding the Hunter Lake project site, all lands within the project area are anticipated to be removed from active agricultural production upon final project approvals.

Figure 5-1. Location of Proposed Mitigation Areas in Relation to Existing Baseline Conditions



6. Determination of Credits

The primary mitigation goal is to generate wetland mitigation credits by creating wetland, restoring or enhancing existing wetland communities. Based on the City's coordination with U.S. Army Corps of Engineers (USACE), USACE must follow the mitigation preference from the 2008 Mitigation Rule, which requires an applicant to purchase available credits from an approved mitigation bank, followed by purchasing available credits from an approved In Lieu Fee provider, followed by permittee-responsible mitigation (PRM) For this project, compensation for wetland impacts will require a combination of purchasing up to 71.1 wetland mitigation bank credits (emergent and forested wetland credits, if available) or creating up to 134.2 acres of onsite permittee-responsible mitigation to mitigate the permanent impacts on existing jurisdictional wetland resources within the Hunter Lake Reservoir project area as determined in Table 6-1 and Table 6-2.

Table 6-1. Summary of Impacts to Wetlands and Mitigation Required for Mitigation Bank Credit Purchase*

Wetland Type	Status	Acres Impacted	Mitigation Ratio	Mitigation Required
PEM	Jurisdictional	16.00	1:1	16.0
PFO	Jurisdictional	55.10	1:1	55.1
PUB	Jurisdictional	2.53	0:1	0.0
	Total	**73.63**	**--**	**71.10**

*The noted 1:1 mitigation bank credit purchase ratio assumes that available credits will be purchased from a wetland mitigation bank that includes the project area 8-digit HUC (07130007), the South Fork of the Sangamon River, in the bank primary service area. Mitigation credit purchase for a project located in the secondary service area of a Mitigation Bank, would result in a higher required compensatory mitigation credit ratio, per the USACE Rock Island District Mitigation and Monitoring Guidelines document (May 2019).

Table 6-2. Summary of Impacts to Wetlands and Mitigation Required for Permittee-Responsible Mitigation**

Wetland Type	Status	Acres Impacted	Mitigation Ratio	Mitigation Required
PEM	Jurisdictional	16.00	1.5:1	24.0
PFO	Jurisdictional	55.10	2:1	110.2
PUB	Jurisdictional	2.53	0:1	0.0
	Total	**73.63**	**--**	**134.2**

**The noted permittee-responsible mitigation assumes that all mitigation activities would be completed within the project area 8-digit HUC (07130007), the South Fork of the Sangamon River. Permittee-responsible mitigation activities conducted outside of the project location 8-digit HUCbut within the 6-digit HUC would require compensatory mitigation be completed at a 2:1 ratio for emergent wetland habitat and a 3:1 ratio for forested wetland habitat, per the USACE Rock Island District Mitigation and Monitoring Guidelines document (May 2019).

In addition to the creation of up to 134.2 acres of on-site mitigation wetland habitat, the design of the Hunter Lake project will also include the establishment of 2,036 acres grassland/prairie on the land immediately adjacent to the reservoir to provide a vegetation buffer around the lake and wetland areas. The existing wetlands within the boundaries of the mitigation site will also be preserved and enhanced as part of the mitigation. These areas will be enhanced through improvement to the hydrology through the connection to Hunter Lake and planting of native, emergent wetland plant species. Stewardship activities aimed at controlling invasive species will be conducted within all mitigation areas, including the existing wetland areas, which will promote better establishment of desirable native species.

Overall, a total of up to 134.2 acres will become a protected mitigation site and will include both forested and emergent wetland habitat areas, either through the purchase of mitigation bank credits or onsite permittee-responsible wetland habitat development.

7. Mitigation Work Plan

Implementation of this work plan will take place concurrent with the impacts authorized by the pending Section 404 permit. Wetlands may be developed in each of five (5) areas as follows:

- Below Hunter Lake Dam: Creation of up to 22.4 acres of palustrine forested (PFO) wetland through grading, supplemental hydrology from behind the dam, and planting with native wetland trees (see Figures 7-1 through 7-3);
- Brush Creek 1: Creation of up to 20.9 acres of PFO wetland through grading and planting with native wetlands trees (see Figures 7-4, 7-5, and 7-7);
- Brush Creek 2: Creation of up to 39.3 acres of PFO wetland through grading and planting with native wetlands trees (see Figures 7-4, 7-6, and 7-8);
- Horse Creek 1: Creation of up to 20.2 acres of palustrine emergent (PEM) wetland and up to 20.1 acres of PFO wetland through grading and planting with appropriate hydrophytic vegetation (see Figures 7-9, 7-10, and 7-12); and
- Horse Creek 2: Creation of up to 4.5 acres of PEM wetland opportunistically and up to 21.3 acres of PFO wetland through limited grading and planting with appropriate wetland trees (see Figures 7-9, 7-11, and 7-13).

Currently, the proposed onsite permittee-responsible mitigation site development design has the capacity to yield up to 148.7 acres (134.2 acre required) in total of potential wetland mitigation (24.7 acres emergent, 124.0 acres forested required), while final permittee-responsible mitigation acreage needs will be determined at a later date and upon a determination of current mitigation bank credits available for purchase.

Besides the established and managed wetland areas identified in this Plan, it is also recognized that additional wetlands (both emergent and forested) are expected to become voluntarily established in suitable areas along the perimeter of Hunter Lake.

In addition to wetland development, upland buffers as described in Chapter 2 of the SEIS will be established as follows:

- Prairie Buffer: Restoration of approximately 2,036 acres of intensely managed row crops to upland prairie buffer. Of this number, 1,832 acres will be planted with native warm season grasses and 204 acres will be planted with a diverse native pollinator mix;
- Upland Forest Buffer: Preservation of approximately 1,724 acres of existing forest land and restoration of approximately 7 acres to upland forest buffer; and
- Successional Lands Buffer: Establishment of approximately 1,286 acres currently used for hay production and pasture as successional lands that will ultimately transition to forested areas.

If applicable, a site protection instrument and associated signage may be utilized to demarcate the noted buffer areas and restrict recreational use or development.

7.1 Grading and Soil Management

Grading will not be required in buffer areas. Grading and soil management in wetland mitigation areas is described below. Grading plans will be forwarded to the USACE subsequent to detailed design.

Excavation will be conducted, where necessary, to establish the planting zones in each mitigation area so that water will inundate or saturate the site at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation. Construction stakes will be installed at the mitigation site to guide operators during construction to create the planned planting zones. Stakes will be installed at approximate 100-foot intervals on tangents and at shorter intervals on curves, depending on the sharpness of the curve. Prior to commencement of construction, care shall be taken to delineate the existing wetlands with construction/snow fencing and silt fence, as necessary, to prevent entry and disturbance in these areas. Upon completion of grading activities, each planting zone will be staked and marked/painted to uniquely identify the various zones for planting.

The main dam and in-basin water control features will be used to maintain a control pool elevation of 568.7 feet. Soils that are excavated for wetland mitigation will be used, pending material suitability determination, in dam and BMP construction or will be spoiled on-site in non-jurisdictional upland areas. Should trash and man-made debris be encountered during site work, it will be hauled offsite and disposed of in an approved landfill. At this time, any in-basin control features located on the upstream portions of Brush and Horse Creek are not anticipated to inundate additional wetland acreage that has not been currently accounted for.

Wetland Creation Below Hunter Lake Dam

Wetlands below the main Hunter Lake Dam will be created as depicted in Figure 7-1 based on excavation in select locations. Areas will be cut to elevation 536 feet within the three cut areas identified in Figure 7-2. The existing ground surface profile of Cross Section A (from Figure 7-2) is detailed in Figure 7-3 and depicts cut areas that will develop into forested wetlands. Transition zones between cut areas and higher elevations will be graded at no steeper than a 3:1 (horizontal:vertical) slope. Suitable cut material will be used in dam construction. Furthermore, cut material will be used to fill or plug the ditch channel along Honeywell Road to retain water on the mitigation areas. Approximately 22.4 acres of forested wetland will be created below Hunter Lake Dam. While aquatic recreation will remain an important component of the Hunter Lake purpose and need, no recreational access points or planned recreational facilities are located within or adjacent to proposed wetland mitigation areas.

Wetland Creation within the Brush Creek Arm

Channels behind the in-lake water control structure within the Brush Creek arm will be excavated and maintained to function as sediment traps in two (2) locations, Brush Creek 1 and Brush Creek 2 (see Figure 7-4). The channels will be excavated to a width of approximately 200 feet as shown in Figure 7-5 and Figure 7-6. Excavated material will be spoiled on either side of the channels to create bench wetlands with grades ranging from pool elevation plus 1.5 feet. Figure 7-7 depicts the existing profile of Cross Section A (from Figure 7-5) and identifies planned cut and fill zones. Figure 7-8 depicts the existing profile of Cross Section A (from Figure 7-6) and identifies planned cut and fill zones. Fill areas will be graded in a range from 568.7 to 570.2 feet and will be planted with appropriate native wetland

trees. Periodic removal of accumulated sediments within the excavated channel will be conducted to maintain functionality of the in-basin dam. It is estimated that sediment removal will occur on a 15-year basis and will entail excavation under low flow conditions to optimize removal rates. Care will be taken to avoid impacts to wetland mitigation areas during sediment removal operations. Up to approximately 20.9 acres of forested wetland will be created at Brush Creek 1 and up to approximately 39.3 acres of forested wetland will be created at Brush Creek 2.

Wetland Creation within the Horse Creek Arm

One channel behind the in-lake water control structure within the Horse Creek arm will be excavated and maintained to function as a sediment trap at Horse Creek 1 (see Figure 7-9). The channel will be excavated to a width of approximately 200 feet as shown in Figure 7-10. Excavated material will be spoiled on the east side of the sediment trap to create bench wetlands with grades ranging from pool elevation to 1.5 feet above pool elevation. Figure 7-12 depicts the existing profile of Cross Section A (from Figure 7-10) and identifies planned cut and fill zones. Fill areas will be graded in a range from 568.7 to 570.2 feet and will be planted with appropriate native hydrophytes. Periodic removal of accumulated sediments within the excavated channel will be conducted to maintain functionality of the in-basin dam. It is estimated that sediment removal will occur on a 15-year basis and will entail excavation under low flow conditions to optimize removal rates. Care will be taken to avoid impacts to wetland mitigation areas during sediment removal operations. Wetland creation at Horse Creek 1 will consist of up to 20.2 acres of emergent wetland and 20.1 acres of forested wetland habitat.

A pool or sediment trap will not be excavated within Horse Creek 2. Instead, the City plans to take advantage of existing grades adjacent to the planned reservoir and will supplement with strategic and select grading to maximize the boundaries of larger, contiguous developing wetlands. Figure 7-13 depicts the existing profile of Cross Section A (from Figure 7-11) and identifies planned cut and fill zones. Fill areas will be graded in a range from 568.7 to 570.2 feet and will be planted with appropriate native hydrophytes. Up to approximately 21.3 acres of forested wetland and 4.5 acres of emergent wetland are expected to develop within appropriate elevation zones as depicted in Figure 7-11.

7.2 Hydrology

Wetland Creation Below Hunter Lake Dam

Water detained within Hunter Lake is the primary hydrology source for the up to 22.4 acres of forested wetland habitat below the dam. Water will be conveyed to the downstream mitigation site and released to the target wetland by perforated pipes to establish wetland hydrology in soils at elevation 536 feet and below as shown in Figure 7-2. A shut-off valve shall be incorporated as a design feature to allow for routine maintenance. The pipes will be constructed as a drip line within a trench and covered with aggregate (Figure 7-3).

Wetland hydrology below the dam will be supplemented by collecting and redirecting the water flowing from east to west in the ditch channel on the south side of Honeywell Road. By plugging this ditch channel (Figure 7-2) the water will be retained in the northeast corner of the mitigation site to hasten wetland development.

Overall, wetland mitigation areas are anticipated to adequately perform during periods of dryness and/or drought conditions, but will also be relying on hydrological in-flow for at least some of their hydrology input. As wetland habitat characteristics become established and associated hydrological indicators develop, it is assumed that wetland mitigation areas will be able to tolerate drought conditions better; especially after those areas develop hydric soils which retain water more significantly.

Wetland Creation within the Brush Creek and Horse Creek Arms

Wetlands at Brush Creek (Figures 7-5 and 7-6) and Horse Creek (Figures 7-10 and 7-11) mitigation sites will be maintained by hydrology from the adjacent reservoir. The planned pool elevation, based on the dam and in-lake BMP structures, is 568.7 feet. Because wetland habitat within the Brush Creek and Horse Creek arms directly abut the reservoir, emergent wetlands are expected to develop within six inches (elevation) of pool level and forested wetlands are expected to develop between 569.2 and 570.2 feet. Current designed wetland mitigation areas have not been designed as stormwater retention basins, despite hydrological input from the adjoining reservoir. As the design and development aspect of the project proceeds further, applicable wetland mitigation area design plans will be provided accordingly.

7.3 Planting Plan

The goal of the planting plan is to increase the cover, density, and diversity of matrix and conservative native plant species in developing native wetland plant communities. It is anticipated that two (2) distinct wetland communities – emergent and forested wetland habitats – will be developed at the respective mitigation sites. Additionally, upland forest and prairie buffer communities will be planted as described herein. Tables 7-1 through 7-13 list the species to be utilized within each plant community, subject to commercial availability, and include the corresponding coefficient of conservatism (C) value and wetland indicator.

C values are described in the Plants of the Chicago Region (Swink and Wilhelm 1994) and Flora of the Chicago Region (Wilhelm and Rericha 2017). C values used herein are derived from Ladd and Thomas (2015). Ranging on a scale from 0 to 10, C values represent the degree to which a particular native species can tolerate disturbance. Species that are nearly always associated with undisturbed remnant natural areas tend to have C values of 9 or 10 whereas weedy species associated with degraded old fields or roadside ditches tend to have C values of 0 or 1. C values are based upon a thorough knowledge of each species' ecological role in the local environment without regard to factors such as showiness, desirability, size, and other factors that are unrelated to vegetational conservatism.

Wetland indicator status ratings are used to denote a plant species proclivity to occur within a wetland. The indicator ratings defined below are from Lichvar et al. (2012). Specific wetland indicator ratings used for the Plan are derived from Lichvar et al. (2016).

- Obligate (OBL) – occur almost always under natural conditions in wetlands (99 percent occurrence in wetlands);

- Facultative Wetland (FACW) – usually occur in wetlands but occasionally found in non-wetlands (67 to 99 percent occurrence in wetlands);
- Facultative (FAC) – equally likely to occur in wetlands and non-wetlands (34 to 66 percent occurrence in wetlands);
- Facultative Upland (FACU) – usually occur in non-wetlands but occasionally found in wetlands 1 to 33 percent occurrence in wetlands);
- Upland (UPL) – occur in wetlands in another region but occur almost always under natural conditions in non-wetlands in the region specified (1 percent occurrence in wetlands).

All plant material used in the planting plan shall be indigenous to central Illinois. Seed used to produce plants for mitigation will be harvested directly from wild, native stands or will be seed that was originally collected from native stands and put into production, if required by the USACE and applicable permitting requirements.

Native seed will be supplied on the basis of pure live seed (PLS), which is the viable/sproutable seed of particular species. Therefore, when ordering one PLS pound of a given species, more than one bulk pound may be delivered to make up for any inert material (stems, hulls or seed that won't germinate). PLS is defined by the formula:

PLS = (Percent Purity of the Seed x Germination Percentage)/100

Seed will be from the most recent harvest [one (1) year old or less]. The seed will contain no prohibited noxious weeds. All native seed will be cleaned/threshed/screened to remove the fruiting bracts, scales, floral parts, awns, perigynia, and other non-seed debris to the maximum practicable extent. Seeds will be fresh, free of deleterious material and disease, and delivered to the site in the original, unopened bags showing a certified net weight, date of testing, supplier's name, and certified guarantee of analysis including the composition, PLS information, and percent weed seed. Seed will be kept dry and unopened until needed for use. Damaged or faulty packages will not be used.

A nurse crop of cereal wheat or oats shall be sown with the native species. Nurse crops are temporary species consisting of an annual, non-competitive crop sown with the permanent vegetation. The nurse crop provides erosion control and reduces the risk of invasive weeds until the permanent vegetation becomes established. Oats are typically used when seeding in the spring whereas wheat is commonly sown in the summer and fall.

Trees used in mitigation planting will be native trees commercially produced in three-gallon pots using the Root Production Method (RPM) as developed by Forrest Keeling Nursery, or similar. As stated above, trees shall be produced from seed that was either harvested directly from the wild or seed that was originally collected from native stands and put into production.

Emergent/scrub-shrub wetland, forested wetland, and bottomland prairie planting zones are established in the grading plan and are presented in the planting plan.

7.3.1 Emergent Wetland

Based on the determination of credits described herein, up to 24.0 acres of emergent wetlands are required and up to approximately 24.7 acres of emergent wetlands may be created as described in the grading plan, contingent upon the purchase of available wetland mitigation bank credits. Emergent wetland planting zones will be seeded with appropriate hydrophytes as identified Table 7-1, pending commercial availability. A nurse crop of oats (in spring) or wheat (summer/fall) is anticipated to be sown with the native species mix.

Table 7-1. Recommended Species for Planting in Emergent Wetlands

Botanical Name	Common Name	C	Indicator
Andropogon gerardii	Big bluestem	5	FAC
Asclepias incarnata	Swamp milkweed	4	OBL
Astragalus canadensis	Canada milk vetch	8	FAC
Bidens aristosa	Swamp marigold	3	FACW
Boltonia asteroides	False aster	4	OBL
Caltha palustris	Marsh marigold	8	OBL
Calamagrostis canadensis	Blue joint grass	6	OBL
Carex scoparia	Pointed bloom sedge	5	FACW
Carex hystricina	Porcupine sedge	7	OBL
Carex vulpinoidea	Fox sedge	3	FACW
Chelone glabra	Turtlehead	8	OBL
Eupatorium maculatum	Joe Pye Weed	10	OBL
Eupatorium perfoliatum	Perfoliate boneset	4	OBL
Eutrochium purpureum	Purple Joe-pye-weed	6	FAC
Filipendula rubra	Queen-of-the-prairie	10	OBL
Glyceria striata	Fowl manna grass	4	OBL
Helenium autumnale	Yellow sneezeweed	5	FACW
Impatiens capensis	Spotted touch-me-not	3	FACW
Iris versicolor	Blue flag iris	5	OBL
Iris virginica	Virginia blueflag	5	OBL
Leersia oryzoides	Rice cut grass	3	OBL
Liatris spicata	Marsh blazing-star	7	FAC
Juncus effusus	Common rush	4	OBL
Lobelia cardinalis	Cardinal Flower	7	OBL
Lobelia siphilitica	Great blue lobelia	4	OBL
Lycopus americanus	Water horehound	4	OBL
Mimulus ringens	Sessile monkey-flower	4	OBL
Panicum virgatum	Switch grass	3	FAC
Physostegia virginiana	Obedience plant	4	FACW

Poa palustris	Fowl bluegrass	7	FACW
Pycnanthemum virginianum	Common mountain mint	5	FACW
Scirpus atrovirens	Dark green rush	3	OBL
Scirpus cyperinus	Wool grass	5	OBL
Spartina pectinata	Prairie cord grass	5	FACW
Verbena hastata	Blue vervain	3	FACW
	Total		

7.3.2 Forested Wetland

Based on the determination of credits described herein, 110.2 acres of forested wetland are required and up to approximately 124 acres of forested wetland habitat may be created as described in the grading plan. Pending availability and per USACE Rock Island District guidance, forested wetlands are anticipated to be planted on an approximate 20' x 20' spacing for container size bottomland hardwood trees or 8' x 10' spacing for bareroot seedlings, resulting in a minimum of at least 100 container size bottomland hardwood trees per acre or 500 bareroot seedlings per acre. Containerized trees will be 3-6 feet tall with a minimum ½-inch caliper reading at the root flair. No individual species of hard mast-producing bottomland trees (pin oak, swamp white oak, shellbark hickory, pecan, etc.) will exceed 20% of the overall planting. Sycamore, river birch, American elm, and dogwood species may be incorporated into the planting scheme provided their combined numbers do not exceed 50% of any single restoration area. Trees recommended for planting within forested wetlands at the mitigation site are identified in Table 7-2, pending commercial availability. A nurse crop of oats (in spring) or wheat (summer/fall) is anticipated to be sown with the native species mix.

Table 7-2. Recommended Species for Planting in Forested Wetlands

Botanical Name	Common Name	Material Type	C	Indicator
Carya illinoensis	Pecan	3-gal RPM/Bare Root	6	FACW
Celtis occidentalis	Hackberry	3-gal RPM/Bare Root	3	FAC
Cephalanthus occidentalis	Buttonbush	3-gal RPM/Bare Root	5	OBL
Cornus Spp.	Dogwood	3-gal RPM/Bare Root	N/A	FAC/FACW
Platanus occidentalis	Sycamore	3-gal RPM/Bare Root	3	FACW
Quercus bicolor	Swamp white oak	3-gal RPM/Bare Root	7	FACW
Quercus lyrata	Overcup oak	3-gal RPM/Bare Root	7	OBL
Quercus macrocarpa	Bur oak	3-gal RPM/Bare Root	5	FAC
Salix discolor	Pussy Willow	3-gal RPM/Bare Root	3	FACW
Salix nigra	Black willow	3-gal RPM/Bare Root	5	OBL
Taxodium distichum	Bald cypress	3-gal RPM/Bare Root	7	OBL
		Total		

7.3.3 Planting Schedule/Methods

Seeding is to be performed during the dormant season (December 1 – February 28) when it may be broadcast on top of the ground using traditional broadcast seeding equipment that has been cleaned to prevent the spread of weed seed from another site. Broadcasting may be accomplished by hand-held spreader, gravity drop seeder, cyclone spreader, or similar method.

If seeding must take place outside of the dormant season, seeding may be accomplished between March 1 and June 1 using either a no-till drill (Truax or Tye), designed specifically for native seed, or a drop seeder (Brillion), as warranted by site conditions. Drop seeders should only be used on cultivated soil (loosened in the top 2 to 3 inches) and should be accompanied with a compaction bar/implement. Planting of native seed should not occur after June 1. If temporary erosion control is required during this time, cereal wheat or annual rye may be used (at least 25 bulk pounds per acre) in conjunction crimped straw mulch.

Planting within emergent zones shall be accomplished during spring using greenhouse raised plugs, potted plants, rhizomes, or rootstocks. Planting shall be conducted manually in accordance with specifications and shall be installed within elevation zones that reflect each species' hydrologic preference.

Woody plant materials used in the forested wetland area and upland forest buffer should be planted in fall (September 1 – December 1) or spring (April 1 – May 15). Trees should be planted no deeper than they grew in the nursery, and into a soil that has been loosened 8 to 12 inches deep. The planting hole should be at least twice the diameter of the tree's soil ball. Once planted, trees should be supported with wooden stakes to prevent dislodging. If wires or ropes are used in the staking process, they shall not come in direct contact with the bark; a rubber hose section or similar should be used as necessary to protect the bark of the tree.

Figure 7-1. Proposed Hunter Lake Dam Wetland Overview

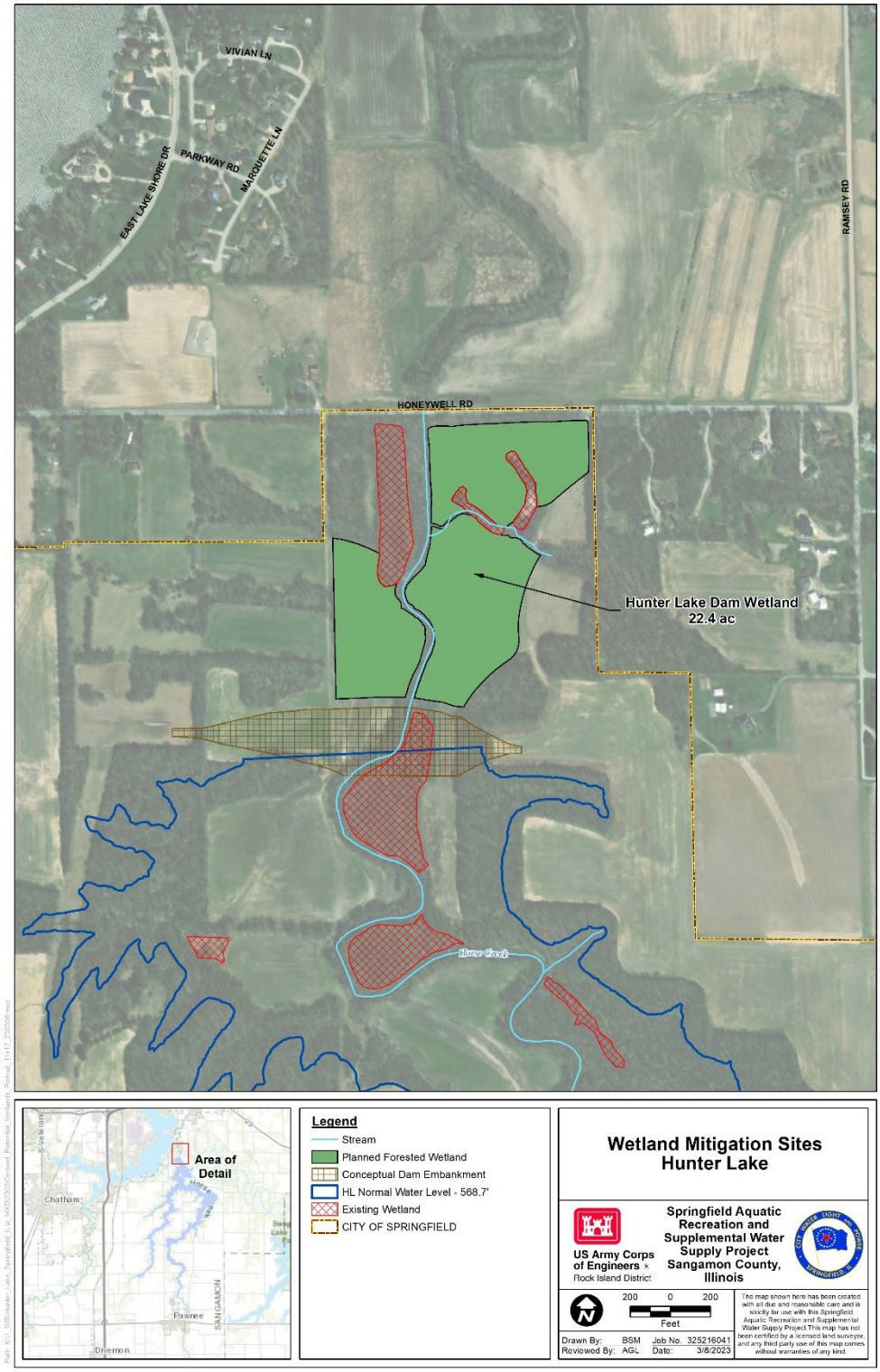


Figure 7-2. Detail of the Proposed Hunter Lake Dam Wetland

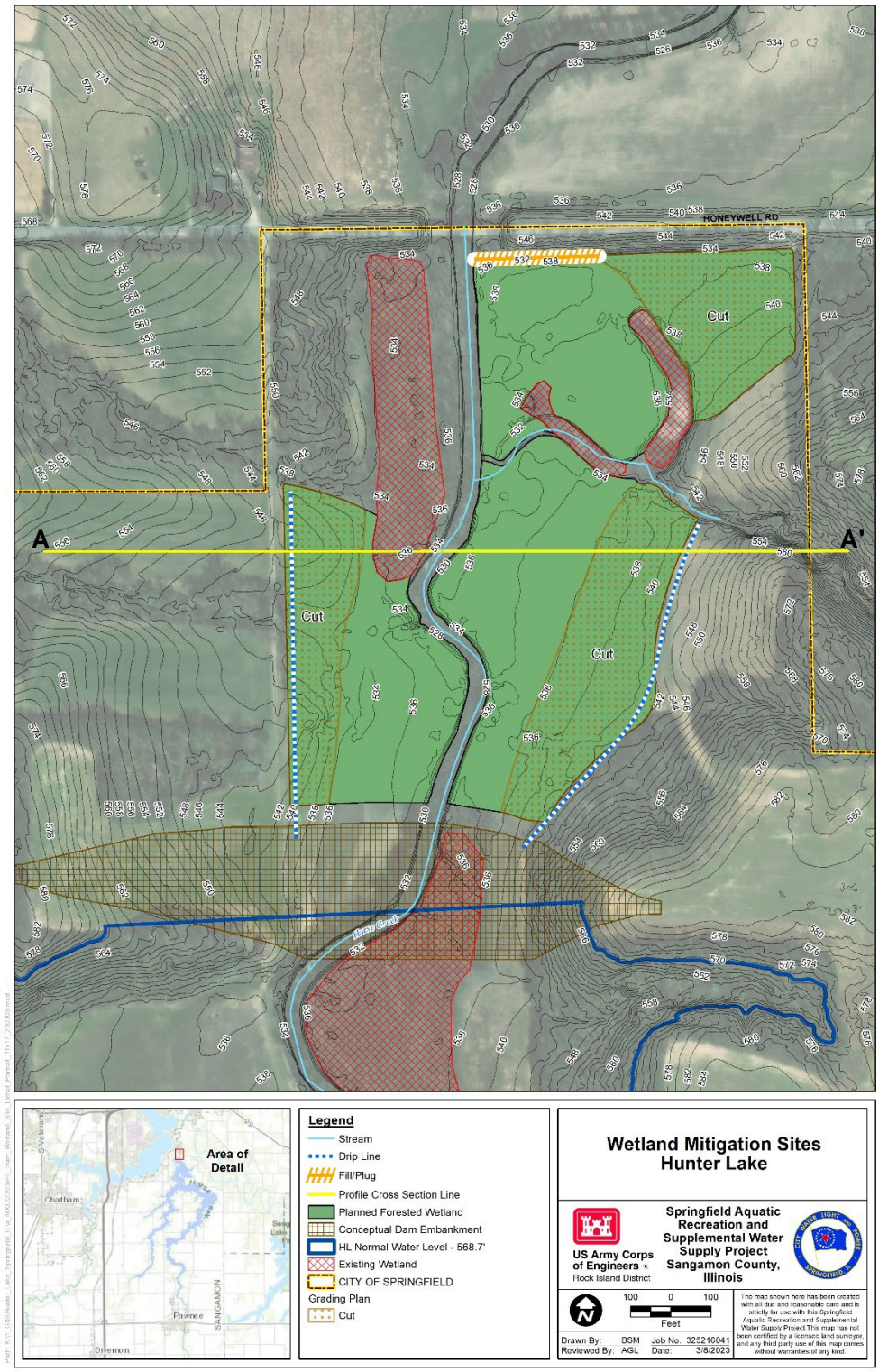
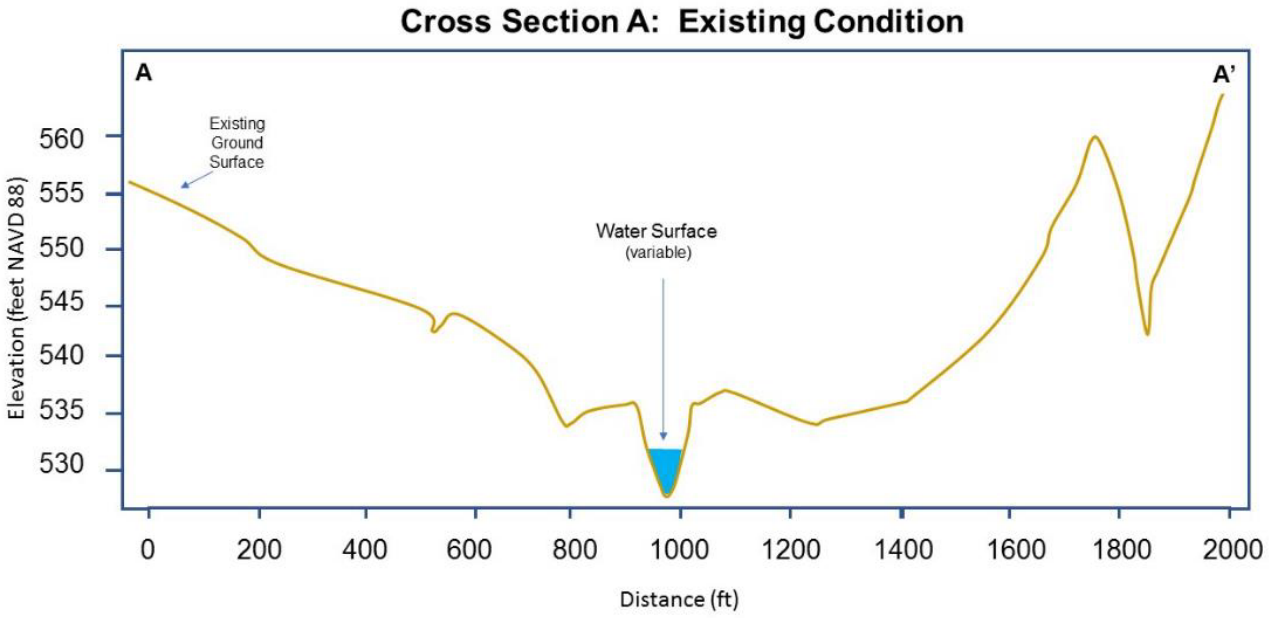
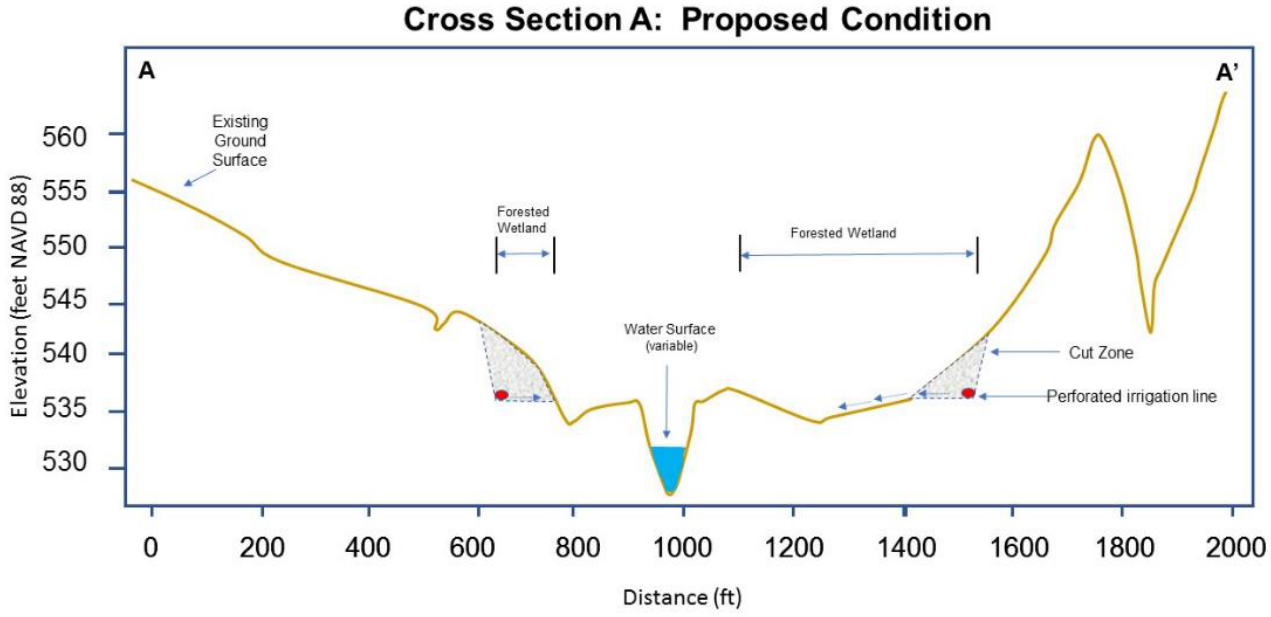


Figure 7-3. Profile of the Proposed Hunter Lake Dam Wetland

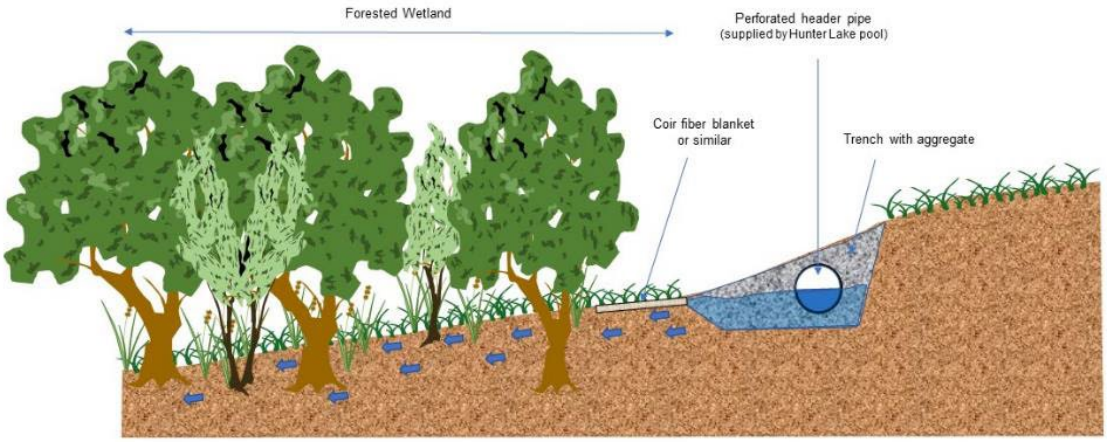


Mitigation Area: Hunter Lake Dam



Mitigation Area: Hunter Lake Dam

Typical Section: Header Pipe Detail



Mitigation Area: Hunter Lake Dam

Figure 7-4. Proposed Brush Creek Wetland Overview

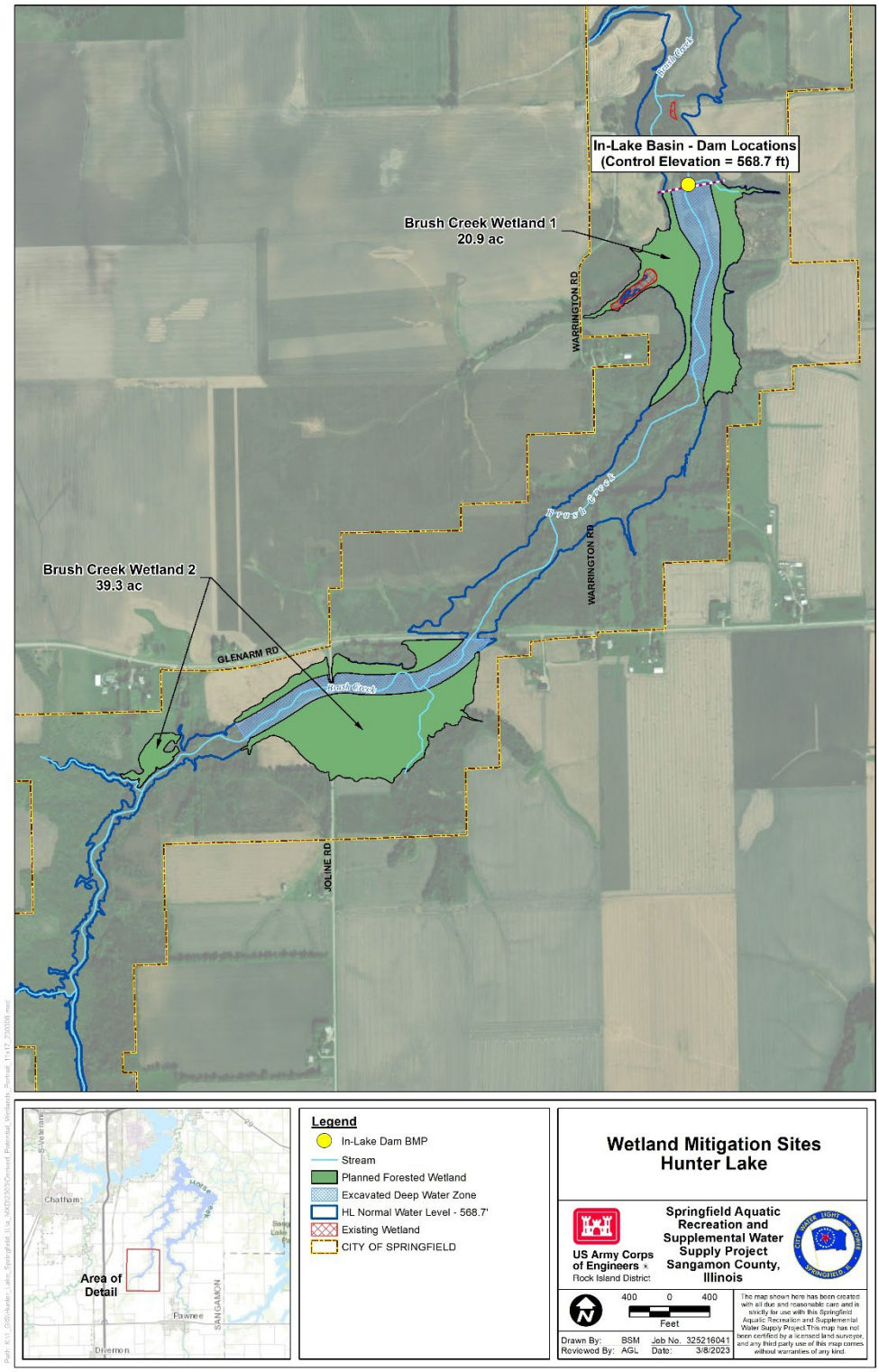


Figure 7-5. Detail of the Proposed Brush Creek 1 Wetland

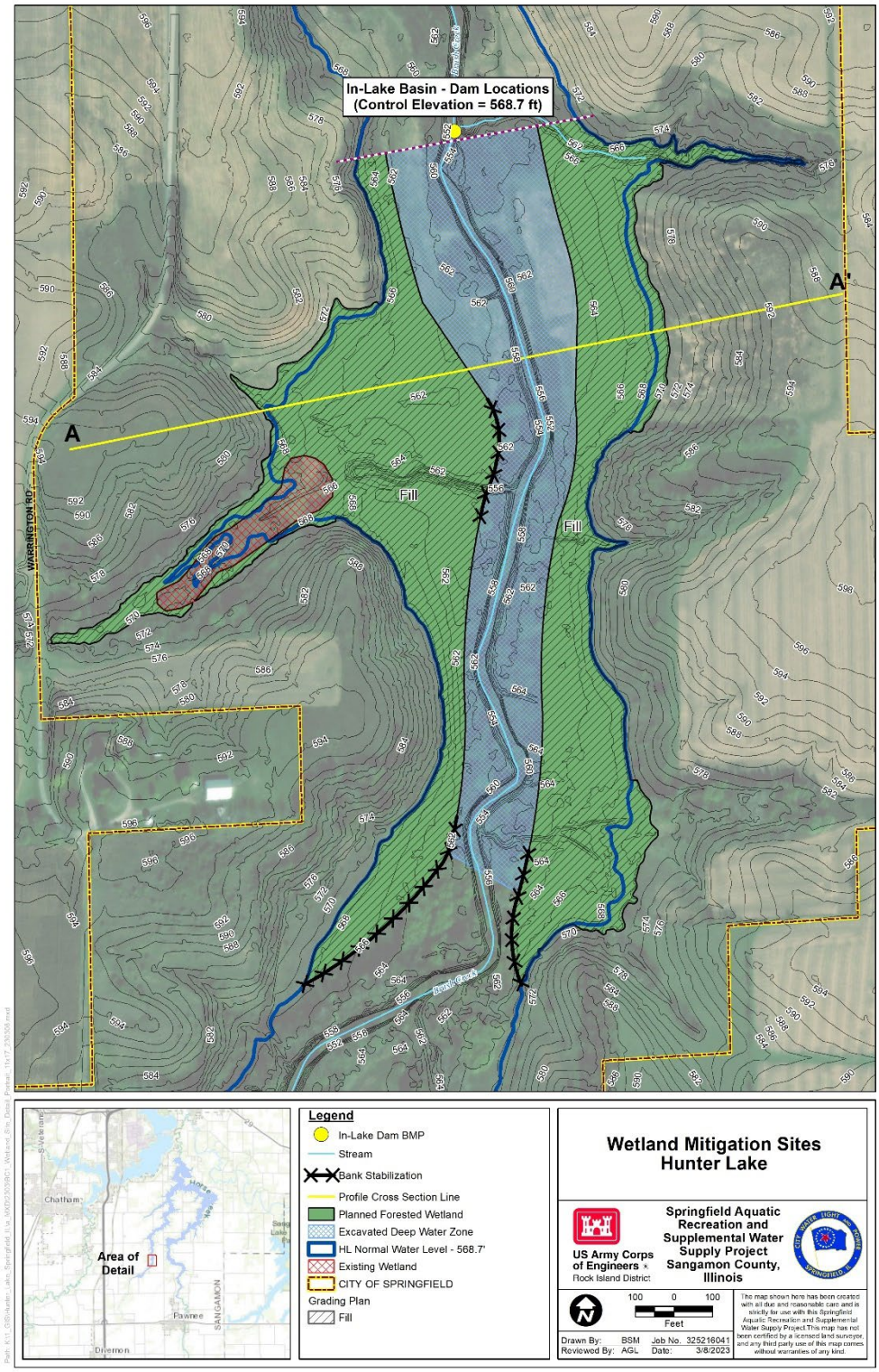


Figure 7-6. Detail of the Proposed Brush Creek 2 Wetland

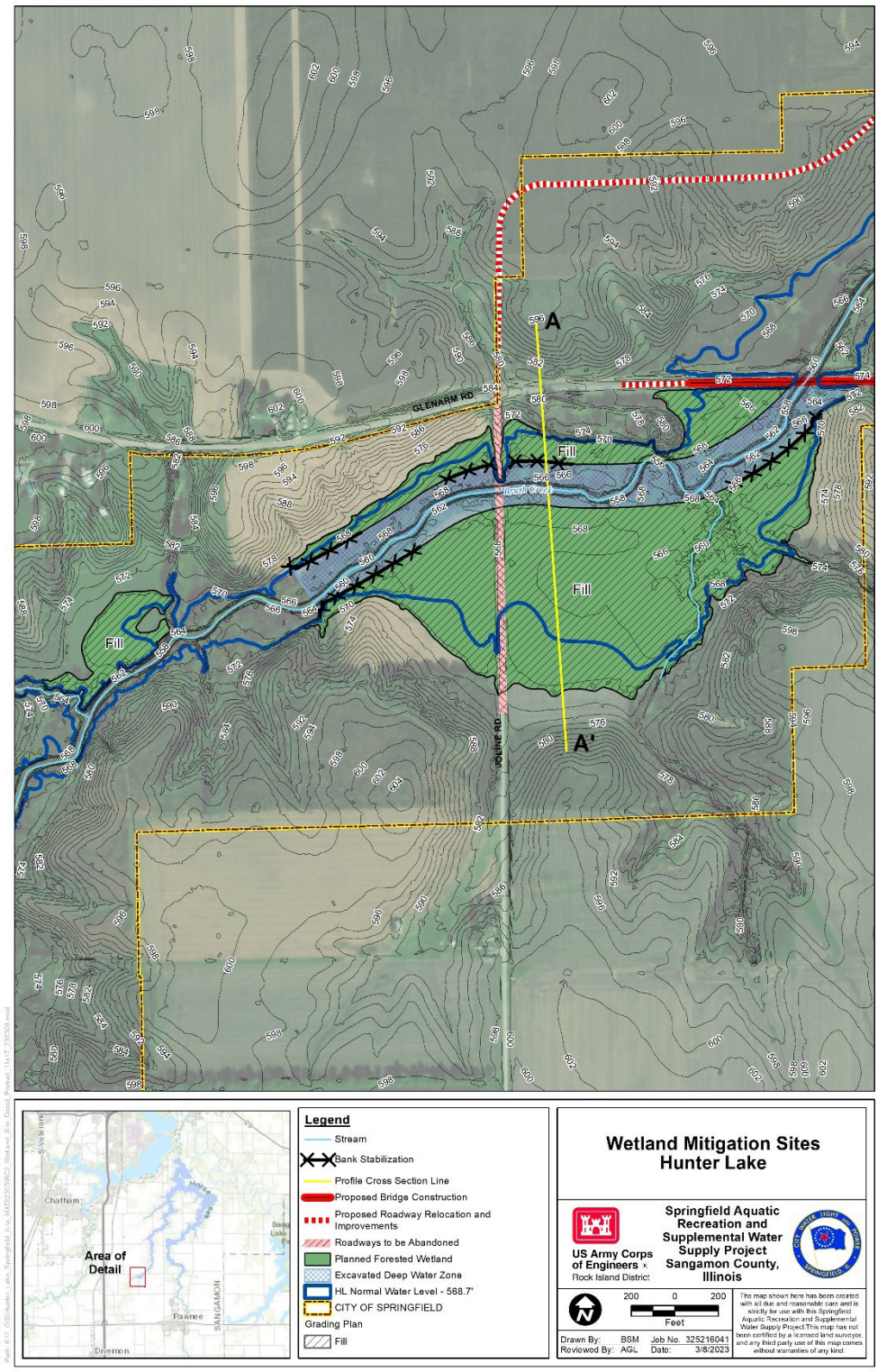
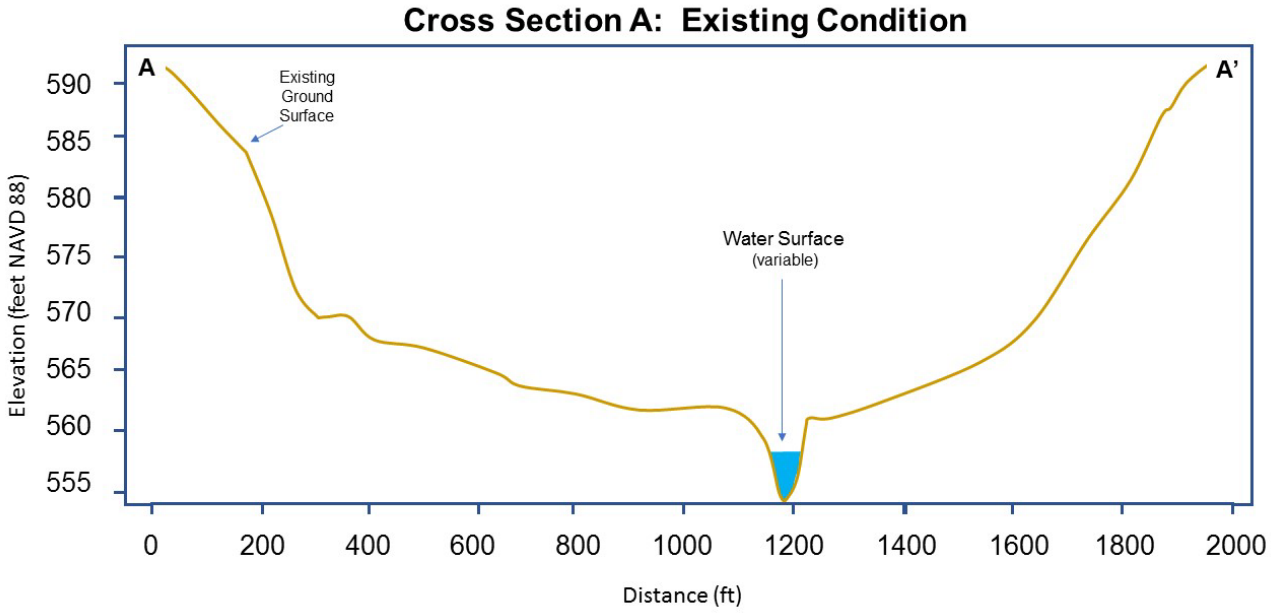
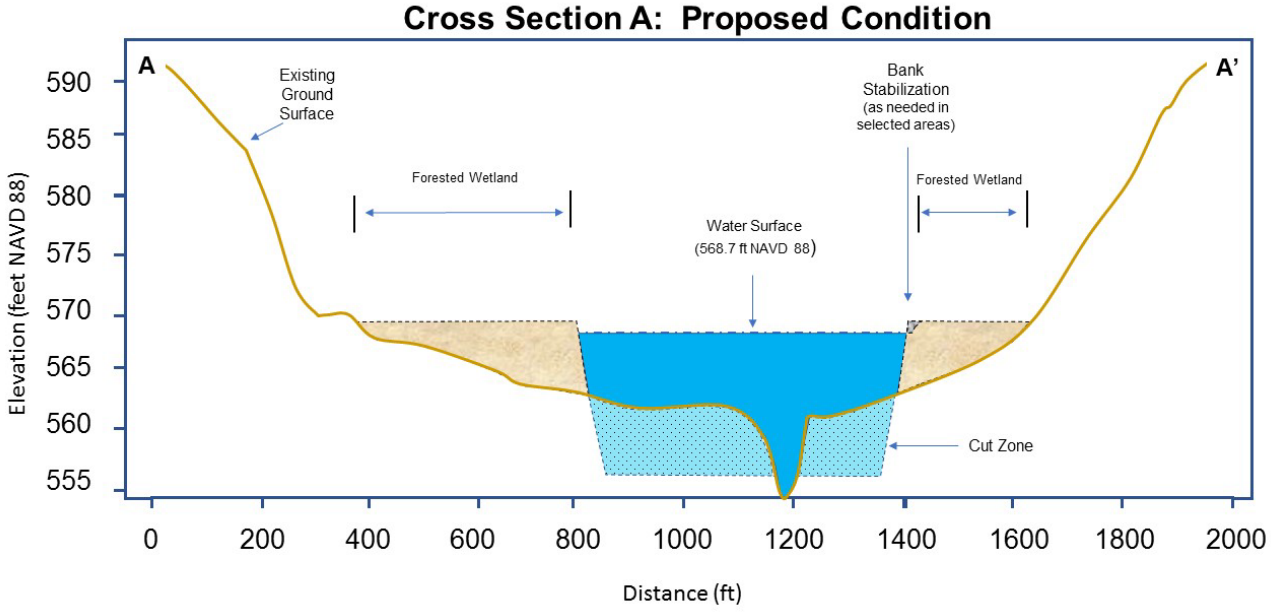


Figure 7-7. Profile of the Proposed Brush Creek 1 Wetland

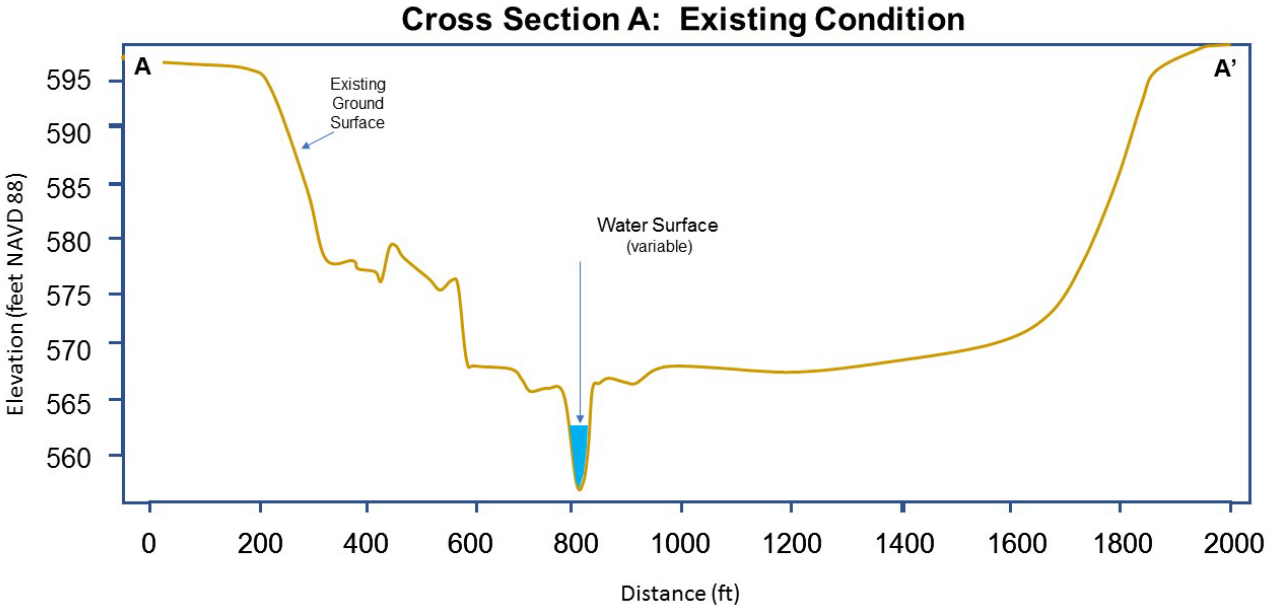


Mitigation Area: Brush Creek -1

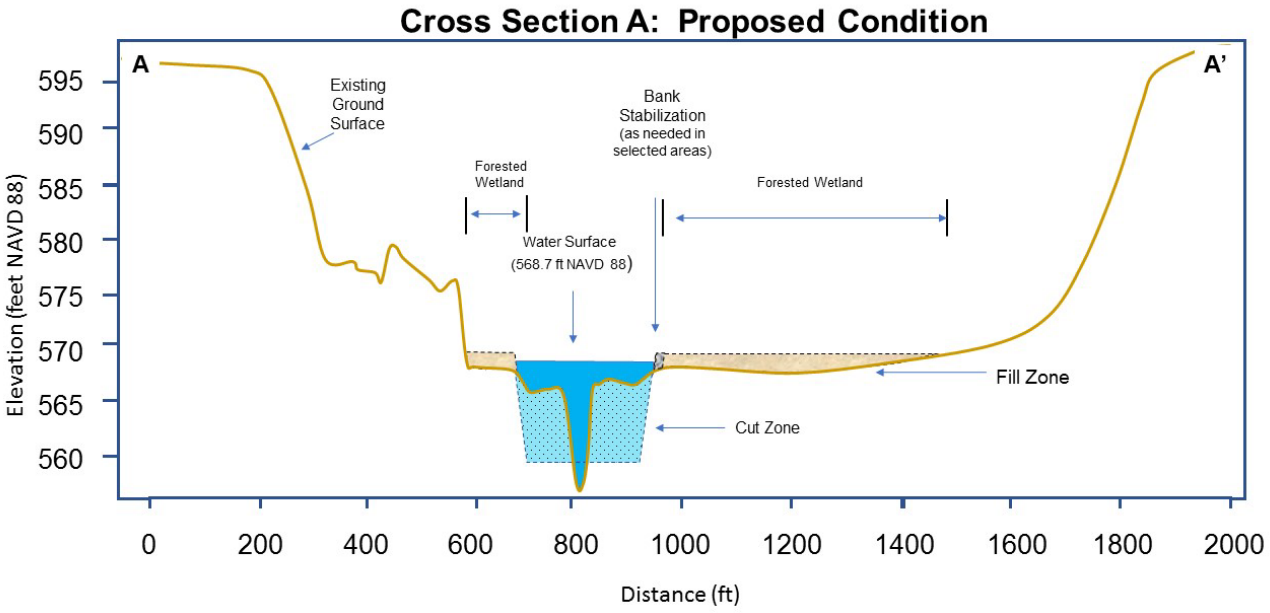


Mitigation Area: Brush Creek -1

Figure 7-8. Profile of the Proposed Brush Creek 2 Wetland



Mitigation Area: Brush Creek -2



Mitigation Area: Brush Creek -2

Figure 7-9. Proposed Horse Creek Wetland Overview

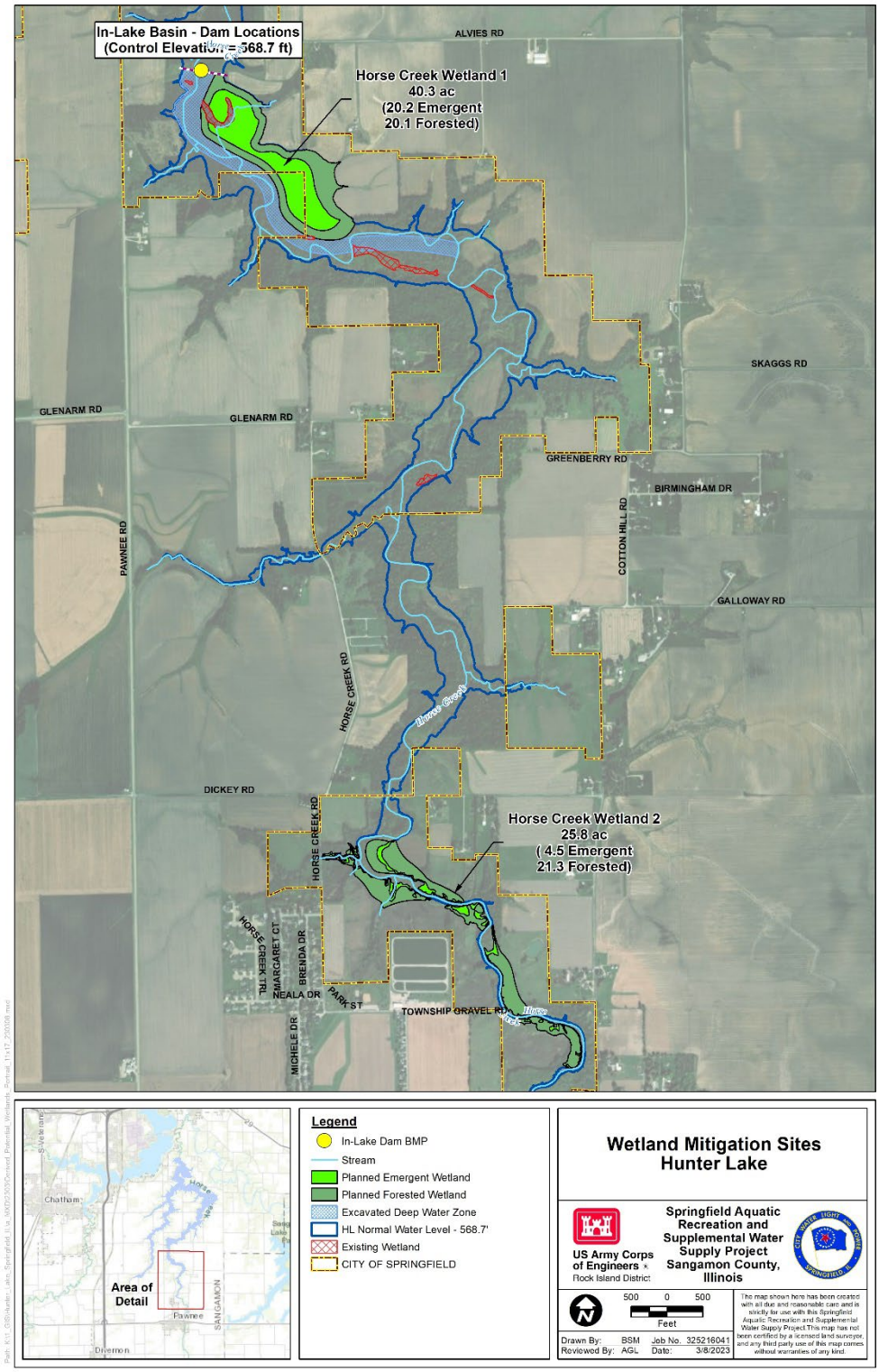


Figure 7-10. Detail of the Proposed Horse Creek 1 Wetland

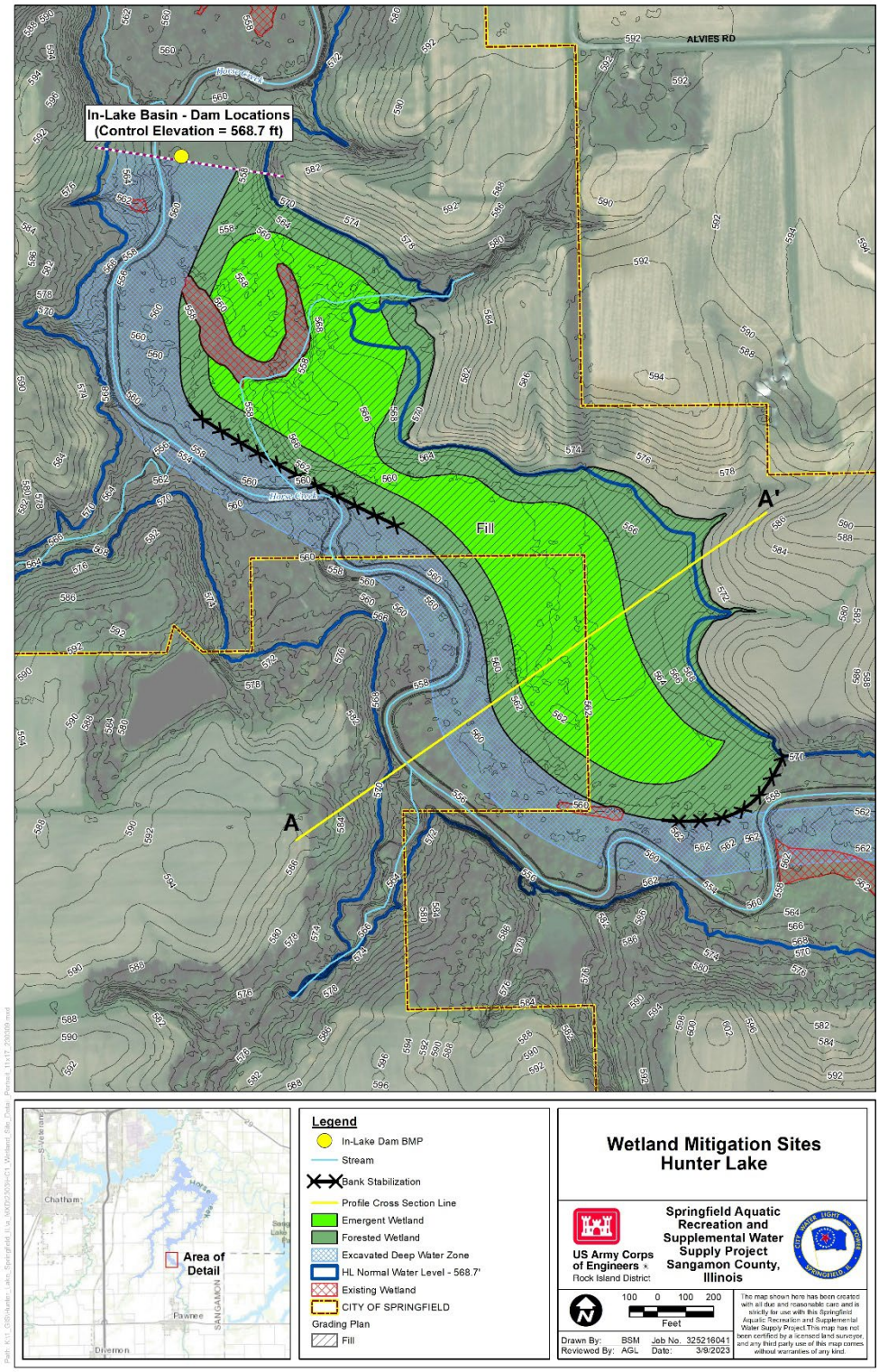


Figure 7-11. Detail of the Proposed Horse Creek 2 Wetland

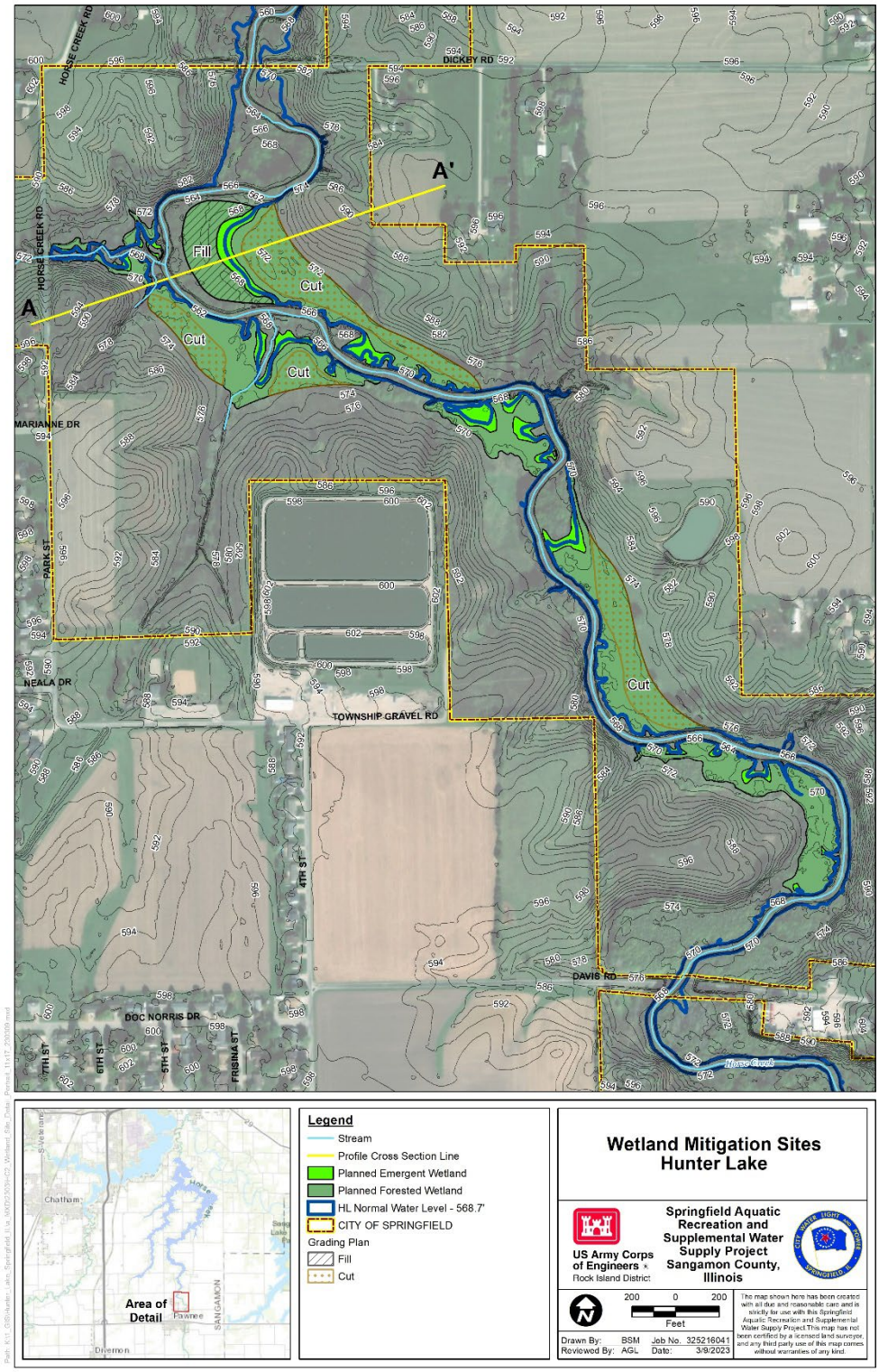
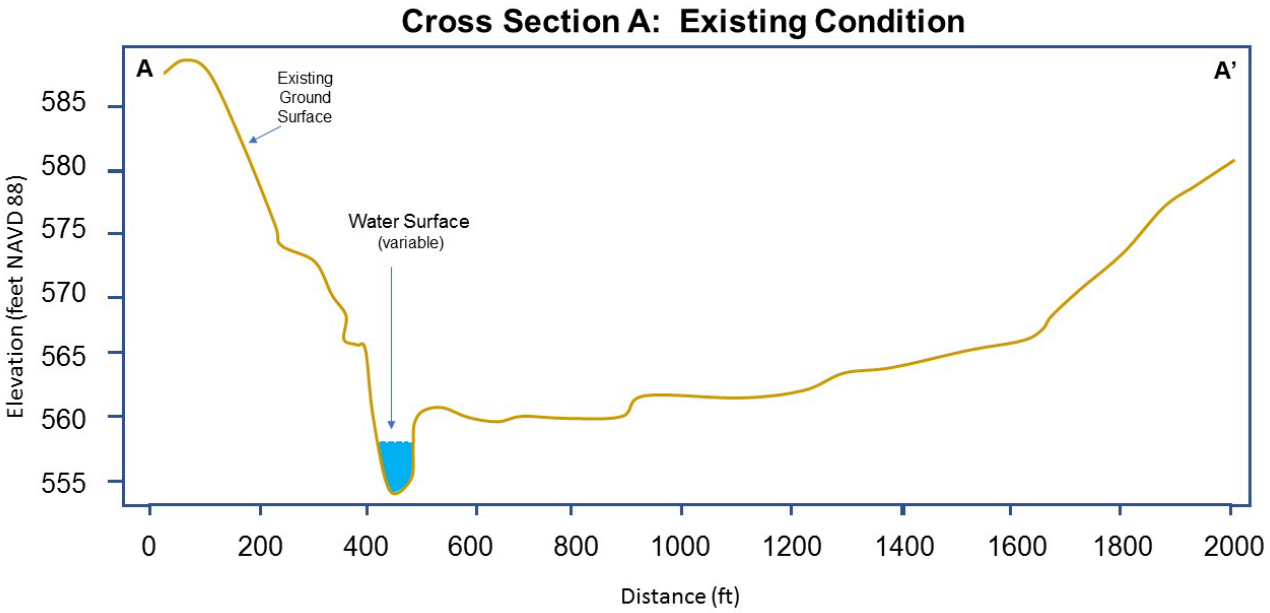
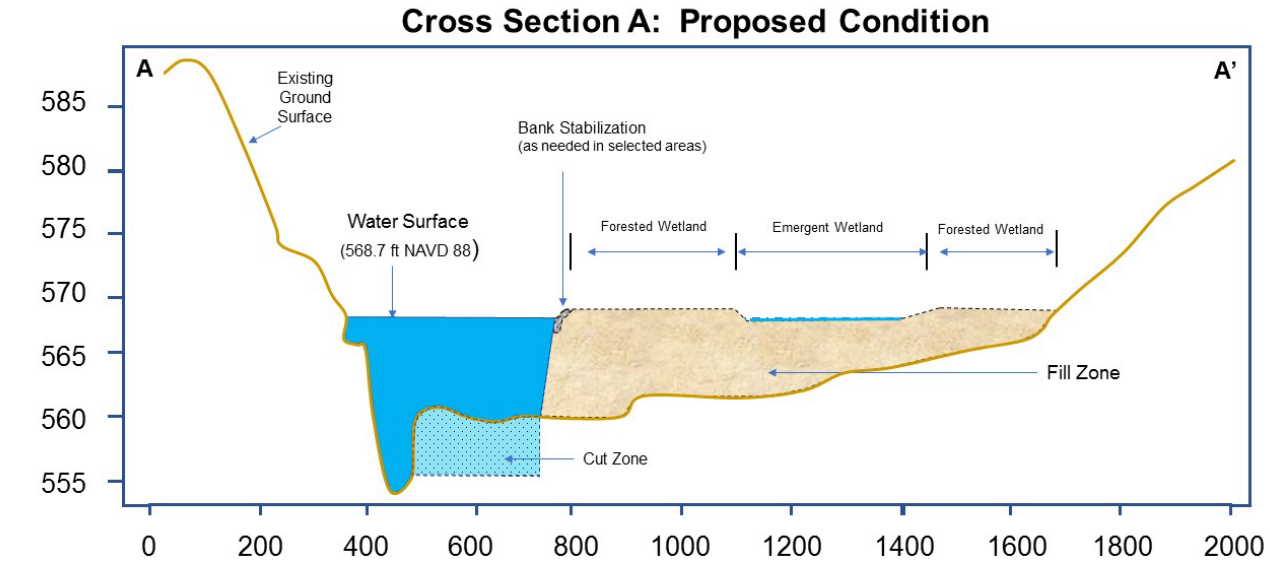


Figure 7-12. Profile of the Proposed Horse Creek 1 Wetland

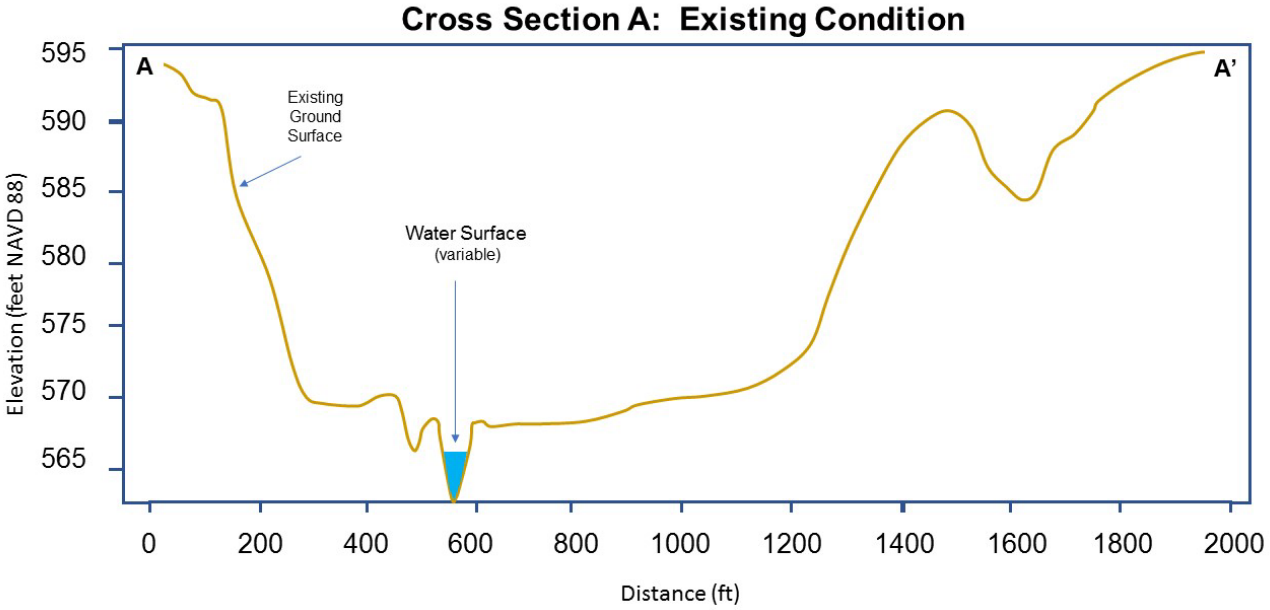


Mitigation Area: Horse Creek -1

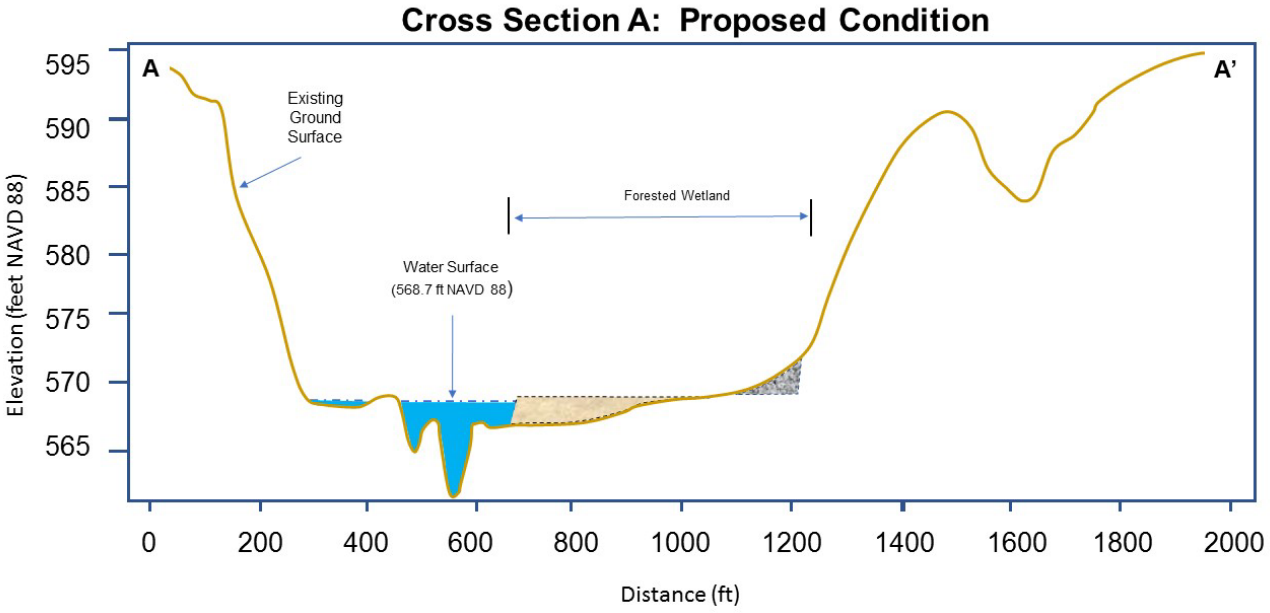


Mitigation Area: Horse Creek -1

Figure 7-13. Profile of the Proposed Horse Creek 2 Wetland



Mitigation Area: Horse Creek -2



Mitigation Area: Horse Creek -2

8. Maintenance Plan

Attempts at vegetation management on a natural site should consider the ecological processes that shaped pre-settlement wetlands and prairies. Some of these processes were disturbances such as fire, flooding, and predation. Removal or alteration of some of these factors has resulted in reduced floristic quality and species richness in many wetlands. Management practices that utilize or mimic natural ecological processes are necessary to maintain ecosystem integrity, stability, structure, dynamics, and species diversity (Illinois Nature Preserve Commission 1990). Management techniques that will be used include the following:

- Invasive species and aggressive native species management
- Herbivore management
- Fire management and/or mowing

8.1 Invasive Species Management

The City will conduct stewardship activities beginning the first year after planting and continuing each year thereafter for ten (10) years at the mitigation sites. Stewardship activities will occur up to three times each year during the growing season (April 1 through October 15) and will be implemented to minimize competition from species such as garlic mustard (*Alliaria petiolata),* Amur honeysuckle (*Lonicera maackii)*, reed canary grass (*Phalaris arundinacea),* multiflora rose (*Rosa multiflora),* cocklebur (*Xanthium strumarium*); aggressive native species such as eastern cottonwood (*Populus deltoides*), sand bar willow (*Salix exigua*), cattail (*Typha spp.)*, as well as other weedy invasives. Stewardship may include herbicide application, mowing or other similar methods to provide optimal growing conditions for the target plant communities.

Restoration and mitigation activities associated with the mitigation sites will create opportunities for invasive species to become established. In particular, grading and general seedbed preparation will create large expanses of bare soil that may be colonized by invasive plant species which may out-compete desirable native plant species. Because of these factors, control of invasive species will be an important part of mitigation activities at the mitigation site.

Because invasive plant species have the potential to directly interfere with the management goals identified herein, specific objectives have been established. Measurable objectives for high priority invasive plant species include:

- Provide annual surveillance to identify new populations, expanding populations, and to determine the effectiveness of prior treatment and management.
- Treat invasive species with appropriate herbicide using the prescribed rates at the prescribed times.

Herbicides should only be applied by trained and licensed herbicide applicators. All herbicides should be applied in accordance with the label requirements and at the rates specified on the label for the target species. Methods for various species are described below and are listed in Table 8-1.

Table 8-1. Herbicide Control of Exotic and Invasive Vegetative Species

Botanical Name	Common Name	Potential Control Techniques
Alliaria petiolata	Garlic mustard	Spray Roundup to plants in the fall or early spring. Individual plants can be hand pulled for small populations. Repeat as necessary.
Lonicera maackii	Amur honeysuckle	Cut and apply Roundup to stumps of larger specimens in fall or dormant season. For saplings or resprouts, apply Roundup to basal bark in fall. Repeat as necessary.
Phalaris arundinacea	Reed canary grass	Spray Rodeo, Dalapon, or Amitrol in the early spring. Repeat as necessary.
Rosa multiflora	Multiflora rose	Spray with Krenite, Banvel, or Roundup during the growing season. Repeat as necessary.
Xanthium strumarium	Common cocklebur	Spray with Roundup or Rodeo in early spring. Repeat as necessary.

Garlic Mustard (*Allaria petiolata*)

For new infestations and small populations of garlic mustard, hand pulling can be effective if it is done before garlic mustard seeds disperse. Another method that can be used is to cut the plant a few inches above the ground just after the flower stalks have elongated, but before the flowers have opened. If the plants have budded, they should be bagged and deposited in a landfill each year until the seed bank is exhausted. In addition to hand pulling, in the fall or very early spring when most native plants are dormant, a foliar glyphosate spray such as Roundup can be applied to individual plants (MDNR 2010b).

Amur Honeysuckle (*Lonicera maackii*)

For smaller plants, the best way to control Amur honeysuckle is to remove it completely (roots and the above ground portion of the plant). If pulling the plant out of the ground is not practical, some success has been seen when the plant is cut off a few inches from the ground and then concentrated glyphosate, such as Roundup or Rodeo, is applied directly to the cut stems. This is most effective when the pesticide is applied during the fall when the plant is likely going to take the glyphosate into the roots (MDNR 2010a).

Reed Canary Grass (*Phalaris arundinacea*)

For small stands of reed canary grass, hand removing the stems at flowering time may kill some of the small patches. Additionally, certain herbicides are effective where there is no real concern for damage to surrounding native species. The herbicides Rodeo, Dalapon, and Amitrol are designed for used in wetlands to kill reed canary grass and should be applied in early spring when reed canary

grass is green and most native wetland species are dormant. Additionally, repeated burning during late fall or spring for several years can control the spread of this species. When practical, it can be useful to sow in seed of nearby native grasses and forbs after reed canary grass has died or gone dormant (MDNR 2017b).

Multiflora Rose (*Rosa multiflora*)
In small, scattered infestations, removing individual plants from the soil can be effective if all the roots of the plant are removed. In addition, repeated cutting or mowing of multiflora rose at the rate of three to six times per growing season can achieve high plant mortality. Herbicides such as Krenite, Banvel, and Roundup can be effective foliar sprays applied directly to multiflora rose plants and should be applied only during the growing season (MDNR 2017a).

Common Cocklebur *(Xanthium strumarium)*
For small populations, hand pulling is effective before bur development and seed dispersal begin. Mowing can be effective, but as with hand pulling, mowing should be carried out before burs are formed. Common cocklebur is susceptible to a variety of herbicides that are commonly used for broadleaved weed control. Several auxin mimicking herbicides can be used such as 2,4-D, triclophyr, glycophosate, and imazaquin. Herbicide spray solutions should contain an appropriate surfactant to ensure complete leaf wetting. Herbicide applications should be made to young three to five leaf plants during active growth to maximize treatment efficacy (DiTomaso et al. 2013).

8.2 Herbivore Management

During the planting stage and early establishment of the mitigation areas, some animals may be problematic. These animals include geese, ducks, deer, beavers, muskrats, rabbits, and small rodents. Geese and muskrats have been noted to follow planting crews and eat or pull out plants minutes after planting (Garbisch 1995). Other problems may arise when the population in the wetland exceeds the carrying capacity of the community. When this takes place, many of the wetland mitigation plants are eaten or destroyed. General practices that control smaller herbivores include controlling weeds surrounding the site, controlling weeds around individual trees, utilizing tree tubes for seedling and bare root plantings, and removing brush piles. Continued monitoring of the site will be necessary to assess the issue of herbivore management and the need for supplemental plantings.

8.3 Prescribed Fire and Mowing

A natural and low-cost method to control woody invasive species is through fire management. Prescribed fire may be utilized as an enhancement and management tool at the mitigation site subsequent to the development of a burn plan and appropriate permit approvals. Prescribed fire helps manage native and adventive weeds, and also restores nutrients for desirable plant growth in the future.

Timing is a critical consideration in maintaining a community with fire. Fires that occur during the growing season are detrimental to native species and result in a loss of diversity. Typically, spring

fires are used because they reduce populations of cool-season, non-native grasses and forbs while promoting the development of warm-season native grasses. Fall fires tend to promote the development of many native prairie forb species. The spring burn season typically begins in early March and runs through early April. Fall burns typically commence about two weeks following the first killing frost, usually in early November. The fall burn season lasts into December, but prescribed burns can occur well into winter depending on site conditions, management goals, and appropriate climatic conditions. Fires also effectively lengthen the growing season by burning off accumulated leaf litter and exposing the soil surface to the sun, thereby increasing soil temperatures and promoting seed germination (Pauly 1997).

If fire management is used at the site, a specific fire management plan should be developed for the Hunter Lake mitigation areas, including details such as the identification of primary and secondary firebreaks, recommended methods of burns for various conditions, and contingency plans in case of escaped fire. Approval will be obtained from the appropriate agencies prior to conducting any burn and prescribed burns will be performed only by experienced, trained professionals.

Mowing should also be conducted in the prairie buffer areas in late spring (May/June) during the first year following planting with prairie species. Mowing helps keep early successional volunteer species in check while the more conservative prairie species are getting established. Mowing may be necessary in subsequent years pending monitoring results.

As management tools, prescribed fire and mowing should be variously applied (technique, timing, and frequency) to achieve diverse plant communities.

9. Performance Standards

Performance standards are observable or measurable attributes that can be used to determine if the Hunter Lake Mitigation Project is meeting the objectives as stated in Section 2. The performance standards listed below will be monitored and submitted to the USACE Rock Island District in an annual report.

9.1 Wetland Creation

Objective: Creation of up to 24.0 acres of emergent wetland habitat and 110.2 acres of forested wetland habitat.

Performance Standard: Positive wetland indicators for all three (3) criteria – wetland hydrology, hydric soils, and hydrophytic vegetation – must be observed and documented in each wetland mitigation area by type (emergent and forested wetland) in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (USACE 2010). Standard must be met at the end of the ten-year monitoring period.

A positive trajectory for development of hydric soil conditions may be permitted due to the extended length of time hydric soil formation may take under certain conditions and will be documented by describing the soil profile and any hydric soil indicators within each wetland mitigation area. Hydrology monitoring is proposed to be conducted in each mitigation wetland area by recording water level data monthly, at a minimum, between April 15th and October 15th, to generally represent the growing season. Ground water levels shall be measured in the absence of inundated conditions. Water levels will be recorded at fixed locations (either utilizing monitoring wells or PVC depth rods) in each wetland mitigation area or at multiple locations depending on mitigation wetland size.

9.2 Control of Aggressive Adventive and Native Species

Objective: Control adventive species (Johnson grass and reed canary grass) and invasive native plant species (giant ragweed, cocklebur, and cottonwood) within the wetland mitigation site.

Performance Standard: The combined relative cover of targeted adventive and invasive native species should be less than 10 percent after ten (10) years within wetland mitigation boundaries.

9.3 Predominance of Dominant Native Vegetation

Objective: Increase the cover and density of native plant species within the wetland mitigation areas.

Performance Standards:

a) 75 percent or more of the dominant plant species occurring within each wetland mitigation area, and by type (PFO, PEM) should be native hydrophytes (FAC, FACW, or OBL) at the end of the ten-year monitoring period;
b) Aerial vegetative cover within each wetland shall be ≥50 percent in the second monitoring year, ≥70 percent in the fifth monitoring year, and ≥80 percent in the tenth monitoring year. Percent cover will not be assessed in inundated areas or mudflats resulting from prolonged inundation.
c) Floristic quality in PFO and PEM wetlands, as well as buffer communities, shall be monitored during the course of the ten-year monitoring period to ensure a positive trajectory. If specific numeric floristic quality benchmarks are required as part of the mitigation performance criteria, any performance benchmarks required by the USACE will be further integrated into the annual monitoring reporting discussed below.
d) Floristic quality shall be measured in terms of each site's FQI as described by Swink and Wilhelm (1994).

9.4 Survival

Objective: Creation of up to 24.0 acres of emergent wetland habitat and 110.2 acres of forested wetland habitat.

Performance Standard: Woody survival rates will exceed 75% of the original planting density and live growth above 5 feet will be present at the end of the ten-year monitoring period. In the second year of the monitoring period, if the survival rate falls below 75%, additional trees and shrubs of suitable size will be replanted the following spring to raise the number of living woody individual to 100% or greater of the original planting density. If unsuccessful at the end of the ten-year monitoring period, the permittee and Corps will review options that may include additional monitoring or further adaptive management actions to ensure the success of the mitigation areas.

10. Monitoring Requirements

10.1 Monitoring

Monitoring within the mitigation sites are the responsibility of the City of Springfield as the permittee and is typically completed by a qualified environmental wetland consultant.. The monitoring phase of the wetland mitigation process is an essential component that ultimately determines whether the wetland restoration effort has been successful. The monitoring plan therefore, reiterates the goals and objectives of the project, applies performance standards, and outlines monitoring tasks. Personnel performing the monitoring activities (whether City staff or qualified contractors) will be appropriately qualified personnel trained in the 1987 Wetland Delineation Manual and 2010 Midwest Regional Supplement techniques and procedures.

The monitoring plan described herein has been established to provide a clearly defined set of protocols by which to follow the progressive development and evaluate the success of the mitigation sites. The assessment of "success" is considered a critical component of this project and is inherently linked to the project objectives as defined in Section 2. Performance Standards used to measure the defined objectives, and determine success, are established in Section 9.

Emergent mitigation wetlands are anticipated to be monitored annually for a period of at least five (5) years, while forested mitigation wetlands are anticipated to be monitored annually for a period of at least ten (10) years, unless it is determined by the applicable agencies that the performance goals have been met for those mitigation areas and no additional monitoring is required, therefore allowing the permittee to petition the agencies to be released from the noted monitoring obligations. Monitoring reports for the emergent and forested wetland mitigation areas will also be submitted on an annual basis to the applicable agencies.

In the event that the wetland restoration effort does not achieve the objectives and performance standards established in the Plan, the City will be responsible for corrective measures. In light of the stated objectives, an approach has been developed to measure performance (i.e., success) and demonstrate the extent to which the objectives have been met.

10.1.1 Construction Phase Monitoring

Onsite construction phase monitoring will be performed to ensure that the Plan is properly implemented as designed and that potential issues are dealt with and resolved expeditiously and with proper attention to overall project objectives. Aspects of monitoring during the construction phase include the following:

- **Adherence to the Mitigation Plan** – Monitoring will entail the proper assurances that plant materials (type, size) are properly utilized and that mitigation methods and schedules are maintained in accordance with the plan.

- **As-Built Plans** – Upon completion of mitigation site construction activities, the applicant will submit As-Built Mitigation Site Plans. Drawings/photographs/location maps of the constructed wetland mitigation areas will be submitted to the USACE District Engineer (DE) within 30 days of completing construction activities. The drawings will include a list of species planted, the location of all plantings, cross-sectional drawings of the planting schemes, and the boundaries of the enhancement activities.

- **Photographic Monitoring** – A photographic record shall be made of all pre-construction conditions at the areas within the mitigation site, construction phase activities, post construction conditions, and deficiencies that may arise at the areas within the mitigation site. Photographic monitoring shall be included as a part of all annual monitoring reports.

10.1.2 Performance-Based Monitoring

Performance-based monitoring will commence the first year after planting and will continue each year for a period of five (5) years for all emergent wetland mitigation areas and ten (10) years for all forested wetland mitigation areas as previously indicated. Mitigation wetlands will be qualitatively assessed each year to identify specific problem areas such as dead zones, invasive species, or areas needing herbivore control. Monitoring will be conducted to evaluate performance standards identified in Section 9 (Performance Standards) and reiterated below.

10.1.2.1 Wetland Creation

Objective: Creation of up to 110.2 acres of forested wetland habitat and 24.0 acres of emergent wetland habitat.

Performance Standard: Positive wetland indicators for all three criteria – wetland hydrology, hydric soils, and hydrophytic vegetation – must be observed and documented in each wetland mitigation site by type (forested and emergent wetland) in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (USACE 2010). Standard must be met at the end of the ten-year monitoring period.

A positive trajectory for development of hydric soil conditions may be permitted due to the extended length of time hydric soil formation may take under certain conditions and will be documented by describing the soil profile and any hydric soil indicators within each wetland mitigation area.

10.1.2.2 Control of Aggressive Adventive and Native Species

Objective: Control adventive species (Johnson grass and reed canary grass) and invasive native plant species (giant ragweed, cocklebur, and Eastern cottonwood) within the wetland mitigation areas.

Performance Standard: The combined relative cover of targeted adventive and invasive native species should be less than 10 percent after five (5) years within emergent wetland and ten (10) years within forested wetland mitigation boundaries.

10.1.2.3 Predominance of Dominant Native Vegetation

Objective: Increase the cover and density of native plant species within the wetland mitigation areas.

Performance Standard:

- 75 percent or more of the dominant plant species occurring within each wetland mitigation site, and by type (PFO, PEM) should be native hydrophytes (FAC, FACW, or OBL) at the end of the ten-year monitoring period;
- Aerial vegetative cover within each wetland shall be ≥50 percent in the second monitoring year, ≥70 percent in the fifth monitoring year, and ≥80 percent in the tenth monitoring year. Percent cover will not be assessed in inundated areas or mudflats resulting from prolonged inundation.
- Floristic quality in PFO and PEM wetlands, as well as buffer communities, shall be monitored during the course of the monitoring periods to ensure a positive trajectory. If specific numeric floristic quality benchmarks are required as part of the mitigation performance criteria, any performance benchmarks required by the USACE will be further integrated into the annual monitoring reporting.
- Floristic quality shall be measured in terms of each site's floristic quality index (FQI) as described by Swink and Wilhelm (1994).

The techniques for monitoring these parameters will include species inventory, cover estimating, and photographic monitoring.

Species Inventory
During the growing season (April 1 – October 15), a competent biologist/botanist will conduct a plant species inventory for the mitigation areas using the meandering search procedure. The biologist will record species on a field data form as they are encountered along a meandering search within the areas. Monitoring results will be summarized in an annual monitoring report. Significant mortality of a particular species or group of species will be noted. Walking the areas within the mitigation site will also serve to detect the presence of invasive species such as reed canary grass, multiflora rose, Amur honeysuckle for purposes of ongoing stewardship.

Cover Estimating
Estimations of species dominance shall be made during the survey by visually assessing species cover within the wetland and the upland buffer. Wetland indicator status shall be noted for each species observed. Areas noted as being low in vegetative cover may be considered for re seeding or re-planting.

Additionally, fixed observation points shall be selected within no fewer than three (3) fixed observation points per distinct mitigation area, to provide representative overviews of each mitigation area. Stake use with unique to designate photo locations is recommended Photo observation points will further document the development of the plant communities and to provide a basis for documenting changes in cover type within the wetland area over time. Photographs will be taken at each station in in each cardinal direction to record a continuous time-series of the mitigation areas from each station. In

conjunction with photographic monitoring of the areas, a vegetation cover map shall be developed and will depict the extent of vegetative cover over each area with applicable species percentages.

10.1.2.4 Survival

Objective: Creation of up to 24.0 acres of emergent wetland habitat and 110.2 acres of forested wetland habitat.

Performance Standard: At least 75 percent of the trees planted within the forested wetland communities shall be surviving at the end of the ten-year monitoring period.

The achievement of this goals shall be based on the direct observation of living plant material during field monitoring efforts. Planted trees of all types shall be observed during the growing season by appropriately qualified personnel for signs of life, including green cambium tissue and leaves.

Volunteers including root sprouts and other forms of vegetative propagation of the species planted in the mitigation area may be counted toward the survival goal. Replanting of trees shall be done at the end of monitoring year five and ten if the performance standard has not been achieved. Any volunteer species, whether beneficial or detrimental, shall be monitored to ensure they do not overpopulate, become monotypic, or crowd out other desirable planted species.

11. Long-Term Management Plan

The long-term management and financing of the mitigation areas within the Hunter Lake Reservoir project area will be the responsibility of the City and they will ensure that the mitigation areas continue to adequately provide aquatic resource functions and services in perpetuity. As part of the written Long-Term Plan, the mitigation areas will have use-restrictions set into perpetuity to ensure that no fill/excavation, farming, or other disturbances are allowed within the boundaries of the sites, other than stewardship activities aimed at promoting the desired vegetation within the sites. Additionally, due to conservation easement or deed restriction requirements for the mitigation areas, recreational use within the mitigation areas or surrounding buffer areas will not be allowed (some limited recreation may be allowed such as hiking, bird watching, etc.) and applicable signage will be placed along the borders of the protected areas.

Identity of Long-Term Steward:
City of Springfield, Illinois

Responsibilities of the Long-Term Steward:
The Long-Term Steward is responsible for monitoring and taking timely corrective actions to sustain the processes and functions of the aquatic resources at the mitigation sites and associated areas that may affect these aquatic resources.

Long-Term Management Activities:
Management and stewardship activities will be commensurate with the needed maintenance and may include: application of approved herbicides, prescribed burning, and mechanical application to control undesired, invasive, and noxious vegetation encroachment. Additional activities such as replanting of trees and herbaceous plants, tree trimming, and repairs to water irrigation systems and ditch plug may be engaged as needed to promote and sustain desired vegetation, biodiversity, and quality of habitats. The Plan will indicate am overall management strategy to address unforeseen changes in mitigation site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The Plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success.

Funding Mechanism for Long-Term Management:
The City of Springfield, Illinois will provide funding to ensure appropriate and secure resources are available for future monitoring and maintenance. The level of funding is anticipated to be adequate and is based on cost estimates for restoration or enhancement of forested and emergent wetlands.

12. Adaptive Management Plan

If for any reason, the City cannot construct the proposed mitigation site in accordance with the approved Plan, the City will notify the USACE District Engineer. If monitoring or other information indicates that the mitigation project is not progressing towards meeting its performance standards as anticipated, the City will notify the USACE District Engineer as soon as possible. The City will work with the USACE District Engineer to evaluate and pursue measures to address deficiencies of the mitigation sites. The measures may include site modifications, design changes, revisions to maintenance requirements, and revised monitoring requirements. The measures will be designed to ensure that the modified mitigation plan provides aquatic resource functions comparable to those described in the mitigation plan's objectives.

Performance standards may be revised, pending USACE approval, in accordance with adaptive management to account for measures taken to address deficiencies in the compensatory mitigation sites. Performance standards also may be revised to reflect changes in management strategies and objectives if the new standards provide for ecological benefits that are comparable or superior to the approved mitigation plan. No other revisions to the performance standards will be allowed except in the case of natural disasters.

If survival of planted vegetation/trees becomes problematic and/or plantings fail to meet the performance standards established in the Plan, then replanting will be necessary as noted in previous sections. Species composition will be reviewed to determine the best species to plant based on observed site conditions as the wetland develops and monitoring events provide more detailed information regarding water levels.

City staff, or hired contractors and/or consultants will construct, maintain, and monitor the site until the performance standards are met and written approval of the completion of site monitoring obligations is secured from the USACE. Personnel performing the monitoring activities (whether City staff or qualified contractors) will be appropriately qualified personnel trained in the 1987 Wetland Delineation Manual and 2010 Midwest Regional Supplement techniques and procedures. The City will then be responsible for the long-term management of the site.

13. Financial Assurances

City is responsible for providing the necessary financial assurances to ensure that the approved wetland mitigation, monitoring and contingency plans are properly implemented for the duration of the project and that the various wetland types meet their intended functions. The City will further coordinate with the USACE to determine the method of financial assurance required for the proposed mitigation development, such as a letter of credit, performance bond, or escrow holding to account for all costs associated with the construction, monitoring, and continues maintenance of the mitigation sites. A 3rd party entity is anticipated to be required to accept the noted funds needed to correct any mitigation deficiencies, which will be reviewed and approved by the USACE prior to approving the final mitigation plans.

In addition to securing the necessary resources to construct the mitigation areas, the City (as the permittee) will be involved throughout the implementation of this project to ensure the site is constructed as planned and that no additional wetland impacts occur to the exiting wetlands on the site.

Additionally, budget will be set aside for long term maintenance of the mitigation areas as part of the funding associated with the maintenance activities.

14. References

Adamus, P.R. 1983. FHWA Assessment Method. Volume 2 of Method for Wetland Functional Assessment. Washington, D.C. USDOT, Federal Highway Administration Report No. FHWA JP-82-24.

Cowardin, L. M, V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deep Water Habitats of the United States. U.S. Fish and Wildlife Service (USFWS).

DiTomaso, J.M., G.B. Kyser et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Informaiton Center, University of California. 544 pp.

Garbisch, E.W. and S. McIninch. 1995. The establishment of *Peltandra virginica* from large and small bulbs as a function of water depth. Wetland Journal 7(1):17-19.

Hunter Lake HEP Team, Illinois Natural History Survey, U.S. Fish and Wildlife Service and Illinois Department of Conservation. Habitat Evaluation Procedures applied to the proposed Hunter Lake (Lake II), Sangamon County, Illinois.

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 Wetland Ratings. Phytoneuron 2016-30: 1-17. ISSN 2153 733X. Retrieved from https://www.fws.gov/wetlands/documents/National-Wetland-Plant-List-2016-Wetland-Ratings.pdf

Mac, M. J., Opler, P.A., Puckett Haecker, C.E., and and P. D. Doran. 1998. Status and Trends of the Nation's Biological Resources. Vol. 1. U.S. Department of the Interior, U.S. Geological Survey, Reston, Va. 1-436 pp. Retrieved from https://www.nwrc.usgs.gov/sandt/Land-use.pdf

Missouri Department of Natural Resources (MDNR). 2010a. Bush Honeysuckles. Retrieved from Thttps://mdc.mo.gov/sites/default/files/resources/2010/08/9675_6621_0.pdf

Missouri Department of Natural Resources (MDNR). 2010b. Garlic Mustard. Retrieved from https://mdc.mo.gov/sites/default/files/resources/2010/08/9677_6623_0.pdf

Missouri Department of Natural Resources (MDNR). 2017a. Multiflora Rose Control. Retrieved from https://mdc.mo.gov/trees-plants/problem-plant-control/invasive-plants/multiflora-rose-control

Missouri Department of Natural Resources (MDNR). 2017b. Reed Canary Grass Control. Retrived from https://mdc.mo.gov/trees-plants/problem-plant-control/invasive-plants/reed-canary-grass-control

Nelson, R.E., editor, 1978, Illinois; land and life in the prairie state: Dubuque, Iowa, Kendall/Hunt Publishing Company, 359 p.

Natural Resources Conservation Service (NRCS). 2017. Web Soil Survey. Retrieved from https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (accessed October 2017).

Omernik, J.M. and G.E. Griffith. 2014. Ecoregions of the conterminous United States: Evolution of a Hierarchical Spatial Framework. Environmental Management 54(6):1249-1266.

Pauly, W.R. 1997. The Tallgrass Restoration Handbook for Prairies, Savannas, and Woodlands. Edited by Stephen Packard and Cornelia F. Mutel. Washington, D.C. Island Press pp. 223-243.

Schwegman, J.E., 1973, Comprehensive plan for the Illinois Natural Preserves System; part 2, The natural divisions of Illinois: Springfield, Illinois, Illinois Nature Preserves Commission, 32 p

Swink, F. and G. S. Wilhelm. 1979. Plants of the Chicago Region, 3rd ed. Morton Arboretum, Lisle, IL. 922 pp.

Swink, Floyd and Gerould Wilhelm. 1994. Plants of the Chicago Region. 4th ed. Indianapolis: Indiana Academy of Science.

U.S. Army Corps of Engineers (USACE). 1995a. An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices.

U.S. Army Corps of Engineers (USACE). 1995b. A Guidebook for Application of Hydrogeomorphic Assessments to Riverine Wetlands.

U.S. Army Corps of Engineers (USACE). 2010a. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0), ed. J. S. Wakeley, R.W. Lichvar, and C. V. Noble. ERDC/EL TR-10-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Army Corps of Engineers (USACE). 2010b. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0), ed. J. S. Wakeley, R.W. Lichvar, and C. V. Noble. ERDC/EL TR-10-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

U.S. Army Corps of Engineers (USACE). 2019. Mitigation and Monitoring Guidelines, Rock Island District (MVR), Regulatory Branch.

Woods, A.J., Omernik, J.M., Pederson, C.L., and B.C. Moran. 2006. Ecoregions of Illinois (color poster with map, descriptive text, and summary tables). U.S. Geological Survey.

Wright, H.A., and A.W. Bailey. 1982. Fire Ecology. John Wiley and Sons, New York, New York.

2. Stream Mitigation Plan

Conceptual Stream Mitigation Plan for the Hunter Lake Project

Prepared for:

City of Springfield, Illinois

Prepared by:

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June 5, 2023

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List of Abbreviations and Acronyms

CWA	Clean Water Act
CFR	Code of Federal Regulations
DA	Department of the Army
HUC	Hydrologic Unit Code
IEPA	Illinois Environmental Protection Agency
Plan	Compensatory Stream Mitigation Plan
USACE	U.S. Army Corps of Engineers
WOTUS	Waters of the United States
WSP USA	WSP USA Environment & Infrastructure Inc.

1 Introduction

This Conceptual Stream Mitigation Plan (Plan) has been prepared to satisfy the mitigation requirements associated with proposed impacts to jurisdictional stream habitat for the construction of the proposed Hunter Lake Reservoir on Horse Creek and Brush Creek located in Sangamon County, Illinois. This Plan has been written to satisfy Clean Water Act stream mitigation requirements codified in 33 CFR 332.4 (Planning and Documentation).

The City of Springfield is developing plans to create the Hunter Lake Reservoir as the preferred option for a supplemental water source and aquatic based recreation opportunities for City Water, Light and Power (CWLP) customers in Springfield, Illinois, and surrounding communities as depicted in **Figure 1-1**. Creation of Hunter Lake will require impoundment on portions of Brush Creek, Horse Creek, and their tributaries, and the subsequent conversion of 237,479 linear feet of jurisdictional stream habitat to lacustrine habitat. Based on input from the U.S. Army Corps of Engineers (USACE) Rock Island District and utilization of the Illinois Stream Mitigation Method (USACE 2010) 2,436,019 stream mitigation credits will be required for the proposed habitat conversion. Required stream mitigation credits were determined based on a variety of current condition and proposed impact factors including existing stream flow type, priority, existing condition, impact duration, and proposed activity (such as impoundment, detention, or fill). This Stream Mitigation Plan (Plan) outlines conceptual stream mitigation concepts and estimated mitigation credits generated by concept type.

The City of Springfield (City) anticipates that construction of the proposed Hunter Lake Reservoir project will impact approximately 196.44 acres of jurisdictional stream habitat within the proposed project area as depicted in **Table 1-1**.

Table 1-1. Summary of Proposed Project Impacts to Jurisdictional Stream Habitat

Stream Type	Status	Length Impacted (feet)	Length Impacted (miles)
Ephemeral	Jurisdictional	22,176	4.20
Intermittent	Jurisdictional	38,019	7.20
Perennial	Jurisdictional	177,284	33.58
Total		**237,479**	**44.98**

**While according to the WOTUS Addendum Report (February 2023) 245,767 linear feet of jurisdictional stream habitat were identified and delineated. It is anticipated that only 237,479 linear feet of jurisdictional stream habitat will be impacted by the proposed project construction.*

Ultimately a Detailed Compensatory Stream Mitigation Plan will be prepared, based on the concepts identified in this plan, to satisfy the mitigation requirements associated with impacts to waters of the U.S. (WOTUS) from the Hunter Lake Reservoir project as required by the USACE Clean Water Act (CWA) Section 404 permit and the associated CWA Section 401 Water Quality Certification issued by Illinois Environmental Protection Agency (IEPA). The final Detailed

Compensatory Stream Mitigation Plan will be written to satisfy the requirements of the Mitigation Rule (33 CFR 332, Compensatory Mitigation for Losses of Aquatic Resources) consistent with Regulatory Guidance Letter 08-03 dated 10 October 2008 and the USACE Rock Island District's Stream/Wetland Mitigation Plan Requirements for Permittee Responsible Mitigation dated 13 August 2009.

2 Objectives

2.1 Plan Objectives

In accordance with this Plan, the City commits to a developing a combination of the required 2,436,019 stream mitigation credits through a combination of the purchase of stream mitigation credits (if available) and permittee responsible mitigation to mitigate the permanent impacts on existing jurisdictional stream resources within the Hunter Lake Reservoir project area. Proposed permittee responsible stream habitat improvements are anticipated to consist generally of riparian plantings (woody and herbaceous), structure (dam) removal, floodplain reconnection, and mitigation measures outlined in the Lake Springfield Watershed Management Plan (Sangamon County SWCD, 2017), all of which may require additional coordination with the USACE for implementation and determination of mitigation credits. These conceptual methods are further discussed below.

The overall objective of this Plan is to determine and address how compensatory stream mitigation for the proposed impacts to existing jurisdictional stream habitat within the Hunter Lake Reservoir project area can provide an accurate replacement of the resource functionality within the existing watershed (or adjoining watersheds) and overall eco-region.

3 Site Selection

3.1 Methods

The methods that are discussed below have been generally assembled based on overall practicability and location within the lands adjacent to the proposed project area or nearby vicinity which would maintain that much of the proposed stream mitigation be conducted within the project area HUC 8, as well as potentially within an adjoining watershed.

The primary stream mitigation area of interest would be lands adjacent to the proposed project area that is under the current ownership of the City of Springfield. This would include City of Springfield property that is currently located outside of the impounded reservoir (project area), and areas that are currently located inside of the project area but are potentially located outside of the impoundment area. Additional areas for potential stream mitigation improvements include those lands on private property which would follow a similar approach. Lastly, private lands in an adjoining watershed may be further evaluated for potential stream mitigation. As this Plan is conceptual at this time, additional evaluation and coordination with the applicable agencies will be required to target specific areas for permittee responsible activities that may be located outside of City of Springfield property boundaries.

Additional discussion of the noted mitigation concepts are further discussed in **Section 6** (Determination of Credits).

4 Site Protection

4.1 Protection Determination

An appropriate real-estate instrument, approved in advance by the USACE, will be required to protect all mitigation sites in perpetuity (USACE 2010). In addition, the CWA Section 404 permit issued by the USACE Rock Island District will require the City of Springfield to be responsible for ensuring that any approved mitigation areas are protected in perpetuity and are not subject to future construction and/or fill activities, except for the purposes of enhancing or restoring the mitigation area.

Wood and Martin (2016) identify five (5) real estate instruments most commonly used to protect compensatory mitigation sites in accordance with the Mitigation Rule at 33 CFR 332.7:

- Conservation Easements
- Deed Restrictions (Restrictive Covenants)
- Transfer of Title
- Multi-Party Agreements
- Other documents (Conservation Land Use Agreements, Federal Facility Management Plans, or Integrated Natural Resource Management Plans) that protect real property or mitigation projects on federal lands. This is not a viable option for the City of Springfield.

The various real estate instrument options for the City of Springfield are discussed briefly below as described in Wood and Martin (2016). It should be noted that the Illinois Stream Mitigation Guidance allows more credit for conservation easements and title transfers than deed restrictions, and it does not mention multi-party agreements (USACE 2010).

The real estate site protection instrument selected and approved by USACE must be recorded with the Sangamon County Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records of title to or interest in real property. Along with the site protection instrument, a copy of the permit, project plans, IEPA Water Quality Certification and the final Detailed Compensatory Stream Mitigation Plan, may also be filed.

<u>Conservation Easement</u>

A conservation easement is an interest in real property that precludes the property owner from using the land in ways that would adversely impact the natural resources on the property. The property owner (“Grantor”) makes a written conveyance of an easement (real estate instrument) which protects the natural resources and restricts the activities that can be conducted on the property. The party receiving the conservation easement is referred to as the “Holder” (or Grantee) and is usually a non-profit, land trust or governmental entity. The Holder does not gain

ownership rights to or possession of the land but does hold a real property interest. The conservation easement may also grant oversight and enforcement rights to a third party, typically in return for some benefit to the Grantor or property owner (such as issuance of a permit or mitigation approval).

Deed Restriction / Restrictive Covenant

A deed restriction or restrictive covenant is a condition in a deed limiting or prohibiting certain uses of real property. Restrictive covenants should "run with the land," meaning that they are enforceable by and against later owners or occupiers of the land. Land developers typically use restrictive covenants when they subdivide property to impose limitations on the use of property such as setback lines, common area use, or architectural design rules. Restrictive covenants are also used to protect compensatory mitigation sites. For compensatory mitigation sites, the recorded restrictive covenant should be written so that it runs with the land. The compensatory mitigation project site is protected as a benefit to the owner, subsequent owners and to the public. Violation of the restrictive covenant would be a violation of the applicable DA permit conditions. Therefore, it is important that the conditions of the DA permit and the deed restriction are linked together to create an enforceable real estate instrument.

Transfer of Title

In a transfer of title, ownership of the compensatory mitigation property is transferred to a natural resource management governmental agency, land trust, land management entity, or another non-profit entity deemed acceptable to the USACE. That entity must agree to manage and protect the mitigation site including its aquatic and other natural resources on the property.

Multi-Party Agreements

Multi-party agreements are agreements among several interested parties to protect a specific property. Those agreements establish roles and responsibilities for each of the signatory parties consistent with applicable federal and/or state statutes, as well as the objectives of the land trust.

It is anticipated that applicable site protection instruments will be determined further along in the permitting process upon final development of specific permittee responsible mitigation site selection and associated mitigation activities. The appropriate instrument will be dependent upon the project situation and whom will be providing long-term maintenance of the specified mitigation site.

5 Baseline Information

5.1 Location

Currently, potential stream mitigation areas are located on lands owned by the City, as well as private lands, adjacent to and within the Hunter Lake Reservoir project area in Sangamon County, Illinois, approximately 8 miles southeast of Springfield, Illinois (**Figure 2-1**). The proposed Hunter Lake Reservoir would be formed by construction of an earthen dam on Horse Creek, and would impound water on both Horse Creek and Brush Creek, which are both tributaries to the South Fork of the Sangamon River in Section 31 of Rochester Township.

5.2 Eco-Region Classification

Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources; and are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components (Omernik and Griffith 2014).

The Hunter Lake Reservoir project area is located within the Illinois/Indiana Prairie Ecoregion, a sub ecoregion of the Central Corn Belt Plains Ecoregion. This region is characterized by glaciated flat to rolling plains made up of loess, glacial till, and alluvium. Before this region was converted to cropland, the natural vegetation of this area consisted of a mosaic of bluestem prairie and oak-hickory forest. The bluestem prairies consisted of a mix of mesic, wet, and dry upland prairies that were dominated by plant species such as big bluestem, Indian grass, switch grass, prairie cord grass, sedges, little bluestem, and side-oats grama. In the oak-hickory forest, the dominant plant species were black oak, white oak, and shagbark hickory (Woods et al. 2006).

At the time of settlement, poorly drained land, ponds, and swamps were common. Poor drainage was especially pronounced in the youngest, most recently glaciated parts of the Wisconsinan till plain. However, even on much older, more dissected till plains in the west where drainage systems are comparatively well integrated, many lowlands between moraines were naturally wet or seasonally covered by standing water (Nelson, 1978). Subsequently, extensive parts of the Illinoian and Wisconsinan till plains have been tiled, ditched, and tied into the existing drainage system to make the land more suitable for cropland and settlement. In the process, marshes and pothole lakes were drained, and once abundant waterfowl were displaced (Schwegman, 1973). Nearly all of the original prairies have now been replaced by agriculture (Woods et al. 2006). Western streams on the Illinoian till plain have fewer species, tend to dry up soon during drought periods, and have lower gradients, more clayey beds, and fewer gravel riffles than eastern streams on the Wisconsinan till plain (Wood et al. 2006).

5.3 Quantification of Waters of the United States

Stream and wetland surveys were conducted in the Fall of 2016 and 2022 within the Hunter Lake Reservoir project area, including the potential inundation area, adjacent shoreline, and adjacent lands anticipated to be used for recreational amenities. Aquatic resources were delineated in

accordance with the August 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0). Detailed information on each assumed jurisdictional resource can be found in the Waters of the US Delineation Addendum Report prepared for the project (February 2023). Three (3) dominant stream habitat types were found throughout the project area including ephemeral, intermittent, and perennial flow stream habitat. Jurisdictional wetland habitat and associated proposed impacts for the project area are addressed in the Conceptual Wetland Mitigation Plan, submitted under separate cover.

5.3.1 Streams

Based on field reconnaissance, mapped USGS NHD streams were either confirmed as stream resources or identified as upland areas. Streams with observable bed/bank and characteristic OHWM indicators were delineated in the field with GPS to document the channel's width at OHWM and width at top of bank. For those mapped USGS NHD channels where indicators of bed/bank and OHWM were lacking, resources were documented as upland areas. A total of 79 jurisdictional streams were identified within the project area including 29 ephemeral streams, 28 intermittent streams, and 22 perennial streams. Stream resources are summarized below in **Table 5-1**. Associated stream functional assessment metrics are provided in **Table 5-4.**

Table 5-1. Summary of Stream Resources within the Hunter Lake Project Area

Water Type	Feature Type	Number	Linear Feet	Miles
Stream	Ephemeral	29	22,176	4.20
	Intermittent	28	38,019	7.20
	Perennial	22	177,284	33.58
Stream Total		**79**	**237,479***	**44.98***

**While according to the WOTUS Addendum Report (February 2023) 245,767 linear feet (46.55 miles) of jurisdictional stream habitat were identified and delineated. It is anticipated that only 237,479 linear feet (44.98 miles) of jurisdictional stream habitat will be impacted by the proposed project construction.*

The identification of stream resources in the field was typically based upon the presence of an ordinary high water mark (OHWM), observable "bed and bank," and the presence of documented surface water connections to navigable waters of the United States. According to 33 CFR 328.3, "the term ordinary high water mark" means "the line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas." In general, the OHWM of a stream is usually determined through an examination of the recent physical evidence of surface flow in the stream channel.

OHWM indicators were evaluated during field reconnaissance using technical guidance described in the USACE National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams (Interim Version, 2022) and the USACE Regulatory Guidance Letter (USACE 2005). The OHWM is the defining element for identifying the lateral limits of streams. However, determining whether any stream is a jurisdictional WOUS involves further assessment in accordance with the

regulations, case law, and clarifying guidance. Applicable information and guidance following the SWANCC and Rapanos decisions were utilized during the field assessment. Streams with observable bed/bank and characteristic OHWM indicators were delineated in the field with GPS to map the presence of stream resources. At these locations the survey team documented depth and width at OHWM and top of bank, and photo-documented the resource. They also recorded any notable features regarding the channel condition, riparian buffer, and level of channel alteration. A detailed summary of individual stream characteristics is provided in the Waters of the U.S. Delineation Addendum (February 2023) prepared for the project.

Ephemeral Stream Habitat: Twenty-nine (29) ephemeral streams were identified and delineated within the Hunter Lake Reservoir project area during the field evaluation (**Table 5-1**). An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source for stream flow.

Delineated ephemeral streams were generally less than 10 feet wide at the top of bank, though most were 5 feet or less in height. If present, the OHWM was usually indicated by a natural bank line, loss of vegetation, and presence of litter/debris. The width at the drainage at the OHWM was less than 6 feet and the height was less than 3 feet, though generally less than one foot. All of the drainages had a riparian corridor, though the size and quality varied greatly. Common riparian species encountered included hackberry, Osage orange, and black walnut.

Intermittent Stream Habitat: Twenty-eight (28) intermittent streams were identified and delineated within the Hunter Lake Reservoir project area during the field evaluation (**Table 5-1**). An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Delineated intermittent streams ranged from 5-15 feet wide and 0.5-8 feet high at the top of bank. The width at the OHWM ranged from 1-8 feet and the height was 0.5-6 feet. Common indicators of an OHWM in these streams include vegetation loss, clear bank line, and natural bank line or shelving. All of these streams had riparian corridors, with dominant species including honey locust, silver maple, and hackberry. While most of these streams had water present at the time of the survey, many consisted of isolated pools or water that was not flowing.

Perennial Stream Habitat: Twenty-two (22) perennial streams were delineated within the Hunter Lake Reservoir project area during the field evaluation (**Table 5-1**). A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

In general, perennial streams are larger than the intermittent streams and, by definition, consistently maintain flow all year. These streams range from 3-20 feet wide at the top of bank and 1-15 feet high. The streams were generally 2-15 feet wide and 0.5-4 feet high at the OHWM,

which was evidenced by natural shelving, vegetation loss, and presence of litter/debris. All of the perennial streams had riparian corridors of varying sizes within the Hunter Lake project area. Some of these streams were observed to support aquatic life, including populations of small fish and frogs. As the only named streams within the project area, detailed descriptions for both Brush and Horse creeks have also been included below.

Brush Creek (STR-420) is a perennial stream that begins southwest of the Town of Divernon and extends north-northeast into the project area where it confluences with Horse Creek just south of the proposed dam location. The total length of the stream within the project area is approximately 8.7 miles (45,793 linear feet) and the contributing drainage basin is approximately 47.9 square miles. Brush Creek was observed with an OHWM identified by bed and bank, sediment sorting, destruction of terrestrial vegetation, natural shelving, and the presence of litter/debris. The OHWM within the project area was between 15 to 25 feet wide and 4 to 8 feet high. The tributary contained flowing and pooled water and a mixed substrate of silts, clays, sand, and gravel throughout at the time of the field evaluation. A large forested riparian corridor (100 to greater than 500 feet) was observed with tree species including silver maple, American elm, box elder, cottonwood, black walnut, hackberry, and honey locust.

Horse Creek (STR-010) is the main perennial stream that would be impounded to create the proposed Hunter Lake Reservoir. The total drainage basin for Horse Creek is 128.16 square miles, which includes the 47.9 square miles contributed by the Brush Creek drainage basin. Approximately 16.9 miles (89,306 linear feet) of Horse Creek is located within the project area. Throughout the project area, the channel is 50 to 70 feet wide and 15 to 20 feet high at the top of bank. The OHWM is marked by natural bank lines, loss of vegetation, clear shoreline, presence of debris, vegetation loss, and natural shelving. At the OHWM, the channel is approximately 30 feet wide with a depth of 5 to 8 feet. The stream had flowing and pooled water, observable fish populations, and displayed signs of floodplain connectivity. A large forested riparian corridor (100 to greater than 500 feet) was observed with tree species including silver maple, American elm, box elder, cottonwood, black walnut, hackberry, and honey locust.

5.4 Aquatic Resource Functions Impacted

5.4.1 Stream Functional Assessment

The functional assessment of the streams within the project area were assessed using the rating factors provided in the Illinois Stream Mitigation Guidance (USACE 2010). A score for each stream was calculated based on stream type (perennial, intermittent, ephemeral), priority (primary, secondary, tertiary), and existing condition (fully functional, moderately functional, functionally impaired). Based on the rating system described in the Mitigation Guidance, a stream can have a score between 0.4 and 2.8. Those streams that support the most diverse communities of aquatic organisms and have not been previously impacted or impaired are considered to have the highest scores. Overall, the average score for all streams within the project area was 0.7, indicating that the many of the streams were considered lower in quality. Both Horse and Brush creeks exhibited a score of 1.4, indicating that they are of moderate quality. All of the streams located within the project area are considered to be “functionally impaired” due to a variety of

factors including previous channelization, bank failure, and a lack of a riparian corridor due to the increased conversion of land use to agriculture over the years.

5.4.2 Assessment Factors

Below is a summary of the stream assessment factors that have been compiled to assess current stream conditions within the Hunter Lake alternative project area.

Stream Type

Streams were classified as one of the following flow regimes which was previously discussed above in **Section 5.3.1**; Ephemeral, Intermittent, Perennial.

Priority

Priority waters is a rating factor used to determine the importance of the stream that would be impacted or used for mitigation. Priority waters are influenced by the quality of the aquatic habitat potentially subject to be impact or used for mitigation. The priority waters factor will influence the amount of stream credits required or generated. Waters listed in the Illinois Section 303(d) Impaired Waters List will score a higher priority. Priority waters are divided into three categories; primary, secondary, and tertiary. Primary streams provide important contributions to biodiversity on an ecosystem scale or higher levels of function contributing to landscape or human values. Impacts to these streams should be rigorously avoided or minimized. Secondary priority areas include waters listed in the Illinois Section 303(d) Impaired Waters List for aquatic life use of indigenous aquatic life use, waters located within lands under public ownership or holdings, streams will a Class B rating for diversity or integrity (Illinois Biological Stream Rating System), streams adjacent to an approved mitigation bank or mitigation site, stream and river reaches within 1.0 mile upstream or downstream of primary priority reaches, and streams designated as enhanced for dissolved oxygen under 35 Ill. Adm. Code 302.206. Tertiary priority areas include all other freshwater systems not ranked as primary or secondary priority.

Existing Condition

Existing condition is the state of the physical, chemical, and biological health of a stream at the time of assessment. Existing condition may be compared to the least disturbed condition of similar streams in the region. This is a measure of the stability and function state of a stream and the stability of the riparian buffer before project impacts. The existing condition considered biological significance, integrity, or diversity of the valley segment or nearby valley segments, water quality, and geomorphic (hydrological, channel) conditions of the subject stream reach. The overall existing condition is divided into three categories; fully functional, moderately functional, and functionally impaired.

Duration

Duration is the amount of time adverse impacts are expected to last. Duration will be factored in the following categories; temporary impacts will occur within a period of less than 180 days; short term impacts will remain evident after 180 days and will not exist after two years; and permanent

impacts will be greater than two years. As duration is related to a given stream impact timeline and associated recovery, it has not been included in **Table 5-4**, but has factored into the stream mitigation credit calculation determination further discussed in **Section 6**.

Activity

Activity is the type of impact that will diminish the functional integrity of the stream system and is the dominant impact at the site. Ten (10) categories of impacts are utilized including armor, below grade (embedded) culvert, clearing, detention, fill, impoundment, morphologic disturbance, pipe, utility crossings, and bridge footings. As activity is related to a given stream impact type, it has not been included in **Table 5-4**, but has factored into the stream mitigation credit calculation determination further discussed in **Section 6**.

The functional assessment of existing jurisdictional stream habitat is provided below in **Table 5-4**. For a complete description of the noted stream assessment factors and associated calculations, please refer to the Illinois Stream Mitigation Guidance (USACE 2010) document.

Table 5-4. Functional Assessment of Streams within Hunter Lake Project Area

Stream ID*	Total Length (ft)	Impact Length (ft)	Stream Type Impacted[1]	Priority[2]	Existing Condition[3]	Total Score
STR-010	89,306	87,785	0.8	0.4	0.2	1.4
STR-020	749.0	0.00	0.1	0.1	0.2	0.4
STR-030	364.0	364.0	0.4	0.1	0.2	0.7
STR-040	1,273.0	1,273.0	0.1	0.1	0.2	0.4
STR-050	2,264.0	2,264.0	0.1	0.1	0.2	0.4
STR-060	3,405.0	3,405.0	0.8	0.1	0.2	1.1
STR-070	1,272.0	1,195.0	0.8	0.1	0.2	1.1
STR-080	2,515.0	2,515.0	0.4	0.1	0.2	0.7
STR-090	302.0	302.0	0.1	0.1	0.2	0.4
STR-100	1,887.0	1,887.0	0.1	0.1	0.2	0.4
STR-102	682.0	682.0	0.4	0.1	0.2	0.7
STR-110	1,530.0	1,530.0	0.4	0.1	0.2	0.7
STR-120	1,821.0	1,821.0	0.1	0.1	0.2	0.4
STR-130	854.0	854.0	0.1	0.1	0.2	0.4
STR-150	1,695.0	1,695.0	0.1	0.1	0.2	0.4
STR-160	4,642.0	4,479.0	0.4	0.1	0.2	0.7
STR-164	142.0	142.0	0.1	0.1	0.2	0.4
STR-165	166.0	166.0	0.1	0.1	0.2	0.4
STR-200	589.0	494.0	0.1	0.1	0.2	0.4
STR-210	2,068.0	2,068.0	0.1	0.1	0.2	0.4
STR-220	1,739.0	1,739.0	0.4	0.1	0.2	0.7
STR-230	1,170.0	1,170.0	0.4	0.1	0.2	0.7
STR-240	2,043.0	2,043.0	0.4	0.1	0.2	0.7
STR-250	1,996.0	1,996.0	0.4	0.1	0.2	0.7

Stream ID*	Total Length (ft)	Impact Length (ft)	Stream Type Impacted[1]	Priority[2]	Existing Condition[3]	Total Score
STR-260	792.0	792.0	0.4	0.1	0.2	0.7
STR-270	5,852.0	5,802.0	0.8	0.1	0.2	1.1
STR-275	1,078.0	776.0	0.4	0.1	0.2	0.7
STR-280	3,417.0	2,572.0	0.8	0.1	0.2	1.1
STR-290	489.0	365.0	0.4	0.1	0.2	0.7
STR-300	801.0	801.00	0.8	0.1	0.2	1.1
STR-310	1,566.0	1,506.0	0.8	0.1	0.2	1.1
STR-320	1,540.0	1,467.0	0.1	0.1	0.2	0.4
STR-330	1,220.0	1,220.0	0.8	0.1	0.2	1.1
STR-335	1,021.0	1,021.0	0.1	0.1	0.2	0.4
STR-340	548.0	548.0	0.1	0.1	0.2	0.4
STR-350	596.0	528.0	0.1	0.1	0.2	0.4
STR-360	2,261.0	2,261.0	0.4	0.1	0.2	0.7
STR-370	4,944.0	4,662.0	0.8	0.1	0.2	1.1
STR-380	1,715.0	1,245.0	0.1	0.1	0.2	0.4
STR-390	769.0	591.0	0.1	0.1	0.2	0.4
STR-400	261.0	177.0	0.1	0.1	0.2	0.4
STR-410	639.0	349.0	0.4	0.1	0.2	0.7
STR-420	45,793.0	45,703.0	0.8	0.4	0.2	1.4
STR-430	1,997.0	1,997.0	0.4	0.1	0.2	0.7
STR-440	1,342.0	1,342.0	0.4	0.1	0.2	0.7
STR-450	1,163.0	1,163.0	0.4	0.1	0.2	0.7
STR-460	2,849.0	2,849.0	0.8	0.1	0.2	1.1
STR-470	777.0	777.0	0.1	0.1	0.2	0.4
STR-480	1,441.0	1,441.0	0.8	0.1	0.2	1.1
STR-490	2,743.0	2,743.0	0.8	0.1	0.2	1.1
STR-495	105.0	105.0	0.8	0.1	0.2	1.1
STR-500	2,771.0	2,771.0	0.8	0.1	0.2	1.1
STR-501	521.0	521.0	0.1	0.1	0.2	0.4
STR-502	881.0	881.0	0.4	0.1	0.2	0.7
STR-510	546.0	546.0	0.1	0.1	0.2	0.4
STR-520	168.0	168.0	0.1	0.1	0.2	0.4
STR-530	263.0	0.00	0.4	0.1	0.2	0.7
STR-540	588.0	468.0	0.4	0.1	0.2	0.7
STR-550	342.0	286.0	0.1	0.1	0.2	0.4
STR-560	2,066.0	1,217.0	0.8	0.1	0.2	1.1
STR-570	7,334.0	7,27.0	0.8	0.1	0.2	1.1
STR-580	286.0	286.0	0.1	0.1	0.2	0.4
STR-590	1,896.0	1,896.0	0.8	0.1	0.2	1.1
STR-600	1,843.0	1,468.0	0.4	0.1	0.2	0.7
STR-610	1,795.0	1,795.0	0.8	0.1	0.2	1.1

Stream ID*	Total Length (ft)	Impact Length (ft)	Stream Type Impacted[1]	Priority[2]	Existing Condition[3]	Total Score
STR-620	1,269.0	1,128.0	0.8	0.1	0.2	1.1
STR-630	452.0	452.0	0.4	0.1	0.2	0.7
STR-640	151.0	151.0	0.1	0.1	0.2	0.4
STR-650	609.0	530.0	0.4	0.1	0.2	0.7
STR-660	353.0	353.0	0.4	0.1	0.2	0.7
STR-670	2,959.0	2909.0	0.4	0.1	0.2	0.7
STR-680	1,136.0	1,136.0	0.8	0.1	0.2	1.1
STR-690	286.0	286.0	0.1	0.1	0.2	0.4
STR-700	542.0	542.0	0.8	0.1	0.2	1.1
STR-710	1,051.0	952.0	0.4	0.1	0.2	0.7
STR-720	1,290.0	1,215.0	0.4	0.1	0.2	0.7
STR-730	1,343.0	1,026.0	0.1	0.1	0.2	0.4
STR-740	473.0	473.0	0.1	0.1	0.2	0.4
STR-750	360.0	134.0	0.1	0.1	0.2	0.4

[1] *Stream Type Categories: Perennial = 0.8; Intermittent = 0.4; Ephemeral = 0.1*
[2] *Priority Categories: Primary = 0.8; Secondary = 0.4; Tertiary = 0.1*
[3] *Existing Condition Categories: Fully Functional = 1.2; Moderately Functional = 0.6; Functionally Impaired = 0.2*
* *Only anticipated jurisdictional streams have been listed in the above table. Features that are currently considered non-jurisdictional erosional swales or features have been omitted.*

5.5 Existing Soils

5.5.1 General Overview

The region that encompasses Sangamon County consists of thin to thick loess, glacial till, outwash deposits, lacustrine sediments, and alluvium. Loess is thickest downward of major floodplains and thins eastward. In upland area, soils are typically high in organic content. Soils derived from loess are primarily occur in the west over till deposits. Younger soils derived primarily from drift are found in central and eastern areas on the till plains. In the floodplain and low terraces areas, natural drainage is usually poor (Woods et al., 2006).

5.5.2 Site Specific

A total of 33 soil map units of 25 soil series are located within the project area. All soil descriptions are taken from the Natural Resources Conservation Service (NRCS) Official Soil Series Descriptions and the Sangamon County soil survey (NRCS 2016). Fayette, Elco, Tama, and Hickory soil map units are located in the upland regions of the project area while Sawmill, Radford, Vesser, and Lawson soil map units dominate the bottomlands and floodplains. Three soil map units, Sawmill silty clay loam, 0 to 2 percent slopes, frequently flooded; Zook silty clay loam, 0 to 2 percent slopes, frequently flooded; and Vesser silt loam, 0 to 2 percent slopes, occasionally flooded are listed on the NRCS National Hydric Soil List (revised December 2015, Sangamon County) (Table 5-5). Hydric soils are described as those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season. Field examination of soils in conjunction with the WOTUS delineation generally confirmed mapped soil type

Table 5-5. Existing Soils in the Hunter Lake Project Area

Map ID	Soil Map Unit	Acres	Hydric
119C2	Elco silt loam, 5 to 10 percent slopes, eroded	7.8	No
119D	Elco silt loam, 10 to 18 percent slopes	98.4	No
119D2	Elco silt loam, 10 to 18 percent slopes, eroded	56.0	No
119D3	Elco silty clay loam, 10 to 18 percent slopes, severely eroded	90.0	No
127C2	Harrison silt loam, 5 to 10 percent slopes, eroded	6.9	No
134C2	Camden silt loam, 5 to 10 percent slopes, eroded	21.9	No
17A	Keomah silt loam, 0 to 2 percent slopes	2.1	No
199B	Plano silt loam, 2 to 5 percent slopes	9.4	No
212C2	Thebes silt loam, 5 to 10 percent slopes, eroded	3.6	No
259D2	Assumption silt loam, 10 to 18 percent slopes, eroded	28.6	No
279B	Rozetta silt loam, 2 to 5 percent slopes	50.5	No
280C2	Fayette silt loam, 5 to 10 percent slopes, eroded	96.3	No
3074A	Radford silt loam, 0 to 2 percent slopes, frequently flooded	1,272.7	No
3077A	Huntsville silt loam, 0 to 2 percent slopes, frequently flooded	1.7	No
3107A	Sawmill silty clay loam, 0 to 2 percent slopes, frequently flooded	40.9	Yes
3284A	Tice silty clay loam, 0 to 2 percent slopes, frequently flooded	7.6	No
3405A	Zook silty clay loam, 0 to 2 percent slopes, frequently flooded	84.1	Yes
3451A	Lawson silt loam, 0 to 2 percent slopes, frequently flooded	605.8	No
43A	Ipava silt loam, 0 to 2 percent slopes	0.3	No

Map ID	Soil Map Unit	Acres	Hydric
567C2	Elkhart silt loam, 5 to 10 percent slopes, eroded	0.6	No
567D2	Elkhart silt loam, 10 to 18 percent slopes, eroded	0.5	No
630C2	Navlys silt loam, 5 to 10 percent slopes, eroded	2.2	No
7075B	Drury silt loam, 2 to 5 percent slopes, rarely flooded	93.5	No
7148A	Proctor silt loam, 0 to 2 percent slopes, rarely flooded	2.5	No
7242A	Kendall silt loam, 0 to 2 percent slopes, rarely flooded	18.1	No
8396A	Vesser silt loam, 0 to 2 percent slopes, occasionally flooded	36.3	Yes
862	Pits, sand	4.4	No
86B	Osco silt loam, 2 to 5 percent slopes	1.3	No
86C2	Osco silt loam, 5 to 10 percent slopes, eroded	3.8	No
8D	Hickory silt loam, 10 to 18 percent slopes	80.9	No
8D2	Hickory loam, 10 to 18 percent slopes, eroded	20.3	No
8D3	Hickory clay loam, 10 to 18 percent slopes, severely eroded	105.6	No
8F	Hickory silt loam, 18 to 35 percent slopes	179.9	No

5.6 Historic and Current Land Use

Historically, the land use in Sangamon County was dominated by prairie grassland and forest land, but by the 1900s, the development of high-yield mechanical and chemical cultivation practices converted a majority of the land to row crop agriculture (Mac et al. 1998). Today, row crop agriculture dominates the landscape within Sangamon County and throughout the project area. Within the potential mitigation areas, small patches of bottomland forest were delineated adjacent to Brush Creek and Horse Creek, however no native grasslands or prairie land were observed during the field survey, while row crop agriculture remained the dominant use of these areas. Although agricultural land use may continue in areas surrounding the Hunter Lake project site, all lands within the project area are anticipated to be removed from active agricultural production upon final project approvals.

6 Determination of Credits

6.1 Overview

In coordination with the USACE Rock Island District and utilization of the Illinois Stream Mitigation Method (USACE 2010), approximately 2,436,019 stream mitigation credits will be required as compensatory mitigation for the proposed Hunter Lake project, which is anticipated to convert 237,479 linear feet of jurisdictional stream habitat to lacustrine habitat.

Required stream mitigation credits was determined based on a variety of current conditions and proposed impact factors including existing stream flow type, priority, existing condition, impact duration, and proposed activity (such as impoundment, detention, or fill), which was previously referenced in **Section 5.4**. This Plan outlines conceptual stream mitigation concepts and estimated mitigation credits generated by concept type below.

6.2 Riparian Zone Mitigation

The Illinois Stream Mitigation Guidance (USACE, 2010) identifies riparian zone plantings as an approved stream mitigation method and the method assumes that invasive species control would be an integral part of the riparian zone planting activity. As such, invasive species control would be implemented during planting, as needed, and would be evaluated during annul monitoring and reporting. Riparian zone plantings are important for soil conservation, water quality, biological diversity, and streambank stabilization (Magnum and Forress, 2005).

Riparian zones would be planted with woody species identified in **Table 6-1** to a maximum width of 300 feet on each side of the proposed streambank. Where a partial riparian zone is already established, additional trees would be planted to achieve a 300-foot-wide riparian corridor. Woody species selected for planting would be based on commercial availability and USACE/IEPA concurrence. In addition to woody plantings, herbaceous species would be established by seeding and areas would be temporarily stabilized by mulching. Depending on site conditions, herbaceous species would include native grasses such as Virginia wild rye (*Elymus virginicus*), switchgrass (*Panicum virgatum*), purpletop (*Tridens flavus*), and/or fox sedge (*Carex vulpinoidea*).

Concepts for the establishment of compensatory stream mitigation credits through riparian zone creation, restoration, or preservation are discussed below. Concepts evaluated include work on both City property and nearby private property. Generation of mitigation credits on private property would require either purchase of the property or establishment of a real estate instrument to allow and protect City of Springfield mitigation activities. All mitigation concepts are subject to USACE/IEPA approval and are based on the riparian methods established in the Illinois Stream Mitigation Guidance (USACE 2010).

At each riparian zone planting location, invasive species control would be implemented. Invasive species would be evaluated prior to and during planting and control would include herbicide applications, as appropriate, by certified applicators in accordance with label instructions. Invasive

species control would be evaluated and implemented annually as needed. Invasive species subject to control would be based on coordination and input from the USACE and may include sericea lespedeza (Lespedeza cuneata), Johnson grass (*Sorghum halepense*), autumn olive (*Elaeagnus umbellata*), common buckthorn (*Rhamnus cathartica*), and Amur honeysuckle (*Lonicera maackii*).

6.2.1 City Property Outside the Impounded Lake

Stream reaches have been identified on City of Springfield property for potential riparian zone mitigation in the Horse Creek and Brush Creek watersheds immediately adjacent to the planned Hunter Lake impoundment (**Figure 2-1**). These stream reaches are located outside the footprint of the impounded lake and either lack a riparian zone completely or only have a partial riparian corridor. Much of this area is in agriculture with row crops to the edge of stream channels. Establishment of a 300-foot-wide woody riparian zone will reduce erosion, improve water quality, and enhance both terrestrial and aquatic habitat. A total of 29 stream reaches and approximately 263 acres have been identified for potential riparian zone mitigation here and based on this approach, approximately 233,796 stream mitigation credits may be generated (see **Figure 2-1** and **Table 6-2**).

6.2.2 City Property Inside Narrow Reaches of the Impounded Lake

Stream reaches have been identified on City of Springfield property for potential riparian zone mitigation in the Horse Creek and Brush Creek watersheds immediately adjacent to the planned Hunter Lake impoundment (**Figure 2-1**). These stream reaches are located inside the footprint of the impounded lake but in select narrow reaches that resemble stream corridors. It was noted in a meeting with the USACE on 28 October 2022 that stream segments upstream of the low-head dams would maintain some flow in the channels, albeit slower. It is in these narrow stream-like corridors that we propose riparian zone plantings. These locations either lack a riparian zone completely or only have a partial riparian corridor. Much of this area is in agriculture with row crops to the edge of stream channels. Establishment of a 300-foot-wide woody riparian zone will reduce erosion, improve water quality, and enhance both terrestrial and aquatic habitat. A total of 14 stream reaches and approximately 99 acres have been identified for potential riparian zone mitigation here and based on this approach, approximately 99,890 stream mitigation credits may be generated (see **Figure 2-1** and **Table 6-3**).

6.2.3 Private Property Outside the Impounded Lake

Stream reaches have been identified on private property for potential riparian zone mitigation in the Horse Creek, Brush Creek, and Henkle Branch watersheds immediately adjacent to the planned Hunter Lake impoundment (**Figure 2-1**). These stream reaches are located outside the footprint of the impounded lake and either lack a riparian zone completely or only have a partial riparian corridor. Much of this area is in agriculture with row crops to the edge of stream channels. Establishment of a 300-foot-wide woody riparian zone will reduce erosion, improve water quality, and enhance both terrestrial and aquatic habitat. A total of 35 stream reaches and approximately 1,015 acres have been identified for potential riparian zone mitigation here and based on this

approach, approximately 422,077 stream mitigation credits can be generated (see **Figure 2-1** and **Table 6-4**).

6.2.4 Private Property Inside Narrow Reaches of the Impounded Lake

Stream reaches have been identified on private property for potential riparian zone mitigation in the Horse Creek and Brush Creek watersheds immediately adjacent to the planned Hunter Lake impoundment (**Figure 2-1**). These stream reaches are located inside the footprint of the impounded lake but in select narrow reaches that resemble stream corridors. It was noted in a meeting with the USACE on 28 October 2022 that portions of the streams upstream of the low-head dams would still maintain some flow in the channels, albeit slower. It is in these narrow stream-like corridors that we propose riparian zone plantings. These locations either lack a riparian zone completely or only have a partial riparian corridor. Much of this area is in agriculture with row crops to the edge of stream channels. Establishment of a 300-foot-wide woody riparian zone will reduce erosion, improve water quality, and enhance both terrestrial and aquatic habitat. A total of four stream reaches and approximately 66 acres have been identified for potential riparian zone mitigation here and based on this approach, approximately 58,940 stream mitigation credits can be generated (see **Figure 2-1** and **Table 6-5**). Identification of private property parcels of interest, applicable ownership, and a discussion and agreement of partial property purchase or easement or deed restriction within the stream improvement and riparian areas are anticipated to be required and integrated into a further detailed mitigation plan.

6.2.5 Private Property in Adjacent Watershed

Stream reaches have been identified on private property for potential riparian zone mitigation immediately east of the proposed Hunter Lake impoundment (**Figure 2-1**). These stream reaches either lack a riparian zone completely or only have a partial riparian corridor. Much of this area is in agriculture with row crops to the edge of stream channels. Establishment of a 300-foot-wide woody riparian zone will reduce erosion, improve water quality, and enhance both terrestrial and aquatic habitat. A total of 14 stream reaches and approximately 702 acres have been identified for potential riparian zone mitigation here and based on this approach, approximately 609,762 stream mitigation credits may be generated (see **Figure 2-1** and **Table 2-6**). Identification of private property parcels of interest, applicable ownership, and a discussion and agreement of partial property purchase or easement or deed restriction within the stream improvement and riparian areas are anticipated to be required and integrated into a further detailed mitigation plan.

6.2.6 Structure Removal

Based on input from the USACE, structure removal and other stream mitigation projects can be performed within the HUC 8 where impacts occur (07130007, South Fork Sangamon) or in adjoining HUC 8 watersheds as depicted in **Figure 2-2**. Mitigation in the HUC 8 of impact (07130007) would be allowed a mitigation factor of 1.0 when calculating credits in accordance with the Illinois Stream Mitigation Guidance (USACE 2010), whereas projects in 07130006, 07130008, 07130011, or 07130012 would calculate using a mitigation factor of 0.5.

The City of Springfield is considering partnering with others to fund and support removal of at least two dams on the Sangamon River; the Petersburg Dam on the Lower Sangamon (7130008) and the Color Plant Road Dam on the South Fork Sangamon (07130007). Credits for removal of the Color Plant Road Dam are based on a mitigation factor of 1.0 (same HUC 8 where impacts occur) whereas credits for removal of the Petersburg Dam are calculated using a mitigation factor of 0.5 as depicted in **Table 6-7**. A total of approximately 11,310 mitigation credits are projected for removal of these two dam structures. Other structure removal projects will be considered as appropriate. It should be noted that removal of dams and other structures located within jurisdictional waterways would likely require separate Clean Water Act Section 401 and Section 404 permit authorizations, as well as other applicable assessments related to aquatic habitat, state and federal listed species, and historical structures, Coordination with applicable state and federal agencies would be required during the permitting process prior to the commencement of any related construction activities.

6.2.7 Lake Springfield Watershed Management Plan

Based on input from the USACE, mitigation is allowed within the same HUC 8 where impacts occur (07130007, South Fork Sangamon) and within the adjoining HUC 8 watersheds depicted in **Figure 2-2**. For calculation of credits in accordance with the Illinois Stream Mitigation Guidance (USACE 2010), mitigation projects within the South Fork Sangamon HUC 8 are allowed a mitigation factor of 1.0, whereas those projects within adjoining HUC 8 watersheds are allowed a mitigation factor of 0.5.

Based on comments following that same meeting, the USACE would consider some of the measures described in the Lake Springfield Watershed Management Plan for Hunter Lake mitigation as long as they are connected to or are adjacent to jurisdictional streams. As such, plantings within non-jurisdictional grassy swales or similar upland plantings cannot be considered for mitigation. The City of Springfield will evaluate the Plan and determine which projects should be presented to the USACE for project mitigation. Existing projects that are presently in place could not be considered for mitigation, and only new projects that have yet to be implemented may be eligible for compensatory mitigation use. Calculation of credits will be based on the provisions of the Illinois Stream Mitigation Guidance (USACE 2010). A placeholder value of 25,000 credits will be used for this conceptual mitigation plan. The number of actual mitigation credits generated may vary.

6.3 Floodplain Reconnection

High stream flows that move outside the channel and into the floodplain typically result in a reduction in flow rate, a dispersal of flow energy, and a deposition of sediment. By providing room for floodwaters to spread out, floodplains lower flood levels and regulate the amount of sediment transported by a stream. This process results in the formation of swales, wetlands, and ephemeral ponding in the floodplain. As a result of periodic disturbance, floodplains are shaped into habitat mosaics that are characterized by a diversity of successional stages and uniquely adapted biota. During inundation, floodplains provide habitat for fish and aquatic biota, and supply nutrients and shelter that enhance fish reproductive success and growth rates (Loos and Shader, 2016).

Disconnection of floodplains has occurred historically, and continues to occur, as result of urbanization and, in particular, floodplain development. Urbanization leads to increased stormwater runoff which leads to increased or concentrated stream flows and incised stream channels. Incised stream channels, like those in the project vicinity, become increasingly disconnected from their floodplains and require larger, more infrequent flood flows to re-establish floodplain connection.

The proposed Hunter Lake project will result in streams being reconnected to their floodplains in select locations upstream of the low-head dams where normal or daily water levels will be raised within the channels. Floodplain reconnection is limited to locations upstream of the low-head dams where stream flow is expected to continue, perhaps at a somewhat slower rate. Because locations between the main dam and the low-head dams will be impounded with little or no flow, they are excluded from floodplain reconnection consideration. However, floodplain reconnection may still represent a viable mitigation design alternative for stream portions located upstream of the low-head dam areas if certain design and grading aspects are integrated, such as bank sloping and benching. Stream bank re-sloping and benching activities are a significant aspect of floodplain reconnection and would likely need utilized within applicable mitigation projects. As such, a placeholder of 25,000 mitigation credits has been included here for this conceptual mitigation plan as summarized in **Table 6-8**. The number of actual mitigation credits generated may vary based on design details if the City of Springfield pursues this mitigation option.

6.4 Third Party Stream Mitigation & Mitigation Banks/In Lieu Fee Programs

The City of Springfield intends to partner with a third-party organization(s) to fund stream restoration projects for additional mitigation credit. Based on USACE comments following the 28 October 2022 meeting, third party stream mitigation projects in the same HUC 8 or immediately adjacent HUC 8 are acceptable for mitigation credit as long as the mitigation project is in the same HUC 6 as the Hunter Lake project. One or more third party stream mitigation projects is anticipated. Mitigation credits generated using this approach would be calculated in accordance with the Illinois Stream Mitigation Guidance (USACE 2010) and would be subject to approval by the USACE. Although the City of Springfield has one third-party partner with at least two different stream mitigation projects ready for approval, design and site-specific information is not yet available. Additional stream mitigation bank or in-lieu fee credits may be available from an approved mitigation bank entity that has available credits for purchase within the project area HUC 8, which are anticipated to be prioritized for purchase over permittee responsible mitigation options. As such, a placeholder of 25,000 mitigation credits has been included here. Actual mitigation credits may vary and are anticipated to be determined closer to 404/401 permit issuance. Per the Mitigation Rule guidance, stream mitigation bank or in-lieu fee credits currently available within the project area HUC 8 would be purchased first, prior to development of onsite permittee-responsible stream mitigation.

Table 6-1. Typical Riparian Zone Planting List[1]

Botanical Name	Common Name	Physiognomy	C[2]	Indicator[3]
Amelanchier arborea	Downy Serviceberry	Tree/Shrub	6	FACU
Betula nigra	River Birch	Tree	4	FACW
Carpinus caroliniana	Blue Beach	Tree	6	FAC
Carya illinoinensis	Pecan	Tree	7	FACW
Celtis occidentalis	Hackberry	Tree	3	FAC
Cephalanthus occidentalis	Buttonbush	Shrub	3	OBL
Cornus amomum	Silky Dogwood	Shrub	5	FACW
Cornus drummondii	Rough-leaved Dogwood	Shrub	2	FAC
Cornus racemosa	Gray Dogwood	Shrub	3	FAC
Diospyros virginiana	Persimmon	Tree	3	FAC
Gymnocladus dioicus	Kentucky Coffeetree	Tree	6	NI
Lindera benzoin	Spicebush	Shrub	5	FACW
Platanus occidentalis	Sycamore	Tree	3	FACW
Prunus americana	Wild Plum	Shrub/Tree	4	UPL
Prunus serotina	Black Cherry	Tree	2	FACU
Quercus bicolor	Swamp White Oak	Tree	7	FACW
Quercus macrocarpa	Bur Oak	Tree	4	FAC
Quercus palustris	Pin Oak	Tree	4	FACW
Quercus rubra	N. Red Oak	Tree	5	FACU
Ulmus americana	American Elm	Tree	4	FACW
Ulmus rubra	Slippery Elm	Tree	5	FAC

[1] Actual species composition would be based on commercial availability and USACE concurrence.
[2] Coefficient of Conservatism established by Ladd and Thomas (2015). An integer between 0 and 10 reflecting the degree of dependence on intact natural habitats (0=weedy; 10=highly conservative).
[3] Indicator established by USACE (2020); OBL=obligate; FACW=facultative wet; FAC=facultative; FACU=facultative upland; UPL=upland; NI=no indicator.

Table 6-2. Stream Mitigation on City Property Outside the Impounded Lake

Stream ID	Stream Name	Priority Waters	Planting (Side A)	Planting (Side B)	Net Benefit (Side A)	Net Benefit (Side B)	Buffer Credit (side1+2 / 2)	Monitoring	Site Protection	Mitigation Construction Timing	Temporal Lag	Mitigation Factor	Sum of Factors (m)	Buffer Length (lf)	Credits (C)=(m)x(lf)
STR-010	Horse Cr	0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	6.775	1,831	12,407
STR-011		0.2	<10%	<10%	0.65	0.65	0.65	0.25	0.4	0	-0.1	1.0	3.7	47	175
STR-020		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	749	6,706
STR-051		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	686	6,136
STR-060		0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	6.775	918	6,217
STR-071		0.2	<10%	<10%	0.65	0.65	0.65	0.25	0.4	0	-0.1	1.0	3.7	247	913
STR-200		0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	220	1,010
STR-210		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,055	9,442
STR-270		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,024	9,168
STR-280		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,082	9,682
STR-335		0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	6.775	904	6,123
STR-360		0.2	10-50%	<10%	0.95	0.65	0.8	0.25	0.4	0	-0.1	1.0	4.15	697	2,893
STR-370		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	623	5,576
STR-371		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,161	10,390
STR-380		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,930	17,273
STR-381		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	286	2,562
STR-390		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	964	8,627
STR-410		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,360	12,175
STR-440		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	424	3,794
STR-500		0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	6.775	549	3,717
STR-560		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,820	16,292
STR-570		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	3,202	28,660
STR-670		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	2,931	26,237
STR-701		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	579	5,186
STR-710		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	907	8,121
STR-720		0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	613	2,820
STR-730		0.2	10-50%	51-100%	0.95	2.4	1.675	0.25	0.4	0	-0.1	1.0	6.775	512	3,466
STR-740		0.2	51-100%	<10%	2.4	0.65	1.525	0.25	0.4	0	-0.1	1.0	6.325	418	2,642
STR-750		0.2	51-100%	<10%	2.4	0.65	1.525	0.25	0.4	0	-0.1	1.0	6.325	851	5,384
														Riparian Credit Subtotal:	**233,796**

Total approximate planting area – 263 ac

Table 6-3. Stream Mitigation on City Property Inside Narrow Reaches of the Impounded Lake

Stream ID	Stream Name	Priority Waters	Planting (Side A)	Planting (Side B)	Net Benefit (Side A)	Net Benefit (Side B)	Buffer Credit (side1+2 / 2)	Monitoring	Site Protection	Mitigation Construction Timing	Temporal Lag	Mitigation Factor	Sum of Factors (m)	Buffer Length (lf)	Credits (C)=(m)x(lf)
STR-010	Horse Cr	0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	7,253	33,362
STR-335		0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	247	1,135
STR-360		0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	411	1,893
STR-370		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,467	13,134
STR-420	Brush Cr	0.2	<10%	51-100%	0.65	2.4	1.525	0.25	0.4	0	-0.1	1.0	6.325	1,373	8,684
STR-420	Brush Cr	0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	7,367	33,888
STR-720		0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	701	3,226
STR-730		0.2	<10%	10-50%	0.65	0.95	0.8	0.25	0.4	0	-0.1	1.0	4.15	966	4,011
STR-750		0.2	10-50%	<10%	0.95	0.65	0.8	0.25	0.4	0	-0.1	1.0	4.15	135	559
														Riparian Credit Subtotal:	**99,890**

Only streams upstream of the low-head dams are included in Table 6-3 because they still generate some flow
Total approximate planting area – 99 ac

Table 6-4. Stream Mitigation on Private Property Outside the Impounded Lake

Stream ID	Stream Name	Priority Waters	Planting (Side A)	Planting (Side B)	Net Benefit (Side A)	Net Benefit (Side B)	Buffer Credit (side1+2 / 2)	Monitoring	Site Protection	Mitigation Construction Timing	Temporal Lag	Mitigation Factor	Sum of Factors (m)	Buffer Length (lf)	Credits (C)=(m)x(lf)
STR-001	Horse Cr	0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	11,002	45,660
STR-010	Horse Cr	0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	2.7	2,403	6,488
STR-010	Horse Cr	0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	3.425	1,200	4,111
STR-011		0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	2.7	3,290	8,882
STR-012	Henkle Br	0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	3.425	5,354	18,338
STR-013		0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	2.7	1,654	4,467
STR-013		0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	3.425	1,391	4,764
STR-060		0.2	10-50%	51-100%	0.95	2.4	1.675	0.25	0.4	0	-0.1	1.0	3.425	697	2,388
STR-270		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	2,591	10,753
STR-280		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	3,664	15,205
STR-335		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	1,201	4,984
STR-360		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	2,114	8,775
STR-370		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	11,593	48,109
STR-371		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	1,405	5,833
STR-372		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	2,592	10,756
STR-380		0.2	<10%	10-50%	0.65	0.95	0.8	0.25	0.4	0	-0.1	1.0	2.55	749	1,909
STR-380		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	3,063	12,710
STR-381		0.2	10-50%	51-100%	0.95	2.4	1.675	0.25	0.4	0	-0.1	1.0	3.425	1,941	6,649
STR-390		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	1,680	6,973
STR-410		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	1,761	7,307
STR-420	Brush Cr	0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	6,145	25,502
STR-421		0.2	<10%	10-50%	0.65	0.95	0.8	0.25	0.4	0	-0.1	1.0	2.55	906	2,309
STR-421		0.2	10-50%	<10%	0.95	0.65	0.8	0.25	0.4	0	-0.1	1.0	2.55	313	799
STR-421		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	3,414	14,168
STR-422		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	2,364	9,809
STR-423		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	472	1,960
STR-424		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	10,381	43,082
STR-560		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	2,255	9,357
STR-570		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	5,479	22,739
STR-670		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	3566	14,800
STR-701		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	3146	13,057
STR-710		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	1586	6,582
STR-730		0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	3.425	948	3,248
STR-730		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	2526	10,483
STR-750		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	4.15	2199	9,124
													Riparian Credit Subtotal:		**422,077**

Total approximate planting area – 1,015 ac

Table 6-5. Stream Mitigation on Private Property Inside Narrow Reaches of the Impounded Lake

Stream ID	Stream Name	Priority Waters	Planting (Side A)	Planting (Side B)	Net Benefit (Side A)	Net Benefit (Side B)	Buffer Credit (side1+2 / 2)	Monitoring	Site Protection	Mitigation Construction Timing	Temporal Lag	Mitigation Factor	Sum of Factors (m)	Buffer Length (lf)	Credits (C)=(m)x(lf)
STR-010	Horse Cr	0.2	10-50%	10-50%	0.95	0.95	0.95	0.25	0.4	0	-0.1	1.0	4.6	2,004	9,220
STR-420	Brush Cr	0.2	<10%	51-100%	0.65	2.4	1.525	0.25	0.4	0	-0.1	1.0	6.325	630	3,984
STR-420	Brush Cr	0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	4,848	43,388
STR-424		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	262	2,349
														Riparian Credit Subtotal:	**58,940**

Only streams upstream of the low-head dams are included in Table 6-5 because they still generate some flow
Total approximate planting area – 66 ac

Table 6-6. Stream Mitigation on Private Property in the Adjacent Watershed

Stream ID	Stream Name	Priority Waters	Planting (Side A)	Planting (Side B)	Net Benefit (Side A)	Net Benefit (Side B)	Buffer Credit (side1+2 / 2)	Monitoring	Site Protection	Mitigation Construction Timing	Temporal Lag	Mitigation Factor	Sum of Factors (m)	Buffer Length (lf)	Credits (C)=(m)x(lf)
STR-800		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	25,713	230,127
STR-810		0.2	10-50%	51-100%	0.95	2.4	1.675	0.25	0.4	0	-0.1	1.0	6.775	3,362	22,777
STR-820		0.2	51-100%	10-50%	2.4	0.95	1.675	0.25	0.4	0	-0.1	1.0	6.775	1,317	8,920
STR-830		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	4,537	40,610
STR-840		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	9,138	81,787
STR-850		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	2,394	21,431
STR-860		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	2,770	24,793
STR-870		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	3,383	30,281
STR-880		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	2,081	18,624
STR-900		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	6,260	56,027
STR-910		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,312	11,739
STR-920		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	1,606	14,372
STR-930		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	2,246	20,105
STR-940		0.2	51-100%	51-100%	2.4	2.4	2.4	0.25	0.4	0	-0.1	1.0	8.95	3,148	28,171
													Riparian Credit Subtotal:		**609,762**

Streams in Table 6-6 are in the same HUC 8 as those impacted by Hunter Lake thus the same mitigation factor is applied per USACE guidance
Total approximate planting area – 702 ac

Table 6-7. Stream Mitigation Credits by Dam Removal

Dam	Stream Name	Priority Waters	Net Benefit	Monitoring	Site Protection	Mitigation Construction Timing	Sum of Factors (m)	Length (ft)[1]	Credits (C) = (m) x (lf)	Mitigation Factor (MF)	Total Credits (MF)x(C)
Within City Property											
Petersburg	Sangamon R	0.2	3.5	0.25	0.4	0	4.35	3,000	13,050	0.5	6,525
Color Plant Rd	Sangamon R	0.2	3.5	0.25	0.4	0	4.35	1,100	4,785	1.0	4,785
									Dam Removal Total		**11,310**

[1] *Length of dam's backwater effect on the river system.*

Table 6-8. Summary of Potential Stream Mitigation Credits Generated

Location	Table	Length	Planting Area (ac)	Mitigation Credits	Probability of Implementation	Implementaton Credits
Riparian Zone						
Streams on City Property Outside the Impounded Lake	2-2	28,591	263.1	233,796	100%	233,796
Streams on City Property Inside Narrow Reaches of the Impounded Lake	2-3	19,920	98.6	99,890	50%	49,945
Streams on Private Property Outside the Impounded Lake	2-4	107,046	1,015.1	422,077	60%	253,246
Streams on Private Property Inside Narrow Reaches of the Impounded Lake	2-5	7,744	65.5	58,940	60%	35,364
Streams on Private Property in the Adjacent Watershed	2-6	69,267	702.0	609,762	40%	243,905
Riparian Zone Mitigation		232,568	2,144.3	1,424,465	TBD	816,256
Structural Removal	2-7			11,310	TBD	11,310
Lake Springfield Watershed Management Plan				25,000	TBD	25,000
Floodplain Reconnection				25,000	TBD	25,000
Third Party Stream Mitigation				25,000	TBD	25,000
Total Potential Stream Mitigation Credit				**1,510,775**		**902,566**

**It should be noted that "mitigation credits" column listed is the anticipated potential mitigation credit yield based on the noted activity, while the "implementation credits" column is offset based on the currently assumed probability of those credits being generated.*

7 Mitigation Work Plan

Implementation of this work plan is anticipated to take place concurrent with the impacts authorized by the pending Section 404 permit. Further project development and coordination is required to identify exact mitigation alternative feasibility and credit generation from those scenarios as the project and permit review process progresses.

As previously noted, a Detailed Compensatory Stream Mitigation Plan will be prepared, based on the concepts identified in this Plan, to satisfy the mitigation requirements associated with impacts to waters of the U.S. (WOTUS) from the Hunter Lake Reservoir project as required by the USACE Clean Water Act (CWA) Section 404 permit and the associated CWA Section 401 Water Quality Certification issued by Illinois Environmental Protection Agency (IEPA). The final Detailed Compensatory Stream Mitigation Plan will be written to satisfy the requirements of the Mitigation Rule (33 CFR 332, Compensatory Mitigation for Losses of Aquatic Resources) consistent with Regulatory Guidance Letter 08-03 dated 10 October 2008 and the USACE Rock Island District's Stream/Wetland Mitigation Plan Requirements for Permittee Responsible Mitigation dated 13 August 2009.

7.1 Implementation Schedule

Mitigation construction timing and associated monitoring and annual reporting will follow a schedule to be developed in the final mitigation Plan. Due to the scale and number of individual projects, mitigation implementation is expected to occur over a period of approximately 15 years. A preliminary schedule is provided below in **Table 7-1**.

Table 7-1. Preliminary Implementation Schedule

Year	Mitigation Activity
1-5	Initiate riparian zone plantings Lake Springfield Watershed Management Plan projects Annual monitoring and reporting
6-10	Continue riparian zone plantings Structure removals Third party stream mitigation Annual monitoring and reporting
11-15	Complete riparian zone plantings Third party stream mitigation Annual monitoring and reporting

**This schedule is preliminary in nature and subject to change. A significant effort would be made to ensure that mitigation site performance attainment was completed or on a positive trajectory prior to the impact of aquatic resources associated with the Hunter Lake Reservoir project.*

8 Maintenance Plan

Attempts at vegetation management on a natural site should consider the ecological processes that shaped pre-settlement wetlands, riparian areas, and prairies. Some of these processes were disturbances such as fire, flooding, and predation. Removal or alteration of some of these factors has resulted in reduced floristic quality and species richness in many areas. Management practices that utilize or mimic natural ecological processes are necessary to maintain ecosystem integrity, stability, structure, dynamics, and species diversity (Illinois Nature Preserve Commission 1990). Management techniques that will be used include the following:

- Invasive species and aggressive native species management
- Herbivore management
- Fire management and/or mowing

Ultimately, an additional Maintenance Plan is anticipated to be integrated into the Detailed Compensatory Stream Mitigation Plan once formal site selection and mitigation has been determined. Additional development and coordination of overall maintenance plan objectives is anticipated to be required based on the nature of the proposed mitigation method and overall site selection. As mentioned above, general management techniques that may be used are further discussed below.

8.1 Invasive Species Management

The City of Springfield will conduct stewardship activities beginning the first year after any mitigation planting and continuing each year thereafter for at least five (5) years applicable mitigation sites. Stewardship activities may occur up to three times each year during the growing season (April 1 through October 15) and will be implemented to minimize competition from species such as garlic mustard (*Alliaria petiolata*), Amur honeysuckle (*Lonicera maackii*), reed canary grass (*Phalaris arundinacea*), multiflora rose (*Rosa multiflora*), cocklebur (*Xanthium strumarium*); aggressive native species such as eastern cottonwood (*Populus deltoides*), sand bar willow (*Salix exigua*), cattail (*Typha spp.*), as well as other weedy invasives. Stewardship may include herbicide application, mowing or other similar methods to provide optimal growing conditions for the target riparian plant communities.

Restoration and mitigation activities associated with the applicable mitigation sites will create opportunities for invasive species to become established. In particular, grading and general seedbed preparation will create large expanses of bare soil that may be colonized by invasive plant species which may out-compete desirable native plant species. Because of these factors, control of invasive species will be an important part of mitigation activities.

Because invasive plant species have the potential to directly interfere with site specific management goals identified herein, specific objectives have been established. Measurable objectives for high priority invasive plant species include:

- Providing annual surveillance to identify new populations, expanding populations, and to determine the effectiveness of prior treatment and management.
- Treating invasive species with appropriate herbicide using the prescribed rates at the prescribed times.

Herbicides should only be applied by trained and licensed herbicide applicators. All herbicides should be applied in accordance with the label requirements and at the rates specified on the label for the target species. Methods for various species are described below and are listed in **Table 8-1**.

Table 8-1. Herbicide Control of Exotic and Invasive Vegetative Species

Botanical Name	Common Name	Potential Control Techniques
Alliaria petiolata	Garlic mustard	Spray Roundup to plants in the fall or early spring. Individual plants can be hand pulled for small populations. Repeat as necessary.
Lonicera maackii	Amur honeysuckle	Cut and apply Roundup to stumps of larger specimens in fall or dormant season. For saplings or resprouts, apply Roundup to basal bark in fall. Repeat as necessary.
Phalaris arundinacea	Reed canary grass	Spray Rodeo, Dalapon, or Amitrol in the early spring. Repeat as necessary.
Rosa multiflora	Multiflora rose	Spray with Krenite, Banvel, or Roundup during the growing season. Repeat as necessary.
Xanthium strumarium	Common cocklebur	Spray with Roundup or Rodeo in early spring. Repeat as necessary.

Garlic Mustard (*Allaria petiolata*)

For new infestations and small populations of garlic mustard, hand pulling can be effective if it is done before garlic mustard seeds disperse. Another method that can be used is to cut the plant a few inches above the ground just after the flower stalks have elongated, but before the flowers have opened. If the plants have budded, they should be bagged and deposited in a landfill each year until the seed bank is exhausted. In addition to hand pulling, in the fall or very early spring when most native plants are dormant, a foliar glyphosate spray such as Roundup can be applied to individual plants (MDNR 2010b).

Amur Honeysuckle (*Lonicera maackii*)

For smaller plants, the best way to control Amur honeysuckle is to remove it completely (roots and the above ground portion of the plant). If pulling the plant out of the ground is not practical, some success has been seen when the plant is cut off a few inches from the ground and then concentrated glyphosate, such as Roundup or Rodeo, is applied directly to the cut stems. This is most effective when the pesticide is applied during the fall when the plant is likely going to take the glyphosate into the roots (MDNR 2010a).

Reed Canary Grass (*Phalaris arundinacea*)

For small stands of reed canary grass, hand removing the stems at flowering time may kill some of the small patches. Additionally, certain herbicides are effective where there is no real concern for damage to surrounding native species. The herbicides Rodeo, Dalapon, and Amitrol are designed for used in wetlands (aquatic habitat) to kill reed canary grass and should be applied in early spring when reed canary grass is green and most native wetland species are dormant. Additionally, repeated burning during late fall or spring for several years can control the spread of this species. When practical, it can be useful to sow in seed of nearby native grasses and forbs after reed canary grass has died or gone dormant (MDNR 2017b).

Multiflora Rose (*Rosa multiflora*)

In small, scattered infestations, removing individual plants from the soil can be effective if all the roots of the plant are removed. In addition, repeated cutting or mowing of multiflora rose at the rate of three to six times per growing season can achieve high plant mortality. Herbicides such as Krenite, Banvel, and Roundup can be effective foliar sprays applied directly to multiflora rose plants and should be applied only during the growing season (MDNR 2017a).

Common Cocklebur *(Xanthium strumarium)*

For small populations, hand pulling is effective before bur development and seed dispersal begin. Mowing can be effective, but as with hand pulling, mowing should be carried out before burs are formed. Common cocklebur is susceptible to a variety of herbicides that are commonly used for broadleaved weed control. Several auxin mimicking herbicides can be used such as 2,4-D, triclophyr, glycophosate, and imazaquin. Herbicide spray solutions should contain an appropriate surfactant to ensure complete leaf wetting. Herbicide applications should be made to young three to five leaf plants during active growth to maximize treatment efficacy (DiTomaso et al. 2013).

8.2 Invasive Species Management

During riparian planting and early establishment of the mitigation areas, some animals may be problematic. These animals include geese, ducks, deer, beavers, muskrats, rabbits, and small rodents. Geese and muskrats have been noted to follow planting crews and eat or pull out plants minutes after planting (Garbisch 1995). Other problems may arise when the population in the area exceeds the carrying capacity of the community. When this takes place, many of the riparian mitigation plants may be eaten or destroyed. General practices that control smaller herbivores include controlling weeds surrounding the site, controlling weeds around individual planted trees, utilizing tree tubes for seedling and bare root plantings, and removing brush piles. Continued monitoring of the sites will be necessary to assess the issue of herbivore management and the need for supplemental plantings.

8.3 Prescribed Fire and Mowing

A natural and low-cost method to control woody invasive species is through fire management. Prescribed fire may be utilized as an enhancement and management tool at mitigation sites subsequent to the development of a burn plan and appropriate permit approvals. Prescribed fire

helps manage native and adventive weeds, and also restores nutrients for desirable plant growth in the future.

Timing is a critical consideration in maintaining a community with fire. Fires that occur during the growing season are detrimental to native species and result in a loss of diversity. Typically, spring fires are used because they reduce populations of cool-season, non-native grasses and forbs while promoting the development of warm-season native grasses. Fall fires tend to promote the development of many native prairie forb species. The spring burn season typically begins in early March and runs through early April. Fall burns typically commence about two weeks following the first killing frost, usually in early November. The fall burn season lasts into December, but prescribed burns can occur well into winter depending on site conditions, management goals, and appropriate climatic conditions. Fires also effectively lengthen the growing season by burning off accumulated leaf litter and exposing the soil surface to the sun, thereby increasing soil temperatures and promoting seed germination (Pauly 1997).

If fire management is used at a mitigation site, a specific fire management plan should be developed for the Hunter Lake Reservoir stream mitigation areas, including details such as the identification of primary and secondary firebreaks, recommended methods of burns for various conditions, and contingency plans in case of escaped fire. Approval will be obtained from the appropriate agencies prior to conducting any burn and prescribed burns will be performed only by experienced, trained professionals.

Depending on the nature of the mitigation project, mowing may be conducted in certain areas to help keep early successional volunteer species in check as more desirable species become established. As management tools, prescribed fire and mowing should be variously applied (technique, timing, and frequency) to achieve diverse plant communities, depending on the nature of the mitigation project and overall mitigation site goals.

9 Performance Standards

Performance standards are observable or measurable attributes that can be used to determine if a given stream mitigation project for the Hunter Lake Reservoir project is meeting the overall mitigation objectives briefly discussed in **Section 2**. Mitigation site specific performance standards are anticipated to be further developed in coordination with the USACE and will be provided in the final Detailed Compensatory Stream Mitigation Plan will be written to satisfy the requirements of the Mitigation Rule (33 CFR 332, Compensatory Mitigation for Losses of Aquatic Resources) consistent with Regulatory Guidance Letter 08-03 dated 10 October 2008 and the USACE Rock Island District's Stream/Wetland Mitigation Plan Requirements for Permittee Responsible Mitigation dated 13 August 2009.

10 Monitoring Requirements

Monitoring and adaptive management plans are intended to measure the level of success of the mitigation work. The final Detailed Compensatory Stream Mitigation Plan will incorporate ecological performance standards as required by 33 CFR 332.5 and monitoring will be performed to evaluate those standards. Monitoring plans also provide information to implement the appropriate corrective measures to reduce the likelihood of mitigation failure.

Routine monitoring events and annual reporting will be required to assess the development and condition of the various mitigation projects. The scope, frequency, and duration of monitoring is expected to vary based on the type of mitigation project – riparian zone planting, structure removal, or other in-stream mitigation activity. Likewise, the content and level of detail of the monitoring reports will be commensurate with the scale and scope of the various compensatory mitigation projects. Annual monitoring report completion and submission to the USACE is anticipated for a period of five to ten years depending on the mitigation sites' attainment of performance standards set forth. Monitoring reports will be drafted in accordance with USACE Rock Island District guidance while using the USACE Rock Island District Standard Mitigation Reporting Form.

All proposed mitigation monitoring will be in accordance with the final Mitigation Rule consistent with Regulatory Guidance Letter 08-03 dated 10 October 2008, and the USACE Rock Island District's Stream/Wetland Mitigation Plan Requirements for Permittee Responsible Mitigation dated 13 August 2009.

11 Long-Term Management Plan

The long-term management and financing of any compensatory stream mitigation areas associated with the Hunter Lake Reservoir project will be the responsibility of the City of Springfield (or designated entity) who will ensure that compensatory mitigation areas continue to adequately provide aquatic resource functions and services in perpetuity. As part of the written long-term management plan which will be refined and provided in the final Detailed Compensatory Stream Mitigation Plan, required mitigation areas are anticipated to have use-restrictions set into perpetuity to ensure that no fill/excavation, farming, or other disturbances are allowed within the boundaries of the sites, other than stewardship activities aimed at promoting the desired vegetation and habitat development within the sites. Additionally, due to conservation easement or deed restriction requirements for the mitigation areas, recreational use within the mitigation areas or surrounding buffer areas may be restricted or prohibited, (some limited recreation may be allowed such as hiking, bird watching, etc.) and applicable signage will be placed along the borders of the protected areas.

Identity of Long-Term Steward:

To be determined

Responsibilities of the Long-Term Steward:

The Long-Term Steward is responsible for monitoring and taking timely corrective actions to sustain the processes and functions of the aquatic resources at the mitigation sites and associated areas that may affect these aquatic resources.

Long-Term Management Activities:

Management and stewardship activities will be commensurate with the needed maintenance and may include: application of approved herbicides, prescribed burning, and mechanical application to control undesired, invasive, and noxious vegetation encroachment. Additional activities such as replanting of trees and herbaceous plants, tree trimming, and repairs to water irrigation systems and ditch plug may be engaged as needed to promote and sustain desired vegetation, biodiversity, and quality of habitats. The Plan will indicate an overall management strategy to address unforeseen changes in mitigation site conditions or other components of the compensatory mitigation project, including the party or parties responsible for implementing adaptive management measures. The Plan will guide decisions for revising compensatory mitigation plans and implementing measures to address both foreseeable and unforeseen circumstances that adversely affect compensatory mitigation success.

Funding Mechanism for Long-Term Management:

The City of Springfield will provide funding to ensure appropriate and secure resources are available for future monitoring and maintenance. The level of funding will be adequate and based on cost estimates for the required mitigation activities.

12 Adaptive Management Plan

If for any reason, the City of Springfield cannot construct the proposed mitigation sites in accordance with the approved Plan, the City of Springfield will notify the USACE District Engineer. If monitoring or other information indicates that the required mitigation projects are not progressing towards meeting their associated performance standards as anticipated, the City will notify the USACE District Engineer as soon as possible. The City of Springfield will work with the USACE District Engineer to evaluate and pursue measures to address deficiencies of the mitigation sites. These measures may include site modifications, alternative or more suitable site selections, design changes, revisions to maintenance requirements, revised monitoring requirements, purchase of mitigation bank or in-lieu fee credits (if available), or a combination of these options. The noted measures will be designed and implemented to ensure that the modified mitigation plan provides aquatic resource functions comparable to those described in the mitigation plan's objectives.

Performance standards may be revised, pending USACE approval, in accordance with adaptive management to account for measures taken to address deficiencies in the compensatory mitigation sites. Performance standards also may be revised to reflect changes in management strategies and objectives if the new standards provide for ecological benefits that are comparable or superior to the approved mitigation plan. No other revisions to the performance standards will be allowed except in the case of natural disasters.

If survival of planted vegetation/trees becomes problematic and/or plantings fail to meet the performance standards established in the Plan, then replanting may be necessary. Additionally, the same criteria would apply for any stream habitat development requirements and associated habitat performance criteria.

City of Springfield staff, or hired contractors and/or consultants would construct, maintain, and monitor the mitigation sites until the performance standards are met and written approval of the completion of site monitoring obligations is secured from the USACE. Personnel performing the monitoring activities (whether City staff or qualified contractors) will be appropriately qualified personnel trained in the 1987 Wetland Delineation Manual and 2010 Midwest Regional Supplement techniques and procedures as well as exhibiting applicable training and experience with stream habitat assessment and associated monitoring techniques.

13 Financial Assurances

The City of Springfield will be responsible for providing the necessary financial assurances to ensure that the approved stream mitigation, monitoring and contingency plans are properly implemented for the duration of the project and that the various stream mitigation types meet their intended functions. The City of Springfield will further coordinate with the USACE to determine the method of financial assurance required for the proposed mitigation development, such as a letter of credit, performance bond, or escrow holding to account for all costs associated with the construction, monitoring, and continues maintenance of the mitigation sites. A third-party entity is anticipated to be required to accept the noted funds needed to correct any mitigation deficiencies, which will be reviewed and approved by the USACE prior to approving the final mitigation plans.

In addition to securing the necessary resources to construct the mitigation areas, the City of Springfield (as the permittee) will be involved throughout the implementation of this project to ensure the sites are constructed as planned.

Additionally, budget will be set aside for long term maintenance of the mitigation areas as part of the funding associated with the maintenance activities.

14 Summary

14.1 Closing

Creation of the Hunter Lake Reservoir will require impoundment on portions of Brush Creek, Horse Creek, and their tributaries, and the subsequent conversion of 237,479 linear feet (44.98 miles) of jurisdictional stream habitat to lacustrine habitat. Based on input from the USACE Rock Island District, approximately 2,436,019 stream mitigation credits will be required for this habitat conversion. Based on the concepts presented in this Plan, a total of approximately 1,510,775 stream mitigation credits are possible as previously summarized in **Table 6-8**. Actual credits generated are expected to be somewhat less and would be based on the availability and feasibility of purchasing private property or establishing third party agreements to execute mitigation activities on properties not currently under city control. Additional stream mitigation opportunities and potential permittee-responsible mitigation development will require considerable further evaluation to ensure that all project-related stream mitigation credit needs are met.

15 References

Bentrup, G. 2008. Conservation Buffers: Design Guidelines for Buffers, Corridors, and Greenways. Gen. Tech. Rep. SRS-109. Asheville, NC: Department of Agriculture, Forest Service, Southern Research Station. 110 p.

DiTomaso, J.M., G.B. Kyser et al. 2013. Weed Control in Natural Areas in the Western United States. Weed Research and Informaiton Center, University of California. 544 pp.

Garbisch, E.W. and S. McIninch. 1995. The establishment of *Peltandra virginica* from large and small bulbs as a function of water depth. Wetland Journal 7(1):17-19.

Ladd, D. and J.R. Thomas. 2015. Ecological checklist of the Missouri flora for Floristic Quality Assessment. Phytoneuron 2015-12: 1–274. Published 12 February 2015. ISSN 2153 733X.

Loos, Jonathon and E. Shader 2016. Reconnecting Rivers to Floodplains. American Rivers. River Restoration Program. Spring 2016. Available at https://www.americanrivers.org/conservation-resource/reconnecting-floodplains/. Accessed December 9, 2022.

Missouri Department of Natural Resources (MDNR). 2010a. Bush Honeysuckles. Retrieved from Thttps://mdc.mo.gov/sites/default/files/resources/2010/08/9675_6621_0.pdf

Missouri Department of Natural Resources (MDNR). 2010b. Garlic Mustard. Retrieved from https://mdc.mo.gov/sites/default/files/resources/2010/08/9677_6623_0.pdf

Missouri Department of Natural Resources (MDNR). 2017a. Multiflora Rose Control. Retrieved from https://mdc.mo.gov/trees-plants/problem-plant-control/invasive-plants/multiflora-rose-control.

Magnum, Jean and Kristin Floress 2005. Illinois Forestry Development Council. Critical Issues Facing Illinois Forests and Forestry. Critical Issue: The Need for Enhanced Protection and Management of Remaining Illinois Riparian (Streamside) Woodlands and Forests. Southern Illinois University Carbondale. June 2005.

Pauly, W.R. 1997. The Tallgrass Restoration Handbook for Prairies, Savannas, and Woodlands. Edited by Stephen Packard and Cornelia F. Mutel. Washington, D.C. Island Press pp. 223-243.

USACE 2010. Illinois Stream Mitigation Guidance (Version 1.0), Stream Mitigation Method for Processing Section 404 Clean Water Act Permit Applications in the State of Illinois. U.S. Army Corps of Engineers. March 2010. Available at: https://www.mvr.usace.army.mil/Missions/Regulatory/Stream-Mitigation/. Accessed November 23, 2022.

USACE 2020. National Wetland Plant List, version 3.5. U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH. Available at: https://wetland-plants.usace.army.mil/nwpl_static/v34/home/home.html. Accessed December 7, 2022.

USACE 2022. National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams for the Wetlands Regulatory Assistance Program (WRAP). U.S. Army Corps of

Engineers. Interim Version, November 2022. Available at: https://www.erdc.usace.army.mil/Media/Publication-Notices/Article/3253541/national-ordinary-high-water-mark-field-delineation-manual-for-rivers-and-strea/

Wood, Cynthia and Steven Martin 2016. Compensatory Mitigation Site Protection Instrument Handbook for the Corps Regulatory Program. U.S. Army Corps of Engineers. July 2016. Available at: https://efaidnbmnnnibpcajpcglclefindmkaj/https://www.nawm.org/pdf_lib/site_protection_instrument_handbook_august_2016.pdf. Accessed December 7, 2022.

Woods, A.J., Omernik, J.M., Pederson, C.L., and B.C. Moran. 2006. Ecoregions of Illinois (color poster with map, descriptive text, and summary tables). U.S. Geological Survey.

Yochum, Steven E. 2017. Guidance for Stream Restoration. U.S. Department of Agriculture, Forest Service, National Stream & Aquatic Ecology Center, Technical Note TN-102.3. Fort Collins, CO.

Figures

Figure 1-1 Site Location

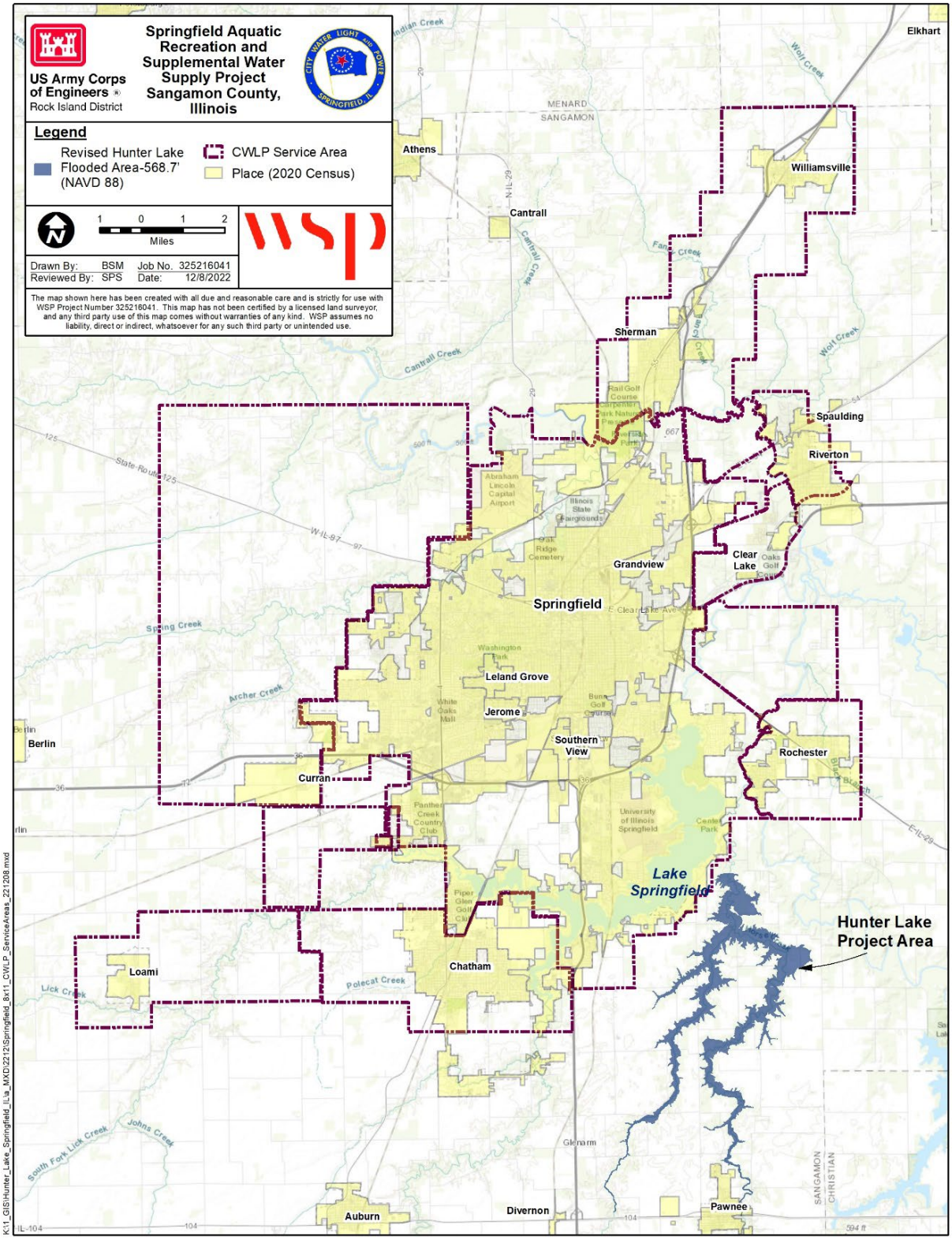


Figure 2-1 Stream Mitigation Reaches

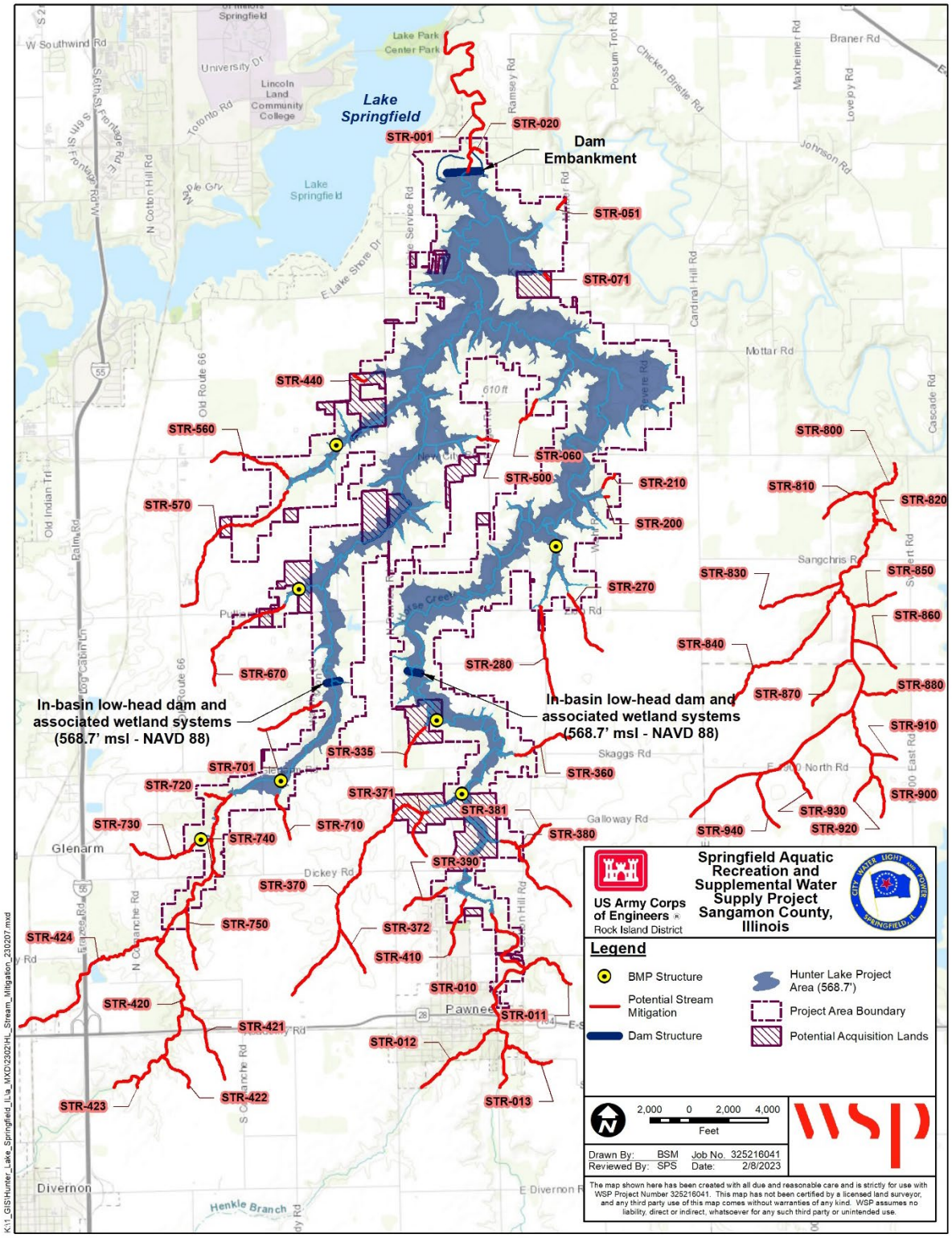
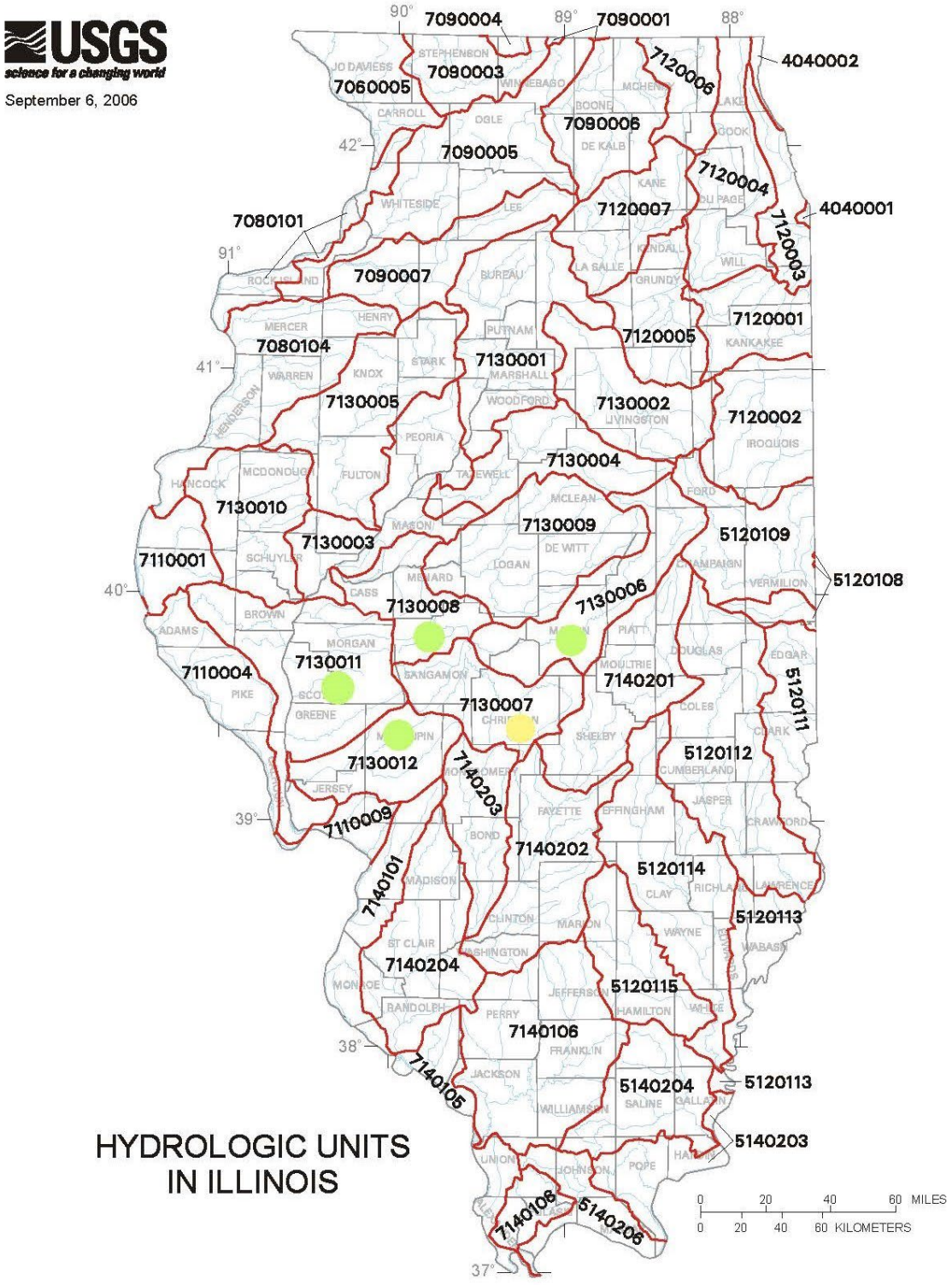


Figure 2-2 Allowable HUC Watersheds for Mitigation



07130007 – South Fork Sangamon (Impact Area) – Mitigation Factor = 1.0
07130006, 07130008, 07130011, 07130012 – Mitigation Factor = 0.5