APPENDIX D

Description of Eliminated Alternatives

US Army Corps of Engineers ®
Rock Island District

Springfield Aquatic Recreation and Supplemental Water Supply Project

Supplemental Environmental Impact Statement

Supplemental Water Supply Alternatives Analysis: Detailed Description of Alternatives Considered and Screening Results.

January 2023

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

BMPs	Best Management Practices
cfs	cubic feet per second
CCR	Coal Combustion Residuals
City	City of Springfield
Corps	U.S. Army Corps of Engineers
CWLP	City Water, Light & Power
FEIS	Final Environmental Impact Statement
gpm	gallons per minute
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
ISWS	Illinois State Water Survey
MGD	million gallons per day
msl	mean sea level
NPV	Net Present Value
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
ppm	parts per million
SCWRD	Sangamon County Water Reclamation District
SSWC	South Sangamon Water Commission
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WWTP	Wastewater Treatment Plant
yd^3	Cubic yards

1.0 INTRODUCTION

The following provides a detailed description of supplemental water supply alternatives considered prior to 2019 for the proposed City of Springfield Aquatic Recreation and Supplemental Water Supply, Hunter Lake project. Note that project descriptions have not been revised or updated since 2018. Additional information is also provided regarding results of the screening analysis. Results of the preliminary screening are provided in Table 2-1. A second level of screening was conducted and results are presented in Section 3.

2.0 RESERVOIR ALTERNATIVES

2.1 Hunter Lake – Original Configuration

Under the 2000 Final Environmental Impact Statement (FEIS), the Hunter Lake alternative would be located southeast of the existing Lake Springfield and north of Pawnee, Illinois (Figure 2-1). The reservoir would be formed by construction of an earthen dam on Horse Creek, a tributary to the South Fork of the Sangamon River, in Section 31 of Rochester Township. This alternative would result in an expected additional yield of somewhat lower than the previously estimated value of 21.5 million gallons per day (MGD) for the Springfield water supply system. As such, the capacity may be considered to be excessive relative to the stated need of 12 MGD (i.e., approximately 10 MGD greater than need). Spillway elevation of the proposed structure under the original configuration was 571 feet mean sea level (msl). The resulting reservoir would inundate portions of both Horse Creek and Brush Creek resulting in a 3,010-acre reservoir that would hold 15.3 billion gallons of water. The project area encompassed approximately 7,795 acres and included 4,785 acres of uplands above the control pool elevation.

The City received comments from the public during the scoping process and met with representatives of the Illinois Environmental Protection Agency (IEPA) to understand and consider permitting issues and constraints associated with the Hunter Lake alternative. The City performed investigations to more fully understand nutrient loading and runoff from the watershed of Hunter Lake. Phosphorous loading and the resultant concentrations in Hunter Lake are of particular concern as these values are expected to periodically be in exceedance of the stated water quality standard of 0.05 parts per million (ppm). Based upon these studies, input from the IEPA, water quality issues, and based on a yield substantially greater than the demonstrated need, the City has determined that the original configuration of Hunter Lake would be eliminated from further consideration.

Alternative	Yield (Inadequate or Excessive)	Environmental Impacts	Availability & Logistics	Existing Technology	Cost	Notes
Reservoir Supply Systems						
Hunter Lake--Original Configuration (21.5 MGD)	Red	Orange	Red	Green	Orange	Excessive capacity, environmental impacts mitigable, beneficial upland habitat restoration, land acquired, inability to achieve State 401 Water Quality Certification due to phosphorous levels, moderate cost, able to expand regional recreational opportunities.
Clinton Lake	Red	Orange	Red	Gray	Gray	Water use committed, no excess capacity, environmental impacts associated with pipeline, extensive pipeline with real estate/ROW complexity, owned by others and not available for use, cost assumed to be moderate with pipeline, would not expand regional recreational opportunities.
Lick Creek Reservoir (8.3 MGD)	Red	Orange	Red	Green	Orange	Insufficient capacity, environmental impacts mitigable, lands not acquired, inability to achieve State 401 Water Quality Certification due to unmitigated phosphorous levels, moderate cost, able to expand regional recreational opportunities.
Dredge Lake Springfield (3.35 MGD)	Red	Orange	Orange	Green	Red	Insufficient capacity, notable impacts from dredging and dredge cell construction, logistical issues with dredge cell development, excessive cost, would not expand regional recreational opportunities.
Raise Lake Springfield by 2 ft (5.15 MGD)	Red	Red	Red	Green	Green	Sufficient capacity, extensive impacts on shoreline habitats and residences, potential impact on power generation, logistical issues related to shoreline management, low probable cost, would not expand regional recreational opportunities.
Lake Sangchris	Red	Orange	Red	Gray	Gray	Water use committed, no excess capacity, environmental impacts associated with pipeline, pipeline with real estate/ROW complexity, owned by others and not available for use, cost assumed to be moderate with pipeline, would not expand regional recreational opportunities.
Lake Shelbyville	Red	Orange	Red	Gray	Gray	Water use committed, no excess capacity, environmental impacts associated with pipeline, extensive pipeline with real estate/ROW complexity, owned by others and not available for use, cost assumed to be moderate with pipeline, would not expand regional recreational opportunities.
Sand and Gravel Pits (1.4 MGD)	Red	Orange	Orange	Green	Green	Insufficient capacity, environmental impacts mitigable, lands not acquired, Lower cost, would not expand regional recreational opportunities.
River Supply Systems						
Sangamon River Dam	Red	Red	Red	Green	Gray	Insufficient capacity, environmental impacts with use under low flow conditions, low flow water quality poor, dissolved oxygen concerns, aquatic life impacts, complex and adverse permitting--unacceptable long term solution, lower cost, expansion of some recreational opportunities, loss of scenic quality and impact on canoeing.
South Fork Dam	Red	Red	Red	Green	Gray	Excessive capacity, extensive environmental impacts, high cost, able to expand regional recreational opportunities.
Illinois River	Green	Orange	Red	Green	Gray	Sufficient capacity, mitigable environmental impacts, water quality concerns, potential for zebra mussel fouling, extensive pipeline with real estate/ROW complexity, high costs, would not expand regional recreational opportunities.
Groundwater Supply Systems						
Intentional Depletion of Sangamon Valley Well Field Reserve Levels	Red	Orange	Red	Green	Gray	Insufficient capacity, mitigable environmental impacts, extensive pipeline with real estate/ROW complexity, adverse effect on other municipal supply systems, legal/logistical uncertainty, high costs, would not expand regional recreational opportunities.
Hybrid Alternatives						
Lick Creek + Sangamon Valley Wells (16.3 MGD)	Red	Orange	Red	Green	Orange	Excessive capacity, environmental impacts mitigable, lands not acquired, inability to achieve State 401 Water Quality Certification due to phosphorous levels, moderate cost, able to expand regional recreational opportunities.
Lick Creek + Sangamon Valley Wells + Sand and Gravel Pits (13.2 MGD)	Green	Orange	Red	Green	Orange	Sufficient capacity, environmental impacts mitigable, lands not acquired, inability to achieve State 401 Water Quality Certification due to phosphorous levels, increased system complexity, moderate cost, able to expand regional recreational opportunities.
Lick Creek + Sangamon Valley Wells + Sand and Gravel Pit A 15.1 MGD)	Green	Orange	Red	Green	Orange	Sufficient capacity, environmental impacts mitigable, lands not acquired, inability to achieve State 401 Water Quality Certification due to phosphorous levels, increased system complexity, moderate cost, able to expand regional recreational opportunities.
Augmentation of Gravel Pit Storage with Transfers from Sangamon River	Red	Orange	Red	Green	Gray	Insufficient capacity during low flow conditions, environmental impacts mitigable, lands not acquired, water quality issues of Sangamon River during low flow, costs not calculated, expected to be lower, would not expand regional recreational opportunities.
Retrofit of Non-CWLP Municipal Wells.	Red	Orange	Red	Green	Gray	Insufficient capacity, mitigable environmental impacts, pipeline with real estate/ROW acquisition needed, adverse effect on other municipal supply systems, legal/logistical uncertainty, costs not calculated, expected to be moderate, would not expand regional recreational opportunities.
Acquisition of Water Rights to Enable Additional Wells to be Drilled in Sangamon River Valley	Red	Orange	Red	Green	Gray	Insufficient capacity, mitigable environmental impacts, pipeline with real estate/ROW acquisition needed, logistical uncertainty in time of drought, costs not calculated, expected to be moderate, would not expand regional recreational opportunities.
Other Alternatives						
Jacksonville Joint Use	Red	Orange	Red	Gray	Gray	Water use committed, no excess capacity, environmental impacts mitigable, extensive pipeline with real estate/ROW complexity, legal complexity during drought conditions, costs not calculated, expected to be moderate, would not expand regional recreational opportunities.
Recycle/Reuse Treated Wastewater	Red	Green	Red	Green	Gray	Insufficient capacity, environmental impacts mitigable, ash impoundments subject to closure, inability to achieve State 401 Water Quality Certification due to phosphorous levels and impairment of Lake Springfield, costs not calculated, expected to be moderate, would not expand regional recreational opportunities.
Water Conservation	Red	Green	Green	Gray	Gray	Insufficient capacity, negligible environmental impacts, currently implemented, lower cost, would not expand regional recreational opportunities.

Red	Excessive/insufficient yield, highly adverse impact/critical flaw, not available or logistically flawed, excessive costs, not technically feasible
Orange	Moderate impacts/mitigable, challenging logistics, moderate costs, technically feasible with challenges
Green	Sufficient yield, low environmental impacts, available with favorable logistics, low costs, technically feasible
Gray	Updated 2016 cost not calculated due to other critical flaws/Not applicable because site is not available

Screening Criteria

Note: Level 1 screening included application of critical flaw review in which key factors considered to eliminate a given alternative from further consideration included the following:

1. Insufficient capacity (yield) of system to meet project need
2. Excessive project environmental impact
3. Logistical issues that are unmitigable (e.g., inability to obtain permits/authorizations)
4. Grossly excessive project costs (>$500M)

Table 2-1. Preliminary Alternatives Eliminated from Further Consideration

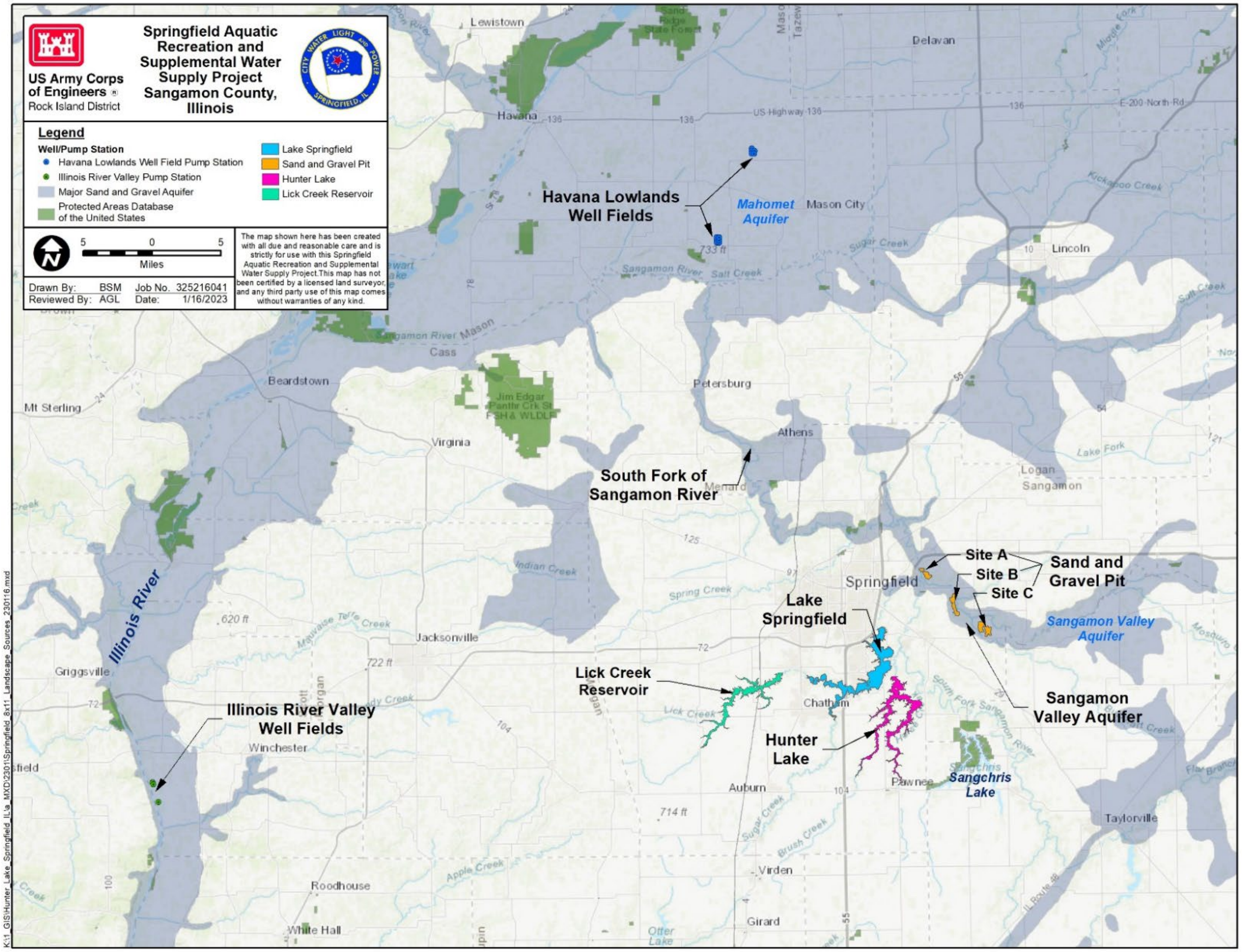

Figure 2-1. Potential Sources for Springfield Supplemental Water Supply

2.2 Lick Creek Reservoir

Construction of a reservoir on Lick Creek was identified as a potential supplemental water supply option in the 2000 FEIS. Lick Creek Reservoir would be located west of Springfield near Loami, Illinois (see Figure 2-1). The resulting reservoir would cover 1,948 acres and the total project would encompass 5,555 acres.

Water would be released from Lick Creek Reservoir during drought conditions, where it would flow by gravity through Lick Creek to maintain the pool level in Lake Springfield near seasonal long-term average. This alternative would provide a capacity of 20,000 acre-feet of storage and would result in a drought yield of 8.3 MGD. Based on a preliminary assessment of environmental impacts of construction of the reservoir (Hanson 1998) impacts would be proportionally similar to those identified for the original Hunter Lake configuration. Similar to the original Hunter Lake configuration, the agricultural nature of the watershed would result in elevated phosphorous levels. Extensive use of best management practices (BMPs) to control phosphorous levels are not practicable as they would require that the reservoir be substantially smaller in order to integrate BMPs that would reduce nutrient loading (e.g., in-lake dams, wet basins, dry basins, shoreline stabilization, etc.). Although this would reduce the magnitude of impacts, it would also reduce the yield to a level that would not meet the need.

In the 2000 FEIS, the Lick Creek Reservoir alternative was only considered in combination with other alternatives as a supplemental water supply source. Sixteen combinations of alternatives that utilized the Lick Creek Reservoir together with the sand and gravel pits and groundwater in the Sangamon River Valley that met the desired yield were identified in the 2000 FEIS. Three alternative combinations, selected to represent high, medium and low-cost options were evaluated (see Hybrid Alternatives in Figure 2-1).

Implementation of this hybrid alternative would result in impacts associated with reservoir construction as well as impacts and costs associated with various Sangamon River Valley Wells and Sand and Gravel Pit options, essentially resulting in double the impact compared to each individual alternative. However, the reservoir has the potential to support additional regional outdoor recreational opportunities.

Due to excessive impact and cost, any alternative that incorporates the Lick Creek Reservoir is considered critically flawed and eliminated from further consideration due to insufficient yield and the additive effect of environmental impacts and costs associated with combining alternatives.

2.3 Dredge Lake Springfield

Recent analyses of the effectiveness of dredging were conducted to determine the benefits of increased yield based on dredging within Lake Springfield. In order to achieve a net additional yield of 12 MGD, a volume of 6,570 million gallons (20,137 acre-feet), over a 12-foot elevation range (average area of 1,678 acres) would be required for dredging. Because areas below the conservation pool are ineffective in providing additional yield, areas above the conservation pool elevation of 547 feet (NAVD 1988) were considered as the effective dredging zone. At this elevation, however, the surface area is limited to approximately 3,650 acres which would result in an optimal dredging volume of 10,130 acre-feet (16.4 million cubic yards [yd^3]). This volume, when evaporation is considered, is equivalent to a yield of only 4.8 MGD, or approximately 40 percent of the required 12.0 MGD. Based on previous dredging efforts in Lake Springfield and Lake Decatur, the capital cost of such a dredging program to achieve only 40 percent of the required capacity is estimated to be approximately $299 million. Consequently, dredging of Lake Springfield, while also burdened by other issues related to logistics of disposal of dredged material and estimated high costs (>$500 million), is critically flawed as a viable alternative to meet existing and expected future needs for supplemental water supply based on insufficient yield. Additionally, Lake Springfield already supports recreational activity, and additional dredging of the lake would not increase the availability. Consequently, yield from this alternative is insufficient to meet drought-related needs and this alternative was eliminated from further consideration.

2.4 Raise Lake Springfield

The alternative of raising the existing full pool elevation of Lake Springfield was re-examined as a potential source of supply augmentation. Initial analysis by the City suggested that a maximum lake level increase from elevation 560.0 to elevation 562.0 (a rise of 2 feet) may be possible (Hanson 1998). Equipment and structural constraints within the power generation plant complex preclude raising the pool level beyond the 562.0 elevation.

Raising the full pool elevation of Lake Springfield 2 feet results in an additional storage volume of 8,660 acre-feet. This volume would yield 5.15 MGD during a 100-year design drought, which represents only about 43 percent of the additional 12 MGD needed to meet the water demand by year 2065 during a 100-year drought.

At the same time, a 2-foot increase in normal pool elevation would have significant adverse impacts to existing development and natural resources adjacent to the lake. Raising the lake level would also impact the private homes, recreational facilities, and transportation infrastructure around the lake. This would include inundation of thirty homes, replacement of at least 50 percent of the existing private septic systems surrounding the lake, impact to private boathouses, boat slips, docks and access structures at several private recreational facilities, parks (Lincoln Memorial Garden, Lincoln Greens Golf Course, several public parks, boat docks, and public and private beaches as well as other facilities such as the Boy Scout, Girl Scout, YMCA, and church camps), and highway bridges (East Lake Drive Bridge over the dam and the original historic Spaulding Bridge). Additionally, Lake Springfield already supports recreational activity, and a 2-foot increase in the normal pool elevation of the lake would not markedly increase the availability of recreational opportunities in the region. Furthermore, the proposed increase in pool level would result in the inundation of over 300 acres of existing wetlands based on a review of the National Wetlands Inventory and flooding both upstream and downstream of Lake Springfield would experience more frequent flooding (USACE 2000).

Therefore, raising Lake Springfield was eliminated from further consideration as it did not yield adequate supplemental water to meet projected demands and would cause significant environmental and social impacts.

2.5 Lake Sangchris

Lake Sangchris is located in the northwest corner of Christian County in central Illinois, approximately 15 miles southeast of Springfield. The lake is an artificial impoundment developed during 1964 through 1966 by the damming of three small arms of Clear Creek which are tributary to the South Fork of the Sangamon River. The lake serves as a condenser cooling water source for the Kincaid Power Station near Kincaid, Illinois. The State of Illinois manages a large portion of the land surrounding the lake as Lake Sangchris State Park that provides recreational opportunities.

The lake is approximately 2,300 acres in size and contains a volume of 9.8 billion gallons. The City re-evaluated the possibility of obtaining water from this source but was advised by Dynegy, Inc. (now Vistra) that as previously discussed in the 2000 FEIS, the lake would not be available as a water supply source. This alternative is critically flawed due to the lack of availability of water for use as supplemental supply and was eliminated from further consideration.

2.6 Lake Shelbyville

Use of water from Lake Shelbyville was suggested as an additional source that could be used to augment the City's water supply during the public scoping period. Lake Shelbyville is located approximately 60 miles southeast of Lake Springfield and is managed and operated by the Corps for the authorized purposes of flood risk management, recreation, water supply, navigation, and fish and wildlife conservation. All water has been allocated to these uses and therefore use of the lake as a supplemental water supply is not feasible (USACE 2016). Additionally, because Lake Shelbyville already supports recreational activity, it would not increase the availability of recreational opportunities in the region. Construction of facilities to pump water would result in additional environmental impact, and those impacts together with the cost to pump water from this lake over 60 miles to Lake Springfield would not be feasible, therefore this alternative was eliminated from further consideration.

2.7 Gravel Pits

The Gravel Pits alternative was identified and evaluated in the 2000 FEIS and has been studied further in a 2008 report (CMT 2008). A number of sand and gravel mining pits have been excavated within the Sangamon River Valley (see Figure 2-1). These pits are located where deposits of unconsolidated sand and gravel were present and are currently full of water. The usable water supply is primarily derived from the stored volume of water at each gravel pit site, with additional gains and losses from infiltration and evaporation, respectively. The water would be collected with floating pumps placed on the water at each gravel pit. The water would be pumped to a head tank and pump station near each site. The pump stations would then transmit the water to Lake Springfield using the pipeline transmission system. Three of the larger sites were evaluated as supplementary water sources for the City of Springfield (CMT 2008). The pits are located just south of the City of Riverton and northwest of the Christian County border and are referred to as Sites A, B, and C (see Figure 2-1). The gravel pits, currently being used for a variety of purposes ranging from sand and gravel businesses to recreation, cover a total of 545 acres and vary in depth.

Studies conducted subsequent to the development of this original alternative indicate the maximum allowable yield from the gravel pits to be much lower than the 7.4 MGD estimated in the original 2008 alternative plan (Layne 2013). This decreased yield is due to potential impacts on the nearby South Sangamon Water Commission (SSWC) wells related to the use of Gravel Pit Site B which is located adjacent to the SSWC wells. In the event that water from Gravel Pit Site B were to be pumped for use by the City, the Layne study suggests that the water in the aquifer around the SSWC wells would be drawn down and as such, using Gravel Pit Site B was not considered prudent. Without Gravel Pit Site B, the combined water production from the gravel pits would be approximately 1.6 MGD (Gravel Pit Site A=0.2 MGD, Gravel Pit Site C=1.4 MGD) and would not meet the needs of the project. Additionally, because the size of Gravel Pit C is limited, it would not increase the regional availability of recreational opportunities. Therefore, this alternative was eliminated from further consideration.

2.8 Illinois River

The Illinois River was evaluated as a raw water source in the 2000 FEIS. Adequate volume exists and would be available during drought conditions, however, water quality varies considerably. As noted in the 2000 FEIS, a well system provides advantages over a surface water intake system for the following reasons:

- Studies conducted by the Illinois State Water Survey (ISWS) indicate that ample groundwater volume and numerous well field locations exist along the Illinois River Valley.
- Vastly improved water quality is available from the aquifer along and under the river.
- Pretreatment of a surface intake supply would be necessary to minimize biofouling of the transmission system during non-use periods.
- Use of a well system precludes serious transmission operational problems caused by zebra mussels encrusting the system. Zebra mussel populations have been documented along the entire river.
- Use of a well system would preclude introduction of the zebra mussels and other exotic species (e.g. Asian carp species) to Lake Springfield.

The factors related to water quality and the potential for biological contamination identified in the 2000 FEIS are still valid for the Illinois River surface intake supply. In addition, this alternative does not provide the region with additional recreational opportunities. Therefore, this alternative was eliminated from further consideration.

2.9 Sangamon River Dam

In 1988, the City obtained a conditional permit from the IEPA to install a temporary, emergency dam on the Sangamon River at the confluence of the South Fork of the Sangamon River to provide a supplemental water source during drought. The conditional permit was issued for the emergency use and not for a permanent supplemental water supply. The permit was renewed in 1993, 2000 and 2006 pending resolution of the source of a supplemental water supply for the City. The permit is currently expired. To date, severe drought conditions to warrant construction of the temporary dam as outlined in the permit have not been met, and the dam has not been constructed.

Additionally, the following issues have been identified for the Sangamon River Dam alternative:

- High potential to violate the general use water quality standard for dissolved oxygen in both the Sangamon and South Fork arms of the proposed pool due to a change in natural reaeration characteristics and exaggerated diurnal variations attributable to increased algal activity;
- Water quality issues because the Decatur Wastewater Treatment Plant (WWTP) contributes 96 percent of the flow to the Sangamon River immediately downstream of Decatur and approximately 85 percent of the flow at the confluence with the South Fork (ISWS 2002);
- Reduced ability to provide adequate water due to a need to maintain a minimum discharge of 41 cubic feet per second (cfs) (26.5 MGD) downstream of the emergency dam whenever flows were available (per Corps requirements); and
- Proposed dam location in a segment of river included in the Nationwide Rivers Inventory (NRI) (National Park Service 2017) would alter the river's scenic quality and the dam would create a barrier for canoeists attempting to navigate the river.

The Sangamon River option was eliminated from further consideration as a permanent alternative water supply to supplement Lake Springfield due to the potential impacts to water quality and aquatic biology and recognized scenic and recreational value of this portion of the Sangamon River.

2.10 South Fork Dam

As identified in the FEIS, the City has examined several possibilities for the location of a dam to construct a reservoir on the South Fork of the Sangamon River both upstream and downstream of the confluence with Horse Creek at elevations ranging from 550 to 570 feet msl. Construction of a dam at these elevations would create very large, shallow reservoirs with surface areas ranging from 6,870 to 13,400 acres and storage that exceeds the current needs.

As reported in the 2000 FEIS, implementation of this alternative would result in extensive impacts to forested floodplains and wetlands. Land acquisition requirements for the South Fork Reservoir would likely be expensive given the projected surface acreage which would make this project extremely expensive. However, this alternative would provide for additional recreational opportunities in the region. These factors are still valid and this alternative was, therefore, eliminated from further consideration.

2.11 Illinois River Well Field Alternatives

Two alternatives were considered that would result in the development of wells and associated pipeline systems to obtain water from the alluvium of the Illinois River:

- Illinois River Well System Well #1 (12 MGD)
- Illinois River Valley Wells #1 + #2 (17.8 MGD)

These alternatives entail development of a collector well system and associated piping to obtain and transmit water from the Illinois River aquifer to Lake Springfield. The ISWS report titled Phase I: Study of Potential Ground-Water Resources for Springfield Task 3: Illinois River West of Jacksonville (Anliker 1997), as well as past and current groundwater development along the Illinois River, show that an appreciable amount of water is available through the Illinois River aquifer. The water would be supplied from a combination of both stored groundwater and infiltrated surface water from the Illinois River. Because the water supplied by collector wells would be comprised of both ground and surface water infiltrating from the Illinois River, the current treatment facilities at Lake Springfield should be able to accommodate any variation of the raw water quality caused by the introduction of water from the Illinois River aquifer. Any changes for the cost of water treatment are considered negligible.

These alternatives are similar to those that were evaluated in the 2000 FEIS. Under the 12 MGD alternative, a single radial collector system would be constructed along with approximately 57 miles of pipeline and four pump stations. The 17.8 MGD alternative would entail the development of a second radial collector system that would be conveyed by the same transmission pipeline and pump stations. The pipeline system would ultimately discharge the water to Lick Creek and then continue to Lake Springfield.

The wells would gather water from the Illinois River and pump it to a one-million-gallon water storage tank at a nearby pump station. This pump station would then transmit the water to the next storage tank. At total of four storage tanks and pump stations and over 57 miles of pipe are required to convey the water to Lake Springfield (CMT 2015a).

The outlet structure at Lake Springfield would consist of a 30-inch pipe, erosion control, and flap gate, located at the north end of Lake Springfield. The outlet would be placed so as not to interfere with existing structures and water activities and would be designed to reduce excessive erosion to protect existing banks and sediment.

These alternatives would entail the acquisition of land or associated easements for more than 680 acres and is estimated to potentially affect more than 350 properties. Because the City most likely lacks eminent domain or “quick take” authority, the location of the pipeline under this alternative may be subject to substantial complexity and high costs associated with land acquisition.

To finalize the design of a well system, further studies would need to be completed investigating the following topics:

- Groundwater contamination
- Right-of-way / land acquisition
- Impact on existing wells and interference between proposed wells
- Electric power availability and contract negotiation
- Environmental impacts
- Test borings/pumping tests
- Soil samples

The results from a thorough investigation into each of these topics would likely impact the final design of the well system. These studies are reflected in the cost estimate through contingencies and legal and administrative fees. Operations and routine maintenance of this system would entail a wireless communication network linking the wells and pump stations to a central control station, monthly operation and inspections of machinery, repair/replacement of failed parts/systems, periodic acid and chlorine treatment of the lateral collection screens to combat clogging from scale and iron bacteria, periodic flushing or pigging of the transmission lines, and routine tank maintenance.

The Illinois River wellfield alternatives were noted to be a reliable means to provide sufficient yield to meet the required need, and were generally considered to be low impact alternatives. Similar to other groundwater collection systems, these alternatives would not provide benefits that would expand regional recreational opportunities. However, each of these alternatives represent a greater degree of complexity and logistical challenge associated with the large number of landowners and parcels that must be crossed. Additionally, these alternatives are demonstrated to have a high capital cost ($203M for 17.8 MGD) and/or have a high total project net present value (NPV) cost ($304M for 12 MGD and $383M for 17.8 MGD). Based on a combination of factors relating to high cost and logistical complexity and uncertainty, these alternatives are considered to be impracticable and were eliminated from further consideration.

2.12 Illinois River Well + Sangamon Valley Wells (15.3 MGD)

This alternative represents a hybrid between the 12 MGD Illinois River Well alternative and the Sangamon Valley Well Field alternative. The intent in developing this alternative was to determine whether a smaller array of supplemental wells within the Sangamon Valley aquifer would provide benefits of additional yield without resulting in substantially increased cost and environmental impacts.

This alternative would entail the acquisition of land or associated easements for a total of 931 acres and is estimated to potentially affect more than 465 properties. Because the City most likely lacks eminent domain or “quick take” authority the location of the pipeline under this alternative may be subject to substantial complexity and high costs associated with land acquisition.

Under this alternative the Illinois River Well System would produce 12 MGD and would be coupled with additional well development within the Sangamon River Valley that would have an additional yield of 3.3 MGD. Therefore, the total yield of this system would be 15.3 MGD and would be sufficient to meet the demonstrated need for supplemental water. However, this alternative would not provide benefits that would expand regional recreational opportunities.

In comparison with the other Illinois River alternatives described above, this alternative incorporates a greater length of transmission pipeline and an increased number of wells which actually represents a greater degree of complexity and logistical challenges associated with the large number of landowners and parcels. Additionally, this alternative has both a high capital cost ($182M) and has a total project NPV cost ($341M). Based on a combination of factors related to high cost and logistical complexity and uncertainty, this alternative is considered to be impracticable and was eliminated from further consideration.

2.13 Havana Lowland Well Fields (17.8 MGD)

Under this alternative the Havana Lowland Well System would be developed in the Mahomet aquifer within Mason County and would produce 17.8 MGD. This alternative would entail ten wells located at two well fields, four pump stations, and over 47 miles of 36-inch piping. The Mahomet aquifer is the major groundwater resource for east-central Illinois that many communities, industries, and irrigators depend on for their supply. There is currently extensive groundwater development within the Havana Lowland (Figure 2-2).

This alternative would entail the acquisition of land or associated easements for a total of 582 acres and is estimated to potentially affect more than 391 properties. Because the City most likely lacks eminent domain or “quick take” authority the location of the pipeline under this alternative may be subject to substantial complexity and high costs associated with land acquisition. Groundwater development of the Mahomet aquifer is also regulated by the Imperial Valley Water Commission which authorizes new well development to those outside the region on a case-by-case basis.

The 17.8 MGD alternative would entail the use of ten 1,233 gallons per minute (gpm) pumps. There are numerous existing wells in the area of the proposed wells, however all are more than 500 feet from the proposed wells. If existing wells are affected by the proposed wells, the City would compensate the owners of impacted wells and have new wells installed away from the influence of the proposed wells. There are no known municipal wells within 1 mile of the proposed wells (CMT 2015b).

The 17.8 MGD Havana Lowland Well Field alternative was noted to be a reliable means to provide sufficient yield to meet the required need under current conditions, and was generally considered to be a low impact alternative. However, because of the intensity of well development within the region (Figure 2-2), groundwater supply systems associated with the Havana Lowland may be potentially influenced by other users and are therefore potentially subject to reduced long-term reliability. Additionally, water quality in the vicinity of the proposed wells is considered to be good under current conditions (Anliker 1997). However, water quality concerns are evident in several areas of the Mahomet aquifer (high ammonia and total organic carbon, arsenic, and agricultural chemical and nutrient contamination (especially the sandy areas of Mason and Tazewell Counties)) (ISWS 2017). Together these issues contribute to long-term “moderate” reliability as they may represent a risk to the City in terms of water supply or quality.

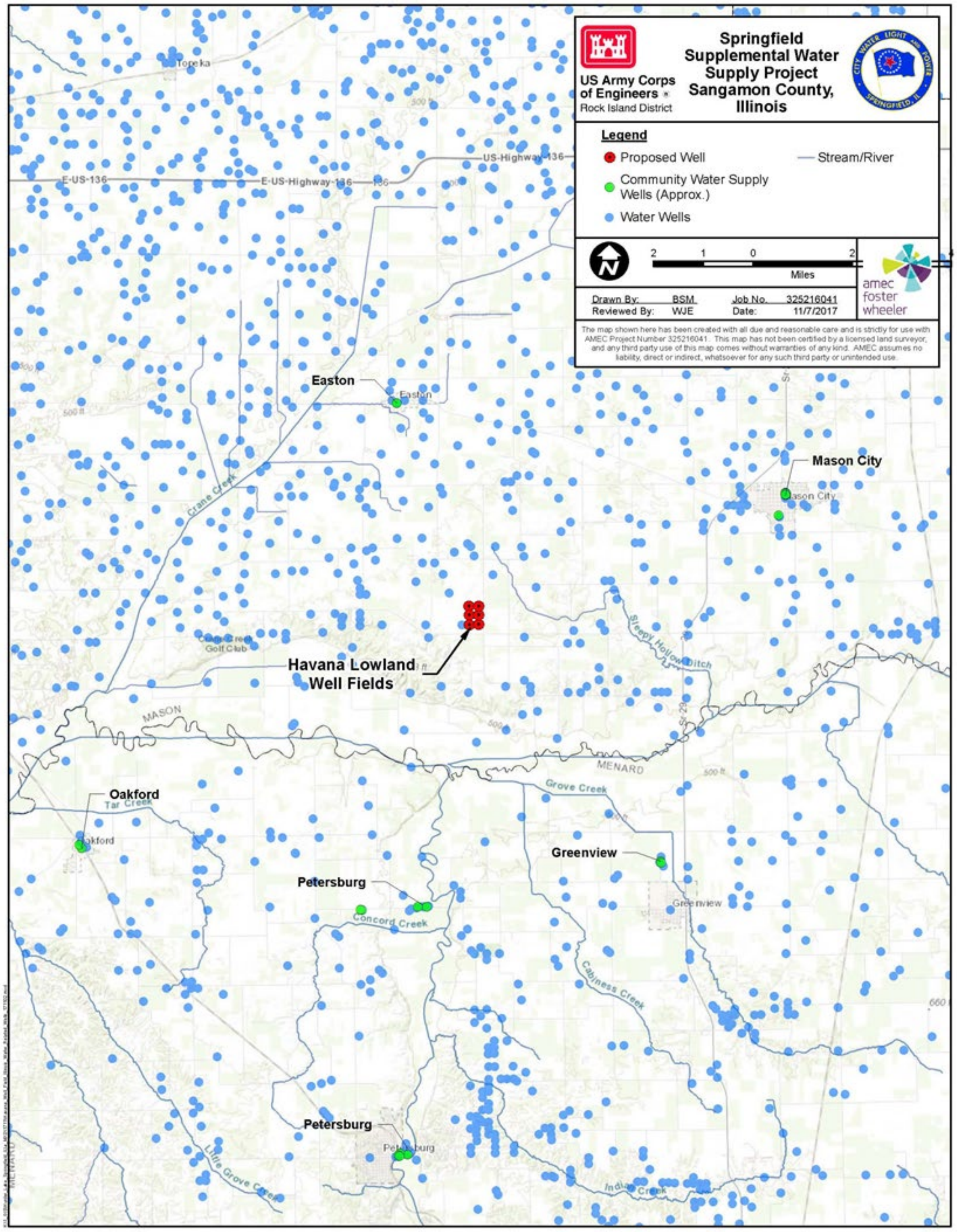

Figure 2-2. Wells Currently Developed in the Mahomet Aquifer in the Vicinity of the Havana Lowland Well Fields Alternatives

Similar to other groundwater collection systems, this alternative would not provide benefits that would expand regional recreational opportunities. However, this alternative represents a greater degree of complexity and logistical challenge associated with the large number of landowners and parcels that must be crossed. Additionally, this alternative has both a high capital cost ($203M) and has a total project NPV cost ($344M). Based on a combination of factors relating to high cost and logistical complexity and uncertainty, and concerns regarding future reliability, this alternative is considered to be impracticable and was eliminated from further consideration.

2.14 Sangamon River Valley Well Fields (12 MGD)

Under this alternative the City would develop a groundwater collection system within the Sangamon Valley using a system of wells, pump stations and pipelines. A series of well clusters would be established within the Sangamon River Valley aquifer using a total of 36 wells located variously within the Sangamon River Valley. This alternative would have a total yield of 12 MGD. A pipeline system of approximately 75 miles is required to convey water from the wells to Lake Springfield. (Note: Cluster 6 which was included in the array identified in the previous FEIS (USACE 2000) is not available for development as this cluster has previously been developed by the Sangamon Valley Water Commission for use by the Village of Chatham). Because production wells would be located within the Sangamon River Valley, they would be subject to periodic flooding from the Sangamon River. As such, well houses would be required to protect system components from flood water. The total cost and 50-year NPV cost of this alternative is $125M and $265M, respectively.

This alternative would entail the acquisition of land or associated easements for a total of 620 acres and would potentially affect an estimated 624 properties. Because the City most likely lacks eminent domain or “quick take” authority the location of the pipeline under this alternative may be subject to substantial complexity and high costs associated with land acquisition.

Because of the intensity of well development within the region (Figure 2-3), groundwater supply systems associated with this alternative may be potentially influenced by other users and are, therefore, potentially subject to reduced long-term reliability. For example, as illustrated in Figure 2-3, the Sangamon Valley aquifer is a narrow, confined aquifer that is intensely used for domestic water use and community water supply. As such, the City lacks any control to preclude future use of the aquifer by others. This issue contribute to long-term “moderate” reliability as they may represent a risk to the City in terms of water supply.

This alternative would be sufficient to meet the demonstrated need for supplemental water. However, it is characterized by logistical complexity, lower reliability, high costs and would not provide benefits that would expand regional recreational opportunities. Because of excessive costs and logistical complexity, this alternative was eliminated from further consideration.

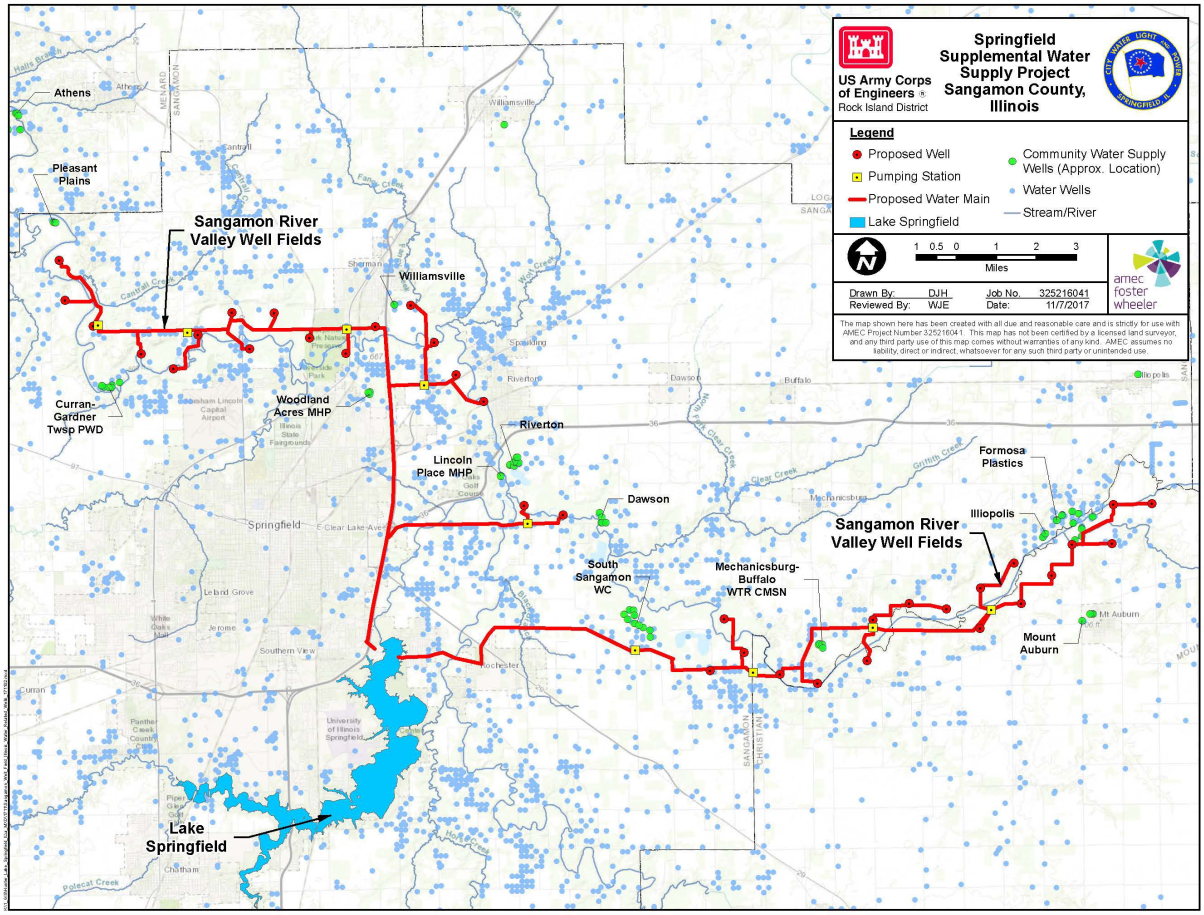

Figure 2-3. Wells Currently Developed in the Vicinity of the Sangamon Valley Well Fields Alternatives

2.15 Sangamon River Valley Well Fields (10.6 MGD) + Gravel Pit C (1.4 MGD) (12 MGD Total)

Under this alternative, the City would develop a groundwater collection system within the Sangamon Valley using a system of wells, pump stations and pipelines. This alternative differs from the previous alternative in that it includes the use of surface water within Gravel Pit C as a component of the supply system and as such would require fewer wells. Gravel Pit C is owned by the City. Based on prior hydrogeological studies (Layne 2013), Gravel Pit C was determined to have a production rate of 1.4 MGD under drought conditions. A series of well clusters would be established within the Sangamon River Valley aquifer using a total of 32 wells located variously within the Sangamon River Valley. This alternative would include well clusters having a total yield of 12 MGD. A pipeline system of approximately 70 miles is required to convey water from the wells to Lake Springfield. (Note: Cluster 6 which was included in the array identified in the previous FEIS [USACE 2000] is not available for development as this cluster has previously been developed by the Sangamon Valley Water Commission for use by the Village of Chatham). The total capital cost and 50-year NPV cost of this alternative is $139M and $286M, respectively.

This alternative would entail the acquisition of land or associated easements for a total of 555 acres and would potentially affect an estimated 568 properties. Because the City most likely lacks eminent domain or “quick take” authority, the location of the pipeline under this alternative may be subject to substantial complexity and high costs associated with land acquisition.

Because of the intensity of well development within the region (see Figure 2-3), groundwater supply systems associated with this alternative may be potentially influenced by other users and are therefore potentially subject to the same reduced long term reduced reliability as described for the Sangamon Valley (12 MGD) alternative.

This alternative would be sufficient to meet the demonstrated need for supplemental water. However, it is characterized by logistical complexity, lower reliability, high costs and would not provide benefits that would expand regional recreational opportunities. Because of excessive costs and logistical complexity, this alternative was eliminated from further consideration.

2.16 Intentional Depletion of Sangamon Valley Well Field Reserve Levels

Existing water supply wells developed within the Sangamon Valley aquifer are designed to allow for yields under drought conditions but are restricted by a draw down level to 4 feet above the municipal well screen to avoid potential impacts to the nearby municipal well fields and the well itself (i.e., "Allowable Drought Yield"). This alternative consists of continuing well field operations to exceed Allowable Drought Yield to below the 4-foot level above the well screen. This alternative would also require reaching agreements with owners of existing water supply wells and necessitate the development of associated pipelines, storage tanks and pump stations to convey water from the municipal wells owned by others to Lake Springfield and may require compensation if wells are damaged. If water in the wells are drawn down to the well screen level, the potential for damage to well equipment would be increased and the City would incur increased liability. Additionally, it is unclear whether the well field would yield sufficient water supplies to meet the City’s needs while continuing to meet the other entities’ needs. This alternative would not provide additional recreational opportunities in the region. For these reasons, this alternative was eliminated from further consideration.

2.17 Lick Creek Hybrid Alternatives

The Lick Creek Reservoir alternative is considered critically flawed due to insufficient yield and the additive effect of environmental impacts and costs associated with combining alternatives. Additionally, this alternative would not provide additional recreational opportunities to the region. Consequently, any hybrid alternative that incorporates the use of Lick Creek is similarly flawed and therefore, eliminated from further consideration.

2.18 Additional Hybrid Alternatives

Two alternatives were developed that represent hybrids between the 12 MGD Havana Lowland Well Field alternative and the Sangamon Valley Well Field alternatives. These hybrids would result in the development of wells and associated pipeline systems to obtain water from Mahomet aquifer and the alluvium of the Sangamon River Valley:

- Havana Lowland Well Fields (Well Field B) + Sangamon River Valley (12.3 MGD)
- Havana Lowland (Well Field A) + Sangamon Valley Wells (15.3 MGD)

The intent in developing these alternatives was to determine whether a smaller array of supplemental wells within the Sangamon Valley aquifer would provide benefits of additional yield without resulting in substantially increased cost and environmental effects.

Under the 12.3 MGD alternative the City would develop Havana Lowland Well Field B (five wells, 9 MGD), which would require approximately 40 miles of 30-inch pipeline and two pump stations. Additionally, it would also entail the development of a series of well clusters within the Sangamon River Valley (10 wells, 3.3 MGD) and associated pipeline and pump stations. This alternative would entail the acquisition of land or associated easements for a total of 846 acres and is estimated to potentially affect more than 434 properties.

Under the 15.3 MGD alternative, the City would develop Havana Lowland Well Field A (six wells, 12 MGD), approximately 41 miles of 30-inch piping, and two pump stations. This alternative would also include the development of the same series of well clusters in the Sangamon River Valley (10 wells, 3.3 MGD) and associated pipeline and pump stations. These alternatives would entail the acquisition of land or associated easements in excess of 628 acres and is estimated to potentially affect more than 465 properties.

Because the City most likely lacks eminent domain or “quick take” authority the location of the pipeline under both of these alternatives may be subject to substantial complexity and high costs associated with land acquisition. Each of these alternatives would be sufficient to meet the demonstrated need for supplemental water. However, neither alternative would provide benefits that would expand regional recreational opportunities.

In comparison with the other Havana Lowland alternative described above, these alternatives incorporate greater length of transmission pipeline and an increased number of wells that actually represent a greater degree of complexity and logistical challenge associated with the large number of landowners and parcels. Additionally, these alternatives have both a relatively high capital cost ($178M to $182M), and a high total project NPV cost ($316M to $317M). Based on a combination of factors relating to high cost and logistical complexity and uncertainty, both of these alternatives were considered to be impracticable and were eliminated from further consideration.

2.19 Augmentation of Gravel Pit Storage with Transfers from Sangamon River

This alternative consists of the use of gravel pits as supplemental water supply coupled with the transfer of water from the Sangamon River to the gravel pits under drought conditions to replenish gravel pit volume. This alternative would entail development of a pump station on the Sangamon River and associated infrastructure to convey water to the gravel pits. The base yield of Gravel Pit C is only 1.4 MGD and potential yield from Sangamon River under drought conditions is negligible due to need to maintain specific flow conditions. Aquatic species would be further stressed and adversely impacted during drought conditions if water transfers were allowed. Additionally, this alternative would not provide additional recreational opportunities to the region. Due to the negligible volume of water available to be transferred to the gravel pits during drought conditions as well as environmental impacts, this alternative was eliminated from further consideration.

2.20 Retrofit of Non-CWLP Municipal Wells

This alternative consists of City Water, Light, & Power (CWLP) action to retrofit some or all existing municipal wells owned by other entities for variable-speed operation and optimizing well field operation. Similar to the Sangamon Valley Well Field alternative, this alternative would also necessitate the development of associated pipelines, storage tanks and pump stations to convey water from the wells (either owned by others or by CWLP) to Lake Springfield. As such, while it may allow for wells that are closer to Lake Springfield (relative to the Havana Lowland or Illinois River collection systems), the piping system, capital costs and maintenance costs would be similar to related alternatives. This alternative would also require reaching agreements with owners of existing water supply wells. This alternative has significant potential legal liabilities as the City would be responsible for any impacts that could occur to individual wells or the well field operation as a result of modifying municipal wells owned and operated by other entities. Additionally, under this alternative drought conditions would effectively result in competition for water supply from the existing well network between both the City of Springfield and the existing owners. Furthermore, should a drought result in changes in the well field operation or diminished availability for the existing owners, the City could be subject to legal actions and could be required to pay damages. In developing agreements with well owners, the City may need to guarantee water supply to their customers. It is unclear if during drought conditions whether the retrofitted wells and the well field would yield sufficient additional water supplies to meet the City's needs while still meeting the other entity's needs. Additionally, this alternative would not provide additional recreational opportunities to the region. For these reasons, this alternative was eliminated from further consideration.

2.21 Acquisition of Water Rights to Enable Additional Wells to be Drilled in Sangamon River Valley

This alternative consists of the acquisition of water rights in advance of drought conditions to allow for emergency action to establish wells within the Sangamon Valley for supplemental water supply. No advance (pre-drought) development of wells or transmission systems would be conducted under this alternative. As drought conditions worsen, the City would implement construction and operations of wells, pipelines, storage, and other infrastructure. Because it is not always clear when a drought is underway, initiating construction and operation of an appropriate number of wells may not occur in time to avoid potential significant impacts, such as the need to shut down power plant operations if Lake Springfield lake levels drop below conservation pool elevation. The uncertainty of this alternative does not provide for reliable water supply yield required in a timely manner. Additionally, this alternative would not provide additional recreational opportunities to the region. Therefore, this alternative was eliminated from further consideration.

2.22 Jacksonville Joint Use

The City of Jacksonville, Illinois, obtains the majority of its water from a well field adjacent to the Illinois River at Naples, Illinois. The water is pumped approximately 22 miles to Jacksonville. As part of the 2000 FEIS, CWLP investigated the possibility of developing a joint use arrangement with Jacksonville to augment the Springfield supply by piping any excess capacity the remaining 30 miles between the two cities. CWLP recently contacted the City of Jacksonville and it was determined that there is no excess capacity available for use by the City of Springfield.

Additionally, this alternative would not provide additional recreational opportunities to the region. Therefore, the Jacksonville system expansion alternative was eliminated from further consideration on the basis of unavailable capacity.

2.23 Recycle/Reuse Treated Wastewater

This alternative considers two potential recycle/reuse options related to the use of effluents from the Sangamon County Water Reclamation District (SCWRD) and CWLP clarification pond effluent for ash sluicing at the CWLP Power Stations. Recycle and reuse of treated wastewater for ash sluicing would reduce withdrawals from Lake Springfield, thereby making more water available for potable use. Neither of these alternatives would provide additional recreational opportunities.

2.24 Reduction of Water Used for Ash Sluicing

CWLP owns and operates four coal-fired power generating units (Dallman 31, 32, 33 and Unit 4). Bottom ash and fly ash from Units 31, 32 and 33 are sluiced to ash ponds using water obtained from Lake Springfield. The Dallman units' fly ash and bottom ash sluice water is pumped to the Dallman Ash Pond. This pond also receives wastewater plant sludge and water collected from the scrubber sludge landfill adjacent to the ash ponds. Water from the Dallman Ash Pond discharges into the Clarification Pond. The Lakeside Ash Pond consists of four cells: Cell 3 is no longer receiving ash and is closed; and Cells 1, 2, and 4 no longer receive ash, but do receive scrubber blowdown and filter backwash and clarifier blowdown from the drinking water facility.

All ash ponds are expected to be closed to comply with implementation of requirements associated with the Coal Combustion Residual (CCR) Rule. Closure of the ash ponds will necessitate the conversion of wet sluicing to dry handling of ash and as such sluice water will no longer be needed. The use of recycled sluice water or recycled gray water from other sources to augment ash sluicing operations is not needed in the long term and, therefore, is not carried over for further analysis. The anticipated reduction in water demand due to the eventual retirement of Dallman Units 31, 32 and 33 and transition to dry ash handling have been incorporated into the analysis of long-term water need. Consequently, this alternative is already embedded within the calculation of supplemental water need and was eliminated from further consideration as a stand-alone alternative.

2.25 Use of SCWRD Effluents for Potable Water Supply

Consideration was also given to the potential for recycling/reuse of SCWRD effluents for direct and indirect use as a potable water supply. The SCWRD has two treatment plants, one approximately 2.25 miles downstream of Lake Springfield (Sugar Creek Plant) and another located on the northwest edge of Springfield that discharges into the Sangamon River approximately 15 to 20 miles from Lake Springfield (Spring Creek Plant). Under this alternative, recycling sewage treatment effluent as a supplemental water supply source could be achieved by conveying the effluent from SCWRD's outfall to either Lake Springfield or directly to the CWLP Water Treatment Plant via a pipeline system. During drought conditions, it is estimated that flow from the Sugar Creek and Spring Creek plants would be 5 MGD and 10 MGD (Gregg Humphrey, SCWRD, personal communication), respectively. However, only a fraction of this flow would be available for reuse given the expected need to provide continued flow to their receiving streams. Therefore, assuming that at a minimum 50 percent of the discharge flow would be needed to support receiving stream aquatic life support during drought conditions, the net volume available for reuse is assumed to only be 7.5 MGD total from both plants.

Although a violation of the adjusted Boron standard was identified in the 2000 FEIS, the adjusted standard has since been eclipsed by the newly adopted General Use standards and based on the available dataset and the currently applicable water quality standards, a segment of Sugar Creek has been recommended for delisting of impairment due to total boron (CDM Smith 2014). Thus, boron is not likely to be a concern for reuse of the SCWRD effluent. However, elevated phosphorous concentrations are problematic. Continuous disinfection throughout the year would be required prior to transmission of water to Lake Springfield that would result in substantial costs to SCWRD that may further reduce feasibility and average flow (IEPA 2015).

Because yield of this alternative is insufficient in meeting expected needs, and concerns about phosphorous levels, this alternative was eliminated from further consideration.

2.26 Conservation

In the 2000 FEIS, a comprehensive water conservation program was identified as a potential alternative. As described in Chapter 1, the benefits of water conservation programs have been integrated in the analysis of existing and future needs. The City currently has implemented and continues to expand its water conservation program and measures to reduce water use and/or water loss. As conservation practices continue to become the norm and there are fewer and fewer pre-1994 fixtures remaining to be replaced, further indoor water reduction will be more difficult to obtain.

In an effort to reduce water loss in the distribution system, CWLP implemented a Leak Detection Program, as described in Chapter 1. The City views the Leak Detection Program as not only a water conservation practice but a necessity to provide reliable service to customers. The City is committed to reducing water waste and will continue to perform annual leak detection surveys, and plans to complete surveys of the entire distribution system every 4 to 5 years.

The additional effectiveness of reducing water demand by implementing further water conservation measures is estimated to be less than 0.5 MGD through 2025 and would decrease to less than 0.25 MGD by 2065. The diminished return of further water conservation measures is attributed to the overall success in the water conservation program that reduced water demand. Further water conservation would only offset a small portion of the 12 MGD of the projected demand. Therefore, a water conservation program alternative alone is not adequate to meet drought requirements for the City and was eliminated from further consideration as a stand-alone alternative.

2.27 Alternatives Retained for Level 2 Screening

Based upon the critical flaw analysis of the level 1 screening, the following alternatives were retained for consideration in the FEIS Level 2 screening:

Reservoir Supply Systems

- Hunter Lake – Revised Configuration

Groundwater Supply Systems

- Havana Lowland Well Fields (Well Field A) (12 MGD)
- Illinois River Well Field (Well #1 only) (12 MGD)
- Sangamon River Valley Well Fields (12 MGD)
- Havana Lowland Well Fields (17.8 MGD)
- Illinois River Valley Well Fields (17.8 MGD)

Hybrid Alternatives

- Havana Lowland Well Fields (Well Field B) + Sangamon River Valley (12 MGD)
- Sangamon River Valley Well Fields (10.33 MGD) + Gravel Pit C (1.4 MGD) (12 MGD total)
- Havana Lowland + Sangamon Valley Wells (15.3 MGD)
- Illinois River Well + Sangamon Valley Wells (15.3 MGD)

Further analysis and evaluation of these alternatives were undertaken in the Level 2 Screening Analysis.

3.0 LEVEL 2 SCREENING - SUPPLEMENTAL WATER SUPPLY

The Level 1 screening established the criteria of yield, cost, environmental impacts, availability and logistics, and technical feasibility to evaluate all alternatives. These factors were modified and expanded upon under the Level 2 screening to provide further refinement as to alternative impact and feasibility. This refinement was based on further analysis of each alternative with respect to each of the factors described below.

- **Yield** – all alternatives considered in the Level 2 analysis have yield of 12 MGD or more. Yields exceeding 12 MGD by less than two thirds (66 percent or 8 MGD) may be expected to result in more substantial project costs or environmental impacts, however, the increased yield above the City’s need is not considered to be a critical flaw.
- **Environmental Impacts** – Potential critical environmental factors include unavoidable impacts to threatened/ endangered species and their critical habitats (State or federally listed); potential for chemical or biological contamination of surface water or groundwater; unmitigated impacts to historic properties listed or eligible for listing to the National Register of Historic Places (NRHP) that cannot be avoided; and impacts to rivers listed as part of the National Wild and Scenic Rivers System.

  Under the Level 2 screening analysis, environmental impacts of candidate alternatives are considered based upon a refined analysis of environmental features. Updated resource analyses of land use/land cover, wetlands, and other features were compiled using Geographic Information Systems and supplemental reconnaissance surveys for each project area and assessed for potential impacts based on the proposed development configuration of each alternative. Potential effects of Level 2 alternatives on environmental factors related to the natural and human environments are summarized in

Table 3-1. Separate consideration was given for impacts related to the natural environment versus those that may be associated with the human environment in consideration of the following factors (note impact analysis was not updated from 2016/2017 results):

- **Aquatic, Wetland, and Terrestrial Habitats** – Impacts and benefits of each alternative create notable and often off-setting contrasts between the Hunter Lake alternative and each of the groundwater collection systems.
- **Water Quality** – Impacts to water quality are associated with construction phase land disturbances and with the effectiveness of BMPs used in both short-term and long-term applications. While all of the Level 2 alternatives would have potential for short-term impacts during construction, Hunter Lake has the potential to detain sediment and nutrients (notably nitrogen and phosphorous) and reduce transport to downstream waters. Integration of extensive use of BMPs within the Hunter Lake alternative (in-basin dams, wetlands, filter strips, etc.) is expected to reduce the concentrations of phosphorous and other nutrients

Alternative	Natural Environment Factors: Project Land Area (acres) (1)	Wetland Impacts (acres)(2)	Wetlands Created (acres)	100-Year Floodplain (acres)	Forested Habitat Impacted (acres)	Upland Habitat Conservation Land (acres)	Stream Impacts: # Crossings (Pipelines), Length of Stream (Hunter Lake)	Aquatic Habitat Created (acres)	Impact on Localized Water Quality	Impact on Downstream Water Quality	Federal Threatened & Endangered Species	Human Environment Factors: Cultural Resource Impact probability(5)	Agricultural Land (acres)	Displacements	Transportation	Increased Recreation Potential
Reservoir Supply Systems																
Hunter Lake--Revised Configuration	7983	54.5 (below 568.7 elev + roads)	145 acres	Floodplain expanded to 571' elev	1,780-(below 568.7 elev + roads)	~5,053 above 568.7' elev	~40 miles converted to open water	2,649 acres (568.7' elevation)	Impact minimized by use of BMPs	Benefits to downstream water quality	No Adverse Effects (3)	Moderate/ High	2,890 total, 701.7 impacted by Hunter Lake	0 residential, 1 commercial Approx. 250 acres to be aquired	Low (mitigated)	High
Groundwater Supply Systems																
Havana Lowland Well Fields (Well Field A) (12 MGD)	476	10.1	None	36	42	None	27	None	Localized, construction phase	No adverse effects	Potential Effect (4)	Moderate	282	0	Low	None
Illinois River Well Field (Well #1 only)(12 MGD)	680	0.8	None	105	47	None	36	None	Localized, construction phase	No adverse effects	Potential Effect (4)	Moderate	402	0	Low	None
Sangamon River Valley Well Fields (12 MGD)	833	82.0	None	392	158	None	73	None	Localized, construction phase	No adverse effects	Potential Effect (4)	High	241	0	Low	None
Havana Lowland Well Fields (17.8 MGD)	582	10.7	None	36	42	None	31	None	Localized, construction phase	No adverse effects	Potential Effect (4)	Moderate	383	0	Low	None
Illinois River Valley Well Fields (17.8 MGD)	696	0.8	None	120	47	None	37	None	Localized, construction phase	No adverse effects	Potential Effect (4)	Moderate	416	0	Low	None
Hybrid Alternatives																
Havana Lowland Well Fields (Well Field B) + Sangamon River Valley (12 MGD)	676	51.5	None	208	146	None	59	None	Localized, construction phase	No adverse effects	Potential Effect (4)	Moderate/ High	372	0	Low	None
Sangamon River Valley Well Fields(10.33 MGD) + Gravel Pit C (1.4 MGD)(12 MGD total)	908	87.3	None	688	154	None	63	None	Localized, construction phase	No adverse effects	Potential Effect (4)	High	219	0	Low	None
Havana Lowlands A + Sangamon Valley Wells (15.3 MGD)	628	50.9	None	130	109	None	41	None	Localized, construction phase	No adverse effects	Potential Effect (4)	Moderate/ High	325	0	Low	None
Illinois River Well + Sangamon Valley Wells (15.3 MGD)	931	47.2	None	207	120	None	57	None	Localized, construction phase	No adverse effects	Potential Effect (4)	Moderate/ High	453	0	Low	None

Notes:

(1) Includes lands below 568.7 + proposed roads and dam to be constructed

(2) Reflects field delineation of wetlands within Hunter Lake alternative, and windshield reconnaissance to refine NWI wetlands for other alternatives

(3) Site evaluated and consultation with USFWS determine the absence of effects on listed species

(4) Sites potentially supporting habitats, final design may demonstrate avoidance or other mitigative measures (Note: forested lands have potential for roosting/foraging of listed bat species, Illinois floodplain has potential for Illinois chorus frog, regal frittilary butterfly, etc.

(5) Impact potential based on archaeological review to identify length through "high probability" cultural resource settings

Table 3-1. Summary of Key Level 2 Environmental Factors

- within Hunter Lake and minimize downstream transport which coincides with the nutrient loss reduction strategy goal.
- **Sensitive Species** – Consultation with the United States Fish and Wildlife Service (USFWS) and the Illinois Department of Natural Resources (IDNR) was conducted in regard to sensitive species potentially affected by the proposed project alternatives. Table 3-2 summarizes the identified species of concern that may occur in the vicinity of each project alternative, based on 2016/2017 data.
- **Cultural Resources** – Potential effects of project activities on cultural resources is considered based upon a review of both previously recorded sites and an assessment of the potential for lands considered as having a high probability of containing archaeological sites based on landscape position (slope, proximity to major streams/rivers, etc.), based on 2016/2017 data.
- **Transportation** – Impacts to transportation infrastructure was evaluated. Although Hunter Lake would inundate multiple roadways, more substantial arterial roadways would be replaced with bridges to maintain continuity of the system.
- **Recreation** – Associated impact to provide ancillary benefits to the public through the provision of additional regional recreation opportunities was considered.

- **Logistics** – Logistical factors related to each of the Level 2 alternatives are summarized in Table 3-3. This factor incorporated elements of 404(b)(1) guidelines by including consideration of availability and technical feasibility. Limiting factors include: availability of the source to the City; capability for the alternative to achieve State 401 Water Quality Certification; other permit requirements; loss of power or water production due to source development; and ability of the alternative to be implemented based on current technology. Under the Level 2 screening analysis additional consideration was given to the complexity of project development based on the number of properties potentially affected and the overall system complexity that may represent logistical or technological challenges for operations and maintenance.
- **Cost** – Primary cost factors for each alternative that were compared include: initial cost of construction (capital cost); annual operation and maintenance costs; operating costs during an 18-month drought condition; and total “net present value” costs for the life of the project. The cost comparison of alternatives was performed on a NPV basis for a 50 year life cycle. The NPV was calculated for all alternatives in 2017 dollars using previously developed detailed cost analyses (CMT 2008, 2015a, 2015b, Hanson 2014, and USACE 2000). For alternatives that were not the subject of previous detailed cost analyses (i.e., new hybrid groundwater alternatives), costs were developed using scalable information based on other alternatives on a per MGD basis. NPV includes capital costs for construction, cost of debt service, annual maintenance, non-drought operation energy, 18-month drought operation energy, and property acquisition costs.

  The estimated value of owned property for Hunter Lake was estimated to be $286,837,000 (this value is presented in 2017 dollars.

Alternative	Sensitive Species (1)																		
	Indiana bat (E), Northern long-eared bat (T)	Decurrent false aster (T)	Kirtlands snake (T)	Mudpuppy (T)	Smoth softshell turtle (E)	Barn owl (T)	Northern harrier (E)	Illinois chorus frog (T)	Hall's bulrush (T)	Ironcolor shiner (T)	Starhead topminnow (T)	Ornate box turtle (T)	Regal frittilary butterfly (T)	Bent milk vetch (T)	Heart-leaved plantain (T)	Bunchflower (T)	Loggerhead shrike (T)	Franklin's ground squirrel (T)	Short-eared owl (T)
	Federal		State																
Reservoir Supply Systems																			
Hunter Lake--Revised Configuration	N		P	P	P	T													
Groundwater Supply Systems																			
Havana Lowland Well Fields (Well Field A) (12 MGD)	T							P	P	T	T	P							
Illinois River Well Field (Well #1 only)(12 MGD)	T	P	T										P	P	P	P	T	T	T
Sangamon River Valley Well Fields (12 MGD)	T		T	T	T	T													
Havana Lowland Well Fields (17.8 MGD)	T							P	P	T	T	P							
Illinois River Valley Well Fields (17.8 MGD)	T	P	T										P	P	P	P	T	T	T
Hybrid Alternatives																			
Havana Lowland Well Fields (Well Field B) + Sangamon River Valley (12 MGD)	T		T	T	T	T		P	P	T	T	P							
Sangamon River Valley Well Fields(10.33 MGD) + Gravel Pit C (1.4 MGD)(12 MGD total)	T		T	T	T	T	T												
Havana Lowlands A + Sangamon Valley Wells (15.3 MGD)	T		T	T	T	T		P	P	T	T	P							
Illinois River Well + Sangamon Valley Wells (15.3 MGD)	T	P	T	T	T							P	P	P	P	P	T	T	T

(1) N= not present, field surveys conducted
P = Potential permanent effects to species, potentially present based on IDNR consultation
T = Potential temporary effects to species, potentially present based on IDNR consultation

Note: Species and status presented reflect conditions at time of 2016/2017 evaluation

Table 3-2. Summary of Potential Effects to Sensitive Species

Alternative	Logistical Factors: Land Area Needed for Easement/Acquisition (acres)	Permittability	No. Properties Affected	Operations/ Maintenance (1)
Reservoir Supply Systems				
Hunter Lake--Revised Configuration	250	Requires Section 401, 402, 404 permits Requires Individual 404 permit Section 401 permitting requires site-specific rule by IPCB	32	Land Acquisition/Design Complexity-Low, Section 404 Individual Permit. Section 401 permitting subject to IPCB ruling. Periodic O/M of BMPs, Monitoring and management of restored habitats. Reliability- High
Groundwater Supply Systems				
Havana Lowland Well Fields (Well Field A) (12 MGD)	476	Requires Section 401, 402, 404 permits Requires well permits Requires authorization by Imperial Valley Water Authority	350	6 deep wells, 2 pump stations. Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Permiting complexity-low. Near numerous center pivot irrigation. Potential Nitrate issues. Reliability: Medium
Illinois River Well Field (Well #1 only)(12 MGD)	680	Requires Section 401, 402, 404 permits Requires well permits	350*	1 deep radial well. Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Reliability-High
Sangamon River Valley Well Fields (12 MGD)	833	Requires Section 401, 402, 404 permits Requires well permits	624	36 wells. Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Permiting complexity-low. Complexity-high, potential impact to private wells. Whole system based on one assumption of 0.33 MGD per square mile during drought conditions. Reliability: Medium
Havana Lowland Well Fields (17.8 MGD)	582	Requires Section 401, 402, 404 permits Requires well permits Requires authorization by Imperial Valley Water Authority	391	10 wells. Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Permiting complexity-low. High cost for excessive yield. Complexity-low. Water authority may limit pumping to non growing season. Reliability: Medium
Illinois River Valley Well Fields (17.8 MGD)	696	Requires Section 401, 402, 404 permits Requires well permits	375*	2 radial wells, Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Reliability-High.

Alternative	Logistical Factors: Land Area Needed for Easement/Acquisition (acres)	Permittability	No. Properties Affected	Operations/ Maintenance (1)
Hybrid Alternatives				
Havana Lowland Well Fields (Well Field B) + Sangamon River Valley (12 MGD)	676	Requires Section 401, 402, 404 permits Requires well permits	483	5 deep wells (9MGD), 10 shallow wells (3.3MGD), Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Permiting complexity-low. Complexity-high, 7 pump stations. Reliability: Medium
Sangamon River Valley Well Fields(10.33 MGD) + Gravel Pit C (1.4 MGD)(12 MGD total)	555	Requires Section 401, 402, 404 permits Requires well permits	568	32 shallow wells, plus Gravel Pit C. Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Permiting complexity-low. Complexity-high, potential impact to private wells.. Reliability: Medium.
Havana Lowlands A + Sangamon Valley Wells (15.3 MGD)	628	Requires Section 401, 402, 404 permits Requires well permits Requires authorization by Imperial Valley Water Authority	465	6 deep wells, 10 Sangamon River Wells. 4 pump stations. Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Permiting complexity-low. Complexity-high. Reliability: Medium
Illinois River Well + Sangamon Valley Wells (15.3 MGD)	931	Requires Section 401, 402, 404 permits Requires well permits	465*	1 radial well, 10 shallow wells, 6 pump stations. Land Acquisition/Design Complexity-High, Section 404 Nationwide Permit, pre-approved Section 401 permit. Permiting complexity-low. Complexity-high, potential impact to private wells. Reliability-High.

(1) Complexity Based on:

1. Number and types of wells
2. Length of transmission piping
3. Amount of annual maintenance
4. Need for and complexity of permitting

Reliability based on:

1. Ability of the system, once installed, to reliably provide required volume.
2. Other restricting items based on previous reports/studies/yield assumptions
3. Potential water quality issues not easily remedied with existing treatment plant
4. Potential for CWLP to control water source and quality over 50-year life of project

* Number of properties estimated

Table 3-3. Summary of Key Level 2 Logistical Factors

This number was not factored into the NPV of non-Hunter Lake alternatives as all land could not be sold at one time and the complexity of purchase and buy back agreements. NPV was calculated using a 3.5 percent interest rate for bonds, a 1 percent discount rate, and 2.5 percent inflation rate for all alternatives. The 2.5 percent inflation rate was assumed for maintenance and energy cost increases over the 50-year life cycle. For the purpose of NPV calculation, the 18-month drought operation was assumed to occur at year 25 of the 50-year life cycle.

Under the Level 2 screening analysis additional consideration was given to differences in capital cost, annual operation and maintenance costs, and total "net present value" costs for the life of the project as summarized in Table 3-4.

	Cost Factors			
Alternative	**Capital Cost ($M)**	**18-month Operation Cost ($M)**	**Annual Maintenance ($M/yr)**	**Total Project Costs-NPV ($M)**
Reservoir Supply Systems				
Hunter Lake--Revised Configuration	$117.5	$0.4	$0.1	$189.8
Groundwater Supply Systems				
Havana Lowland Well Fields (Well Field A) (12 MGD)	$137.7	$2.1	$0.3	$235.1
Illinois River Well Field (Well #1 only)(12 MGD)	$173.0	$3.4	$0.4	$304.2
Sangamon River Valley Well Fields (12 MGD)	$125.3	$3.9	$0.8	$265.2
Havana Lowland Well Fields (17.8 MGD)	$203.4	$3.5	$0.4	$344.2
Illinois River Valley Well Fields (17.8 MGD)	$223.8	$4.3	$0.5	$383.7
Hybrid Alternatives				
Havana Lowland Well Fields (Well Field B) + Sangamon River Valley (12 MGD)	$182.2	$2.6	$0.5	$316.6
Sangamon River Valley Well Fields(10.33 MGD) + Gravel Pit C (1.4 MGD)(12 MGD total)	$138.6	$3.6	$0.8	$286.0
Havana Lowlands A + Sangamon Valley Wells (15.3 MGD)	$177.7	$3.2	$0.5	$315.8
Illinois River Well + Sangamon Valley Wells (15.3 MGD)	$206.9	$4.5	$0.6	$376.4

Note: All costs adjusted to 2016 dollars (updated 2022 dollars are presented for the Hunter Lake alternative in Section 2.6.2

Red: Alternative critically flaw ed if excessive Capital Cost and/or excessive Total Project Cost

Table 3-4. Summary of Key Level 2 Cost Factors

Based upon the critical flaw analysis of the Level 1 screening and the more in-depth analysis of the Level 2 screening, the following alternatives were retained for detailed analysis.:

- Reservoir Supply Systems
  - Hunter Lake – Revised Configuration
- Groundwater Supply Systems
  - Havana Lowland Well Fields (Well Field A) (12 MGD)

3.1 Alternatives Eliminated in Phase 1 Level 2 Screening

Based upon the above criteria, preliminary alternatives were evaluated to determine their reasonability for further consideration. Scoring followed the following rationale:

- **Red** – Excessive/insufficient yield, highly adverse impact/critical flaw, logistically flawed, excessive costs
- **Orange** – Moderate impacts/mitigable, challenging logistics, moderate costs
- **Green** – Sufficient yield, low environmental impacts, favorable logistics, low costs

Ranking of alternatives based on each of these criteria are summarized in Table 3-5. Rationale for the elimination of these preliminary alternatives is provided in the following subsections.

Alternative	Yield (Inadequate or Excessive)	Impacts-Natural Environment	Impact-Human Environment	Logistics	Existing Technology	Cost	Notes
Groundwater Supply Systems							
Illinois River Well Field (Well #1 only)(12 MGD)							Sufficient capacity, mitigable environmental impacts, extensive pipeline with real estate/ROW complexity, high costs, would not expand regional recreational opportunities.
Sangamon River Valley Well Fields (12 MGD)							Sufficient capacity, mitigable environmental impacts, extensive pipeline with real estate/ROW complexity, higher system complexity, moderate costs, would not expand regional recreational opportunities.
Havana Lowland Well Fields (17.8 MGD)							Excessive capacity, mitigable environmental impacts, extensive pipeline with real estate/ROW complexity, high costs, would not expand regional recreational opportunities.
Illinois River Valley Well Fields (17.8 MGD)							Excessive capacity, mitigable environmental impacts, extensive pipeline with real estate/ROW complexity, high costs, would not expand regional recreational opportunities.
Hybrid Alternatives							
Havana Lowland Well Fields (Well Field B) + Sangamon River Valley (12 MGD)							Sufficient capacity, mitigable environmental impacts, extensive pipeline with real estate/ROW complexity, higher system complexity, high costs, would not expand regional recreational opportunities.
Sangamon River Valley Well Fields(10.33 MGD) + Gravel Pit C (1.4 MGD)(12 MGD total)							Sufficient capacity, mitigable environmental impacts, extensive pipeline with real estate/ROW complexity, higher system complexity, high costs, would not expand regional recreational opportunities.
Havana Lowlands A + Sangamon Valley Wells (15.3 MGD)							Sufficient capacity, environmental impacts mitigable, extensive pipeline with real estate/ROW complexity, higher system complexity, increased system complexity, moderate cost, would not expand regional recreational opportunities.
Illinois River Well + Sangamon Valley Wells (15.3 MGD)							Sufficient capacity, environmental impacts mitigable, extensive pipeline with real estate/ROW complexity, higher system complexity, increased system complexity, high cost, would not expand regional recreational opportunities.

Excessive/insufficient yield, Highly adverse impact/critical flaw, logistically flawed, excessive costs
Yield notably greater than need, but not excessive; Moderate impacts/mitigable, challenging logistics, moderate costs
Sufficient yield, low environmental impacts, favorable logistics, low costs, technically feasible

Screening Criteria

Note: Level 1 screening included application of critical flaw review in which key factors considered to eliminate a given alternative from further consideration included the following:

1. Insufficient capacity (yield) of system to meet project need
2. Excessive project environmental impact
3. Logistical issues that are unmitigable (e.g., inability to obtain permits/authorizations) ,
4. Grossly excessive project costs

Note: The following are additional Level 2 screening factors used to identify critical Level 2 issues:

5. Excessive Yield contributing to cost and complexity
6. Logistical issues related to exceptionally high system complexity and challenges regarding construction, operations and maintenance
7. Excessive Capital Cost and/or excessive Total Project Cost

Table 3-5. Alternatives Eliminated from Further Consideration in Level 2 Analysis

4.0 LITERATURE CITED

Anliker, M. A. 1997. Report on the Impacts on Local Ground-Water levels at Two Locations by the Proposed Hunter Lake. ISWS Letter Report.

CDM Smith. 2014. Lake Springfield Watershed TMDL Stage 1 Report. Prepared for Illinois EPA. September 2014.

CMT (Crawford, Murphy, and Tilly Inc.). 2008. Preliminary Plan to Develop a Sangamon River Valley Backup Water Supply. Prepared for City of Springfield Illinois city Water, Light and Power. February 2008.

CMT (Crawford, Murphy, and Tilly Inc.). 2015a. Water Supply Alternatives Cost Update of 1998 Feasibility Study – Illinois River Well System. Prepared for the City of Springfield, Illinois – City Water, Light, and Power.

CMT (Crawford, Murphy, and Tilly Inc.). 2015b. Water Supply Alternatives Cost Update of 1998 Feasibility Study – Havana Lowland Well System. Prepared for the City of Springfield, Illinois – City Water, Light, and Power.

Hanson Engineers. 1998. Evaluation of Significant Environmental Impacts Associated with Lick Creek Reservoir. Prepared for City Water Light and Power. May 1998.

Hanson Engineers. 2014. Hunter Lake Construction Cost Estimate - Updated to 2014 Dollars. Prepared for the City of Springfield, Illinois – City Water, Light, and Power.

IEPA (Illinois Environmental Protection Agency). 2015. Illinois Nutrient Loss Reduction Strategy. Available at: http://www.epa.illinois.gov/Assets/iepa/water-quality/watershed-management/nlrs/nlrs-final-revised-083115.pdf, Accessed on November 1, 2017.

ISWS (Illinois State Water Survey). 2002. Map 5, Sangamon Region, Update.

ISWS (Illinois State Water Survey). 2017. Groundwater Science – Mahomet Aquifer, Illinois, State Water Survey. Available at: http://www.isws.illinois.edu/gws/archive/mahomet.asp (accessed 2017.

Layne Hydro. 2013. Potential Yield of Gravel Pits in the Sangamon River Valley: Refinement of 2012 Estimates. Layne Hydro, a division of Layne Christensen Company Prepared for the City of Springfield-City Water, Light, and Power.

National Park Service. 2017. Illinois Segments, Nationwide Rivers Inventory, National Park Service, U.S. Department of Interior. Retrieved from https://www.nps.gov/ncrc/programs/rtca/nri/states/il.html (accessed March 2017).

USACE. 2000. Finale Environmental Impact Statement, USACE Rock Island District. November 2000.

USACE. 2016. Corps Lake Shelbyville 2016 Draft Master Plan. http://www.mvs.usace.army.mil/Missions/Recreation/Lake-Shelbyville/2016-Master-Plan/ Accessed on December 12, 2016.

Appendix A: Project History

Project History

- December 1988: Ordinance authorizes Office of Public Utilities to move forward with Lake Springfield II.
- July 1989: A permit application for the construction of Hunter Lake was submitted to the Corps.
- July 1989: Bonds issued for project development start-up.
- September 1989 - October 1993: Studies performed on Environmental Impact Statement (EIS) work for Hunter Lake.
- October 1993: The first Draft EIS was submitted to the Corps.
- August 1994: Corps responds to Draft EIS with comments, including requesting additional study requirements, such as further evaluation of supplemental water supply alternatives. Other issues included analyzing operating plans, groundwater impacts, water quality projections, wetlands, municipal sewage impacts, and flood assessments.
- 1995-1998: Additional environmental studies conducted to satisfactorily address alternatives analyses and other issues.
- May 1998: Revised Draft EIS submitted to Corps.
- April 1999: Corps published the Draft EIS.
- May 1999 – September 2000: Public comments considered by Corps and City; revisions incorporated into Final EIS.
- November 2000: Corps publishes Final EIS.
- February 2001: Public Hearing on Final EIS held by Corps.
- March - May 2001: Additional wetlands information developed and responses to Public Hearing comments formulated. Corps begins formulating Record of Decision (ROD). Corps needs IEPA's Section 401 permit prior to formulating final permit conditions.
- August 2002 – present: Negotiations conducted, feasibility studies performed and draft agreements prepared with Divernon, Pawnee, and the Virden Sanitary District to achieve IEPA goals regarding sewage treatment and to address Pawnee concerns regarding flooding. Agreement executed with Divernon in August 2003 for re-location of effluent option, but after public hearing, similar option not feasible for Virden Sanitary District. Connection of all three communities to Springfield Metro Sanitary District explored as feasible option for all three communities.
- May 2006 – August 2007: Responses to requests for information provided to Corps and IEPA. Corps used information to prepare an update to its November 2000 FEIS, and IEPA to publish its anti-degradation assessment. Updates reviews of alternative water supply options. Corps and IEPA Public Notices published in May 2007. Responses to comments provided to Corps and IEPA in August 2007.

Project History (continued)

- May 29, 2007: IEPA publishes its Fact Sheet on Anti-degradation Assessment for Hunter Lake.
- May 2008: Updated Permit Application provided to Corps and permit fee provided to IEPA.
- December 3, 2008: Joint Public Notice issued by Corps, IEPA, Illinois Department of Natural Resources (IDNR)/Office of Water Resources. Public hearing held pursuant to IEPA's Anti-degradation Assessment / Section 401 permitting.
- January 7, 2009: City Council votes to purchase Clear Lake gravel pit.
- January – June 2009: Corps and IEPA review public comments from December 3, 2008 public hearing. CWLP provides responses to questions forwarded by Corps and IEPA.
- December 2010: Corps puts Hunter Lake permit on inactive status and mandates CWLP to investigate gravel pits alternative.
- Early 2012: CWLP contracts for a pump test of the gravel pits to determine:
    - Water Yield of gravel pits
    - Potential impacts of withdrawals on aquifer water levels
    - Compare water yield estimate to previous estimates
- The pump test report identified severe limitations on the use and water yield from the gravel pits without affecting neighboring communities' wells.
- 2013: - CWLP collected additional data related to gravel pits analysis including:
    - Volume of gravel pits - perform bathymetric surveys
    - Neighboring Community Well data - capacity, depth, screen and pump elevations
    - Revised water supply demand analysis
- August 2013: Revised pump test report determined that gravel pits not a viable option in terms of capability to provide water supply volume and potential negative impacts on neighboring community wells.
- February 2014: CWLP contracts for updated water demand analysis for next 50 years.
- March 2014: CWLP contracts to update cost estimate of supplemental water supply alternatives.
- July 2015: City Council authorizes CWLP to pursue construction of Hunter Lake.
- August 22, 2015: Memorandum of Understanding signed by City of Springfield and IDNR. MOU states IDNR will manage the Hunter Lake project area for public access for outdoor recreation, education and habitat conservation.
- September 2015- CMT hired to update costs associated with the options for removing the 3 wastewater treatment plants effluent from Hunter Lake tributaries.
- January 2016- Northwater Consulting hired to perform antidegradation assessment for water quality and a watershed plan for Hunter Lake (1-yr sampling plan).

Project History (continued)

- June 2016: Amec Foster Wheeler hired to prepare Supplemental EIS and related studies as per USACE direction.
- July-August 2016: Survey of bats within Hunter Lake area completed as per USACE requirements.
- August 24, 2016: Public scoping meeting held to provide an overview and history of the project, present the project alternatives, and solicit comments from the public.
- October 2016: Survey of wetlands and waters of the United States completed as per the USACE requirements.

Appendix B: SEIS Project Scoping Report

(See Appendix B to the SEIS)