CAVELAND ENVIRONMENTAL AUTHORITY, INC.

REGIONAL FACILITY PLAN

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Caveland Environmental Authority, Inc

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ACRONYMS

ACRONYM AND ABBREVIATION GLOSSARY

ADF	Average daily flow
AS	Activated sludge
AQI	Air Quality Index
CEA	Caveland Environmental Authority
Cfs	Cubic feet per second
CSO	Combined sewer overflow
C	Contact time
DEP	Department for Environmental Protection
DES	Division of Environmental Services
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
DOC	Division of Conservation
DOW	Division of Water
DWM	Division of Waste Management
EIS	Environmental Impact Statement: (DEIS--draft EIS, FEIS--final EIS)
EL	Effluent limit
EPA	Environmental Protection Agency
FIRM	Flood Insurance Rate Map
Fps	Feet per second
Gpd	Gallons per day
gpm	Gallons per minute
I/I	Infiltration/inflow
KPDES	KPDES Permits Branch
KPDES	Kentucky Pollutant Discharge Elimination System
KRA	Kentucky River Authority
KWWOA	Kentucky Water and Wastewater Operators Association
Mgd or MGD	Million gallons per day
mg/l	Milligrams per liter
MLSS	Mixed liquor suspended solids
MOR's	Monthly operating reports
NPDES	National Pollutant Discharge Elimination System
O & M	Operations and maintenance
OX	Oxidation
P & S	Plans and specifications

PE	Professional Engineer
pH	Hydrogen ion activity; acidity/alkalinity continuum; (7 neutral, less than 7 acidic, greater than 7 alkaline)
POD	Point of discharge
POS	Plan of Study
Ppb	Parts per billion
Ppm	Parts per million
Ppt	Parts per trillion (also, parts per thousand)
PVC	Polyvinyl chloride
QA/QC	Quality assurance/quality control
SS	Suspended solids; see also TSS, VSS
TDS	Total dissolved solids
TMDL	Total maximum daily load
TOD	Total Oxygen Demand
TSS	Total suspended solids
USDA	United States Department of Agriculture
US EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VSS	Volatile suspended solids
WWTP/WRF	Wastewater Treatment Plant/ Water Reclamation Facility
401	Water Quality Certification under Section 401 of Clean Water Act

Section 1 – Regional Facility Plan Summary

Introduction and Background

Planning for the Caveland Environmental Authority Regional Wastewater System began in the late 1970's. The Caveland Environmental Authority was established under KRS 65 by an Interlocal Agreement and is chartered as a corporate body under the laws of the Commonwealth of Kentucky. In 1984 the Board of the Caveland Environmental Authority (CEA) adopted the Mammoth Cave Area Amended 201 Facilities Plan. That Plan outlined the facilities and implementation activities needed for the municipalities of Horse Cave, Cave City and Park City to join in a regional wastewater system controlled and operated by CEA, a separate governmental entity having board members from each of the three participating municipalities.

From the 201 Plan, the existing Horse Cave and Cave City Water Reclamation Facility (WRF) were expanded and improved. The sanitary sewer collections systems serving the Horse Cave and Cave City areas were renovated and expanded to eliminate pollution to the cave system. Improvements included a new effluent force main from the Cave City WRF to the Horse Cave WRF effluent pump wet well where it is combined with the effluent from the Horse Cave WRF and pumped directly to the Green River. This effluent pumping system eliminated potential pollution of the Cave System from local discharge of the plant effluents.

CEA owns and operates a sewage collection and treatment system for the citizens, residents and commercial and industrial users within its territory. This territory includes a portion of Hart County, Barren County, Hardin County, Edmonson County and Larue County, Kentucky. The CEA Service Limits and Planning Area Map is **Figure 1-1**.

Previous Facilities Plans and Reports

There have been several Facilities Plans (including Amendments) and Reports written in previous years. These previous plans and reports are listed below:

1. Mammoth Cave Area 201 Facilities Plan (Date uncertain; approx. 1981/ Campbell Wallace, Consulting Engineer)
2. Addendum – Mammoth Cave Area 201 Facilities Plan (September 3, 1981/ Barren River Area Development District/Addendum to Campbell Wallace 201 Plan)
3. Preliminary Design Report Mammoth Cave Area Regional Sewer System (January 1983/ Haworth, Meyer and Boleyn, Inc.)
4. Bonnieville, Kentucky, 201 Facilities Plan Report (September 1983/ Barren River Area Development District)

5. 201 Facilities Plan Amendment Mammoth Cave Area Kentucky (January 1984/Haworth, Meyer and Boleyn, Inc.)
6. Preliminary Engineering Report Sewage Systems (September 1992/Water Management Services)
7. Bonnieville, Kentucky, Sewer Facilities Plan (Revised Feb. 1997/ Mayes, Sudderth and Etheredge, Inc.)
8. Amendment to Caveland Environmental Authority, Inc., Horse Cave Wastewater Treatment Plant Regional Facilities Plan (April 2002/Water Management Services)

Purpose of the Plan

State regulations require all wastewater agencies to submit a Regional Facilities Plan or Asset Inventory Report every ten years, or when an agency is planning on expanding the existing wastewater treatment capacity by thirty percent or building a new facility/discharge. These requirements are contained in 401 KAR 5:006. This Facilities Plan will evaluate and establish a plan for wastewater service, comply with 401 KAR 5:006, and enable CEA to meet DEP requirements.

The scope and purpose of this Regional Facility Plan is to:

- Develop a comprehensive plan for serving CEA's needs in a cost-effective and environmentally sound manner through the planning period. The 20-year Regional Facilities Plan will be developed in accordance with the regulation and Division of Water guidance document*, Regional Facility Plan Guidance,* 2011. The Facility Plan Planning Period will be from 2021 through 2041 (20 Years). The proposed improvements will be constructed during the first 24 months of the Planning Period, depending on the level of funding available.
- Develop and evaluate options for upgrading the Horse Cave and Cave City WRFs.
- Document input received during public hearings required by DOW regulations.
- Describe CEA's recommended implementation and funding plan for the selected alternative(s).
- Document the completion of the required environmental, archaeological, and historic preservation cross cutter agency review requests.

Recommended Alternative

The recommended alternative is the elimination of the Cave City WRF and renovation and expansion of the Horse Cave WRF. Additional capacity will be added to the Horse Cave WRF so that it can receive existing and future flows from the Cave City service area as well as existing and future flows from all other service areas. The capacity of the Horse Cave WRF will be increased from 0.48 MGD to 1.30 MGD and the Cave City WRF will be taken offline.

The benefits of this recommended alternative are:

- Lowest cost solution for providing wastewater services to the CEA Service Area.
- Takes advantage of the under-utilized biological treatment capacity that has been built into the Horse Cave WWTP but has not been used.
- Eliminates existing and future regulatory requirements associated with operating the Cave City plant.

Cost of Proposed Plan

The total cost of the proposed plan is $7.791 million (refer to the project cost estimate in **Table 8-2**). This cost includes engineering, construction and permitting. However, because all work will take place within existing CEA property and easements, there will be no land acquisition costs, and minimal legal costs.

The CEA intends to use Project Phasing and grants to fund a portion of the Project. This will limit the Capital Costs to level that can be supported by the current rate structure. Grant sources will include the Economic Development Agency and Community Development Block Grants.

The CEA passed a rate increase in 2018. This increase raised the user rates by 5% per year for three consecutive years. The current rate is $5.88 per 1,000 gallons of usage. This is a flat rate applied to all system users. The rate increase also included an annual increase in the rate based on the Consumer Price Index. This is an annual increase and is applied each year in May. The rate increase took into consideration that the CEA is close (approximately 3 years from now – 2024) to paying off two large loans they secured to construct the existing infrastructure.

By using grants to fund a portion of the Project, paying off two loans and phasing constriction of the proposed improvements the existing rate structure should generate sufficient revenue to fund the proposed improvements without a rate increase. At this time the current User Rate for 4,000 gallons of use is $23.52.

The proposed improvements are shown as Alternative 3 in Section 8 see **Figures 8-3**, **8-4** and **8-5.**

Planning Agency Commitments to Implement Plan

CEA has the authority to prepare and implement the recommended project within the planning area. DOW construction and environmental permits must be secured prior to construction.

Schedule of Implementation for Recommended Project

The Schedule of Implementation for the elimination of the Cave City WWTP and renovation of the Horse Cave WRF is listed in **Table 1-1** below. (The project schedule will mainly be dependent on securing project financing and regulatory permit approvals).

Table 1-1 Schedule of Implementation for Recommended Project

Recommended Project	Estimated Completion Date
Apply for Project Financing	August 2020
Submit Facility Plan for Review	February 2021
Public Hearing on Facility Plan	March 2021
Engineering Design	March 2021
Construction Permit from DOW	May 2021
Facility Plan Approved (SPEAR Issued)	September 2021
Bidding	October 2021
Construction Starts	November 2021
Construction Complete	March 2023

Section 2 – Statement of Purpose and Need

A regional facility plan is required by Kentucky 401 KAR 5:006, Section 2, for the following reasons:

1. A new regional planning agency is formed.
2. A new WRF is proposed within an existing planning area.
3. An existing regional planning agency proposes to expand the Average Daily Design Capacity of an existing waster reclamation facility by more than thirty (30) percent; and
4. The equivalent population served by an existing wastewater collection system or a system with a Kentucky Inter-System Operating Permit is proposed for expansion by more than thirty (30) percent of the population served in the previously approved regional facility plan.

A regional facility plan may also be needed to address water quality or public health concerns; inadequate system or system components or to comply with increased treatment levels that improve effluent quality. The plan, once prepared, must be submitted and approved by the Kentucky Division of Water.

The existing WRF at Cave City and Horse Cave are coming to the end of their service life and in need of upgrades in order to meet current and future treatment regulations. CEA has commissioned this Facility Plan to evaluate options for upgrading the Horse Cave and Cave City WWTPs. The main features of the plan will be:

1. Update populations and flow projections.
2. Evaluate needed upgrades and improvements to the Cave City and Horse Cave WRF
3. Evaluate the ability of the existing WRF to meet existing and future effluent requirements.
4. Identify the best use of the existing WRF.
5. Select a recommended alternative for implementation.
6. Prepare an implementation plan for the recommended alternative including identification of project phases; schedule for implementation; and identification of funding sources.

Section 3 – Physical Characteristics of the Planning Area

Introduction

This section of the Facility Plan will delineate the planning area boundaries and describe key topographic, geographic and natural and/or man-made features of the area.

Existing Planning Area

The current CEA planning area includes approximately 141,000 Acres located mostly in Hart County with a small portion of the service area extending into Barren, Edmonson, Larue and Hardin counties (see **Figure 1-1** – CEA Service Limits and Planning Area). Most of the service area exists in a corridor that runs along the east and west side of I-65 as it traverses Hart County and Barren County. The service area includes the cities of Park City, Cave City, Horse Cave, Rowlettes and Bonnieville. The City of Munfordsville (located along I-65 in Hart County) has its own wastewater collection and treatment facilities and is not part of the CEA service limits or planning area. These current service limits and planning area were developed during the completion of the Horse Cave Wastewater Treatment Regional Facilities Plan (April 2002/Waste Management Services).

To further identify the planning area and its characteristics, the following maps are included in this section:

1. One (1) current map, indicating the planning area boundary, service area boundary, watershed boundaries, county lines, populated places, cities and/or towns, and project areas or proposed planning period phases (**Figure 1-1**: CEA Service Limits & Planning Area).
2. One (1) current map, including locations of wastewater treatment facilities (including package treatment plants), collection lines (gravity, force main, inceptors), pump stations, public drinking water intake points, and groundwater supply areas [Source Water Area Protection Plans (SWAPP) and/or Wellhead Protection Areas (WHPA)] ;(Shown on **Figure 1-1**: CEA Service Limits & Planning Area)
3. One (1) seven and one-half (7 ½) minute USGS topographic map (**Figure 3-1**).
4. One (1) current map delineating the 100-year floodplain (**Figure 3-2**: FEMA Flood Map)
5. Local planning and zoning land use maps (**Figure 3-3**: Cave City Zoning Map).

Topographic/Geographical Features of Planning/Service Area:

Most of the CEA service area is located within Hart County, Kentucky. Hart County lies largely in the Mississippian Plateaus area of south-central Kentucky. Topographically, it occupies two plateau areas. The lower area is a slightly rolling limestone plain characterized by few surface streams and thousands of sinkholes. Elevations on the sinkhole plain range from about 750 feet

on the east to 640 feet on the west, at the base of the Dripping Springs escarpment. The sinkhole plain is studded with irregular hills and ridges, erosion remnants from a retreating escarpment, which rise is 100 feet or more.

The Dripping Springs escarpment is a southeastward-facing cuesta which rises 200 feet or more above the sinkhole plain. It is a prominent topographic feature. Behind the escarpment is a higher tableland which locally has been referred to as the Mammoth Cave Plateau. This higher plateau is more highly dissected by stream erosion than the lower plateau. Local reliefs of 200 feet are common in this part of the county.

Green River follows a sinuous route across the center of the county. It is entrenched 150 to 200 feet below the karst plateau. The area north of the river is hilly and contains the highest elevations in Hart County. Several hills attain elevations in excess of 1000 feet. The highest, Frenchman Knob (about 6 miles north-northeast of Munfordville), is 1156 feet at the triangulation station. Three high knobs, 6 to 8 miles northeast of Munfordville, are Three Kiln Knob at 1080 feet, Grindstone Knob at 1078 feet and Knox Knob at 1040 feet. Maxey Knob, south of Green River near the Hart-Green County line, is 1082 feet.

The lowest elevation in the county, 421 feet, is the normal pool level of Green River where it leaves the western edge of the county.

The elevation of Munfordville, at the courthouse, is 612 feet. Elevations of other communities are Bonnieville, 670 feet; Canmer, 645 feet; Cub Run, 766 feet; Hardyville, 704 feet; Hammonville, 710 feet; Horse Cave, 635 feet; and Rowletts, 633 feet.

Natural and/or Man-Made Features of Planning/Service Area:

One of the most prominent geographical features of the planning/service area is its proximity to Mammoth Cave National Park. The park is a U.S. National Park in central Kentucky, encompassing portions of Mammoth Cave. The official name of the system is the Mammoth-Flint Ridge Cave System for the ridge under which the cave has formed. The park was established as a national park on July 1, 1941. It became a World Heritage Site on October 27, 1981, and an international Biosphere Reserve on September 26, 1990.

The park is located primarily in Edmonson County, Kentucky, with small areas extending eastward into Hart County and Barren County. It is centered around the Green River, with a tributary, the Nolin River, feeding into the Green just inside the park. With a confirmed 365 miles of passageways, it is by far the world's longest known cave system.

Another natural feature of the area is Nolin River Lake which is fed by the Nolin River. Nolin Lake was authorized under the Flood Control Act if 1938. The Louisville District of the U. S. Army Corps of Engineers designed, built, and operates the lake to reduce flood damages downstream from

the dam. The dam is about 8 miles above the confluence of the Nolin and Green Rivers. During the fall and winter months, when excessive rainfall is likely, the lake is kept at a relatively low level referred to as winter pool. Should heavy rains occur, surface water runoff is stored in the lake until the swollen streams and rivers below the dam have receded and can handle the release of the stored water without damage to lives or property.

Section 4 – Socioeconomic Characteristics of the Planning Area

Introduction

Because only a very small portion of the existing planning area extends over the Hart County line into Hardin and Larue Counties (i.e. encompassing only the un-incorporated town of Upton, which is located about one mile from the Hardin and Larue County Line), this section of the Facility Plan will follow the socioeconomic characteristics of Hart County and Northern Barren County, including the Cave City and Horse Cave WRFs in Hart County and the cities of Cave City, Park City, Mammoth Cave, Horse Cave, and Bonnieville.

Historical Population Data

Hart County and Barren County have both had significant growth over the past five decades, between 1960 and 2010. Hart County has had an overall population increase of almost 30 percent, going from a population of 14,119 in 1960 to a population of 18,199 in 2010 (the last census year). Barren County has seen a larger increase in population with an overall increase of nearly 50 percent, increasing from a population of 28,303 in 1960 to a population of 42,173 in 2010. **Table 4-1** and **4-2** along with **Figure 4-1** present this historical population data.

Table 4-1

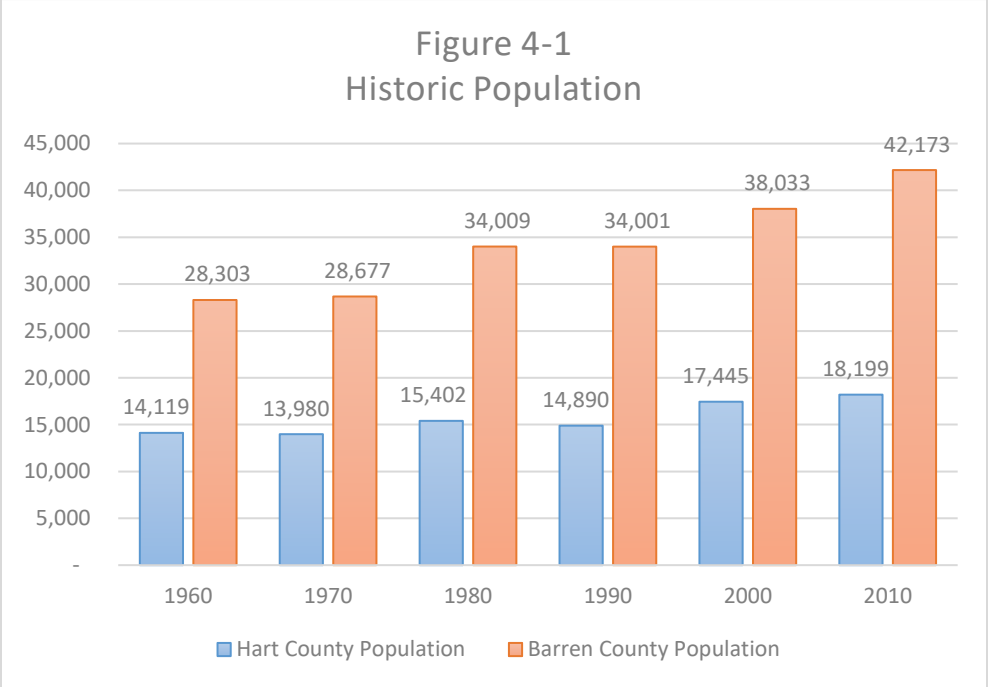
Population and Percent Growth
Hart County, Kentucky

	Population	Percent Change
1960	14,119	
1970	13,980	-0.98%
1980	15,402	10.17%
1990	14,890	-3.32%
2000	17,445	17.16%
2010	18,199	4.32%

Table 4-2

Population and Percent Growth
Barren County, Kentucky

	Population	Percent Change
1960	28,303	
1970	28,677	1.32%
1980	34,009	18.59%
1990	34,001	-0.02%
2000	38,033	11.86%
2010	42,173	10.89%



The service area includes five cities/areas currently served by sanitary sewers: Horse Cave, Cave City, Park City, Mammoth Cave, and Bonnieville. **Table 4-3** presents the historical population data for these cities as reported by the Kentucky State Data Center.

Table 4-3
Population of Incorporated Cities
Based on 2010 Census Data

	Horse Cave	Cave City	Park City	Bonnieville
2000	2,231	1,868	515	125
2010	2,311	2,240	537	255
% Change	4%	20%	4%	104%

The number of households and persons per household in the area were used to analyze the service area. **Table 4-4** and **4-5** represent this data for Hart County and Barren County for historical, current, and future trends.

Table 4-4		
Number of Households and Persons per Household History and Projections Hart County, Kentucky		
	Number of Households	Persons per household
2000	6,769	2.54
2010	7,097	2.53
2020	7,532	2.45
2030	7,756	2.41

Table 4-5		
Number of Households and Persons per Household History and Projections Barren County, Kentucky		
	Number of Households	Persons per household
2000	15,346	2.54
2010	16,999	2.53
2020	19,245	2.42
2030	21,152	2.36

Population Projections

Based on the information obtained from the Kentucky State Data Center, both the population in Hart County and in Barren County are projected to increase. Presented in **Table 4-6**, the Hart County population is projected to increase until 2025 but will slowly decrease over the following 15 years. Overall, the population in Hart County in expected to increase by three (3) percent from 2010 to 2025. Barren County is projected to have a constant increase in its population from 2010 to 2025, increasing by almost 15 percent. Presented on **Table 4-7** is the population projections for the incorporated cities of within the service areas.

Table 4-6		
County Population Projections Through 2040		
	Hart County	Barren County
2020	18,680	45,135
2025	18,685	46,580
2030	18,835	47,945
2035	18,935	49,210
2040	18,890	50,330

Table 4-7
Incorporated Cities Population Projections Through 2040

	Horse Cave	Cave City	Park City	Bonnieville
2020	2,425	2,426	559	264
2025	2,426	2,504	577	272
2030	2,445	2,577	594	280
2035	2,458	2,645	609	288
2040	2,452	2,705	623	294

Socioeconomic Conditions

The initial capital costs and annual operation and maintenance costs of sanitary sewage collection and treatment improvements proposed in any planning document must be paid for by the users of the system.

According to the U.S. Department of Labor, Bureau of Labor and Statistics, unemployment in Hart County is currently 5.2 percent and Barren County's current unemployment rate is 5.1 percent. Both counties have a lower unemployment rate than the State of Kentucky (5.3 percent), and the National unemployment rate (5.7 percent). The major employers in the area are manufacturing, construction, accommodation and food services, retail trade, and health care and social assistance. Median household income in Hart County is $33,408, which is below the State average of $43,036. Barren County also has a lower median household income than the State average with $38,873.

Current and Projected Industrial and Commercial Users of the System

There are several commercial/industrial users contributing flow to the wastewater system. Some examples are sawmills, commercial bakeries, plastic product producers, and asphalt paving mixture and block manufacturing. Currently there are no plans for adding any industrial or commercial users into the system.

Economic Impact on the Community

The main impact of this plan would be cost savings to the CEA and system users. The plan would lower costs associated with maintenance and replacement of existing infrastructure. The increased capacity of the system would make it possible for growth that would generate additional revenue. This additional revenue would help maintain lower rates for system users. Lower user rates can be a substantial factor in business decisions regarding where to locate a new facility.

Section 5 – Existing Environment in the Planning Area

Physical

The existing CEA service area includes areas in Hart County and Northern Barren County. The service area in Hart County generally includes a corridor along I-65 as it traverses the county and stops south of Munfordville. (Munfordville has its own WRF and collection system and is not part of the CEA service area.). The service area in Northern Barren County is also located along the I-65 corridor and includes the cities of Park City, Cave City and part of the Mammoth Cave National Park. These areas are shown on **Figure 1-1**.

Although the planning area covers a large geographic area potential impacts will be limited to the existing Horse Cave and Cave City WWTPs. Any construction activities will be limited to the existing treatment plant sites (and areas adjacent to these sites). Therefore, all construction will be in areas that have been previously disturbed. No changes or construction activities are anticipated in the sanitary sewer collection system or to the effluent force mains.

Geology

The subject area is part of the Mississippian Plateau or Pennyrile Region, consisting of a limestone plain characterized by tens of thousands of sink holes, sinking streams, streamless valleys, springs, and caverns. The term “karst” is used to define this type of terrain. The karst terrain of the Mississippian Plateau occurs because the bedrock in the eastern and southern parts of the region is dominated by thick deposits of Mississippian-age limestones. These limestones are soluble (i.e., will dissolve) under the right conditions, which means they can easily be eroded by waters moving through the ground. These ground waters can form miles of passages beneath the surface, from tiny conduits only inches wide, to large caverns and rooms more than 100 feet wide. The Mammoth Cave-Flint Ridge cave system is in the planning area and is the longest cave in the world (by far) and is formed in the Mississippian-age limestones in the Mississippian Plateau Region. A generalized geological map is shown for the area in **Figure 3-1**.

Another geologic feature of the area, called the Dripping Springs Escarpment, occurs in the western part of the Mississippian Plateau Region. This is a line of hills formed by isolated Pennsylvanian- and Mississippian-age sandstones capped by more erodible Mississippian-age shales and limestones. These hills are known to as “knobs,” and can reach elevations of over 1000 feet.

Surface and Groundwater Hydrology

The service area is in a highly karst geological area characterized by undulating terrain, few surface streams, and surface drainage via sinkholes and underground caves.

The service area includes part of the Green River which is located near Munfordville. This major river drains a large portion of the mid-section of Kentucky and creates a deep narrow valley through the region (the river lies approximately 140 feet in elevation below the surrounding terrain).

The service area also includes Bacon Creek which is located near Bonnieville. This water course takes a meandering path through the service area and outlets into Nolin River at the Grayson/Hart county line.

Most of the service areas' drainage system is provided by caves which, for the most part, are directly connected with the surface drainage system. Surface drainage passes directly (through sinks) to the groundwater system without the benefit of soil filtration and thus the quality of the groundwater is more like the quality of surface streams. This groundwater quality is variable depending upon the nature and use of the drainage basin above. Populated areas which depend on septic tanks and percolation fields for sewage disposal have a high likelihood of impacting the groundwater quality in their vicinity.

Topography

As was described in previous sections, most of the service area of the CEA has a geological setting that is highly karst. Many areas of the service area have no surface streams. Areas that do have a surface stream are, for the most part, relatively small and do not have a defined 100-year flood plain.

However, the Green River which splits the service area of the CEA drains a major portion of the mid-section of Kentucky and, consequently, does have a 100-year flood plain. For the most part, the Green River flood plain is relatively narrow. This topographic feature of the Green River serves to contain the flooding of the river to a narrow band. Since the only proposed construction is in the vicinity of the existing WWTPs, the project is not impacted by the level of the 100-year flood.

The topography of the service area is described as irregular and varies across several regions. The region between Horse Cave and Munfordville is described as 60 percent pasture and 40 percent wooded, with undulating terrain varying between about 500 and 950 feet above sea level. Elevation in the area is generally around 550 to 650 feet above sea level with a low point at the Green River and a high point of 700 feet near Horse Cave. The areas north of Bacon Creek in Bonnieville are entirely karst, with no apparent surface drainage features. This

topography continues northward all the way to Upton, just north of the service areas' northern boundary (i.e., the Hart County line). The elevation of this area is in the range of 650 to 800 feet above sea level.

Soils

In the Horse Cave area, soils are generally in the Caneyville-Fredonia-Hagerstown classification. These soils are gently sloping to steep, moderately deep and deep well-drained soils that have a clayey subsoil on ridge tops and hillsides. Near the Green River, soils are a Baxter Crider classification. These are gently sloping to steep, very deep, well-drained soils that have a clayey or loamy subsoil, on ridge tops and hillsides. North of the Green River, the area is also characterized by Caneyville-Fredonia-Hagerstown classification, previously described. North of the Munfordsville Interstate 65 exit, the area is characterized by the Jefferson-Riney-Caneyville classification. These soils are gently sloping to steep, very deep to moderately deep, well-drained soils that have loamy or clayey subsoil on ridge tops and hillsides. In the Bonnieville area north to the county line, the soils are predominately the Caneyville-Fredonia-Hagerstown type as previously described. The soil descriptions above are based on the U.S. Department of Agriculture, Soil Conservation Service, General Map for Hart County, KY.

Water Sources and Supply

The CEA provides water service to Park City and Cave City. They purchase water wholesale from the Green River Valley Water District (GRVWD) and transport this water through a water distribution system that they own and operate. The GRVWD treats surface water from the Green River and Rio Springs, and purchases treated water from the Glasgow Water Company. Many rural communities are served by rural water companies. The Green River supplies water for Munfordville, and the Green and Nolin Rivers provide water for irrigation, fishing, and boating. Farm ponds, small lakes, and creeks are used throughout the planning area for livestock water, irrigation, and recreation.

Environmental Concerns

Most of the environmental concerns in the service area are centered around failing septic systems. As failures occur to individual septic systems, repairs are generally made on-site unless a municipal wastewater collection system is within a reasonable distance. In these cases, the property is connected to the sanitary sewer system.

The entire CEA Facilities Planning Area is characterized by a karst type geology. Surface drainage in these areas drains to sinks which directly connect to the groundwater. In karst

areas, subsurface sewage disposal systems (septic tanks and lateral fields) can and frequently do fail without any surface evidence. A failure condition may discharge the septic tank effluent into the karst geological stratum, thus polluting the groundwater. Public sanitary sewer collection and treatment facilities are the only feasible solution to this groundwater pollution threat.

Wetlands

Hart and Barren Counties have many potential small and intermittent wetlands. The U.S. Department of Interior, Fish and Wildlife Service maintains a detailed record of wetland locations in these counties. Because construction will be limited to the existing Horse Cave and Cave City WRF sites (and areas adjacent to the sites), construction in wetland areas will be avoided.

Threatened/Endangered Species

A table of endangered, threatened, proposed, and candidate species, as specified by the U.S. Fish and Wildlife service, Kentucky Ecological Services Field Office, are listed in **Table 5-1**. Because all proposed alternatives will be carried out in locations that have been previous disturbed, no wildlife habits will be disturbed or impacted.

Table 5-1

Threatened / Endangered Species

Group	Common Name	Scientific Name	Status
Clams	Purple Cat's Paw	Epioblasma obliquata obliquata	Endangered
Clams	Pink Mucket (Pearly Mussel)	Lampsilis abrupta	Endangered
Clams	Rough Pigtoe	Pleurobema plenum	Endangered
Clams	Orangefoot Pimpleback (Pearly Mussel)	Plethobasus cooperianus	Endangered
Clams	Ring Pink (mussel)	Obovaria retusa	Endangered
Clams	Spectaclecase (mussel)	Cumberlandia monodonta	Endangered
Clams	Rayed Bean	Villosa fabalis	Endangered
Clams	Clubshell	Pleurobema clava	Endangered
Clams	Fanshell	Cyprogenia stegaria	Endangered
Clams	Northern Riffleshell	Epioblasma torulosa rangiana	Endangered
Clams	Snuffbox Mussel	Epioblasma triquetra	Endangered
Clams	Rabbitsfoot	Quadrula cylindrica cylindrica	Threatened
Clams	Sheepnose Mussel	Plethobasus cyphyus	Endangered
Clams	Fat Pocketbook	Potamilus capax	Endangered
Crustaceans	Kentucky Cave Shrimp	Palaemonias ganteri	Endangered

Mammals	Indiana Bat	Myotis sodalis	Endangered
Mammals	Gray Bat	Myotis grisescens	Endangered
Mammals	Northern Long-Eared Bat	Myotis septentrionalis	Threatened

Air Quality

Air quality in the service area is characterized as "good" according to the Environmental Protection Agency's Air Quality Index (AQI). Mammoth Cave National Park, which is part of the service area, has the most available air quality data. Out of the past 120 sample days, samples had a good or moderate rating on the AQI. Construction involved with all proposed alternatives should not significantly affect air quality conditions.

Cultural

The U.S. Department of Interior, National Park Service has designated eight locations in the planning area as archeological sites, see **Table 5-2** for entire list. Though there are around 55 sites in Hart and Barren Counties, only eight of those sites are within the planning area. There are no known significant cultural or historical sites that will be impacted by any of the recommended alternatives.

Table 5-2

National Register of Historic Places in CEA Planning Areas in Hart County and Barren County, Kentucky

Horse Cave Historic District	Belle's Tavern
Wigwam Village No. 2	Cave City Commercial District
Renfro Hotel	McCoy, Andrew House
Unknown Confederate Soldier Monument in Horse Cave	Old Zion Methodist Church

National and State Parks

Mammoth Cave National Park preserves the cave system and a part of the Green River valley and hilly country of south-central Kentucky. This is the world's longest known cave system, with more than 390 miles explored. Mammoth Cave National Park is in the Caveland Environmental Authority service area. The Cave City WRF currently serves the Mammoth Cave National Park area. No proposed construction for any of the alternatives will be in or affect the park system.

Water Quality in Streams and Lakes in the Planning Area

The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes water quality, identifies widespread problems of national significance, and describes various programs implemented to restore and protect waters. **Table 5-3** shows the designation of impaired waterbodies in the planning area.

Section 303(d) of the Clean Water Act requires all states, territories, and authorized tribes to develop lists of impaired waters. These are waters that are too polluted or otherwise degraded to meet established water quality standards. This law requires the jurisdictions to establish priority rankings for waters on the list and develop Total Maximum Daily Loads (TMDLs) for these waters. A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still safely meet water quality standards.

There are two water courses in the planning area that show up on the list of impaired waters – the Green River and Bacon Creek. The section of Green River that runs through the planning area is listed as impaired, while most other areas of the river are noted as good on the 303(d) list. **Table 5-3** shows the Water Quality Assessment information for these water courses.

Table 5-3
Water Quality Assessment

Waterbody Name	Waterbody ID	Most Current Data Available	Location	Map	Waterbody Type	Size	Unit	Status	State TMDL Development Status
Bacon Creek 0.2 to 17.2	KY486197_01	2012	Lake to Bonnieville, KY	Waterbody Map	River	17.0	Miles	Impaired	TMDL needed
Bacon Creek 17.2 to 27.1	KY486197_02	2012	Bonnieville City Limits to End of Forested Riparian Zone	Waterbody Map	River	9.9	Miles	Impaired	TMDL needed
Bacon Creek 27.1 to 32.6	KY486197_03	2012	End of Forested Riparian Zone to Cr 1212	Waterbody Map	River	5.5	Miles	Impaired	TMDL needed
Green River 210.4 to 250.1	KY493284_07	2012	Eastern Boundary of Mammoth Cave National Park to Lynn Camp Creek	Waterbody Map	River	39.7	Miles	Impaired	TMDL needed

Section 6 – Existing Wastewater System

On-Site Disposal Systems

All heavily populated aeras in the Planning Area have sanitary sewer service. Outside the heavily populated areas, on-site disposal systems are used. The local health departments are well organized and respond to complaints and issues with on-site systems on a case-by-case basis. The CEA is committed to assisting with the ongoing maintenance of the on-site systems. The CEA provides septic tank pumping services and treats the septage at one its two Regional Water Reclamation Facilities.

The CEA is committed to providing sanitary sewer service to all areas currently being served by on-site systems. The CEA works closely with local governments and health departments to identify critical aeras and works to provide service to those areas.

Since the entire Planning Area is located on karst topography, there is a general concern that on-site treatment systems may contribute to contamination issues with the cave system. To minimize the impact of these systems the CEA makes every effort to extend sanitary sewer service to unserved areas.

CEA Treatment Facilities – Description

The CEA owns and operates two treatment plants in the Planning Area: The Cave City Water Reclamation Facility and the Horse Cave Water Reclamation Facility. The Cave City facility serves areas south of Horse Cave and in Barren County. The Horse Cave facility serves Horse Cave and portions of Hart County. Both plants operate independently, but their combined effluent is pumped together through a single pipeline to a single discharge point on the Green River. This Regional Facility Plan will evaluate the existing Horse Cave and Cave City Treatment Plants and develop alternatives that will provide sanitary sewer service through 2040.

Horse Cave Water Reclamation Facility

The Horse Cave plant is an oxidation ditch plant with an Annual Average Daily Flow (ADF) capacity of 0.480 MGD; a Peak Day (PDF) capacity of 0.720 MGD and a Peak Hour (PHF) capacity of 1.373 MGD. The plant's flow schematic is shown in **Figure 6-1**.

The plant is well-operated and effluent testing indicates that the Facility consistently operates well within the limits of the KPDES permit. There are no current enforcement actions against the Horse Cave WRF. There are no known overflows in the collection system. The key permit limits for the Horse Cave WRF are shown in **Table 6-1. Table 6-2** lists flow data for the Horse Cave WRF and **Table 6-3** lists the flow data for the Cave City WRF.

The following sections will review the design criteria for each unit process at the Horse Cave WRF and discuss the available capacity of each.

Headworks

The flow to the Horse Cave plant enters the plant at the grit chamber. The grit chamber is the manually cleaned type and the channel is shaped such that the velocity of the influent is slowed enough to settle out the sand and gravel and maintain the organic material in suspension. The grit chamber has a maximum design capacity of 1.373 MGD which is sufficient to accommodate the Facility's Design Peak Hour Flow (1.373 MGD). Therefore, the existing system would need to be upgraded to treat above its current rated capacity of 0.48 MGD. Flow can be routed around the grit chamber to allow cleaning of the channel.

From the grit chambers, the flow passes through a Parshall flume, and then to the mechanically cleaned bar screen. The existing mechanically cleaned bar screen has a maximum rated capacity of 1.370 MGD which is sufficient to accommodate the plant's current Design Peak Hour Flow Rate of 1.373 MGD. The influent screening system includes a weir, bypass channel and manually cleaned bar screen to screen the influent flow in the event the mechanically cleaned bar screen fails, becomes clogged or is taken out of service for repair or maintenance.

The existing influent screening system does not have reserve capacity to treat additional flow and is at the end of its design life and will need to be replaced in the couple of years.

The screening facility discharges to the entrance well of the screw pumps. Two 30-inch screw pumps are provided, each with a variable capacity of 875 to 1,985 gallons per minute (1.260 to 2.858 MGD).

In addition to the raw sewage flows, the screws also lift the return activated sludge (RAS) from the clarifiers back to the Oxidation Ditches. The maximum design RAS rate is 150% of the ADF or 500 gpd (0.720 MGD). Therefore, the maximum flow to the screw pumps would be 1,455 gpm (2.095 MGD - the Peak Hour Flow – 1.373 MGD plus the maximum RAS rate – 0.72 MGD).

The existing screw pumps have a firm capacity of 1,985 gpm (2.858 MGD) which is sufficient to accommodate the design PHF plus the design Maximum RAS rate. This pumping system also has a reserve capacity of approximately 520 gpm or 0.763 MGD which would allow for some

additional flow. The existing screw pumps and drives are nearing the end of their design life and will need to be replaced in the next 5 years.

Oxidation Ditches

The Screw Pumps discharge to a headbox that feeds a flow splitter which consists of dual 6" Parshall flumes. The flow train is split by the flumes to the two (2) Oxidation Ditches. Each ditch has an aeration volume of approximately 233,00 gallons and a design organic loading of 570 pounds of BOD per day based on the ADF and Average Daily Loading (285 mg/l BOD).

Each Oxidation Ditch is equipped with three (3) brush rotors capable of producing a maximum of 83 pounds of oxygen per hour for a total aeration rate, per Oxidation Ditch, of 249 pounds of oxygen per hour or 5,976 pounds of oxygen per day.

The Horse Cave biological process is designed to be operated in the Activated Sludge Mode. However, due to the permit limitations and influent ammonia-nitrogen concentrations, some level of nitrification will be required. Therefore, the Sludge Age is long enough for the Nitrifying Bacteria to grow and become established. The Nitrifying Bacteria growth rate is a function of temperature (assuming there is ample food, oxygen, pH, alkalinity, etc.) The lowest single day temperature MLSS measurement of 6.6 degree Celsius was recorded on March 4, 2014. The 14-day average temperature around this event was approximately 10 degrees Celsius.

The Biological Process Design Parameters are summarized as follows:

Solids Retention Time -	15 Days
Total Pounds Under Aeration -	17,100 #
Organic Loading/1000 CF - Of Aeration Basin	18.3 #/1,000 CF
Design MLSS Concentration -	4,400 mg/l
Food to Mass Ratio -	0.067
Minimum Operating Temperature -	6.6°C
Aeration Basin Volume -	0.4657 MGD
Daily Organic Loading -	1,140 #/day

The existing aeration basin volumes are adequate to treat the Design ADF of 0.480 MGD. Facility improvements/expansion will be required to treat additional flows and loadings. The existing brush rotors are nearing the end of their design life and will need to be replaced in the next 5 years.

Clarifiers

The plant is equipped with two (2), 24 ft. and 0ne (1) 40' diameter center feed clarifiers with a side water depth of 12 feet. The available surface area is summarized as follows:

Clarifier No. 1 – 24'ø = 452 Square Feet (SF)

Clarifier No. 2 – 24'ø = 452 SF

Clarifier No. 3 – 40'ø = 1,257 SF

Total: 2,161 SF

The flow from the Oxidations Ditches is split proportionally between the three (3) Clarifiers. The maximum surface loading rates at the PHF are summarized as follows:

Clarifier No. 1 = $\frac{(288{,}000)}{452\ SF}$ = 637 gpdpsf

Clarifier No. 2 = $\frac{(288{,}000)}{452\ SF}$ = 637 gpdpsf

Clarifier No. 3 = $\frac{(798{,}000)}{1{,}257\ SF}$ = 635 gpdpsf

These overflow rates are below the recommended maximum overflow rates allowed by 10 State Standards of 1,000 to 1,200 gallons per day per square foot (gpdpsf). Therefore, the existing clarifier system does have some reserve capacity that could be used to treat additional flow. The two (2) existing 24' diameter clarifiers are at the end of their design life and need to be replaced in the next few years.

Ultraviolet Disinfection Equipment

The effluent from all clarifiers is disinfected by two (2) Ultraviolet Light Disinfection Systems (One System is manufactured by SunTech and the other by Enaqua). The flow can be split between the UV units such that all flow from Clarifiers 1 and 2 is disinfected by the SunTech UV system (refer to the Horse Cave Flow Schematic) and all flow from Clarifier No. 3 is disinfected by the Enaqua UV system.

These UV systems have a combined treatment capacity of 2.25 MGD (SunTech capacity – 1.25 MGD; Enaqua capacity – 1.00 MGD) based on 65% UV transmission at 70% lamp output. This capacity is adequate to accommodate the 1.373 MGD PHF.

The existing Ultraviolet Light disinfection System has some reserve capacity that could be used to treat additional flow. However, the SunTech UV system is at the end of its design life and will need to be replaced in the new couple of years. The Enaqua system is nearing the end of its design life and will need to be replaced in the next 5 years.

Effluent Pumping System

The Horse Cave WRF (HCWRF) effluent is combined with the Cave City WRF (CCWRF) effluent and pumped to the Green River. Therefore, the Horse Cave Effluent Pump Station must have sufficient Firm Pumping Capacity to pump the combined PHF from the Horse Cave and Cave City WRF's. Therefore, the Firm Capacity must be:

HCWRF PHF + CCWRF PHF = Firm Capacity

HC PHF = 1.373 MGD = 955 gpm

CC PHF = 1.920 MGD = 1,333 gpm

Therefore, the firm capacity at the HC Effluent Pump Station must be at least:

955 gpm + 1,333 gpm = 2,288 gpm ≈ 2,300 gpm

The Existing pumps have the following Rated Capacities:

Pump No. 1 - 1,100 gpm at 94' TDH, 40 Hp, 1755 rpm
Pump No. 2 - 1,100 gpm at 94' TDH, 40 Hp, 1755 rpm
Pump No. 3 - 2,000 gpm at 144' TDH, 125 Hp, 1755 rpm
Pump No. 4 - 2,000 gpm at 144' TDH, 125 Hp, 1755 rpm

Based on a hydraulic model of the existing system and pressure tests conducted in the Field, the capacity of the existing Effluent Pump Station is summarized as follows:

Pump No. 3 or 4 On – 1,954 gpm at 145' TDH

Pump 3 and 4 On – 2,219 gpm

The Smaller pumps (No. 1 or 2) cannot be operated when one of the Larger Pump is on as they cannot overcome the pressure generated by the larger pump(s).

Based on the requirements of 10 State Standards, the Effluent Pump Station must be capable of pumping the PHF with the Largest Unit Out of Service. Therefore, the firm Capacity of the Existing Effluent Pump station is 1,950 gpm.

To accommodate the theoretical PHF of 2,300 gpm the existing effluent storage tanks can be used. The existing Effluent Storage Tank capacities are summarized as follows:

Effluent Storage Tank No. 1 – 68' Diameter x 5.5' Deep (623.5 – 618.0) = 149,400 gal

Effluent Storage Tank No. 2 – 31' Diameter x 21' Deep (633.0 – 612.0) = 118,500 gal

Total Effluent Storage Volume Available = 149,400 + 118,500 = 267,900 gallons

With the existing Backpressure Sustaining Valve (Pressure Sustaining Valve (PSV) set at 56 psi and one of the Large Effluent Pumps in operation (Pump 3 or 4) the Effluent Pump Station will have a Firm Capacity of approximately 2,344 gpm with 1,826 gpm being discharged to Outfall

No. 003 and 518 gpm being discharged to holding Tanks 1 and 2. With a total Available Storage Volume of 267,900 gallons this condition could be maintained for approximately 517 minutes or 8.6 hours.

Based on the hydraulic analysis of the existing Effluent Pumping System, the System has a Firm Capacity sufficient to accommodate the 2,300 gpm PHF.

The existing effluent pumps do not have reserve capacity to treat additional flow. Additionally, the existing pumps are nearing the end of their design life and will need to be replaced in the next couple of years.

Sludge Processing and Disposal

Waste Activated Sludge (WAS) is dried on Sand Drying Beds and disposed of at a Sanitary Landfill. The Horse Cave plant also shares a Mobile Screw Press with the Cave City WRF to dewater WAS. The anticipated sludge Production is summarized as follows:

BOD Applied to the Oxidation Ditches at the ADF and Loading – 1,140 #/d x 0.7 # Sludge/# BOD Applied

Total Sludge Production = 798 #/D ≈ 800 #/D

If the Sand Drying Beds are used only for emergencies and during the summer months, the Centrifuge can be used to dewater the WAS generated at the HCWRF. The centrifuge has a rated capacity of 400 dry pounds per hour of solids. Therefore, the sludge can be processed by operating the centrifuge 14 to 16 hours per week. This will allow ample time for the centrifuge to be used to process the solids at the Cave City WRF.

Horse Cave Collection System

The collection constructed in the 1960's to serve the City of Horse Cave was constructed using vitrified clay pipe. All gravity sewers constructed since the then have been polyvinyl chloride or polyethylene pipe. Approximately 55% of the gravity sewers that discharge to the Horse Cave WRF were constructed using Vitrified clay pipe. The CEA is currently developing a collection system map as a part of the implementation of their CMOM Plan. The collection system inventory is summarized as follows:

Manholes – 624

Lift Stations – 21

Grinder Stations – 12

Gravity Mains – 126,500 Lineal Feet

Force Mains – 157,000 Sewers Lineal Feet

The Horse Cave sewer collection system is subject to unusually low infiltration and inflow rates. Operators report that a quick downpour will bring flows up the most, however, they fall very quickly back to normal. Operators also report, and operation reports confirm that even multiple days of steady rain have a minimal impact on system flows. One explanation of this unusual phenomenon would be due to the karst geology of the area, with area water tables well below the sewer even after periods of sustained rainfall.

Cave City Water Reclamation Facility

The Cave City plant is an oxidation ditch plant with an Annual Average Daily Flow (ADF) capacity of 0.600 MGD; a Peak Day (PDF) capacity of 0.900 MGD and a Peak Hour (PHF) capacity of 1.920 MGD. The plant's flow schematic is shown in **Figure 6-2**.

The plant is well-operated and effluent testing indicates that the Facility consistently operates well within the limits of the KPDES permit. There are no current enforcement actions against the Cave City WRF. There are no known overflows in the collection system. The key permit limits are shown in **Table 6-1** and **Table 6-3** lists flow data for the Cave City WRF.

The following sections will review the design criteria for each unit process at the Horse Cave WRF and discuss the available capacity of each.

Headworks

The flow to the Cave City plant enters the plant at the grit chamber. The grit chamber is the manually cleaned type and the channel is shaped such that the velocity of the influent is slowed enough to settle out the sand and gravel and maintain the organic material in suspension. The grit chamber has a maximum design capacity of 1.920 MGD which is sufficient to accommodate the Facility's Design Peak Hour Flow (1.920 MGD). Therefore, the existing system would need to be upgraded to treat above the current rated capacity of 0.600 MGD. Flow can be routed around the grit chamber to allow cleaning of the channel.

From the grit chambers, the flow passes through a Parshall flume, and then to a comminutor where the influent solids are macerated. The existing comminutor has a maximum rated capacity of 1.920 MGD which is sufficient to accommodate the plant's current Design Peak Hour Flow Rate of 1.920 MGD. The comminutor system includes a weir, bypass channel and manually cleaned bar screen to screen the influent flow in the event the comminutor fails, becomes clogged or is taken out of service for repair or maintenance.

The existing influent comminutor system does not have reserve capacity to treat additional flow and is at the end of its design life and will need to be replaced in the couple of years.

The screening facility discharges to the entrance well of the screw pumps. Two screw pumps are provided, each with a variable capacity of 875 to 1,985 gallons per minute (1.260 to 2.858 MGD).

In addition to the raw sewage flows, the screws also lift the return activated sludge (RAS) from the clarifiers back to the Oxidation Ditches. The maximum design RAS rate is 150% of the ADF or 625 gpd (0.90 MGD). Therefore, the maximum flow to the screw pumps would be 1,960 gpm (2.820 MGD - the Peak Hour Flow – 1.920 MGD plus the maximum RAS rate – 0.900 MGD).

The existing screw pumps have a firm capacity of 1,985 gpm (2.858 MGD) which is sufficient to accommodate the design PHF plus the design Maximum RAS rate. This pumping system has no significant reserve capacity to treat additional flow. The existing screw pumps and drives are at the end of their design life and will need to be replaced in the next couple of years.

Oxidation Ditches

The Screw Pumps discharge to a headbox that feeds a flow splitter which consists of dual 6" Parshall flumes. The flow train is split by the flumes to the two (2) Oxidation Ditches. Each ditch has an aeration volume of approximately 300,000 gallons and a design organic loading of 710 pounds of BOD per day based on the ADF and Average Daily Loading.

Each Oxidation Ditch is equipped with three (3) brush rotors capable of producing a maximum of 103 pounds of oxygen per hour for a total aeration prate, per Oxidation Ditch of 310 pounds of oxygen per hour or 7,440 pounds of oxygen per day.

The Cave City biological process is designed to be operated in the Activated Sludge Mode. However, due to the permit limitations and influent ammonia-nitrogen concentrations, some level of nitrification is required. Therefore, the Sludge Age is long enough for the Nitrifying Bacteria to grow and become established. The Nitrifying Bacteria growth rate is a function of temperature (assuming there is ample food, oxygen, pH, alkalinity, etc.) The lowest single day temperature MLSS measurement of 6.6 degree Celsius was recorded on March 4, 2014. The 14-day average temperature around this event was approximately 10 degrees Celsius.

The Biological Process Design Parameters are summarized as follows:

Solids Retention Time -	15.5 Days
Total Pounds Under Aeration -	22,000 #
Organic Loading/1000 CF - Of Aeration Basin	17.7 #/1,000 CF

Design MLSS Concentration - 4,400 mg/l

Food to Mass Ratio - 0.065

Minimum Operating Temperature - 6.6°C

Aeration Basin Volume - 0.600 MGD

Daily Organic Loading - 1,420 #/d

The existing aeration basin volumes are adequate to treat the Design ADF of 0.600 MGD. Facility improvements/expansion will be required to treat additional flows and loadings. The existing brush rotors are at the end of their design life and will need to be replaced in the next year or two.

Clarifiers

The plant is equipped with two (2), 40' diameter center feed clarifiers with a side water depth of 12 feet. The available surface area is summarized as follows:

Clarifier No. 1 – 40'ø = 1,257 Square Feet (SF)

Clarifier No. 2 – 40'ø = 1,257 SF

Total: 2,514 SF

The flow from the Oxidations Ditches is split proportionally between the three (3) Clarifiers. The maximum surface loading rates at the PHF are summarized as follows:

Clarifier No. 1 = $\frac{(960{,}000)}{1{,}257\ SF}$ = 764 gpdpsf

Clarifier No. 2 = $\frac{(960{,}000)}{1{,}257\ SF}$ = 764 gpdpsf

These overflow rates are below the recommended maximum overflow rates allowed by 10 State Standards of 1,000 to 1,200 gallons per day per square foot (gpdpsf). Therefore, the existing clarifier system does have some reserve capacity that could be used to treat additional flow. The two (2) existing 40' diameter clarifiers are at the end of their design life and need to be replaced in the next few years.

Ultraviolet Disinfection Equipment

The effluent from all clarifiers is disinfected an Ultraviolet Light Disinfection Systems (The System is manufactured by Trojan Technologies) and supplemented with a Peracetic Acid (PAA) Feed System.

The UV system has a design capacity of 1.920 MGD based on 65% UV transmission at 70% lamp output. The supplemental PAA System is used on an as needed basis to ensure permit compliance.

The existing Ultraviolet Light disinfection System has adequate capacity to treat the design PHF. However, the system would need to be replaced/expanded to treat additional flow. The existing UV disinfection system is at the end of its design life and will need to be replaced in the next year or two.

Effluent Pumping System

The Cave City WRF (CCWRF) effluent is pumped to the Horse Cave WRF where the effluents are combined and pumped to the Green River. Therefore, the Cave City Effluent Pump Station must have sufficient Firm Pumping Capacity to pump the Cave City PHF to the Horse Cave WRF. Therefore, the Cave City WRF effluent pump station must have a firm capacity of 1.920 MGD.

The existing effluent pump station includes three (3) Wemco Hidrostal centrifugal pumps with a rated variable capacity of 100 to 1,160 gpm (per pump). Therefore, the existing effluent pump station has a firm capacity of 2,320 gpm (3.340 MGD) which is adequate to handle the design PHF.

The existing effluent pumps have some reserve capacity to handle additional flow. However, the existing pumps are at the end of their design life and will need to be replaced in the next year or two.

Sludge Processing and Disposal

Waste Activated Sludge (WAS) is dried on Sand Drying Beds and disposed of at a Sanitary Landfill. The Cave City plant also shares a Mobile Screw Press with the Horse Cave WRF to dewater WAS. The anticipated sludge Production is summarized as follows:

> BOD Applied to the Oxidation Ditches at the ADF and Loading – 1,420 #/d x 0.7 # Sludge/# BOD Applied
>
> Total Sludge Production = 994 #/D ≈ 1,000 #/D

If the Sand Drying Beds are used only for emergencies and during the summer months, the Centrifuge can be used to dewater the WAS generated at the CCWRF. The centrifuge has a rated capacity of 400 dry pounds per hour of solids. Therefore, the sludge can be processed by operating the centrifuge 18 to 20 hours per week. This will allow ample time for the centrifuge to be used to process the solids at the Horse Cave WRF.

Cave City Collection System

The collection constructed in the 1960's to serve the Cave City was constructed using vitrified clay pipe. All gravity sewers constructed since the then have been polyvinyl chloride or polyethylene pipe. Approximately 55% of the gravity sewers that discharge to the Cave City WRF were constructed using Vitrified clay pipe. The CEA is currently developing a collection system map as a part of the implementation of their CMOM Plan. The collection system inventory is summarized as follows:

Manholes – 440

Lift Stations – 13

Grinder Stations – 85

Gravity Mains – 149,266 Lineal Feet

Force Mains – 85,448 Lineal Feet

The Cave City sewer collection system is subject to unusually low infiltration and inflow rates. Operators report that a quick downpour will bring flows up the most, however, they fall very quickly back to normal. Operators also report, and operation reports confirm that even multiple days of steady rain have a minimal impact on system flows. One explanation of this unusual phenomenon would be due to the karst geology of the area, with area water tables well below the sewer even after periods of sustained rainfall.

Section 7 – Forecast of Flows and Wasteloads in the Planning Area

Background

Historic, current, and projected population, number of households, and persons per household were covered in Section 4. There is no intent to increase the service area of either WRF beyond the current Planning Area. All proposed alternatives focus on upgrading the existing plants. Due to the varied population growth within the service area, past sewage flows were used to project flows to year 2040.

There are several manufacturing facilities in the Horse Cave service area. Significant Industrial Users and their annual average daily flow rates are summarized as follows:

Marzetti's -	200,000 gpd
Sister Schubert's -	20,000
Dart Container 001-	60,000
Dart Container 002 -	380
Dart Container 003 -	30,000
Kentucky Chrome -	20,000

All industrial waste discharged from Marzetti's is pretreated by the Hart County Industrial Authority Horse Cave Pretreatment Plant prior to being discharged to the Horse Cave and/or Cave City collection system. All other industrial flow is discharged to the Horse cave collection system. The CEA developed and administers an Industrial Pretreatment Program in accordance with the requirements of the Kentucky Division of Water.

There are no Significant Industrial Users in the Cave City service area (other than the flow from Marzetti's that is split between the Horse Cave and Cave City WRFs). In the Horse Cave and Cave City service areas there is a negligible amount of light commercial customers and those customers do not excessively affect the system.

Projected flows calculated in this section will be utilized in assessing the proposed alternatives and evaluating the size and type of equipment needed for these alternatives.

Infiltration and Inflow

The Horse Cave collection system exhibits a low level of infiltration and inflow (I/I). There are no known rainfall-induced bypasses or overflows. The I/I rates are very low and the treatment plants show very small increases during rain events. The Monthly Report of Operation data was

analyzed for 2020 to determine the amount of I/I entering the system. Based on this analysis the following Infiltration and Inflow Rates were determined:

Annual Volume of I/I - 4.273 MGD

Average Daily I/I Flow - 0.012 MGD

Percent of I/I Flow - 3.8 %

The Cave City collection system also exhibits a low level of infiltration and inflow (I/I). There are no known rainfall-induced bypasses or overflows. The I/I rates are very low and the treatment plants show very small increases during rain events. The Monthly Report of Operation data was analyzed for 2020 to determine the amount of I/I entering the system. Based on this analysis the following Infiltration and Inflow Rates were determined:

Annual Volume of I/I - 6.965 MGD

Average Daily I/I Flow - 0.019 MGD

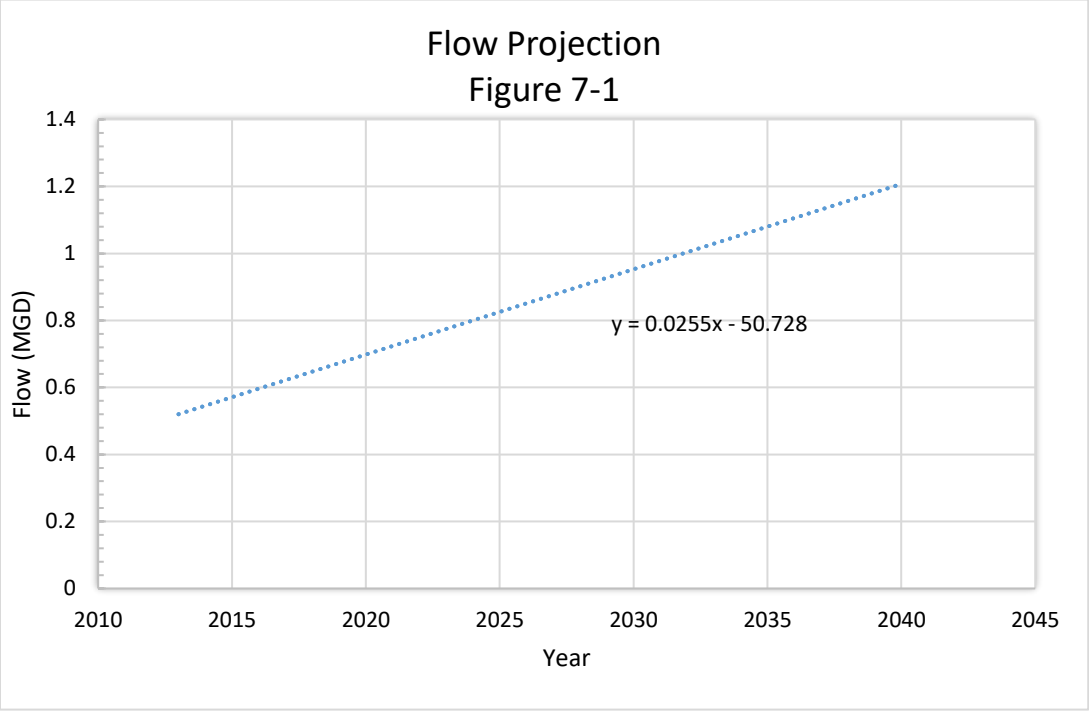
Percent of I/I Flow - 6.6 %

Forecasted Flow

Historical flow data from Horse Cave WRF and Cave City WRF was used to forecast flows to year 2040. Detailed historical flow data for the Horse cave and Cave City WRFs is presented in **Table 6-2** and **Table 6-3**.

Flow data from 2013 to 2019 was used to graph a line that shows a projection of flows over time for the Planning Area. This graph was used to develop a regression equation to project flows to year 2040. **Figure 7-1** shows the flow projection to year 2040. The flow using the linear regression equation equals **1.20 MGD**. An additional 0.10 MGD was added to the projected flow which makes the 2040 projected flow **1.30 MGD.** The 0.10 MGD increase was added to provide flexibility to accommodate potential expansions at Hart County Industrial Authority and other areas of potential development. Historical Averaged Daily Flows are summarized in **Table 7-1**. **Table 7-2** provides a breakdown of the projected flow based on user classification/source.

Table 7-1			
Historical Average Daily WRF Flows (MGD)			
	Horse Cave WWTP (MGD)	Cave City WWTP (MGD)	Combined (MGD)
2013	0.319	0.195	0.514
2014	0.291	0.228	0.519
2015	0.259	0.222	0.481
2016	0.335	0.272	0.607
2017	0.412	0.354	0.766
2018	0.336	0.355	0.691
2019	0.257	0.274	0.531



Forecasted Wasteload

Past influent loading data from Horse Cave WRF and Cave City WRF was used to forecast the influent wasteload to be used to develop and analyze alternatives. Influent Loading Data from 2020 was used to forecast the wasteloading over the design period. Data from 2020 was used as it is the most representative data available.

From this data set it was determined that the Annual Average Influent BOD Loading to the Horse Cave WRF is 350 mg/l. This loading reflects loadings received from the Significant Industrial Users that discharge to the Horse Cave WRFs. Using the same time period, the

Annual Average Influent BOD concentration to the Cave City WRF is 320 mg/l. At this time, there are no anticipated discharges to the system that would increaser or decrease the anticipated wasteloading. Therefore, these loading were used to evaluate the Alternatives. **Table 7-3** summarizes the loadings used to develop and evaluate the Alternatives.

To develop the Alternatives, we contacted the Kentucky Division of Water and requested a Wasteload Allocation (WLA) for the various alternatives considered. Based on size of the receiving stream (the Green River) the existing effluent limitations will not change. Therefore, all Alternatives evaluated are based on the Effluent Limits listed in **Table 6-1**

Section 8 – Evaluation of Alternatives

Introduction

Based on the age and condition of the existing process equipment as previously described, the Horse Cave and Cave City WRF's will need significant improvements/upgrades to continue to provide sanitary sewer service to the Planning Area. Additionally, the capacity of the Horse Cave WRF will need to be increased to meet the projected flows and loadings from the facilities' service area (most of the future development and wastewater production will be generated in the southern end of the Planning Area and the Horse Cave WRF is considerable closer to this area than the Cave City WRF).

All alternatives developed are based on the following minimum WRF treatment capacities:

Horse Cave – 0.700 MGD ADF

Cave City – 0.600 MGD ADF

During the development of alternatives for upgrading the existing Water Reclamation Facilities various treatment processes were evaluated including:

1. Converting the plants to Sequencing Batch Reactors (SBR)
2. Adding Moving Bed Bioreactors (MBBR) to the treatment train to reduce the loading to the oxidation ditches to allow for an increase flow rate at the Horse Cave WRF without increasing the size of the oxidation ditches.
3. Converting the existing Horse Cave Oxidation Ditches to Integrated Fixed Film Activated Sludge (IFAS) to allow for increased biological loading without increasing the size of the oxidation ditches.
4. Eliminating the clarifiers and using membrane reactors (MBR).
5. Converting the oxidation ditches to conventional aeration basins

Based on an in-depth review of these treatment technologies, these systems were eliminated from further consideration for the following reasons:

1. The SBR's would require constructing new tanks and abandoning most of the existing tankage. These systems also have a greater number of motors associated with cycling the reactors which results in increased maintenance. SBRs are also heavily reliant on automatic controls to properly sequence the reactors through the various treatment steps which represents a potential failure point.
2. The MBBR Alternative was effective at reducing the loading and keeping the size of the Horse Cave Oxidation Ditches the same however, the cost of adding the MMR Tanks, Media and blowers exceeded the benefit of the system. The blower horsepower was

also considerable which would significantly increase the operation and maintenance costs of the Plant.

3. We investigated converting the Horse Cave Oxidation Ditches to an IFAS System and received a couple of equipment proposals. As with the MBBR Option, the equipment costs coupled with the increased power requirements and increased operational costs excluded this option form additional consideration.
4. The MBR option was found not to be a viable option due to the equipment costs and costs associated with replacing the membranes. This option may have been feasible if space was an issue. The Horse Cave WRF site is relatively large and there is plenty of space to construct clarifiers which have significantly lower operation and maintenance costs as compared to MBRs.
5. We also considered converting the existing Horse Cave Oxidation Ditches to aeration basins and adding tankage to increase the aeration volume to accommodate the increased loading. The costs for this option were similar to those associated with using oxidation ditch technology and the oxidation ditch process is more readily converted to biological nutrient removal mode of operation. Therefore, there was no benefit to pursuing this option.
6. Regionalization was considered but there are no opportunities in the Planning area to support this alternative. Essentially the WRF's in the CEA Planning area are Regional Facilities.

Wastewater Treatment Alternatives

Based on the evaluation of treatment processes the following Alternatives were developed for the CEA Planning area to provide sanitary sewer service through 2040:

1. Alternative 1 - No Action Plan
2. Alternative 2 - Renovate the Cave City WRF and maintain the ADF Capacity of 0.600 MGD, renovate and expand the Horse Cave WRF to a rated ADF of 0.700 MGD (Optimization of Existing Systems).
3. Alternative 3 - Eliminate the Cave City WRF, pump all sewage generated in the Cave City WRF service limits to the Horse Cave WRF and expand the Horse Cave WFR to a rated ADF of 1.3 MGD.

Alternative 1 – No Action Plan

Implementation of this Alternative would limit the growth in the planning area, limit the ability of the CEA to expand sanitary sewer service to unsewered areas and potentially result in contamination of local surface waters and the cave system.

As the plants reach capacity, new sewer connections will be limited, and the utility will struggle to provide service to existing system users. At some point the CEA will have to stop providing septic tank sludge disposal services which will increase the probability of onsite system failures which could lead to surface water and ground water contamination.

Limited treatment capacity would also prohibit the utility's ability to extend sewer service to unsewered areas. This will increase the number of onsite disposal systems constructed in the Planning Area and the potential for surface water and ground water contamination. Considering the karst features in the area, contaminated ground water can enter the cave system and create environmental issues.

Alternative 2 – Renovate the Cave City WRF, Renovate and Expand the Capacity of the Horse Cave WRF to 0.700 MGD for a Total Capacity of 1.300 MGD

Under this Alternative the Cave City WRF would be renovated to treat an ADF of 0.600 MGD (PDF – 0.900 MGD; PHF – 1.920 MGD) and the Horse Cave WRF would be renovated and expanded to treat an ADF of 0.700 (PDF – 1.050 MGD; PHF – 2.177 MGD) for a combined ADF treatment capacity of 1.300 MGD. The effluent front the Cave City Plant would continue to be pumped to the Horse Cave Plant and then the combined effluent would be pumped to the Green River for ultimate disposal.

Renovation of the Cave City WRF would include:

1. New influent mechanically cleaned bar screen with debris compactor and building to prevent freezing.
2. Replace the existing Influent Flow Meter.
3. New Influent/RAS screw pumps and controls.
4. Renovation and repair of the Influent Screw Pump Structure.
5. Repair and Renovation of the existing Oxidation Splitter Box.
6. Replacement of the Oxidation Ditch Rotors Brush Rotors with discs.
7. Repair and renovate the existing oxidation ditch concrete structures.
8. Replace the existing Clarifier Drives, Skimmers and Sludge Scrapers
9. Replace the Ultraviolet Light Disinfection System
10. Replace the Effluent Pumps
11. Renovate the existing Sludge Storage Tank.
12. Renovate the existing electrical, control and SCADA System.
13. Upgrade the Standby Power Generator

14. General site improvements including lighting, pavement, Control Building Renovation, etc.

Renovation and Expansion of the Horse Cave WRF would include:

1. New influent mechanically cleaned bar screen with debris compactor and building to prevent freezing.
2. Replace the existing Influent Flow Meter.
3. New Influent/RAS screw pumps and controls.
4. Renovation and repair of the Influent Screw Pump Structure.
5. Repair, Renovation and Expansion of the existing Oxidation Splitter Box.
6. Replacement of the Oxidation Ditch Rotors Brush Rotors with discs.
7. Repair and renovate the existing oxidation ditch concrete structures.
8. Construct a new Oxidation Ditch with a 0.200 MGD ADF capacity
9. Construct one new 35’ Diameter Clarifier (the existing 24’ diameter clarifiers will be removed from service. It is not cost effective to renovate the existing clarifiers as additional clarifier surface area would be required regardless due to the increase in plant capacity.)
10. Construct a new Ultraviolet Light Disinfection System including a new, reconfigured channel.
11. Construct a new Effluent Pump Building complete with new Effluent Pumps and Controls.
12. Demolish an existing Sludge Storage Tank and construct a new 150,000-gallon Sludge Storage Tank.
13. Renovate the existing electrical, control and SCADA System.
14. Upgrade the Standby Power Generator
15. General site improvements including lighting, pavement, Control Building Renovation, etc.

The Process Flow Schematics for the renovated Cave City WRF and the renovated and expanded Horse Cave WRF are shown in **Figure 8-1** and **8-2** respectively. The capital costs associated with renovating the Cave City WRF and renovating and expanding the Horse Cave WRF are shown in **Table 8-1**.

Alternative 3 – Abandon the Cave City WRF and Renovate and Expand the Capacity of the Horse Cave WRF to 1.300 MGD

Under this Alternative the Cave City WRF would be taken offline and all raw sewage from the plant's service area would be pumped to the Horse Cave WRF. The Horse Cave WRF would be renovated and expanded to treat an ADF of 1.300 MGD (PDF – 1.95 MGD; PHF – 3.700 MGD). The effluent from the Horse Cave Plant would continue to be pumped to the Green River for ultimate disposal.

Renovation and Expansion of the Horse Cave WRF would include:

1. New influent mechanically cleaned bar screen with debris compactor and building to prevent freezing.
2. New Influent/RAS pumps and controls.
3. New Oxidation Ditch Splitter Box.
4. Replacement of the existing Oxidation Ditch Rotors Brush Rotors with discs.
5. Repair and renovate the existing oxidation ditch concrete structures.
6. Construct a new Oxidation Ditch with a 0.800 MGD ADF capacity
7. New 56' Diameter Clarifier (the existing 24' diameter clarifiers will be removed from service. It is not cost effective to renovate the existing clarifiers as additional clarifier surface area would be required regardless due to the increase in plant capacity.)
8. New Ultraviolet Light Disinfection System including a new, reconfigured channel.
9. New Effluent Pump Building complete with new Effluent Pumps and Controls.
10. Demolish an existing Sludge Storage Tank and construct a new 250,000-gallon Sludge Storage Tank.
11. Renovate the existing electrical, control and SCADA System.
12. Upgrade the Standby Power Generator
13. General site improvements including lighting, pavement, Control Building Renovation, etc.
14. New Raw Sewage Pump Station at the Cave City WRF and connect the pump station discharge line with 60 LF of 12" DI to the existing 12" HDPE force main from the Cave City WRF to the Horse Cave WRF and extend the force main with 450 LF of 12" DI to the new Horse Cave WRF Influent Screening Structure.

The Process Flow Schematic for the renovated and expanded Horse Cave WRF are shown in **Figure 8-3**. Plan views for these improvements is shown in **Figures 8-4** and **8-5**. The capital

costs associated with removing the Cave City WRF from service and renovating and expanding the Horse Cave WRF are shown in **Table 8-2**.

Alternative Analysis

This section of the Facility Plan will compare the alternatives based on Capital Costs, Operation and Maintenance Costs and Non-monetary effectiveness criteria. The cost analysis is based on the present worth of the capital costs and operation and maintenance costs using a weighted average cost of capital of 3% per year. The Non-monetary analysis is based on a weighted scoring system and includes Environmental Impact, Implementation Capability, Water Quality Objectives, Flexibility and Public Acceptance.

Capital and Operation and Maintenance Cost Present Worth Analysis

The Capitol Costs associated with implementing Alternative 2 (Renovate the CC and Renovation and Expansion of the HC WRF's) is $9,425,200 with an estimated Salvage Value of $856,000 after 20 years. The Capital Costs associated with implementing Alternative 3 is $7,791,400 with an estimated Salvage Value of $1,248,000 after 20 years. These costs are detailed in **Tables 8-1 and 8-2.**

Operation and Maintenance costs for the alternatives include the following costs:

Alternative 2 – Renovate the Cave City WRF and Renovate and Expand the HC WRF

1. Each plant will have a dedicated operator to perform all routing operation and maintenance of the plant. Average operator hourly cost is $25/Hour x 1.60 (to cover insurance, benefits and taxes) = $40/Hour. Annual cost/plant = $83,200; Total Cost = $166,400
2. Equipment Repair and Maintenance – The CEA has a 3-member Maintenance and Repair Crew. The average hourly labor rate is similar to the operators. The crew is equipped with a service truck and associated tools. The crew maintains and repairs all mechanical equipment at the plants. It is estimates that the crew will spend 4 hours per week at each plant. The crew costs are as follows:
    a. Labor 3 crew members x $40/Hour = $120/Hour
    b. Service Truck and Tools x $25/Hour = $25/Hour
    c. Total Cost = $145/Hr. x 4 hrs. per week x 52 Weeks Per Year x 2 Plants = $60,300
3. Equipment Maintenance and Repair Parts – Equipment repair, and maintenance parts costs are estimated to average 2% of the total new equipment cost per year.

For this alternative, the estimated annual average cost for maintenance and repair parts is $66,400.

4. Power and Water Costs – The monthly average power bill at each plant is estimated at $3,900/Month. The monthly average water bill at each plant is $150/Month. The annual cost for both plants is $97,200.
5. Annual Scans and Toxicity Testing is estimated to be $4,800 per plant per year = $9,600.
6. Administrative support and engineering are estimated to average 10% of the annual labor cost to operate the plant = $16,600

Based on this analysis the estimated annual Operation and Maintenance Cost for Alternative 2 is $416,500.

Alternative 3 – Abandon the Cave City WRF and Renovate and Expand the Capacity of the Horse Cave WRF to 1.300 MGD

1. The plant will have a dedicated operator to perform all routing operation and maintenance of the plant. Average operator hourly cost is $25/Hour x 1.60 (to cover insurance, benefits and taxes) = $40/Hour. Annual cost/plant = $83,200
2. Equipment Repair and Maintenance – The CEA has a 3-member Maintenance and Repair Crew. The average hourly rate is similar to the operators. The crew is equipped with a service truck and associated tools. The crew maintains and repairs all mechanical equipment at the plants. It is estimated that the crew will spend 6 hours per week at the plant. The crew costs are as follows:
    a. Labor 3 crew members x $40/Hour = $120/Hour
    b. Service Truck and Tools x $25/Hour = $25/Hour
    c. Total Cost = $145/Hr. x 6 hrs. per week x 52 Weeks Per Year = $45,200
3. Equipment Maintenance and Repair Parts – Equipment repair, and maintenance parts costs are estimated to average 2% of the total new equipment cost per year. For this alternative, the estimated annual average cost for maintenance and repair parts is $43,200.
4. Power and Water Costs – The monthly average power bill for the plant is estimated at $4,900/Month. The monthly average water bill for the plant is estimated at $150/Month. The annual cost for utilities is $60,600.
5. Annual Scans and Toxicity Testing is estimated to be $5,800 per year for the plant.
6. Administrative support and engineering are estimated to average 10% of the annual labor cost to operate the plant = $8,300

Based on this analysis the estimated annual Operation and Maintenance Cost for Alternative 3 is $246,300.

Table 8-3 compares the Capital and Operation and Maintenance Costs for each Alternative.

Evaluation of Non-Monetary Factors

In addition to comparing the Capital and Operation and Maintenance Costs of the alternatives, Non-monetary Factors were also considered. These Factors include the following:

1. Environmental Impact – Evaluation of this factor included analyzing the benefit of pumping treated effluent from the Cave City Plant to the Horse Cave Plant when compared to reducing the power consumption by approximately 40% by consolidating the treatment process at one location.

   Since the plants were placed online, most of the growth in the system has been south of Horse Cave. Sewage generated in this area of the collection system is pumped to the Horse Cave Plant. The CEA has constructed a network of force mains to convey this sewage. These lines were constructed using polyethylene pipe to eliminate mechanical joints in the lines. This has resulted in essentially eliminating sewage spills from the force mains. This methodology has been proven over the past 3 decades in the area.

   Both Alternatives are to be constructed at the existing Water Reclamation Facility sites on previously disturbed ground. Therefore, there are no anticipated environmental impacts associated with the proposed construction sites.

   Implementation of this project will result in short term environmental impacts. These impacts will be limited to storm water runoff from the construction site and localized air pollution from construction activities. Thee impacts will be minimized by implementing a Storm Water Pollution Prevention Plan for the construction activities and requiring that all construction equipment meet current air quality requirements.

2. Implementation Capability – The project construction components were compered to identify any potential issues with implementation. Alternative 2 creates some issues with funding when compared to 3 as the Capital costs are higher for this alternative. Broth projects could be phased in in the event full funding cannot be secured. All construction materials and components are readily available in the area.

   The improvements proposed by both alternatives can be constructed without interrupting service and maintaining the same level of treatment through out the construction period.

3. Water Quality Objectives – Both alternatives will provide the same level of treatment and be capable of meeting the Division of Waters Water Quality Objectives for the area. If Alternative 2 is implemented, the effluent from the Cave City WRF would be pumped to the Horse Cave WRF and then to the outfall at the Green River where Alternative 3 would involve pumping raw sewage collected int he Cave City aera to Horse Cave for treatment. This could minimize the potential for surface or ground water contamination in the event the force main failed.

   Alternative 3 includes fewer treatment components which could reduce the potential for surface and/or ground water contamination due to treatment process component failure.

4. Flexibility – Both alternatives provided a significant level of flexibility. All treatment components include back up units to ensure continuous, uninterrupted treatment even with one of multiple components out of service. If Alternative 3 is implemented, the CEA will "idle" the Cave City WRF so that it can be brought online in the event of a catastrophic failure in the system.

5. Public Acceptance – The public is concerned with preserving the environment and natural resources in the area. Both alternatives will provide enhanced treatment as compared to the current treatment processes and provide capacity for growth. CEA's tract record with eliminating Sanitary Sewer Overflows in the system and meeting all KPDES Permit discharge limitations is excellent and the implementation of either alternative will serve to continue this legacy.

   The public is also concerned with the cost -of-service aspect and want utility rates to be competitive for the area, attract industrial users and support small business.

Numerical values were assigned to each Non-monetary Factor for each alternative. Numbers between 1 and 10 were assigned with 1 being the least desirable. **Table 8-4** displays this analysis.

The Non-monetary analysis is based on a weighted scoring system and includes Environmental Impact, Implementation Capability, Water Quality Objectives, Flexibility and Public Acceptance.

Recommended Alternative

Based on the comparison of Capital Costs, Operation and Maintenance Costs and Non-monetary Factors, Alternative 3, Abandoned the Cave City WRF and Renovate and Expand the Horse Cave WRF is recommended for implementation. The constriction of the proposed improvements can readily be phased in to facilitate project funding.

Cost of Recommended Alternative

The total cost of the proposed plan is $7.791 million (refer to the project cost estimate in **Table 8-2**). This cost includes engineering, construction and permitting. However, because all work will take place within existing CEA property and easements, there will be no land acquisition costs, and minimal legal costs.

The CEA intends to use Project Phasing and grants to fund a portion of the Project. This will limit the Capital Costs to level that can be supported by the current rate structure. Grant sources will include the Economic Development Agency and Community Development Block Grants.

The CEA passed a rate increase in 2018. This increase raised the user rates by 5% per year for three consecutive years. The current rate is $5.88 per 1,000 gallons of usage. This is a flat rate applied to all system users. The rate increase also included an annual increase in the rate based on the Consumer Price Index. This is an annual increase and is applied each year in May. The rate increase took into consideration that the CEA is close (approximately 3 years from now – 2024) to paying off two large loans they secured to construct the existing infrastructure.

By using grants to fund a portion of the Project, paying off two loans and phasing constriction of the proposed improvements the existing rate structure should generate sufficient revenue to fund the proposed improvements without a rate increase. At this time the current User Rate for 4,000 gallons of use is $23.52

The proposed improvements are shown as Alternative 3 in Section 8 see **Figures 8-3**, **8-4** and **8-5.**

Anticipated Funding Sources for the Recommended Alternative

The CEA intends to apply for grant to fund a portion of the Project. At this time the CEA anticipated securing grants from the Community Block Grant Program and the Economic Development Agency. The balance of the Project could be funded by the CEA Capital Improvements Fund and/or through a low interest load form the Kentucky Infrastructure Authority. Project Phasing will also be used to control the capital expenditure that can be supported by the current rate structure. Anticipated funding ranges are summarized as follows:

Community Development Block Grants –	$500,000 to $1,200,000
Economic Development Agency -	$1,000,000 to $2,000,000
CEA Capital Improvements Fund -	$200,000 to $6,100,000
Kentucky Infrastructure Authority -	$4,100,000 to $6.100,000

Environmental Impacts of the Recommended Alternative

The improvements proposed for Alternative 3 will be constructed on previously disturbed ground at the existing WRF sites. Since these areas have been previously disturbed, significant environmental impact are not anticipated. There are no know endangered species, wetlands or environmentally sensitive areas in the proposed construction zone.

Implementation of this project will result in short term environmental impacts. These impacts will be limited to storm water runoff from the construction site and localized air pollution from construction activities. Thee impacts will be minimized by implementing a Storm Water Pollution Prevention Plan for the construction activities and requiring that all construction equipment meet current air quality requirements.

Social and Financial Impact of Recommended Alternative

Implementation of the proposed Alternative will allow the CEA to continue to provide sanitary sewer service to the Planning Area. This will result in allowing the community to continue to develop and enhance the quality of life in the area. The finical impact of implementing the Alternative will be minimal as the CEA does not anticipate increasing the user rates when this Alternative is implemented. The current rate structure in combination with phasing the implementation of the Project, securing grant funds and retiring current bonds will provide the funding sources for the Project without an additional rate increase.

Overall, the implementation of this project will benefit the community by protecting the environment, providing capacity of expansion and maintaining the current rate structure.

Implementation Schedule of Recommended Alternative

The Schedule of Implementation for the elimination of the Cave City WWTP and renovation of the Horse Cave WRF is listed below. (The project schedule will mainly be dependent on securing project financing and regulatory permit approvals).

Schedule of Implementation for Recommended Project

Recommended Project	Estimated Completion Date
Apply for Project Financing	August 2020
Submit Facility Plan for Review	March 2021
Public Hearing on Facility Plan	April 2021
Engineering Design	March 2021
Construction Permit from DOW	May 2021

Facility Plan Approved (SPEAR Issued)	September 2021
Bidding	October 2021
Construction Starts	November 2021
Construction Complete	March 2023

Section 9 – Cross-Cutter Correspondence and Mitigations

United States Fish and Wildlife Service Review

A letter was sent to the United States Fish and Wildlife Service (USFWS) on March 23, 2021, requesting a review of the significant concerns for local fish and wildlife resources or habitat with the proposed projects. The letter of response was received on To Be Determined (TBD). All comments have been taken under advisement in the Site Acquisition process. A copy of the letter received from the USFWS is included in Appendix B.

Kentucky Department of Fish and Wildlife Resource Review

A letter was sent to the Kentucky Department of Fish and Wildlife Resources (KDFWR) on March 23, 2021, requesting a review of the significant concerns for local fish and wildlife resources or habitat with the proposed projects. The letter of response was received on TBD. The letter states that KDFWR does not anticipate any impacts on any federally listed or state listed threatened/endangered species. A copy of the letter received from the KDFWR is included in Appendix B.

Kentucky Heritage Council Review

A letter was sent to the Kentucky Heritage Council (KHC) on March 23, 2021, requesting a review of the significant cultural or historical concerns with the proposed projects. A copy of the letter sent to the KHC is included in Appendix B.

United States Army Corps of Engineers Review

A letter was sent to the United States Army Corps of Engineer (USACE) on March 23, 2021, requesting a review of the significant concerns for wetlands and other jurisdictional interests for the proposed projects. The letter of response was received on TBD. The letter states that the request is not an action usually completed by the Louisville District U.S. Army Corps of Engineers. A copy of the letter received from the USACE is included in Appendix B.

Natural Resource Conservation Service Review

A letter was sent to the Natural Resource Conservation Service (NRCS) on March 23, 2021, requesting its review of significant concerns over agricultural resources as a result of the recommended plan. The letter of response was received on TBD. The letter states that all pipelines are within previously disturbed areas and therefore are not impacting prime farmland. The treatment facility site is to be reviewed in a separate determination upon site acquisition. A copy of the letter received from NRCS is included in Appendix B.

Kentucky Clearinghouse Review

In addition to the agencies listed above, the KDOW will prepare a State Planning and Environmental Assessment Report (SPEAR) that is distributed to the following agencies:

Kentucky Department of Public Health
Kentucky Division for Air Quality
Kentucky Division of Forestry
Kentucky Division of Waste Management

Kentucky Division of Wastewater
Kentucky State Clearinghouse
Kentucky Geological Survey

Comments received from these agencies will be considered in approval of the RFP.

Section 10 – Evaluation of Recommended Regional Facility Plan

Environmental Impacts

The improvements for the recommended alternative (alternative 3) will be constructed on previously disturbed ground at the existing WRF sites. Since these areas have been previously disturbed, significant environmental impact are not anticipated. There are no know endangered species, wetlands or environmentally sensitive areas in the proposed construction zone.

Implementation of this project will result in short term environmental impacts. These impacts will be limited to storm water runoff from the construction site and localized air pollution from construction activities. These impacts will be minimized by implementing a Storm Water Pollution Prevention Plan for the construction activities and requiring that all construction equipment meet current air quality requirements.

Institutional Structure

CEA's current institutional structure will remain and is adequate to implement the recommended alternative. No inter municipality agreements will be needed.

Funding Plan

The total cost of the proposed plan is $7.791 million. The CEA intends to use Project Phasing and grants to fund a portion of the Project. This will limit the Capital Costs to a level that can be supported by the current rate structure. Grant sources will include the Economic Development Agency and Community Development Block Grants.

The CEA intends to apply for grants to fund a portion of the Project. At this time, the CEA anticipates securing grants from the Community Block Grant Program and the Economic Development Agency. The balance of the Project could be funded by the CEA Capital Improvements Fund and/or through a low interest load form the Kentucky Infrastructure Authority. Project Phasing will also be used to control the capital expenditure to a level that can be supported by the current rate structure. Anticipated funding ranges are summarized as follows:

Community Development Block Grants –	$500,000 to $1,200,000
Economic Development Agency -	$1,000,000 to $2,000,000
CEA Capital Improvements Fund -	$200,000 to $6,100,000
Kentucky Infrastructure Authority -	$4,100,000 to $6.100,000

Current and Projected Residential User Charge

The current User Rate for 4,000 gallons of use is $23.52. Base on the 2019 rate study the current rate along with the retirement of existing dept and low interest loans shall be adequate to fund the recommended projects.

Implementation Schedule of Recommended Alternative

The Schedule of Implementation for the elimination of the Cave City WWTP and renovation of the Horse Cave WRF is listed below. (The project schedule will mainly be dependent on securing project financing and regulatory permit approvals).

Schedule of Implementation for Recommended Project

Recommended Project	Estimated Completion Date
Apply for Project Financing	August 2020
Submit Facility Plan for Review	March 2021
Public Hearing on Facility Plan	April 2021
Engineering Design	March 2021
Construction Permit from DOW	May 2021
Facility Plan Approved (SPEAR Issued)	September 2021
Bidding	October 2021
Construction Starts	November 2021
Construction Complete	March 2023

Section 11 – Documentation of Public Participation

This Section will be completed once the Public Comments have been received and addressed.

Section 12 – Regional Facility Plan Completeness Checklist and Forms

Requirements: Two (2) hard copies, one certified by a professional engineer licensed in Kentucky and one (1) non-certified digital copy of the regional facility plan and the planning area shapefile on a Compact Disc (CD) shall be submitted to the Cabinet. This completeness checklist should be completed and submitted with each regional facility plan.

Regional Planning Agency Name: Caveland Environmental Authority

Date: January 2021

		Page No.
	SECTION 1	
	REGIONAL FACILITY PLAN SUMMARY- This section shall provide a brief summary of the information provided in the facility plan, including the following:	1 – 3
1.	Purpose of the plan and major problems evaluated in the plan.	2
2.	Recommended alternative chosen to remediate or correct the problems and/or serve the area of need identified in the plan. Also, include any institutional arrangements necessary to implement the recommended alternative(s).	2
3.	Estimated cost of implementing the proposed plan (including user fees) and the proposed funding method to be used.	3
4.	Planning agency commitments necessary to implement the plan.	3
5.	Schedule of implementation for projects.	3
	SECTION 2	
	STATEMENT OF PURPOSE AND NEED- This section shall contain a brief description of the purpose and need for a submitting the facility plan.	4
	SECTION 3	
	PHYSICAL CHARACTERISTICS OF THE PLANNING AREA- This section shall delineate the planning area boundaries and describe key topographic, geographic and pertinent natural or man-made features of the area. Digital or electronic submission of the planning area boundary shapefile in a standard GIS format shall also be included. This section shall also include the following maps:	5 – 7
1.	One (1) up-to-date map, suitable for photocopying, indicate the planning area boundary, service area boundary, watershed boundaries, county lines, populated places, cities and/or towns and project areas or proposed planning period phases.	Figure 1-1
2.	One (1) up-to-date map, suitable for photocopying, include locations of wastewater treatment facilities (including package treatment plants), discharge location(s), collection lines (gravity, force main, interceptors), pump stations, public drinking water intake points and groundwater supply areas [Source Water Area Protection Plans (SWAPP) and/or Wellhead Protection Areas (WHPA)].	Figure 1-1
3.	One (1) seven and one-half (7 ½) minute USGS topographic map including the location of wetlands, delineation of the 100-year floodplain, surface water(s), and topography.	Figure 3-1
4.	If available, a local planning and zoning land use map	Figure 3-3

(Continued on next page)

(Continued on next page)

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Unit Process Design Criteria Form for the Recommended Alternative (Alternative 3)

Unit Process	Number of Units[1]	Flow per Unit (MGD)	Design Criteria[2]
Influent Pumping	3	1.90 MGD	10 States Standards; Hydraulic Institute; Variable Speed Includes 1.95 MGD RAS
Screening	1	5.70 MGD	With Emergency Bypass; 10 States Standards – Includes 1.95 MGD RAS
Grit Removal	N/A	N/A	
Primary Clarification	N/A	N/A	
Biological Process	3	2 at 0.25 MGD, one at 0.80 MGD	10 States Standards; WEF; MOP 8
Chemical Phosphorus Removal	N/A	N/A	10 States Standards; WEF; MOP 8 – Biological P removal to be included in design. No Permit Limit at this time
Final Clarification	2	One 40' Diameter Unit – 1.22 MGD Max, One – 56' Diameter Unit – 2.48 MGD Max.	10 States Standards; EPA Reliability 1.5 Standards
Disinfection	1	3.70 MGD	10 States Standards; EPA MOP 8
RAS/WAS Pumping	0 – Influent Pumps handle the Raw Sewage and RAS	0.0	10 States Standards; MOP 8
Effluent Pump Station	3	3 at 1.23 MGD	
Sludge Treatment	1	20-30 days storage	10 States Standards; WEF MOP 8
Sludge Dewatering	Sand Drying Beds and Screw Press		Sludge Dewatering at KSR WWTP

[1] The number of units shall be in accordance with the reliability/redundancy checklist
[2] The design criteria shall be in accordance with 401 KAR 5:005 including Ten States Standards

TABLES

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 6-1
KPDES PERMIT LIMITATIONS FOR THE HORSE CAVEWRF (001), CAVE CITY WRF (002) AND DISCHARGE TO THE GREEN RIVER (003)

HORSE CAVE WRF EFFLEUNT (OUTFALL 001)

EFFLEUNT PARAMETER	LOADING (#/day)		CONCENTRATION (mg/l)				FREQUENCY	SAMPLE TYPE
	MONTHY AVERAGE	MAXIMUM WEEKLY AVERAGE	MINIMUM	MONTHY AVERAGE	MAXIMUM WEEKLY AVERAGE	MAXIMUM		
Flow - Design Capacity 0.480 MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
BOD Effluent	120	180	N/A	30	45	N/A	1/Week	24 Hour Composite
BOD Influent	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hour Composite
BOD Percent Removal	N/A	N/A	N/A	85			1/Month	Calculated
TSS Effluent	120	180	N/A	30	45	N/A	1/Week	24 Hour Composite
TSS Influent	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hour Composite
TSS Percent Removal	N/A	N/A	N/A	85	N/A	N/A	1/Month	Calculated

CAVE CITY WRF EFFLEUNT (OUTFALL 002)

EFFLEUNT PARAMETER	LOADING (#/day)		CONCENTRATION (mg/l)				FREQUENCY	SAMPLE TYPE
	MONTHY AVERAGE	MAXIMUM WEEKLY AVERAGE	MINIMUM	MONTHY AVERAGE	MAXIMUM WEEKLY AVERAGE	MAXIMUM		
Flow - Design Capacity 0.600 MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
BOD Effluent	150	225	N/A	30	45	N/A	1/Week	24 Hour Composite
BOD Influent	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hour Composite
BOD Percent Removal	N/A	N/A	N/A	85			1/Month	Calculated
TSS Effluent	150	225	N/A	30	45	N/A	1/Week	24 Hour Composite
TSS Influent	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hour Composite
TSS Percent Removal	N/A	N/A	N/A	85	N/A	N/A	1/Month	Calculated

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 6-1
KPDES PERMIT LIMITATIONS FOR THE HORSE CAVEWRF (001), CAVE CITY WRF (002) AND DISCHARGE TO THE GREEN RIVER (003)

DISCHARGE TO THE GREEN RIVER (OUTFALL 003)

EFFLEUNT PARAMETER	LOADING (#/day)		CONCENTRATION (mg/l)				FREQUENCY	SAMPLE TYPE
	MONTHY AVERAGE	MAXIMUM WEEKLY AVERAGE	MINIMUM	MONTHY AVERAGE	MAXIMUM WEEKLY AVERAGE	MAXIMUM		
Flow - Design Capacity 1.080 MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
Ammonia as mg/l NH3-N	150	225	N/A	20.0	30.0	N/A	1/Week	24 Hour Composite
E. Coli	N/A	N/A	N/A	130	240	N/A	1/Week	Grab
Dissolved Oxygen	N/A	N/A	2	N/A	N/A	N/A	1/Week	Grab
pH	N/A	N/A	6.0	N/A	N/A	9.0	1/Week	Grab
Acute WET	N/A	N/A	N/A	N/A	N/A	1.00	1/Quarter	Two Discreet Grab Samples 12 Hours Apart
Total Phosphorus	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hour Composite
Total Nitrogen	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hour Composite

CAVELAND ENVIRONMENTAL AUTHORITY

REGIONAL FACILITY PLAN

TABLE 6-2

HORSE CAVE WATER RECLIMATION FACILITY FLOW DATA 2019

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.207	0.179	0.227	0.270	0.237	0.210	0.235	0.274	0.248	0.293	0.233	0.246
	0.249	0.183	0.152	0.249	0.296	0.225	0.296	0.218	0.255	0.268	0.236	0.200
	0.263	0.188	0.215	0.231	0.266	0.212	0.331	0.263	0.271	0.257	0.235	0.303
	0.251	0.231	0.261	0.238	0.260	0.222	0.244	0.262	0.246	0.229	0.233	0.278
	0.266	0.241	0.241	0.248	0.219	0.230	0.279	0.233	0.269	0.230	0.263	0.287
	0.260	0.440	0.231	0.280	0.241	0.221	0.239	0.269	0.254	0.344	0.258	0.380
	0.316	0.337	0.265	0.284	0.248	0.244	0.325	0.266	0.215	0.270	0.256	0.200
	0.306	0.226	0.233	0.297	0.255	0.327	0.260	0.267	0.231	0.259	0.232	0.252
	0.295	0.192	0.293	0.300	0.286	0.248	0.271	0.328	0.262	0.261	0.222	0.234
	0.291	0.246	0.199	0.286	0.261	0.225	0.332	0.250	0.262	0.231	0.211	0.268
	0.316	0.421	0.256	0.241	0.226	0.234	0.298	0.205	0.251	0.227	0.241	0.257
	0.243	0.402	0.256	0.274	0.236	0.227	0.235	0.278	0.178	0.201	0.294	0.274
	0.236	0.232	0.261	0.339	0.255	0.240	0.281	0.277	0.258	0.189	0.295	0.214
	0.263	0.215	0.222	0.210	0.239	0.264	0.246	0.282	0.226	0.212	0.267	0.200
	0.297	0.203	0.291	0.233	0.267	0.205	0.245	0.283	0.242	0.253	0.236	0.187
	0.305	0.186	0.183	0.292	0.232	0.250	0.295	0.263	0.260	0.259	0.213	0.555
	0.239	0.206	0.152	0.292	0.235	0.269	0.249	0.259	0.266	0.215	0.227	0.303
	0.266	0.177	0.267	0.252	0.240	0.299	0.250	0.223	0.249	0.242	0.299	0.263
	0.339	0.343	0.272	0.361	0.256	0.269	0.321	0.245	0.267	0.243	0.303	0.256
	0.285	0.476	0.306	0.262	0.231	0.250	0.280	0.277	0.212	0.224	0.320	0.274
	0.304	0.229	0.262	0.246	0.229	0.308	0.186	0.265	0.212	0.222	0.350	0.250
	0.283	0.234	0.272	0.240	0.211	0.271	0.294	0.294	0.248	0.224	0.327	0.170
	0.381	0.265	0.263	0.292	0.269	0.289	0.249	0.265	0.208	0.224	0.236	0.263
	0.290	0.212	0.263	0.252	0.275	0.287	0.267	0.238	0.250	0.287	0.250	0.171
	0.225	0.272	0.247	0.221	0.230	0.274	0.201	0.283	0.256	0.244	0.249	0.143
	0.203	0.251	0.242	0.205	0.238	0.287	0.252	0.319	0.275	0.281	0.353	0.187
	0.254	0.256	0.228	0.203	0.208	0.283	0.292	0.277	0.267	0.261	0.258	0.246
	0.192	0.254	0.242	0.161	0.221	0.294	0.187	0.274	0.212	0.266	0.220	0.261
	0.271		0.302	0.236	0.221	0.283	0.253	0.259	0.233	0.267	0.196	0.262
	0.292		0.302	0.236	0.247	0.226	0.269	0.243	0.230	0.436	0.557	0.256
	0.203		0.234		0.207		0.255	0.212		0.312		0.230
Monthly Average	0.271	0.261	0.246	0.258	0.243	0.256	0.265	0.263	0.244	0.256	0.269	0.254
Monthly Maximum	0.381	0.476	0.306	0.361	0.296	0.327	0.332	0.328	0.275	0.436	0.557	0.555
Annual Average Daily Flow - ADF	0.257											
Annual Maximum Daily Flow - PDF	0.557											

CAVELAND ENVIRONMENTAL AUTHORITY

REGIONAL FACILITY PLAN

TABLE 6-2

HORSE CAVE WATER RECLIMATION FACILITY FLOW DATA 2018

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.392	0.359	0.425	0.446	0.305	0.329	0.383	0.328	0.373	0.352	0.375	0.415
	0.362	0.399	0.347	0.366	0.308	0.247	0.327	0.290	0.279	0.287	0.368	0.364
	0.299	0.393	0.344	0.446	0.259	0.306	0.257	0.324	0.288	0.272	0.278	0.364
	0.354	0.445	0.433	0.449	0.289	0.315	0.289	0.311	0.243	0.241	0.275	0.319
	0.348	0.400	0.405	0.492	0.000	0.322	0.242	0.275	0.252	0.202	0.417	0.319
	0.262	0.454	0.419	0.513	0.261	0.289	0.357	0.255	0.283	0.401	0.356	0.327
	0.313	0.570	0.458	0.481	0.314	0.245	0.411	0.243	0.294	0.373	0.328	0.256
	0.316	0.503	0.405	0.435	0.290	0.259	0.340	0.233	0.289	0.414	0.343	0.303
	0.353	0.334	0.404	0.482	0.278	0.316	0.351	0.228	0.392	0.414	0.314	0.291
	0.336	0.447	0.395	0.422	0.201	0.329	0.309	0.314	0.261	0.339	0.265	0.398
	0.440	0.534	0.455	0.481	0.173	0.296	0.340	0.278	0.235	0.292	0.333	0.181
	0.385	0.516	0.484	0.324	0.223	0.305	0.354	0.293	0.296	0.283	0.333	0.276
	0.419	0.445	0.411	0.538	0.164	0.336	0.361	0.299	0.288	0.266	0.289	0.336
	0.337	0.436	0.500	0.147	0.237	0.325	0.347	0.285	0.264	0.383	0.392	0.320
	0.334	0.517	0.436	0.496	0.260	0.281	0.349	0.287	0.254	0.421	0.318	0.299
	0.434	0.425	0.519	0.524	0.260	0.326	0.361	0.380	0.244	0.284	0.298	0.200
	0.461	0.499	0.410	0.429	0.204	0.305	0.302	0.326	0.259	0.259	0.419	0.287
	0.450	0.494	0.395	0.379	0.284	0.305	0.309	0.309	0.270	0.292	0.285	0.276
	0.455	0.482	0.508	0.512	0.224	0.271	0.313	0.266	0.270	0.346	0.337	0.274
	0.408	0.453	0.447	0.436	0.284	0.305	0.396	0.328	0.267	0.274	0.293	0.313
	0.440	0.471	0.464	0.359	0.196	0.366	0.361	0.320	0.347	0.268	0.254	0.254
	0.360	0.551	0.445	0.298	0.224	0.321	0.313	0.329	0.292	0.297	0.199	0.178
	0.503	0.524	0.484	0.381	0.173	0.323	0.368	0.289	0.250	0.377	0.249	0.200
	0.458	0.614	0.546	0.373	0.236	0.394	0.251	0.244	0.406	0.296	0.261	0.125
	0.442	0.611	0.480	0.353	0.171	0.405	0.340	0.268	0.372	0.272	0.251	0.132
	0.400	0.393	0.465	0.333	0.282	0.524	0.343	0.277	0.229	0.310	0.315	0.243
	0.380	0.445	0.495	0.286	0.273	0.391	0.343	0.334	0.292	0.356	0.299	0.250
	0.408	0.471	0.544	0.334	0.247	0.409	0.287	0.329	0.306	0.311	0.309	0.179
	0.353		0.546	0.410	0.218	0.439	0.269	0.285	0.257	0.326	0.351	0.181
	0.376		0.455	0.353	0.299	0.280	0.316	0.314	0.265	0.331	0.418	0.240
	0.386		0.435		0.262		0.255	0.318		0.330		0.408
Monthly Average	0.386	0.471	0.450	0.409	0.239	0.329	0.327	0.295	0.287	0.318	0.317	0.274
Monthly Maximum	0.503	0.614	0.546	0.538	0.314	0.524	0.411	0.380	0.406	0.421	0.419	0.415
Annual Average Daily Flow - ADF	0.342											
Annual Maximum Daily Flow - PDF	0.614											

CAVELAND ENVIRONMENTAL AUTHORITY

REGIONAL FACILITY PLAN

TABLE 6-2

HORSE CAVE WATER RECLIMATION FACILITY FLOW DATA 2017

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.307	0.418	0.441	0.375	0.347	0.429	0.495	0.449	0.758	0.387	0.448	0.352
	0.390	0.377	0.434	0.461	0.402	0.505	0.590	0.531	0.531	0.406	0.521	0.394
	0.234	0.340	0.435	0.495	0.388	0.407	0.411	0.427	0.310	0.374	0.420	0.346
	0.334	0.365	0.387	0.440	0.449	0.323	0.290	0.456	0.321	0.650	0.440	0.337
	0.301	0.265	0.365	0.468	438.000	0.414	0.388	0.476	0.399	0.384	0.414	0.280
	0.367	0.350	0.392	0.444	0.394	0.425	0.500	0.429	0.384	0.415	0.445	0.477
	0.333	0.399	0.442	0.429	0.231	0.428	0.665	0.484	0.351	0.464	0.449	0.409
	0.206	0.362	0.313	0.406	0.380	0.366	0.129	0.495	0.327	0.503	0.459	0.488
	0.274	0.320	0.345	0.319	0.372	0.335	0.960	0.516	0.347	0.473	0.495	0.359
	0.314	0.332	0.302	0.324	0.420	0.391	0.366	0.441	0.315	0.491	0.432	0.345
	0.359	0.326	0.335	0.403	0.420	0.314	0.456	0.387	0.379	0.419	0.513	0.331
	0.398	0.353	0.277	0.379	0.450	0.418	0.443	0.390	0.409	0.462	0.455	0.348
	0.419	0.330	0.328	0.355	0.435	0.386	0.478	0.326	0.480	0.430	0.325	0.301
	0.346	0.363	0.408	0.434	0.295	0.467	0.420	0.454	0.464	0.453	0.375	0.369
	0.266	0.344	0.422	0.364	0.447	0.470	0.448	0.521	0.433	0.462	0.461	0.350
	0.494	0.364	0.375	0.396	0.415	0.529	0.426	0.463	0.458	0.443	0.503	0.423
	0.346	0.386	0.443	0.380	0.405	0.158	0.448	0.483	0.409	0.365	0.427	0.434
	0.341	0.371	0.419	0.443	0.415	0.374	0.486	0.470	0.447	0.445	0.509	0.512
	0.558	0.376	0.350	0.401	0.425	0.426	0.444	0.461	0.478	0.482	0.505	0.434
	0.344	0.364	0.408	0.377	0.484	0.420	0.489	0.456	0.471	0.535	0.516	0.633
	0.352	0.278	0.381	0.414	0.495	0.478	0.523	0.485	0.445	0.462	0.424	0.313
	0.259	0.431	0.415	0.444	0.396	0.454	0.434	0.427	0.462	0.487	0.496	0.414
	0.350	0.438	0.437	0.321	0.330	0.500	0.436	0.414	0.419	0.440	0.399	0.598
	0.317	0.385	0.495	0.336	0.459	0.637	0.494	0.403	0.396	0.555	0.238	0.404
	0.394	0.387	0.508	0.367	0.398	0.300	0.467	0.463	0.434	0.514	0.184	0.375
	0.342	0.306	0.305	0.378	0.421	0.477	0.576	0.428	0.425	0.509	0.304	0.206
	0.339	0.392	0.461	0.372	0.496	0.476	0.500	0.456	441.000	0.511	0.377	0.239
	0.308	0.421	0.120	0.389	0.392	0.468	0.460	0.459	0.435	0.539	0.269	0.343
	0.325		0.417	0.380	0.319	0.491	0.461	0.471	0.448	0.484	0.320	0.354
	0.316		0.660	0.348	0.283	0.534	0.459	0.422	0.421	0.458	0.299	0.439
	0.348		0.521		0.279		0.485	0.451		0.462		0.409
Monthly Average	0.341	0.362	0.398	0.395	14.511	0.427	0.472	0.451	15.112	0.467	0.414	0.388
Monthly Maximum	0.558	0.438	0.660	0.495	438.000	0.637	0.960	0.531	441.000	0.650	0.521	0.633
Annual Average Daily Flow - ADF	2.811											
Annual Maximum Daily Flow - PDF	441.000											

CAVELAND ENVIRONMENTAL AUTHORITY

REGIONAL FACILITY PLAN

TABLE 6-2

HORSE CAVE WATER RECLIMATION FACILITY FLOW DATA 2016

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.199	0.275	0.256	0.240	0.274	0.260	0.313	0.486	0.341	0.411	0.326	0.395
	0.189	0.360	0.242	0.243	0.371	0.253	0.259	0.481	0.356	0.261	0.348	0.333
	0.191	0.243	0.233	0.228	0.331	0.221	0.407	0.377	0.417	0.484	0.372	0.420
	0.210	0.251	0.280	0.258	0.379	0.244	0.486	0.455	0.313	0.410	0.366	0.233
	0.193	0.220	0.229	0.257	0.339	0.183	0.321	0.439	0.296	0.468	0.368	0.447
	0.206	0.211	0.194	0.205	0.295	0.217	0.640	0.429	0.279	0.466	0.418	0.388
	0.214	0.201	0.244	0.282	0.290	0.209	0.426	0.275	0.330	0.442	0.383	0.420
	0.200	0.266	0.232	0.299	0.266	0.208	0.428	0.364	0.346	0.433	0.437	0.393
	0.217	0.239	0.257	0.242	0.340	0.235	0.412	0.372	0.412	0.414	0.433	0.395
	0.215	0.249	0.258	0.211	0.378	0.234	0.258	0.373	0.346	0.444	0.419	0.375
	0.246	0.226	0.231	0.331	0.410	0.208	0.332	0.363	0.273	0.372	0.445	0.321
	0.224	0.272	0.241	0.299	0.405	0.244	0.389	0.362	0.359	0.358	0.256	0.423
	0.248	0.235	0.232	0.348	0.322	0.222	0.427	0.403	0.342	0.496	0.414	0.392
	0.294	0.318	0.249	0.348	0.311	0.230	0.390	0.354	0.342	0.496	0.396	0.453
	0.260	0.304	0.275	0.332	0.242	0.284	0.403	0.364	0.430	0.398	0.414	0.407
	0.220	0.276	0.326	0.361	0.337	0.326	0.441	0.443	0.403	0.269	0.449	0.477
	0.228	0.274	0.243	0.313	0.369	0.352	0.399	0.417	0.451	0.479	0.394	0.583
	0.272	0.293	0.282	0.354	0.353	0.273	0.463	0.413	0.371	0.455	0.375	0.349
	0.209	0.233	0.337	0.300	0.328	0.292	0.381	0.359	0.391	0.389	0.328	0.389
	0.261	0.225	0.333	0.333	0.394	0.264	0.374	0.637	0.438	0.448	0.362	0.454
	0.263	0.256	0.338	0.372	0.287	0.305	0.372	0.367	0.425	0.480	0.448	0.415
	0.250	0.400	0.280	0.322	0.288	0.347	0.389	0.371	0.353	0.348	0.461	0.404
	0.165	0.264	0.308	0.308	0.229	0.391	0.449	0.338	0.456	0.356	0.474	0.480
	0.212	0.238	0.279	0.331	0.258	0.309	0.289	0.362	0.464	0.383	0.332	0.232
	0.233	0.251	0.261	0.337	0.266	0.324	0.428	0.324	0.362	0.367	0.244	0.202
	0.291	0.228	0.158	0.357	0.337	0.310	0.410	0.358	0.468	0.413	0.252	0.296
	0.267	0.207	0.220	0.400	0.275	0.300	0.501	0.320	0.422	0.388	0.362	0.237
	0.303	0.236	0.215	0.343	0.217	0.334	0.459	0.291	0.494	0.404	0.423	0.373
	0.273		0.215	0.314	0.176	0.318	0.475	0.342	0.445	0.422	0.407	0.357
	0.258		0.254	0.341	0.218	0.363	0.548	0.328	0.416	0.399	0.396	0.339
	0.293		0.327		0.226		0.300	0.346		0.406		0.366
Monthly Average	0.236	0.259	0.259	0.307	0.307	0.275	0.405	0.384	0.385	0.412	0.383	0.379
Monthly Maximum	0.303	0.400	0.338	0.400	0.410	0.391	0.640	0.637	0.494	0.496	0.474	0.583
Annual Average Daily Flow - ADF	0.333											
Annual Maximum Daily Flow - PDF	0.640											

CAVELAND ENVIRONMENTAL AUTHORITY

REGIONAL FACILITY PLAN

TABLE 6-2

HORSE CAVE WATER RECLIMATION FACILITY FLOW DATA 2015

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.199	0.275	0.256	0.240	0.274	0.260	0.313	0.486	0.341	0.411	0.326	0.395
	0.189	0.360	0.242	0.243	0.371	0.253	0.259	0.481	0.356	0.261	0.348	0.333
	0.191	0.243	0.233	0.228	0.331	0.221	0.407	0.377	0.417	0.484	0.372	0.420
	0.210	0.251	0.280	0.258	0.379	0.244	0.486	0.455	0.313	0.410	0.366	0.233
	0.193	0.220	0.229	0.257	0.339	0.183	0.321	0.439	0.296	0.468	0.368	0.447
	0.206	0.211	0.194	0.205	0.295	0.217	0.640	0.429	0.279	0.466	0.418	0.388
	0.214	0.201	0.244	0.282	0.290	0.209	0.426	0.275	0.330	0.442	0.383	0.420
	0.200	0.266	0.232	0.299	0.266	0.208	0.428	0.364	0.346	0.433	0.437	0.393
	0.217	0.239	0.257	0.242	0.340	0.235	0.412	0.372	0.412	0.414	0.433	0.395
	0.215	0.249	0.258	0.211	0.378	0.234	0.258	0.373	0.346	0.444	0.419	0.375
	0.246	0.226	0.231	0.331	0.410	0.208	0.332	0.363	0.273	0.372	0.445	0.321
	0.224	0.272	0.241	0.299	0.405	0.244	0.389	0.362	0.359	0.358	0.256	0.423
	0.248	0.235	0.232	0.348	0.322	0.222	0.427	0.403	0.342	0.496	0.414	0.392
	0.294	0.318	0.249	0.348	0.311	0.230	0.390	0.354	0.342	0.496	0.396	0.453
	0.260	0.304	0.275	0.332	0.242	0.284	0.403	0.364	0.430	0.398	0.414	0.407
	0.220	0.276	0.326	0.361	0.337	0.326	0.441	0.443	0.403	0.269	0.449	0.477
	0.228	0.274	0.243	0.313	0.369	0.352	0.399	0.417	0.451	0.479	0.394	0.583
	0.272	0.293	0.282	0.354	0.353	0.273	0.463	0.413	0.371	0.455	0.375	0.349
	0.209	0.233	0.337	0.300	0.328	0.292	0.381	0.359	0.391	0.389	0.328	0.389
	0.261	0.225	0.333	0.333	0.394	0.264	0.374	0.637	0.438	0.448	0.362	0.454
	0.263	0.256	0.338	0.372	0.287	0.305	0.372	0.367	0.425	0.480	0.448	0.415
	0.250	0.400	0.280	0.322	0.288	0.347	0.389	0.371	0.353	0.348	0.461	0.404
	0.165	0.264	0.308	0.308	0.229	0.391	0.449	0.338	0.456	0.356	0.474	0.480
	0.212	0.238	0.279	0.331	0.258	0.309	0.289	0.362	0.464	0.383	0.332	0.232
	0.233	0.251	0.261	0.337	0.266	0.324	0.428	0.324	0.362	0.367	0.244	0.202
	0.291	0.228	0.158	0.357	0.337	0.310	0.410	0.358	0.468	0.413	0.252	0.296
	0.267	0.207	0.220	0.400	0.275	0.300	0.501	0.320	0.422	0.388	0.362	0.237
	0.303	0.236	0.215	0.343	0.217	0.334	0.459	0.291	0.494	0.404	0.423	0.373
	0.273		0.215	0.314	0.176	0.318	0.475	0.342	0.445	0.422	0.407	0.357
	0.258		0.254	0.341	0.218	0.363	0.548	0.328	0.416	0.399	0.396	0.339
	0.293		0.327		0.226		0.300	0.346		0.406		0.366
Monthly Average	0.236	0.259	0.259	0.307	0.307	0.275	0.405	0.384	0.385	0.412	0.383	0.379
Monthly Maximum	0.303	0.400	0.338	0.400	0.410	0.391	0.640	0.637	0.494	0.496	0.474	0.583
Annual Average Daily Flow - ADF	0.333											
Annual Maximum Daily Flow - PDF	0.640											

CAVELAND ENVIRONMENTAL AUTHORITY

REGIONAL FACILITY PLAN

TABLE 6-3

CAVE CITY WATER RECLIMATION FACILITY FLOW DATA 2019

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.275	0.282	0.221	0.263	0.262	0.283	0.202	0.244	0.282	0.249	0.269	0.289
	0.268	0.264	0.321	0.264	0.31	0.234	0.24	0.274	0.304	0.237	0.236	0.338
	0.262	0.213	0.279	0.297	0.305	0.238	0.276	0.274	0.24	0.204	0.238	0.313
	0.283	0.235	0.274	0.29	0.352	0.246	0.272	0.255	0.249	0.265	0.249	0.258
	0.214	0.262	0.278	0.304	0.231	0.251	0.27	0.255	0.214	0.275	0.233	0.239
	0.25	0.768	0.278	0.32	0.219	0.286	0.259	0.278	0.293	0.41	0.214	0.258
	0.234	0.463	0.272	0.273	0.26	0.309	0.326	0.248	0.21	0.295	0.251	0.255
	0.241	0.307	0.306	0.27	0.234	0.357	0.248	0.245	0.202	0.26	0.265	0.233
	0.276	0.262	0.425	0.266	0.236	0.304	0.281	0.373	0.263	0.25	0.257	0.256
	0.269	0.338	0.293	0.234	0.243	0.258	0.314	0.261	0.233	0.305	0.269	0.275
	0.182	0.605	0.295	0.204	0.269	0.259	0.176	0.191	0.268	0.284	0.257	0.227
	0.246	0.411	0.285	0.269	0.209	0.253	0.252	0.279	0.213	0.275	0.259	0.266
	0.244	0.283	0.266	0.396	0.201	0.219	0.307	0.27	0.274	0.259	0.256	0.284
	0.284	0.274	0.252	0.218	0.243	0.24	0.249	0.256	0.248	0.277	0.254	0.279
	0.26	0.202	0.315	0.273	0.237	0.293	0.287	0.25	0.224	0.277	0.281	0.276
	0.253	0.37	0.264	0.259	0.241	0.227	0.318	0.253	0.223	0.284	0.222	0.88
	0.136	0.343	0.26	0.227	0.26	0.266	0.256	0.279	0.23	0.236	0.157	0.348
	0.228	0.256	0.265	0.231	0.231	0.439	0.283	0.224	0.227	0.248	0.227	0.286
	0.355	0.523	0.274	0.438	0.204	0.334	0.383	0.239	0.249	0.245	0.212	0.265
	0.268	0.531	0.26	0.339	0.263	0.305	0.275	0.236	0.238	0.273	0.174	0.288
	0.252	0.332	0.281	0.239	0.261	0.347	0.21	0.244	0.248	0.234	0.256	0.278
	0.248	0.296	0.246	0.283	0.253	0.316	0.264	0.258	0.206	0.251	0.253	0.277
	0.404	1.089	0.265	0.269	0.233	0.277	0.362	0.236	0.239	0.264	0.258	0.273
	0.267	0.312	0.289	0.27	0.265	0.378	0.506	0.253	0.226	0.236	0.232	0.216
	0.277	0.288	0.288	0.254	0.27	0.302	0.259	0.267	0.224	0.271	0.234	0.179
	0.271	0.27	0.32	0.266	0.264	0.298	0.295	0.337	0.235	0.353	0.425	0.194
	0.24	0.272	0.296	0.257	0.238	0.275	0.315	0.281	0.301	0.271	0.311	0.289
	0.242	0.263	0.322	0.232	0.262	0.295	0.218	0.253	0.225	0.222	0.235	0.274
	0.254		0.342	0.236	0.239	0.282	0.236	0.234	0.225	0.236	0.244	0.419
	0.253		0.276	0.234	0.275	0.224	0.264	0.253	0.157	0.426	0.989	0.321
	0.274		0.266		0.222		0.268	0.266		0.295		0.331
Monthly Average	0.258	0.368	0.286	0.273	0.251	0.287	0.280	0.260	0.239	0.273	0.274	0.296
Monthly Maximum	0.404	1.089	0.425	0.438	0.352	0.439	0.506	0.373	0.304	0.426	0.989	0.880
Annual Average Daily Flow - ADF	0.279											
Annual Maximum Daily Flow - PDF	1.089											

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 6-3
CAVE CITY WATER RECLIMATION FACILITY FLOW DATA 2018

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.1	0.157	0.129	0.282	0.392	0.409	0.322	0.382	0.364	0.209	0.365	0.667
	0.106	0.138	0.253	0.303	0.369	0.524	0.347	0.328	0.334	0.483	0.373	0.38
	0.14	0.2	0.274	0.498	0.395	0.38	0.39	0.407	0.338	0.376	0.321	0.348
	0.171	0.183	0.246	0.254	0.535	0.328	0.304	0.325	0.334	0.442	0.271	0.335
	0.137	0.197	0.294	0.263	0.433	0.32	0.337	0.331	0.336	0.371	0.6	0.307
	0.17	0.1	0.269	0.425	0.443	0.415	0.314	0.321	0.354	0.329	0.375	0.287
	0.237	0.277	0.24	0.282	0.39	0.364	0.399	0.374	0.301	0.349	0.299	0.336
	0.253	0.245	0.192	0.147	0.359	0.446	0.284	0.361	0.306	0.338	0.325	0.339
	0.227	0.329	0.333	0.238	0.406	0.473	0.327	0.326	0.59	0.262	0.446	0.291
	0.32	0.419	0.299	0.213	0.424	0.365	0.33	0.376	0.367	0.267	0.348	0.412
	0.332	0.287	0.304	0.287	0.482	0.366	0.369	0.33	0.331	0.273	0.342	0.235
	0.251	0.206	0.247	0.339	0.387	0.362	0.329	0.278	0.347	0.299	0.342	0.322
	0.198	0.271	0.23	0.405	0.466	0.368	0.35	0.375	0.324	0.325	0.35	0.377
	0.189	0.303	0.212	0.441	0.42	0.373	0.449	0.361	0.331	0.561	0.647	0.481
	0.136	0.382	0.292	0.383	0.43	0.428	0.449	0.332	0.345	0.56	0.4	0.448
	0.14	0.327	0.339	0.241	0.403	0.482	0.411	0.48	0.358	0.3	0.381	0.234
	0.133	0.365	0.261	0.24	0.433	0.467	0.431	0.371	0.348	0.387	0.321	0.442
	0.135	0.262	0.213	0.356	0.533	0.468	0.401	0.294	0.323	0.341	0.387	0.396
	0.201	0.378	0.329	0.242	0.521	0.465	0.399	0.343	0.338	0.435	0.363	0.427
	0.251	0.418	0.211	0.253	0.433	0.45	0.542	0.409	0.338	0.388	0.292	0.449
	0.278	0.6966	0.229	0.364	0.452	0.334	0.513	0.342	0.464	0.251	0.369	0.301
	0.263	0.418	0.258	0.342	0.492	0.366	0.399	0.362	0.451	0.346	0.298	0.259
	0.225	0.539	0.286	0.353	0.427	0.352	0.474	0.287	0.31	0.299	0.395	0.299
	0.201	0.529	0.405	0.294	0.429	0.458	0.379	0.415	0.595	0.271	0.32	0.23
	0.218	0.32	0.352	0.359	0.474	0.383	0.381	0.311	0.51	0.324	0.369	0.149
	0.261	0.273	0.353	0.32	0.423	0.506	0.316	0.286	0.447	0.342	0.343	0.327
	0.246	0.343	0.358	0.346	0.427	0.59	0.347	0.341	0.455	0.354	0.404	0.313
	0.267	0.346	0.506	0.364	0.367	0.255	0.352	0.346	0.43	0.297	0.301	0.305
	0.275		0.446	0.265	0.371	0.422	0.352	0.354	0.314	0.323	0.443	0.262
	0.355		0.359	0.332	0.355	0.461	0.356	0.296	0.359	0.31	0.59	0.294
	0.237		0.355		0.546		0.347	0.406		0.273		0.851
Monthly Average	0.215	0.318	0.293	0.314	0.433	0.413	0.377	0.350	0.378	0.345	0.379	0.358
Monthly Maximum	0.355	0.697	0.506	0.498	0.546	0.590	0.542	0.480	0.595	0.561	0.647	0.851
Annual Average Daily Flow - ADF	0.348											
Annual Maximum Daily Flow - PDF	0.851											

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 6-3
CAVE CITY WATER RECLIMATION FACILITY FLOW DATA 2017

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.236	0.271	0.37	0.129	0.316	0.331	0.451	0.406	0.209	0.304	0.239	0.26
	0.33	0.88	0.227	0.506	0.379	0.42	0.44	0.416	0.324	0.275	0.271	0.2
	0.233	0.256	0.235	0.323	0.392	0.324	0.389	0.458	0.409	0.289	0.327	0.247
	0.242	0.285	0.272	0.274	0.329	0.417	0.405	0.444	0.392	0.352	0.387	0.219
	0.22	0.208	0.233	0.288	..362	0.507	0.413	0.415	0.29	0.351	0.46	0.189
	0.163	0.279	0.246	0.295	0.306	0.371	1.752	0.418	0.321	0.405	0.27	0.228
	0.153	0.421	0.372	0.272	0.215	0.341	0.753	0.404	0.281	0.511	0.217	0.167
	0.133	0.305	0.289	0.281	0.332	0.368	0.138	0.362	0.348	0.5	0.19	0.167
	0.215	0.225	0.363	0.33	0.376	0.532	0.7	0.399	0.356	0.372	0.179	0.171
	0.341	0.274	0.294	0.363	0.402	0.466	0.423	0.465	0.411	0.384	0.184	0.165
	0.363	0.339	0.302	0.393	0.41	0.449	0.464	0.503	0.354	0.306	0.196	0.251
	0.445	0.281	0.161	0.346	0.394	0.479	..504	0.5	0.351	0.313	0.214	0.208
	0.369	0.229	0.28	0.371	0.351	0.51	0.502	0.419	0.276	0.331	0.165	0.26
	0.363	0.221	0.194	0.49	0.322	0.474	0.503	0.425	0.359	0.377	0.16	0.19
	0.248	0.199	0.192	0.409	0.353	0.457	0.525	0.501	0.351	0.327	0.217	0.202
	0.486	0.275	0.211	0.383	0.392	0.414	0.493	0.5	0.367	0.237	0.198	0.19
	0.384	0.269	0.364	0.338	0.412	0.118	0.441	0.493	0.377	0.26	0.201	0.212
	0.271	0.29	0.268	0.382	0.411	0.258	0.88	0.43	0.366	0.275	0.24	0.22
	0.547	0.285	0.155	0.357	0.468	0.33	0.516	0.462	0.342	0.323	0.153	0.139
	0.367	0.323	0.32	0.359	1.08	0.379	0.513	0.577	0.37	0.335	0.166	0.179
	0.36	0.21	0.314	0.408	0.506	0.456	0.629	0.342	0.363	0.375	0.177	0.242
	0.268	0.275	0.256	0.386	0.336	0.468	0.498	0.524	0.493	0.307	0.186	5.9
	0.26	0.304	0.268	0.286	0.374	0.527	0.408	0.44	0.38	0.324	0.215	0.881
	0.251	0.298	0.388	0.376	0.583	0.694	0.489	0.417	0.361	0.227	0.208	0.153
	0.388	0.194	0.341	0.359	0.411	0.334	0.468	0.378	0.358	0.225	0.22	0.115
	0.24	0.201	0.279	0.464	0.4	0.392	0.419	0.346	0.315	0.248	0.211	0.138
	0.228	0.219	0.371	0.349	0.583	0.449	0.502	0.451	0.359	0.291	0.204	0.145
	0.224	0.283	0.34	0.406	0.433	0.385	0.412	0.415	0.285	0.223	0.26	0.145
	0.218		0.345	0.455	0.402	0.434	0.446	0.372	0.271	0.22	0.248	0.159
	0.254		0.376	0.399	0.313	0.423	0.48	0.36	0.293	0.218	0.287	0.202
	0.233		0.373		0.311		0.411	0.188		0.171		0.124
Monthly Average	0.291	0.289	0.290	0.359	0.410	0.417	0.529	0.427	0.344	0.311	0.228	0.396
Monthly Maximum	0.547	0.880	0.388	0.506	1.080	0.694	1.752	0.577	0.493	0.511	0.460	5.900
Annual Average Daily Flow - ADF	0.358											
Annual Maximum Daily Flow - PDF	5.900											

CAVELAND ENVIRONMENTAL AUTHORITY

REGIONAL FACILITY PLAN

TABLE 6-3

CAVE CITY WATER RECLIMATION FACILITY FLOW DATA 2016

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.13	0.169	0.17	0.216	0.171	0.196	0.468	0.333	0.425	0.354	0.325	0.168
	0.119	0.306	0.168	0.2	0.215	0.228	0.432	0.327	0.405	0.316	0.328	0.227
	0.077	0.211	0.171	0.167	0.205	0.207	0.702	0.429	0.473	0.329	0.322	0.191
	0.14	0.17	0.172	0.179	0.164	0.25	0.531	0.462	0.425	0.325	0.269	0.187
	0.134	0.148	0.177	0.159	0.143	0.164	0.361	0.49	0.413	0.288	0.269	0.2
	0.098	0.128	0.11	0.175	0.179	0.235	1.2	0.599	0.287	0.295	0.256	0.265
	0.119	0.092	0.191	0.182	0.186	0.207	0.692	0.351	0.406	0.353	0.221	0.166
	0.144	0.152	0.203	0.172	0.17	0.025	0.597	0.437	0.419	0.336	0.235	0.14
	0.181	0.135	0.201	0.168	0.177	0.22	0.459	0.327	0.443	0.315	0.19	0.136
	0.139	0.146	0.227	0.121	0.203	0.351	0.376	0.431	0.473	0.308	0.194	0.152
	0.146	0.151	0.237	0.198	0.181	0.351	0.531	0.451	0.304	0.288	0.207	0.25
	0.14	0.144	0.239	0.17	0.215	0.351	0.607	0.448	0.379	0.334	0.184	0.171
	0.153	0.1258	0.19	0.19	0.194	0.351	0.497	0.451	0.417	0.367	0.176	0.223
	0.161	0.059	0.216	0.187	0.171	0.346	0.478	0.451	0.423	0.336	0.225	0.168
	0.176	0.223	0.239	0.169	0.117	0.414	0.479	0.412	0.351	0.373	0.196	0.124
	0.133	0.139	0.194	0.178	0.186	0.208	0.396	0.572	0.364	0.44	0.218	0.149
	0.119	0.179	0.174	0.155	0.218	0.392	0.382	0.461	0.541	0.256	0.209	0.698
	0.114	0.175	0.151	0.179	0.205	0.535	0.377	0.454	0.344	0.338	0.314	0.163
	0.152	0.168	0.122	0.196	0.195	0.426	0.462	0.452	0.335	0.318	0.216	0.106
	0.119	0.193	0.115	0.209	0.406	0.44	0.471	0.869	0.309	0.331	0.198	0.135
	0.126	0.124	0.103	0.193	0.203	0.364	0.457	0.42	0.388	0.309	0.164	0.159
	0.127	0.184	0.8	0.191	0.214	0.457	0.406	0.449	0.355	0.309	0.206	0.151
	0.112	0.366	0.173	0.173	0.305	0.466	0.445	0.443	0.301	0.398	0.253	0.254
	0.085	0.214	0.211	0.2	0.208	0.575	0.396	0.484	0.325	0.298	0.187	0.211
	0.139	0.161	0.212	0.221	0.222	0.492	0.411	0.408	0.321	0.294	0.177	0.252
	0.232	0.139	0.183	0.226	0.345	0.49	0.395	0.459	0.318	0.318	0.158	0.383
	0.122	0.186	0.21	0.239	0.282	0.391	0.402	0.45	0.263	0.26	0.189	0.215
	0.148	0.12	0.127	0.215	0.256	0.274	0.502	0.368	0.331	0.245	0.301	0.322
	0.145	0.158	0.208	0.213	0.251	0.616	0.464	0.368	0.32	0.312	0.298	0.265
	0.183		0.234	0.203	0.248	0.438	0.378	0.418	0.364	0.278	0.249	0.254
	0.194		0.292		0.209	0.469	0.372	0.508		0.26		0.254
Monthly Average	0.139	0.168	0.207	0.188	0.214	0.353	0.488	0.451	0.374	0.319	0.231	0.217
Monthly Maximum	0.232	0.366	0.800	0.239	0.406	0.616	1.200	0.869	0.541	0.440	0.328	0.698
Annual Average Daily Flow - ADF	0.279											
Annual Maximum Daily Flow - PDF	1.200											

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 6-3
CAVE CITY WATER RECLIMATION FACILITY FLOW DATA 2015

Average	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	0.135	0.213	0.139	0.219	0.24	0.254	0.311	0.259	0.292	0.2	0.202	0.225
	0.176	0.144	0.18	0.336	0.206	0.256	0.372	0.181	0.292	0.208	0.177	0.187
	0.212	0.148	0.309	0.474	0.189	0.231	0.376	0.192	0.257	0.209	0.175	0.163
	0.178	0.161	0.431	0.249	0.161	0.244	0.348	0.211	0.308	0.184	0.19	0.152
	0.126	0.234	0.165	0.228	0.189	0.271	0.228	0.18	0.329	0.221	0.226	0.138
	0.135	0.041	0.14	0.177	0.234	0.275	0.29	0.211	0.27	0.218	0.198	0.125
	0.113	0.16	0.19	0.309	0.235	0.249	0.426	0.235	0.314	0.225	0.224	0.157
	0.128	0.15	0.089	0.295	0.274	0.275	0.317	0.256	0.27	0.242	0.158	0.159
	0.099	0.117	0.212	0.324	0.264	0.261	0.359	0.216	0.273	0.241	0.205	0.166
	0.108	0.119	0.346	0.243	0.234	0.296	0.365	0.283	0.283	0.216	0.201	0.177
	0.127	0.144	0.204	0.215	0.227	0.256	0.355	0.243	0.252	0.119	0.131	0.191
	0.152	0.12	0.093	0.173	0.255	0.258	0.303	0.306	0.194	0.251	0.194	0.165
	0.149	0.146	0.194	0.302	0.22	0.292	0.307	0.262	0.289	0.173	0.174	0.14
	0.156	0.113	0.273	0.438	0.254	0.288	0.326	0.281	0.226	0.209	0.64	0.162
	0.152	0.088	0.13	0.274	0.286	0.275	0.293	0.299	0.239	0.227	0.206	0.146
	0.143	0.075	0.19	0.365	0.282	0.25	0.296	0.257	0.233	0.218	0.17	0.177
	0.169	0.063	0.23	0.246	0.296	0.266	0.319	0.193	0.231	0.209	0.229	0.149
	0.152	0.088	0.122	0.253	0.215	0.288	0.336	0.266	0.246	0.141	0.29	0.125
	0.154	0.162	0.137	0.277	0.248	0.307	0.288	0.269	0.237	0.184	0.204	0.129
	0.117	0.166	0.175	0.261	0.242	0.298	0.357	0.243	0.221	0.192	0.157	0.117
	0.156	0.507	0.191	0.233	0.224	0.285	0.328	0.255	0.218	0.203	0.176	0.363
	0.142	0.21	0.169	0.2	0.256	0.304	0.331	0.274	0.211	0.202	0.131	0.212
	0.13	0.092	0.117	0.204	0.271	0.309	0.304	0.232	0.376	0.244	0.177	0.22
	0.153	0.163	0.179	0.225	0.288	0.251	0.266	0.262	0.209	0.203	0.212	0.232
	0.133	0.178	0.199	0.235	0.246	0.314	0.316	0.242	0.227	0.123	0.151	0.158
	0.147	0.153	0.195	0.232	0.218	0.327	0.276	0.253	0.231	0.207	0.211	0.302
	0.142	0.164	0.187	0.203	0.347	0.239	0.298	0.264	0.138	0.357	0.178	0.141
	0.141	0.162	0.187	0.183	0.269	0.213	0.3	0.243	0.265	0.245	0.153	0.218
	0.157		0.209	0.176	0.272	0.261	0.312	0.291	0.268	0.202	0.221	0.173
	0.137		0.21	0.179	0.273	0.239	0.299	0.176	0.22	0.19	0.304	0.171
	0.144		0.222		0.226		0.277	0.267		0.22		0.17
Monthly Average	0.144	0.153	0.194	0.258	0.246	0.271	0.319	0.245	0.254	0.209	0.209	0.178
Monthly Maximum	0.212	0.507	0.431	0.474	0.347	0.327	0.426	0.306	0.376	0.357	0.640	0.363
Annual Average Daily Flow - ADF	0.223											
Annual Maximum Daily Flow - PDF	0.640											

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 7-2
PROJECTED WRF FLOW DATA BROKEN DOWN BY USER CALSSIFICATION/SOURCE FOR THE HORSE CAVE WRF AND CAVE CITY WRF
DATA USED TO EVALUATE ALTERNATIVES

PARAMETER					
ALTERNATIVE	**TOTAL FLOW MGD**	**RESIDENTIAL**	**COMMERCIAL**	**INDUSTRIAL**	**INFILTRATION/INFLOW**
ALTERNATIVE 2 - RENOVATE CAVE CITY (0.60 MGD) AND RENOVATE AND EXPAND HORSE CAVE TO 0.70 MGD					
Alternate 2 - Cave City	0.600	0.289	0.096	0.175	0.040
Alternate 2 - Horse Cave	0.700	0.373	0.125	0.175	0.027
ALTERNATIVE - REMOVE CAVE CITY FROM SERVICE AND EXPAND HORSE CAVE TO 1.30 MGD					
Alternative 3 - Horse Cave	1.300	0.663	0.221	0.350	0.066

Notes
I/I based on percentage calculated from MRO's
Industrial is based on 350,000 gpd - 1/2 to HC, 1/2 to CC
Commercial is based on 25% of flow less I/I and Industrial

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 7-3
PLANT INFLUENT LOADING DATA FOR THE HORSE CAVE WRF, CAVE CITY WRF
DATA USED TO EVALUATE ALTERNATIVES

	PARAMETER				
ALTERNATIVE	**FLOW MGD**	**BOD LOADING - MG/L**	**BOD LOADING LBS/DAY**	**TSS LOADING - MG/L**	**TSS LOADING LBS/DAY**
ALTERNATIVE 2 - RENOVATE CAVE CITY (0.60 MGD) AND RENOVATE AND EXPAND HORSE CAVE TO 0.70 MGD					
Alternate 2 - Cave City	0.60	320	1,601	200	1,001
Alternate 2 - Horse Cave	0.70	350	2,043	265	1,547
ALTERNATIVE - REMOVE CAVE CITY FROM SERVICE AND EXPAND HORSE CAVE TO 1.30 MGD					
Alternative 3 - Horse Cave	1.30	335	3,632	233	2,521

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-1
ALTERNATIVE 2 - RENOVATE THE CAVE CITY WASTER RECLIMATION FACILITY AND INCREASE THE CAPACITY FOR THE HORSE CAVE PLANT TO 0.700 MGD CAPITAL COST ESTIMATE

Heritage Engineering, LLC
603 North Shore Drive, Suite 204
Jeffersonville, Indiana 47130
(812)-280-8201
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Project: CEA Facility Plan Update
Alternate 2 - Renovate Cave City Increase HC
Location: Cave City/Horse Cave Kentucky
Date: January 2021
Prepared by: Heritage Engineering, LLC

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 2 RENOVATE THE CAVE CITY WATER RECLIMATION FACILITY AND INCREASE THE CAPACITY OF THE HORSE CAVE PLANT TO 0.70 MGD				
	CAVE CITY WRF RENOVATION				
	Influent Mechanically Cleaned Bar Screen				
1	2 MGD Influent Screen	EA.	$ 225,000	1	$ 225,000
2	Debris Packer/Washer	EA.	$ 52,500	1	$ 52,500
3	Concrete Channel Demolition	L.S.	$ 10,000	1	$ 10,000
4	Concrete Slab	C.Y.	$ 600	10	$ 6,000
5	Concrete Walls for Screen Channel	C.Y.	$ 750	20	$ 15,000
6	Top Slab	C.Y.	$ 750	15	$ 11,250
7	Grout	C.Y.	$ 1,200	1	$ 1,200
8	Grating	SF	$ 40	50	$ 2,000
9	Handrail	L.F.	$ 40	30	$ 1,200
10	Building 20 x 15	S.F.	$ 150	300	$ 45,000
11	Building Mechanical	S.F.	$ 25	300	$ 7,500
12	Building Architectural	S.F.	$ 20	300	$ 6,000
13	Building Electrical	S.F.	$ 20	300	$ 6,000
14	Excavation For Structure	C.Y.	$ 20	120	$ 2,400
15	Backfill	C.Y.	$ 25	30	$ 750
16	Control Gates with Actuators	EA.	$ 20,000	2	$ 40,000
17	Inlet Piping	L.S.	$ 10,000	1	$ 10,000
18	Discharge Piping	L.S.	$ 10,000	1	$ 10,000
19	Misc. Metals	L.S.	$ 7,500	1	$ 7,500
20	Influent Flow Meter	L.S.	$ 20,000	1	$ 20,000
21	Electrical Work	L.S.	$ 25,000	1	$ 25,000
	Total Influent Mechanically Cleaned Bar Screen				**$ 504,300**
	Influent Screw Pumps and Oxidation Ditch Splitter Box Renovation				
1	Influent Screw Pumps - Firm Capacity 2.82 MGD - 1,960 gpm (1.920 PHF + 0.900 RAS)	EA.	$ 142,500	2	$ 285,000
2	Screw Pump Controls	L.S.	$ 52,500	1	$ 52,500
3	Concrete Demolition	L.S.	$ 15,000	1	$ 15,000
4	Concrete Replacement - Slab	C.Y.	$ 600	15	$ 9,000
5	Concrete Wall Replacement	C.Y.	$ 750	30	$ 22,500
6	Top Slab Replacement	C.Y.	$ 750	10	$ 7,500
7	Grout	C.Y.	$ 1,200	6	$ 7,200
8	Grating	SF	$ 40	100	$ 4,000
9	Handrail	L.F.	$ 40	50	$ 2,000
10	Control Gates with Actuators	EA.	$ 20,000	4	$ 80,000
11	Inlet Piping	L.S.	$ 10,000	1	$ 10,000
12	Discharge Piping	L.S.	$ 15,000	1	$ 15,000
13	Misc. Metals	L.S.	$ 7,500	1	$ 7,500
14	Splitter Box Renovation	L.S.	$ 25,000	1	$ 25,000
15	Flow Meters to Oxidation Ditches	L.S.	$ 20,000	1	$ 20,000
16	Electrical Work	L.S.	$ 25,000	1	$ 25,000
	Total Influent Screw Pumps and Oxidation Ditch Splitter Box Renovation				**$ 587,200**
	Oxidation Ditch Renovation - 0.600 MGD ADF Capacity				
1	Oxidation Ditch Structure Selective Demolition	L.S.	$ 40,000	1	$ 40,000
1	Oxidation Ditch Structure Slab Partial Replacement	C.Y.	$ 580	100	$ 58,000
2	Oxidation Ditch Structure Walls Partial Replacement	C.Y.	$ 780	120	$ 93,600
5	Oxidation Ditch Equipment - Includes Discs, Covers and Effluent Weir	L.S.	$ 250,000	1	$ 250,000
6	Oxidation Ditch BNR Equipment - Includes DO Probes, ORP Probes and Control Panel	L.S.	$ 45,000	1	$ 45,000
7	Oxidation Ditch VFD's	L.S.	$ 36,000	1	$ 36,000
8	Handrails	L.S.	$ 30,000	1	$ 30,000
9	Miscellaneous Metals	L.S.	$ 15,000	1	$ 15,000
10	Electrical Work	L.S.	$ 53,000	1	$ 53,000
	Total Oxidation Ditch Renovation - 0.600 MGD ADF Capacity				**$ 620,600**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-1
ALTERNATIVE 2 - RENOVATE THE CAVE CITY WASTER RECLIMATION FACILITY AND INCREASE THE CAPACITY FOR THE HORSE CAVE PLANT TO 0.700 MGD CAPITAL COST ESTIMATE

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603 North Shore Drive, Suite 204
Jeffersonville, Indiana 47130
(812)-280-8201
FAX (812)-280-8281

Project: CEA Facility Plan Update
Alternate 2 - Renovate Cave City Increase HC
Location: Cave City/Horse Cave Kentucky
Date: January 2021
Prepared by: Heritage Engineering, LLC

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 2 RENOVATE THE CAVE CITY WATER RECLIMATION FACILITY AND INCREASE THE CAPACITY OF THE HORSE CAVE PLANT TO 0.70 MGD				
	Renovate Two Existing 40' Diameter Clarifiers				
1	Demolition of Existing Clarifier Equipment	L.S.	$ 30,000	1	$ 67,000
2	Selective Demolition of Existing Structural Concrete	L.S.	$ 25,000	1	$ 25,000
3	Concrete Replacement	L.S.	$ 40,000	1	$ 40,000
4	Clarifier Mechanism and Fiberglass Baffles and Weirs	L.S.	$ 165,000	2	$ 330,000
5	Return Sludge Draw off Structure and Equipment	L.S.	$ 30,000	1	$ 30,000
6	Clarifier Splitter Box Modifications	L.S.	$ 20,000	1	$ 20,000
7	Electrical	L.S.	$ 21,000	1	$ 21,000
	Total Renovate Two Existing 40' Diameter Clarifiers				**$ 533,000**
	UV Disinfection and 1.92 MGD Effluent Pumping System				
1	1.92 MGD UV Disinfection System	EA.	$ 185,000	1	$ 185,000
2	Control Gates	EA.	$ 12,000	2	$ 24,000
3	Selective Demolition of Existing UV Channel	L.S.	$ 15,000	1	$ 15,000
4	New Concrete for UV Channel	L.S.	$ 35,000	1	$ 35,000
5	Inlet Piping	L.S.	$ 15,000	1	$ 15,000
6	Discharge Piping	L.S.	$ 20,000	1	$ 20,000
7	Misc. Metals	L.S.	$ 10,000	1	$ 10,000
8	670 gpm Turbine Effluent Pumps	EA.	$ 20,000	3	$ 60,000
9	Pump Controls	EA.	$ 15,000	3	$ 45,000
10	Selective Demolition of Existing Effluent Tank to be Used As Effluent Pump Wet Well	L.S.	$ 20,000	1	$ 20,000
11	Concrete Walls and Top Slab for New Effluent Wet Well	L.S.	$ 35,000	1	$ 35,000
12	Grout	C.Y.	$ 1,200	3	$ 3,600
13	Grating	SF	$ 40	80	$ 3,200
14	Handrail	L.F.	$ 40	80	$ 3,200
15	Pump Access Hatches	EA.	$ 750	4	$ 3,000
16	Inlet Piping	L.S.	$ 15,000	1	$ 15,000
17	Discharge Piping	L.S.	$ 40,000	1	$ 40,000
18	Misc. Metals	L.S.	$ 15,000	1	$ 15,000
19	Effluent Flow Meter	L.S.	$ 20,000	1	$ 20,000
20	Electrical Work	L.S.	$ 23,000	1	$ 23,000
	Total UV Disinfection and Effluent Pumping System				**$ 590,000**
	Yard Piping, and Site Improvements				
1	20" Piping	L.F.	$ 250	100	$ 25,000
2	12" Piping	L.F.	$ 130	600	$ 78,000
3	8" Piping	L.F.	$ 100	120	$ 12,000
4	6" Piping	L.F.	$ 75	120	$ 9,000
5	3" Piping	L.F.	$ 50	600	$ 30,000
6	12" Gate Valves	EA.	$ 4,500	4	$ 18,000
7	8" Gate Valves	EA.	$ 3,200	3	$ 9,600
8	6" Gate Valves	EA.	$ 2,800	2	$ 5,600
9	3" Gate Valves	EA.	$ 1,200	3	$ 3,600
10	Yard Hydrants	EA.	$ 600	4	$ 2,400
11	Crushed Stone Base	TN.	$ 30	600	$ 18,000
12	Asphalt Pavement	TN.	$ 130	170	$ 22,100
13	Concrete Pavement	S.F.	$ 10	1,500	$ 15,000
14	Power Distribution	L.S.	$ 50,000	1	$ 50,000
15	Standby Power System	L.S.	$ 125,000	1	$ 125,000
16	SCADA System Improvements	L.S.	$ 75,000	1	$ 75,000
17	Site Lighting	L.S.	$ 15,000	1	$ 15,000
18	Clean Up, Seed and Straw	L.S.	$ 25,000	1	$ 25,000
	Total Yard Piping and Site improvements				**$ 538,300**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-1
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Project:	**CEA Facility Plan Update**
	Alternate 2 - Renovate Cave City Increase HC
Location:	**Cave City/Horse Cave Kentucky**
Date:	**January 2021**
Prepared by:	**Heritage Engineering, LLC**

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 2 RENOVATE THE CAVE CITY WATER RECLIMATION FACILITY AND INCREASE THE CAPACITY OF THE HORSE CAVE PLANT TO 0.70 MGD				
	TOTAL CONSTRUCTION COSTS FOR ALTERNATIVE 2 CAVE CITY WRF RENOVATION				**$ 3,373,400**
	Contingency and Soft Costs				
1	Contingency at 5% of Estimated Construction Costs	L.S.	$ 169,000	1	$ 169,000
2	Engineering at 5.24%	L.S.	$ 186,000	1	$ 186,000
3	General Inspection During Construction Phase at 2%	L.S.	$ 71,000	1	$ 71,000
	Total Contingency and Soft Costs - Phase I				**$ 426,000**
	TOTAL ESTIMATED PROJECT COSTS FOR CAVE CITY WRF RENOVATION				**$ 3,799,400**
	HORSE CAVE WRF RENOVATION AND EXPANSION TO 0.700 MGD				
	Influent Mechanically Cleaned Bar Screen				
1	2.5 MGD Influent Screen	EA.	$ 225,000	1	$ 225,000
2	Debris Packer/Washer	EA.	$ 52,500	1	$ 52,500
3	Concrete Channel Demolition	L.S.	$ 10,000	1	$ 10,000
4	Concrete Slab	C.Y.	$ 600	10	$ 6,000
5	Concrete Walls for Screen Channel	C.Y.	$ 750	20	$ 15,000
6	Top Slab	C.Y.	$ 750	15	$ 11,250
7	Grout	C.Y.	$ 1,200	1	$ 1,200
8	Grating	SF	$ 40	50	$ 2,000
9	Handrail	L.F.	$ 40	30	$ 1,200
10	Building 20 x 15	S.F.	$ 150	300	$ 45,000
11	Building Mechanical	S.F.	$ 25	300	$ 7,500
12	Building Architectural	S.F.	$ 20	300	$ 6,000
13	Building Electrical	S.F.	$ 20	300	$ 6,000
14	Excavation For Structure	C.Y.	$ 20	120	$ 2,400
15	Backfill	C.Y.	$ 25	30	$ 750
16	Control Gates with Actuators	EA.	$ 20,000	2	$ 40,000
17	Inlet Piping	L.S.	$ 10,000	1	$ 10,000
18	Discharge Piping	L.S.	$ 10,000	1	$ 10,000
19	Misc. Metals	L.S.	$ 7,500	1	$ 7,500
20	Influent Flow Meter	L.S.	$ 20,000	1	$ 20,000
21	Electrical Work	L.S.	$ 25,000	1	$ 25,000
	Total Influent Mechanically Cleaned Bar Screen				**$ 504,300**
	Influent Screw Pumps and Oxidation Ditch Splitter Box Renovation				
1	Influent Screw Pumps - Firm Capacity 3.220 MGD - 2,240 gpm (2.170 PHF + 1.050 RAS)	EA.	$ 165,000	2	$ 330,000
2	Screw Pump Controls	L.S.	$ 60,000	1	$ 60,000
3	Concrete Demolition	L.S.	$ 20,000	1	$ 20,000
4	Concrete Replacement - Slab	C.Y.	$ 600	20	$ 12,000
5	Concrete Wall Replacement	C.Y.	$ 750	40	$ 30,000
6	Top Slab Replacement	C.Y.	$ 750	15	$ 11,250
7	Grout	C.Y.	$ 1,200	7	$ 8,400
8	Grating	SF	$ 40	120	$ 4,800
9	Handrail	L.F.	$ 40	60	$ 2,400
10	Control Gates with Actuators	EA.	$ 20,000	4	$ 80,000
11	Inlet Piping	L.S.	$ 10,000	1	$ 10,000
12	Discharge Piping	L.S.	$ 15,000	1	$ 15,000
13	Misc. Metals	L.S.	$ 7,500	1	$ 7,500
14	Splitter Box Renovation	L.S.	$ 35,000	1	$ 35,000
15	Flow Meters to Oxidation Ditches	L.S.	$ 20,000	1	$ 20,000
16	Electrical Work	L.S.	$ 25,000	1	$ 25,000
	Total Influent Screw Pumps and Oxidation Ditch Splitter Box Renovation				**$ 671,350**

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	ALTERNATIVE 2 RENOVATE THE CAVE CITY WATER RECLIMATION FACILITY AND INCREASE THE CAPACITY OF THE HORSE CAVE PLANT TO 0.70 MGD				
	Existing Oxidation Ditch Renovation - 0.500 MGD ADF Capacity				
1	Oxidation Ditch Structure Selective Demolition	L.S.	$ 35,000	1	$ 35,000
1	Oxidation Ditch Structure Slab Partial Replacement	C.Y.	$ 580	80	$ 46,400
2	Oxidation Ditch Structure Walls Partial Replacement	C.Y.	$ 780	110	$ 85,800
5	Oxidation Ditch Equipment - Includes Discs, Covers and Effluent Weir	L.S.	$ 210,000	1	$ 210,000
6	Oxidation Ditch BNR Equipment - Includes DO Probes, ORP Probes and Control Panel	L.S.	$ 45,000	1	$ 45,000
7	Oxidation Ditch VFD's	L.S.	$ 36,000	1	$ 36,000
8	Handrails	L.S.	$ 30,000	1	$ 30,000
9	Miscellaneous Metals	L.S.	$ 15,000	1	$ 15,000
10	Electrical Work	L.S.	$ 47,000	1	$ 47,000
	Total Oxidation Ditch Renovation - 0.500 MGD ADF Capacity				**$ 550,200**
	New 0.200 MGD Oxidation Ditch				
1	Oxidation Ditch Structure Slab	C.Y.	$ 580	180	$ 104,400
2	Oxidation Ditch Structure Walls	C.Y.	$ 780	210	$ 163,800
3	Excavation For Structure	C.Y.	$ 15	700	$ 10,500
4	Backfill	C.Y.	$ 30	280	$ 8,400
5	Oxidation Ditch Equipment - Includes Discs, Covers and Effluent Weir	L.S.	$ 125,000	1	$ 125,000
6	Oxidation Ditch BNR Equipment - Includes DO Probes, ORP Probes and Control Panel	L.S.	$ 35,000	1	$ 35,000
7	Oxidation Ditch VFD's	L.S.	$ 30,000	1	$ 30,000
8	Handrails	L.S.	$ 15,000	1	$ 15,000
9	Miscellaneous Metals	L.S.	$ 7,500	1	$ 7,500
10	Electrical Work	L.S.	$ 15,000	1	$ 15,000
	Total New 0.200 MGD Oxidation Ditch				**$ 514,600**
	New 35' Diameter Clarifier				
1	Earthwork Including, Excavation and Backfill	L.S.	$ 35,000	1	$ 67,000
2	Structural Concrete	C.Y.	$ 780	420	$ 327,600
3	Clarifier Mechanism and Fiberglass Baffles and Weirs	L.S.	$ 145,000	1	$ 145,000
4	Return Sludge Draw off Structure and Equipment	L.S.	$ 20,000	1	$ 20,000
5	Clarifier Splitter Box Modifications	L.S.	$ 25,000	1	$ 25,000
6	Electrical	L.S.	$ 12,000	1	$ 12,000
	Total New 35' Diameter Clarifier				**$ 596,600**
	UV Disinfection - 2.177 MGD and 4.097 MGD Effluent Pumping System (Cave City WRF PHF - 1.920 + Horse Cave PHF - 2.177 = 4.097 MGD)				
1	2.17 MGD UV Disinfection System	EA.	$ 195,000	1	$ 195,000
2	Control Gates	EA.	$ 12,000	2	$ 24,000
3	Selective Demolition of Existing UV Channel	L.S.	$ 15,000	1	$ 15,000
4	New Concrete for UV Channel	L.S.	$ 35,000	1	$ 35,000
5	Inlet Piping	L.S.	$ 15,000	1	$ 15,000
6	Discharge Piping	L.S.	$ 20,000	1	$ 20,000
7	Misc. Metals	L.S.	$ 10,000	1	$ 10,000
8	950 gpm Turbine Effluent Pumps	EA.	$ 35,000	4	$ 140,000
9	Pump Controls	EA.	$ 15,000	4	$ 60,000
10	Selective Demolition of Existing Effluent Tank to be Used As Effluent Pump Wet Well	L.S.	$ 30,000	1	$ 30,000
11	Concrete Walls and Top Slab for New Effluent Wet Well	L.S.	$ 45,000	1	$ 45,000
12	Grout	C.Y.	$ 1,200	4	$ 4,800
13	Grating	SF	$ 40	100	$ 4,000
14	Handrail	L.F.	$ 40	120	$ 4,800
15	Pump Access Hatches	EA.	$ 750	5	$ 3,750
16	Inlet Piping	L.S.	$ 15,000	1	$ 15,000
17	Discharge Piping	L.S.	$ 40,000	1	$ 40,000
18	Misc. Metals	L.S.	$ 15,000	1	$ 15,000
19	Effluent Flow Meter	L.S.	$ 20,000	1	$ 20,000
20	Electrical Work	L.S.	$ 28,000	1	$ 28,000
	Total UV Disinfection and Effluent Pumping System				**$ 724,350**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-1
ALTERNATIVE 2 - RENOVATE THE CAVE CITY WASTER RECLIMATION FACILITY AND INCREASE THE CAPACITY FOR THE HORSE CAVE PLANT TO 0.700 MGD CAPITAL COST ESTIMATE

Heritage Engineering, LLC
603 North Shore Drive, Suite 204
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(812)-280-8201
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Project:	**CEA Facility Plan Update**
	Alternate 2 - Renovate Cave City Increase HC
Location:	**Cave City/Horse Cave Kentucky**
Date:	**January 2021**
Prepared by:	**Heritage Engineering, LLC**

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 2 RENOVATE THE CAVE CITY WATER RECLIMATION FACILITY AND INCREASE THE CAPACITY OF THE HORSE CAVE PLANT TO 0.70 MGD				
	New 50' Diameter Aerobic Sludge Holding Tank				
1	Earthwork Including Demolition of Existing Tankage, Excavation and Backfill, Fill of Existing Lagoon in the Area of New Sludge Holding Tank	L.S.	$ 85,000	1	$ 85,000
2	Structural Concrete	C.Y.	$ 780	530	$ 413,400
3	Diffused Air System	L.S.	$ 48,000	1	$ 48,000
4	Blowers	L.S.	$ 40,000	2	$ 80,000
5	Decanter	L.S.	$ 15,000	1	$ 15,000
6	Misc. Metals	L.S.	$ 20,000	1	$ 20,000
7	Electrical	L.S.	$ 27,000	1	$ 27,000
	Total New 50' Diameter Sludge Holding Tank				**$ 688,400**
	Yard Piping, and Site Improvements				
1	16" Piping	L.F.	$ 150	800	$ 120,000
2	12" Piping	L.F.	$ 130	400	$ 52,000
3	8" Piping	L.F.	$ 100	150	$ 15,000
4	6" Piping	L.F.	$ 75	160	$ 12,000
5	3" Piping	L.F.	$ 50	600	$ 30,000
6	16" Gate valves	EA.	$ 7,500	2	$ 15,000
7	12" Gate Valves	EA.	$ 4,500	4	$ 18,000
8	8" Gate Valves	EA.	$ 3,200	3	$ 9,600
9	6" Gate Valves	EA.	$ 2,800	2	$ 5,600
10	3" Gate Valves	EA.	$ 1,200	3	$ 3,600
11	Yard Hydrants	EA.	$ 600	4	$ 2,400
12	Crushed Stone Base	TN.	$ 30	400	$ 12,000
13	Asphalt Pavement	TN.	$ 130	160	$ 20,800
14	Concrete Pavement	S.F.	$ 10	1,500	$ 15,000
15	Control Building Renovation	L.S.	$ 125,000	1	$ 125,000
16	Power Distribution	L.S.	$ 50,000	1	$ 50,000
17	Standby Power System	L.S.	$ 125,000	1	$ 125,000
18	SCADA System Improvements	L.S.	$ 75,000	1	$ 75,000
19	Site Lighting	L.S.	$ 15,000	1	$ 15,000
20	Clean Up, Seed and Straw	L.S.	$ 25,000	1	$ 25,000
	Total Yard Piping and Site improvements				**$ 746,000**
	TOTAL CONSTRUCTION COSTS FOR ALTERNATIVE 2 HORSE CAVE WRF RENOVATION AND EXPANSION TO 0.700 MGD				**$ 4,995,800**
	Contingency and Soft Costs - Phase II				
1	Contingency at 5% of Estimated Construction Costs	L.S.	$ 250,000	1	$ 250,000
2	Engineering at 5.24%	L.S.	$ 275,000	1	$ 275,000
3	General Inspection during Construction Phase II Only at 2%	L.S.	$ 105,000	1	$ 105,000
	Total Contingency and Soft Costs				**$ 630,000**
	TOTAL ESTIMATED PROJECT COSTS FOR HORSE CAVE RENOVATION AND EXPANSION TO 0.700 MG				**$ 5,625,800**
	TOTAL ESTIMATED PROJECT COSTS FOR ALTERNATIVE 2				**$ 9,425,200**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-1
ALTERNATIVE 2 - RENOVATE THE CAVE CITY WASTER RECLIMATION FACILITY AND INCREASE THE CAPACITY FOR THE HORSE CAVE PLANT TO 0.700 MGD CAPITAL COST ESTIMATE

Heritage Engineering, LLC
603 North Shore Drive, Suite 204
Jeffersonville, Indiana 47130
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Project:	**CEA Facility Plan Update**
	Alternate 2 - Renovate Cave City Increase HC
Location:	**Cave City/Horse Cave Kentucky**
Date:	**January 2021**
Prepared by:	**Heritage Engineering, LLC**

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 2 RENOVATE THE CAVE CITY WATER RECLIMATION FACILITY AND INCREASE THE CAPACITY OF THE HORSE CAVE PLANT TO 0.70 MGD				
	Salvage Values at the end of 20 years				
	Concrete Structures, Buildings, Yard Piping and Site Improvements have a 30 year life span before significant repair or replacement is required				
	Process Equipment has a life span of 20 years or less and therefore, has no Salvage Value				
	Reused concrete tankage has a life span of 20 years and therefore, has no Salvage Value				
1	Cave City Influent Screen Structure and Building	L.S.	$ 35,000	1	$ 35,000
2	Cave City Influent Screw Pump Renovation	L.S.	$ 18,000	1	$ 18,000
3	Cave City Oxidation Ditch Renovation	L.S.	$ 51,000	1	$ 51,000
4	Cave City Clarifier Renovation	L.S.	$ 14,000	1	$ 14,000
5	Cave City UV System	L.S.	$ 24,000	1	$ 24,000
6	Cave City Effluent Pump Station	L.S.	$ 40,000	1	$ 40,000
7	Cave City Yard Piping and Site Improvements	L.S.	$ 65,000	1	$ 65,000
8	Horse Cave Influent Screen Structure and Building	L.S.	$ 35,000	1	$ 35,000
9	Horse Cave Influent Screw Pump Renovation	L.S.	$ 23,000	1	$ 23,000
10	Horse Cave Oxidation Ditch Renovation	L.S.	$ 45,000	1	$ 45,000
11	Horse Cave New Oxidation Ditch	L.S.	$ 96,000	1	$ 96,000
12	Horse Cave New 35' Diameter Clarifier	L.S.	$ 110,000	1	$ 110,000
13	Horse Cave UV System	L.S.	$ 27,000	1	$ 27,000
14	Horse Cave Effluent Pump Station	L.S.	$ 40,000	1	$ 40,000
15	Horse Cave New Sludge Holding Tank	L.S.	$ 138,000	1	$ 138,000
16	Horse Cave Yard Piping and Site Improvements	L.S.	$ 95,000	1	$ 95,000
	Total 20 year Salvage Value				**$ 856,000**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-2
ALTERNATIVE 3 EXPAND HORSE CAVE TO 1.3 MGD WITH NEW OXIDATION DITCH CAPITAL COST ESTIMATE

Heritage Engineering, LLC
603 North Shore Drive, Suite 204
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(812)-280-8201
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Project: CEA Facility Plan
Alternate 3
Location: Horse Cave Kentucky
Date: January 2021
Prepared by: Heritage Engineering, LLC

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 3 EXPAND HORSE CAVE TO 1.3 MGD WITH NEW OXIDATION DITCH				
	Influent/RAS Pump Station 5.65 MGD Firm Capacity (3.700 PHF + 1.95 RAS), Mechanically Cleaned Bar Screen and Oxidation Ditch Flow Splitter				
1	1310 gpm Submersible Pumps	EA.	$ 35,000	4	$ 140,000
2	Pump Controls	EA.	$ 15,000	4	$ 60,000
3	6 MGD Influent Screen	EA.	$ 225,000	1	$ 225,000
4	Debris Packer/Washer	EA.	$ 52,500	1	$ 52,500
5	Concrete Slab	C.Y.	$ 600	85	$ 51,000
6	Concrete Walls for Screen Channel, Inf Pump Station and Flow Splitter	C.Y.	$ 750	130	$ 97,500
7	Top Slab	C.Y.	$ 750	45	$ 33,750
8	Grout	C.Y.	$ 1,200	5	$ 6,000
9	Grating	SF	$ 40	250	$ 10,000
10	Handrail	L.F.	$ 40	120	$ 4,800
11	Pump Access Hatches	EA.	$ 750	4	$ 3,000
12	Building 20 x 52	S.F.	$ 200	1,040	$ 208,000
13	Building Mechanical	S.F.	$ 25	1,040	$ 26,000
14	Building Architectural	S.F.	$ 20	1,040	$ 20,800
15	Building Electrical	S.F.	$ 20	1,040	$ 20,800
16	Excavation For Structure	C.Y.	$ 20	670	$ 13,400
17	Backfill	C.Y.	$ 25	130	$ 3,250
18	Control Gates with Actuators	EA.	$ 20,000	6	$ 120,000
19	Inlet Piping	L.S.	$ 15,000	1	$ 15,000
20	Discharge Piping	L.S.	$ 20,000	1	$ 20,000
21	Misc. Metals	L.S.	$ 15,000	1	$ 15,000
22	Influent Flow Meter	L.S.	$ 20,000	1	$ 20,000
23	Oxidation Ditch 1 and 2 Influent Flow Meter	L.S.	$ 20,000	1	$ 20,000
24	Oxidation Ditch 3 Influent Flow Meter	L.S.	$ 20,000	1	$ 20,000
25	Electrical Work	L.S.	$ 49,000	1	$ 49,000
	Total Influen/RAS Pump Station 5.65 MGD Firm Capacity, Mechanically Cleaned Bar Screen and Oxidation Ditch Flow Splitter				**$ 1,254,800**
	New 0.8 MGD Oxidation Ditch				
1	Oxidation Ditch Structure Slab	C.Y.	$ 580	500	$ 290,000
2	Oxidation Ditch Structure Walls	C.Y.	$ 780	600	$ 468,000
3	Excavation For Structure	C.Y.	$ 15	2,000	$ 30,000
4	Backfill	C.Y.	$ 30	800	$ 24,000
5	Oxidation Ditch Equipment - Includes Discs, Covers and Effluent Weir	L.S.	$ 330,000	1	$ 330,000
6	Oxidation Ditch BNR Equipment - Includes DO Probes, ORP Probes and Control Panel	L.S.	$ 45,000	1	$ 45,000
7	Oxidation Ditch VFD's	L.S.	$ 36,000	1	$ 36,000
8	Handrails	L.S.	$ 30,000	1	$ 30,000
9	Miscellaneous Metals	L.S.	$ 15,000	1	$ 15,000
10	Electrical Work	L.S.	$ 39,000	1	$ 39,000
	Total New 0.8 MGD Oxidation Ditch				**$ 1,307,000**
	Renovate Existing Oxidation Ditches				
1	Oxidation Ditch Equipment - Includes Discs, Covers and Effluent Weir	L.S.	$ 251,000	1	$ 251,000
2	Oxidation Ditch BNR Equipment - Includes DO Probes, ORP Probes and Control Panel	L.S.	$ 15,000	1	$ 15,000
3	Oxidation Ditch VFD's	L.S.	$ 29,000	1	$ 29,000
4	Handrails	L.S.	$ 15,000	1	$ 15,000
5	Miscellaneous Metals	L.S.	$ 15,000	1	$ 15,000
6	Electrical Work	L.S.	$ 10,000	1	$ 10,000
	Total Renovate Existing Oxidation Ditches				**$ 335,000**
	New 56' Diameter Clarifier				
1	Earthwork Including Demolition of Existing Tankage, Excavation and Backfill, Fill of Existing Lagoon in the Area of Clarifier Structure	L.S.	$ 85,000	1	$ 67,000
2	Structural Concrete	C.Y.	$ 780	600	$ 468,000
3	Clarifier Mechanism and Fiberglass Baffles and Weirs	L.S.	$ 225,000	1	$ 225,000
4	Return Sludge Draw off Structure and Equipment	L.S.	$ 20,000	1	$ 20,000
5	Clarifier Splitter Box Modifications	L.S.	$ 45,000	1	$ 45,000
6	Electrical	L.S.	$ 12,000	1	$ 12,000
	Total New 56' Diameter Clarifier				**$ 837,000**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-2
ALTERNATIVE 3 EXPAND HORSE CAVE TO 1.3 MGD WITH NEW OXIDATION DITCH CAPITAL COST ESTIMATE

Heritage Engineering, LLC
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Project: CEA Facility Plan Alternate 3
Location: Horse Cave Kentucky
Date: January 2021
Prepared by: Heritage Engineering, LLC

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 3 EXPAND HORSE CAVE TO 1.3 MGD WITH NEW OXIDATION DITCH				
	UV Disinfection and 3.70 MGD Effluent Pumping Structure				
1	860 gpm Turbine Pumps	EA.	$ 25,000	4	$ 100,000
2	Pump Controls	EA.	$ 15,000	4	$ 60,000
3	3.70 MGD UV Disinfection System	EA.	$ 300,000	1	$ 300,000
4	Concrete Slab	C.Y.	$ 600	70	$ 42,000
5	Concrete Walls for Screen Channel, Inf Pump Station and Flow Splitter	C.Y.	$ 750	140	$ 105,000
6	Top Slab	C.Y.	$ 750	40	$ 30,000
7	Grout	C.Y.	$ 1,200	5	$ 6,000
8	Grating	SF	$ 40	120	$ 4,800
9	Handrail	L.F.	$ 40	120	$ 4,800
10	Pump Access Hatches	EA.	$ 750	4	$ 3,000
11	Building 25 x 40	S.F.	$ 180	1,000	$ 180,000
12	Building Mechanical	S.F.	$ 25	1,000	$ 25,000
13	Building Architectural	S.F.	$ 20	1,000	$ 20,000
14	Building Electrical	S.F.	$ 20	1,000	$ 20,000
15	Excavation For Structure	C.Y.	$ 20	670	$ 13,400
16	Backfill	C.Y.	$ 30	130	$ 3,900
17	Control Gates	EA.	$ 12,000	2	$ 24,000
18	Inlet Piping	L.S.	$ 15,000	1	$ 15,000
19	Discharge Piping	L.S.	$ 60,000	1	$ 60,000
20	Misc. Metals	L.S.	$ 15,000	1	$ 15,000
21	Effluent Flow Meter	L.S.	$ 20,000	1	$ 20,000
22	Electrical Work	L.S.	$ 43,000	1	$ 43,000
	Total 3.70 MGD UV Disinfection and Effluent Pumping Structure				**$ 1,094,900**
	New 50' Diameter Aerobic Sludge Holding Tank				
1	Earthwork Including Demolition of Existing Tankage, Excavation and Backfill in the Area of Sludge Holding Tank	L.S.	$ 85,000	1	$ 85,000
2	Structural Concrete	C.Y.	$ 780	530	$ 413,400
3	Diffused Air System	L.S.	$ 48,000	1	$ 48,000
4	Blowers	L.S.	$ 40,000	2	$ 80,000
5	Decanter	L.S.	$ 15,000	1	$ 15,000
6	Misc. Metals	L.S.	$ 20,000	1	$ 20,000
7	Electrical	L.S.	$ 27,000	1	$ 27,000
	Total New 50' Diameter Sludge Holding Tank				**$ 688,400**
	Plant Drain Pump Station				
1	300 GPM Submersible Pumps	EA.	$ 15,000	2	$ 30,000
2	Wet Well	L.S.	$ 25,000	1	$ 25,000
3	Valve Vault	L.S.	$ 15,000	1	$ 15,000
4	Piping Modifications	L.S.	$ 25,000	1	$ 25,000
5	Pump Controls	L.S.	$ 20,000	1	$ 20,000
6	Electrical Work	L.S.	$ 20,000	1	$ 20,000
	Total Plant Drain Pump Station				**$ 135,000**
	Cave City Raw Sewage Pump Station To the Horse Cave Regional Plant				
1	700 GPM Submersible Pumps	EA.	$ 35,000	3	$ 105,000
2	Wet Well	L.S.	$ 75,000	1	$ 75,000
3	Valve Vault	L.S.	$ 30,000	1	$ 30,000
4	Piping Modifications	L.S.	$ 60,000	1	$ 60,000
5	Pump Controls	L.S.	$ 35,000	1	$ 35,000
6	Electrical Work	L.S.	$ 25,000	1	$ 25,000
	Total Cave City Raw Sewage Pump Station To the Horse Cave Regional Plant				**$ 330,000**
	Demolition of Existing Structures and Equipment				
1	Existing Clarifiers	L.S.	$ 25,000	1	$ 25,000
2	Existing Effleunt Pumps and Effluent Wet Well	L.S.	$ 25,000	1	$ 25,000
3	Existing Holding Tank	L.S.	$ 15,000	1	$ 15,000
4	Screw Pump and Structure	L.S.	$ 25,000	1	$ 25,000
5	Pump Controls	L.S.	$ 25,000	1	$ 25,000
6	Electrical Work	L.S.	$ 20,000	1	$ 20,000
	Total Demolition of Existing Structures and Equipment				**$ 135,000**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
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Project: CEA Facility Plan
Alternate 3
Location: Horse Cave Kentucky
Date: January 2021
Prepared by: Heritage Engineering, LLC

NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES	TOTAL PRICE
	ALTERNATIVE 3 EXPAND HORSE CAVE TO 1.3 MGD WITH NEW OXIDATION DITCH				
	Yard Piping, and Site Improvements				
1	30" Piping	L.F.	$ 350	100	$ 35,000
2	16" Piping	L.F.	$ 150	1,130	$ 169,500
3	12" Piping	L.F.	$ 130	1,350	$ 175,500
4	8" Piping	L.F.	$ 100	310	$ 31,000
5	6" Piping	L.F.	$ 75	320	$ 24,000
6	3" Piping	L.F.	$ 50	1,200	$ 60,000
7	16" Gate valves	EA.	$ 7,500	2	$ 15,000
8	12" Gate Valves	EA.	$ 4,500	8	$ 36,000
9	8" Gate Valves	EA.	$ 3,200	6	$ 19,200
10	6" Gate Valves	EA.	$ 2,800	4	$ 11,200
11	3" Gate Valves	EA.	$ 1,200	6	$ 7,200
12	Yard Hydrants	EA.	$ 600	8	$ 4,800
13	Crushed Stone Base	TN.	$ 30	1,000	$ 30,000
14	Asphalt Pavement	TN.	$ 130	330	$ 42,900
15	Concrete Pavement	S.F.	$ 10	3,000	$ 30,000
16	Power Distribution	L.S.	$ 75,000	1	$ 75,000
17	Site Lighting	L.S.	$ 30,000	1	$ 30,000
18	Clean Up, Seed and Straw	L.S.	$ 50,000	1	$ 50,000
	Total Yard Piping and Site improvements				**$ 846,300**
	TOTAL ESTIMATED CONSTRUCTION COSTS FOR ALTERNATIVE 3				**$ 6,963,400**
	Contingency and Soft Costs				
1	Contingency at 5% of Estimated Construction Costs	L.S.	$ 349,000	1	$ 349,000
2	Engineering at 6.55%	L.S.	$ 479,000	1	$ 479,000
	Total Contingency and Soft Costs				**$ 828,000**
	TOTAL ESTIMATED PROJECT COSTS FOR ALTERNATIVE 3				**$ 7,791,400**
	Salvage Values at the end of 20 years				
	Concrete Structures, Buildings, Yard Piping and Site Improvemnts have a 30 year life span before significant repair or replacement is required				
	Process Equipemnt has a life span of 20 years or less and therfore, has no Salvage Value				
	Reused concrete tankage has a life span of 20 years and therefore, has no Salvage Value				
1	Infleunt/RAS Pump Station	L.S.	$ 167,000	1	$ 167,000
2	New Oxidation Ditch	L.S.	$ 271,000	1	$ 271,000
3	New 56' Diameter Clarifier	L.S.	$ 179,000	1	$ 179,000
4	UV Disinfection System and Effleunt Pump Building	L.S.	$ 153,000	1	$ 153,000
5	Sludge Holding Tank	L.S.	$ 170,000	1	$ 170,000
6	Plant Drain Pump Station	L.S.	$ 22,000	1	$ 22,000
6	Cave City Raw Sewage Pump Station	L.S.	$ 55,000	1	$ 55,000
6	Yard piping and Site Improvements	L.S.	$ 231,000	1	$ 231,000
	Total 20 year Salvage Value				**$ 1,248,000**

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-3
PRESENT WORTH ANALYSIS OF ALTERNATIVE CAPITAL AND OPERATION AND MAINTENANCE COSTS
PRESENT WORTH VALUES AR EBASED ON 3% ANNUAL COST OF CAPITAL

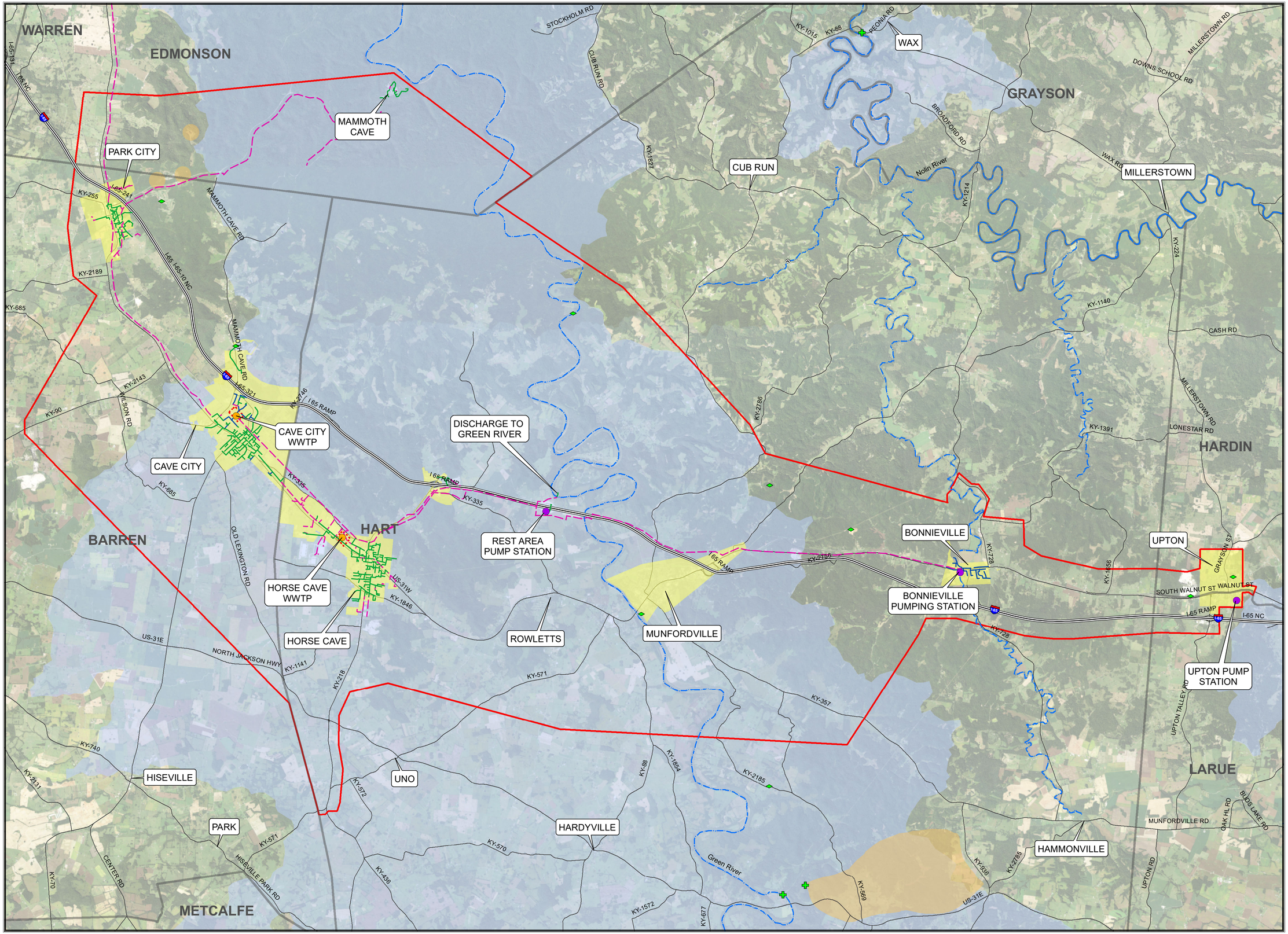
Alternative	Alternative Estimated Capital Cost (Present Worth Cost)	Salvage Value at Year 20 (3% Cost of Capital)	Present Worth of Salvage Value	Annual Operation and Maintenance Costs	Present Worth of Annual Operation and Maintenance Costs	Total Present Worth of Alternatives
2	$ 9,425,200	$ 856,000	$ 474,300	$ 416,500	$ 6,196,700	$ 15,147,600
3	$ 7,791,400	$ 1,248,000	$ 691,400	$ 246,300	$ 3,664,500	$ 10,764,500

CAVELAND ENVIRONMENTAL AUTHORITY
REGIONAL FACILITY PLAN
TABLE 8-4
EVALUATION OF NON-MONETARY FACTORS
ALTERNATIVES ARE RATED FROM 1 TO 10 WITH 1 BEING THE LEAST DESIRABLE

Non-monetary Factor	Alternative 2 - Renovate CC, Renovate and Expand HC	Alternative 3 - Abandon the CC WRF, Renovate and Expand HC
1. Environmental Impact	8	8
2. Implementation Capability	9	9
3. Water Quality Objectives	9	9
4. Flexibility	8	9
5. Public Acceptance	7	8
TOTAL	41	43
WEIGHTED AVERAGE	8.2	8.6

FIGURES

CEA SERVICE LIMITS & PLANNING AREA MAP



LEGEND

- PUMP STATION
- WWTP
- DOW INTAKES
- DOW WITHDRAWALS
- GRAVITY SEWER
- FORCE MAIN
- FLOW LINES
- MUNFORDVILLE SERVICE AREA
- PROJECT LIMITS
- SERVICE AREA
- CITY LIMITS
- WHPP
- SWAPP

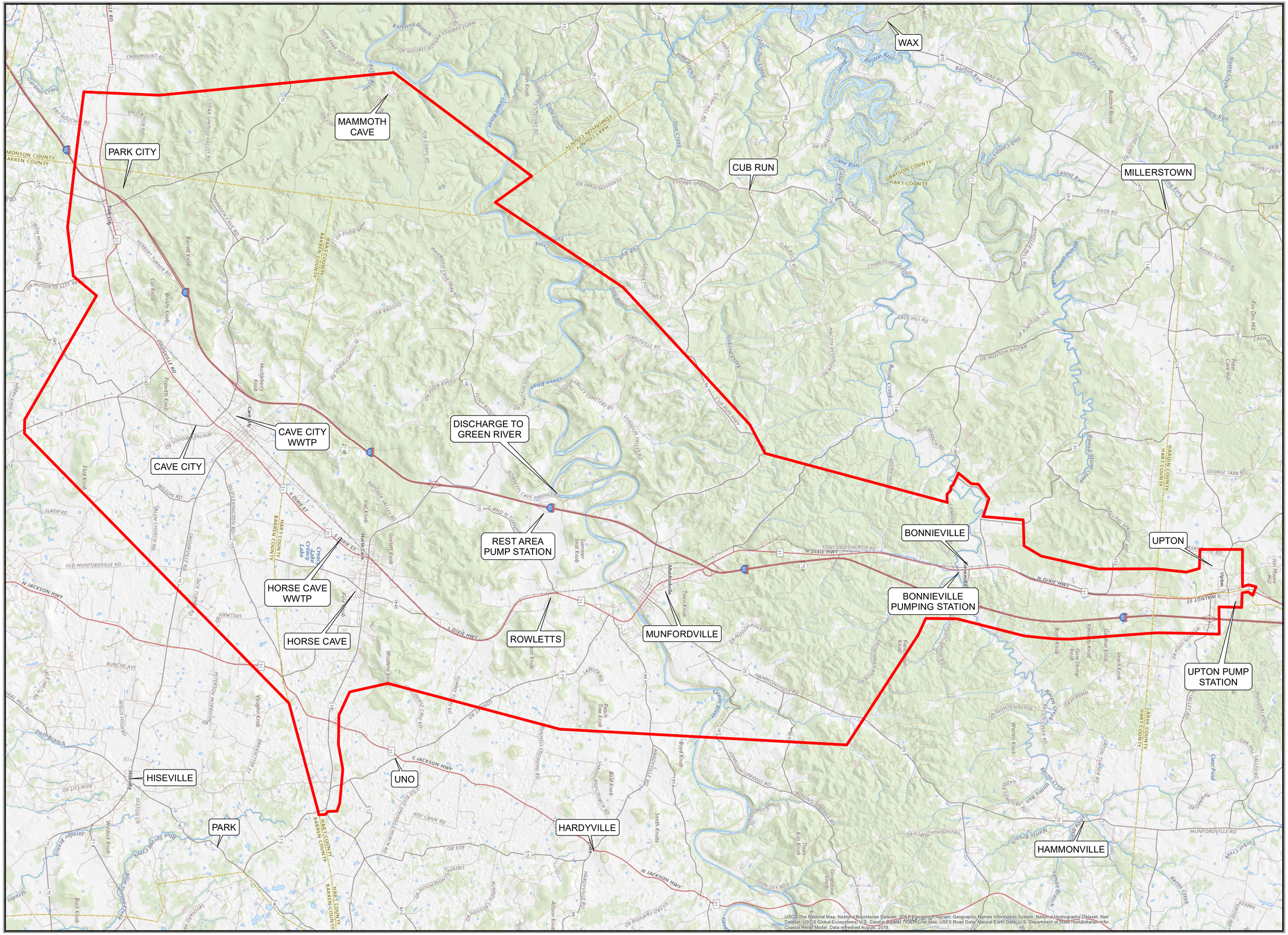
HERITAGE ENGINEERING

0 5,000 10,000

FIGURE 1-1

X:\AA-Projects 2015\15025 - CEA Facility Plan\FEMA\15025 - CEA SERVICE LIMITS FIGURE 1-1.mxd

CEA SERVICE LIMITS & PLANNING AREA
USGS TOPOGRAPHICAL MAP



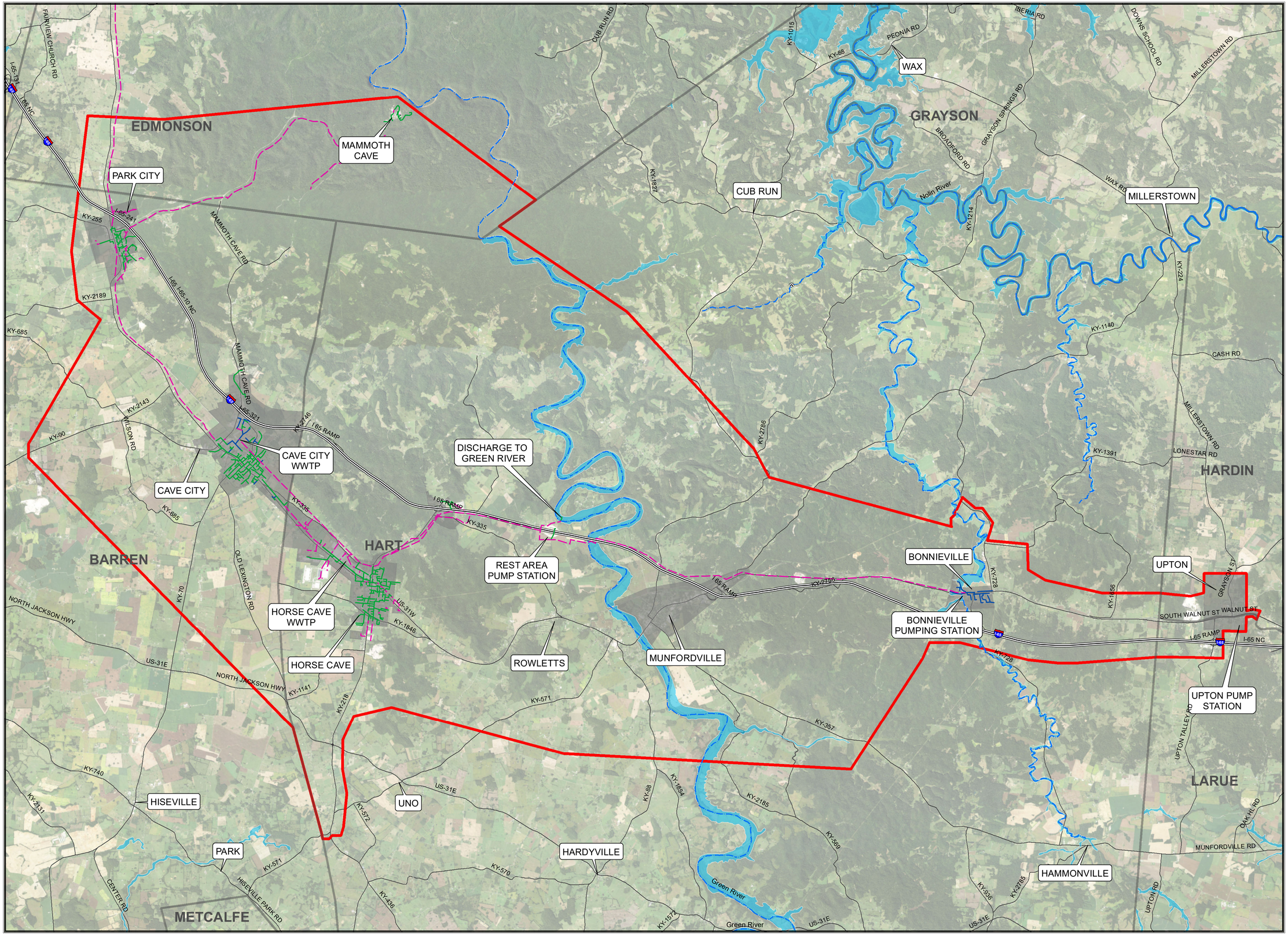
HERITAGE ENGINEERING

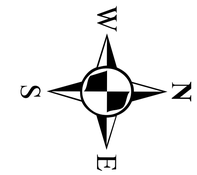
0 5,000 10,000

FIGURE 3-1

X:\AA-Projects-2015\15025 - CEA Facility Plan\FEMA\15025 - CEA SERVICE LIMITS & PLANNING AREA MAP.mxd

CEA SERVICE LIMITS & PLANNING AREA FEMA FLOOD MAP





HERITAGE ENGINEERING

0 5,000 10,000

FIGURE 3-2

X:\AA-Projects-2015\15025 - CEA Facility Plan\FEMA\15025 - CEA SERVICE LIMITS & PLANNING AREA MAP.mxd

CAVE CITY
ZONING MAP

MAP DATE: July 25, 2018

Scale: 1" = 600'

0 1/4 1/2 3/4 1

miles

LEGEND

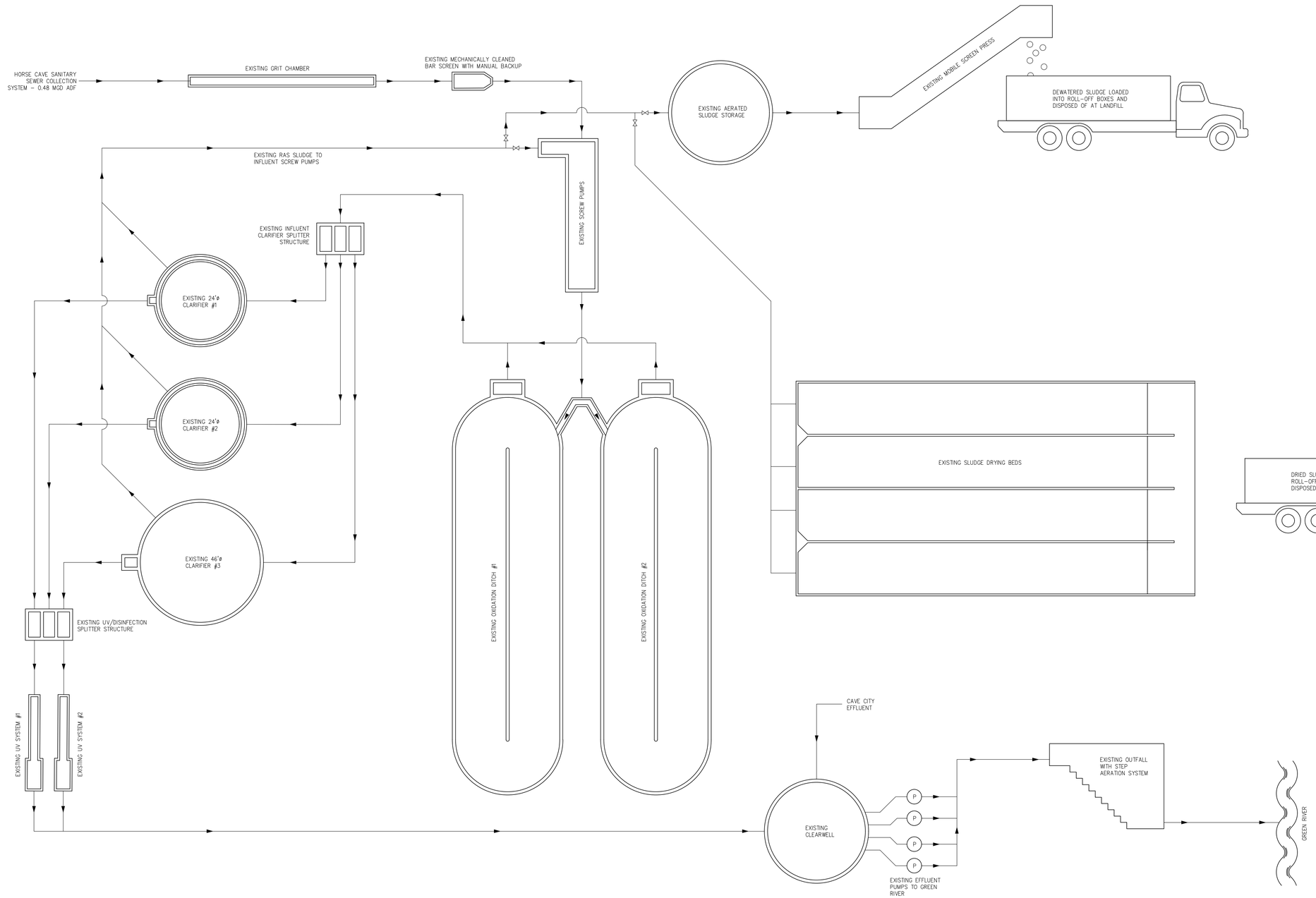
- Roads
- City Limits
- Railroad

AGRI	Agricultural District
P	Public
B-1	Central Business District
B-2	General Business District
B-3	Highway Service Business District
R-1	Low Density Residential District
R-2	Medium Density Residential District
R-3	Small Lot Medium Density Residential District
R-4	High Density Residential District
I-1	Light Industrial District
I-2	Heavy Industrial District

JOINT CITY - COUNTY PLANNING COMMISSION
OF BARREN COUNTY, KENTUCKY

126 E PUBLIC SQ. - CITY HALL
GLASGOW, KY 42141
OFFICE: (270) 659-0661 FAX: (270) 651-9553
WEBSITE: WWW.JCCPC-KY.COM

FIGURE 3-3



EXISTING HORSE CAVE WASTEWATER TREATMENT PLANT FLOW SCHEMATIC

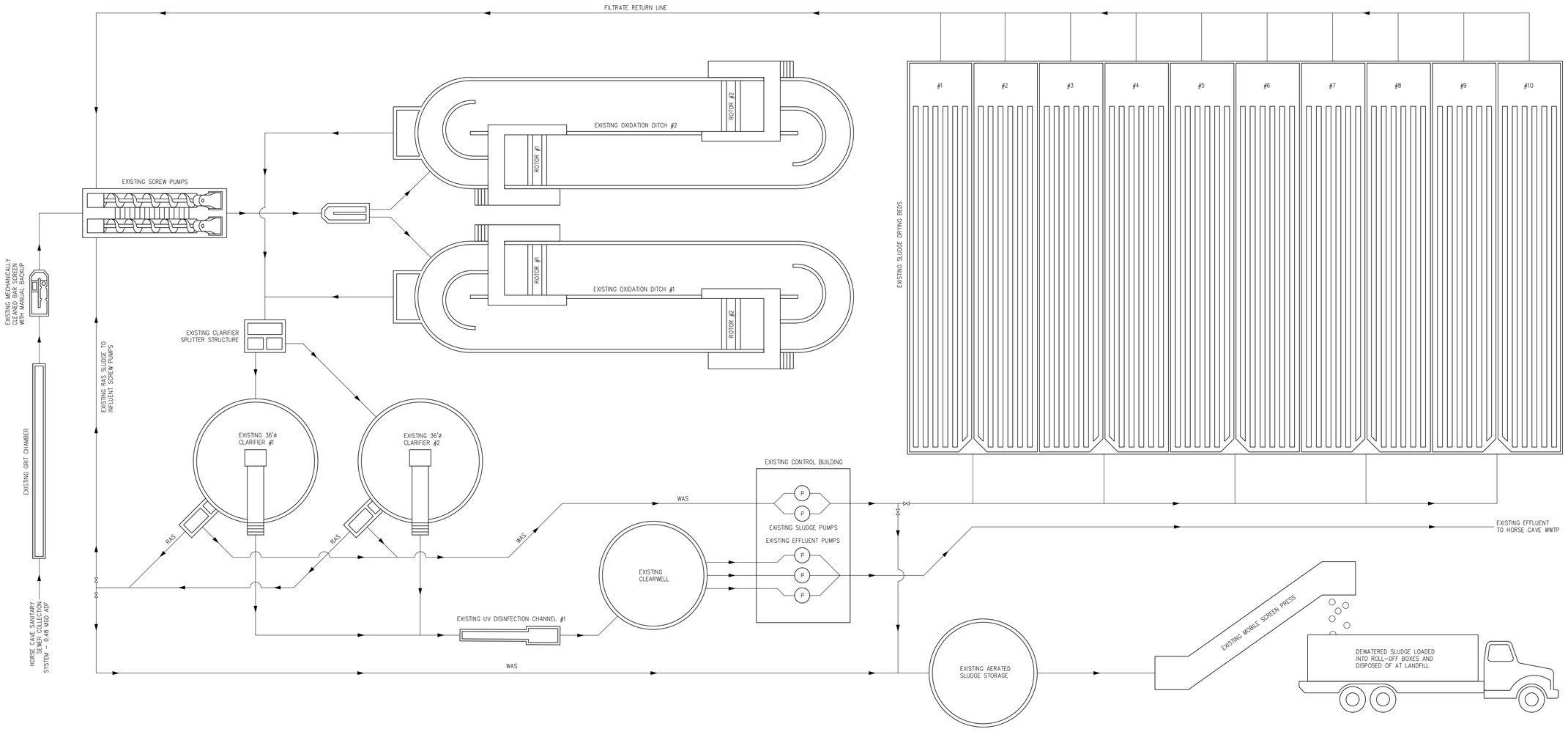
N
W E
S

EXISTING HORSE CAVE WRF PROCESS FLOW SCHEMATIC

HERITAGE ENGINEERING

NOT TO SCALE

FIGURE 6-1



EXISTING CAVE CITY WASTEWATER TREATMENT PLANT FLOW SCHEMATIC

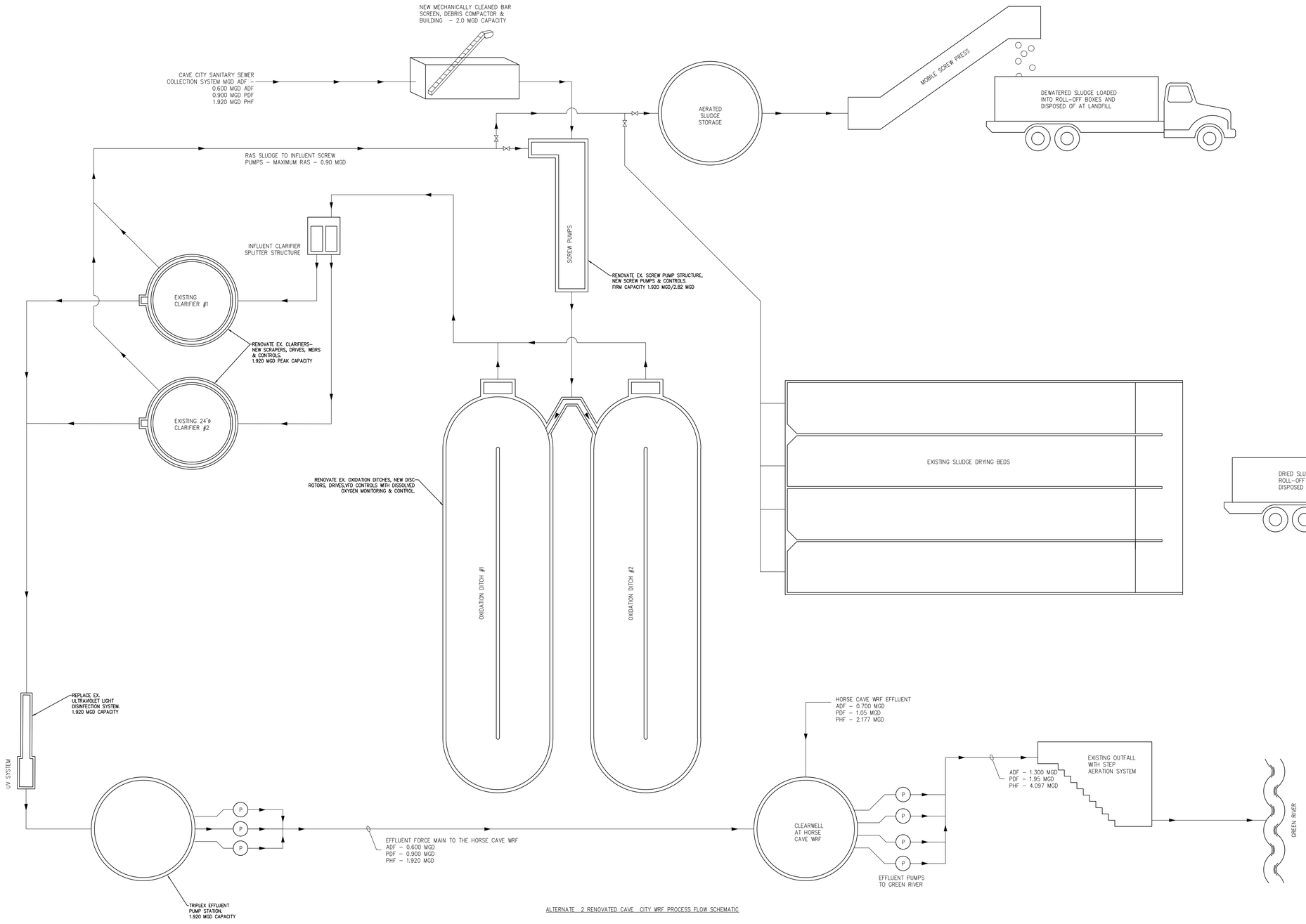
N
W
E
S

EXISTING CAVE CITY WRF
PROCESS FLOW SCHEMATIC

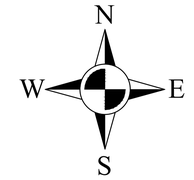
HERITAGE ENGINEERING

NOT TO SCALE

FIGURE 6-2



ALTERNATE 2 RENOVATED CAVE CITY WRF PROCESS FLOW SCHEMATIC

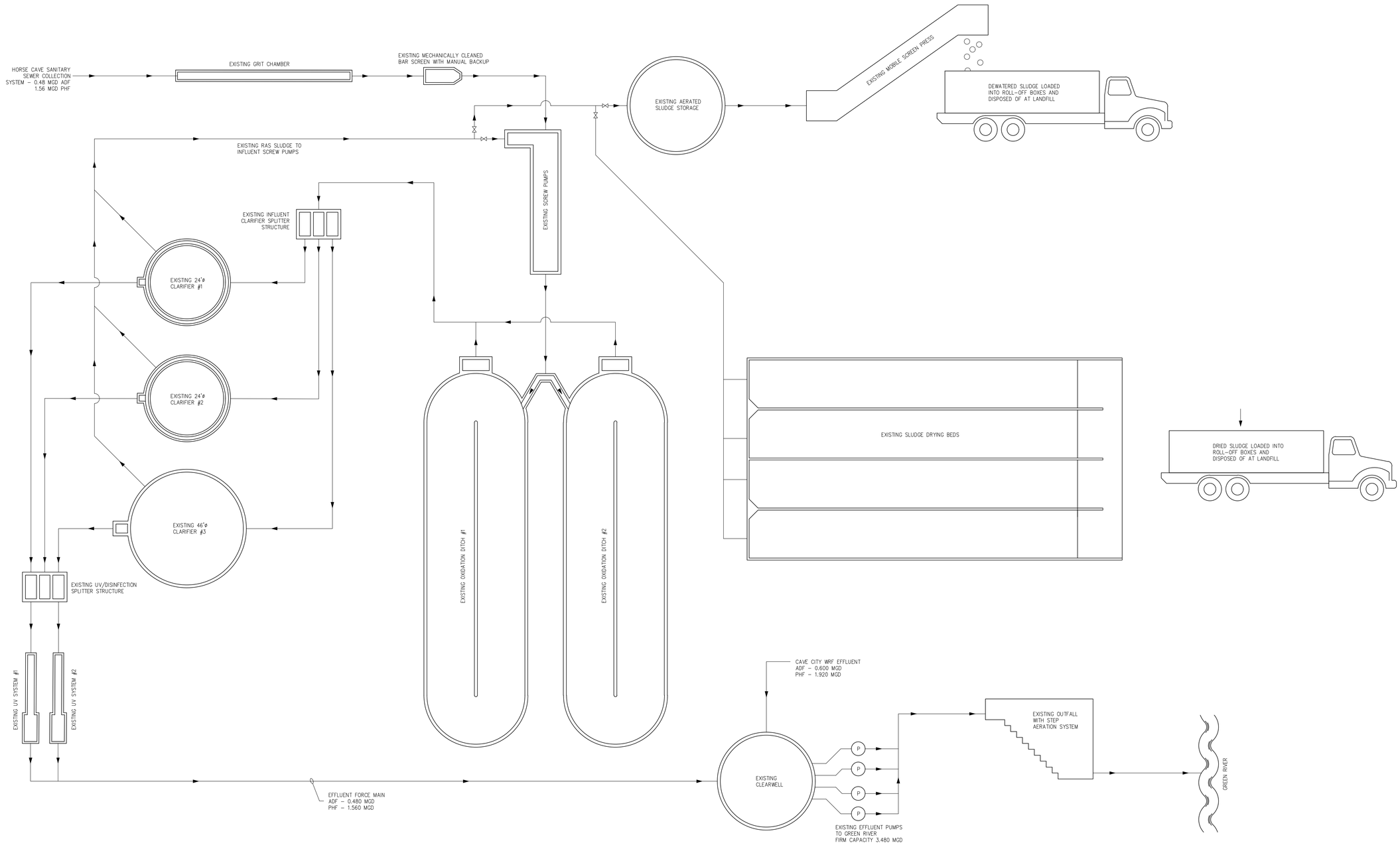


ALTERNATE 2 RENOVATED CAVE CITY WRF PROCESS FLOW SCHEMATIC

HERITAGE ENGINEERING

NOT TO SCALE

FIGURE 8-1



ALTERNATE 2 RENOVATED & EXPANDED HORSE CAVE WRF PROCESS FLOW SCHEMATIC

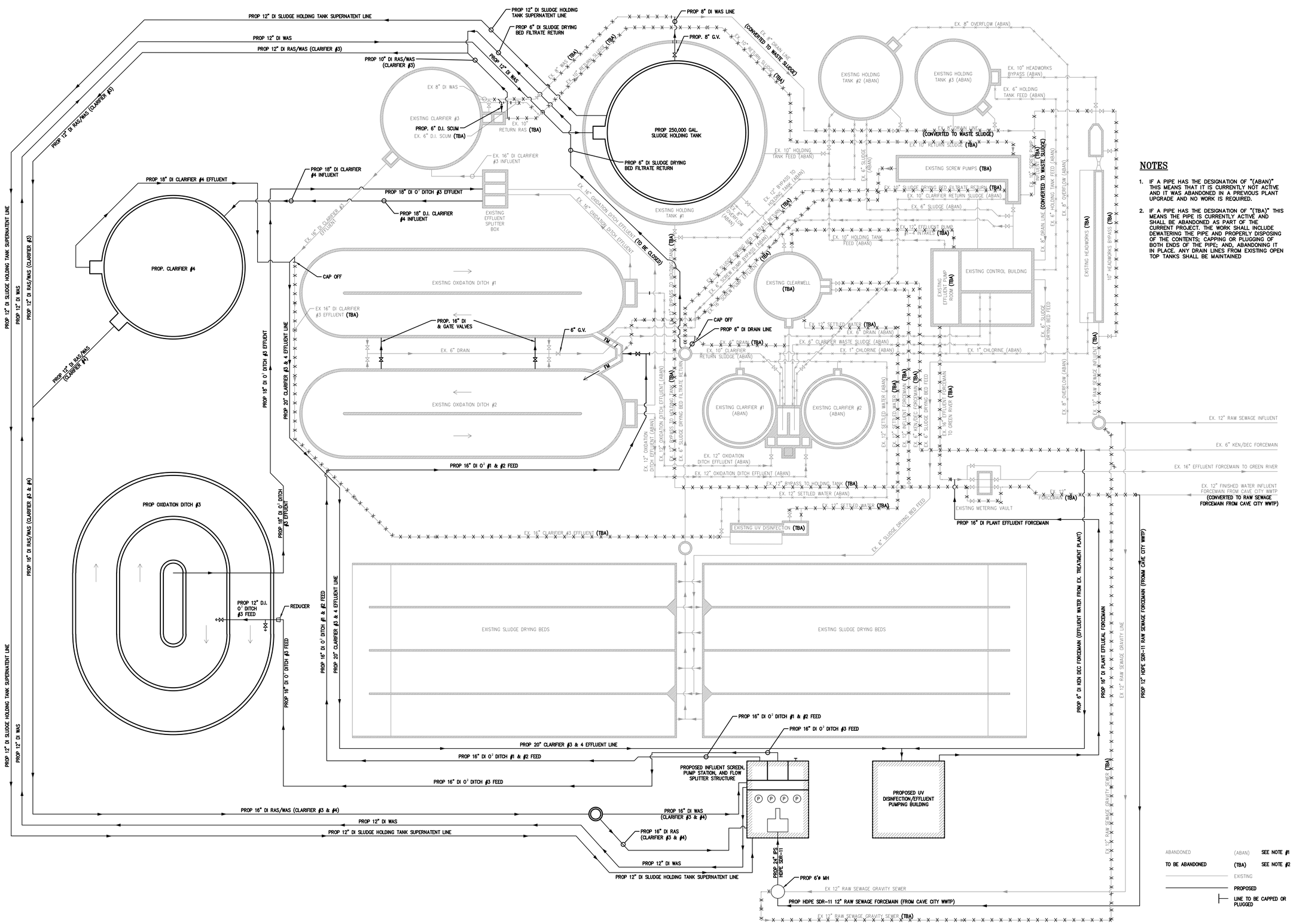
N
W E
S

ALTERNATE 2 RENOVATED & EXPANDED HORSE CAVE WRF PROCESS FLOW SCHEMATIC

HERITAGE ENGINEERING

NOT TO SCALE

FIGURE 8-2



NOTES

1. IF A PIPE HAS THE DESIGNATION OF "(ABAN)" THIS MEANS THAT IT IS CURRENTLY NOT ACTIVE AND IT WAS ABANDONED IN A PREVIOUS PLANT UPGRADE AND NO WORK IS REQUIRED.
2. IF A PIPE HAS THE DESIGNATION OF "(TBA)" THIS MEANS THE PIPE IS CURRENTLY ACTIVE AND SHALL BE ABANDONED AS PART OF THE CURRENT PROJECT. THE WORK SHALL INCLUDE DEWATERING THE PIPE AND PROPERLY DISPOSING OF THE CONTENTS; CAPPING OR PLUGGING OF BOTH ENDS OF THE PIPE; AND, ABANDONING IT IN PLACE. ANY DRAIN LINES FROM EXISTING OPEN TOP TANKS SHALL BE MAINTAINED

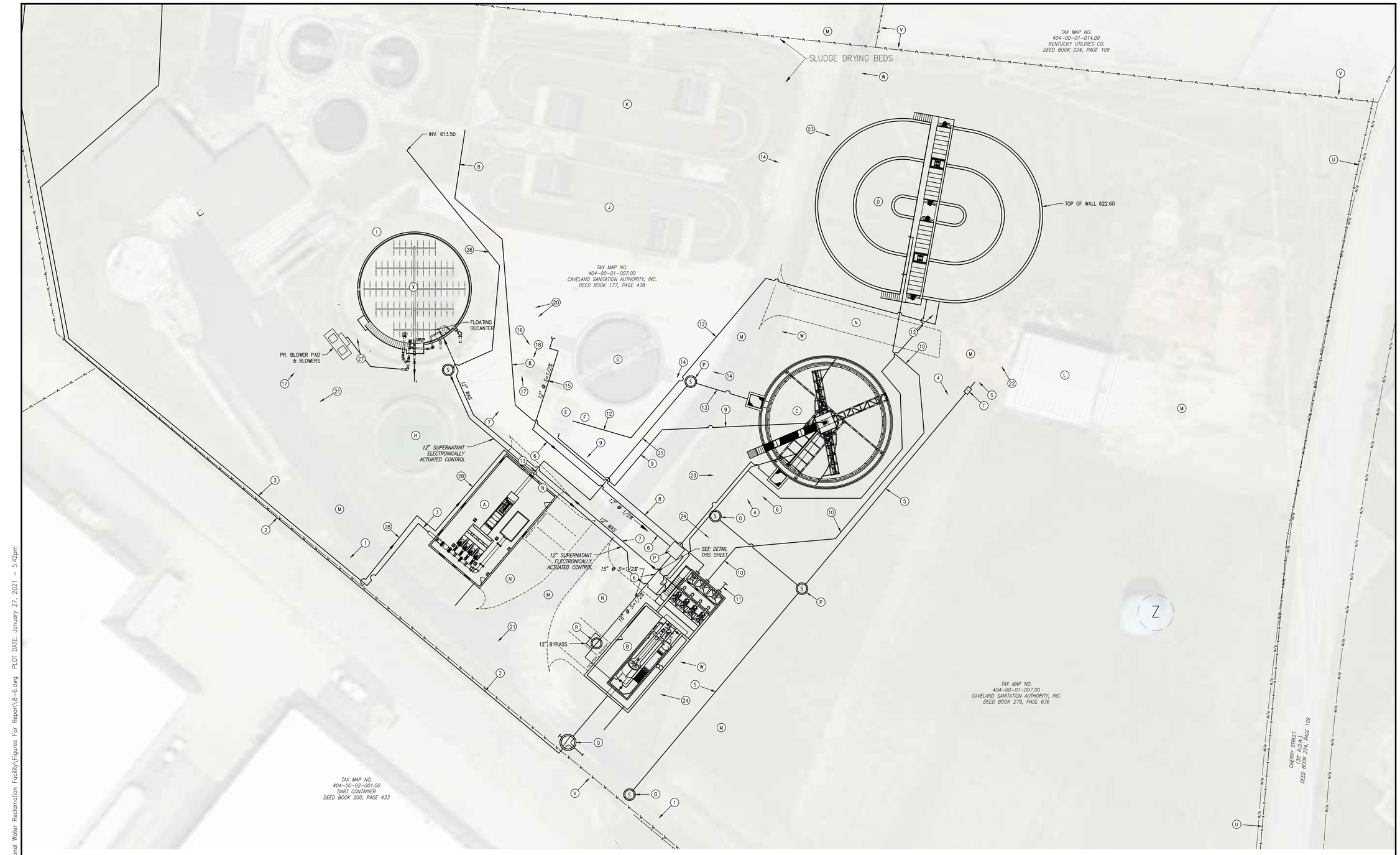
ALTERNATE 3 RENOVATED & EXPANDED HORSE CAVE WRF PROCESS FLOW SCHEMATIC

HERITAGE ENGINEERING

NOT TO SCALE

FIGURE 8-3

ALTERNATE 3 RENOVATED & EXPANDED HORSE CAVE WRF SITE PLAN



N
W E
S

STRUCTURES (XX)

A. PROPOSED UV DISINFECTION/EFFLUENT PUMPING BUILDING
B. PROPOSED 18" 24" INFLUENT SCREEN, PUMP STATION, AND FLOW SPLITTER BUILDING
C. PROPOSED 56' CLARIFIER
D. PROPOSED OXIDATION DITCH #3
E. EXISTING CLARIFIER SPLITTER BOX
F. FUTURE CLARIFIER SPLITTER BOX
G. EXISTING CLARIFIER #3
H. EXISTING HOLDING TANK #2
I. EXISTING ABANDONED HOLDING TANK #1
J. EXISTING OXIDATION DITCH #1
K. EXISTING OXIDATION DITCH #2
L. EXISTING SLUDGE PROCESSING BUILDING
M. EXISTING ACCESS ROAD
N. PROPOSED ACCESS ROAD OR PARKING AREA
O. EXISTING MANHOLE TO BE REPLACED
P. PROPOSED MANHOLE
Q. PROPOSED 6' MANHOLE OVER EXISTING 12" RAW SEWAGE INFLUENT LINE
R. PROPOSED RAS FLOW METER STATION
S. EXISTING SLUDGE PROCESSING BUILDING SIMPLEX PUMP STATION
T. PROPOSED 4'X4' METER PIT WITH RELOCATED FLOW METER
U. PROPOSED FENCING
V. EXISTING FENCING
W. EXISTING FENCING TO BE REMOVED
X. PROPOSED 250,000 GALLON SLUDGE HOLDING TANK

LEGEND

EXISTING
PROPOSED
FUTURE

PIPING (#)

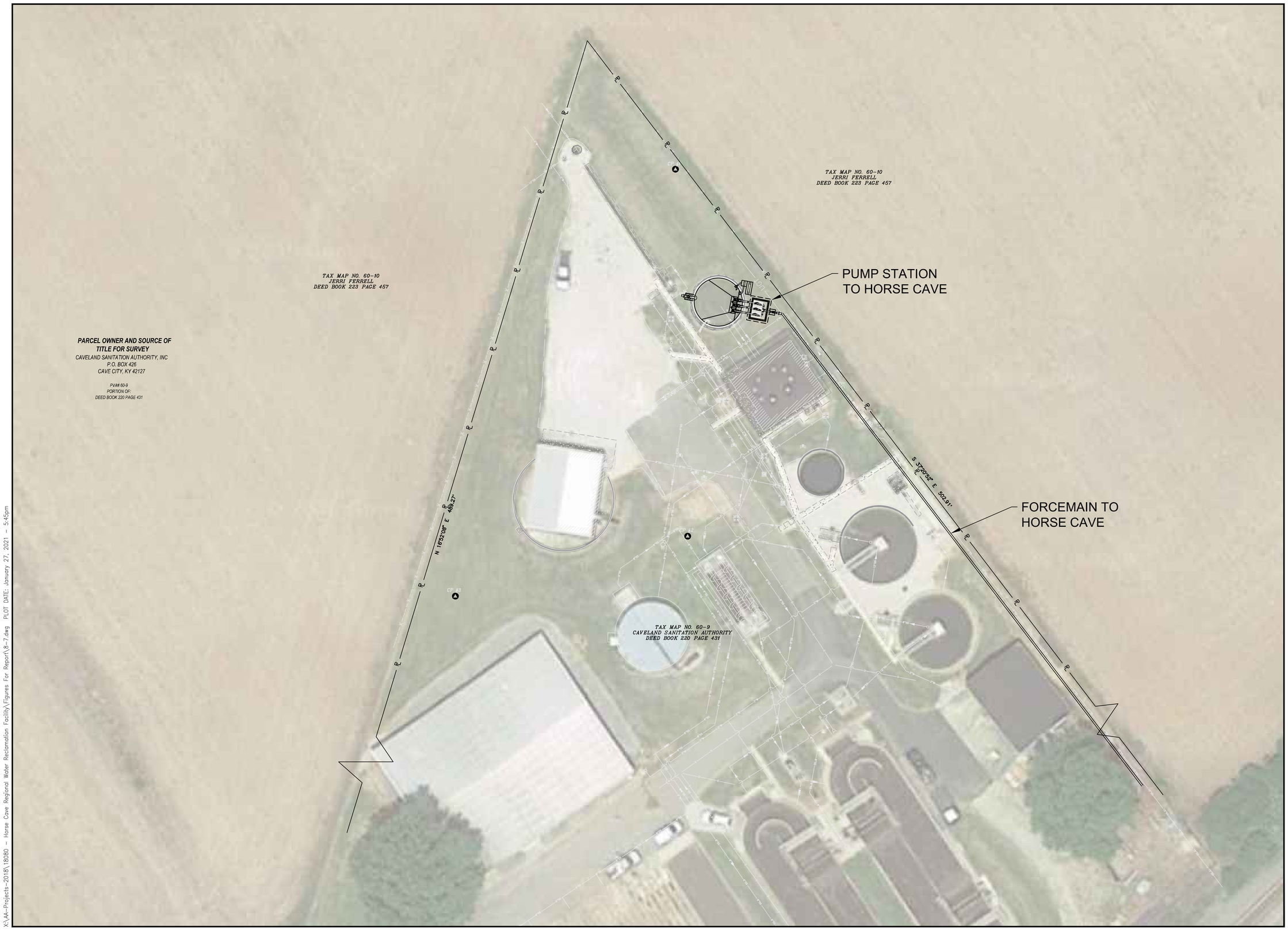
1. EXISTING 12" RAW SEWAGE INFLUENT LINE
2. PROPOSED 12" RAW SEWAGE FORCEMAIN FROM CAVE CITY WWTP
3. EFFLUENT LINE TO GREEN RIVER DISCHARGE
4. REMOVE EXISTING 6" SEWER AS NEEDED
5. PROPOSED 8" SEWER
6. PROPOSED 12" CLARIFIER RAS LINE
7. PROPOSED 7" WAS LINE
8. EFFLUENT LINE FROM OXIDATION DITCH #1 AND #2 TO CLARIFIER SPLITTER BOX
9. PROPOSED CLARIFIER INFLUENT LINE
10. OXIDATION DITCH #3 INFLUENT LINE
11. FUTURE OXIDATION DITCH INFLUENT STUB OUT
12. OXIDATION DITCH #3 EFFLUENT LINE
13. PROPOSED 14" DI CLARIFIER #3 EFFLUENT LINE @ S=0.5%
14. EXISTING 16" CLARIFIER EFFLUENT LINE
15. PROPOSED RAS LINE FROM EXISTING CLARIFIER
16. EXISTING 10" CLARIFIER RAS LINE (TBA)
17. EXISTING 8" CLARIFIER WAS LINE
18. EXISTING 6" CLARIFIER SCUM LINE
19. EXISTING 8" CLARIFIER RAS LINE
20. EXISTING OXIDATION DITCH EFFLUENT LINES
21. EXISTING 4" WATER SERVICE
22. EXISTING 6" SLUDGE PROCESSING BUILDING LATERAL
23. EXISTING 10" FORCEMAIN
24. REMOVE EXISTING 10" SEWER AS NEEDED
25. PROPOSED 20" DI CLARIFIER #3 & 4 EFFLUENT LINE @ S=0.5%
26. PROPOSED 6" DI DRYING BEDS FILTRATE RETURN LINE AT S=?%
27. PROPOSED 8" DI SLUDGE LINE
28. PROPOSED 6" DI KEN DEC FORCEMAIN (EFFLUENT WATER FROM TREATMENT PLANT).
29. EXISTING KEN DEC 6" FORCEMAIN (EFFLUENT WATER FROM TREATMENT PLANT).
30. EXISTING 10" DI DRAIN LINE

HERITAGE ENGINEERING

0 30 60

FIGURE 8-4

X:\AA-Projects-2018\18080 - Horse Cave Regional Water Reclamation Facility\Figures For Report\8-6.dwg PLOT DATE: January 27, 2021 - 5:42pm



ALTERNATE 3 CAVE CITY WASTEWATER PUMP STATION WRF SITE PLAN

HERITAGE ENGINEERING

FIGURE 8-5

X:\AA-Projects-2018\18080 - Horse Cave Regional Water Reclamation Facility\Figures For Report\8-7.dwg PLOT DATE: January 27, 2021 - 5:45pm

APPENDIX A

Kentucky Division of Water Wasteload Allocation Letter

ANDY BESHEAR
GOVERNOR

REBECCA W. GOODMAN
SECRETARY

ANTHONY R. HATTON
COMMISSIONER

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601
TELEPHONE: 502-564-2150
TELEFAX: 502-564-4245

January 26, 2021

Dave Eberenz, P.E.
Heritage Engineering
603 North Shore Dr, Suite 204
Jeffersonville, IN 47130

Re: Caveland Environmental Authority Facility Plan
WLA Preliminary Limits Request
Permit No: KY0091561
AI: 1773
Hart County, Kentucky

Dear Mr. Eberenz:

This letter is in response to your recent email to the Division of Water asking for preliminary limits for the facility plant of Caveland Environmental Authority's KPDES permit. The email described two scenarios, one in which Outfall 001 (Horse Cave WRF) has its design capacity increased to 0.7 MGD, Outfall 002 (Cave City) being renovated, but with no design increase, and Outfall 003 (Caveland WWTP) having its design capacity increased from 1.08 MGD to 1.30 MGD. The second scenario sees all of the waste from Outfall 002 (Cave City) being sent to Outfall 001 (Horse Cave WRF) instead, increasing Outfall 001 design capacity to 1.3 MGD. Outfall 002 would be shut down, and Outfall 003 would also have its design capacity increased to 1.3 MGD.

For Outfall 001(Horse Cave WRF), both alternatives (Increasing to 0.7 MGD or Increasing to 1.3 MGD by accepting Outfall 002 waste), the following limits are applicable:

Pollutant	Summer Limits (mg/l)	Winter Limits (mg/l)
BOD_5 (Effluent)	30	30
BOD_5 (Influent)	Report	Report
Total Suspended Solids (Effluent)	30	30
Total Suspended Solids (Influent)	Report	Report
BOD_5 (Percent Removal)	85	85
Total Suspended Solids (Percent Removal)	85	85

For Outfall 002 (Cave City WRF), option 1 (no change in design capacity), the following limits are applicable:

Pollutant	Summer Limits (mg/l)	Winter Limits (mg/l)
BOD_5 (Effluent)	30	30
BOD_5 (Influent)	Report	Report
Total Suspended Solids (Effluent)	30	30
Total Suspended Solids (Influent)	Report	Report
BOD_5 (Percent Removal)	85	85
Total Suspended Solids (Percent Removal)	85	85

In the case of option 2 (Cave City waste being diverted to Horse Cave WRF), Outfall 002 would be shut down and removed from the permit.

For Outfall 003 (Caveland WWTP), in both cases, the following limits apply:

Pollutant	Summer Limits (mg/l)	Winter Limits (mg/l)
Ammonia, as N (Effluent)	20	20
pH	6.0/9.0	6.0/9.0
Dissolved Oxygen	2.0	2.0
Acute WET (TU_a)	1.0	1.0
Total Phosphorus (Effluent)[1]	1.0	1.0
Total Phosphorus (Influent)	Report	Report
Total Nitrogen (Effluent)	Report	Report
Total Nitrogen (Influent)	Report	Report
[1]Expressed as annual average mass effluent limitation.		

In addition to the above limits, the monthly average and maximum weekly average values of Escherichia coli shall be at or below 130 colonies per 100 milliliters or 240 colonies per 100 milliliters, respectively, the year around. If a form of chlorine is proposed to disinfect the wastewater, then de-chlorination will likely be needed to achieve the chlorine residual effluent concentration. Additional effluent limitations and water quality standards are contained in 401 KAR Chapter 5 and 401 KAR Chapter 10.

These preliminary design effluent limitations are valid for one (1) year from the date of this letter, and are subject to change as a result of additional information which may be presented during the public notice phase of the Kentucky Pollutant Discharge Elimination System (KPDES) permitting process. As such, this letter does not convey any authorization or approval to proceed with the construction or operation of the proposed WWTP. Construction and KPDES permit applications must be submitted to request such authorization or approval. Nor does this letter ensure issuance of either permit. During the review processes of these permits the Division of Water will further evaluate the viability of the project.

Should you have any questions regarding this letter, please contact me at (502) 782-6946 or E-mail at matthew.fields@ky.gov.

1/27/2021

X Matthew Fields

Matthew Fields
WLA Coordinator, DOW
Signed by: Matthew Fields

APPENDIX B

Cross Cutter Letters

Caveland Environmental Authority, Inc.
www.ceawater.com

P.O. Box 426
508 S. Dixie Hwy
Cave City, KY 42127
(270) 773-2887 (p)
(270) 773-2283 (f)

March 9, 2021

Attention: Lori Dials
Water Infrastructure Branch
Kentucky Division of Water
300 Sower Blvd.
Frankfort, KY 40601

RE: Caveland Environmental Authority, Inc. Regional Facility Plan
Mitigation Letter

Dear Ms. Dials,

The purpose of this letter is to notify the Kentucky Division of Water that the Caveland Environmental Authority, Inc. (CEA) will adhere to mitigation requirements set forth by planning and review agencies for work completed during implementation of the Regional Facility Plan. If you have any questions, please contact me at (270) 773-2887 or email at david@ceawater.com.

Sincerely,

David Peterson
Chief Executive Officer (CEO)
Caveland Environmental Authority, Inc.

HERITAGE ENGINEERING, LLC

March 23, 2021

Kentucky Heritage Council
State Historic Preservation Office
ATTN: Mr. Nick Laracuente,
Site Protection Program Manager
The Barstow House
410 High Street
Frankfort KY 40601

Re: Caveland Environmental Authority, Inc.
Regional Facility Plan

Mr. Laracuente:

Pursuant to the requirements of the State Environmental Review Process for the Kentucky Division of Water, State Revolving Fund, please review the proposed Regional Facility Plan for the Caveland Environmental Authority (CEA). The improvements outlined in the Regional Facility Plan recommend the Cave City Water Reclamation Facility (WRF) be taken offline and that all sanitary sewage generated in the services limits of the Cave City Plant be pumped to the expanded Horse Cave Water Reclamation Facility (WRF). This will require $7.8 million in improvements to construct a pump station at the Cave City WRF and increase the capacity of the Horse Cave WRF to 1.30 MGD.

These improvements will occur within the next 24 months and accommodate future needs of the CEA Planning Area for the next 20 years. The environmental impacts of implementing the Recommended Alternative will have short term impacts related to construction of the proposed improvements. No long-term environmental impacts are anticipated as all proposed improvements will be constructed on previously disturbed ground at the existing WRF sites.

Please advise of any present concerns your office may have related to the abovementioned project. We would appreciate a response within 30 days, if possible. If you have questions or require additional information, feel free to contact me at (502) 562-1412 and/or email: rrafferty@heritageeng.com.

Sincerely,

Ravi Rafferty, PE

Attached:
Map
Horse Cave WWTP Site Plan
Cave City WWTP Site Plan

642 SOUTH 4TH ST., SUITE 100
LOUISVILLE, KENTUCKY 40202
PHONE: 502-562-1412 FAX: 502-562-1413

603 N. SHORE DR., UNIT 204
JEFFERSONVILLE, INDIANA 47130
PHONE: 812-280-8201 FAX: 812-280-8281

HERITAGE ENGINEERING, LLC

March 23, 2021

Ms. Melinda Cave
NRSC – Program Delivery Point
809 Main Street
Munfordville, KY 42765-9423

Re: Caveland Environmental Authority, Inc.
Regional Facility Plan

Dear Ms. Cave:

Pursuant to the requirements of the State Environmental Review Process for the Kentucky Division of Water, State Revolving Fund, please review the proposed Regional Facility Plan for the Caveland Environmental Authority (CEA). The improvements outlined in the Regional Facility Plan recommend the Cave City Water Reclamation Facility (WRF) be taken offline and that all sanitary sewage generated in the services limits of the Cave City Plant be pumped to the expanded Horse Cave Water Reclamation Facility. This will require $7.8 million in improvements to construct a pump station at the Cave City WRF and increase the capacity of the Horse Cave WRF to 1.30 MGD.

These improvements will occur within the next 24 months and accommodate future needs of the CEA Planning Area for the next 20 years. The environmental impacts of implementing the Recommended Alternative will have short term impacts related to construction of the proposed improvements. No long-term environmental impacts are anticipated as all proposed improvements will be constructed on previously disturbed ground at the existing WRF sites.

Please advise of any present concerns your office may have related to the abovementioned project. We would appreciate a response within 30 days, if possible. If you have questions or require additional information, feel free to contact me at (502) 562-1412 and/or email: rrafferty@heritageeng.com.

Sincerely,

Ravi Rafferty, PE

Attached:
Map

642 SOUTH 4TH ST., SUITE 100
LOUISVILLE, KENTUCKY 40202
PHONE: 502-562-1412 FAX: 502-562-1413

603 N. SHORE DR., UNIT 204
JEFFERSONVILLE, INDIANA 47130
PHONE: 812-280-8201 FAX: 812-280-8281

HERITAGE ENGINEERING, LLC

March 23, 2021

U.S. Army Corps of Engineers
CELRL-RD, Room 752
600 Dr. Martin Luther King Jr. Place
Louisville, KY 40202-0059
Office: (502) 315-6733

Re: Caveland Environmental Authority, Inc.
Regional Facility Plan

To whom it may concern:

Pursuant to the requirements of the State Environmental Review Process for the Kentucky Division of Water, State Revolving Fund, please review the proposed Regional Facility Plan for the Caveland Environmental Authority (CEA). The improvements outlined in the Regional Facility Plan recommend the Cave City Water Reclamation Facility (WRF) be taken offline and that all sanitary sewage generated in the services limits of the Cave City Plant be pumped to the expanded Horse Cave Water Reclamation Facility. This will require $7.8 million in improvements to construct a pump station at the Cave City WRF and increase the capacity of the Horse Cave WRF to 1.30 MGD.

These improvements will occur within the next 24 months and accommodate future needs of the CEA Planning Area for the next 20 years. The environmental impacts of implementing the Recommended Alternative will have short term impacts related to construction of the proposed improvements. No long-term environmental impacts are anticipated as all proposed improvements will be constructed on previously disturbed ground at the existing WRF sites.

Please advise of any present concerns your office may have related to the abovementioned project. We would appreciate a response within 30 days, if possible. If you have questions or require additional information, feel free to contact me at (502) 562-1412 and/or email: rrafferty@heritageeng.com.

Sincerely,

Ravi Rafferty, PE

Attached:
Map

642 SOUTH 4TH ST., SUITE 100
LOUISVILLE, KENTUCKY 40202
PHONE: 502-562-1412 FAX: 502-562-1413

603 N. SHORE DR., UNIT 204
JEFFERSONVILLE, INDIANA 47130
PHONE: 812-280-8201 FAX: 812-280-8281

HERITAGE ENGINEERING, LLC

March 23, 2021

Mr. Virgil Lee Andrews Jr., Field Office Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
J.C. Watts Federal building
330 West Broadway, Suite 265
Frankfort, KY 40601

Re: Horse Cave Pretreatment Plant Expansion

Dear Mr. Andrews:

Pursuant to the requirements of the State Environmental Review Process for the Kentucky Division of Water, State Revolving Fund, please review the proposed Regional Facility Plan for the Caveland Environmental Authority (CEA). The improvements outlined in the Regional Facility Plan recommend the Cave City Water Reclamation Facility (WRF) be taken offline and that all sanitary sewage generated in the services limits of the Cave City Plant be pumped to the expanded Horse Cave Water Reclamation Facility. This will require $7.8 million in improvements to construct a pump station at the Cave City WRF and increase the capacity of the Horse Cave WRF to 1.30 MGD.

These improvements will occur within the next 24 months and accommodate future needs of the CEA Planning Area for the next 20 years. The environmental impacts of implementing the Recommended Alternative will have short term impacts related to construction of the proposed improvements. No long-term environmental impacts are anticipated as all proposed improvements will be constructed on previously disturbed ground at the existing WRF sites.

Please advise of any present concerns your office may have related to the abovementioned project. We would appreciate a response within 30 days, if possible. If you have questions or require additional information, feel free to contact me at (502) 562-1412 and/or email: rrafferty@heritageeng.com.

Sincerely,

Ravi Rafferty, PE

Attached:
Facility Plan

642 SOUTH 4TH ST., SUITE 100
LOUISVILLE, KENTUCKY 40202
PHONE: 502-562-1412 FAX: 502-562-1413

603 N. SHORE DR., UNIT 204
JEFFERSONVILLE, INDIANA 47130
PHONE: 812-280-8201 FAX: 812-280-8281

APPENDIX C

Kentucky Pollutant Discharge Permit Limitation Permit for the CEA

KPDES

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

PERMIT NO: KY0091561

AI NO: 1773

AUTHORIZATION TO DISCHARGE UNDER THE

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to Authority in KRS 224,

Caveland Environmental Authority
P.O. Box 426, 508 South Dixie Hwy
Cave City, KY 42127

is authorized to discharge from facilities located at

Horse Cave WWTP
100 Sewage Plant Road
Horse Cave, Hart County

Cave City WWTP
301 Gaunce Drive
Cave City, Barren County

to receiving waters named

Green River (37.2411, -85.9342)

in accordance with effluent limitations, monitoring requirements and other conditions set forth in this permit.

This permit shall become effective on November 1, 2016.

This permit and the authorization to discharge shall expire at midnight, October 31, 2021.

September 20, 2016

Date Signed

Sara J Beard

Peter T. Goodmann, Director

Division of Water

THIS KPDES PERMIT CONSISTS OF THE FOLLOWING SECTIONS.

SECTION 1

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. EFFLUENT AND MONITORING REQUIREMENTS

1.1. Compliance Monitoring Locations (Outfalls)

The following table lists the outfalls authorized by this permit, the latitude and longitude of each and the DOW assigned KPDES outfall number.

TABLE 1.

No.	Treatment Provided	Latitude (N)	Longitude (W)	Receiving Waters	Description of Outfall
001	Screening, Grit Removal Oxidation Ditches Sedimentation UV Disinfection	37.1349	-85.9663	Outfall 003	Domestic (Sanitary) Wastewater
002	Screening, Grit Removal Oxidation Ditches Sedimentation UV Disinfection	37.1703	-85.9160	Outfall 003	Domestic (Sanitary) Wastewater
003	Discharge to Surface Water	37.2411	-85.9342	Green River	Commingled Wastewater from Outfalls 001 and 002

1.2. Zones of Initial Dilution (ZIDs) and Mixing Zones (MZs)

The following table summarizes the ZIDs and/or MZs granted for this outfall. Although the maximum allowable MZ was not assigned at this time for one or more of the pollutants for which a MZ was requested, future water quality-based effluent limitations and the associated mixing zones for these or other pollutants will be calculated using current KYWQS, receiving water conditions, and effluent data.

TABLE 2.

Effluent Characteristic	ZID		MZ		
	Distance From Outfall (ft)	Dilutions	Distance From Outfall (ft)	Surface Area of Involvement (ft^2)	Volume of Water Involved (cfs)
Whole Effluent Toxicity	N/A	N/A	17.90	213.69	15.05

1.3. Effluent Limitations and Monitoring Requirements

The following table summarizes the effluent limitations and monitoring requirements for Outfall 001.

TABLE 3.

EFFLUENT LIMITATIONS									MONITORING REQUIREMENTS	
Effluent Characteristic	STORET Code	Units	Loadings (lbs/day)		Concentrations				Frequency	Sample Type
			Monthly Average	Maximum Weekly Average	Minimum	Monthly Average	Maximum Weekly Average	Maximum		
Flow, Effluent	50050	MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
BOD_5[1], Effluent	00310	mg/l	120	180	N/A	30	45	N/A	1/Week	24 Hr Composite[2]
BOD_5[1], Influent	00310	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hr Composite[2]
BOD_5[1],Percent Removal	81010	%	N/A	N/A	N/A	85	N/A	N/A	1/Month	Calculated[3]
TSS, Effluent	00530	mg/l	120	180	N/A	30	45	N/A	1/Week	24 Hr Composite[2]
TSS, Influent	00530	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hr Composite[2]
TSS, Percent Removal	81011	%	N/A	N/A	N/A	85	N/A	N/A	1/Month	Calculated[3]

The Design Flow of the POTW is 0.480 MGD. The Average Annual Flow of the POTW is 0.37 MGD

[1]BOD_5 –Biochemical Oxygen Demand, 5-day

[2]A 24-hour composite is a sample collected using an automated sampler set to collect equal volume aliquots of 120 to 140 ml each every 15 minutes over a 24 hour period. The sample must be maintained at 6 ^{o}C at all times

[3]Percent Removal is calculated using the following equation: $\text{Percent Removal} = \left[\frac{(\text{Monthly Average Influent - Monthly Average Effluent})}{\text{Monthly Average Influent}}\right] \times 100$

The following table summarizes the effluent limitations and monitoring requirements for Outfall 002.

TABLE 4.

EFFLUENT LIMITATIONS									MONITORING REQUIREMENTS	
Effluent Characteristic	STORET Code	Units	Loadings (lbs/day)		Concentrations				Frequency	Sample Type
			Monthly Average	Maximum Weekly Average	Minimum	Monthly Average	Maximum Weekly Average	Maximum		
Flow, Effluent	50050	MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
BOD_5[1], Effluent	00310	mg/l	150	225	N/A	30	45	N/A	1/Week	24 Hr Composite[2]
BOD_5[1], Influent	00310	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hr Composite[2]
BOD_5[1],Percent Removal	81010	%	N/A	N/A	N/A	85	N/A	N/A	1/Month	Calculated[3]
TSS, Effluent	00530	mg/l	150	225	N/A	30	45	N/A	1/Week	24 Hr Composite[2]
TSS, Influent	00530	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Week	24 Hr Composite[2]
TSS, Percent Removal	81011	%	N/A	N/A	N/A	85	N/A	N/A	1/Month	Calculated[3]

The Design Flow of the POTW is 0.600 MGD. The Average Annual Flow of the POTW is 0.28 MGD

[1]BOD_5 –Biochemical Oxygen Demand, 5-day

[2]A 24-hour composite is a sample collected using an automated sampler set to collect equal volume aliquots of 120 to 140 ml each every 15 minutes over a 24 hour period. The sample must be maintained at 6 ^{o}C at all times

[3]Percent Removal is calculated using the following equation: $\text{Percent Removal} = \left[\frac{(\text{Monthly Average Influent} - \text{Monthly Average Effluent})}{\text{Monthly Average Influent}}\right] \times 100$

The following table summarizes the effluent limitations and monitoring requirements for Outfall 003.

TABLE 5.

EFFLUENT LIMITATIONS									MONITORING REQUIREMENTS	
Effluent Characteristic	STORET Code	Units	Loadings (lbs/day)		Concentrations				Frequency	Sample Type
			Monthly Average	Maximum Weekly Average	Minimum	Monthly Average	Maximum Weekly Average	Maximum		
Flow, Effluent	50050	MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
Ammonia (as mg/l NH_3N)	00610	mg/l	N/A	N/A	N/A	20.0	30.0[2]	N/A	1/Week	24 Hr Composite[1]
E. Coli[3]	51040	#/100 ml	N/A	N/A	N/A	130[4]	240[5]	N/A	1/Week	Grab
Dissolved Oxygen	00300	mg/l	N/A	N/A	2.0	N/A	N/A	N/A	1/Week	Grab
pH	00400	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Week	Grab
Acute WET[6]	03598	TU_A	N/A	N/A	N/A	N/A	N/A	1.00	1/Quarter	([7])
Total Phosphorus	00665	mg/l	N/A	N/A	N/A	Report	Report[2]	N/A	1/Week	24 Hr Composite[1]
Total Nitrogen[8]	00600	mg/l	N/A	N/A	N/A	Report	Report[2]	N/A	1/Week	24 Hr Composite[1]

The Design Flow of the POTW is 1.080 MGD. The Average Annual Flow of the POTW is 0.650 MGD

[1]A 24-hour composite is a sample collected using an automated sampler set to collect equal volume aliquots of 120 to 140 ml each every 15 minutes over a 24 hour period. The sample must be maintained at 6 ^{o}C at all times

[2]Daily Maximum

[3]E. Coli – Escherichia Coli Bacteria

[4]Thirty (30) day Geometric Mean

[5]Seven (7) day Geometric Mean

[6]WET – Whole Effluent Toxicity

[7]Two (2) discrete grab samples shall be collected 12 hours apart.

[8]Total Nitrogen is the summation of the analytical results for Total Nitrates, Total Nitrites, and Total Kjeldahl Nitrogen

1.4. Standard Effluent Requirements

The discharges to waters of the Commonwealth shall not produce floating solids, visible foam or a visible sheen on the surface of the receiving waters.

1.5. Application Monitoring

POTWs are required to complete application Forms 1 and A which requires a minimum of 3 samples to be collected and analyzed. To ensure that sufficient samples are collected and analyzed DOW shall impose at a minimum annual sampling during years 2 through 4 of the permit term for those parameters required to be analyzed and reported on the application. The results of the application monitoring shall be submitted on an annual DMR and summarized on the renewal application. The permittee shall report the No Discharge (NODI) 9 – Conditional Monitoring Not Required This Period for years 1 and 5 of the permit.

TABLE 6.

Effluent Characteristic	STORET Code	Units	Concentrations		Frequency	Sample Type
			Average	Maximum		
Temperature (May 1- October 31)	00011	°F	Report	Report	3/5 years	Grab
Temperature (November 1- April 30)	00011	°F	Report	Report	3/5 years	Grab
Total Kjeldahl Nitrogen (TKN)	51449	mg/l	Report	Report	3/5 years	Grab
Nitrate Plus Nitrite Nitrogen	51450	mg/l	Report	Report	3/5 years	Grab
Oil & Grease	00552	mg/l	Report	Report	3/5 years	Grab
Phosphorus (Total)	00665	mg/l	Report	Report	3/5 years	Grab
Total Dissolved Solids (TDS)	70296	mg/l	Report	Report	3/5 years	Grab
Antimony, Total Recoverable	01268	mg/l	Report	Report	3/5 years	Grab
Arsenic, Total Recoverable	00978	mg/l	Report	Report	3/5 years	Grab
Beryllium, Total Recoverable	00998	mg/l	Report	Report	3/5 years	Grab
Cadmium, Total Recoverable	01113	mg/l	Report	Report	3/5 years	Grab
Chromium, Total Recoverable	01118	mg/l	Report	Report	3/5 years	Grab
Copper, Total Recoverable	01119	mg/l	Report	Report	3/5 years	Grab
Lead, Total Recoverable	01114	mg/l	Report	Report	3/5 years	Grab
Mercury, Total Recoverable	71901	mg/l	Report	Report	3/5 years	Grab
Nickel, Total Recoverable	01074	mg/l	Report	Report	3/5 years	Grab
Selenium, Total Recoverable	00981	mg/l	Report	Report	3/5 years	Grab
Silver, Total Recoverable	01079	mg/l	Report	Report	3/5 years	Grab
Thallium, Total Recoverable	00982	mg/l	Report	Report	3/5 years	Grab
Zinc, Total Recoverable	01094	mg/l	Report	Report	3/5 years	Grab
Cyanide, Free (amenable to chlorination)	00722	mg/l	Report	Report	3/5 years	Grab
Phenolic Compounds, Total	70029	mg/l	Report	Report	3/5 years	Grab
Hardness, Total (as CaCO3)	00900	mg/l	Report	Report	3/5 years	Grab
Acrolein	34210	µg/l	Report	Report	3/5 years	Grab
Acrylonitrile	34215	µg/l	Report	Report	3/5 years	Grab

Benzene	34030	µg/l	Report	Report	3/5 years	Grab
Bromoform	32104	µg/l	Report	Report	3/5 years	Grab
Carbon tetrachloride	32102	µg/l	Report	Report	3/5 years	Grab
Chlorobenzene	34301	µg/l	Report	Report	3/5 years	Grab
Chlorodibromomethane	34306	µg/l	Report	Report	3/5 years	Grab
Chloroethane	85811	µg/l	Report	Report	3/5 years	Grab
2-Chloroethylvinyl ether (mixed)	34576	µg/l	Report	Report	3/5 years	Grab
Chloroform	32106	µg/l	Report	Report	3/5 years	Grab
Dichlorobromomethane	32101	µg/l	Report	Report	3/5 years	Grab
1,1-Dichloroethane	34496	µg/l	Report	Report	3/5 years	Grab
1,2-Dichloroethane	32103	µg/l	Report	Report	3/5 years	Grab
Trans-1,2-Dichloroethylene	34546	µg/l	Report	Report	3/5 years	Grab
1,1-Dichloroethylene	34501	µg/l	Report	Report	3/5 years	Grab
1,2-Dichloropropane	34541	µg/l	Report	Report	3/5 years	Grab
1,3-Dichloropropylene	77163	µg/l	Report	Report	3/5 years	Grab
Ethylbenzene (34371)	34371	µg/l	Report	Report	3/5 years	Grab
Methyl bromide (Bromomethane)	34413	µg/l	Report	Report	3/5 years	Grab
Methyl chloride (Chloromethane)	34418	µg/l	Report	Report	3/5 years	Grab
Methylene chloride	34423	µg/l	Report	Report	3/5 years	Grab
1,1,2,2-Tetrachloroethane	34516	µg/l	Report	Report	3/5 years	Grab
Tetrachloroethylene	34475	µg/l	Report	Report	3/5 years	Grab
Toluene	34010	µg/l	Report	Report	3/5 years	Grab
1,1,1-Trichloroethane	34506	µg/l	Report	Report	3/5 years	Grab
1,1,2-Trichloroethane	34511	µg/l	Report	Report	3/5 years	Grab
Trichloroethylene	39180	µg/l	Report	Report	3/5 years	Grab
Vinyl chloride	39175	µg/l	Report	Report	3/5 years	Grab
p-Chloro-m-cresol	82627	µg/l	Report	Report	3/5 years	Grab
2-Chlorophenol	34586	µg/l	Report	Report	3/5 years	Grab
2,4-Dichlorophenol	34601	µg/l	Report	Report	3/5 years	Grab
2,4-Dimethylphenol	34606	µg/l	Report	Report	3/5 years	Grab
4,6-Dinitro-o-cresol	34657	µg/l	Report	Report	3/5 years	Grab
2,4-Dinitrophenol	34616	µg/l	Report	Report	3/5 years	Grab
2-Nitrophenol	34591	µg/l	Report	Report	3/5 years	Grab
4-Nitrophenol	34646	µg/l	Report	Report	3/5 years	Grab
Pentachlorophenol	39032	µg/l	Report	Report	3/5 years	Grab
Phenol	34694	µg/l	Report	Report	3/5 years	Grab
2,4,6-Trichlorophenol	34621	µg/l	Report	Report	3/5 years	Grab
Acenaphthene	34205	µg/l	Report	Report	3/5 years	Grab

Acenaphthylene	34200	µg/l	Report	Report	3/5 years	Grab
Anthracene	34220	µg/l	Report	Report	3/5 years	Grab
Benzidine	39120	µg/l	Report	Report	3/5 years	Grab
Benzo(a)Anthracene	34526	µg/l	Report	Report	3/5 years	Grab
Benzo(a)pyrene	34247	µg/l	Report	Report	3/5 years	Grab
3,4-Benzofluoranthene	79531	µg/l	Report	Report	3/5 years	Grab
Benzo(ghi) perylene	34521	µg/l	Report	Report	3/5 years	Grab
Benzo(k)fluoranthene	34242	µg/l	Report	Report	3/5 years	Grab
Bis(2-chloroethoxy) methane	34278	µg/l	Report	Report	3/5 years	Grab
Bis(2-chloroethyl)ether	34273	µg/l	Report	Report	3/5 years	Grab
Bis(2-chloroisopropyl) ether	34283	µg/l	Report	Report	3/5 years	Grab
Bis(2-ethylhexyl) phthalate	39100	µg/l	Report	Report	3/5 years	Grab
4-Bromophenyl phenyl ether	34636	µg/l	Report	Report	3/5 years	Grab
Butyl benzyl phthalate	34292	µg/l	Report	Report	3/5 years	Grab
2-Chloronaphthalene	34581	µg/l	Report	Report	3/5 years	Grab
4-Chlorophenyl phenyl ether	34641	µg/l	Report	Report	3/5 years	Grab
Chrysene	34320	µg/l	Report	Report	3/5 years	Grab
Di-n-butyl phthalate	39110	µg/l	Report	Report	3/5 years	Grab
Dibenzo(a,h)Anthracene	34556	µg/l	Report	Report	3/5 years	Grab
1,2-Dichlorobenzene	34536	µg/l	Report	Report	3/5 years	Grab
1,3-Dichlorobenzene	34566	µg/l	Report	Report	3/5 years	Grab
1,4-Dichlorobenzene	34571	µg/l	Report	Report	3/5 years	Grab
3,3'-Dichlorobenzidine	34631	µg/l	Report	Report	3/5 years	Grab
Diethyl phthalate	34336	µg/l	Report	Report	3/5 years	Grab
Dimethyl phthalate	34341	µg/l	Report	Report	3/5 years	Grab
2,4-Dinitrotoluene	34611	µg/l	Report	Report	3/5 years	Grab
2,6-Dinitrotoluene	34626	µg/l	Report	Report	3/5 years	Grab
1,2-Diphenylhydrazine	34346	µg/l	Report	Report	3/5 years	Grab
Fluoranthene	34376	µg/l	Report	Report	3/5 years	Grab
Fluorene	34381	µg/l	Report	Report	3/5 years	Grab
Hexachlorobenzene	39700	µg/l	Report	Report	3/5 years	Grab
Hexachlorobutadiene	39702	µg/l	Report	Report	3/5 years	Grab
Hexachlorocyclo-pentadiene	34386	µg/l	Report	Report	3/5 years	Grab
Hexachloroethane	34396	µg/l	Report	Report	3/5 years	Grab
Indeno(1,2,3-cd)pyrene	34403	µg/l	Report	Report	3/5 years	Grab
Isophorone	34408	µg/l	Report	Report	3/5 years	Grab
Naphthalene	34696	µg/l	Report	Report	3/5 years	Grab
Nitrobenzene	34447	µg/l	Report	Report	3/5 years	Grab

N-Nitrosodi-N-propylamine	34428	µg/l	Report	Report	3/5 years	Grab
N-Nitrosodimethylamine (NDMA)	34438	µg/l	Report	Report	3/5 years	Grab
N-Nitrosodiphenylamine	34433	µg/l	Report	Report	3/5 years	Grab
Phenanthrene	34461	µg/l	Report	Report	3/5 years	Grab
Pyrene	34469	µg/l	Report	Report	3/5 years	Grab
1,2,4-Trichlorobenzene	34551	µg/l	Report	Report	3/5 years	Grab

SECTION 2
COLLECTION SYSTEM REQUIREMENTS

2. Collection System Requirements

2.1. Prohibitions

The following prohibitions apply to the collection system and its users:

1) There shall be no sanitary sewer overflows (SSOs);
2) No user shall introduce any pollutant or pollutants that will cause pass through or interference with the operation of the POTW and the collection system; or
3) No user shall introduce any of the following pollutants:
    a. Pollutants which create a fire or explosion hazard, including but not limited to, wastestreams with a closed cup flashpoint of less than 140 ^{o}F (60 ^{o}C);
    b. Pollutants which will cause corrosive structural damage or have a pH less than 5.0 standard units unless the POTW is designed to accommodate such pH levels;
    c. Solid or viscous pollutants in amounts that would obstruct the flow to the POTW thus resulting in interference;
    d. Any pollutant released in a discharge at such a volume or strength as to cause interference in the POTW;
    e. Heat in such quantities that the temperature at the POTW treatment plant exceeds 104 ^{o}F (40 ^{o}C) unless the POTW requests and the Approval Authority grants alternate temperature limits;
    f. Petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass-through;
    g. Pollutants which result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health and safety problems; and,
    h. Any trucked or hauled waste except, at discharge points designated by the POTW

All POTW's, in cases where pollutants contributed by user(s) of the collection system are likely to result in reoccurring interference or pass-through, shall develop and enforce specific effluent limits for industrial user(s), and all other users, as appropriate, which, together with appropriate changes in the POTW treatment plant's facilities or operation, are necessary to ensure renewed and continued compliance with the POTW's KPDES permit or sludge use or disposal practices. POTW's with approved Pretreatment Programs meet this requirement.

2.2. Capacity, Management, Operation and Maintenance (CMOM) Program

2.2.1. Applicability

These conditions apply to all permittees with sewage infrastructure including the sewer system and wastewater treatment plant.

2.2.2. Goals

The goals of a comprehensive CMOM Program are:

1) To better manage, operate, and maintain the collection system;
2) Investigate capacity constrained areas of the collection system;
3) Proactively prevent or minimize SSOs;
4) Respond to SSO events; and
5) Proactively prevent or minimize the potential for the release of pollutants from ancillary activities through plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from storage areas.

To achieve these goals permittee shall complete a CMOM self-assessment using the checklist in the "Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems," EPA 305-B-05-002 to determine the scope of the CMOM program. The guide is available at: http://www.epa.gov/npdes/pubs/cmom_guide_for_collection_systems.pdf.

Upon completion of the checklist the permittee shall develop a proposed plan of action to achieve the goals of the CMOM program.

2.2.3. CMOM Plan

At a minimum the plan of action shall include the following:

1) Self-Assessment Summary (including recommended improvements and schedules);
2) Collection System Diagram;
3) Sewer Overflow Response Protocol (SORP);
4) Best Management Practices (BMPs); and
5) Any other constituent programs necessary to achieve the goals of the CMOM program (See http://www.epa.gov/region04//water/wpeb/momproject/documents/r4prgguide.pdf for additional guidance)

2.2.4. Collection System Diagram

The collection system diagram shall include the following:

1) Scale;
2) North arrow;
3) Date the map was drafted and most recent revision;
4) Street names;
5) Surface waters;
6) Service area boundaries;
7) Manholes and other access points (including structure IDs);
8) Sewer lines;
9) Pump stations (including structure IDs);
10) Wastewater treatment plants;
11) Permitted discharge points or outfalls (including CSO outfalls);
12) CSO regulators, for combined sewer systems; and
13) Locations of recurring SSOs that occurred within the last five (5) years prior to the effective date of this permit.

2.2.5. Sewer Overflow Response Protocol (SORP)

At a minimum the SORP shall include the following elements:

1) An overflow response procedure including designated responders for the permittee, response times, and cleanup methods;
2) A public advisory procedure;
3) A regulatory agency notification procedure.;
4) A manhole and pump station inspection schedule;
5) A procedure for addressing discharges to buildings caused by blockage, flow condition, or other malfunction in sewer infrastructure owned or operationally-controlled by the permittee; and
6) A requirement to include the structure ID for reported incidents.

2.2.6. Best Management Practices (BMPs)

BMPs are schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to implement the prohibitions listed in Section 2.1 of this permit. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage.

2.2.7. Implementation

Implementation shall be as soon as possible, but no later than one year from the effective date of the permit or as specified in the schedule of compliance for this permit.

2.2.8. Documentation

The permittee shall maintain all applicable CMOM program documents at the facility and make them available upon request to EEC personnel. Initial copies and modification thereof shall be sent to DOW upon request.

2.2.9. Modification

The permittee shall amend CMOM Programs documentation whenever there is a change in the facility or change in operation of the facility which materially affects the requirements specified in applicable documents.

2.2.10. Modification for Ineffectiveness

If any of the CMOM programs prove to be ineffective in achieving the general objective of preventing and eliminating SSOs and other unauthorized discharges, the permit, and/or specific CMOM programs shall be subject to modification to address deficiencies. If at any time following the issuance of this permit any of the CMOM programs are found to be inadequate pursuant to a state or federal site inspection or review, affected CMOM program documents shall be modified to incorporate such changes necessary to resolve concerns.

2.3. Pretreatment Program

DOW has approved the Pretreatment Program developed by the permittee on 08/08/1986.

The permittee shall:

1) Be responsible for the performance of all pretreatment requirements contained in 40 CFR Part 403;
2) Implement and enforce its approved POTW pretreatment program;
3) Enforce the requirements promulgated under Sections 307(b), 307(c), 307(d), and 402(b) of the Act;
4) Cause industrial users subject to federal categorical standards to achieve compliance no later than the date specified in those requirements or, in the case of a new industrial user, upon commencement of the discharge; and
5) Be subject to enforcement actions, penalties, fines, and other remedies by the Cabinet.

The pretreatment program and all of its elements are incorporated as enforceable conditions of the KPDES permit. The Cabinet may initiate enforcement action against a POTW and against an industrial user for noncompliance with applicable standards and requirements as provided in KRS 224.16-050(1), 224.70-110, and 224.73-120, and pursuant to the Clean Act.

During the 4th quarter of the reporting year DOW shall provide the permittee with instructions on the preparation and submittal of the Annual Pretreatment Program Report. The annual report shall be prepared in accordance with these instructions and shall be in the proper format and include sufficient detail such that DOW can ascertain compliance with the Pretreatment Program Requirements. The report is to be submitted to DOW's Surface Water Permits Branch no later than March 1st of the following calendar year. Annual reports not in the proper format, that do not include all the necessary elements, that are not sufficient detail, or are received after March 1st are incomplete and is a violation of the KPDES permit unless DOW has granted an extension.

SECTION 3
STANDARD CONDITIONS

3. STANDARD CONDITIONS

3.1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of KRS Chapter 224 and is grounds for enforcement action; for permit termination, revocation and reissuance, modification, or denial of a permit renewal application. Any person who violates applicable statutes, who fails to perform any duty imposed, or who violates any determination, permit, administrative regulation, or order of the cabinet promulgated pursuant thereto shall be liable for a civil penalty as provided at KRS 224.99.010.

3.2. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new permit.

3.3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action, that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3.4. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3.5. Proper Operation and Maintenance

The permittee shall at all times, properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems, which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

3.6. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, notification of planned changes or anticipated noncompliance does not stay any permit condition.

3.7. Property Rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

3.8. Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

3.9. Inspection and Entry

The permittee shall allow the Director or an authorized representative (including an authorized contractor acting as a representative of the Director), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by KRS 224, any substances or parameters at any location.

3.10. Monitoring and Records

(1) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(2) Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities which shall be retained for a period of at least five (5) years (or longer as required by 401 KAR 5:065, Section 2(10), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

(3) Records of monitoring information shall include:

(i) The date, exact place, and time of sampling or measurements;
(ii) The individual(s) who performed the sampling or measurements;
(iii) The date(s) analyses were performed;
(iv) The individual(s) who performed the analyses;
(v) The analytical techniques or methods used; and
(vi) The results of such analyses.

(4) Monitoring must be conducted according to test procedures approved under 401 KAR 5:065, Section 2(8) unless another method is required under 401 KAR 5:065, Section 2(9) or (10).

(5) KRS 224.99-010 provides that any person who knowingly violates KRS 224.70-110 or other enumerated statutes, or who knowingly renders inaccurate any monitoring device or method required to be maintained under this permit, shall be guilty of a Class D felony and, upon conviction, shall be punished by a fine of not more than $25,000, or by imprisonment for not more than one (1) year, or both. Each day upon which a violation occurs shall constitute a separate violation.

3.11. Signatory Requirement

(1) All applications, reports, or information submitted to the Director shall be signed and certified pursuant to 401 KAR 5:060, Section 4.

(2) KRS 224.99-010 provides that any person who knowingly provides false information in any document filed or required to be maintained under KRS Chapter 224 shall be guilty of a Class D felony and upon conviction thereof, shall be punished by a fine not to exceed twenty-five thousand dollars ($25,000), or by imprisonment, or by fine and imprisonment, for each separate violation. Each day upon which a violation occurs shall constitute a separate violation.

3.12. Reporting Requirements

3.12.1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(i) The alteration or addition to a permitted facility, may meet one of the criteria for determining whether a facility is a new source in KRS 224.16-050; or
(ii) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under KRS 224.16-050; or
(iii) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

3.12.2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3.12.3. Transfers

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under KRS 224; see 401 KAR 5:070, Section 5; in some cases, modification or revocation and reissuance is mandatory.

3.12.4. Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(i) Monitoring results must be reported on a DMR or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.
(ii) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 401 KAR 5:065, Section 2(8), or another method required for an industry-specific waste stream under 401 KAR 5:065, Section 2(9) or (10), the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.
(iii) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

3.12.5. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit, shall be submitted no later than fourteen (14) days following each schedule date.

3.12.6. Twenty-four Hour Reporting

(i) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.
(ii) The following shall be included as information which must be reported within twenty-four (24) hours under this paragraph:
(A) Any unanticipated bypass which exceeds any effluent limitation in the permit.
(B) Any upset which exceeds any effluent limitation in the permit.

(C) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within twenty-four (24) hours.
(iii) The Director may waive the written report on a case-by-case basis for reports under paragraph ii of this section if the oral report has been received within twenty-four (24) hours.

3.12.7. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under Sections 3.12.1, 3.12.4, 3.12.5 and 3.12.6, at the time monitoring reports are submitted. The reports shall contain the information listed in Section 3.12.6.

3.12.8. Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Director, it shall promptly submit such facts or information.

3.13. Bypass

3.13.1. Definitions

(i) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.
(ii) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

3.13.2. Bypass Not Exceeding Limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Section 3.13.1.

3.13.3. Notice

(i) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, and if possible at least ten days before the date of the bypass.
(ii) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section 3.12.6.

3.13.4. Prohibition of Bypass

(i) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:
(A) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
(B) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
(C) The permittee submitted notices as required under Section 3.13.3.
(ii) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the conditions listed above in Section 3.13.3.

3.14. Upset

3.14.1. Definition

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

3.14.2. Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations, if the requirements of Section 3.14.3 are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

3.14.3. Conditions Necessary for a Demonstration of Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(i) An upset occurred and that the permittee can identify the cause(s) of the upset;
(ii) The permitted facility was at the time being properly operated;
(iii) The permittee submitted notice of the upset as required in Section 3.12.6; and
(iv) The permittee complied with any remedial measures required under Section 3.4.

3.14.4. Burden of Proof

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

SECTION 4
WET TESTING REQUIREMENTS

4. WET TESTING REQUIREMENTS

The permittee shall initiate, within thirty (30) days of the effective date of this permit, or continue the series of tests described below to evaluate wastewater toxicity of the discharge from Outfall 001.

4.1. Sampling Requirements

Tests shall be conducted on each of two grab samples collected over the period of discharge,(i.e., discrete sample #1 taken at commencement of discharge, sample #2 taken approximately 12 hours later, sooner if discharge is expected to cease). The elapsed time between the collection of each grab sample and the initiation of each test shall not exceed 36 hours.

Samples shall be iced and maintained at not greater than 6 ^{o}C during collection, storage, transport and until used in the test by the laboratory.

4.2. Test Requirements

The Acute WET test requirements consists of two 48-hour static non-renewal toxicity tests with water flea (*Ceriodaphnia dubia*, *Daphnia magna*, or *Daphnia pulex*) and two 48-hour static non-renewal toxicity tests with fathead minnow (*Pimephales promelas*) performed on discrete grab samples of 100% effluent (1.00 TU_A) at the frequency specified. Testing of each sample shall begin within 36 hours of the collection of that sample.

4.3. Serial Dilutions

Effluent concentrations for the tests must include the percent effluent required by the permit and at least four additional effluent concentrations as in the following table.

TABLE 7.

Required Percent Effluent	Dilution 1 Percent	Dilution 2 Percent	Dilution 3 Percent	Dilution 4 Percent	Dilution 5 Percent
100	20	40	60	80	100

For a required percent effluent of 100%, test concentrations shall be 20%, 40%, 60%, 80% and 100%.

For a required percent effluent less than 100% but greater than or equal to 75%, the test concentrations shall include the required percent effluent, two (2) concentrations below that are based on a 0.5 dilution factor, and two (2) concentrations above: one (1) at mid-point between 100% and the required percent effluent, and one (1) at 100% effluent.

For a required percent effluent less than 75%, test concentrations shall include the required percent effluent, two (2) concentrations below on a 0.5 dilution factor, and two (2) concentrations above the required percent effluent based on a 0.5 dilution factor if possible, one (1) at mid-point between 100% and the required percent effluent, and one (1) at 100% effluent.

Selection of different effluent concentrations must be approved by DOW prior to testing. Controls shall be conducted concurrently with effluent testing using synthetic water.

4.4. Controls

Control tests shall be conducted concurrent with effluent testing using synthetic water. The analysis will be deemed reasonable and good only if the minimum control requirements are met.

Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period.

Within 30 days prior to initiating an effluent toxicity test, a reference toxicant test must be completed for the method used; alternatively, the reference toxicant test may be run concurrent with the effluent toxicity test.

Control survival is 90% or greater in test organisms held in synthetic water.

For the fathead minnow test: at least 80% survival in controls and the average dry weight per surviving organism in control chambers equals or exceeds 0.25 mg.

4.5. Test Methods

All test organisms, procedures, and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, EPA-821-R-02-012 (5th edition), the most recently published edition of this publication, or as approved in advance by DOW.

4.6. Reduction to Single Species Testing

After at least six (6) consecutive passing toxicity tests using both, the water flea and the fathead minnow, a request for testing with only the most sensitive species may be submitted to DOW. Upon approval, the most sensitive species may be considered as representative and all subsequent compliance tests may be conducted using only that species unless directed at any time by DOW to change or revert to both.

4.7. Reduction in Monitoring Frequency

The permittee may request a reduction in the frequency of WET testing from quarterly to annual upon demonstration that no test failures, incomplete tests, or invalid tests occurred during the following specified timeframes:

1) Existing facilities: four (4) consecutive quarters;
2) New or expanded facilities: eight (8) consecutive quarters.

New and expanded facilities are defined in the above Requirements Effective Dates Section of this permit. In the event of the failure of an annual test or non-submission by January 28th of the year following the completion of the test, the permittee will again be subject to quarterly WET testing.

4.8. Reporting Requirements

Results of all toxicity tests conducted with any species shall be reported according to the most recent format provided by DOW (See the Section for Submission of DMRs of this permit). Notification of failed test shall be made to DOW within five days of test completion. Test reports shall be submitted to DOW within thirty (30) days of completion. A control chart including the most recent reference toxicant test endpoints for the effluent test method (minimum of 5, up to 20 if available) shall be part of the report.

4.9. Test Results

If noncompliance occurs in an initial test, the permittee shall repeat the test using new samples. Results of this second round of testing will be used to evaluate the persistence of the toxic event and the possible need for a Toxicity Reduction Evaluation (TRE).

Noncompliance is demonstrated if the LC_{50} is less than 100 % effluent. If noncompliance occurs in an initial test, the permittee shall repeat the test using new grab samples collected approximately twelve (12) hours apart. Sampling must be initiated within ten (10) days of completing the failed test. The second round of testing shall include both species unless approved for only the most sensitive species by DOW.

4.10. Accelerated Testing

If the second round of testing also demonstrates noncompliance, the permittee will be required to perform accelerated testing as specified in the following paragraphs.

Complete four (4) additional rounds of testing to evaluate the frequency and degree of toxicity within sixty (60) days of completing the second failed round of testing. Results of the initial and second rounds of testing specified above plus the four (4) additional rounds of testing will be used in deciding if a TRE shall be required.

If results from any two (2) of six (6) rounds of testing show a significant noncompliance with the Toxicity limit, i.e., ≥1.2 times the TU, or results from any four of the six tests show toxicity as defined above, a TRE will be required.

The permittee shall provide written notification to DOW within five (5) days of completing the accelerated testing, stating that: (1) toxicity persisted and that a TRE will be initiated; or (2) that toxicity did not persist and normal testing will resume.

Should toxicity prove not to be persistent during the accelerated testing period, but reoccur within twelve (12) months of the initial failure at a level ≥ 1.2 times the TU, then a TRE shall be required.

4.11. WET TRE

Having determined that a TRE is required, the permittee shall initiate and/or continue at least monthly testing with both species until such time as a specific TRE plan is approved by DOW. A TRE plan shall be developed by the permittee and submitted to DOW within thirty (30) days of determining a TRE is required. The plan shall be developed in accordance with the most recent Environmental Protection Agency (EPA) and DOW guidance. Questions regarding this process may be submitted to DOW.

The TRE plan shall include Toxic Identification Evaluation (TIE) procedures, treatability studies, and evaluations of: chemical usage including changes in types, handling and suppliers; operational and process procedures; housekeeping and maintenance activities; and raw materials. The TRE plan will establish an implementation schedule to begin immediately upon approval by DOW, to have duration of at least six (6) months, and not to exceed twenty-four (24) months. The implementation schedule shall include quarterly progress reports being submitted to DOW, due the last day of the month following each calendar quarter.

Upon completion of the TRE, the permittee shall submit a final report detailing the findings of the TRE and actions taken or to be taken to prevent the reoccurrence of toxicity. This final report shall include: the toxicant(s), if any are identified; treatment options; operational changes; and the proposed resolutions including an implementation schedule not to exceed one-hundred-eighty (180) days.

Should the permittee determine the toxicant(s) and/or a workable treatment prior to the planned conclusion of the TRE, the permittee will notify DOW within five (5) days of making that determination and take appropriate actions to implement the solution within one-hundred-eighty (180) days of that notification.

SECTION 5
OTHER CONDITIONS

5. OTHER CONDITIONS

5.1. Other Permits

This permit has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal, and local agencies.

5.2. Continuation of Expiring Permit

This permit shall be continued in effect and enforceable after the expiration date of the permit provided the permittee submits a timely and complete application in accordance with 401 KAR 5:060, Section 2(4).

5.3. Antidegradation

For those discharges subject to the provisions of 401 KAR 10:030 Section 1(3)(b)5, the permittee shall install, operate, and maintain wastewater treatment facilities consistent with those identified in the approved regional facility plan.

5.4. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved in accordance with 401 KAR 5:050 through 5:080, if the effluent standard or limitation so issued or approved:

1) Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
2) Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

5.5. Sludge Disposal

The disposal or final use of sewage sludge generated during the treatment of domestic sewage by a POTW shall be disposed of in accordance with state and federal requirements [401 KAR Chapter 45 and 40 CFR 503].

5.6. Certified Operators

The wastewater treatment plant shall be under the primary responsibility of Class II Wastewater Treatment Plant Certified Operators or higher.

The collection system shall be under the primary responsibility of Class II Collection System Certified Operators or higher.

5.7. Outfall Signage

The KPDES permit establishes monitoring points, effluent limitations, and other conditions to address discharges from the permitted facility. In an effort to better document and clarify these locations the permittee should place and maintain a permanent marker at each of the monitoring locations.

SECTION 6
MONITORING AND REPORTING REQUIREMENTS

6. MONITORING AND REPORTING REQUIREMENTS

6.1. KPDES Outfalls

Discharge samples and measurements shall be collected at the compliance point for each KPDES Outfall identified in this permit. Each sample shall be representative of the volume and nature of the monitored discharge.

6.2. Monthly Operating Reports (MORs)

In addition to the monitoring of effluent as specified by the permit, the permittee shall conduct process control monitoring on a daily basis. Process control monitoring is that monitoring performed by the operators of the wastewater treatment plant to determine if the wastewater system is operating at its optimum efficiency. This monitoring includes but is not limited to influent and effluent quality and quantity monitoring, chemical usage, sludge monitoring including volume produced, wasted, and disposed, and monitoring of internal units such as aeration basins and oxidation ditches.

The data shall be recorded using the Microsoft EXCEL-based Monthly Operating Report (MOR) workbook available of the Department for Environmental Protection's Forms webpage at:

http://dep.ky.gov/formslibrary/Pages/default.aspx

The updated workbook shall be maintained on-site and made available upon request by Cabinet personnel.

6.3. Sufficiently Sensitive Analytical Methods

Analytical methods utilized to demonstrate compliance with the effluent limitations established in this permit shall be sufficiently sensitive to detect pollutant levels at or below the required effluent limit. It is the responsibility of the permittee to demonstrate compliance with permit parameter limitations by utilization of sufficiently sensitive analytical methods.

6.4. Certified Laboratory Requirements

All laboratory analyses and tests required to demonstrate compliance with the conditions of this permit shall be performed by EEC certified general wastewater laboratories.

6.5. Submission of DMRs

Monitoring results obtained during each monitoring period must be reported. The completed DMR for each monitoring period must be submitted no later than the 28th day of the month following the monitoring period for which monitoring results were obtained.

The completed DMR for each monitoring period must be entered into the DOW approved electronic system no later than midnight on the 28th day of the month following the monitoring period for which monitoring results were obtained.

For more information regarding electronic submittal of DMRs, please visit the Division's website at: http://water.ky.gov/permitting/Pages/netDMRInformation.aspx or contact the DMR Coordinator at (502) 564-3410.