

# PRELIMINARY ENGINEERING REPORT

FOR

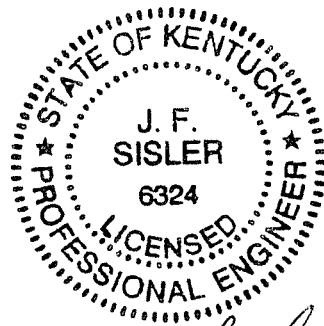
PHASE VIII B

WATER SYSTEM IMPROVEMENTS AND  
WATER TREATMENT PLANT EXPANSION

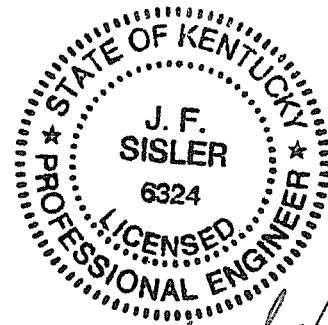
(Carter, Elliott & Lawrence Counties)

RATTLESNAKE RIDGE WATER DISTRICT  
CARTER COUNTY, KENTUCKY

REC'D  
NOV 16  
PUBLIC SERVICES  
COMMISSION



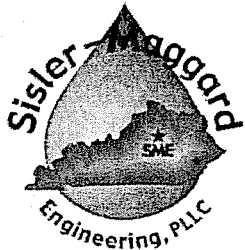
*J. F. Sisler*



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# **Preliminary Engineering Report Phase VIII B**

## **Water Treatment Plant Expansion And Improvements**

### **Rattlesnake Ridge Water District**

#### **Executive Summary**

##### **Findings**

The first phase of Rattlesnake Ridge Water District service areas first began receiving water in October 1985. Some of the final areas of Phase I to receive service came out of project contingency funds which had been set aside until all original bid project lines had been laid.

However, not all of the requested waterline extensions from customer petitions could be made with original project contingency funds, and the District realized that service to these areas would have to be made on future projects. A Phase II extension project was completed in January of 1990 which included approximately 12 miles of new line and construction of a new 80,000 gallon storage tank with service to about 120 new customers.

The base distribution system was in place and the District began Phase III in May 1992 to further expand water service to other feasible areas, which could not be constructed previously. These Phase III areas under consideration, as well as other areas had been petitioning the District for service since the end of 1985 when the initial system went into operation. The initial portions of Phase III went into service in late 1992 with some subsequent areas completed with contingency funds in mid-1993. Phase III completion had a total of 1130 customers. Phase IV Construction began in October 1994 and was completed in October 1995. Upon Phase IV completion, the District had a total of 1500 customers. Phase V construction began in November 1995 and was completed in January 1997. When Phase V was completed, the District had a total of 1735 customers. Finally, with an average annual growth of 4.28% over the

last five years the District currently has 2245 customers as of March 2001. Phase VIB is under construction and should be complete by the end of 2001. The phase VIB project will add approximately 530 new customers for a total of 2775 customers.

The same reasons that necessitated the need for water service to the original areas still exists in the areas that are now petitioning for water service. The water problems in Carter, Elliot and Lawrence Counties have been generally well known for a number of years, and have continuously been brought to the attention of the Rattlesnake Ridge Board as residents within these areas have been unsuccessful in obtaining water service from any other public source. All these areas are known for their low ground water levels and the continuous ground water quality deterioration. Many residents rely on cisterns as their sole source of water, which requires having water hauled to their homes during the drier summer months when rainwater collected from roofs is inadequate. Contamination problems with this source of water supply include problems such as bird droppings on rooftops used to collect rainwater and infiltration of contaminated ground water into leaky cistern tanks. The areas that are served with drilled wells have problems of quantity and quality because the ground water has chemical contaminants as well as fecal contaminants caused by inoperable septic tanks and drain fields.

The existing water purchase contract with the City of Grayson was found to be inadequate and uneconomical when the Phase VIB areas were served and when these Phase VII expansions and system improvements are implemented. Therefore, it was necessary for the Rattlesnake Ridge Water District to seek funding for its own water treatment plant to provide supply to its existing customers, the new prison, as well as any additional customers in the area, that are not able to receive service due to the lack of supply currently available to RRWD, by the City of Grayson. The new water treatment plant is currently under construction and is scheduled for completion in fall 2001, to serve Phase VIB and this Phase VII project.

A review of the most recent Income Statement prepared by the District's accountant for the 12 months ending December 31, 2000 reveals that the District was operating at an approximate net income of \$52,000 (excluding depreciation). The information contained in this audited 12-month statement of income, forms the basis of information

included in the financial section of this report. (See Appendix C.)

The results of the projection of annual income and expenses for the five year period following the Phase VIIIA construction reveals the District will end each year with a positive net income. This indicates that the Phase VIIIB proposed expansion project would not adversely affect the District's financial condition.

**An increase in the customer base as proposed under the Phase VIII A and this Phase VIIIB project will have a net positive effect, in that it will allow the District to substantially increase revenues using the already developed distribution system and build on the investment in the new water treatment plant expansion. Based upon the implementation of the proposed water treatment plant it will allow the District to approach the President's and Governor's goal of water for all rural residents.**

### **Recommendations**

Based on studies, findings and conclusions and in accordance with other pertinent information contained in this report, it is recommended that the Rattlesnake Ridge Water District take the following steps:

- A) Review this report, then direct the Engineer, upon notification of RUS - RD to immediately complete necessary documentation to RUS - RD for further processing for Loan and Grant funds to construct the extensions and improvements outlined in this Report.
- B) Begin the process of tying down and collecting all other tap fees and funds to complete the project funding.
- C) Direct the Engineer to complete all necessary plans, specifications and contract documents to receive approvals and permission to advertise this project for bids.
- D) Upon completion of the above and receipt of approvals, initiate actions to acquire required permits, fee simple titles and right of way easements for

construction areas.

- E) Upon favorable review of RUS, CDBG and ARC make necessary petitions and applications, through local and bond counsel, to the Kentucky Public Service Commission for a Certificate of Need and Necessity.
- F) Amend Water District boundaries in project area as needed.

# Preliminary Engineering Report

## Phase VIII B

### Water Treatment Plant Expansion And Improvements

#### Rattlesnake Ridge Water District

##### Section 1 - General

###### Purpose

The purpose of this Phase VIII B project is to develop a plan that will evaluate the potential methods by which potable water treatment plant can be expanded and add much needed usable water storage to the existing distribution system. **This project is a continuation of the District's long time goal of providing potable water to all feasible rural residents.** Furthermore, in acknowledgement of the President and Governor's goal of water for all rural Kentucky, the District is providing service to the most feasible areas as low as 5 houses per mile.

###### Scope

###### Phase I & II Service Areas

1. The existing Rattlesnake Ridge Water District service area includes two separated areas of Carter County. One section, north of I-64 includes service to the Gregoryville area of U.S. 60 including Smith Branch and State Route 1947.
2. The other larger area south of I-64 includes service to areas east of Route 7 including Route 1 from Hitchins to Webbville, Davy's Run, Route 1496, Huff Run, Mayhew Flats, Eidson Road, and several other County Roads.
3. Areas served west of Route 7 include Route 7 from Shady Valley south to the Grayson Lake State Park Campground, Rattlesnake Ridge, State Route 182 and 773, Cory Ridge, Church Ridge, Barkley Flats, Three Pines Road, Bear Ridge, Benyan Branch, Route 504 and many other lesser traveled County

Roads.

### **Phase III Service Area**

The following areas were provided service in Phase III extensions that were completed in summer of 1993:

#### **SOUTHERN CARTER COUNTY**

**Aden**-Gregoryville Road from US Rt 60 to the community of Aden.

**Oats Hill**-Oats Hill Road from Church Ridge to end of Oats Hill Road.

**Squire Lick**-Beginning at Mountain Top along Chapel Mountain Top Mine Road to Rt. 986 and along Rt. 986 from Ross Chapel to Providence Road.

**Tick Ridge**-From Rt. 986 along Frazier Road to Tick Ridge Lookout Tower. This line could allow future connection to Olive Hill water system.

**Clifty Creek**-Service along Rt. 986 from Rt. 7 to Rt. 182.

#### **NORTHERN ELLIOT COUNTY**

**Rt. 504** - Service along Rt. 504 from Rt. 1555 to the Rowan County line.

### **Phase IV Service Areas**

The Phase IV project provided service to areas in northeastern Elliot County and northwestern Lawrence County as follows:

#### **ELLIOT COUNTY**

**State Rt. 7**- Beginning in Carter County at the entrance to Grayson Lake State Park and running south along SR 7 crossing the Little Sandy River portion of Grayson Lake at Bruin with service to the new State beach and picnic area and thence to the Little Sandy River at SR 706.

**State Rt. 409**- Beginning at SR 7 at Bruin to Ison Creek including Porter Creek

**Horton Flats**- Beginning at SR 7 running west on the county road.

**SR 855 (Bear Flats)**- Beginning at SR 7 and running north to Bear Flats.

**SR 706**- Beginning at SR 7 and running to Laurel Branch including Rose Creek.

**SR 649 (Stark Ridge)**- This line which created a loop line tying separate Phase II and Phase III areas together. The line begins at SR 504 near Caney Creek and follows SR 649 west across Stark Ridge to again intersect SR 504 near Ault and connecting to a Phase III line.

**Open Fork Road**- Beginning at SR 986 and running south along Open Fork County road and thence with branches to Ibex and Gimlet Creek Road.

### **LAWRENCE COUNTY**

**SR 1** - Beginning at Webbville and running along SR 1 to Brammer Gap with branches to serve Diamond Ridge and the Clevinger Knob areas.

### **Phase V Service Areas**

The Phase V project provided service to customers located in northern Carter County in the following areas:

### **CARTER COUNTY**

**US 60** – Beginning on US 60 east of Biggs Hill near Wicker Hollow at a new pump station. Thence continuing up Wicker Hollow and cross country and then crossing Tygart's Creek and returning to SR 182 on Oakland Ridge. Then, continuing along SR 182 (Oakland Ridge) to the intersection of SR 2.

**SR 2** – The line extends south along SR 2 to Jordan Fork and then up Jordan Fork and also north along SR 2 to Carter City and finally along SR 2 from Carter City to the intersection of SR 2 and SR 7 at Gesling.

**SR 7** -- Beginning at the intersection of SR 2 and SR 7 and continuing east along SR 7 to the foot of John Moore Hill.

**SR 474** - Beginning in Carter City at the intersection of SR 2 and running west along Smith Creek.



## **Phase VIB Service Areas**

The following areas were served by Phase VIB waterline extension project for the Rattlesnake Ridge Water District includes:

### **Smoky Area (Northeastern Carter County north of I-64)**

Service to the following areas would provide a dependable and safe potable water supply to approximately **430** residences.

**Erwin Ridge Road** -Beginning on Erwin Ridge Road southwest of Oakland Ridge, the line will continue west on Erwin Ridge Road to its intersection with SR 2.

**State Route 2** -The line will proceed south along SR 2 to its intersection with East Trough Camp Road and north to Bethel Ridge Road.

**State Route 1025 and Smoky Creek Road** -Beginning at SR 1025 (Ervin Ridge Road) and Oakland Ridge Road and thence along SR 1025 to Smoky Creek Road and also Beginning at the intersection of SR 2 and Smoky Creek Road and continuing east on Smoky Creek Road until its intersection with SR 1025. Then continuing southeast on SR 1025 to its intersection with Prater Creek Road near Prater and thus continuing until the end of Prater Creek Road. The line will also continue south on SR 1025 under I-64 near city limits of Olive Hill.

**State Route 1704 (Trough Camp Road)** - Beginning at the intersection of SR 2 and SR 1704 and running southwest along SR 1704 to near I-64.

**Webb Ridge Road** - Beginning at the intersection of Webb Ridge Road and SR 2 and continuing west on Webb Ridge Road until its intersection with Rose Ridge Road near Rose Hill at S.R. 59.

**Rose Ridge Road** - Beginning at the intersection of Rose Ridge Road and Webb Ridge Road and SR 59 and continuing west on Rose Ridge Road until the intersection of SR 1662. Also, running south on Smith's Run Road from the intersection of Rose Ridge Road continuing under I - 64 to near the intersection of US 60 at Globe. Finally, running south on Tomo Lane from its intersection with Rose Ridge Road.

**Walnut Grove Ridge Road** - Beginning at the intersection of Walnut Grove Ridge Road and Rose Ridge Road and SR 1662 and continuing west on Walnut Grove Ridge Road to the intersection of SR 1068. Also, running south on Horton /Flat Fork Road from its intersection with Walnut Grove Ridge Road until its intersection with SR 1024. Then continuing east and west on SR 1024 to Fitch near the Rowan County line to the west.

**SR 59** - Beginning at the intersection of Rose Ridge Road and SR 59 and continuing south on SR 59 for approximately 1½ miles.

**Bethel Ridge Road** - Beginning at the intersection of SR 2 and Bethel Ridge Road and continuing on Bethel Ridge Road west to near the Lewis County line.

### **SOUTH OF I-64**

**Cory Branch Road** - Beginning near Cory and continuing east on Cory Branch Road to its intersection with SR 182 near Grahn.

**SR 1620 (Thompson Branch)** - Beginning at the intersection of SR 1620 and Parker Trail in Elliot County and continuing northwest on SR 1620 into Carter County to near its intersection with SR 174.

**Sherman Waggoner Road – Elliot County** - Beginning at the intersection of SR 504 and Sherman Waggoner Road and continuing northwest on Sherman Waggoner Road before going cross – country and then following SR 1620 until near its intersection with Joel Skaggs Road to provide hydraulic gradient to serve Mushroom Hill.

**Big Run Road** - Beginning at the intersection of Maddox Trail and Big Run Road and continuing northwest on Big Run Road through Fultz under I – 64 until its intersection with US 60 with service to the existing Gregoryville water tank.

**Maddox Trail** - Beginning at the intersection of SR 7 and Maddox Trail and continuing on Maddox Trail in a northerly direction until its intersection with Big Run Road.

**US 60** - Beginning at the intersection of US 60 and Big Run Road and continuing northwest on US 60 near its intersection with Wicker Hollow Road. This line will be

parallel to an existing line and provide additional flow to existing Phase V Pump Station to be upgraded to serve Phase VII in Smoky area.

**State Route 1496 (Lost Creek Road)** - Beginning at the intersection of SR 1 and continuing on SR 1496 in an easterly direction until its intersection with Hickory Log Hollow Road. Also, with a line continuing from the intersection of SR 1496 and E K Mines Branch Road north on E K Mines Branch Road. Also service off SR 1496 for Knipp Branch and Cook Creek.

**State Route 201** - Beginning at the intersection of SR 1 and SR 201 near Webbville and continuing south on SR 201 approximately 1 mile.

**Green Branch Road** - Beginning at the intersection of SR 486 and continuing on Green Branch Road to its end.

**Rocky Branch Road** - Beginning near the intersection at end of existing line on SR 706 (Rose Road) and continuing on SR 706 (Rocky Branch Road) south to Burke.

**Mushroom Hill Road – 2/3 Carter County and 1/3 Elliot County** - Beginning on Mushroom Hill Road near its intersection with SR 1620 and continuing north on Mushroom Hill Road to near Lawton.

**South Bethel Ridge Road – Carter County** - Beginning at the intersection of Smoky Road and South Bethel Ridge Road and continuing north on South Bethel Ridge Road until near its intersection with Sapp Road.

**Smoky Valley Road – Carter County** - Beginning at the intersection of SR 2 and Smoky Valley Road and continuing west on Smoky Valley Road until near the end of road.

**Fults Ridge Road – Carter County** - Beginning at intersection of Smoky Valley Road and Fults Ridge Road and continuing north on Fults Ridge Road for ½ mile.

**Webb Lane – Carter County** - Beginning at the intersection of Rose Ridge Road and Webb Lane and continuing south on Webb Lane for approximately 1 mile.

**SR 7 (Horton Flats Road to Rattlesnake Ridge Road) – Carter County** - Beginning

at the intersection of SR 986 and SR 7 and continuing north on SR 7 until its intersection with Rattlesnake Ridge Road. This line is a backfeed to provide water to rest of system from new water treatment plant.

**Phase VIIIA Service Areas**

The following areas were served by Phase VIIIA waterline extension project for the Rattlesnake Ridge Water District includes:

Service to the following areas would provide a dependable and safe potable water supply to approximately **442** residences.

**Carter County**

**James Chapel Road**

**Lovell Road**

**SR 1612 (Little Brushy) off SR 1122**

**Lawrence County**

**SR 201** – Upgrade to 4” on SR 201 from SR 1 to existing end on SR 201 Upgrade to 6” on SR 1 from 486 to SR 201.

**Dry Fork Road off SR 201**

**Camp Branch RD off SR 201**

**Griffith Branch RD of SR 201**

**Fishertown RD off SR 201**

**McNeil Branch Road off SR 201**

Twin Lick Road off SR 201

Lick Fork Road off SR 201

Abbs Creek off SR 201

Needmore Branch off SR 201

Little Bear Drive off SR 201

Twin Branch (Gobblers Knob) off SR 628 at San Branch

Wiley Branch off Cam Creek

Caines Creek From SR 32 to Hurricane Creek, Gillum Branch at SR 486

Elliot County

Lower Newcombe 706 N off SR 32

Anderson Branch off SR 706 N

Boggs Branch from Newcombe

Boggs Branch from Rocky Br. At Burke

Salyers Br. Off SR 486

Wallow Hole RD off SR 486

Paul Barker RD off Wallow Hole

SR 32 North from Ferguson MKT

**Beech Grove extension off SR 32 including Hay Hollow**

**Whites Creek off SR 486**

**POPULATION & HOUSEHOLD INCOME**

Population for Carter, Laurence, and Elliot County are based upon the 2000 U.S. Census of Population and Housing.

**Population Projections**

| Year | Population    | % Change      | Avg. Household Size | Population    | % Change      | Avg. Household Size | Population      |
|------|---------------|---------------|---------------------|---------------|---------------|---------------------|-----------------|
|      | <u>Carter</u> | <u>Carter</u> | <u>Carter</u>       | <u>Elliot</u> | <u>Elliot</u> | <u>Elliot</u>       | <u>Lawrence</u> |
| 1990 | 24,340        | -             | 2.70                | 6,455         | -             | 2.70                | 13,998          |
| 2000 | 26,889        | +10.5%        | 2.95                | 6,748         | +4.5%         | 2.50                | 15,569          |

\*Based on moderate growth series

The absence of water and sewer facilities are generally the limiting factor in determining how a particular area may develop and the rate of development. One would expect to see a 10% to 20% increase in population per decade in areas that obtain at least one of these services with water being the most important to growth.

It is expected that the number of customers will increase at a faster rate when a public water supply is made available. Including the population growth in the Water District and the existing non-signed houses, which will join the public water supply, a 5% per year increase the first year after construction is complete, and a 4% annual increase thereafter.

The total estimated population located within this proposed service area of the Rattlesnake Ridge Water District is estimated at (628 X 2.8 average) **1,758** persons.

### **Household Income**

**The 1990 Census of Population and Housing shows the median household income for Carter, to be \$17,083; for Elliot County it is \$13,890, and for Lawrence County it is \$15,273. Therefore, all four counties fall below the State's median household income level of \$22,534. This will allow the District to qualify for the low interest rate of 4.5% on RUS Loan funds for this project.**

### **Service Areas**

The service areas within the Rattlesnake Ridge Water District are almost exclusively residential in nature. Single family homes dominate the service area. Studies conducted by the U.S. Census Bureau in 2000 indicate 2.95 persons occupy each household unit in Carter, 2.50 in Elliot and 2.60 in Laurence in this project area. We have assumed an average of 2.80 households throughout the project area.

Other land uses include forest products, coal mining, and agricultural.

The development of the public water system for the Rattlesnake Ridge Water District has encouraged some economic development in the other service areas, especially in the area around Grayson Lake State Park. This is not expected, however, to



significantly alter the predominately **rural**, residential nature of the proposed service areas.

Future development and growth is expected in the service areas and along all major Kentucky State and U.S. highways and served county roads.

### **Description of Existing Service Area Boundary**

The existing Rattlesnake Ridge Water District (R.R.W.D.) service area boundaries include two separated areas both north and south of I-64. A map of the existing Rattlesnake Ridge Water District Service Area Boundary is retained by the District for reference. The District boundary is also shown on map at end of this report.

The new service areas of the Rattlesnake Ridge Water District for this project includes portions of Carter, Elliot and Lawrence Counties.

# **Preliminary Engineering Report**

## **Phase VIII B**

### **Water Treatment Plant Expansion And Improvements**

#### **Rattlesnake Ridge Water District**

##### **Section 2 – Planning Areas**

Carter County (the home county) is located in Northeastern Kentucky bordered to the north by Lewis and Greenup. Rowan County to the West, Boyd County to the East, and Morgan and Lawrence Counties to the South. Grayson is the county seat for Carter County.

Carter County is separated by Interstate 64 and U.S. 60 which follows an East-to-West direction across the county and Kentucky Routes 1 and 7 which runs North-to-South on the eastern end of the County.

##### **Phase VIII B Proposed Project**

The proposed project will include the expansion of the current water treatment plant from 1.6 MGD to 2.6 MGD. This will be accomplished by adding an additional 1.0 MGD Actiflo treatment unit and filter. This will require a building addition as well. Also, the raw water pumps and high service pumps must be upgraded. The existing drying beds will be expanded to meet the additional waste flow.

This project will also include a new 300,000 gallon elevated water tank near Rattlesnake Ridge Road to help alleviate the increased demand on the existing Mayhew Flats tank. This tank will be controlled by the WTP high service pump. In addition, a new 150,000 gallon elevated water tank will be constructed near four mile road along Big Run Road. This tank will eliminate a low pressure area due to increased demand on the system. This tank will be fed by the new water booster to be installed on Big Run Road. The project will also include the upgrade of the SR 504 water booster to help with increased demand.

# **Preliminary Engineering Report Phase VIII B**

## **Water Treatment Plant Expansion And Improvements**

### **Rattlesnake Ridge Water District**

#### **Section – 3 Existing Facilities**

The existing sources of water for non-served residents of the Rattlesnake Ridge Water District include individually dug or drilled wells, cisterns, or pond water, usually with no type of treatment provided.

The usable groundwater in the District is generally contaminated with minerals such as sulfur, iron, or chlorides, which cause problems with hardness, taste, odor, and color. Since the area is not served by sewers, there is also great concern about the introduction of fecal coliforms into the groundwater supply.

At the inception of the Rattlesnake Ridge Water District two (2) sources of water were investigated. The feasibility of construction of a treatment plant to withdraw water from Grayson Lake was found to be impractical both from an initial cost standpoint and because the Corps of Engineers usually requires a charge for raw water withdrawal from their flood storage/recreational facilities. Federal laws have now changed and therefore, the Water Treatment Plant alternative is now feasible and under construction. The first 5 (five) phases of Rattlesnake Ride Water District were served by water purchased from the City of Grayson.

#### **Rattlesnake Ridge Water District System Source of Water Supply**

The source of water supply for the District has now become a 1.6-mgd Water Treatment Plant (WTP) located on Grayson Lake off Horton Flats Road near Bruin. This source of water will meet or exceed all regulations or guidelines relating to potable water imposed by the Kentucky Division of Water.

### **Distribution System (through Phase VIB)**

The distribution system upon completion of **Phase VIB** will contain approximately 366 miles of 10", 8", 6", 4", and 3" water mains. Although no fire demand is supplied, the distribution mains have been designed to meet peak water demands. Ten (10) storage tanks are provided for a total storage capacity of 1,386,000 gallons.

The storage is based on the average customer daily water usage of 150 gallons per day. The District currently has (as of March 1, 2000) 2,179 customers plus Phase VIB at 530 customers for a total of 2,709 customers. The new prison will use 200,000 GPD plus 2,708 customers at 150 GPD. Therefore, there exists about 2.92 days of storage, which exceeds Division of Water, PSC and RUS requirements.

### **Water Treatment Plant**

The current water treatment plant currently has a capacity of 1.6 MGD. The documented average daily usage of all current customers ( $\pm 4056$ ) at the Rattlesnake Ridge Water District is 3930 gallons per month divided by 30.4167 days per month equals 129.20 gallons per day per customer. At the completion of this Phase VIIIA project the District will have approximately 4,100 customers plus the prison, the golf course, and the City of Olive Hill. The water treatment plant will be required to produce  $(4,100 \text{ customers} \times 129.20 \text{ GPD} + 200,000 \text{ GPD [prison]}) + 350,000 \text{ GPD (Parks)} + 200,000 \text{ GPD (Olive Hill)} + 50,000 \text{ GPD (Sandy Hook)} = 1,329,720 \text{ GPD} + 15\% \text{ water loss (199,458 GPD)} = 1,529,178 \text{ GPD}$ . Therefore the plant will be at  $1,529,178 \div 2,600,000 = 60\%$  of capacity.

## **Storage Tanks and Pumping Stations**

A 262,000-gallon tank is located at the intersection of Mayhew Flats and Edison Road. This tank will be filled from the District's new Water Treatment Plant.

A second 97,000 gallon tank, located on McConnell Branch Road, is filled by a 250 gpm pump station on SR 986, which receives its supply from the Mayhew Flats Tank and the new Water Treatment Plant.

A third 60,000 gallon tank, located off U.S. 60 at Gregoryville, will be filled by the Water Treatment Plant and Mayhew Flats Tank.

A fourth 86,000-gallon tank, located along Route 504 at Gimlet, is filled by a 90-gpm pump station located along Route 986 between Benyan Branch and Bear Ridge. This pump station is supplied water by the McConnell Branch tank.

A fifth 50,000-gallon tank, located along Route 504 near Ault is filled by a 90-gpm pump station on Route 504 near the intersection of Route 1555.

The sixth tank of 75,000 gallons constructed in Phase IV is located in Elliot County on State Route 7 near Hog Camp and is currently feed by 100 GPM pump station on SR 7. However, this pump station will be eliminated by Phase VIA and service to this tank and tank number nine will be provided by the new water treatment plant.

The seventh tank (54,000 gallons) constructed in Phase IV is located in Lawrence County on Diamond Ridge. This tank is filled by a pump station at the intersection of State Route 1 and Diamond Ridge Road. The pump station is fed by gravity through Webbville from the Mayhew Flats tank.

The eighth tank (102,000 gallons) constructed in Phase V is located in Carter County on a hill off SR 182 near Oakland Christian Church. This tank is fed by a pump station at the base of the hill on US 60 near Biggs Hill at the intersection of US 60 and Wicker Hollow Road. This pump station is fed by gravity through Gregoryville from the Gregoryville tank.

A ninth tank of 500,000 gallons was added in Phase VIA adjacent to the existing 75,000 gallon tank. It will be fed by the new Water Treatment Plant.

The tenth tank is an elevated 100,000 gallons being added in Phase VIB on Walnut Grove Ridge Road at the Carter /Lewis County line. This tank is fed by a 250 GPM pump station at Smoky Creek Road and SR 2 in Phase VIB.

**Therefore, total storage upon completion of Phase VI B will be 1,386,000 gallons.**

Hypochlorinators are included with the Gregoryville (US 60), State Route 986 Pump Station and new Smoky Valley Pump Stations.

### **Main-Line Pressure Reducing Valve Stations (MPRV's)**

One MPRV is located on Huff Run Road and regulates pressure to the entire District service area along Route 1 from Hitchins south to Webbville. A hypochlorinator is included with this station.

A second MPRV is located on Route 7 near Rattlesnake Ridge Road and regulates pressure to the Grayson Lake State Park campground area. This will be reversed in Phase VI B.

A third MPRV is located on Route 504 and regulates pressure to the low-lying areas along the line.

# **Preliminary Engineering Report Phase VII (Revised)**

## **Water Treatment Plant Expansion And Improvements**

### **Rattlesnake Ridge Water District**

#### **Section 4 – Need for Project**

##### **Design Criteria and Approvals**

All waterlines will be designed in accordance with Kentucky Natural Resources and Environmental Protection Cabinet, Division of Water, **Rural Utilities Service – Rural Development**, and Kentucky Public Service Commission guidelines.

Design drawings will be submitted for approval to the Division of Water and **Rural Utilities Service – Rural Development**. The Preliminary and Final Engineering Reports will be filed with the application for a Certificate of Convenience and Necessity from the Kentucky Public Service Commission. The minimum pressure at all customer meter connections will be 30 psi. Individual pressure reducing valves will be provided at all meter settings where main line pressure is to exceed 90 psi.

##### **Land and Rights-of-Way**

For all lines constructed on private rights-of-way, a construction and permanent easements will be obtained from the property owner prior to constructing the lines. For lines to be constructed on Kentucky State or county highways, all necessary encroachment permits will be obtained before proceeding with waterline construction.

It is anticipated that there will be **no** requirement for fee simple land acquisition of the water storage tank in Gregoryville. This tank will be constructed adjacent to existing tank at Gregoryville.

There will be land required for tank off SR 486 in Elliot County. Therefore, small

acquisition costs will apply.

This tank will be fed by the new water treatment and the Mayhew Flats tank.

### **Source of Water Supply**

The source of water supply to the District will be RRWD's proposed 2.6 mgd water treatment plant located near Bruin on Grayson Lake, which will be completed in fall 2001. The District has a 9,000,000-gallon/month (300,000-gallons/day) water contract for 35 years from the City of Grayson. This contract will continue upon completion of the new water treatment plant, but a minimum of 100,000 GPD will be withdrawn to meet contract unless City of Grayson initiates cancellation of the contract.

The proposed project will include the expansion of the current water treatment plant from 1.6 MGD to 2.6 MGD. This will be accomplished by adding an additional 1.0 MGD Actiflo treatment unit and filter. This will require a building addition as well. Also, the raw water pumps and high service pumps must be upgraded. The existing drying beds will be expanded to meet the additional waste flow.

### **Total Water Storage**

The District upon completion of Phase VIIB, will have 1,596,000 gallons of storage to serve 4,100 customers as set out hereinbefore.

The RUS, Division of Water and PSC require one (1) day storage based on average daily consumption. The average daily consumption in the Rattlesnake Ridge Water District is 129 gallons per day per customer. Therefore, the existing required storage of  $(4,100 \times 129 \text{ GPD} + 200,000 \text{ GPD for the prison} + 350,000 \text{ GPD (Parks)} + 200,000 \text{ GPD (Olive Hill)} + 50,000 \text{ GPD (Sandy Hook)}) = 1,328,900 \text{ GPD}$  exceeds and gives the existing system 1.2 days storage.

Due to the hydraulic necessities of this Phase VIIB project, one (2) new tank of approximately 450,000 gallons will be added at Big Run and Rattlesnake Ridge Road.



This will give the District a total of 2,046,000 gallons of storage.

Therefore, the system will have upon completion of Phase VIII B 2,046,000 gallons storage /614,219 GPD = 1.50 days storage.

### **Distribution System Extensions and Improvements – Phase VII**

The proposed 150,000 gallon Big Run tank will eliminate a low pressure area due to increased demand on the system. This tank will be fed by the new water booster to be installed on Big Run Road. The project will also include the upgrade of the SR 504 water booster to help with increased demand.

# **Preliminary Engineering Report**

## **Phase VIII B**

### **Water Treatment Plant Expansion And Improvements**

#### **Rattlesnake Ridge Water District**

#### **Section 5 – Proposals Considered**

Due to the increased growth in the area and the potential to serve Olive Hill and Sandy Hook with potable, the District needs to expand its current water treatment plant. The surrounding communities have problems in the recent past with source capacity, therefore the District has no other option but to expand its own plant.

In conjunction with the Governor and President's goal of water to all (feasible) **rural** residences, the District put together this Phase VII project to provide service to roads (areas) with five (5) houses per mile.

#### **Construction Problems**

The proposed project as presented in Phase VIII B does not anticipate any significant construction problems. There are several small stream crossings and a minimum amount of sedimentation is to be expected to temporarily occur during waterline construction. These crossings are not anticipated to be of a magnitude that will degrade the environment and the construction specifications will require sedimentation control. No significant problems are anticipated to occur on the project involving construction or operational problems.

## **Hydraulic Computations**

A simple hydraulic check has been made to assure that the areas of service and preliminary line size can be determined. At the time of final design, a detailed computerized hydraulic analysis will be made.

# **Preliminary Engineering Report**

## **Phase VIII B**

### **Water Treatment Plant Expansion And Improvements**

#### **Rattlesnake Ridge Water District**

### **Section – 6 Conclusions and Recommendations**

Based on studies, findings and conclusions and in accordance with other pertinent information contained in this report, it is recommended that the Rattlesnake Ridge Water District take the following steps:

- A) Review this report, then direct the Engineer, upon notification of RUS - RD, to immediately complete necessary documentation to RUS - RD for further processing for Loan and Grant funds to construct the extensions and improvements outlined in this Report.
- B) Begin the process of tying down and collecting all other funds and tap fees to complete the project funding.
- C) Direct the Engineer to complete all necessary plans, specifications and contract documents to receive approvals and permission to advertise this project for bids.
- D) Upon completion of the above and receipt of approvals, initiate actions to acquire required permits, fee simple titles and right of way easements for construction areas.
- E) Upon favorable review of RUS - RD and ARC make necessary petitions and applications, through local and bond counsel, to the Kentucky Public Service Commission for a Certificate of Need and Necessity.
- F) Amend Water District boundaries in project area as needed.

**PHASE VIII B**  
**RATTLESNAKE RIDGE WATER DISTRICT**  
**Water Treatment Plant Expansion**  
**And Improvements**  
**SME: 03002**

**PROJECT COST ESTIMATE**

|                                     |                       |
|-------------------------------------|-----------------------|
| WTP Expansion                       |                       |
| New 1 MGD Actiflo Train             | \$1,250,000.00        |
| New 1 MGD Filter                    | \$350,000.00          |
| New Building Addition               | \$150,000.00          |
| Drying Bed Expansion                | \$250,000.00          |
| High Service Pump Upgrade           | \$100,000.00          |
| Raw Water Pump Upgrade              | \$100,000.00          |
| 300,000 gal Elevated Tank           | \$675,000.00          |
| 150,000 gal Elevated Tank           | \$425,000.00          |
| New Pump Station - Big Run          | \$100,000.00          |
| Pump Station Upgrade(SR 504)        | \$50,000.00           |
| <b>Total Estimated Construction</b> | <b>\$3,450,000.00</b> |
| Contingencies (10%)                 | \$330,000.00          |
| Engineering                         |                       |
| Design                              | \$244,000.00          |
| Inspection                          | \$131,000.00          |
| Other Engineering                   |                       |
| Surveys                             | \$10,000.00           |
| Easements                           | \$10,000.00           |
| Environmental                       | \$10,000.00           |
| Geotech                             | \$12,000.00           |
| Army Corps Eng Permits              | \$12,000.00           |
| Permits                             | \$8,000.00            |
| Archaeologist                       | \$6,000.00            |
| Botanist/Biologist                  | \$2,000.00            |
| Legal                               | \$25,000.00           |
| Construction                        |                       |
| Interest                            | \$30,000.00           |
| CDBG Planning & Admin               | \$40,000.00           |
| IEDF Admin                          | \$15,000.00           |
| Acquisition                         | \$15,000.00           |
| <b>Total Project Cost</b>           | <b>\$4,350,000.00</b> |

**PHASE VIII B**

**RATTLESNAKE RIDGE WATER DISTRICT  
Water Treatment Plant Expansion  
And Improvements**

**SME: 03002**

**PROPOSED PROJECT FUNDING**

|                              |          |                       |
|------------------------------|----------|-----------------------|
| ARC                          |          | \$400,000.00          |
| IEDF - 2008                  | Lawrence | \$500,000.00          |
| IEDF - 2008                  | Elliott  | \$500,000.00          |
| CDBG                         |          | \$1,000,000.00        |
| RD Grant & Loan              |          | \$1,936,000.00        |
| RRWD                         |          | \$14,000.00           |
| <b>Total Project Funding</b> |          | <b>\$4,350,000.00</b> |

PHASE VIII B

RATTLESNAKE RIDGE WATER DISTRICT  
Water Treatment Plant Expansion  
And Improvements

SME: 03002

EXISTING RATE SCHEDULE

| GALLONAGE BLOCKS FOR EACH<br>GALLONAGE<br>METER SIZE | MONTHLY RATE FOR EACH<br>BLOCK |
|--|--------------------------------|
| <b><u>5/8 X 3/4 inch Meter</u></b>                   |                                |
| First 1,000 gallons                                  | \$ 12.50 (Minimum Bill)        |
| Next 4,000 gallons                                   | \$ 7.90 per 1,000 gallons      |
| Next 5,000 gallons                                   | \$ 6.80 per 1,000 gallons      |
| Next 10,000 gallons                                  | \$ 5.80 per 1,000 gallons      |
| Next 20,000 gallons                                  | \$ 4.00 per 1,000 gallons      |
| Over 40,000 gallons                                  | \$ 3.10 per 1,000 gallons      |
| <b><u>3/4" Meter</u></b>                             |                                |
| First 5,000 gallons                                  | \$ 44.00 Minimum bill          |
| Next 5,000 gallons                                   | \$ 6.80 per 1,000 gallons      |
| Next 10,000 gallons                                  | \$ 5.80 per 1,000 gallons      |
| Next 20,000 gallons                                  | \$ 4.00 per 1,000 gallons      |
| All Over 40,000 gallons                              | \$ 3.10 per 1,000 gallons      |
| <b><u>1" Meter</u></b>                               |                                |
| First 10,000 gallons                                 | \$ 78.00 Minimum bill          |
| Next 10,000 gallons                                  | \$ 5.80 per 1,000 gallons      |
| Next 20,000 gallons                                  | \$ 4.00 per 1,000 gallons      |
| All Over 40,000 gallons                              | \$ 3.10 per 1,000 gallons      |
| <b><u>1 1/2" Meter</u></b>                           |                                |
| First 30,000 gallons                                 | \$ 175.00 Minimum bill         |
| Next 10,000 gallons                                  | \$ 4.00 per 1,000 gallons      |
| All Over 40,000 gallons                              | \$ 3.10 per 1,000 gallons      |
| <b><u>2" Meter</u></b>                               |                                |
| First 50,000 gallons                                 | \$ 254.00 Minimum bill         |
| All Over 50,000 gallons                              | \$ 3.10 per 1,000 gallons      |
| <b><u>3" Meter</u></b>                               |                                |
| First 100,000 gallons                                | \$ 409.00 Minimum bill         |
| All Over 100,000 gallons                             | \$ 3.10 per 1,000 gallons      |

**EXISTING RATE SCHEDULE**

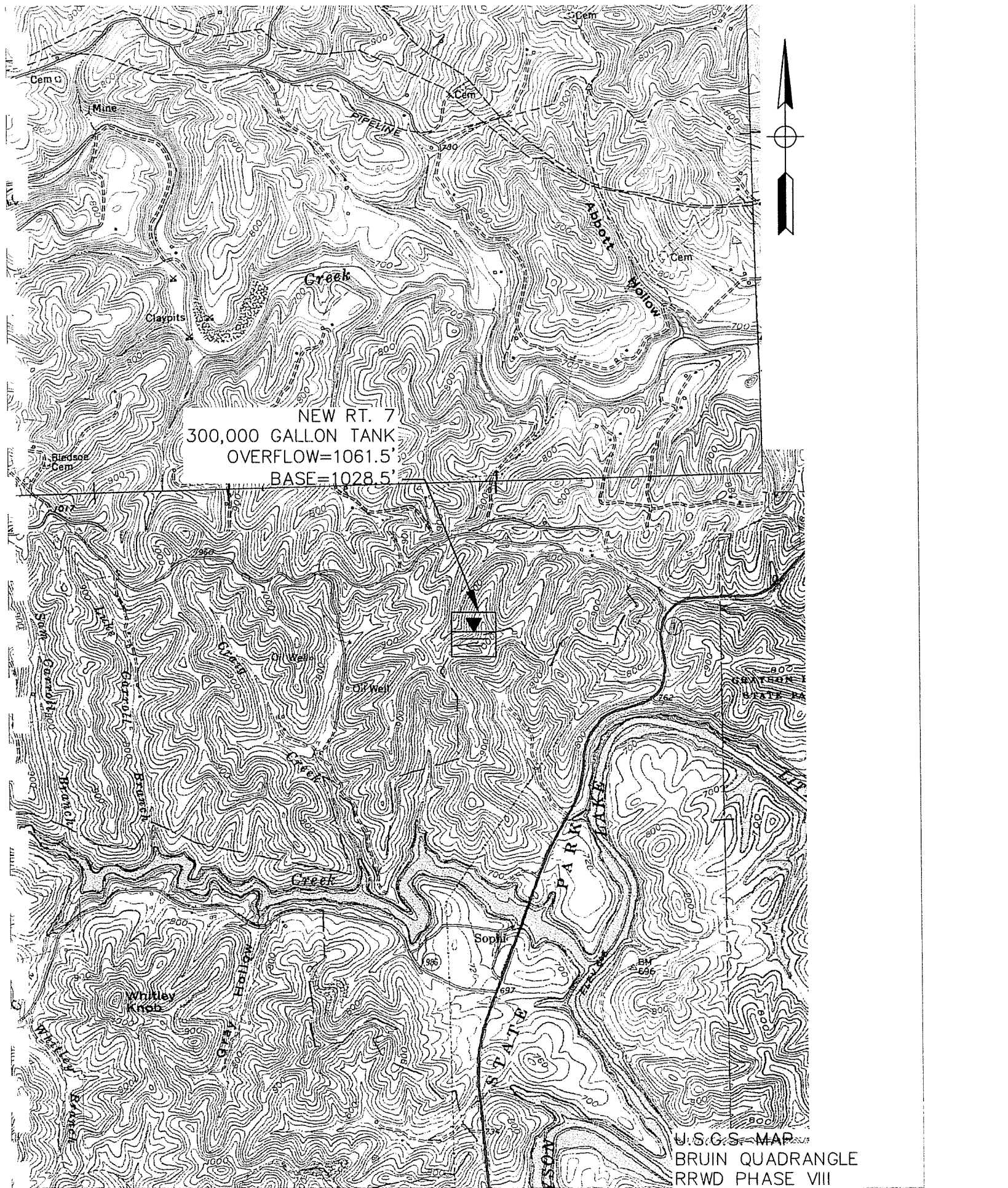
**RATTLESNAKE RIDGE WATER DISTRICT**

**(Continued)**

**CONNECTION FEES BY PSC TARIFF**

| <u>Meter Size</u>   | <u>Service Connection Charge</u> |
|---------------------|----------------------------------|
| 5/8 inch x 3/4 inch | \$ 700.00                        |
| 3/4 inch            | \$ 800.00                        |
| 1 inch              | \$ 1,100.00                      |
| 1 1/2 inch          | \$ 1,250.00                      |
| 2 inch              | \$ 1,500.00                      |
| 3 inch              | \$ 2,100.00                      |

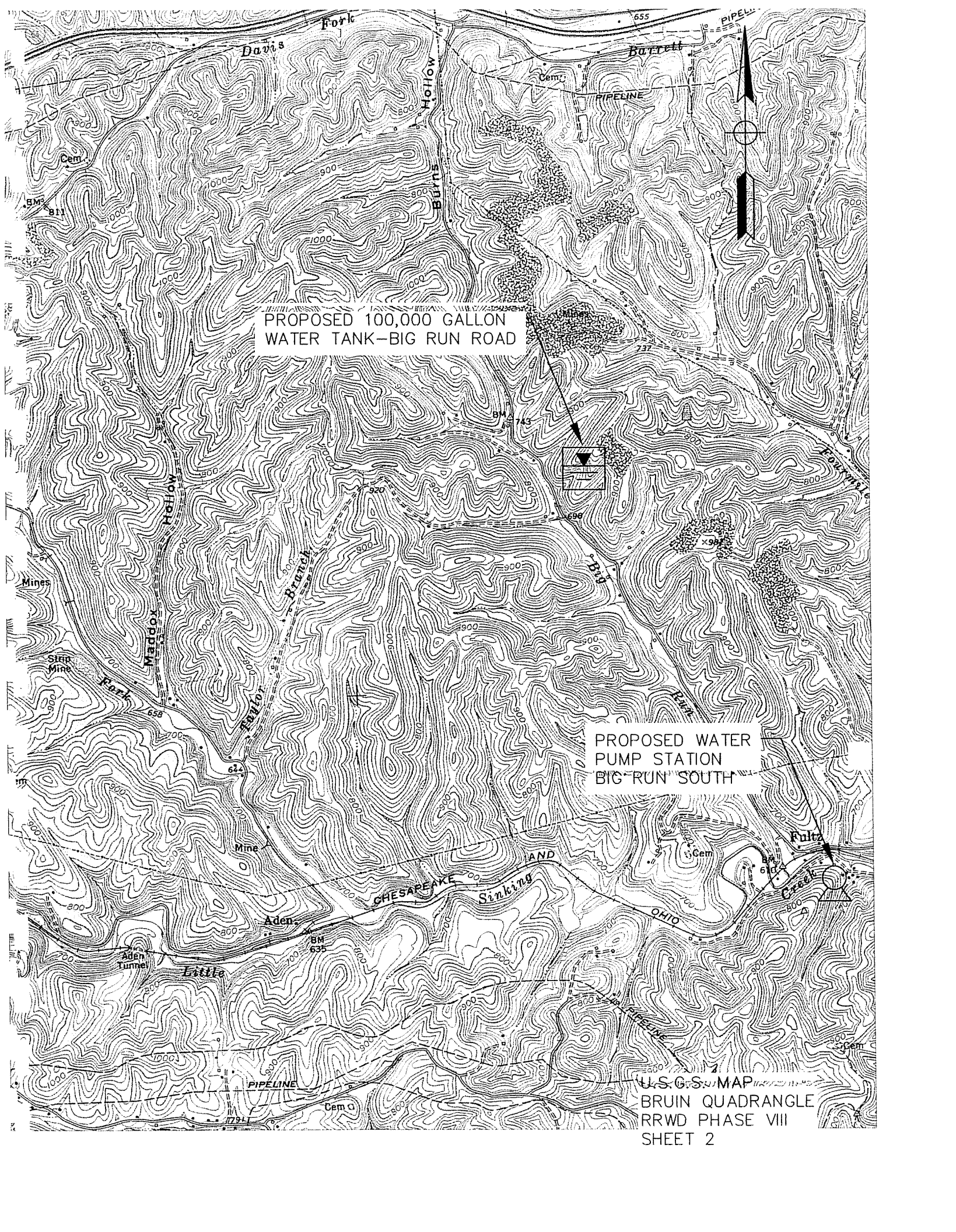




NEW RT. 7  
300,000 GALLON TANK  
OVERFLOW=1061.5'  
BASE=1028.5'



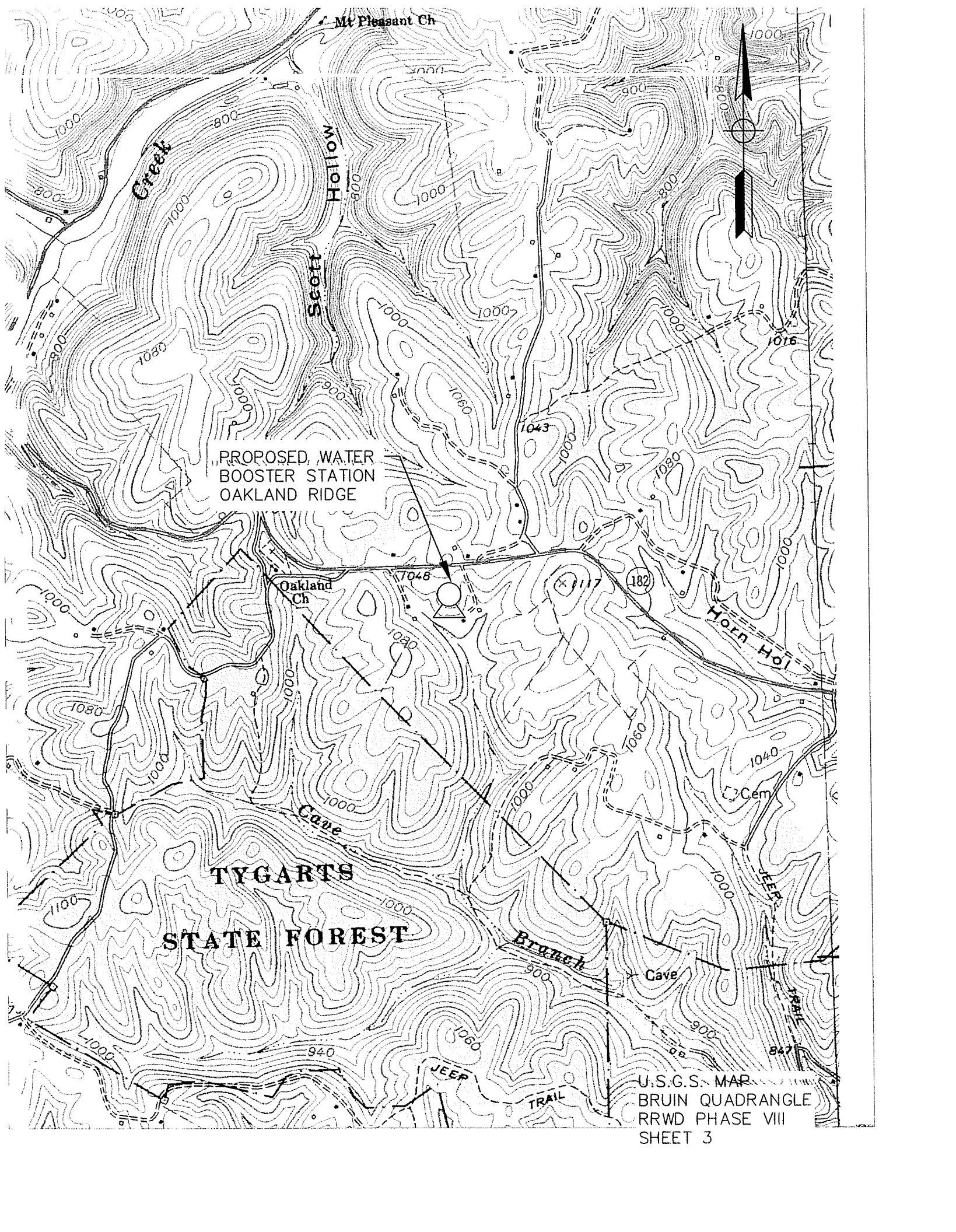
U.S.G.S. MAP  
BRUN QUADRANGLE  
RRWD PHASE VIII  
SHEET 1



PROPOSED 100,000 GALLON  
WATER TANK-BIG RUN ROAD

PROPOSED WATER  
PUMP STATION  
BIG RUN SOUTH

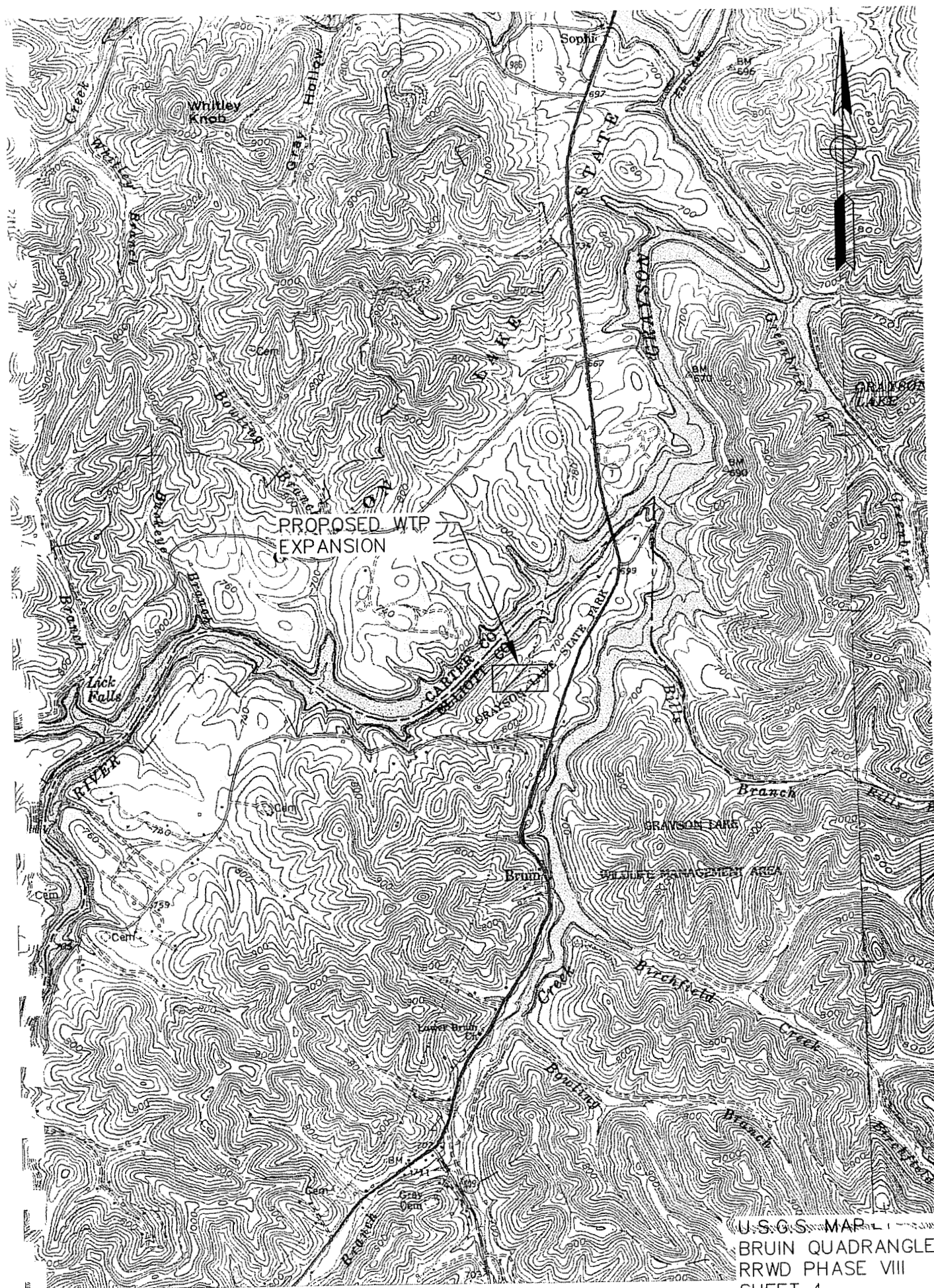
U.S.G.S. MAP  
BRUIN QUADRANGLE  
RRWD PHASE VIII  
SHEET 2



PROPOSED WATER BOOSTER STATION  
OAKLAND RIDGE

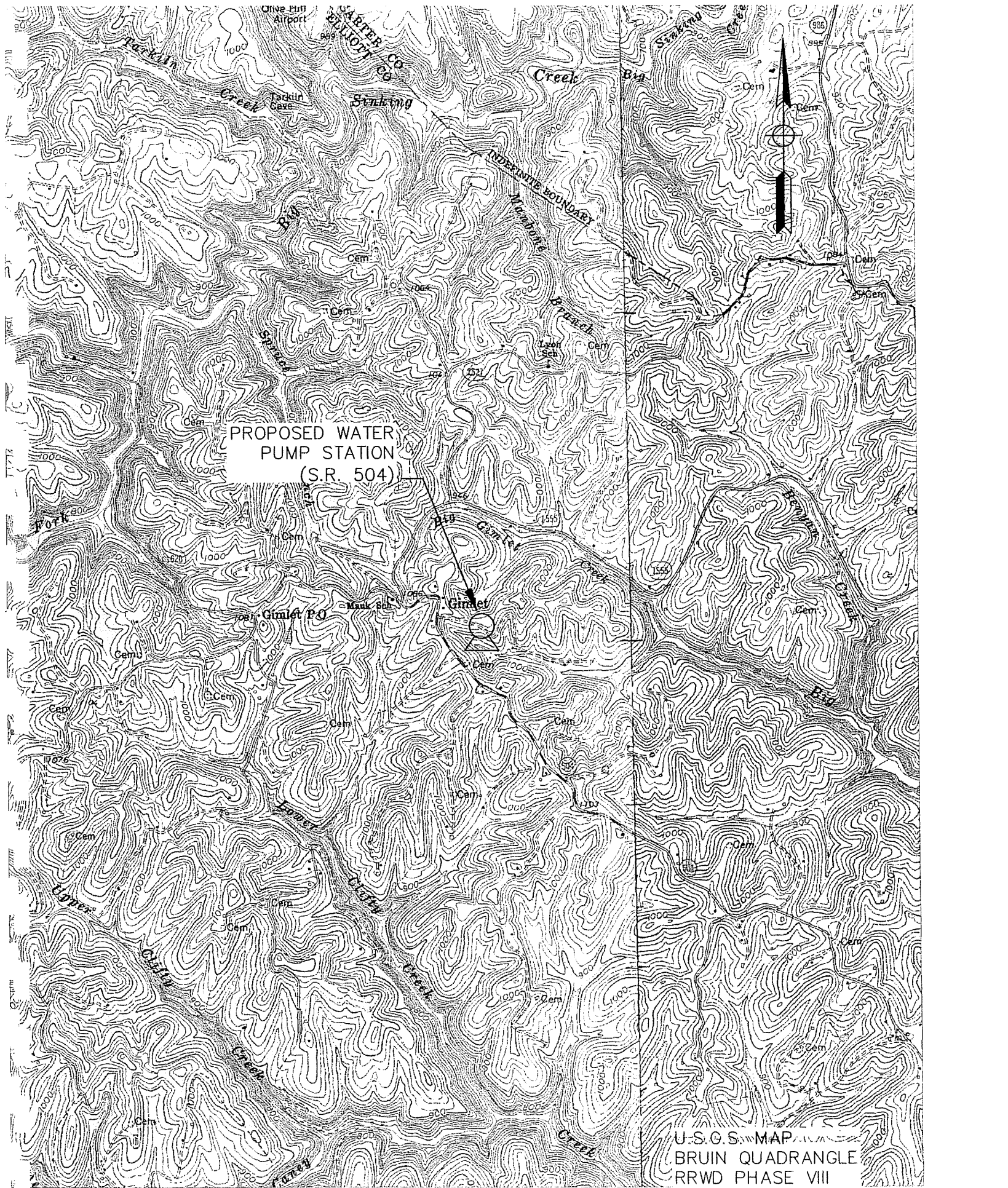
**TYGARTS  
STATE FOREST**

U.S.G.S. MAP  
BRUIN QUADRANGLE  
RRWD PHASE VIII  
SHEET 3



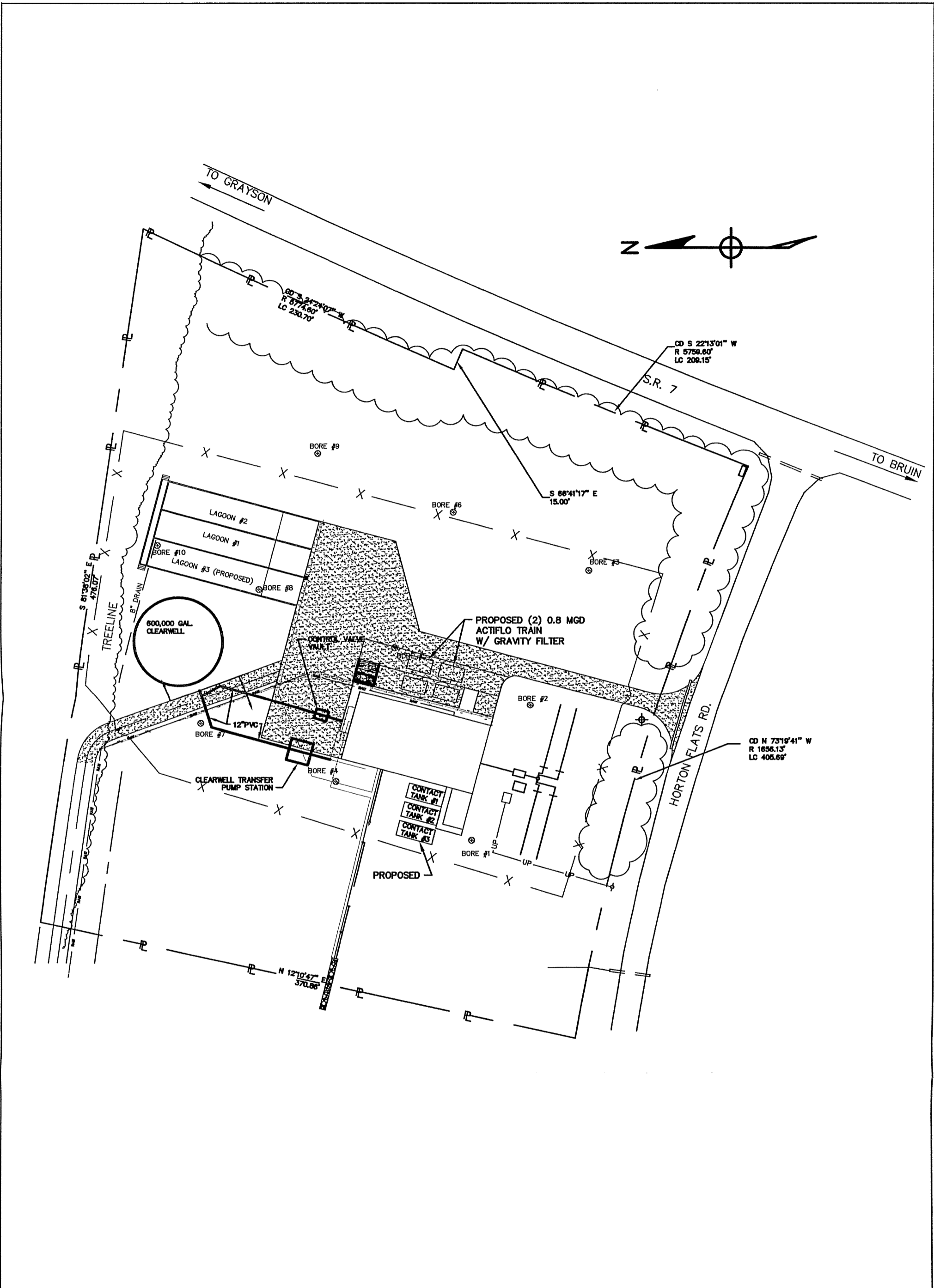
PROPOSED WTP  
EXPANSION

U.S.G.S. MAP L1  
BRUIN QUADRANGLE  
RRWD PHASE VIII  
SHEET 4



PROPOSED WATER  
PUMP STATION  
(S.R. 504)

U.S.G.S. MAP  
BRUIN QUADRANGLE  
RRWD PHASE VIII  
SHEET 5



SCALE: NTS  
 DATE: 5/06  
 DRAWN BY: EM  
 CHECKED BY: M.K.M.  
 APPROVED BY: J.F.S.

**RATTLESNAKE RIDGE WATER DISTRICT  
 WATER TREATMENT PLANT EXPANSION  
 PHASE VIII**



SISLER-MAGGARD ENGINEERING, PLLC  
 Engineering - Surveying  
 Lexington, Kentucky 40517

PROJECT NO: 03002  
 DWG NO: 1 OF 1