

PRELIMINARY ENGINEERING REPORT

QUEEN'S GAP WATER SYSTEM OPERATIONAL REIMBURSEMENT

PREPARED FOR:



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I. PROJECT AREA AND HISTORY

The Queen's Gap Development is located in the northwest portion of Rutherford County. This project will encompass not only the land on which the development resides, but also an alignment along Painter's Gap road from Pinnacle Elementary to the entrance of the development. A water line extension will be located inside of this alignment to bring water to the primary tank at the development.

The Queen's Gap development was started in 2006, and became one of numerous developments that failed with the economic downturn of 2008. The infrastructure for this development was bonded, and the County recently settled with the bonding company for an amount they feel will complete the infrastructure to the lots in Phase I of the project. Phase III of the project is also bonded, although no settlement has yet been made to fund the infrastructure for Phase III. However, Phase III operation and maintenance costs are being included as part of this report since this infrastructure will eventually be constructed.

II. PROJECT DESCRIPTION

Rutherford County intends to complete the water infrastructure inside of the Queen's Gap development as per the bond agreement. Once completed, the County will turn the system over to the Broad River Water Authority (BRWA) since the County has no water infrastructure and thus no maintenance crews of its own. Presently, there is only one residence inside of the Queen's Gap development, so there is concern regarding reimbursement for the cost of operation and maintenance of the new system. This abbreviated report is to address the issue of operational and maintenance costs of the new system, and to allow Rutherford County to budget an appropriate number to reimburse the BRWA for its ongoing costs for a period of time.

Presently, BRWA has a water line that runs within approximately 4 miles of the Queen's Gap development. The line, which runs to Pinnacle Elementary, is 10 inches in size. Although there is adequate water at this location to feed the development, the pressure gradient is insufficient to supply water to the lowest planned tank within the development. As a result, a booster station is planned to be located at the Pinnacle School location to carry water to the primary storage tank at Queen's Gap. Once water has reached the primary tank, it will then be distributed to all recorded lots, with some lots located approximately 1,400 feet above the primary tank elevation. This will require three additional booster stations, three tanks, as well as a system of water lines ranging in 2 to 6 inches in size.

In order for water to remain potable, it needs to maintain certain levels of chemicals—primarily chlorine—to ensure that no bacterial and/or viral growth occurs within the lines. In a typical system, water is “turned over” enough to ensure that the lines are filled with

fresh water on a regular basis. However, with only one user being located near the end of the Queen's Gap system, which contains an approximate line storage of 80,000 gallons, the detention time of the water in the lines could easily reach 200 days. This is much too long for water to sit in the lines, and can result in a loss of chlorine residual. As a result, a flushing program must be implemented. This flushing program, along with depreciation of appropriate appurtenances, will be the basis to compute the maintenance costs to be budgeted for the system.

The North Carolina Department of Environment and Natural Resources will allow mothballing portions of the line that are not in use. This will allow a significant reduction in ongoing expenses to maintain the necessary residuals in these lines. In order to isolate these lines, numerous additional valves will be installed in the system initially to help better isolate areas even when residents begin to build within the development. To further reduce flushing requirements, a mixer will be installed in the primary tank to keep the water from stagnating. The mixer also has a chlorine injector that will allow chlorine residuals inside of the tank to remain high, so when lines are flushed the chemical concentration will last longer, allowing for less frequent flushing. Although there is no method to determine when, how and in what order residences will be constructed, a linear increase in residential density is assumed in determining activation of lines within the system. Based on this progression, it is anticipated that 85,000 gallons of water per week will need to be flushed through the system to maintain the necessary constituents. At the agreed-upon rate of \$1.00/1000 gallons, the resulting annual cost for flushing is \$4,420.00.

Regarding depreciation, it was determined that only mechanical appurtenances would be included in depreciation, since they have regular and more costly maintenance schedules. The number used for depreciation in this scenario is a 20-year, 100% replacement cost. This depreciation schedule is appropriate given the lower operational loads as a result of less frequent and lower volume flushing requirements. Based on an estimated \$150,000 replacement cost, the depreciation would be \$7,500.00 annually.

III. SUMMARY

We feel the reimbursement of \$11,920.00 annually (\$994.00 monthly) to the Broad River Water Authority for taking ownership of the Queen's Gap water system would be adequate to meet all of the expenses of maintaining the system. A reduction and/or elimination of this payment could be set based on thresholds of revenue generated monthly and/or annually as residents locate within the development. For instance, for an average water user of 5,000 gallons/month, their water bill would be \$45.80 at current BRWA rates. At an average of 5,000 gallons per month per home, the recommended reimbursement rate of \$994/month would be met with 22 homes.