



Water Conservation Plan

Nixa Water Quality Department

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www.nixa.com

Neighbors committed to an exceptional quality of life

Introduction

Water is an essential resource which each and every one of us is responsible to protect and conserve. Water conservation measures prevent shortages for the current population and adherence to insures that water will be available for future generations to use in an amount adequate for normal domestic, commercial, and industrial needs.

The primary purpose of this water conservation plan is to address the need for a coordinated response and to provide advanced planning for periods of drought or other water shortage incidents. Water conservation must be a joint effort between the citizens of Nixa and the City itself. System wide water conservation and the wise use of water will extend the life of our existing system and it will extend the lead time needed for the design and construction of new sources of water. We need to practice sustainability of our water system so that our groundwater table is stable and so it will recharge at a rate that is as fast as the withdrawal rate.

Survey results from our water customers indicated a desire by the majority of the respondents that the City promote water conservation. One of the methods needed to better prepare the community for droughts and water shortages is for the City to provide education about water conservation. The City should help build support for rain gardens, drought resistant landscaping, bioretention swales, drip irrigation, rain barrels, and other water conservation measures.

The State Water Resources Plan (section 640.415 RSMo), which is a provision of the Water Resources Law enacted by the Missouri Legislature, requires the Department of Natural Resources (DNR) to ensure that the quality and quantity of Missouri's water resources are maintained at the highest possible level to support present and future beneficial uses. Following the lead of Missouri DNR, it is the City of Nixa's responsibility to provide the best levels of service to our water customers. (e.g. for drinking water, water for the operation of businesses, water for schools, water for irrigation purposes, and cooling water for industries.)

This conservation plan was written to develop, maintain, and establish a long-range, comprehensive plan for the use of our groundwater supply. The plan is intended to help address existing and future requirements for drinking water supplies, agriculture, industry, recreation, environmental protection, fire protection, and other related needs. To further that goal, the City has joined the Tri-State Water Coalition in order to investigate and participate in the development of additional surface water supplies in Southwest Missouri, Northeast Oklahoma, and Southeast Kansas.

Water quantity, quality and availability affect the well-being of all people. This plan was created in times of abundance as a forward-thinking measure to understand the nature of a water shortage. The drought which occurred during 2012 accelerated one aspect of this plan. The City adopted an ordinance to provide increased water rates during droughts and water shortage to discourage higher non-essential water use. Water is one more essential resource which was once considered to be unlimited and cheap. We can no longer consider water as an unlimited resource, and because of its shortage we cannot guarantee that its cost will stay at the same low prices we have experienced in the past.

1. Conservation Planning Goals

The City's water conservation plan will include City water usage cutbacks and reduction in unaccounted water by better metering and reduction of leaks. The City will increase its efforts to educate the public about how to conserve water. (e.g. through television, radio, newspaper, and our website, by inserts in our water bill mailings, and by other methods to alert our customers of the need to conserve water.) Water conservation will be encouraged on a voluntary basis, but it will progress to emergency mandatory phases as drought events or water shortages occur or worsen. The City encourages all methods of water conservation that we can practice on a daily basis.

- a. The City should strive for a goal of 10% or less of unaccounted for water.
- b. The City needs its water customers to use their water wisely instead of using it without thought as to where it comes from and assuming that it is a never-ending supply.
- c. The groundwater supply under Nixa needs to be protected from depletion by excessive irrigation demands.
- d. The City and its customers need to develop a culture of long term water conservation as opposed to temporary responses to droughts.

We need to encourage the use of plants and grasses that are drought resistant and more suitable to our region, especially during our dry years. We need to encourage the use of landscaping that consumes less water to flourish and grow. Landscaping needs to be tailored to include proper planning and design, the use of soil analyses, proper plant selection for this region, practical selection of turf grasses, efficient irrigation designs including drip irrigation for shrubs and trees, the use of mulches for moisture retention in the soil, and appropriate vegetative maintenance.

The City recognizes that in order to accomplish this conservation plan's goals, that other conservation methods may be needed that are not included in this plan. The City may revise and modify the goals of this plan as the need arises and as better ideas and suggestions for conservation are identified.

2. Water System Profile

The City of Nixa obtains water from 8 deep groundwater wells with a pumping capacity of 5635 gallons per minute (gpm). The water pumped from these wells is distributed throughout the City with underground pipes sized from 2" to 12". Pipe materials consist of galvanized steel, cast iron, ductile iron, cement asbestos (Transite), and PVC. Most of the system is modern PVC piping. There are 7 elevated storage tanks with a storage volume of 3.5 million gallons.

The majority of the system is 20 to 30 years old. Some of the distribution system is over 60 years old; Well #1 was drilled in 1948. When originally constructed, it used a pressure tank in the well house until 1964 when Tower #1 was erected on site at 203 East St. Louis Street. Well #2 was utilized until Well #3 was drilled in 1975. Well #2 is no longer used for a water supply, the Department of Natural Resources currently uses it for a groundwater monitoring well.

Areas like Nixa, which have many sinkholes and faults, will sometimes have problems with contaminated wells, or wells that are under the direct influence of surface water. Thus far, Nixa has not experienced these types of problems. Our wells are cased past the areas influenced by the sinkholes and faults.

During the very dry summer of 2012, residents irrigated their landscaping with more than 60 million gallons during July. During that same period the groundwater table lowered to a level 100 feet lower than the normal groundwater table elevation seen in March of each year. Since our wells appear to not be under the direct influence of surface water, recharge of our aquifer needs to be both vertical and lateral. When our customers started to irrigate their landscaping on alternate days, the pressure on the wells lessened significantly and the groundwater table started to recover. When there is a need for intensive pumping of our wells, from within a four square mile area of our deep aquifer, there is a significant cone of depression created in our water table. When demand lessens by half, as typically occurs during the winter months, we have seen the aquifer recover to previous levels from the low levels which occur during summer peak demands.

In 2012, water losses accounted for 8% to 33% of all water pumped. As we go forward into the future, the amount of water loss needs to be consistently 10% or less.

3. Water Demand Forecast

The City water demand during winter months averages approximately 1.8 million gallons per day. Our peak daily summer demand is approximately 4.2 million gallons, with peak gallons per minute rates of up to 6000 gallons per minute for several hours in the morning during peak irrigation season, if everyone waters simultaneously. During peak demand days the capacity of the wells is exceeded and usage includes some storage volume in the elevated storage tanks.

The City grew at a rate of 700 persons per year from 1990 to about 2008, but in recent years, growth has slowed to less than half that rate. If growth is projected at 350 persons per year for the next twenty years, the population of Nixa should increase from the estimated 2012 population of 19,722 to 26,722 by the year 2032. With that growth, the average daily demand should increase from 1.8 mgd to 2.2 mgd by the year 2032. If our customers practice water conservation to help reduce the peak demand on the system and the City is able to reduce the unaccounted for water losses, then peak usage could possibly equal our current peak usage. That is why conservation is so important.

Olsson Associates, a consulting engineering firm, performed a study of the Nixa water system during 2012. Their projection for population growth showed a considerably higher population of 40,546 in the year 2032, with a corresponding average daily demand of 5.19 mgd, a maximum daily demand of 10.13 mgd, and a peak hourly demand of 17.22 mgd. If their projections accurately predict future growth and water demand, the City will need to engage in a very aggressive capital improvement plan to meet those water demand needs. As mentioned above, the City wells did not have the capacity to supply the peak demand flow that occurred during the summer of 2012. Olsson Associates recommends that the City construct one well immediately to meet the current peak demand and the City should consider another well by the year 2020 to meet future growth demands. The City should consider elevated storage tanks at each new well site to provide for normal system operation for fire flow needs and for times when wells are offline.

4. Capital Improvement Plan

The City has the capacity to provide drinking water for average daily demand flows, but the peak hourly demand flows, during peak irrigation events, cannot be met on a regular basis. To meet peak hourly flows the City will need to drill more wells. The 2012 water study concluded that two additional wells and two elevated water storage tanks will be required in the next 20 years. The schedule of recommended improvements shows that the first well should be constructed in 2013 and the first elevated tank should be constructed in 2015. The construction of two new wells will help the City meet peak demands now and for several years in the future. If conservation measures are practiced by the City's water customers for irrigation usage during the summer months then the capacity of the two additional wells will be sufficient for the next 20 years even if one or two of the existing wells have to be shut down temporarily.

Existing water lines in the distribution system provide good pressures to all parts of the system, but there are some 2" diameter lines that do not provide satisfactory fire flows. Also, there are some areas of the City that need loop lines or larger diameter loop lines to improve system pressures during times of high demand. The City should replace any 2" diameter line with a minimum 6" main with associated fire hydrants.

A proposed 5 year capital improvement plan is incorporated in the Olsson Associates 2012 water system master plan that addresses the improvements.

5. Water Conservation Measures

The measures listed below are suggestions for wise water use. They are listed by use and condition. During periods of drought these measures become more critical to help the City maintain a good water supply for its customers.

INDOOR RESIDENTIAL USE

CONSERVATION FOR NORMAL CONDITIONS

- Use dishwashers only when they are full. Washing dishes by hand (don't let the tap run!) saves about 25 gallons.
- Adjust water level on clothes washing machines. If not adjustable, only run washer when full.
- Turn off faucets while brushing teeth, etc. This saves about 5 gallons per day.
- Reduce water used per flush by installing a low volume per flush toilet or by placing water displacement inserts in the toilet tank. A plastic jug can be used as an alternative. Do not use bricks as they can disintegrate when soaked for a long period of time and the resulting grit hinders closing of the flap valve.
- Do not use the toilet as a trash can.
- Use sink and tub stoppers to avoid wasting water.
- Keep a bottle of chilled water in the refrigerator for drinking.
- Find and fix leaks in toilets, which can leak silently. The following method can be used to see if this is occurring: place a drop of food coloring in the upper tank and do not flush for 30 minutes. If color appears in the bowl, there is leakage.
- Find and fix leaks in faucets and water-using appliances. Faucets can usually be fixed cheaply and quickly by replacing o-rings, washers or other parts that degrade through use and over time.
- Adapt plumbing with flow-restricting or other water-saving devices. These are usually inexpensive and easy to install.
- Learn to read your water meter so you can judge how much water you use and what difference conservation makes. City staff will be available at the public works office to instruct customers on how to read their meters.

- Take shorter showers and shallower baths. Saves about 25 gallons.
- Reduce the number of toilet flushes per day. Each flush uses about 5 gallons (2-3 gallons if you have water-saving toilets).
- Don't use a garbage disposal.
- Use non-phosphate detergent and save laundry water for lawns and plants.
- For more conservation tips see the Nixa Water page at www.nixa.com.

CONSERVATION MEASURES FOR EMERGENCY WATER CONSERVATION PHASES

(In addition to measures listed above)

- Turn off shower while soaping up.
- Use disposable eating utensils.

OUTDOOR RESIDENTIAL USE

CONSERVATION FOR NORMAL CONDITIONS

Lawns

- Water before 10:00 A.M. to prevent evaporation, which occurs during the hottest part of the day. Morning is better than evening to lessen the possibility of fungal growth.
- Water only when lawn shows signs of wilt. Grass that springs back when stepped on does not need water.
- Water thoroughly, not frequently; long enough to soak roots. A light sprinkling evaporates quickly and encourages shallow root systems. Water slowly to avoid runoff.
- Do not let the sprinkler run any longer than necessary. In an hour, 600 gallons can be wasted.
- Allow a maximum of one inch of water per week on your lawn.
- Use pistol-grip nozzles or valves on hoses to avoid waste when watering flowers and shrubs.
- On an annual basis, aerate lawns by punching holes 6 inches apart. This allows water to reach roots rather than run off the ground surface.
- Do not mow lawns shorter than 2 to 3 inches high to help retain moisture.
- Position sprinklers to water the lawn, not the pavement.

- Avoid watering on windy days when the wind not only blows water off target, but also causes excess evaporation.
- Keep sprinkler heads clean to prevent uneven watering.
- Adjust hose to simulate a gentle rain. Sprinklers that produce a fine mist waste water through evaporation.
- Install a rain sensor switch which keeps an automatic sprinkler system from running during rainfall events or know how to turn off the irrigation system when ground is sufficiently moist.
- Use some type of alarm clock or stove timer to remind you to shut off sprinklers that don't have timers.

Vegetable and Flower Gardens

- Water deeply, slowly and weekly. Most vegetables require moisture to a depth of six to eight inches.
- Wilting plants in the hot sun don't necessarily mean they need water. Check plants in late evening or first thing in the morning. If leaves are back upright, then the plant is probably not too dry.
- Keep soil loose so water can penetrate easily.
- Use mulch around plants and between rows to hold in moisture.
- Keep weeds out to reduce competition for water.
- Put the water where you want it and avoid evaporation by using soil-soakers or slow-running hoses, not sprinklers.

Trees and Shrubs

- Water deeply using a soil-soaker.
- Water only when needed. Check the depth of soil dryness by digging with a trowel. While the surface may be dry, adequate moisture may be retained beneath the surface.
- Mulch to reduce evaporation. A two to three (2-3) inch layer of wood chips, pine needles, grass clippings, or straw keeps the soil cool in summer. Mulch adds landscape interest and reduces weeds, and the few weeds that do grow are easy to uproot.
- Dig troughs around plants to catch and retain water.
- Water plants growing in full sun more often than those in shade.
- Do not use sprinklers. Apply water directly at base of plant.

- Do not fertilize during the summer. Fertilizing plants increases their need for water.
- Postpone planting until fall or spring when there is generally less need for water.
- Install trickle-drip irrigation systems close to the roots of your plants. By dripping water slowly, the system doesn't spray water into the air where it can be lost through evaporation. Use soil probes for large trees.
- Water when it is cloudy or at night.

CONSERVATION MEASURES FOR EMERGENCY CONSERVATION PHASES

(In addition to measures listed above)

- Do not allow children to play with hose or sprinklers.
- Limit washing driveways, vehicles, machinery, etc.
- Catch rainfall by placing rain barrels or other containers under downspouts and use the collected rainwater to water plants, trees, and shrubs.
- Use leftover household water, if available.
- Consider delaying the seeding or sodding of new lawns.
- Determine the amount of water being used outdoors by comparing water bills for the summer and winter.
- Vegetable gardens and food trees should be given minimal amounts of water on an individual basis only. Do not water lawns and inedible plants.
- Do not use sprinklers.
- Most outdoor watering is prohibited under emergency conditions.
- Do not wash driveways, sidewalks, or patios.

HOSPITAL AND HEALTH CARE FACILITY USE

- Reduce laundry usage or services by changing bed linen, etc., only when necessary to preserve the health of patients or residents.
- Use disposable food service items.
- Eliminate, postpone, or reduce, as may be appropriate, elective surgical procedures during the period of emergency.

INDUSTRIAL USE

- Identify and repair all leaky fixtures and water-using equipment. Give special attention to equipment connected directly to waterlines, such as processing machines, steam-using machines, washing machines, water-cooled air conditioners, and furnaces.
- Assure that valves and solenoids that control water flows are shut off completely when the water-using cycle is not engaged.
- Adjust water-using equipment to use the minimum amount of water required to achieve its stated purpose.
- Shorten rinse cycles for laundry machines as much as possible; implement lower water levels wherever possible.
- For processing, cooling and other uses, either reuse water or use water from sources that would not adversely affect public water supplies.
- Advise employees, students, patients, customers, and other users not to flush toilets after every use. Install toilet tank displacement inserts; place flow restrictor in shower heads and faucets; close down automatic flushes overnight.
- Install or adjust automatic flushing valves to use as little water as possible or to cycle at longer intervals.
- Place water-saving posters and literature where employees, students, patients, customers, etc. will have access to them.
- Check meters on a frequent basis to determine consumption patterns.
- Review usage patterns to see where other savings can be made.

6. Benefit/Cost Analysis

Adherence to the City's water conservation plan will keep water rates lower for a longer period of time. The longer period that capital improvements can be delayed, the longer the period will be that rates will stay down. During 2012 our existing wells could not keep up with the irrigation demand. The City plans to construct a new well in 2013 and a second new well in the next five years. If water conservation is not practiced, then more new wells, towers, and water line extensions will be needed more quickly than shown in the Capital Improvement Plan. This will accelerate the need to raise rates more quickly than planned in order to provide adequate financial support for these additional improvements.

There are benefits to the City which might not be tangible or monetary but do aid in the healthiness of the economy. Good drinking water will attract residents and thus businesses. If good drinking water becomes less available or the cost becomes too high, then the benefit of good water decreases and there is a negative impact to the economy.

There are additional benefits to water conservation. Using less water will result in less water flowing into the sewer collection system which will lower pumping and treatment costs for the wastewater system. There will be lower electrical costs, less wear and tear on pumps which will result in lower operation and maintenance costs, and less chemical usage that lowers the cost to operate the wastewater treatment plant.

7. Targeted Conservation Measures

Conservation measures that need to be practiced are prioritized as follows:

1. Irrigate on alternate days depending on whether your street address is odd or even. Water on Tuesday, Thursday, and Saturday if your address is an odd number. Water on Wednesday, Friday, and Sunday if your address is an even number. Do not irrigate more than 1” of water per week on your yard.
2. The City should look for water leaks in the distribution system by hiring a leak detection company on a periodic basis and when any leaks are discovered the City should fix them as soon as possible.
3. The City should replace old water meters on a 10 year schedule so the meters will more accurately reflect usage and measure small leaks which will accumulate to a large amount. The customers may be more inclined to repair their small leaks if the meter accurately measures them and the customers have to pay for the water lost to leaks.
4. Replace oversized meters with correctly sized meters or magnetic meters which can detect small flows.
5. Educate customers on water conservation methods by mailings and by holding seminars on efficient irrigation methods, how to program controllers, and the benefits of weather-based controllers/rain sensor installations.
6. Place pamphlets on summer lawn watering and conservation landscaping in the various City buildings for citizens to pick up and read. Include water saving tips on the water bills.
7. Water rates should be changed to a level rate instead of the current declining block rates.
8. Require the construction and modification of in-ground sprinkler systems to have a building permit and fee. Require inspection of the connection to the water system, require a backflow device, and require a moisture sensor on the system so it does not operate during wet rainy weather.
9. Look for unmetered in-ground irrigation systems.
10. Include AMI water and electric meters in any long term capital improvement plan.
11. Identify chronic over-irrigators and volunteer to perform an audit of their system or perform a tune-up, reprogramming, or replacement of their old equipment.
12. Audit our accounts to see if all our electric customers also have water service. If not, check why they do not have water service.

8. Forecast of Water Conservation Effects

The conservation of water will lower the revenue to the City from water sales, but revenue will increase as the number of water customers increase. The base rate should be adjusted to create a more stable base revenue to fund our mostly fixed expenses. The rate per gallon needs to be adjusted, also, so that our revenues are not so dependent on the variable amount used by our customers. Any rate changes need to be gradual over a several year period.

9. Implementation Strategy

The targeted conservation measures need to be implemented immediately or as soon as the budget will allow.

An emergency water use ordinance was adopted in August of 2012 to provide mandatory water use measures to help reduce excessive water use during times of severe water shortages. It includes surcharges for usage above 15,000 gallons per month. This threshold is where most usage is strictly optional irrigation usage, which is above and beyond normal usage to keep landscaping and turf alive during drought periods.