Update on Water System Projects

Council Workshop

April 14, 2016

What we will cover today

- Well Siting Study
- Northeast Well Field: Wells 18-22
- Future Water Treatment Plant No. 4
- DNR Water Supply Plan
- Actions Requested by Council

Well Siting Study

- Study to site new Wells No. 18-22 is complete
- Study submitted to the DNR & was reviewed
- DNR was a stakeholder throughout development

resourceful. naturally.
engineering and environmental consultants

BARR

Technical Memorandum

To: Stefan Higgins, Asst. City Engineer
From: John Greer, PG, Adam Janzen, Brian LeMon, PE
Subject: Northeast Well Field Evaluation – Phase 3
Date: January 25, 2016
Project: 23021012.03
c: Kate Drewry, Jeanne Ramponi, Joe Richter (MnDNR); Project File

1.0 Introduction

The City of Blaine (the City) currently operates 16 municipal water supply wells. Aquifers from which the City's existing water supply wells pump include the following:

- Quaternary deep sand and gravel (below the clay layer discussed later)
- Jordan Sandstone
- Tunnel City Group and Wonewoc Sandstone (aka, Tunnel City-Wonewoc or TCW)
- Mt. Simon Sandstone

Well locations are shown on Figure 1. As the City continues to grow, additional water supply will be needed to meet future water demands. Toward this end, the City plans to construct a series of new wells along with a new water treatment plant, per the water supply section of their current, approved Comprehensive Plan. The current plan is to have four new water supply wells, Wells 18, 19, 20, and 21, brought on line by about 2017. Installation of Wells 18, 19, 20, and 21 is anticipated by the City's current water appropriation permit (Permit 1976-6227). The City reviewed land that might be available for future well fields and identified parcels in the northeastern corner of the City as the targeted area for a new well field. The collection of sites is called the Northeast Well Field and is shown on Figure 1.

There has been concern that pumping from Blaine's wells may negatively impact water levels in local surface water features of concern. This concern needed to be addressed in order to plan out the future water supply for the City. A scope of work was developed to evaluate what, if any, impact pumping from the planned future supply wells might have on these features. The scope also included consideration related to siting the wells in order to better ensure that the City will be able to obtain approximately 6,000 gallons per minute (gpm) from the well field.

Following the phased approach described in the April 2013 proposal to the City, Barr Engineering (Barr) completed a desktop study of the feasibility of developing the Northeast Well Field in 2013 (Barr, 2013). That study found that a continuous, shallow clay layer present throughout the City prevents pumping in Blaine's wells from impacting the surface water features of concern. Phase 1 results also indicated that a greater well spacing than originally planned for the Northeast Well Field would be needed in order for the

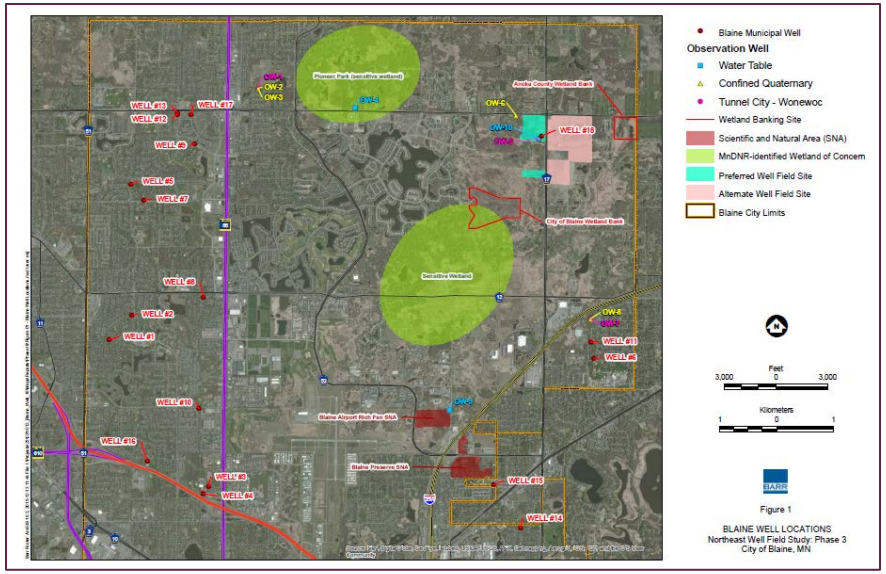
Barr Engineering Co. 4300 MarketPointe Drive, Suite 200, Minneapolis, MN 55435 952.832.2600 www.barr.com

Well Siting Study: Results

- NE Well field should supply ~6,000 gpm
- Four or five wells to obtain desired capacity
- Well spacing increased slightly from first cut
- Clay layer mitigates impacts to surface water features

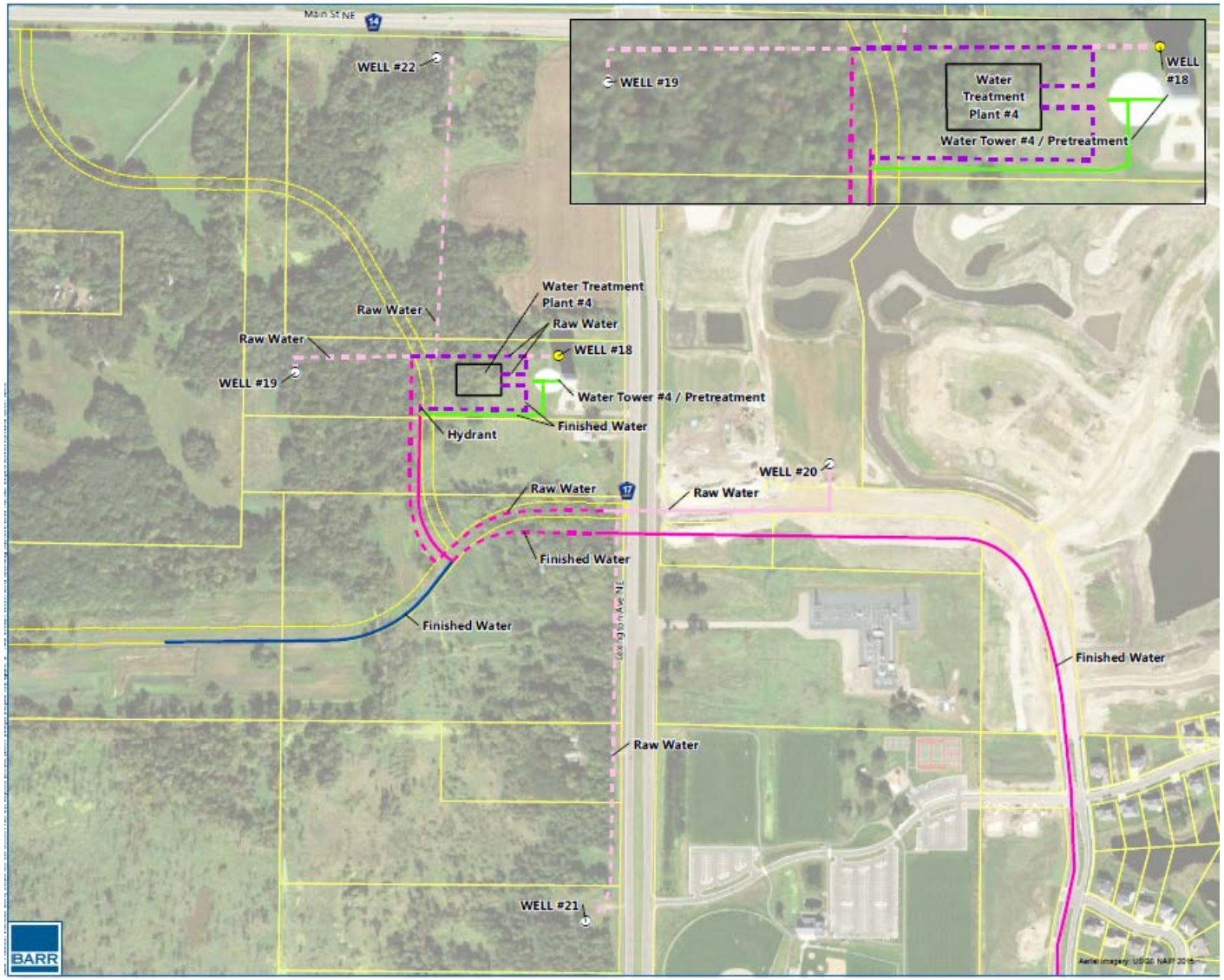
Well Siting Study Outcome

- Met DNR on March 18th reaction was positive
- No known road blocks to new wells
- Wells 18 to 21 are on the way!



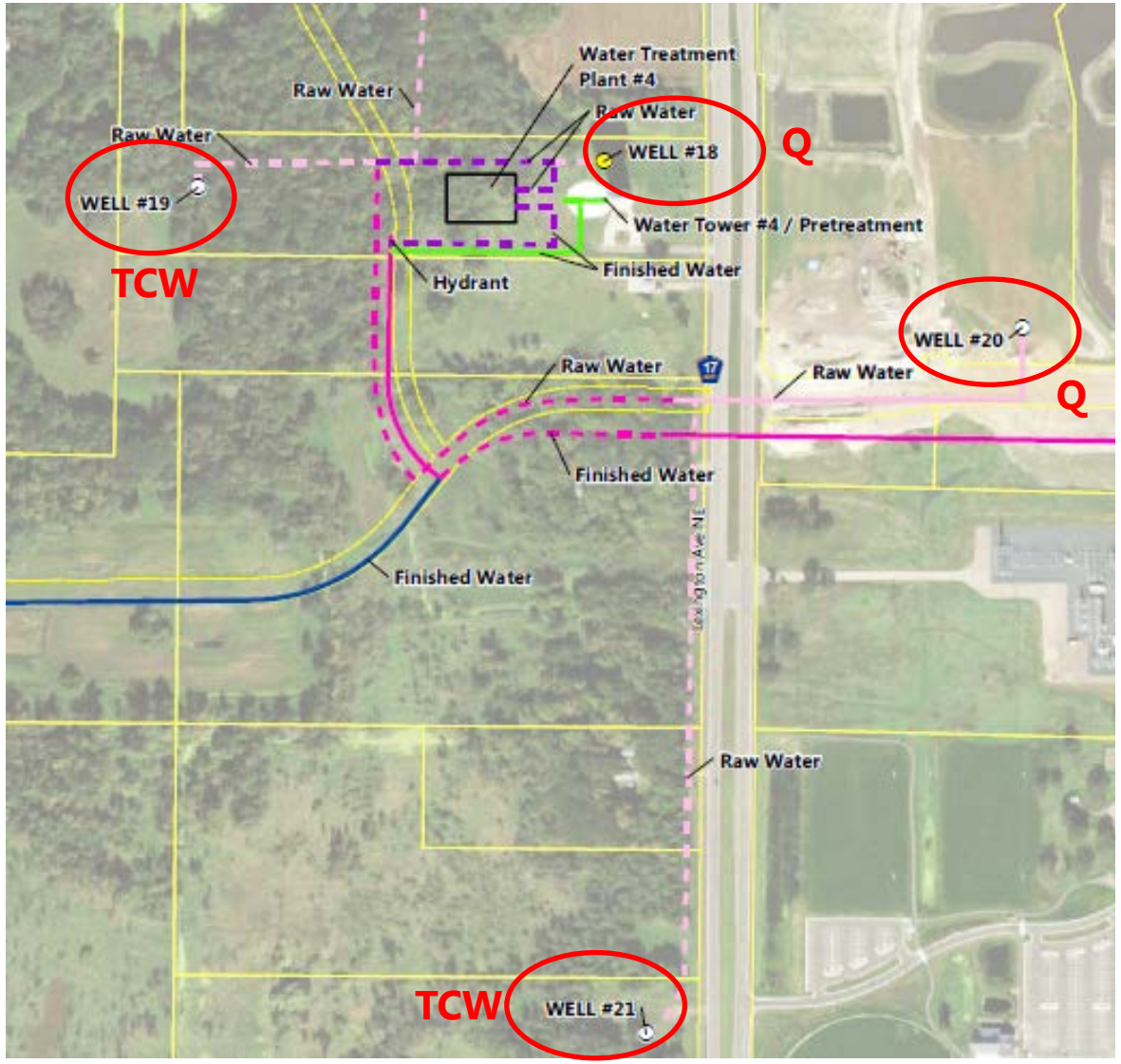
Northeast Well Field Plans

- Northeast Well Field includes Wells 18-22 and WTP4
- On site of existing water tower 4



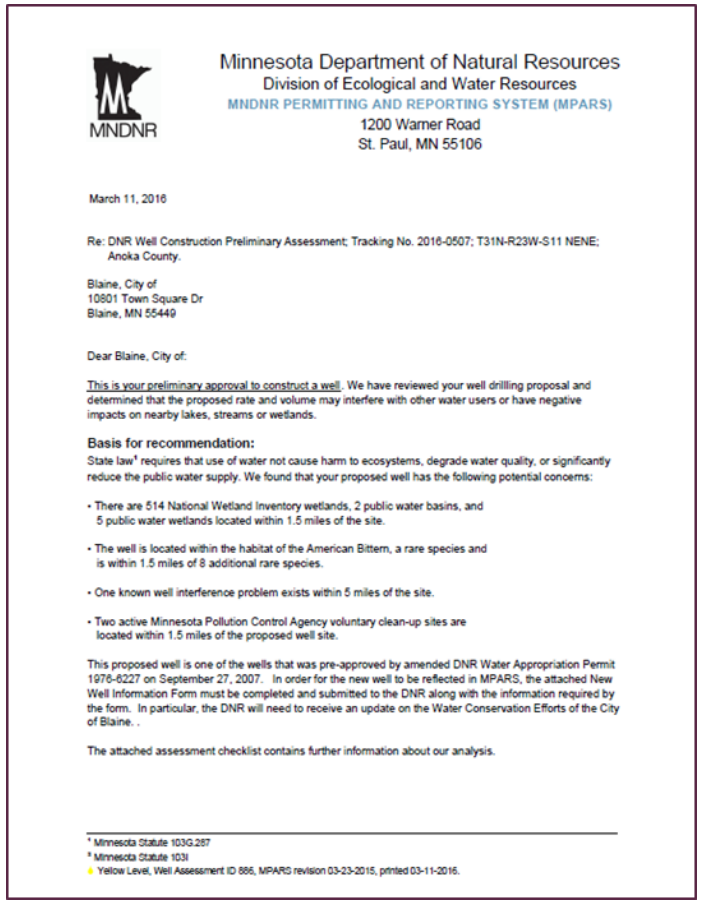
Wells 18-21

- Wells 18-21 scheduled for construction this summer.
- Wells, raw watermain, pump and motor, valves, meters, controls
- Quaternary aquifer (Q)
- Tunnel City Wonewoc (TCW) aquifer



Well Construction Approval

As a result of the Well Siting Study, the DNR approved the pre-construction permits for Wells 19-21



MNDNR

Minnesota Department of Natural Resources
Division of Ecological and Water Resources
MNDNR PERMITTING AND REPORTING SYSTEM (MPARS)
1200 Warner Road
St. Paul, MN 55106

March 11, 2016

Re: DNR Well Construction Preliminary Assessment; Tracking No. 2016-0507; T31N-R23W-S11 NENE; Anoka County.

Blaine, City of
10801 Town Square Dr
Blaine, MN 55449

Dear Blaine, City of:

This is your preliminary approval to construct a well. We have reviewed your well drilling proposal and determined that the proposed rate and volume may interfere with other water users or have negative impacts on nearby lakes, streams or wetlands.

Basis for recommendation:
State law[1] requires that use of water not cause harm to ecosystems, degrade water quality, or significantly reduce the public water supply. We found that your proposed well has the following potential concerns:

- There are 514 National Wetland Inventory wetlands, 2 public water basins, and 5 public water wetlands located within 1.5 miles of the site.
- The well is located within the habitat of the American Bittern, a rare species and is within 1.5 miles of 8 additional rare species.
- One known well interference problem exists within 5 miles of the site.
- Two active Minnesota Pollution Control Agency voluntary clean-up sites are located within 1.5 miles of the proposed well site.

This proposed well is one of the wells that was pre-approved by amended DNR Water Appropriation Permit 1976-6227 on September 27, 2007. In order for the new well to be reflected in MPARS, the attached New Well Information Form must be completed and submitted to the DNR along with the information required by the form. In particular, the DNR will need to receive an update on the Water Conservation Efforts of the City of Blaine. .

The attached assessment checklist contains further information about our analysis.

[1] Minnesota Statute 103G.287
[2] Minnesota Statute 103I
[3] Yellow Level, Well Assessment ID 866, MPARS revision 03-23-2015, printed 03-11-2016.

BLAINE

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Well 18-21 Construction Schedule

- Well Bid Packages
  - Bid Opening: May 2016
  - Construction complete: December 2016
- Watermain Bid Package
  - Bid Opening: Summer 2016
  - Construction complete: December 2016
- DNR Appropriation Permit Renewal: March 2017

Well and Watermain Cost Estimate

- Wells and Watermain: $4.7M*
  - Well 18 pump/motor, controls, watermain, site work
  - Well 19 construction, pump/motor, controls, watermain, site work
  - Well 20 construction, pump/motor, controls, watermain, site work
  - Well 21 construction, pump/motor, controls, watermain, site work
  - Temporary chemical feed until WTP4 online
  - Altitude valve in Water Tower 4

*Note: Construction costs are rising

WTP4 Pre-Feasibility Study

- Completed for well field layout and budgetary cost estimating
- Study basis:
  - 8.6 MGD plant, 4 x 1500 gpm well supply
  - Match water quality of existing WTPs
  - Evaluate type of plant
  - Evaluate equipment alternatives
  - Estimate cost
  - Estimate site layout, watermain connections

WTP4 vs. Existing WTPs

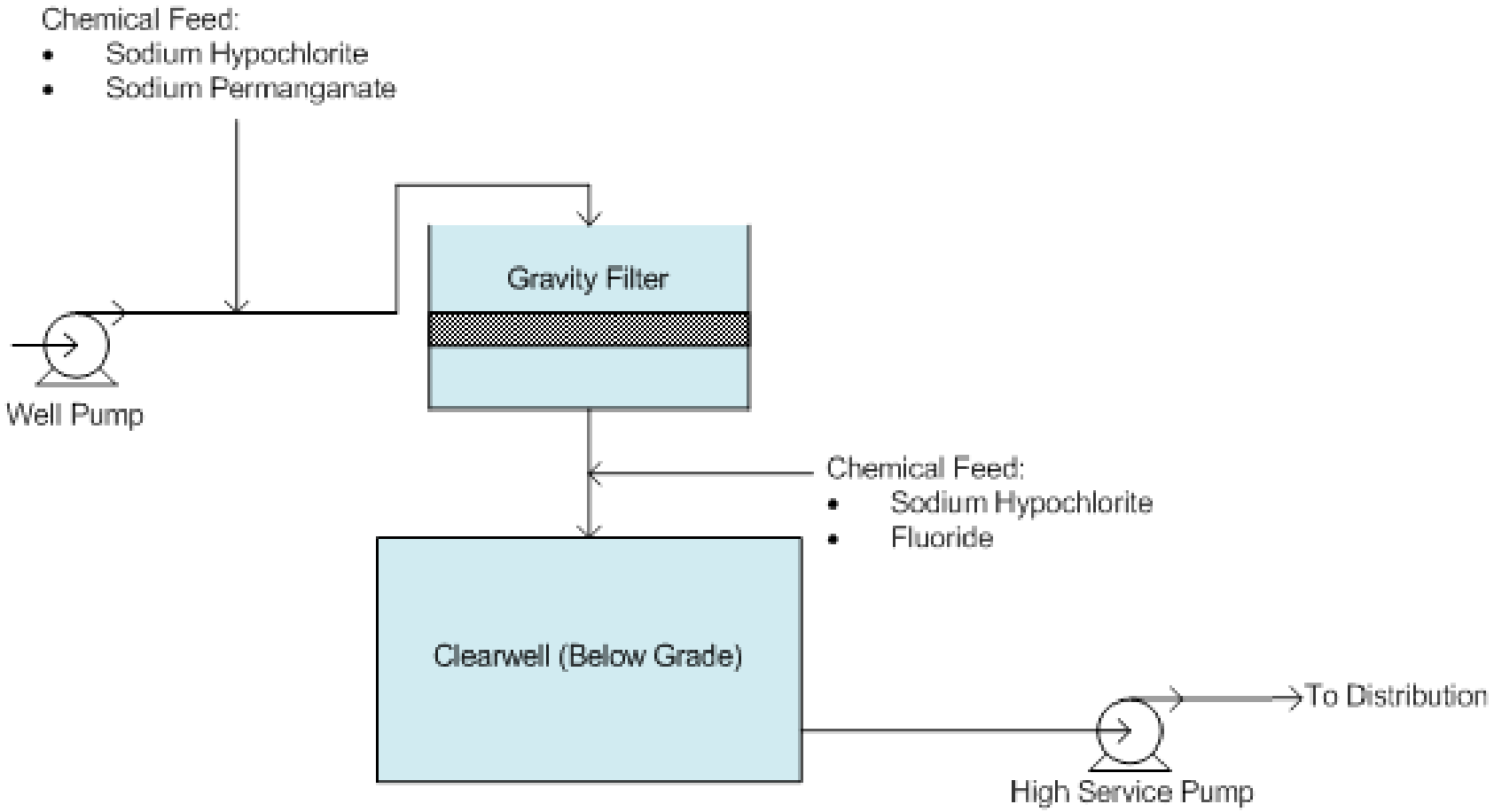
Proposed WTP4

- 8.6 MGD
- Gravity filters
- Traditional filter media
- Onsite chlorine generation
- Clearwell onsite
- High service pumping to system
- Lamella clarifier backwash recovery

WTP1-3

- Smaller capacity
- Pressure filters
- Pyrolusite media (2016)
- Chlorine gas
- No storage onsite
- Pressurized flow direct to system
- Backwash reclaim basins

WTP4 Schematic

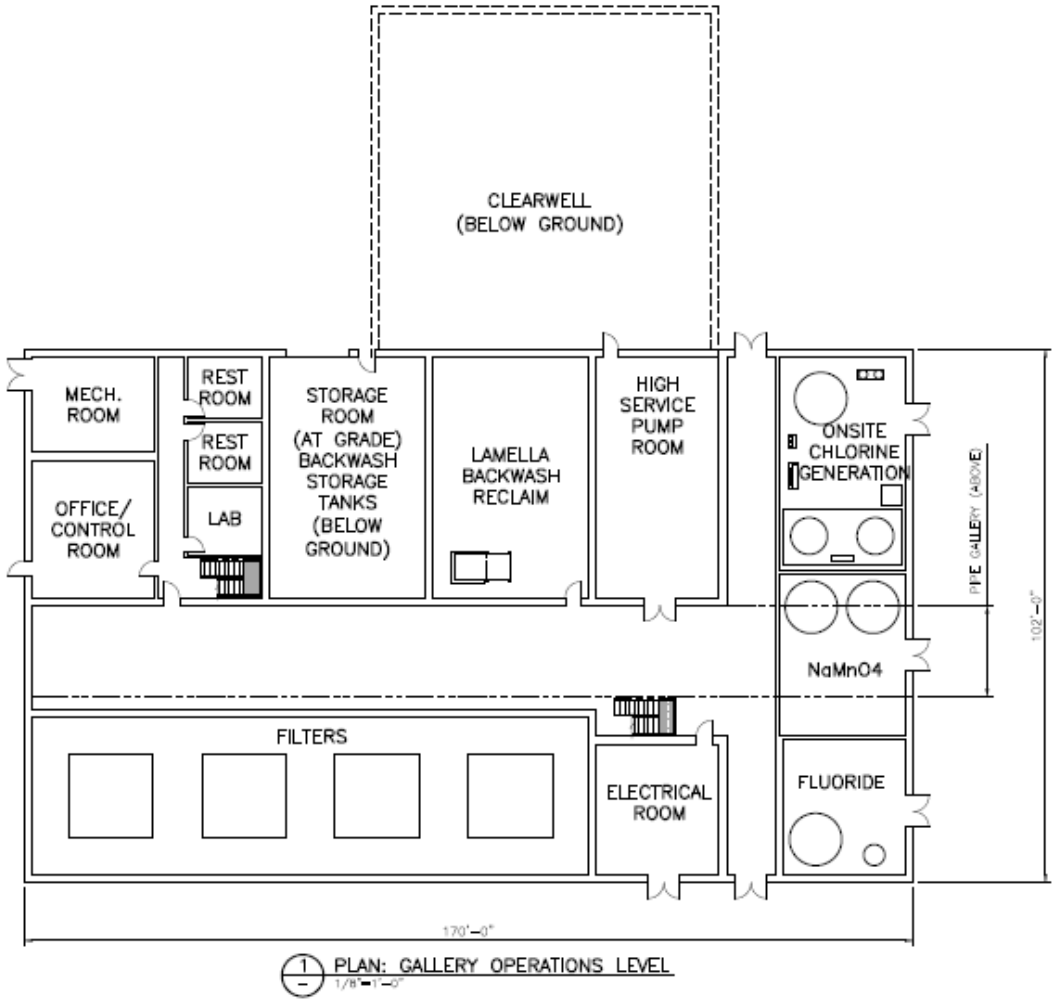


WTP4 Preliminary Decisions

- Gravity filters with traditional media
  - Industry standard design for this size of plant, reduced maintenance costs, larger site available for gravity filter footprint
- Onsite chlorine generation
  - Safer to operate
- Lamella clarifier backwash water recovery
  - Increased water efficiency, less wasted water
- Clearwell and high service pumps
  - Reduce size of well pumps feeding WTP

*Note: All decisions based on municipal WTP tours, Barr recommendations, and operator input and preferences

WTP4 Preliminary Layout



WTP4 Design and Construction Schedule

Wells and watermain online	Winter 2016
Pilot study with well water	Winter 2016
Complete feasibility study	Winter 2016
WTP4 design and bidding (9 mo)	Winter 2016/2017
Construction (12 mo)	2017-2018
WTP4 online	End 2018

WTP4 Cost Estimate

- Water Treatment Plant No. 4: $22.3M*
  - Gravity filters with traditional media
  - Onsite chlorine generation
  - Lamella plate backwash water recovery
  - Onsite clearwell
  - High service pumps

*Note: Construction costs are rising

DNR Water Supply Plan- overview

- Formerly called Water Emergency and Conservation Plan
- Last submitted May 2007
- New Water Supply Plan due December 31, 2016
- Necessary for all public water suppliers that serve over 1,000
- Outlines historical water use, emergency plans, and water conservation efforts
- Necessary before DNR Water Appropriations Permit renewal in March 2017

DNR Water Supply Plan

- What does the DNR look for in your plan?
  - Water use vs. set state benchmark goals
  - Conservation efforts performed
  - Progress on commitments made in last plan

DNR Water Supply Plan- Benchmarks

- State benchmark goals:
  - 75 gpcd
  - 2.6 peak day : average day ratio of water use (summer: winter)
  - Unaccounted for water less than 10%
- Barr will analyze 2006-2015 water use data to evaluate performance vs. benchmarks

DNR Water Supply Plan- Conservation Efforts

- Conservation efforts performed:
  - Water conservation billing rate
  - Documented efforts made to promote water conservation
  - Public education
- City will need to document and verify what measures were performed

DNR Water Supply Plan- 2007 Action Items and Progress

2007 Action Items and progress:

- Determine impact of pumping on Pioneer Park
  - Completed with well siting study
- Sprinkling ban
  - Currently odd/even ban is authorized by council action (Tier 1)
  - Committed to year round ongoing condition (no trigger or authorization) in 2007 plan
- Public education programs
  - Need to document activities
- Regularly record groundwater data
  - New monitoring wells have been installed, monitored monthly

Summary of Actions Requested by Council

- Well Siting Study – *None, complete*
- Northeast Well Field: Wells 18-21
  - Award construction contract in May 2016
- Future Water Treatment Plant No. 4
  - Authorize pilot study and complete feasibility study by end of 2016
  - Authorize WTP4 design by early 2017
- DNR Water Supply Plan
  - Enact ongoing year round odd/even sprinkling restrictions by Dec. 2016
  - Submit plan to DNR by December 31, 2016
- DNR Appropriations Permit
  - Apply for renewal by March 2017

Questions, Comments and Discussion

Thank you!