

Advanced WTP Facility Planning

Mount Carmel, IL



City Council Discussion

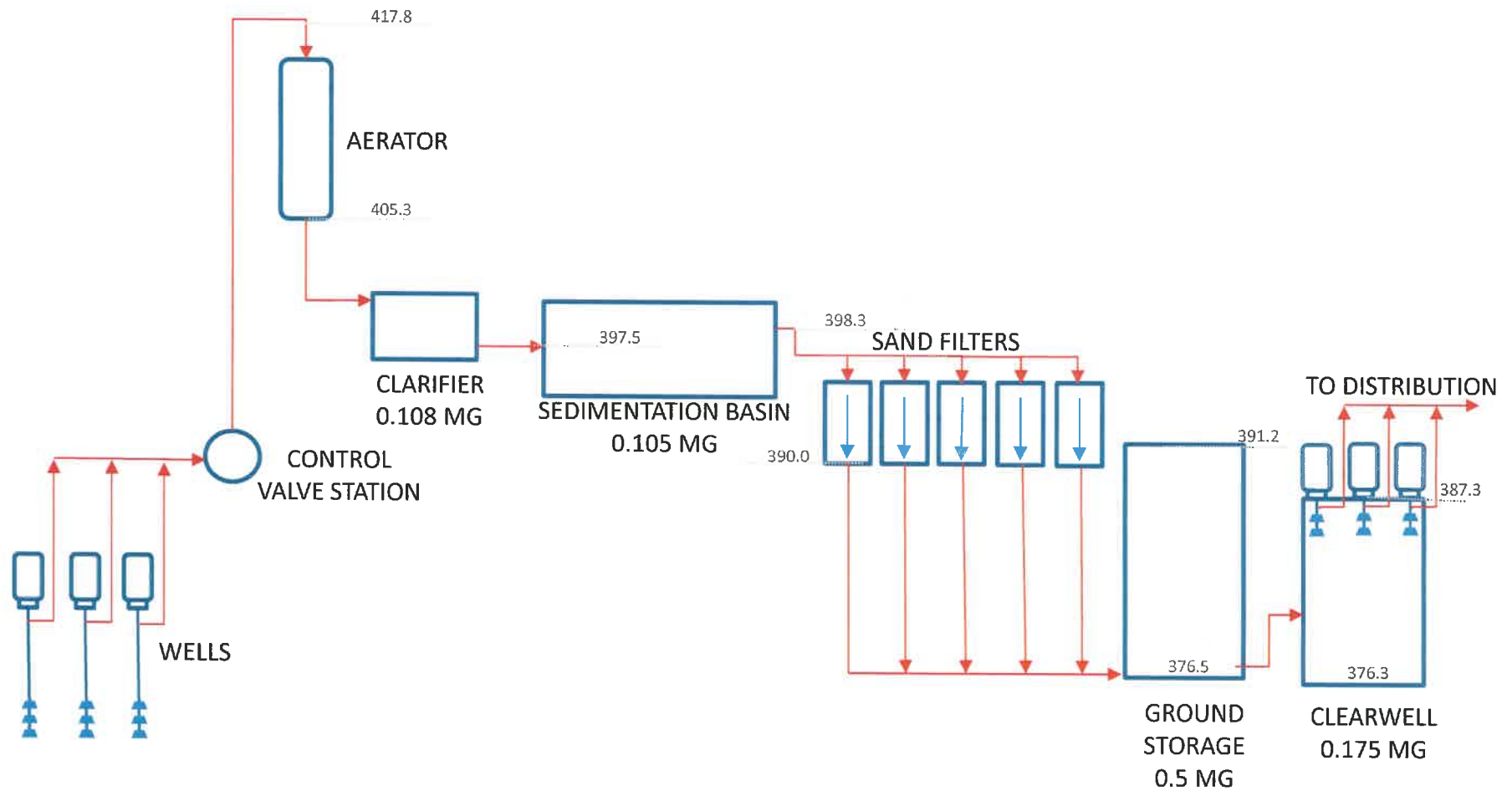
November 18, 2019



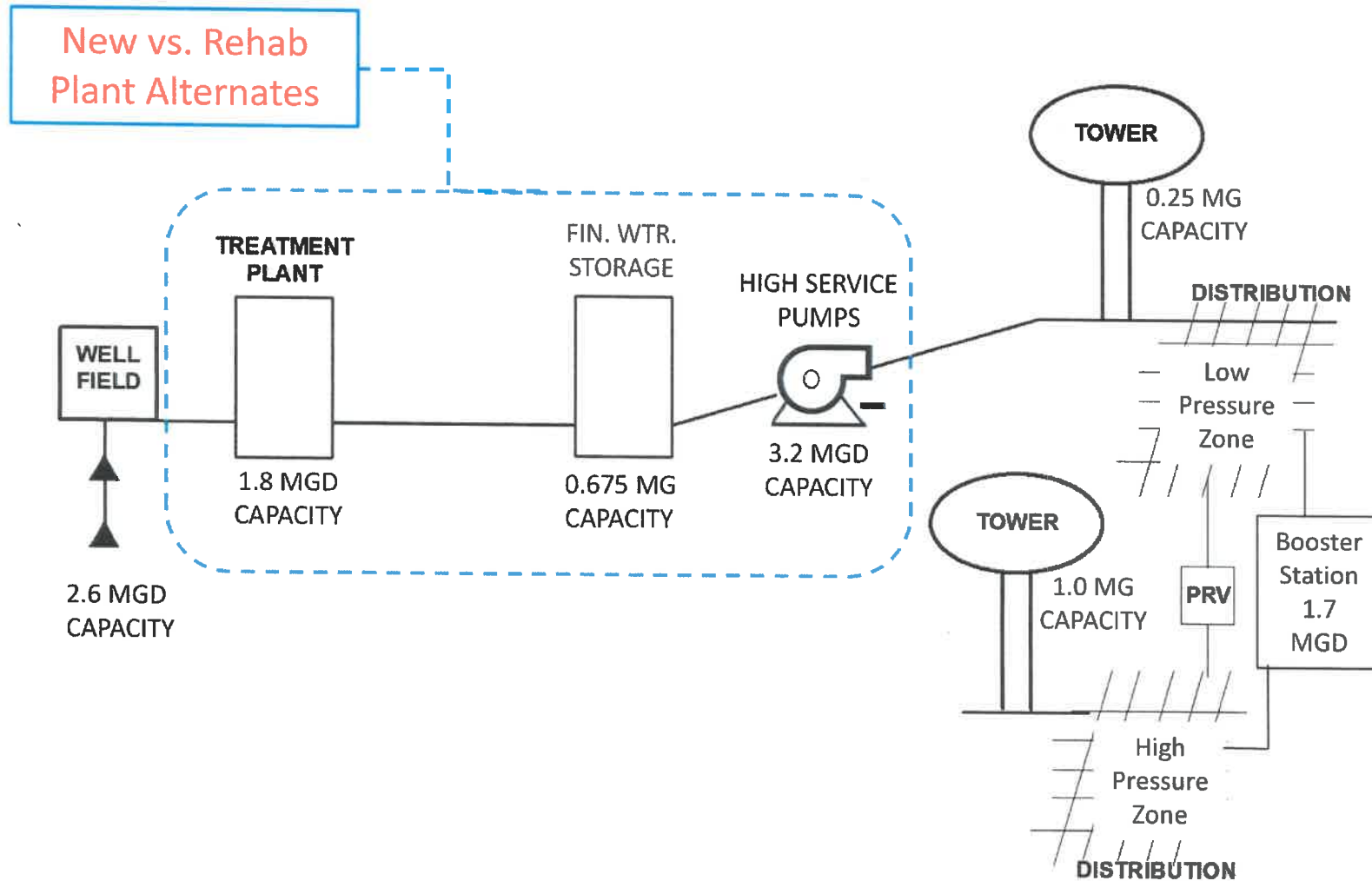
Discussion Agenda

- Existing System
- Alternatives Considered
- Evaluation of Alternatives
- Selected Alternative
- Project Implementation Schedule
- Proposed Next Steps

Existing System



Proposed System Configuration



IEPA Evaluation (February 2019)

IEPA Requirement or Recommendation

Make provision to chemically neutralize chlorine gas, sized to treat entire contents of largest storage vessel on site

Seal fluoride solution container and vent to exterior of WTP

Provide containment vessels or protective curbing for chemical feed and storage tanks

Provide separate switches for fan and lights outside of chlorine gas room and at the inspection window

Install day and bulk storage tanks for chemicals

Provide containment for the WTP diesel fuel lines

Install filter to waste capacity

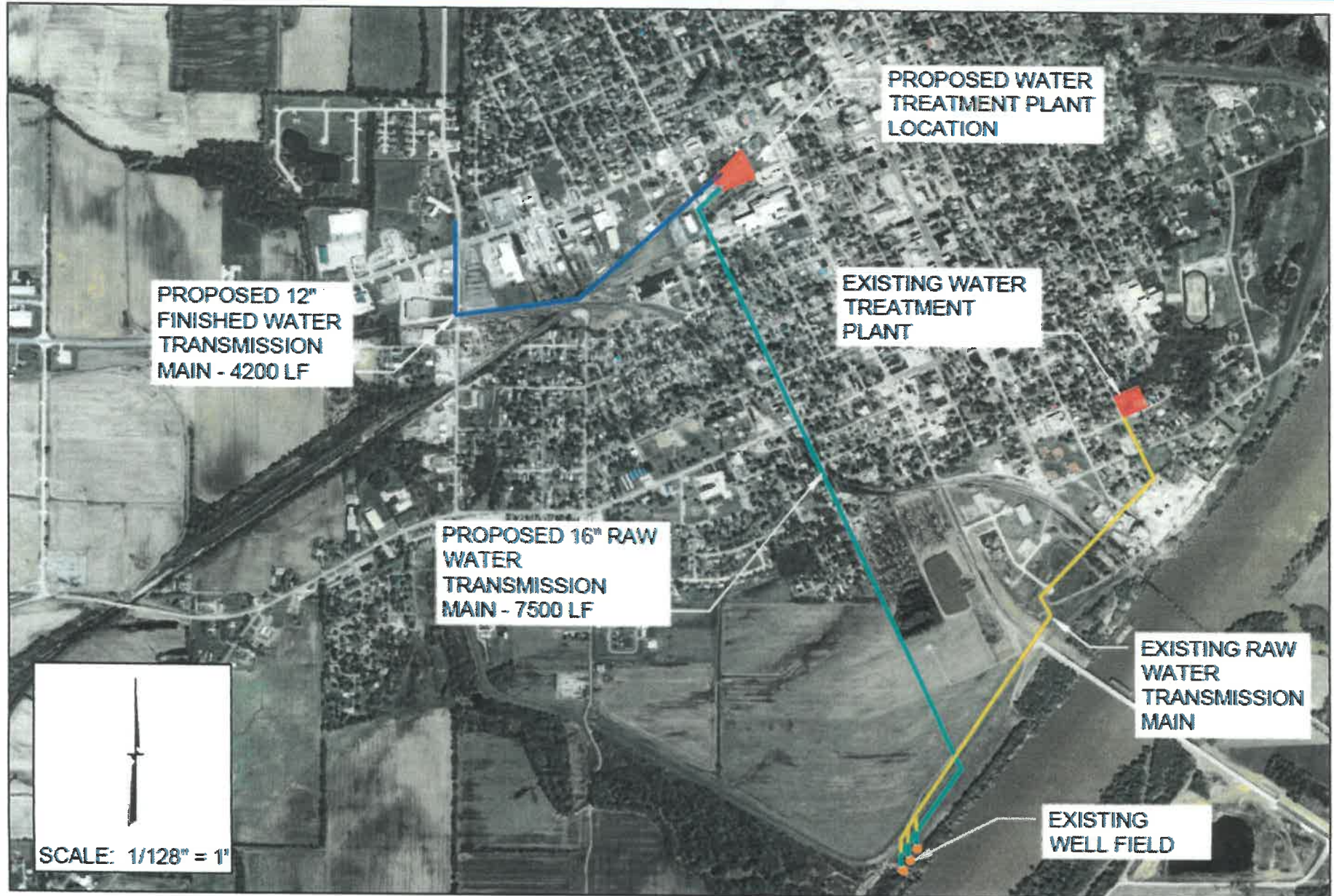
Consider installation of second clarifier

Construction of 0.175 MG clearwell does not meet standards; provide a properly constructed overflow

Cover the sedimentation basins

Common wall construction between filters and sedimentation basin does not meet standards

Alternates Considered



Alternatives Considered

- Conventional treatment (Rapid mix/flocculation/sedimentation/filtration)
- Lime softening using Claricone
- Ion exchange softening
- Softening via nanofiltration
- Actiflo high rate clarification
- Membrane gravity filtration

Alternatives Considered

- Conventional treatment (Rapid mix/flocculation/sedimentation/filtration)
- ~~Lime softening using Claricone~~
- ~~Ion exchange softening~~
- Softening via nanofiltration
- ~~Actiflo high rate clarification~~
- ~~Membrane gravity filtration~~

Lime sludge residuals

Ion exchange - chlorides at WWTP

High capital and replacement costs

Softening Treatment Options

Lime Softening using Claricones

Lime Softening

Advantages:

- Effective for surface water, ground water and GWUDI
- Good quality finished water (taste winners)
- Reliable & robust process

Disadvantages:

- Increased residuals handling
- Higher O&M for lime equipment
- Significant residuals management

Lime sludge
residuals

Ion Exchange Softening

Ion Exchange Softening

Advantages:

- Proven softening process
- Can treat multiple WQ parameters

Disadvantages:

- Ongoing salt cost
- Periodic resin bed replacement
- Potential brine wastewater impact at WWTP

Ion exchange -
chlorides at WWTP

Nanofiltration Softening

Nanofiltration

Advantages:

- Effective for surface water, ground water and GWUDI
- Good quality finished water
- No brine waste issues at WWTP

Disadvantages:

- More complex process
- Highest O&M cost for periodic membrane replacement
- Highest power costs for membrane filtration

Alternatives Considered

N1: Construct a new WTP using conventional treatment at a new site (Rapid mix/flocculation/sedimentation/filtration)

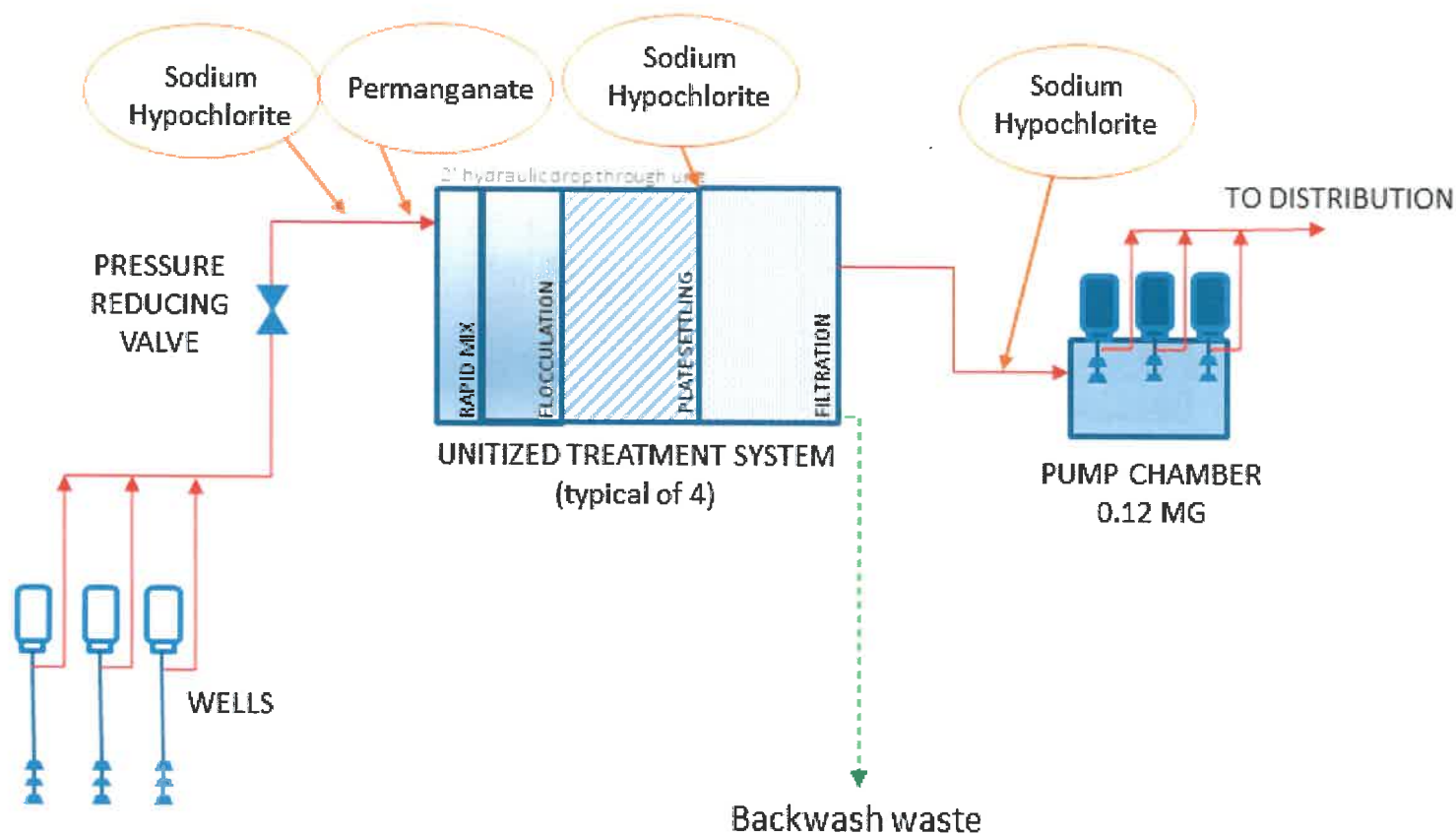
N2: Construct a new WTP at a new site using conventional treatment **plus softening via nanofiltration**

E1: Construct a new WTP at the existing site using conventional treatment

E2: Construct a new WTP at the existing site using conventional treatment **plus softening via nanofiltration**

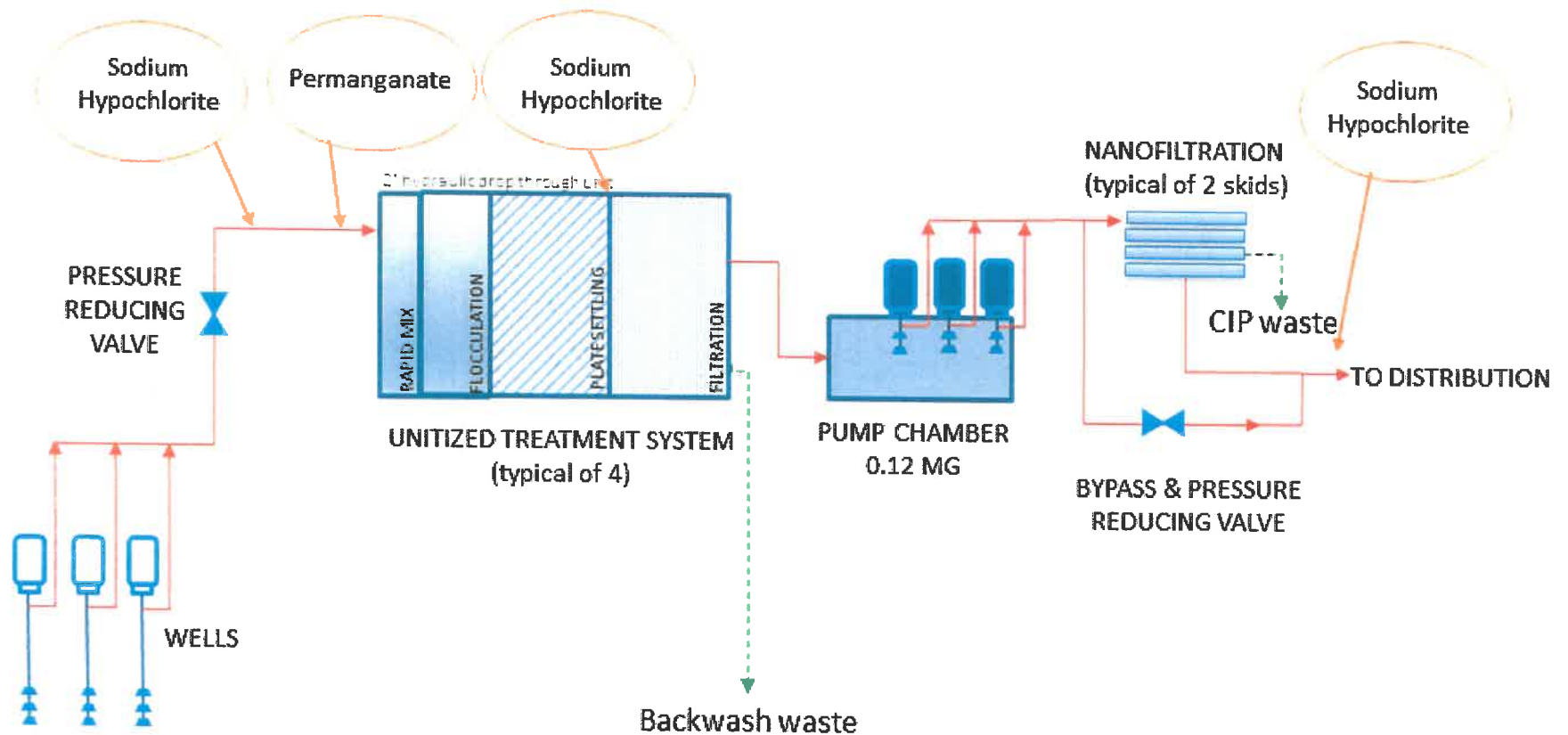
Alternatives Considered

N1: Construct a new WTP using conventional treatment at a new site (Rapid mix/flocculation/sedimentation/filtration)



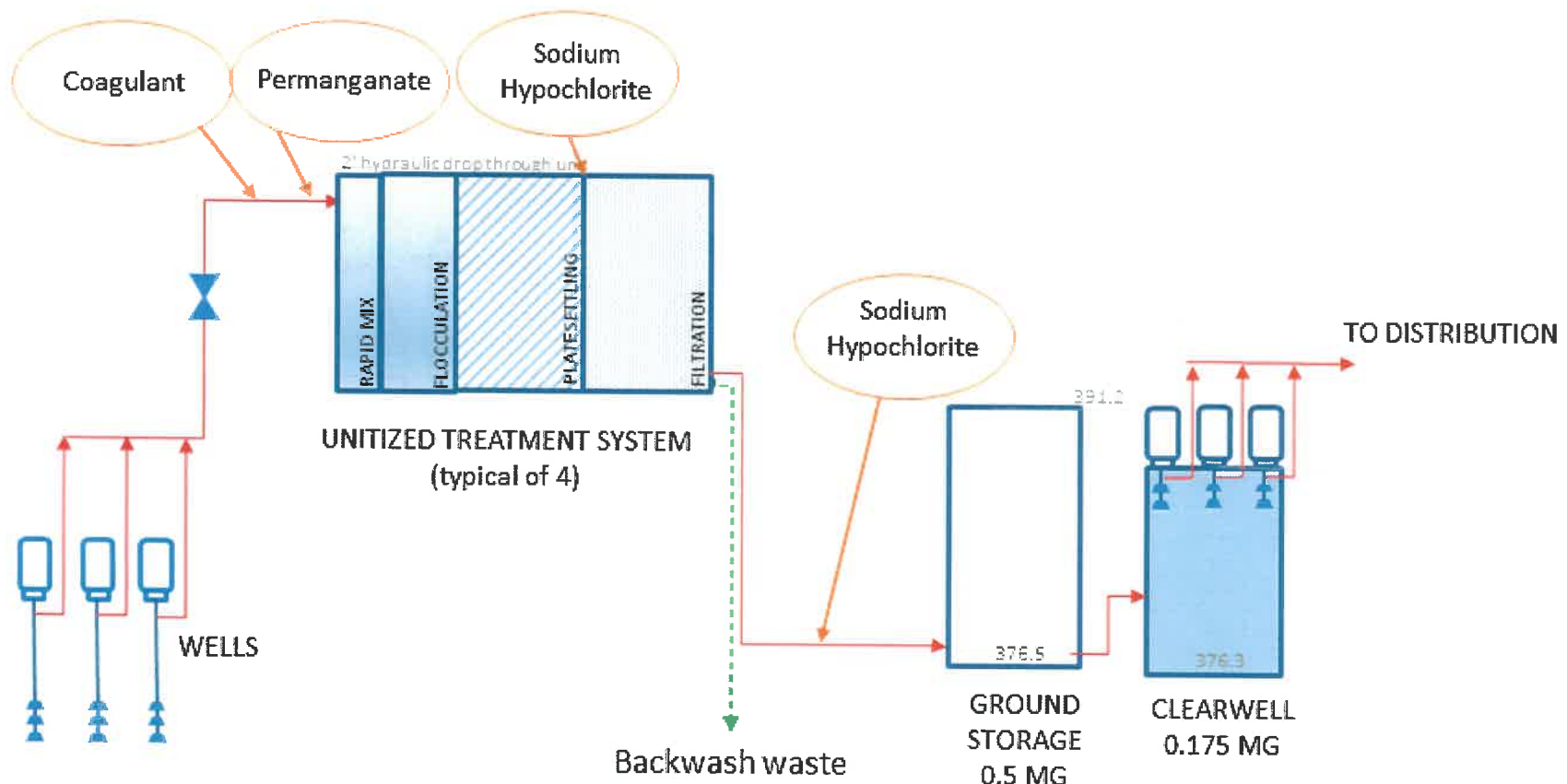
Alternatives Considered

N2: Construct a new WTP at a new site using conventional treatment **plus softening** via nanofiltration



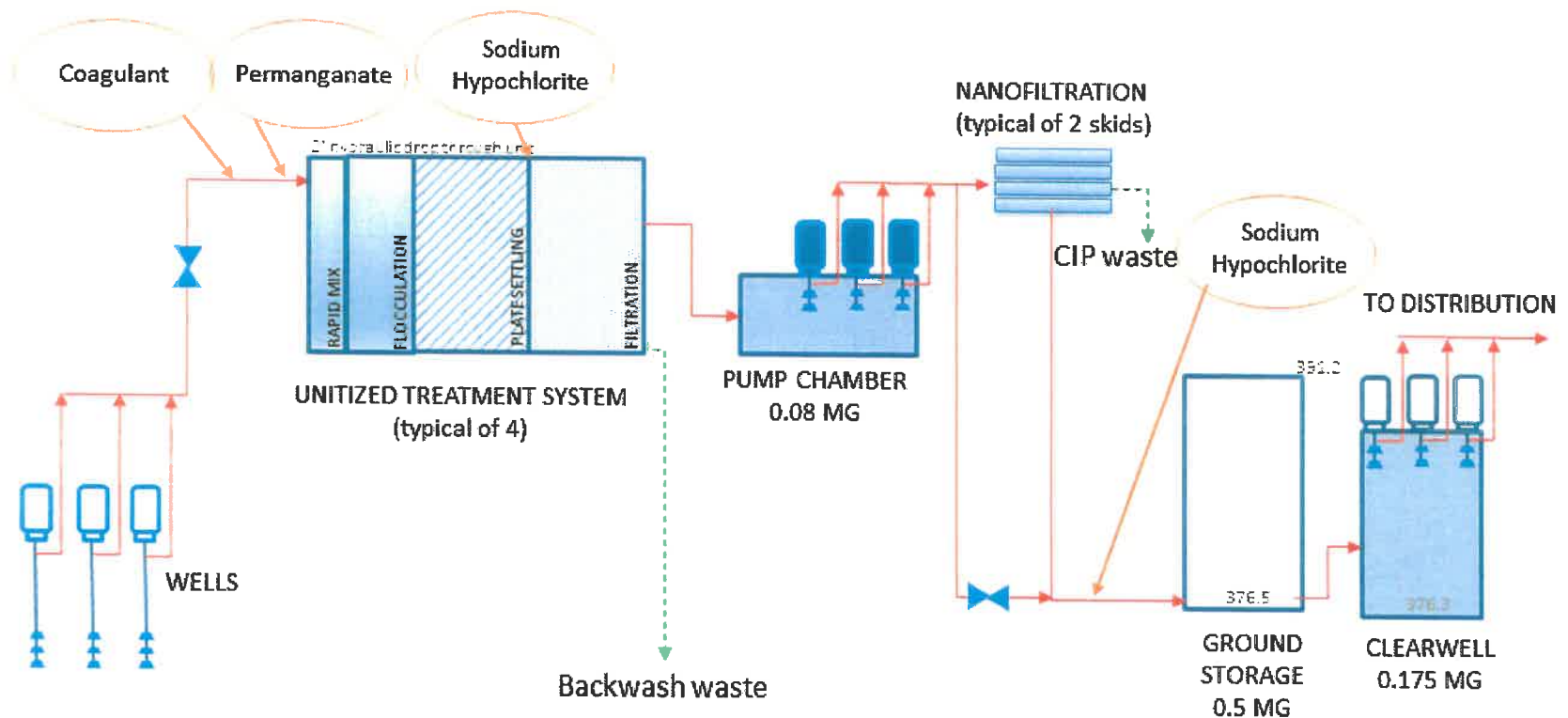
Alternatives Considered

E1: Construct a new WTP at the existing site using conventional treatment



Alternatives Considered

E2: Construct a new WTP at the existing site using conventional treatment **plus** softening via nanofiltration



Alternatives Considered

Alternative	N1	N2	E1	E2
Description	Conventional	Conventional + NF	Conventional	Conventional + NF
Capital Cost	\$9,348,000	\$11,228,000	\$8,109,000	\$9,989,000
20 year Operation & Maintenance Cost	\$748,000	\$4,893,000	\$709,000	\$4,854,000
Total Life Cycle Cost	\$10,096,000	\$16,121,000	\$8,818,000	\$14,843,000

IEPA Evaluation (February 2019)

IEPA Requirement or Recommendation	
Make provision to chemically neutralize chlorine gas, sized to treat entire contents of largest storage vessel on site	Addressed with new Chemical Building
Seal fluoride solution container and vent to exterior of WTP	
Provide containment vessels or protective curbing for chemical feed and storage tanks	
Provide separate switches for fan and lights outside of chlorine gas room and at the inspection window	
Install day and bulk storage tanks for chemicals	
Provide containment for the WTP diesel fuel lines	✓ - Modification
Install filter to waste capacity	✓ - Replaced
Consider installation of second clarifier	✓ - Removed from service
Construction of 0.175 MG clearwell does not meet standards; provide a properly constructed overflow	✓ - Add
Cover the sedimentation basins	✓ - Replaced with conventional treatment
Common wall construction between filters and sedimentation basin does not meet standards	✓ - Removed from service

Project Implementation Schedule

● Project Schedule

■ Preliminary Design Engineering	Nov 2019 – Mar 2020
■ Final Design Engineering	Apr 2020 – Dec 2020
■ Submit IEPA Funding Nomination Form	Jan 31, 2020 (March)
■ Facility Plan – IEPA Review & Approval	Jan 2020 – Dec 2020
■ Environmental Checklist	Mar 2020
■ Project Plan Checklist	Dec 2020
■ Advertise	Jan 2021
■ Construction	2021 – 2022
■ New WTP in Operation	2023

Proposed Next Steps

- **Next Steps**

- Move forward with Preliminary Design Engineering
 - Optimal site layout and foot print
 - Determine construction sequencing issues
 - Develop detailed civil, structural, electrical design requirements
 - Perform equipment selection prior to final design
 - Prepare site rendering drawings
 - Construction cost estimates
 - Phasing plan to maximize loan forgiveness

Discussion / Questions