CHAPTER 8
NEW WATER TREATMENT PLANT ALTERNATIVES

Introduction

This chapter presents a detailed discussion of alternatives which propose to construct a new WTP at a new site. The decision to investigate replacement alternatives at a new site was made because the cost to retrofit the existing plant is high and the ultimate capacity of any WTP on the existing property is practically limited to 30 mgd. Construction of a new WTP also offers a lower risk profile and more straightforward capacity expansion opportunities when compared to upgrades at the existing WTP. Alternatives 3 and 4 are intended to bracket the spectrum of options with regard to cost and space requirements associated with a new WTP on a new site of unspecified nature. Alternative 5 was developed to investigate construction of a new WTP on a site which is already owned by the City.

Alternative 3 Overview

Alternative 3 proposes construction of a new WTP using newer treatment technologies which have smaller footprints than their conventional counterparts. These processes tend to be more mechanically driven and may require additional regulatory approval. They typically have higher initial equipment costs than traditional treatment technologies, but lower overall costs resulting from smaller basins and structures. The consolidated footprints are used to define the minimum adequate property size that would be needed for a WTP with an ultimate capacity of 45 mgd. It is assumed that initial construction would be for a WTP capacity of 30 mgd, with expansion in 2065 to 45 mgd.

Alternative 4 Overview

Alternative 4 uses conventional treatment technologies which rely on hydraulic residence time for effectiveness. These technologies are proven and accepted by regulatory agencies, but they have a higher capital cost than more recent treatment technologies because they require larger basins and structures. Traditional processes offer some operational flexibility and a degree of reliability that more modern technologies may lack. Larger process footprints associated with conventional clarification and filtration facilities that have lower average flow rates are used to determine minimum property size requirements. Mechanical dewatering is still included by necessity for this alternative, and planned facilities are designed to accommodate an ultimate capacity of 45 mgd. It is assumed that initial construction would be for a WTP capacity of 30 mgd, with expansion in 2065 to 45 mgd.

Alternative 5 Overview

Alternative 5 proposes construction of a new WTP on a property which is currently owned by the City. The property is located across the street from the current WTP property and is currently the site of both the City's skate park and the WTP residuals handling pond. Initial

layouts were completed using both conventional processes and more technologically advanced processes, but it was determined that the property cannot practically accommodate conventional treatment processes and achieve 45 mgd ultimate capacity. The development of this alternative assumes the use of new treatment technologies with consolidated footprints. Since the old mill pond would be filled in under this alternative, additional washwater clarification basins are necessary to handle process wastewater before discharge to Skunk Creek. It is assumed that initial construction would be for a WTP capacity of 30 mgd, with expansion in 2065 to 45 mgd.

Alternative 3, 4, and 5 Planning Principles

The development of new WTP construction alternatives considers some general principles for planning which are different from those associated with the development of Alternatives 1 and 2 as presented in Chapter 7. These considerations include:

- Operations at the existing WTP would continue for the duration of the new plant construction. Production up to the rated 20 mgd capacity of the existing plant would continue to be available during peak periods without the potential need for water rationing.
- The duration of construction for a new WTP is shorter than the duration of construction of improvements at the existing WTP under either Alternative 1 or 2.
- Temporary facilities might be necessary during construction to allow for raw water supply and treated water disposal during startup and commissioning of the new WTP. This may present some disruption to production at the existing WTP, but impacts could be minimized by properly timing the interruptions.
- Construction of a new WTP would not begin as soon as construction of improvements under Alternative 1 or 2 because of the added time required for property acquisition, funding, and potentially more extensive permitting requirements.
- Site layout and construction sequencing of a new WTP are not subject to the constraints of Alternatives 1 and 2.
- Site access, internal traffic flow, parking, visual appeal, and the final site layout would be better optimized with a new WTP.

Property Considerations

For the purposes of connecting a new WTP to the existing water distribution system infrastructure, it is best to locate a new WTP in close proximity to the existing plant. The large-diameter distribution system piping in the vicinity of the existing plant can be used to adequately convey plant flows without significant upgrades. In addition, the existing raw water intake could be reused without major modification, and the old mill pond could continue to be used for process water discharge unless needed for other facility siting, as in Alternative 5. The cost and time to integrate a new treatment plant increases significantly with more distant sites because of pipeline construction costs and potential electrical

infrastructure upgrades. Other challenges associated with a distant site include right-of-way acquisition, environmental permitting for a new intake, liquid waste stream handling, and additional engineering for needed pipelines and electrical infrastructure.

The scope of this study does not include the identification of a specific site for a new WTP under Alternatives 3 and 4. A cursory review of City GIS property, land use, topography, and critical areas information suggests that there are several viable properties within ½ mile of the existing plant. Without knowing specific property characteristics, the most useful methodology for developing new plant alternatives is to cover a full range of potential space and cost requirements at the conceptual level which meet project objectives. Alternative 3 represents the smallest reasonable footprint and Alternative 4 represents the largest reasonable footprint. The treatment process selections bracket cost ranges subject to the planning criteria presented in Chapter 6.

The property used for Alternative 5 is the parcel across the street from the City's existing WTP. The City already owns this property. In this alternative, the old mill pond would be drained and filled to accommodate construction of new WTP structures on the site. The site is too small to accommodate conventional treatment processes at 45 mgd capacity. Available information regarding the geotechnical conditions at the site suggest that construction of WTP structures on the site will be challenging and more costly than typical construction. The City would also be required to demolish the existing skate park located on the property and rebuild the skate park at another location.

Process Alternatives and Selection

This section presents the basis for developing Alternatives 3, 4, and 5. Each of the primary treatment processes and main support facilities are discussed below.

Intake, Raw Water Pump Station, and Rapid Mixing

Alternatives 3, 4, and 5 propose the same improvements for the intake, raw water pumping, and rapid mixing facilities. As with Alternatives 1 and 2, two additional pumps will be added to the existing intake facilities to expand its capacity to 30 mgd. Upgrades to securely tie the structure back into the riverbank to prevent failure during a seismic event or slide will also be made to the existing intake. As with existing plant scenarios, a new intake would be required for production rates in excess of 30 mgd. A new pumped diffusion system for chemical coagulant addition will be constructed at the new WTP site. Construction of a new WTP at any location requires additional raw water transmission piping to supply water to the new location.

Clarification

Without the space restrictions imposed by the existing site, the City may choose to use clarification technologies other than ballasted flocculation. Two locally proven technologies were selected through Chapter 6 pre-screening; these were conventional flocculation and

sedimentation, and ballasted flocculation. Both processes use flocculation and sedimentation, but the ballasted process uses mechanical mixing, microsand addition, and inclined plate settlers to achieve floc maturation and settling with significantly less hydraulic retention time and surface area. These processes represent the high and low end of acceptable clarification rates per unit of surface area and, consequentially, the lowest and highest required surface areas and resulting footprints.

Alternative 3 Clarification

Ballasted flocculation is proposed in Alternative 3, with a proposed configuration of the equipment identical to the existing plant upgrade alternatives. The ballasted flocculation system and unit size would result in a settling rate of approximately 22 gpm/ft^2 at design capacity.

Alternative 4 Clarification

Alternative 4 proposes conventional flocculation and sedimentation which would make use of long, rectangular basins. The train consists of a tapered flocculation process followed by sedimentation. For sizing purposes, two rectangular basins would initially be constructed to achieve a combined capacity of 30 mgd. Each train would have three flocculation chambers with a detention time of 20 to 30 minutes, and a sedimentation basin sized to have a design surface overflow rate of 1 gpm/ft^2. These criteria represent conservative industry standards and the largest process footprint. Higher overflow rates might be achieved in practice, and could certainly be increased with the addition of inclined settlers to the basins. Evaluating these options could be made part of value engineering work completed during final design.

Alternative 5 Clarification

Ballasted flocculation is proposed in Alternative 5 with the same configuration and design flow rate as in Alternative 3. Conventional flocculation and sedimentation requires too much space for this alternative.

Ozone

As with Alternatives 1 and 2, space provisions are allocated for the new WTP alternatives to allow for the future addition of intermediate ozonation. Multiple contact basins sized to provide adequate contact time at full capacity would be installed between the clarification and filtration processes with liquid oxygen storage and ozone generators located nearby. The hydraulic profile of the new WTP should also allow water surface level differentials between the sedimentation basins and filters to allow for head loss associated with the ozonation process.

Filtration

Granular media filters are incorporated into all new WTP alternatives, as recommended in the pre-screening discussions in Chapter 6. New filter design would allow for air scouring during the backwashing process which is currently unavailable with the existing WTP filters. Air scour will reduce spent filter backwash water volumes and increase cycle durations. Filters would also be initially constructed with a deeper bed of granular media that allows higher filtration rates. A common channel for all clarified water can be used to distribute flow to all filters. With this approach, the number of filters does not need to be equally divisible by the number of clarification treatment trains. For Alternatives 3, 4, and 5, the filter layout is based on sizing each filter area to maintain uniform flow and air distribution while providing an appropriate filtration rate.

Alternatives 3 and 5 Filtration

Alternatives 3 and 5 use ten filters with an area of 440 ft^2 each to meet the 45 mgd capacity at a standard deep-bed filtration rate of 8 gpm/ft^2 with one filter off line. Six filters would be initially constructed to achieve 30 mgd at the same filtration rate without redundancy. This configuration would allow the plant to operate long enough to determine if a higher filtration rate can be used while still adequately meeting performance requirements. Other plants in the region commonly achieve 10 gpm/ft^2 with deep-bed media and optimized clarification upstream of the filters.

Alternative 4 Filtration

Alternative 4 uses a more conservative filtration rate of 5 gpm/ft^2 associated with standard granular media depths. This would require a larger ultimate configuration using twelve filters with an area of 520 ft^2 each, with eight initially constructed. Final design of this alternative might include initial construction of basins that could accommodate a future deep-bed media depth, thereby reducing the number of additional filters needed for an expanded plant capacity of 45 mgd.

Disinfection and Finished Water Storage

Alternatives 3, 4, and 5 assume the use of free chlorine to achieve the most stringent 0.5-log *Giardia* inactivation requirements for post-filtration disinfection. The contact time necessary in the clearwell to meet this disinfection requirement is conservatively based on current chlorination practices, historic seasonal demand and temperature profiles, and a well-baffled clearwell design. The clearwell should also have multiple cells, allowing a cell to be isolated and taken off line for inspection during lower demand periods. This configuration would also allow the clearwell to be operated at lower volumes during lower capacity production periods if a water quality benefit is achieved.

For all alternatives, sizing of the clearwell is based on initial construction of the volume required at the ultimate WTP capacity of 45 mgd. This approach eliminates the risks associated with expansion of this critical facility at a later date.

Different clearwell sizes were used for each alternative. The minimum volume necessary to meet disinfection requirements at 45 mgd is 1.1 million gallons. This size of clearwell is used for Alternatives 3 and 5. The clearwell proposed in Alternative 4 has a volume of 2.0 million gallons, reflecting the more conservative footprint of the new WTP planned in this alternative. Clearwell volume requirements will be determined during preliminary design for the selected alternative.

For all alternatives, the new clearwell is located directly beneath the new HSPS to minimize footprint and piping. Minimal space requirements to allow for the installation of future in-line UV units as an alternative future disinfection approach is also provided with the facility layouts.

High Service Pumping

As described above, Alternatives 3, 4, and 5 propose construction of a new HSPS in an enclosed building above the clearwell. The HSPS building footprint is sized to allow adequate spacing for pipe and support equipment between vertical turbine pump units, which would ultimately provide a firm pumping capacity of 45 mgd. The HSPS will also house the backwash pumps.

Chemicals

Chemical storage space needs and cost estimates are based on similar, comparable treatment facilities using similar treatment processes. Optimal chemical storage tank volumes and configurations would be developed as part of the final design process based on delivery schedules and operational preferences. All three alternatives include space provisions and layouts for chemical systems adequate to meet needs for a capacity of 45 mgd. Chemical systems might include multiple coagulants and filter aid systems, sodium hypochlorite, and future potential pH adjustment and ozonation.

Residuals and Solids Handling

Alternatives 1 and 2 included mechanical dewatering processes and equipment for processing filter backwash, filter-to-waste, and other residuals streams. Alternatives 3, 4, and 5 include similar thickening, storage and equalization, and dewatering facilities. The sizing of these facilities at the new WTP differ in that they are sized for an ultimate production capacity of 45 mgd rather than the 30 mgd capacity used in Alternatives 1 and 2.

Alternatives 3, 4, and 5 include an initial 50-foot diameter gravity thickener with an estimated loading rate of 10 lbs per day per square foot of surface area. Space to construct a second thickener of the same size is included for the future expansion. A storage and

equalization tank for thickened solids, initially sized to handle four days of volume at 45 mgd capacity, is also included to offer operational flexibility. The mechanical dewatering building is sized based on the initial installation of two dewatering units and with provisions for one future dewatering unit, along with conveyance systems and a truck loading bay.

It is assumed that dewatered solids are conveyed by trucks for off-site disposal. An equalization basin is also included on site layouts for liquid process stream storage prior to discharge. For Alternatives 3 and 4, the old mill pond will be retained for clarification and discharge to Skunk Creek. Alternative 5 includes a washwater clarification basin to replace the old mill pond because the space occupied by the pond is required for other facilities.

Support Facilities

New WTP support facilities do not include specialty historic architectural finishing like those required at the existing WTP site. The support buildings under new WTP alternatives are based on layout and configuration of treatment facilities that have similar capacities, staffing levels, and support systems to that of Grants Pass. Project cost estimates for the support buildings are based on estimates developed for these similar facilities and assume CMU block walls and metal roof construction materials. Support buildings and areas are the same for Alternatives 3, 4, and 5 and are presented in Table 8-1. The operations and administration building would include staff work areas such as offices, meeting rooms, lockers and restrooms, lunch room, and records storage.

Table 8-1
Planning-Level Support Building Size Summary

Building	Dimensions (Length × Width × Height) (ft)	Area (ft^2)
Chemical Storage	105 × 60 × 20	6,300
Ozone Generator Room	25 × 75 × 20	1,875
Maintenance and Shop	40 × 60 × 15	2,400
Operations and Administration (Two stories)	60 × 50 × 30	6,000
Electrical Building	40 × 40 × 15	1,600

Summary of Alternatives

The treatment processes and facilities included in the new WTP alternatives offer a planning-level analysis of space requirements and allow a fair value comparison between all of the alternatives. Treatment processes common in footprint and cost between Alternatives 3, 4, and 5 include:

- Rapid mixing
- Finished water pumping

- Solids handling facilities
- Support buildings
- Backup power
- Future space provisions

Treatment facilities that differ in footprint and costs between Alternatives 3 and 5 and Alternative 4 include:

- Clarification
- Filtration
- Finished water storage
- Site civil, including site preparation, paving, yard piping, landscaping, security, etc.
- Distribution system integration, based on feasible sites for the different total property requirements

Alternative 5 differs from both Alternatives 3 and 4 in that it includes construction of washwater clarification basins.

Figures 8-1, 8-2, and 8-3 show process flow schematics for Alternatives 3, 4, and 5, respectively. Table 8-2 presents a comparison of the advantages and disadvantages for the three alternatives.

Facility Layouts and Construction Sequencing

Conceptual level site plans for Alternatives 3, 4, and 5 are shown in Figures 8-4, 8-5, and 8-6, respectively. The site plans shown for Alternatives 3 and 4 are intended to be representative of site layouts for each alternative without considering specific property or site orientation needs. It is expected that final site layouts would depend on the shape and orientation of the actual property. The site layout for Alternative 5 takes the unique dimensions and configuration of the City property into consideration. As the life expectancy of the new WTP structures would be expected to be a minimum of 75 years, the site plans include footprints associated with initial construction to achieve a capacity of 30 mgd and space provisions that allow expansion to an ultimate capacity of 45 mgd.

Based on the layouts, the property size requirements for a new WTP under Alternatives 3 and 4 ranges between 3.3 and 5.0 acres. These space requirements do not include additional space requirements that might become necessary for an irregularly-shaped parcel; unusable critical areas such as wetlands, steep slopes, or flood plains; unique land use codes or setbacks; or unfavorable geotechnical conditions. For the identified parcel under Alternative 5, all of the information known concerning such property constraints is considered.

BALLASTED FLOCCULATION

COAGULATION | MATURATION | PLATE OR TUBE SETTLING

DIFFUSED RAPID MIXING

COAGULANT

RAW WATER

BASIN #1

BASIN #2

BASIN #3 (FUTURE 45 MGD)

BALLAST SAND MAKE-UP

RECLAIMED BALLAST SAND

SETTLED SOLIDS

BALLAST SAND RECLAMATION SYSTEM

NOTE: FOR SIMPLIFICATION, BASIN OVERFLOW SYSTEM IS NOT INCLUDED.

GRAVITY THICKENING

(FUTURE 45 MGD)

THICKENED SOLIDS STORAGE

LIQUID DISPOSAL TO OLD MILL POND

WASH WATER EQUALIZATION

MECHANICAL DEWATERING

SOLIDS DISPOSAL

FILTER BACKWASH

FILTRATION (DEEP BED MEDIA)

(FUTURE 45 MGD)

FILTER TO WASTE

OZONE CONTACT (FUTURE IF NECESSARY)

AIR SCOUR

ULTRAVIOLET DISINFECTION (OPTIONAL)

CHLORINE DISINFECTION

BACKWASH PUMPING

HIGH SERVICE PUMPING

DISTRIBUTION

FINISHED WATER STORAGE (1.1 MG)

PIPING LEGEND

- RAW WATER
- SETTLED WATER
- FILTERED WATER
- FINISHED WATER
- PROCESS WASTE WATER
- LIQUID DISPOSAL
- THICKENED SOLIDS
- DEWATERED SOLIDS

REV	DATE	BY	DESCRIPTION

SCALE: NO SCALE

DESIGNED F. MARESCALCO

DRAWN F. MARESCALCO

CHECKED B. GINTER

MSA | MWH® | City of Grants Pass

WATER TREATMENT PLANT FACILITY PLAN UPDATE
FIGURE 8-1
PROCESS FLOW SCHEMATIC - ALTERNATIVE 3

K:\TAC_Projects\12\1340\CAD\Figures\FLOW SCHEMATIC - SMALL LAYOUT.dwg FLOW SCHEM 10/23/2013 4:35 PM FJM 18.2s (LMS Tech)

NOTE: FOR SIMPLIFICATION, BASIN OVERFLOW SYSTEM IS NOT INCLUDED.

MULTI-STAGE TAPERED FLOCCULATION

SEDIMENTATION

PLATE OR TUBE SETTLING (FUTURE 45 MGD)

DIFFUSED RAPID MIXING

COAGULANT

RAW WATER

SED BASIN #1

SED BASIN #2

SED BASIN #3 (FUTURE 45 MGD)

SETTLED SOLIDS

GRAVITY THICKENING

(FUTURE 45 MGD)

LIQUID DISPOSAL TO OLD MILL POND

THICKENED SOLIDS STORAGE

WASH WATER EQUALIZATION

MECHANICAL DEWATERING

SOLIDS DISPOSAL

FILTER BACKWASH

FILTRATION

(FUTURE 45 MGD)

FILTER TO WASTE

OZONE CONTACT (FUTURE IF NECESSARY)

BACKWASH PUMPING

HIGH SERVICE PUMPING

DISTRIBUTION

FINISHED WATER STORAGE (2.0 MG)

AIR SCOUR

ULTRAVIOLET DISINFECTION (OPTIONAL)

CHLORINE DISINFECTION

PIPING LEGEND

- RAW WATER
- SETTLED WATER
- FILTERED WATER
- FINISHED WATER
- PROCESS WASTE WATER
- LIQUID DISPOSAL
- THICKENED SOLIDS
- DEWATERED SOLIDS

REV	DATE	BY	DESCRIPTION

SCALE: NO SCALE

DESIGNED F. MARESCALCO

DRAWN F. MARESCALCO

CHECKED B. GINTER

MSA

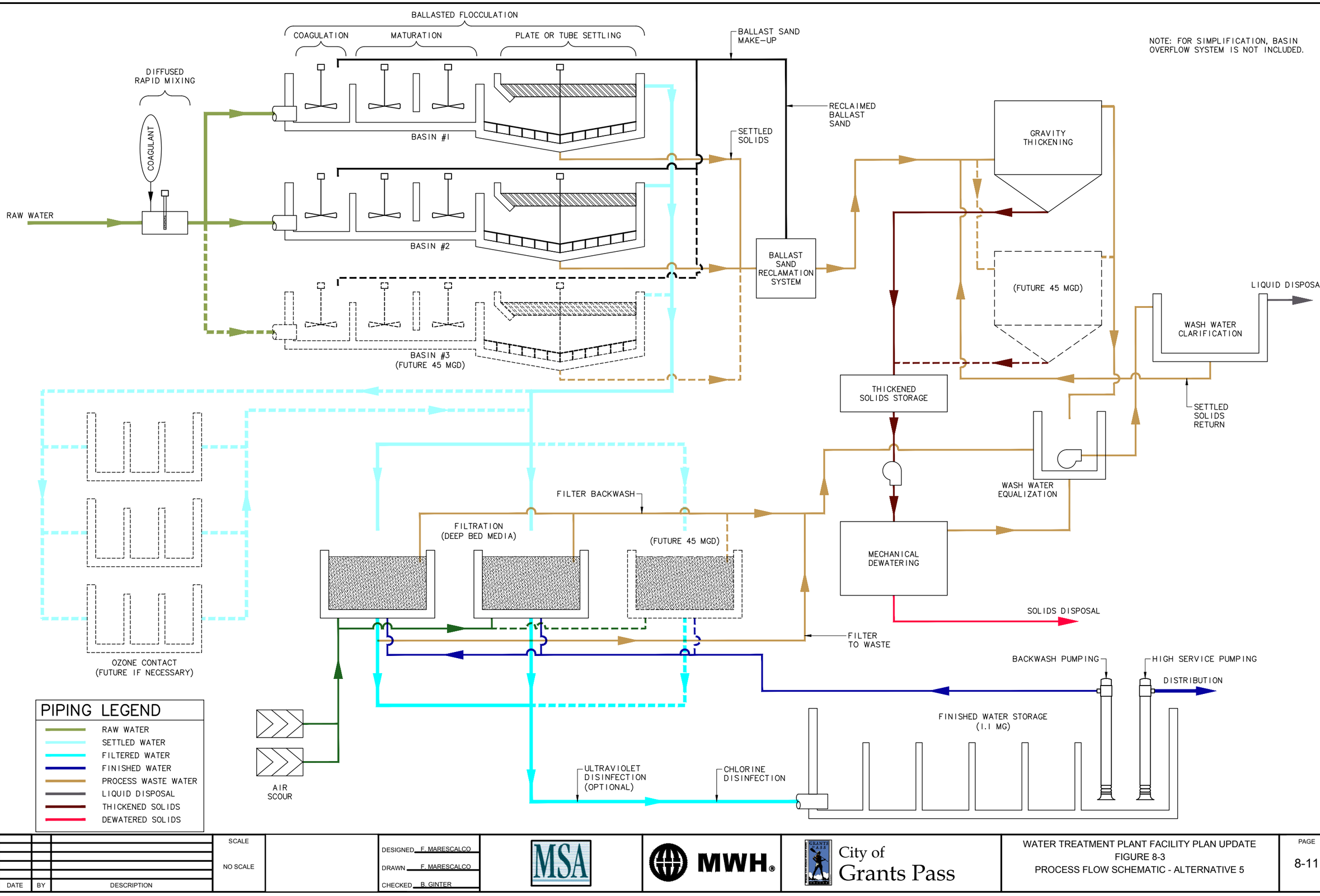
MWH®

City of Grants Pass

WATER TREATMENT PLANT FACILITY PLAN UPDATE
FIGURE 8-2
PROCESS FLOW SCHEMATIC - ALTERNATIVE 4

PAGE 8-10

K:\TAC_Projects\12\1340\CAD\Figures\FLOW SCHEMATIC.dwg FLOW SCHEM 10/23/2013 4:36 PM FJM 18.2s (LMS Tech)



K:\TAC_Projects\12\1340\CAD\Figures\FLOW SCHEMATIC - SMALL LAYOUT.dwg ALTERNATIVE 5 10/23/2013 4:35 PM FJM 18.2s (LMS Tech)

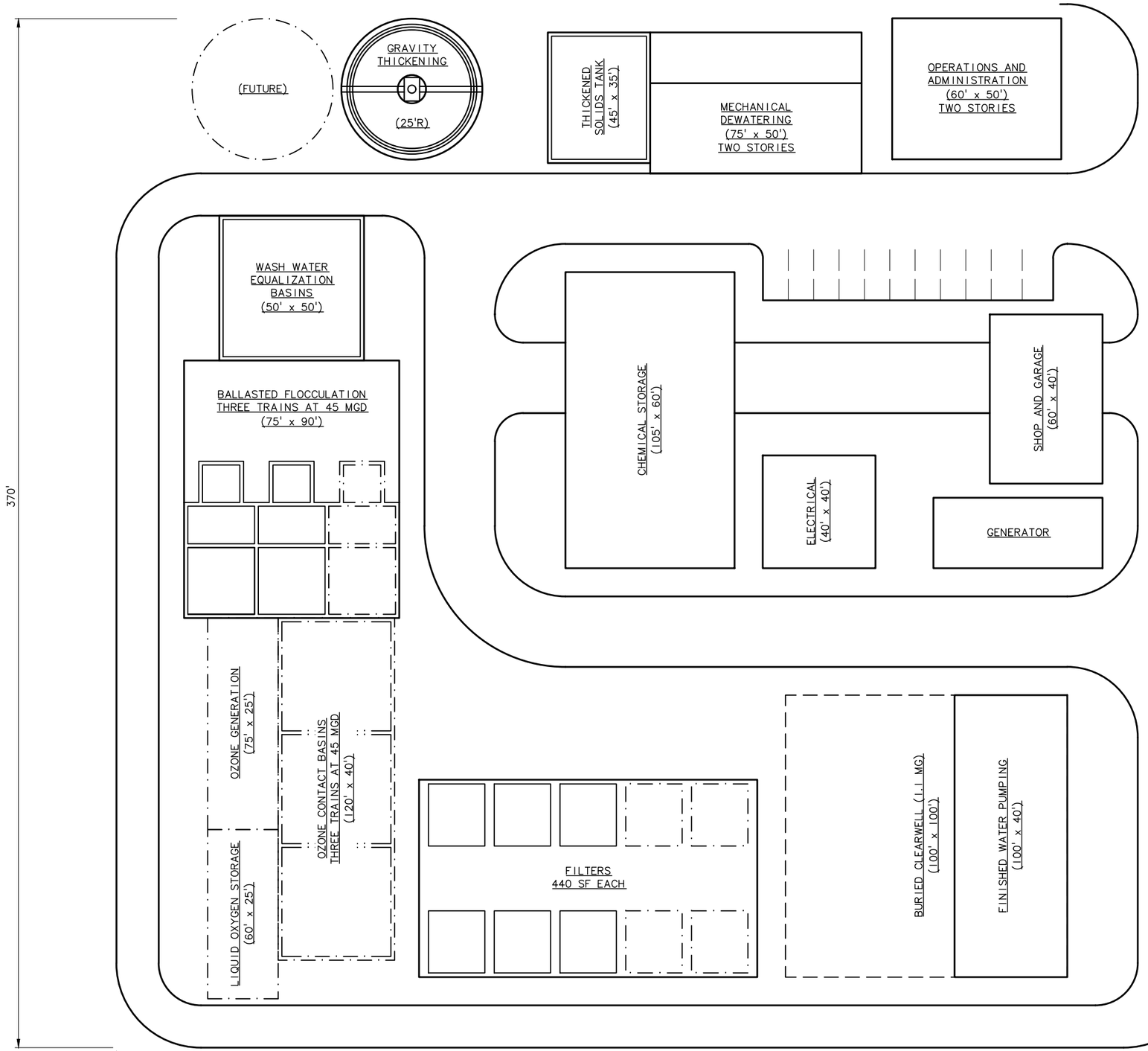
REV	DATE	BY	DESCRIPTION

SCALE: NO SCALE

DESIGNED F. MARESCALCO
DRAWN F. MARESCALCO
CHECKED B. GINTER

MSA | MWH® | City of Grants Pass

WATER TREATMENT PLANT FACILITY PLAN UPDATE
FIGURE 8-3
PROCESS FLOW SCHEMATIC - ALTERNATIVE 5



APPROXIMATE REQUIRED
AREA = 3.3 ACRES

REV	DATE	BY	DESCRIPTION

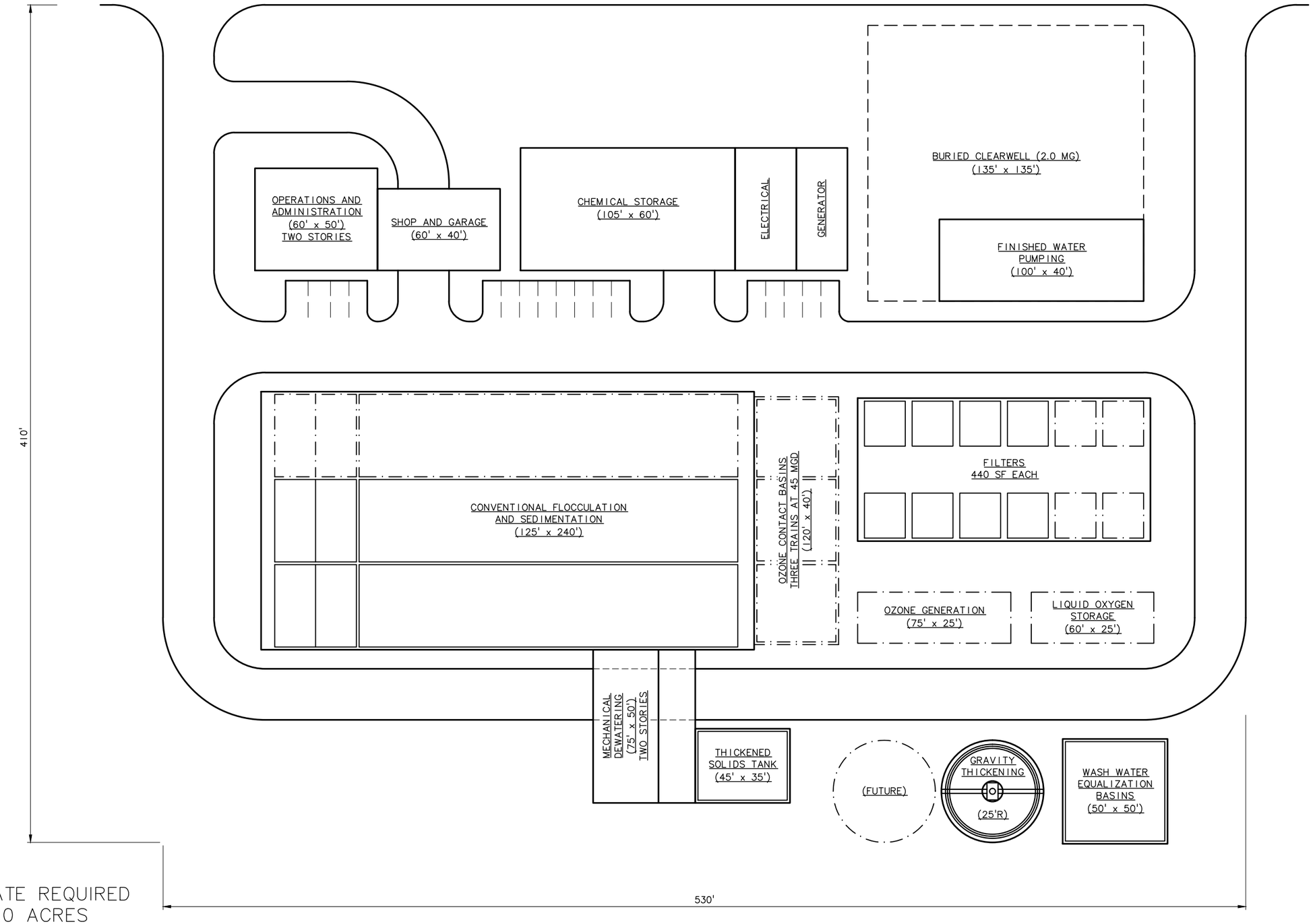
SCALE 1"=40'

WARNING
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED F. MARESCALCO
DRAWN S. KIRK
CHECKED C. KELSEY

MSA MWH® City of Grants Pass

WATER TREATMENT PLANT FACILITY PLAN UPDATE
FIGURE 8-4
SITE LAYOUT - ALTERNATIVE 3



APPROXIMATE REQUIRED
AREA = 5.0 ACRES

REV	DATE	BY	DESCRIPTION

SCALE 1"=50'

WARNING
0 ½ 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED F. MARESCALCO
DRAWN S. KIRK
CHECKED C. KELSEY

MSA MWH®

City of Grants Pass

WATER TREATMENT PLANT FACILITY PLAN UPDATE
FIGURE 8-5
SITE LAYOUT - ALTERNATIVE 4

PLOT DATE: 10/24/2013 0659:02

USER: NISHIHAM

0 30 60

FULL SIZE: 1" = 30'
HALF SIZE: 1" = 60'

PROPERTY LINE

PROPERTY SET BACK

3

1

(50'x41.5')
BALLASTED FLOCCULATION

PARKING

SOLIDS THICKENER
(2@75')

SOLIDS HOLDING & PUMP STATION
(32'x27')

OZONE CONTACTOR
(24'x48')

ADMINISTRATION OPERATIONS & MAINTENANCE
(100'x50')

FILTERS (73'x66')
420 SF EACH

PARKING

LIQUID OXYGEN STORAGE
(40'x25')

OZONE GEN ROOM
(50'x26')

CHEMICAL ROOM
(50'X125')

FINISHED WATER PUMPING
(103'x40')

CLEARWELL
1,100,000 GAL
(103'x103')

MECHANICAL DEWATERING
(50'x50')

WW CLARIFIERS
(43'x63')

ELECTRICAL BUILDING
(43'x43')

WW EQ
169,000 GAL
(43'x43')

PROPERTY LINE

OVERHEAD POWERLINES

8" FM TO MILL POND

2

GENERAL SHEET NOTES

1. PROPOSED NEW WTP WILL BE 30 MGD. EXPANSION TO 45 MGD MAY BE ACHIEVED IN THE FUTURE. THIS WOULD ELIMINATE NEED TO BUILD A NEW 15 MGD WTP ON THE EXISTING SITE AND THEREFORE WOULD ELIMINATE THE NEED TO OPERATE TWO UNIQUE WTP FACILITIES FOR 4-5 MONTHS DURING PEAK DEMAND PERIOD.
2. NEW WASHWATER CLARIFICATION SYSTEM WILL BE NEEDED WITH NEW WTP SINCE OLD MILL POND IS BEING RECLAIMED
3. CONSTRUCTION STAGING SPACE MAY BE AVAILABLE ON THE PROPOSED NEW WTP SITE AFTER RECLAMATION OF THE OLD MILL POND.
4. EXISTING WTP SITE WILL BE ABANDONED AFTER START-UP OF NEW WTP. COULD CONTINUE TO USE THE SPACE FOR MISCELLANEOUS FUNCTIONS.
5. LOT SIZE IS APPROXIMATELY 5.1 ACRES; 3.5 ACRES AFTER SETBACKS. OLD MILL POND IS APPROXIMATELY 1.4 ACRES.

SHEET KEYNOTES

1. OLD MILL POND WILL BE RECLAIMED IN ITS ENTIRETY, BUT WILL RETAIN THE DISCHARGE LOCATION TO SKUNK CREEK.
2. FORCE MAIN FROM EXISTING WASHWATER EQUALIZATION BASIN TO OLD MILL POND WILL NEED TO BE RELOCATED TO TEMPORARY WASHWATER CLARIFICATION SYSTEM TO KEEP EXISTING WTP IN SERVICE.
3. ASSUMED 50' SETBACK ON WEST EDGE OF PROPERTY ADJACENT TO RESIDENTIAL ZONED PROPERTY AND 20' SETBACK ON SOUTH AND EAST EDGE OF PROPERTY ADJACENT TO M STREET AND INDUSTRIAL ZONED PROPERTY.

W:\1530683 Grants Pass\TO 21 - Facility Plan\Studies & Reports\Final Report\Chapter 8\

REV	DATE	BY	DESCRIPTION

SCALE: AS NOTED

DESIGNED A. NISHIHARA
DRAWN A. NISHIHARA
CHECKED P. KREFT

MSA | MWH | City of Grants Pass

WATER TREATMENT PLANT FACILITY PLAN UPDATE
FIGURE 8-6
SITE LAYOUT - ALTERNATIVE 5

Table 8-2
Alternatives 3,4 and 5 Comparison Summary

Alternative	Advantages	Disadvantages
3	• Lowest initial construction and expansion costs • Smaller basin structures to maintain • Less property required	• Additional operator oversight of ballasted flocculation process • More mechanical systems to maintain • Additional regulatory approval may be required
4	• Proven clarification technologies for Grants Pass' Rogue River supply • Larger clearwell offers system storage reliability in addition to disinfection • Process retrofitting might offer capacity increases without new basin construction	• Requires more property • Higher initial construction and expansion costs
5	• City already owns the property • Smaller basin structures to maintain • Close to existing WTP and intake structure • Lower cost of connecting WTP to existing raw water and finished water pipelines.	• Geotechnical conditions of property are likely challenging • Permitting may be more difficult due to proximity to critical areas • Additional operator oversight of ballasted flocculation process • More mechanical systems to maintain • Additional regulatory approval may be required • Wetland mitigation and construction of a new skate park would be necessary

For each alternative, a single uninterrupted construction period of 28 months is estimated. Alternative 5 might require an increased duration for site preparation due to demolition and potential unsuitable soils. The construction period assumes that the contractor is allowed use of the entire undeveloped property for the duration of construction. Alternative 5 might require use of part of the existing WTP for staging and storage, if the City is willing to allow this. This assumption results in a shorter construction duration than those estimated for Alternatives 1 and 2 as presented in Chapter 7. The estimated construction duration for Alternatives 1 and 2 is approximately 48 to 54 months due to phasing of improvements.

Project Cost Estimates

Tables 8-3, 8-4, and 8-5 present planning-level project cost estimates for Alternatives 3, 4, and 5, respectively. The anticipated total project costs are expressed in 2013 dollars. These costs are for the initial construction under each alternative and will result in a new WTP with a rated capacity of 30 mgd. Tables 8-3, 8-4, and 8-5 do not show costs for expansion in 2065. A cursory review of City GIS property, land use, topography, and critical areas information suggests that there are several viable properties, in addition to the skate park property, within ½ mile of the existing plant. Costs associated with integrating a new WTP into the existing system were developed based on this general vicinity. Actual property acquisition and integration costs for Alternatives 3 and 4 will vary with site.

It is anticipated that construction of a new WTP would likely not begin for several years to allow time for property acquisition, design, environmental and regulatory permitting, public acceptance, financing, and bidding. Expansion to 45 mgd under any alternative would not take place until approximately 2065. Because the timing of capital outlays is different between alternatives, the net present value analysis of alternatives is presented in Chapter 9 for equivalent cost comparisons of all the alternatives.

Estimated project costs were developed using recent local industry information from estimates, bid tabs, vendor quotations, and other material unit costs for similar treatment facilities. Line item estimates represent installed costs that include materials, labor, equipment, and contractor overhead and profit.

These opinions of probable cost are based on planning-level analysis and a low level of project definition. These estimates are Class 5 estimates as defined in Chapter 7. They are subject to the following list of assumptions.

- No cost has been included for unusual site conditions requiring environmental remediation, poor soil conditions, or demolition of existing structures in Alternatives 3 or 4. Costs for extra foundations and remediation of poor soil conditions in Alternative 5 are based on similar projects. The cost for wetlands mitigation is based on an average cost of wetland mitigation banks in Oregon. Skate park construction costs are based on information associated with construction of the current park and appropriate escalation factors.
- No cost has been included associated with demolition of the existing WTP once the new plant is online.
- Cost for property acquisition in Alternatives 3 and 4 is based on a conservative assumption of recently assessed suitable properties in Grants Pass.
- Costs for piping connections to the existing raw water intake and the distribution system in Alternatives 3 and 4 are representative values and may vary widely depending on final site location. The cost for Alternative 5 is based on smaller assumed lengths because the location is known. All of the alternatives assume 48-

inch diameter steel pipe in public right-of-way. No cost for private easements is included.

- Costs for a permanent standby generator to produce approximately 5 MGD of finished water are included.
- No allowance is included for premium architectural finishes on plant structures. Concrete masonry unit construction with architectural metal roofing is assumed for building costs.
- Site civil and finishing costs will vary based on actual site size and layout.

Table 8-3
Alternative 3 Project Cost Estimate

Facility	Estimated Cost (2013 USD)
Mobilization and General Conditions (8 percent)	$2,400,000
Intake and Raw Water Pump Station Improvements	$1,450,000
Raw Water Transmission Main	$1,000,000
Rapid Mixing	$340,000
Clarification	$3,200,000
Filtration	$5,200,000
Treated Water Storage and Chlorine Contact Basin	$1,570,000
Finished Water Pumping and Metering	$4,400,000
Finished Water Transmission	$380,000
Process Wastewater Equalization Basin	$390,000
Backwash Force Main to Old Mill Pond	$400,000
Gravity Thickener	$1,500,000
Thickened Solids Storage Tank	$500,000
Mechanical Dewatering Structure and Equipment	$1,900,000
Chemical Storage and Feed Building and Equipment	$2,000,000
Maintenance, Operations, and Administration Building	$2,250,000
Site Electrical	$2,500,000
Miscellaneous Yard Piping	$260,000
Site Civil	$160,000
Site Finishing and Security	$80,000
Subtotal: Construction without Contingency	**$31,900,000**
Contingency (20 percent)	**$6,400,000**
Subtotal: Construction with Contingency	**$38,300,000**
Engineering, Permitting, Construction Management Services, Legal, Administration (25 percent)	**$8,000,000**
Property Acquisition	**$1,100,000**
Total Estimated Project Cost with Contingencies	**$47,400,000**

Table 8-4
Alternative 4 Project Cost Estimate

Facility	Estimated Cost (2013 USD)
Mobilization and General Conditions (8 percent)	$2,800,000
Intake and Raw Water Pump Station Improvements	$1,450,000
Raw Water Transmission Main	$1,260,000
Rapid Mixing	$340,000
Clarification	$4,500,000
Filtration	$7,500,000
Treated Water Storage and Chlorine Contact Basin	$2,630,000
Finished Water Pumping and Metering	$4,400,000
Finished Water Transmission	$380,000
Process Wastewater Equalization Basin	$390,000
Backwash Force Main to Old Mill Pond	$400,000
Gravity Thickener	$1,500,000
Thickened Solids Storage Tank	$500,000
Mechanical Dewatering Structure and Equipment	$1,900,000
Chemical Storage and Feed Building and Equipment	$2,000,000
Maintenance, Operations, and Administration Building	$2,225,000
Site Electrical	$2,500,000
Miscellaneous Yard Piping	$400,000
Site Civil	$240,000
Site Finishing and Security	$100,000
Subtotal: Construction without Contingency	**$37,400,000**
Contingency (20 percent)	**$7,500,000**
Subtotal: Construction with Contingency	**$44,900,000**
Engineering, Permitting, Construction Management Services, Legal, Administration (25 percent)	**$9,400,000**
Property Acquisition	**$1,100,000**
Total Estimated Project Cost with Contingencies	**$55,400,000**

Table 8-5
Alternative 5 Project Cost Estimate

Facility	Estimated Cost (2013 USD)
Mobilization and General Conditions (8 percent)	$2,700,000
Intake and Raw Water Pump Station Improvements	$1,450,000
Raw Water Transmission Main	$250,000
Rapid Mixing	$340,000
Clarification	$3,200,000
Filtration	$5,200,000
Treated Water Storage and Chlorine Contact Basin	$1,570,000
Finished Water Pumping and Metering	$4,400,000
Finished Water Transmission	$300,000
Process Wastewater Equalization Basin	$390,000
Washwater Clarification Basins	$600,000
Gravity Thickener	$1,500,000
Thickened Solids Storage Tank	$500,000
Mechanical Dewatering Structure and Equipment	$1,900,000
Chemical Storage and Feed Building and Equipment	$2,000,000
Maintenance, Operations, and Administration Building	$2,250,000
Site Electrical	$2,500,000
Miscellaneous Yard Piping	$260,000
Construction Dewatering	$700,000
Temporary Washwater Clarification Facilities	$250,000
Site Preparation	$1,000,000
Additional Cost for Building and Structure Pile Foundations	$3,000,000
Site Finishing and Security	$120,000
Subtotal: Construction without Contingency	**$36,400,000**
Contingency (20 percent)	**$7,300,000**
Subtotal: Construction with Contingency	**$43,700,000**
Engineering, Permitting, Construction Management Services, Legal, Administration (25 percent)	**$9,100,000**
Wetlands Mitigation Cost	**$600,000**
Property Acquisition and Skate Park Construction	**$800,000**
Total Estimated Project Cost with Contingencies	**$54,200,000**

A new WTP constructed under any new WTP alternative would require expansion from a capacity of 30 mgd to a capacity of 45 mgd in approximately 2065. Expansion to 45 mgd under any alternative requires the construction of a new intake structure and raw water pump station and the construction of additional treatment trains. Estimated project costs for this

expansion for each alternative are shown in Table 8-6. These expansion costs affect the net present value of alternatives which are developed and presented in Chapter 9.

Table 8-6
Estimated Project Cost for Plant Expansions in 2065

Alternative	Estimated Project Cost (2013 USD)
3	$33,000,000
4	$36,700,000
5	$37,000,000

Note: This is a Class 5 estimate. The accuracy ranges from –30 percent to +50 percent.

Near-Term Improvements

During construction of a new WTP, the existing plant would continue to supply drinking water to the system. The structural condition of the clearwell at the existing WTP is of such concern that the team investigated a separate project which would increase short-term disinfection and supply reliability at the existing WTP. A project cost of approximately $450,000 was developed based on a combination of structural fortification within the clearwell and plumbing provisions to allow emergency insertion of post-filtration UV disinfection units if the clearwell were to fail. This project cost was included in economic calculations for new treatment plant alternatives in order to provide a conservative financial comparison to other alternatives.

Based on further investigation of the feasibility of completing such improvements in the clearwell, including recent analysis of potential structural improvements, it was concluded that such improvements cannot be completed while maintaining adequate water production to meet the City's water demands. Because of these difficulties and the fact that no investment can effectively mitigate damage in a major event, the project was not investigated any further.

Summary

Alternatives 3, 4, and 5 propose constructing a new WTP on a new site and each have a range of initial capital costs and operational implications, similar to those presented in Chapter 7. The alternatives also offer differing approaches to layout and configuration, each with varying advantages, disadvantages, and estimated project costs. They also define a range of required property size for the purposes of selecting an appropriate location. A comparative evaluation of all five alternatives, which includes social and environmental considerations in addition to the costs developed, is presented in Chapter 9 and is used as the basis for capital improvement recommendations.