

CITY OF MADRAS

WASTEWATER SYSTEM

2017 MASTER PLAN UPDATE

PUBLIC MEETING PRESENTATION

NOVEMBER 29, 2017

REASONS FOR PLAN UPDATE

1. **Previous WW Master Plan completed in 1996**
2. **Support Asset Management – Inventory, Condition, & Maintenance Plan**
3. **Updated Population Projections – 2015 forecasts from PSU (State Program)**
4. **Evaluate System Capacity– Identify service needs inside UGB for next 20 yrs**
5. **Capital Improvements Plan – Identify WW projects & estimate probable costs**
6. **Industrial Site Readiness – Plan for infrastructure needs**
7. **Financial Plan (**pending**)– identify rates & charges needed to sustain service**

EXISTING WW FACILITIES

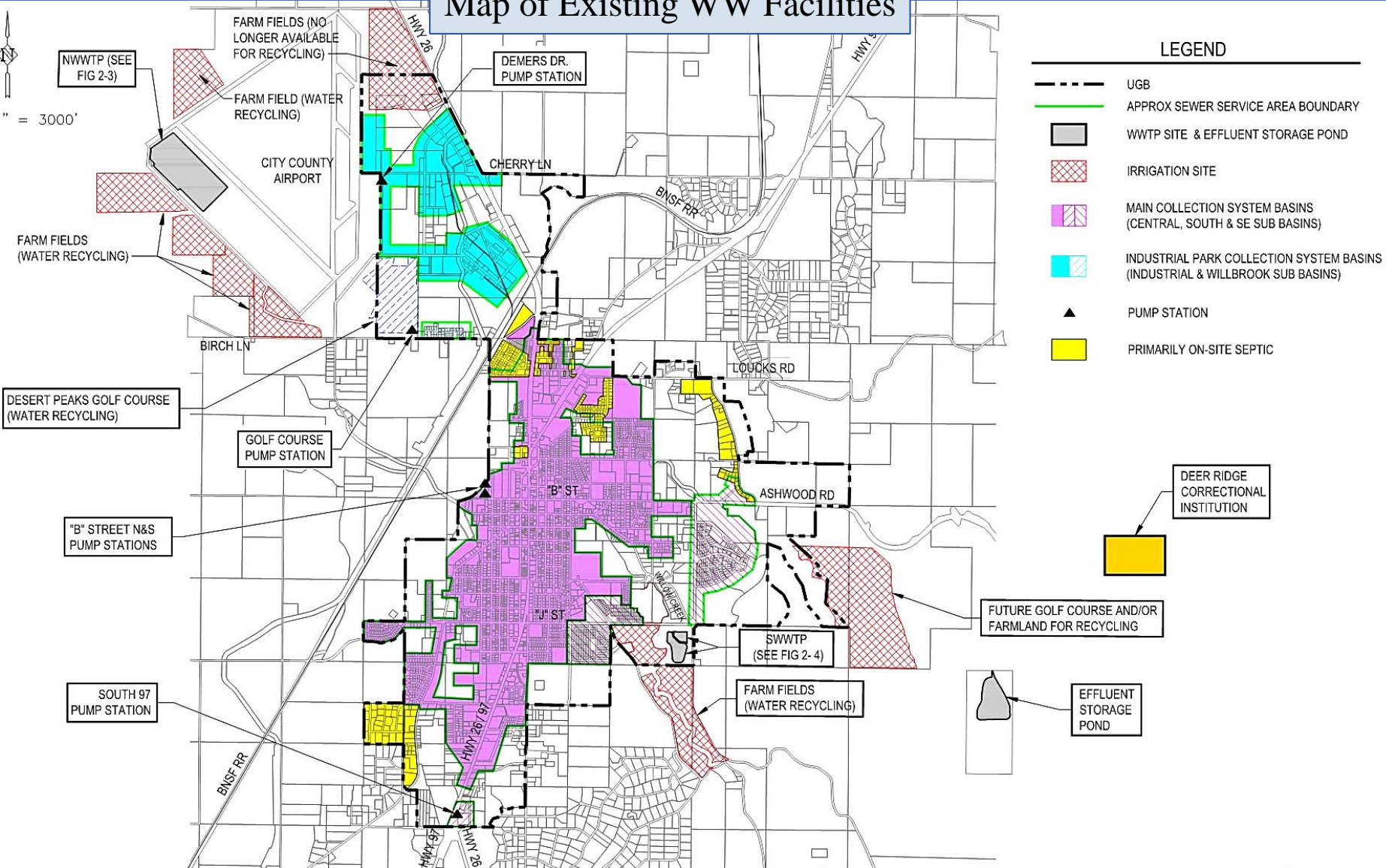
- 1. Two Collection Systems – Main (most of City) & Industrial Pk (North Area)**
- 2. Five Sewage Pump Stations – B Street N & S (two largest); Demers serves Industrial Pk; Golf Course & South 97 are small**
- 3. Two WWTPs**
 - North (near airport): Lagoon system constructed in mid 1970s; plant upgraded twice in 1990s**
 - South (at J St. & Grizzly): Mechanical system; built in 2001; designed for 2 expansions - 1st completed in 2008 for DRCI (prison)**
 - Effluent Storage Pond at each WWTP for seasonal storage**
 - All effluent recycled by irrigation of farmland & golf course**

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Map of Existing WW Facilities

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SCALE: 1" = 3000'



LEGEND

- UGB
- APPROX SEWER SERVICE AREA BOUNDARY
- WWTP SITE & EFFLUENT STORAGE POND
- IRRIGATION SITE
- MAIN COLLECTION SYSTEM BASINS (CENTRAL, SOUTH & SE SUB BASINS)
- INDUSTRIAL PARK COLLECTION SYSTEM BASINS (INDUSTRIAL & WILLBROOK SUB BASINS)
- PUMP STATION
- PRIMARILY ON-SITE SEPTIC

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EXISTING WW FACILITIES MAP
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FIG 2-1
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REGULATION OF WW FACILITIES

- 1. Permitted through OR Department of Environmental Quality**
- 2. Effluent & biosolids recycling regulated by State OAR**
 - City recycles Class B effluent & biosolids according to approved plans**
- 3. No surface water discharge currently permitted**
 - Requires different type of permit**
 - Discharge must meet water quality stds for receiving stream**
 - Discharge must meet antidegradation & dilution requirements**
 - All effluent recycled by irrigation of farmland & golf course**

INVENTORY & CONDITION ASSESSMENTS

- 1. Sewers –Condition adequate; original lines near end of projected service life in 20 years; should institute cleaning/inspection program**
- 2. Pump Stations – Age and Condition are issues at Demers & Golf Course. Age a consideration for B Street North.**
- 3. North WWTP –Age an issue for many components**
- 4. South WWTP – Plant generally in adequate to good condition**

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Demers Drive PS



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Demers Drive PS



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“B Street North PS



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NWWTP Lagoon



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SWWTP SBR



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Basis of Planning – Forecasts for Population and DUs inside UGB

Year	Population (1)	Occupied DUs (2)	AAGR (3)
2015	7,484	2,880	---
2020	8,070	3,105	1.52%
2025	8,700	3,345	1.51%
2030	9,268	3,565	1.27%
2035	9,815	3,775	1.15%
2065	12,749	4,905	0.88%

(1) PSU 2015 forecast for entire area within UGB (under State Population Forecast Program).

(2) Forecasts for occupied DUs based on an average unit occupancy of 2.6 PPH.

(3) AAGR calculated for each incremental 5-year period to 2035 and 30-year period 2035-65.

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Basis of Planning–Forecast WW Treatment Capacity Requirements (in MGD)

Year	Total Forecast WW Flows (1)		Net Available ADF (2)
	Maximum Monthly	Peak Hourly	
2020	0.89	2.38	0.15
2025	1.03	2.75	0.01
2030	1.09	2.91	– 0.05
2035	1.14	3.04	– 0.10
2065 (build-out)	1.41	3.76	

(1) Includes projected flows based on population forecasts plus full contribution of allotted capacity for prison. No allowance for additional major industrial development.

(2) Based on the existing total ADF capacity of 1.04 MGD.

MGD – Million Gallons per Day

ADF – Average Design Flow

COLLECTION SYSTEM ANALYSIS

1. Modeled Sewer Systems under current & projected flows

- **Industrial Park projections incl. addition of 1.0 MGD avg flow at three alternative sites to plan for potential major developments**
- **Projected Main System flows distributed using proposed developments**

2. Flow records show sewers not subject to excessive infiltration & inflow (runoff, snow melt, or perched groundwater)

3. Capacities of existing sewers & pump stations adequate for current conditions

4. Modeling identified capacity shortfalls under projected flows & evaluated alternative improvements

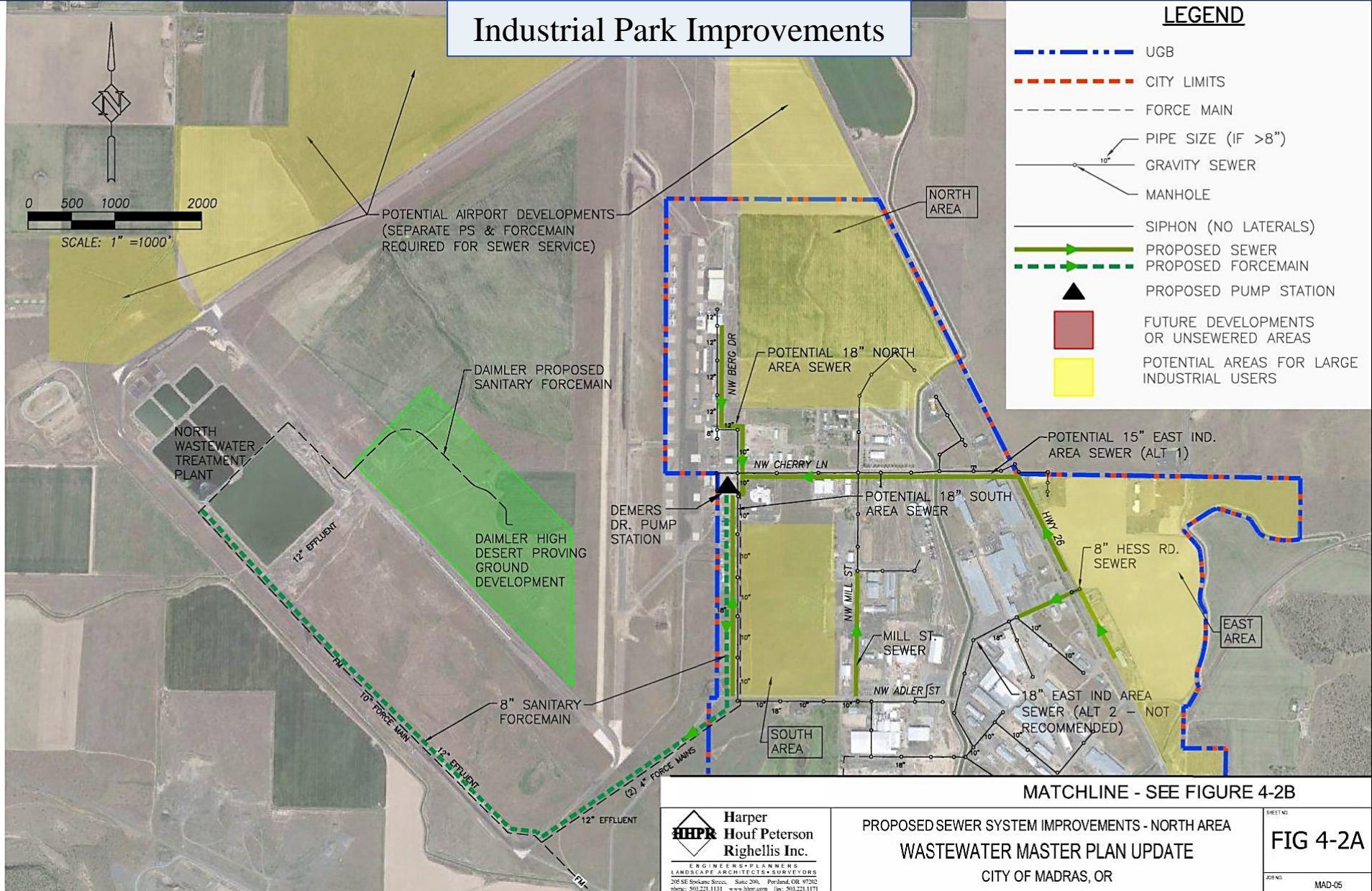
RECOMMENDED INDUSTRIAL PARK SEWER IMPROVEMENTS

- 1. Sewer extensions within existing developed areas – address infill**
 - Mill & Hess Streets – 8” Gravity Sewers**
- 2. Potential parallel sewer to increase capacity**
 - Address site readiness for major industrial users (assume 1.0 MGD avg flow)**
 - Three alternative sites evaluated – north, south & east areas of Industrial Pk**
 - Initial sewer alignment & sizing identified for each alternative site**
 - Service to north & south areas less costly than to east (across Hwy 26)**

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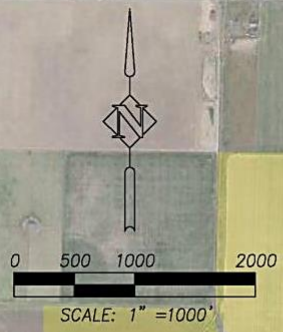
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Industrial Park Improvements



LEGEND

- - - - - UGB
- - - - - CITY LIMITS
- - - - - FORCE MAIN
- | PIPE SIZE (IF >8")
- | GRAVITY SEWER
- MANHOLE
- | SIPHON (NO LATERALS)
- PROPOSED SEWER
- - - - - PROPOSED FORCEMAIN
- ▲ PROPOSED PUMP STATION
- FUTURE DEVELOPMENTS OR UNSEWERED AREAS
- POTENTIAL AREAS FOR LARGE INDUSTRIAL USERS



MATCHLINE - SEE FIGURE 4-2B

Harper Houf Peterson Righellis Inc.
 ENGINEERS-PLANNERS
 LANDSCAPE ARCHITECTS-SURVEYORS
 205 SE Spokane Street, Suite 200, Portland, OR 97202
 phone: 503.221.1131 www.hhrp.com fax: 503.221.1171

PROPOSED SEWER SYSTEM IMPROVEMENTS - NORTH AREA
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Estimates of Probable Costs for Sewer Improvements Industrial Park Collection System (Current to Dec 2016)

Project Description	Time Frame (Years)	Pipe Size (inches)	Approximate Length (ft.)	Probable Project Cost (1)
Industrial Park Sewer Extensions				
1. Hess Street Sewer	6-10	8	1,670	\$338,000
2. Mill Street Sewer	6-10	8	1,430	\$290,000
Subtotal for Sewer Extensions				\$628,000

Potential Sewers for Major Industrial Park Users

1. East Area Parallel Sewer – Cherry Ln.	(2)	15	4,800	\$1,620,000
2. South Area Parallel Sewer – Demers Dr.	(2)	18	2,400	\$972,000
3. North Area Parallel Sewer – Airport Way	(2)	18	2,240	\$909,000

(1) Probable project cost includes a 25% construction contingency and 35% allowance for nonconstruction costs (engineering and administrative).

(2) Potential improvements shown for planning industrial site readiness. Timing dependent on developments for major users. Required sewer projects for major user(s) must be reevaluated based on actual development proposal(s).

RECOMMENDED MAIN COLLECTION SYSTEM SEWER IMPROVEMENTS

1. Capacity Upgrades for Projected Flows

- **North Wye Sewer (replacement – pipe bursting)**
- **Culver Hwy Sewer (parallel pipe)**

2. Sewer extensions in unsewered areas

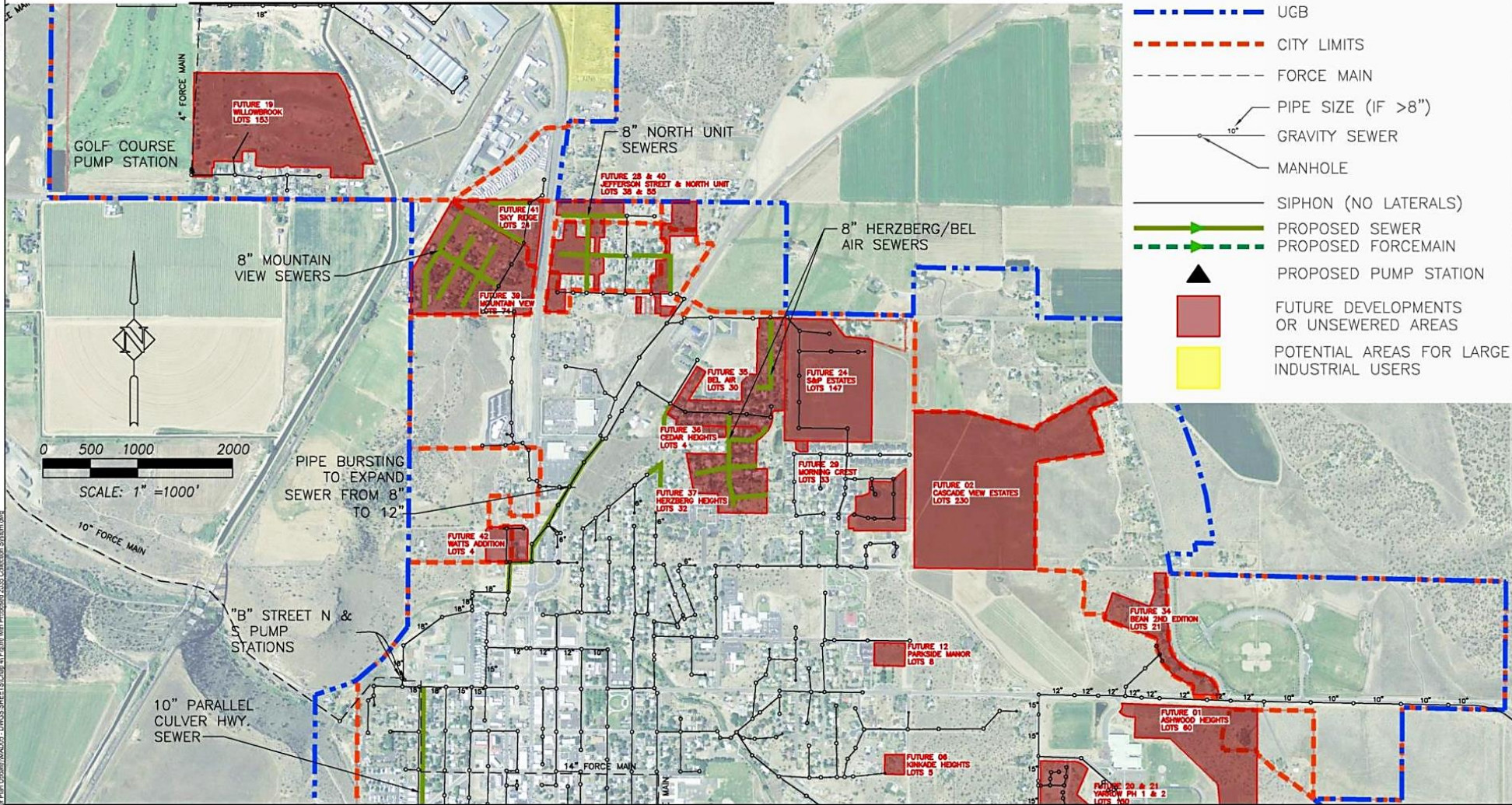
- **Mostly North side tributary to North Wye Sewer**
- **Juniper Hts tributary to Culver Hwy Sewer**

3. Sewer extensions needed for proposed developments

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Main System Sewer Improvements

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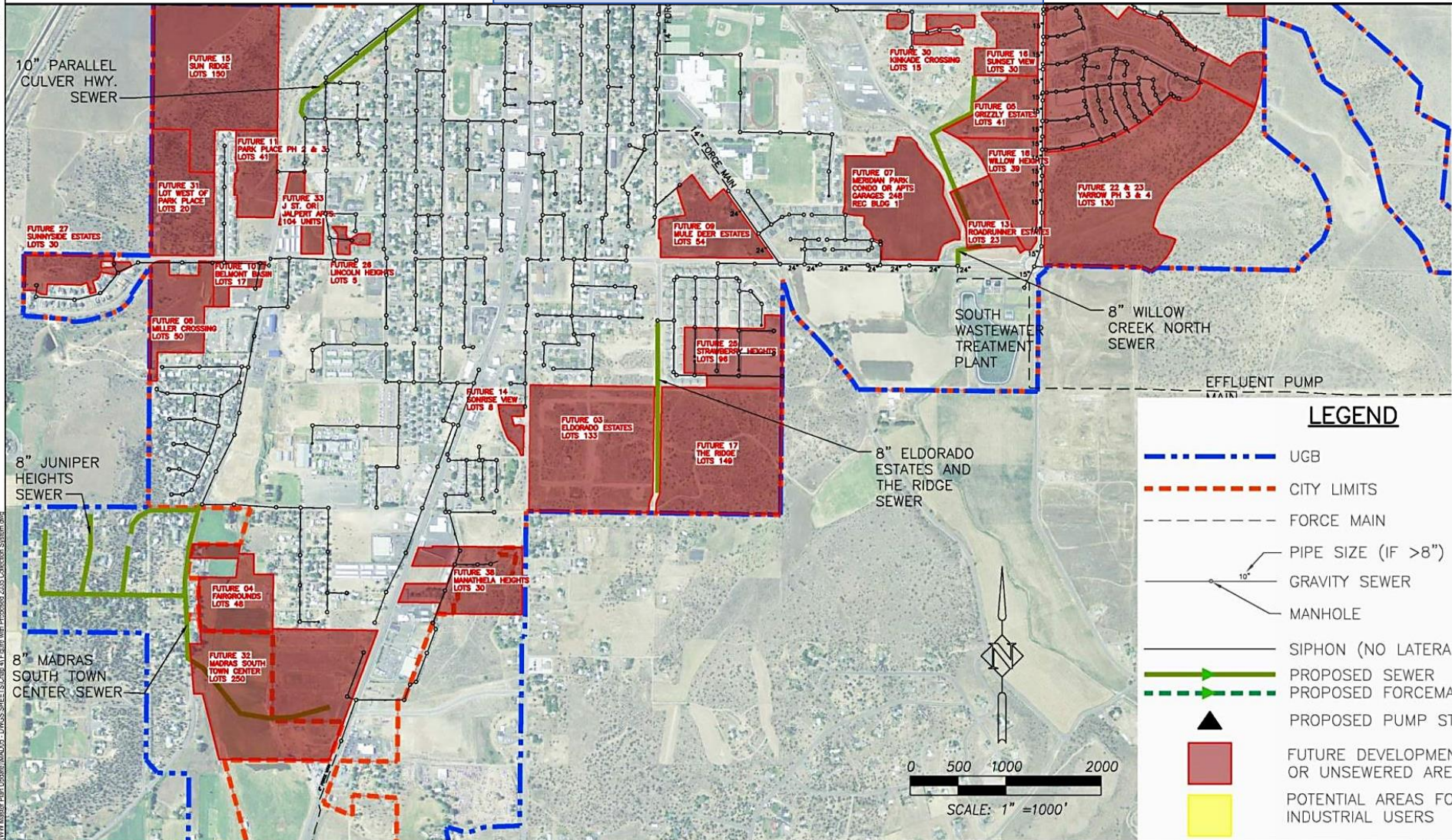
PROPOSED SEWER SYSTEM IMPROVEMENTS - CENTRAL AREA
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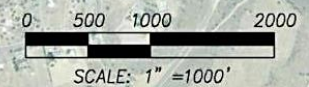
Main System Sewer Improvements

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LEGEND

- UGB
- CITY LIMITS
- FORCE MAIN
- PIPE SIZE (IF >8")
- GRAVITY SEWER
- MANHOLE
- SIPHON (NO LATERALS)
- PROPOSED SEWER
- PROPOSED FORCEMAIN
- PROPOSED PUMP STATION
- FUTURE DEVELOPMENTS OR UNSEWERED AREAS
- POTENTIAL AREAS FOR LARGE INDUSTRIAL USERS



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PROPOSED SEWER SYSTEM IMPROVEMENTS - SOUTH AREA
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Estimates of Probable Costs for Sewer Improvements Main Collection System (Current to Dec 2016)

Project Description	Time Frame (Years)	Pipe Size (inches)	Approximate Length (ft.)	Probable Project Cost (1)
1. North Y Sewer Replacement (By Pipe Bursting)	11-15	12	2,060	\$852,000
2. Culver Hwy. Parallel Sewer	11-15	10	3,100	\$733,000
3. Mountain View/Sky Ridge Sewer Extensions (2)	1-5	8	4,500	\$1,139,000
4. Jefferson Street/North Unit (2)	1-5	8	2,900	\$539,000
5. Bel Air/Herzberg Heights (2)	1-3	8	5,100	\$1,120,000
6. Juniper Heights Sewer Extension (2)	16-20	8	5,350	\$1,354,000
7. Willow Creek North Sewer Extension (3)	16-20	8	2,500	\$548,000
8. Madras South Town Center Sewer Extension (3)	>20 Yrs	8	2,420	\$613,000
9. Eldorado Estates/The Ridge Sewer Extension (3)	>20 Yrs	8	1,800	\$456,000
Subtotal for Main Collection System Sewers				\$7,354,000

- (1) Probable project cost includes a 25% construction contingency and 35% allowance for nonconstruction costs.
- (2) Unsewered areas with current developments.
- (3) Sewer extension required for future developments

RECOMMENDED IMPROVEMENTS PUMP STATIONS

1. North Area:

- **Replace Demers PS - design for future expansions to handle industrial growth (3-5 Years)**
- **Replace Demers Force Main—future 8”Force Main when Demers PS is expanded**
- **Replace Golf Course PS—expand to accommodate Willowbrook (6-10 Years)**

2. Main Collection System:

- **Renovate B Street North PS & Add Screening Equipment (11-15 Years)**
- **Replace standby power generator serving B St North & South PS (11-15 Years)**
- **Renovate South 97 PS (11-15 Years)**
- **Expand B Street South PS along w/South WWTP expansion (16-20 Years)**

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Estimates of Probable Costs for Pump Station Improvements (Current to Dec 2016)

Project Description	Time Frame (Years)	Current Capacity (MGD)	Planned Capacity (MGD)	Probable Project Cost (1)
A. Industrial Park Collection System (North Area)				
1. Golf Course PS Replacement – Expanded Capacity	6-10	N/A	0.21	\$475,000
2. Demers PS Replacement – Expanded Capacity	16-20	0.42	1.33	\$1,735,000
3. Demers Force Main Replacement – 8” Pipe	(2)	0.56	1.33	\$1,535,000
Subtotal – Pump Stations & Force Mains in North Area				\$3,745,000
B. Main Collection System Pump Stations				
1. Influent Screen at “B” Street North PS – No expansion	1-5	1.11	1.11	\$450,000
2. “B” Street North PS Renovation – No expansion	11-15	1.11	1.11	\$590,000
3. “B” Street North & South Generator Set Replacement	11-15	N/A	N/A	\$235,000
4. South U.S. 97 PS Renovation – No expansion	11-15	0.06	0.06	\$60,000
5. “B” Street South PS Expansion & Renovation	16-20	1.33	2.66	\$710,000
Subtotal – Pump Stations in Main Collection System				\$2,045,000
Total – Pump Stations & Force Mains				\$5,790,000

(1) Probable project cost includes a 25% construction contingency and 35% allowance for nonconstruction costs (engineering and administrative).

(2) Potential improvement shown for planning industrial site readiness. Timing dependent on developments for major users. Required projects for major user(s) must be reevaluated based on actual development proposal(s).

WASTEWATER TREATMENT PLANT ALTERNATIVES EVALUATION

1. Evaluate alternative treatment scenarios to meet 20-yr needs & address industrial site readiness

- **Address small, projected capacity deficit from population growth**
- **Address WW distribution for best use of existing WWTPs**
- **Provide flexibility for serving proposed developments & potential Industrial-Park development**









2. Evaluate North WWTP alternatives:

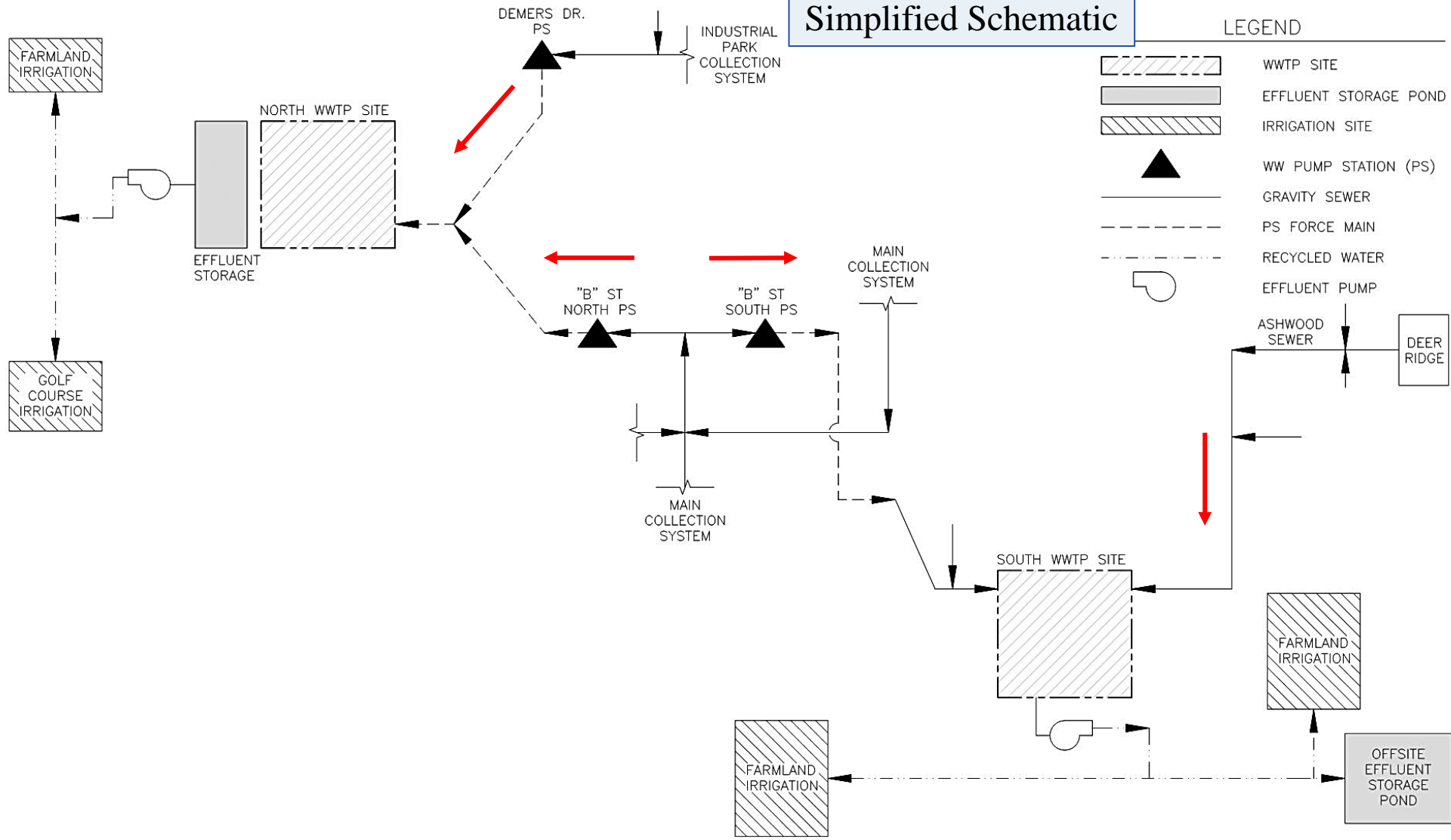
- **Alternative capacity expansions to for industrial development**
- **Upgrade of existing facilities to address age & condition issues (renovation, retrofit or replacement)**

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Simplified Schematic

LEGEND

	WWTP SITE
	EFFLUENT STORAGE POND
	IRRIGATION SITE
	WW PUMP STATION (PS)
	GRAVITY SEWER
	PS FORCE MAIN
	RECYCLED WATER
	EFFLUENT PUMP



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 LANDSCAPE ARCHITECTS • SURVEYORS
 203 SE Spokane Street, Suite 200, Portland, OR 97202
 phone: 503.271.1131 www.hhr.com fax: 503.271.1171

EXIST WW FACILITIES SIMPLIFIED SCHEMATIC
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RECOMMENDED APPROACH FOR SOUTH WWTP

- 1. Add Biosolids Thickening Equipment - Reduce Volume Hauled to Drying Beds at North WWTP**
- 2. Phase 1 South WWTP Upgrade/Expansion—retrofit to provide small incremental expansion (8-10 years)**
- 3. Use future Golf Course site (193 ac) for effluent recycling as flows increase**
 - Use site as farmland for crop irrigation until golf course is developed**
- 4. Phase 2 South WWTP Upgrade—0.5 MGD expansion**
 - Free-up capacity at North WWTP for industrial development**
 - Complete in 16+ years depending on development pace**
- 5. Expand Effluent Storage Capacity & Acquire 180 acres of Farmland w/Phase 2 WWTP expansion**

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Estimates of Probable Costs for South WWTP Improvements (Current to Dec 2016)




Project Description	Time Frame (Years)	Current Capacity (MGD)	Planned Capacity (MGD)	Probable Project Cost (1)
1. Add Biosolids Thickening System	1-5	0.54	0.65	\$1,215,000
2. Phase 1 Expansion/Renovation (Retrofit Existing Plant)	6-10	0.54	0.65	\$1,205,000
3. Expand Effluent Recycling Capacity (develop irrigation site)	6-10	0.54	0.65	\$500,000
4. Phase 2 Expansion and Renovation	16-20	0.65	1.15	\$9,710,000
5. Phase 2 Effluent Storage Expansion	16-20	0.65	1.15	\$8,910,000
6. Phase 2 - Acquire Farmland & Expand Irrigation System	16-20	0.65	1.15	\$3,310,000
Total for South WWTP Improvements				\$24,850,000

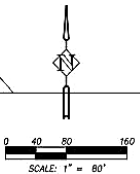
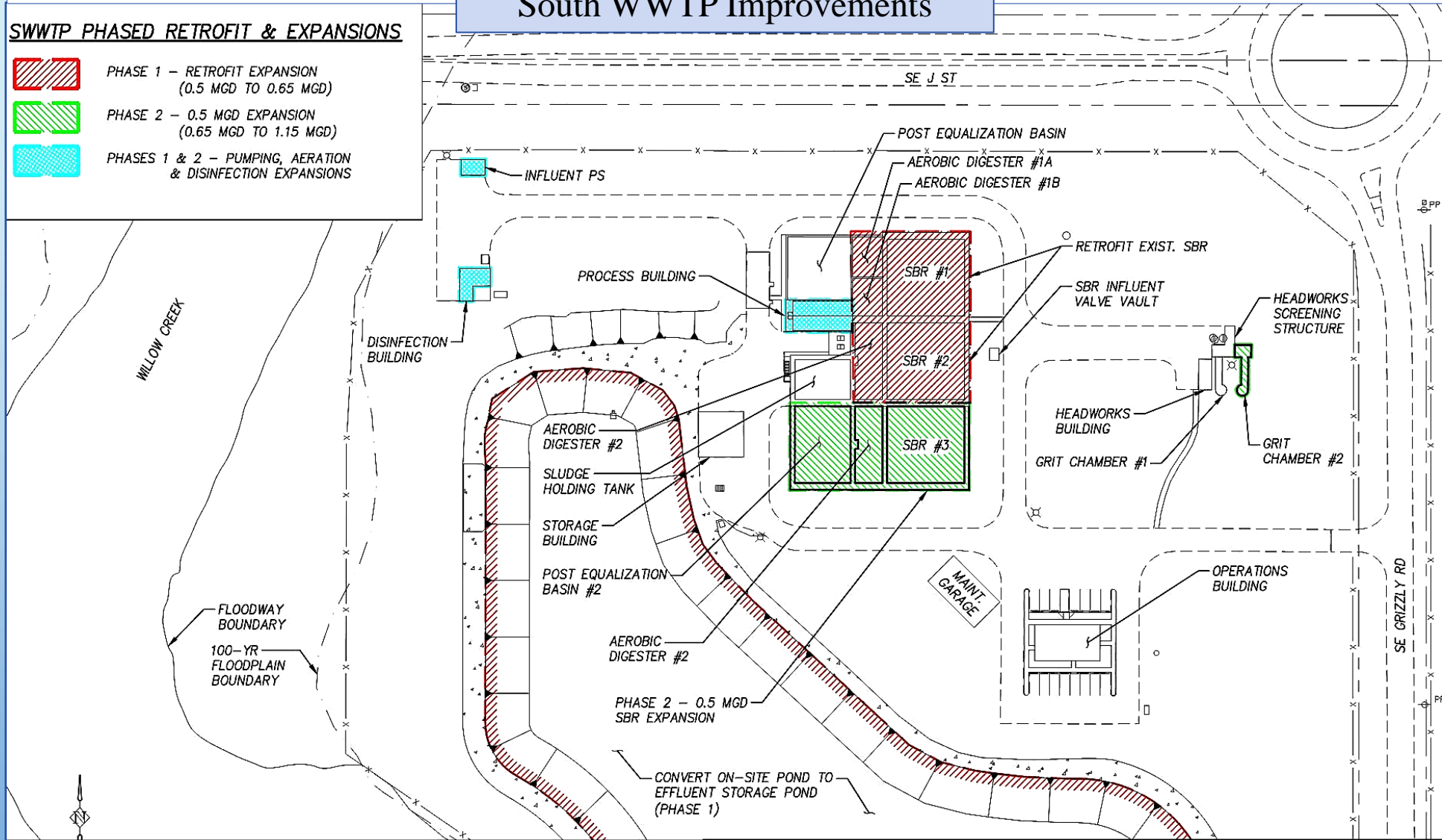
(1) Probable project cost includes a 25% construction contingency and 35% allowance for nonconstruction costs (engineering and administrative).

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South WWTP Improvements

SWWTP PHASED RETROFIT & EXPANSIONS

-  PHASE 1 – RETROFIT EXPANSION (0.5 MGD TO 0.65 MGD)
-  PHASE 2 – 0.5 MGD EXPANSION (0.65 MGD TO 1.15 MGD)
-  PHASES 1 & 2 – PUMPING, AERATION & DISINFECTION EXPANSIONS



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PHASED SWWTP EXPANSION
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FIG 5-1
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RECOMMENDED APPROACH FOR NORTH WWTP

- 1. Retrofit North WWTP to address age/deficiencies (no expansion)**
 - First phase - Replace/upgrade clarification & disinfection equipment**
 - Second phase - retrofit lagoon system to maintain capacity**
 - Add irrigation site (~40 ac) for effluent recycling (replace developed sites)**

- 2. Expand North WWTP as needed to serve Industrial Park developments**
 - Plan evaluated phased WWTP expansions in 0.5 MGD increments**

ALTERNATIVES EVALUATION - NORTH WWTP

1. Recommended Treatment Processes for Future Expansions

- **Add Preliminary Treatment w/Mechanical Screening & Grit Removal**
- **Secondary Treatment w/Aerated Lagoon System & Clarification**
- **Disinfection Using Tablet Chlorination System**
- **Aerobic Digesters & Sludge Drying Beds (same as existing)**

2. Expand Effluent Recycling Capacity w/WWTP expansions

- **Expand effluent storage capacity with each WWTP expansion**
- **Add ~300 ac of farmland for recycling with each WWTP expansion**
- **Install effluent transmission pipeline to addition farm sites**

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Estimates of Probable Costs for North WWTP Improvements (Current to Dec 2016)

Project Description	Time Frame (Years)	Current Capacity (MGD)	Planned Capacity (MGD)	Probable Project Cost (1)
A. Phase 1 Upgrade to Address Age/Deficiencies				
1. Phase 1a Improvements - Clarifier & Disinfection Equipment	1-5	0.50	0.50	\$2,310,000
2. Phase 1b Improvements - Retrofit Lagoon System	11-15	0.50	0.50	\$7,950,000
3. Acquire Farmland & Expand Irrigation System	11-15	0.50	0.50	\$1,550,000
Subtotal for Phase 1 North WWTP Upgrade				\$11,810,000
B. Potential Industrial Site Readiness Projects				
1a. Phase 2 Retrofit for 0.5 MGD Expansion (to 1.0 MGD)	(2)	0.50	1.00	\$10,350,000
1b. Phase 2 Effluent Storage Ponds for 0.5 MGD Expansion	(2)	0.50	1.00	\$12,140,000
1c. Phase 2 Farmland Acquisition & Irrigation System Expansion	(2)	0.50	1.00	\$4,550,000
2a. Phase 3 Construction of 0.5-MGD Module (Expand to 1.5 MGD)	(2)	---	1.5	\$12,100,000
2b. Phase 3 Effluent Storage Ponds for Expansion to 1.5 MGD	(2)	---	1.5	\$12,140,000
2c. Phase 3 Farmland Acquisition & Irrigation System Expansion	(2)	---	1.00	\$5,205,000
Subtotal for Phase 2 & 3 North WWTP Expansions				\$56,485,000

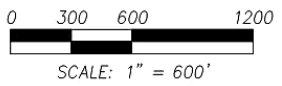
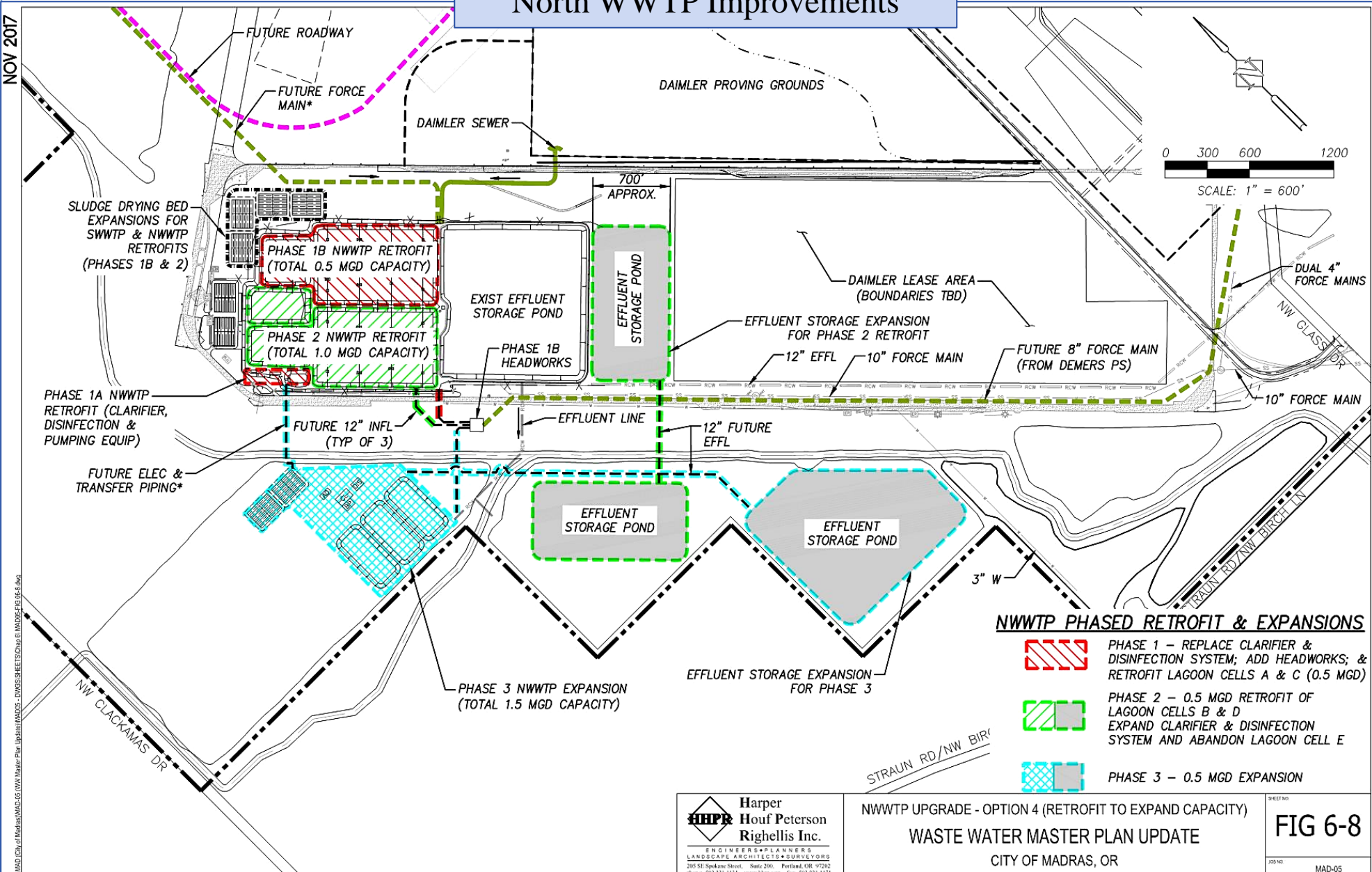
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(2) Potential improvement shown for planning industrial site readiness. Timing dependent on developments for major users. Required projects for major user(s) must be reevaluated based on actual development proposal(s).




2017 WW MASTER PLAN UPDATE

North WWTP Improvements

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NWWTP PHASED RETROFIT & EXPANSIONS

-  PHASE 1 - REPLACE CLARIFIER & DISINFECTION SYSTEM; ADD HEADWORKS; & RETROFIT LAGOON CELLS A & C (0.5 MGD)
-  PHASE 2 - 0.5 MGD RETROFIT OF LAGOON CELLS B & D
EXPAND CLARIFIER & DISINFECTION SYSTEM AND ABANDON LAGOON CELL E
-  PHASE 3 - 0.5 MGD EXPANSION

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205 SE Spokane Street, Suite 200, Portland, OR 97202
Phone: 503.231.1151 www.hhrp.com Fax: 503.231.1171

NWWTP UPGRADE - OPTION 4 (RETROFIT TO EXPAND CAPACITY)
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QUESTIONS OR COMMENTS?



ACKNOWLEDGEMENTS:

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