

Board of Supervisors Meeting



Carson City
Public Works Department

Capital Improvement Plan Update:

Wastewater Collection, Treatment
and Reuse

March 14, 2013

Topics of Discussion

- Regionalization
- Existing Facilities (Collection, Treatment, and Reuse)
- Phased Implementation and Capital Improvement Plan
- Questions



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Regionalization



Overview

- Six entities have wastewater treatment facilities in Upper Carson River Basin
 - Minden Gardnerville Sanitation District (MGSD)
 - Indian Hills General Improvement District (IHGID)
 - Douglas County North Valley
 - Carson City
 - Carson Highlands (Mound House)
 - Rolling A (Dayton)



Overview

- Met with Douglas County, Lyon County, IHGID and MGSD representatives
- Planning level analysis of regional alternatives



Abbreviations

IHGID: Indian Hills General Improvement District

MGSD: Minden Gardnerville Sanitation district

Existing Upper Carson River Basin Wastewater Treatment Facilities

Facility	Current Flow (mgd)	Capacity (mgd)
MGSD (Minden Gardnerville)	2.1	2.8
IHGID (Douglas County)	0.6	0.6
Douglas Co. No. Valley	0.45	0.45
Carson City	5.6	6.9
Carson Highlands (Mound House)	0.06	0.07
Rolling A (Dayton)	~0.9	1.5

Note: Flows are estimated for peak month conditions



Abbreviations

IHGID: Indian Hills General Improvement District

mgd: million gallons per day

MGSD: Minden Gardnerville Sanitation District

Screening of Regional Alternatives

- Carson City – Regional treatment facility due to central location and largest flows
- Relocation of Carson City WRP – Excluded due to high costs for PS, FM and new WRP
- MGSD – Excluded because of recent upgrades, existing available capacity and contracts
- North Valley – Excluded due to high costs for replacement PS and FM
- IHGID – Excluded due to high costs for replacement PS and FM
- Rolling A WWTP – Excluded due to high costs for replacement PS and FM



Abbreviations

WRP: Wastewater Reclamation Plant

PS: Pump stations

FM: Force mains

Regional Alternatives Considered

- Carson City Alone – Baseline for comparison of alternatives
- Carson City with Mound House area
- Carson City with commercial area in north Douglas County
- Carson City with Mound House and commercial area in north Douglas County



Comparison of Alternatives

Alternative	Projected Flow		Estimated Local Cost for Regional Facilities		
	(mgd)	(AF/Y)	Conveyance System ⁽¹⁾	Carson City WRP ⁽²⁾	Connection Fee ⁽³⁾
Carson City Alone - Baseline	8.9	9,970	\$5 - 10 mil ⁽¹⁾	\$140 + mil	\$66 mil
Carson City + Mound House	9.7	10,870	LC: \$10-12 mil	>>	LC: \$16 mil
Carson City + Commercial Area	9.0	10,100	DC: Unknown	>	DC: \$0.6 mil
Carson City + Mound House + Commercial Area	9.8	10,980	LC: \$10-12 mil DC: Unknown	>>	LC: \$16 mil DC: \$0.6 mil

Notes:

- 1) Estimated cost of Morgan Mill P.S. and downstream conveyance system upgrades only. All collection system upgrades estimated \$50 million
- 2) WRP costs based on expansion of existing treatment processes for full development conditions.
- 3) Connection fees based on \$5,000/ERU.



Abbreviations:

Mil: Million
 LC: Lyon County
 DC: Douglas County
 ERU: Equivalent Residential Unit
 WRP: Wastewater Reclamation Plant

Other Regionalization Issues

- Effluent Reuse for All Alternatives
 - Reclaimed water production exceeds irrigation demands (~10,000 AF/Y vs. 3,600 AF/Y)
 - New reuse sites and improvements at Stewart Ponds required
- Other Effluent Disposal Methods Required
 - RIBs: significant nitrogen removal required at WRP and potential ground water issues
 - Discharge to Carson River: more significant nitrogen and phosphorus removal required



Abbreviations

AF/Y: Acre Feet / Year

RIBs: Rapid infiltration Basins

WRP: Wastewater Reclamation Plant

Conclusions and Recommendations

- Expansion of Carson City WRP to a regional facility is not cost-effective
- North Douglas County commercial area can continue to discharge to the Carson City sewer system
- Detailed study should be undertaken to evaluate feasibility of providing sewer service to Mound House area
- Biosolids management study should be undertaken to evaluate regionalization if IHGID, Douglas County or Lyon County decide to upgrade current sludge management facilities



Abbreviations

IHGID: Indian Hills General Improvement District
WRP: Wastewater Reclamation Plant

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Existing Facilities

Collection, Treatment, and Reuse



Collection System Asset Inventory

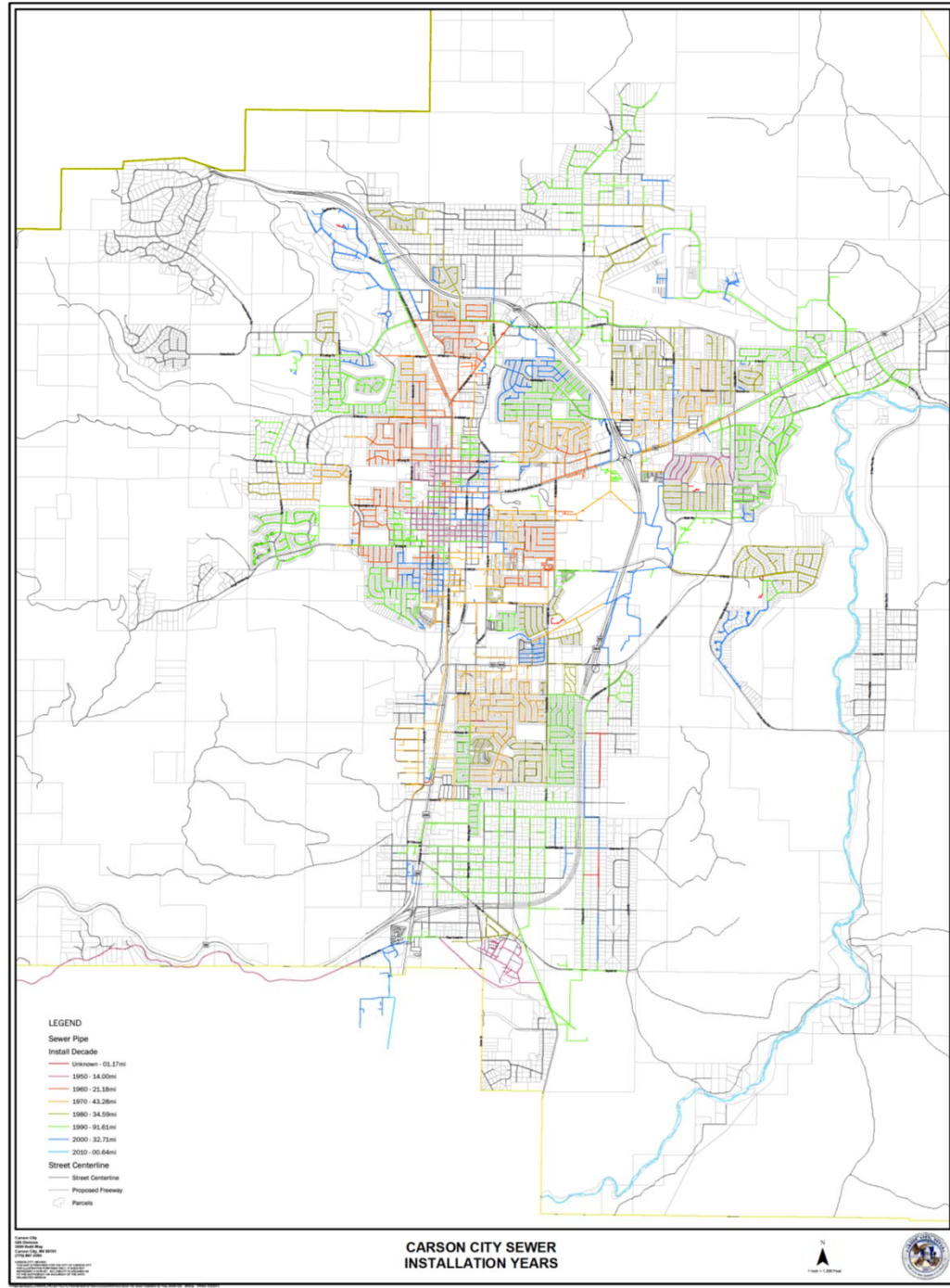
(Collections)

- 5 Lift Stations
- 239 miles of sewer (installed by decade)
 - 1950 14 miles
 - 1960 21 miles
 - 1970 43 miles
 - 1980 35 miles
 - 1990 92 miles
 - 2000 33 miles
 - 2010 1 mile

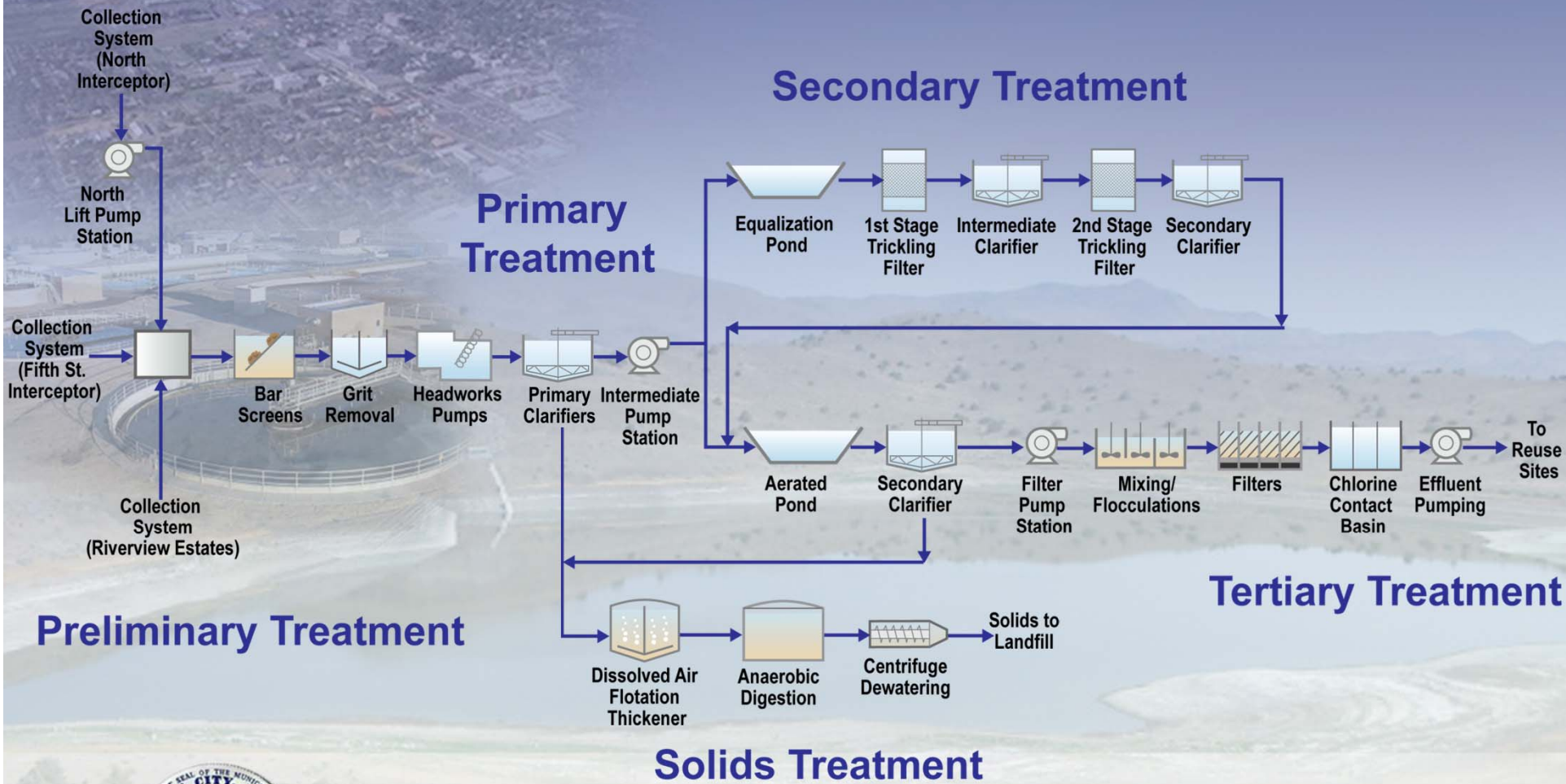


Collection System Map

(Collections)



Carson City Flow Schematic (Treatment)



Carson City Wastewater Treatment Plant



Airport

Fairview

5th Street

Preliminary Treatment Processes

PURPOSE

Remove large debris and grit

PROCESS UNITS

Influent Pumping/Septage
Receiving (2010)



Preliminary Treatment Processes

PURPOSE

Remove large debris and grit

PROCESS UNITS

Bar Screens/Grit
Removal/Pumping (1980's)



Primary Treatment Processes

PURPOSE

Settle large organic, insoluble matter

PROCESS UNIT

Primary Clarifiers/Sludge Pumping (1980's)



Primary Treatment Processes

PURPOSE

Settle large organic, insoluble matter

PROCESS UNIT

Equalization Basin (1980's)



Primary Treatment Processes

PURPOSE

Settle large organic, insoluble matter

PROCESS UNIT

Emergency Storage Pond
(1980's)



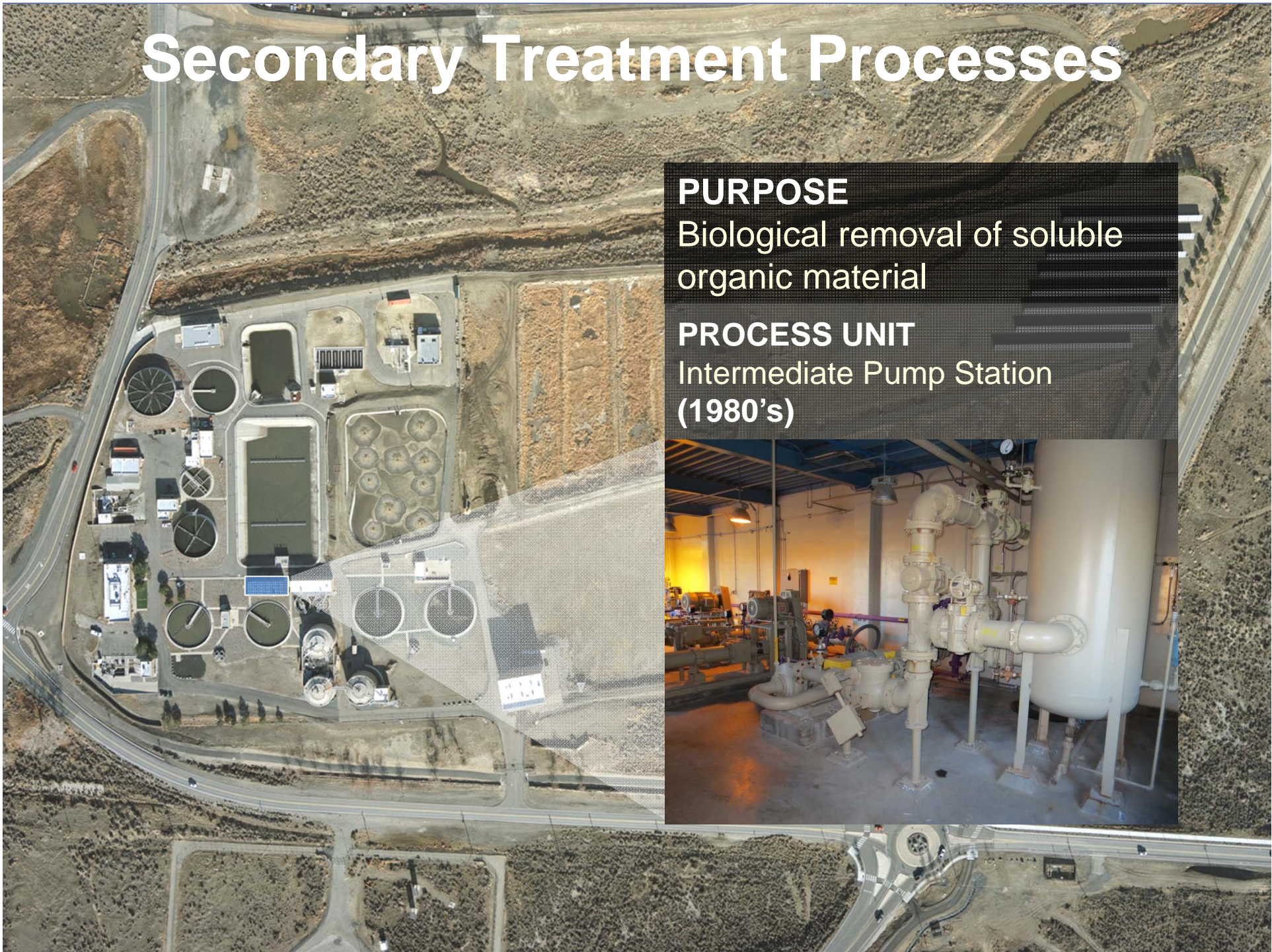
Secondary Treatment Processes

PURPOSE

Biological removal of soluble organic material

PROCESS UNIT

Intermediate Pump Station
(1980's)



Secondary Treatment Processes

PURPOSE

Biological removal of soluble organic material

PROCESS UNIT

Trickling Filter System (1960's)



Secondary Treatment Processes

PURPOSE

Biological removal of soluble organic material

PROCESS UNIT

Aerated Pond (1978) - Interim



Secondary Treatment Processes

PURPOSE

Biological removal of soluble organic material

PROCESS UNIT

Secondary Clarifiers/Sludge Pumping (1980's)



Tertiary Treatment Processes

PURPOSE

Chemical and physical removal of fine material

PROCESS UNIT

Filtration (2000's)



Tertiary Treatment Processes

PURPOSE

Chemical and physical removal of fine material

PROCESS UNIT

Disinfection (1980's)



Solids Handling Processes

PURPOSE

Concentrate and reduce solids

PROCESS UNIT

Thickening (1990's)



Solids Handling Processes

PURPOSE

Concentrate and reduce solids

PROCESS UNIT

Digestion (1985)



Solids Handling Processes

PURPOSE

Concentrate and reduce solids

PROCESS UNIT

Dewatering (2000's)



Effluent Pumping

PURPOSE

Deliver reuse water to Brunswick Canyon Reservoir and reuse sites

PROCESS UNIT

Forebay /Effluent Pump Station (1980's)



Existing Reuse Facilities



Storage

- Brunswick Reservoir
- Capacity of 3,500 acre-ft
- Effluent Storage (Winter)

Reuse Sites

- Golf Courses, State Prison Farm, Parks, Cemetery, Carson River Springs



The Challenges Ahead....

- Several existing treatment facilities will need rehabilitation in the near term
- Upgrade and/or replacement of some treatment processes is likely within the planning horizon
- Certain influent constituents have increased over the past several years which could require regulatory changes



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**Phased Implementation
and CIP**



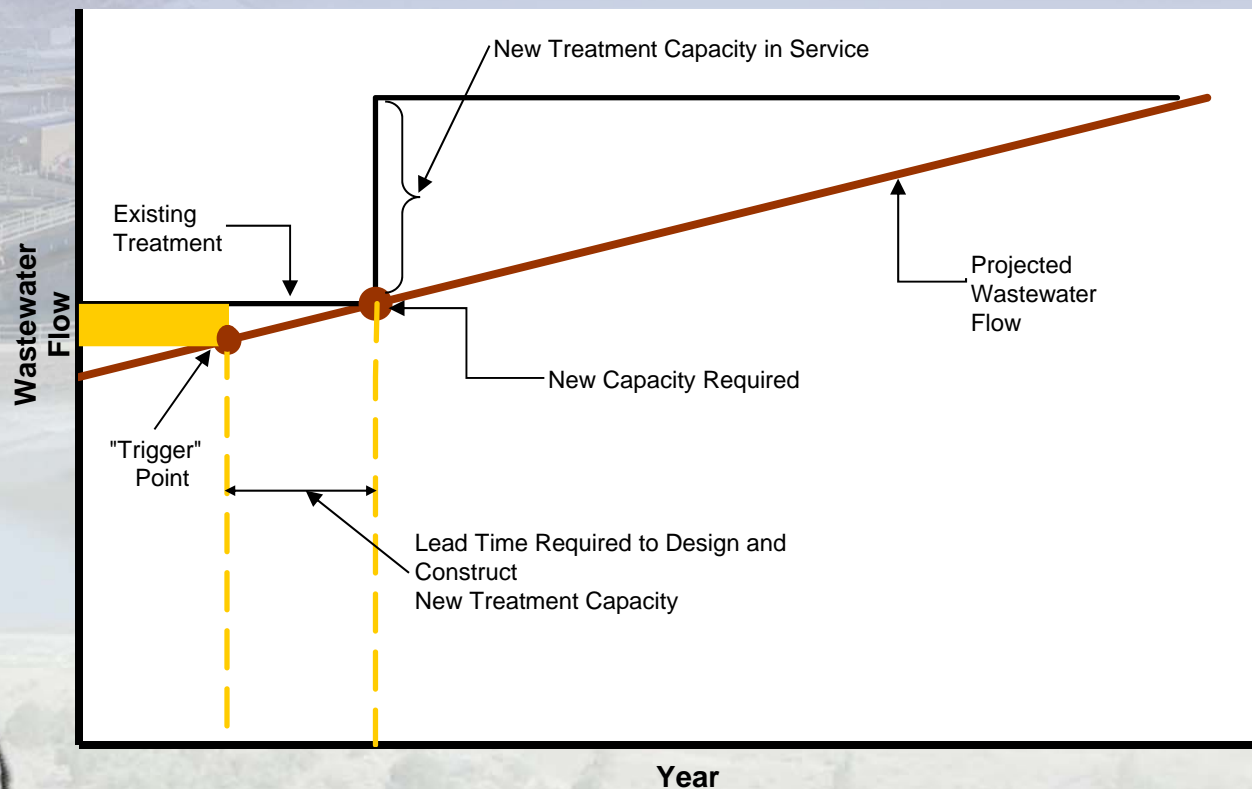
Key Planning Principles

- Plan for a 25-year horizon
- Plan processes which are the same or similar to existing processes
- Size treatment processes to match existing facilities
- Provide a flexible layout
- Plan for incremental expansion to minimize fiscal and administrative impacts



“Trigger Curve” Concept

Planning and facility construction is implemented when actual wastewater flows reach pre-determined “trigger” values.



Immediate Project Needs (Treatment)



Tricking Filter Facility (OOS)

Aeration Basins

Blower/MCC Building

IPS

Aerated Pond (OOS)

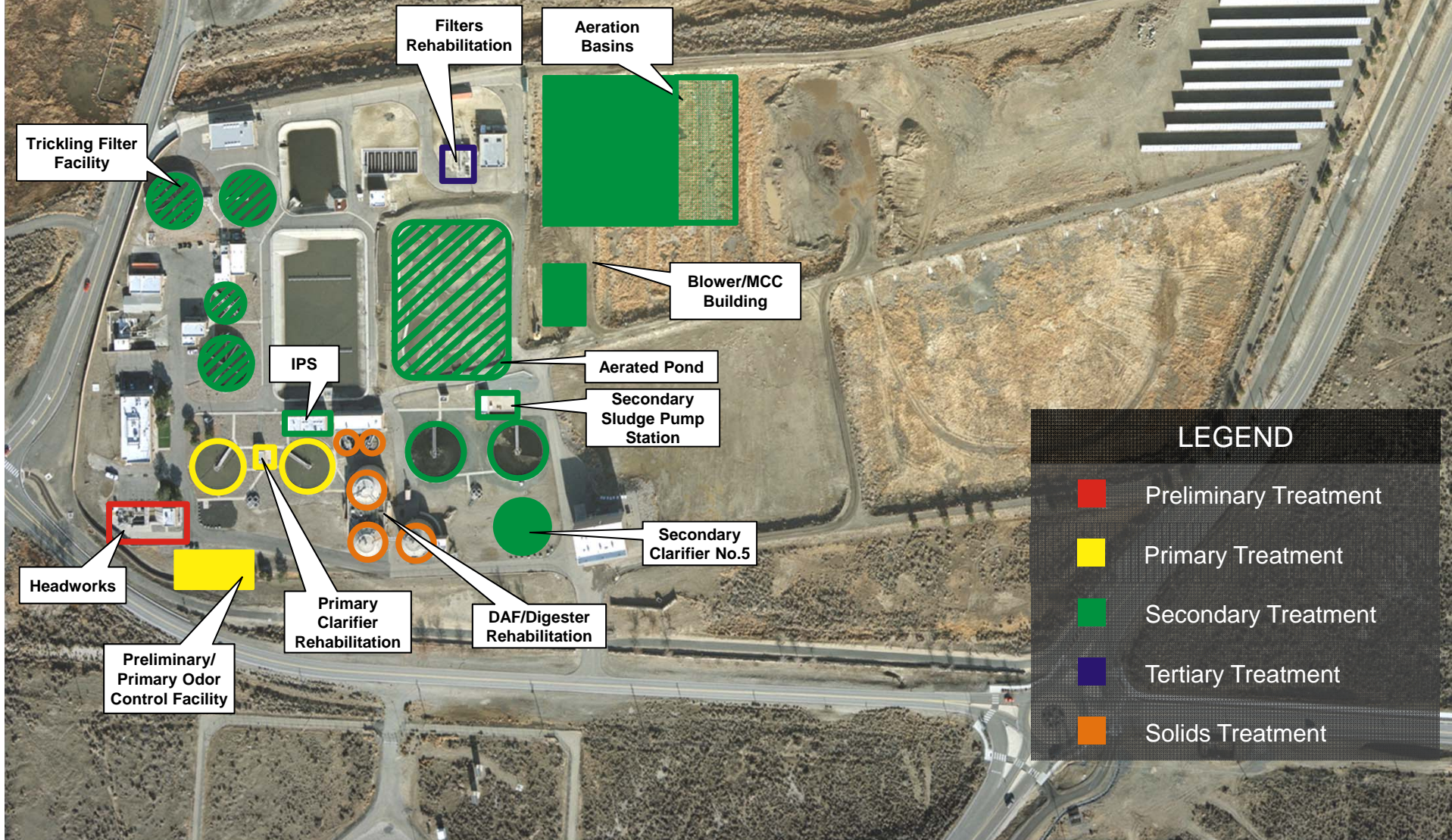
Secondary Sludge Pump Station

Secondary Clarifier No.5

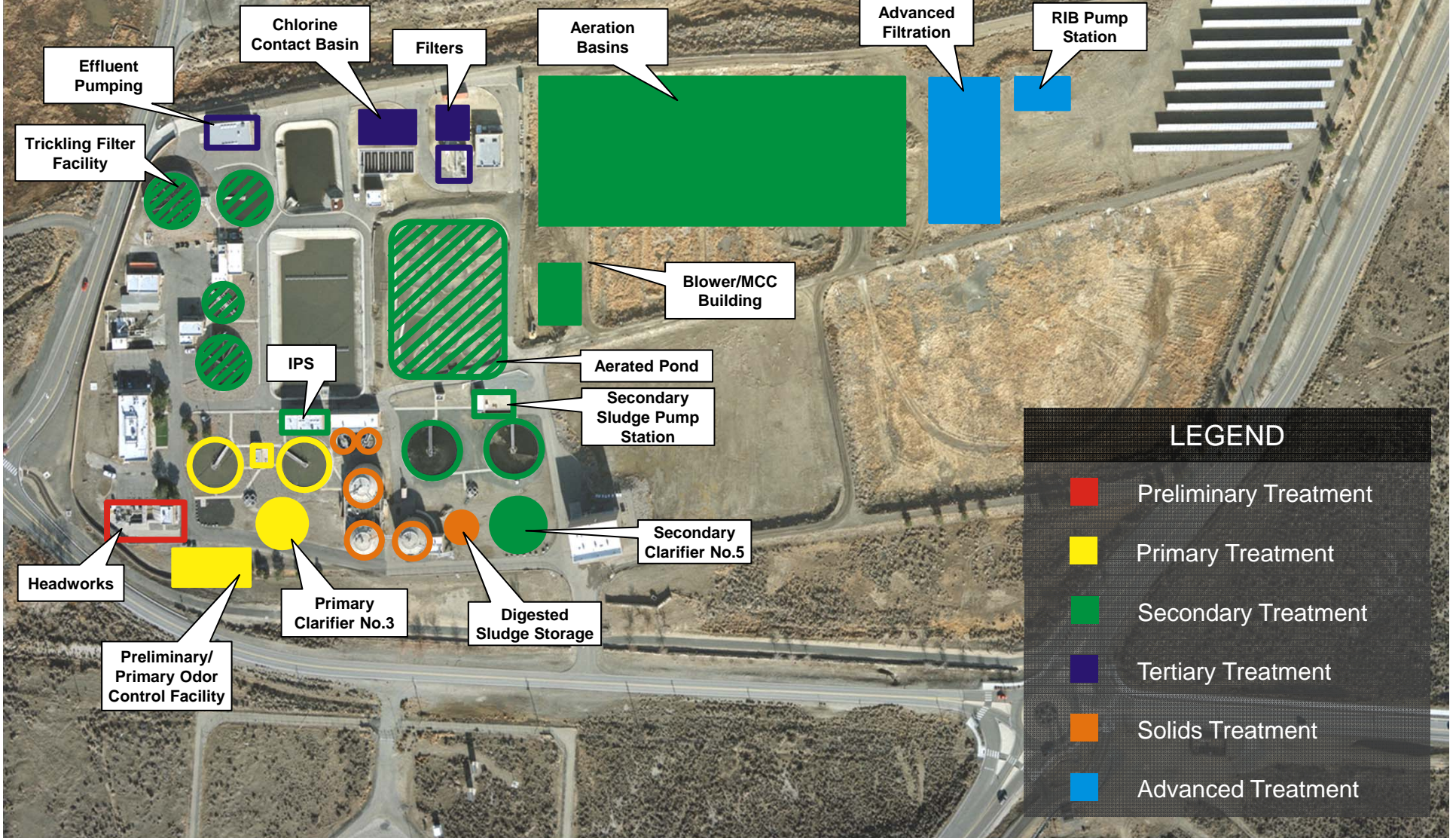
LEGEND

■ Secondary Treatment

Near Term (5-yr) Phased Projects (Treatment)



25-yr Phased Implementation Plan (Treatment)



5 year Capital Improvement Plan

(Collection, Treatment, Reuse)

TITLE	FY 2013-14	FT 2014-15	FY 2015-16	FY2016-17	FY2017-18	TOTAL
Wastewater						
WWTP CIP (see WWTP CIP)	4,298,600	10,315,965	12,059,728	4,890,554	5,509,141	37,073,988
Pumps/Motors Replacement Program	150,000	150,000	175,000	200,000	200,000	875,000
Facility Maintenance Program	100,000	100,000	100,000	100,000	100,000	500,000
WWTP Specialized Equipment Replacement	60,000	60,000	60,000	60,000	60,000	300,000
SCADA Antenna	35,000					
Collection						
Sewer Line Replacement/Rehabilitation (see PW Sewer)	663,694	663,694	663,694	663,694	663,694	3,318,470
Slip Lining Manholes/Mains Citywide Maintenance Program	150,000	150,000	150,000	150,000	150,000	750,000
Equipment Replacement Program-Sewer/Wastewater (see Fleet)	215,000	17,000	64,000		225,680	521,680
Empire Lift Station Rehabilitaion	140,000					140,000
Riverview Lift Station-Reconstruction				1,600,000		1,600,000
Morgan Mill Lift Station-Reconstruction					2,000,000	2,000,000
South Lift Station Rehabilitaion				85,000		85,000
North Lift Station Rehabilitaion					60,000	60,000
Reuse						
Air release repair and rehabilitation	30,000	30,000	30,000	30,000	30,000	150,000
Rehabilitate clay-val at Upper Centennial, Edmonds and Effluent Building	20,000					20,000
Rehabilitate joint couplings	50,000	50,000	50,000	50,000	50,000	250,000
Replace air compressors and rehab difuser system at Brunswick		100,000		200,000		300,000
Rehabilitate reservoir at Eagle Valley Golf Course			25,000			25,000
Golf Course Reclaimed Maintenance System Improvements	75,000	75,000	75,000	75,000	75,000	375,000
Wastewater Total	5,987,294	11,711,659	13,452,422	8,104,248	9,123,515	48,344,138



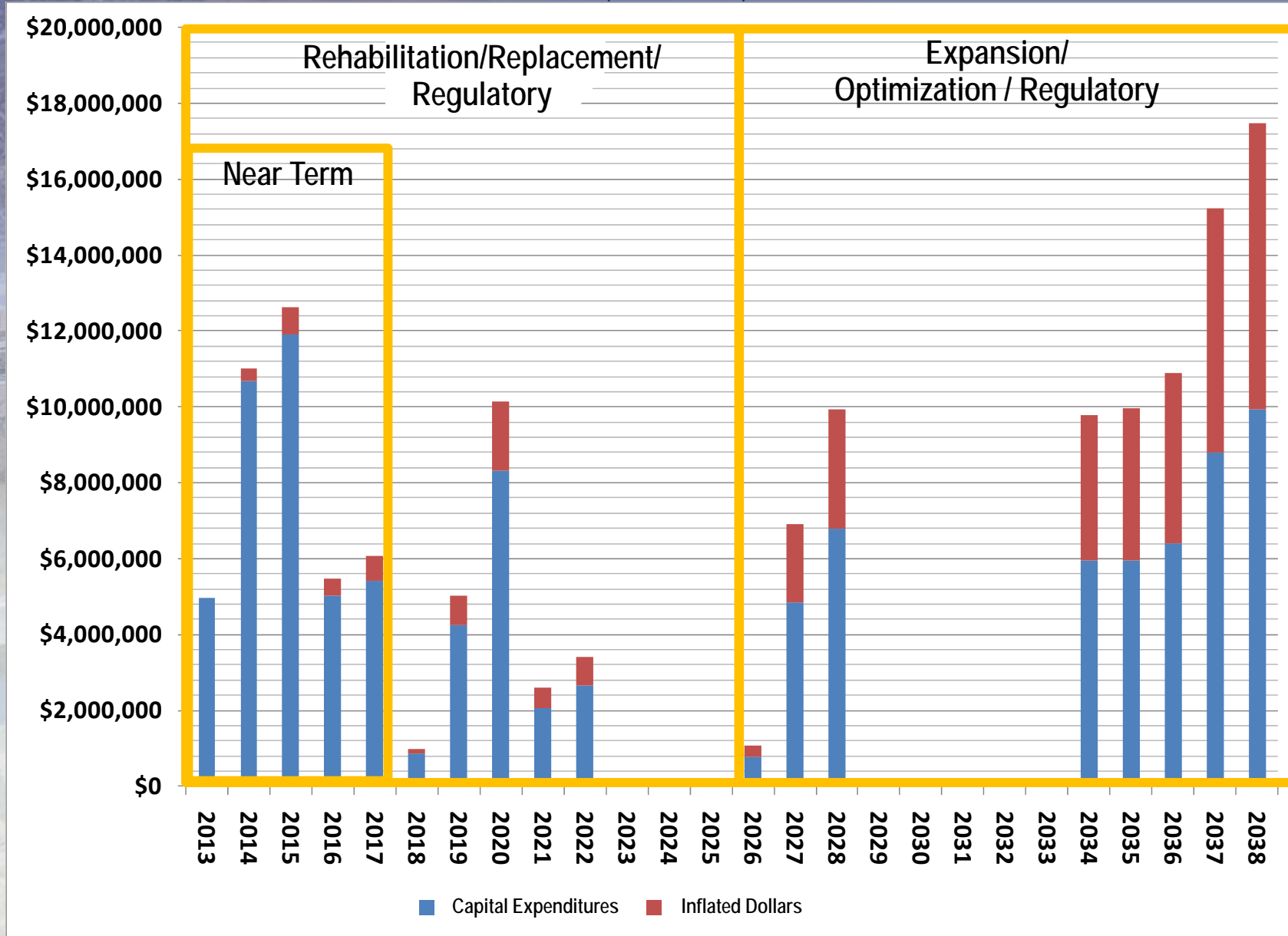
5 year Capital Improvement Plan (Treatment)

Project Element	Total Project Cost \$	Fiscal Year Beginning in				
		2013	2014	2015	2016	2017
PRELIMINARY TREATMENT						
HEADWORKS						
Headworks rehabilitation	952,000	285,600	666,400	--	--	--
ODOR CONTROL						
Cover headworks and grit basin openings	411,000	--	--	--	123,300	287,700
Primary clarifier covers	419,000	--	--	--	125,700	293,300
Headworks/primary odor control facility	2,460,000	--	--	246,000	1,107,000	1,107,000
PRIMARY TREATMENT						
Primary sludge pump station rehab (pumps and piping)	278,000	--	--	--	--	278,000
Fixed primary sludge blanket level reading	45,000	--	--	--	--	45,000
Primary clarifier maintenance (re-level weirs - recoat mechanism)	467,000	--	--	--	140,100	326,900
SECONDARY TREATMENT						
AERATION BASINS						
Aeration Basins (3)	5,047,000	504,700	2,271,150	2,271,150	--	--
Distribution structures	526,000	52,600	236,700	236,700	--	--
Blower/MCC building	2,629,000	262,900	1,183,050	1,183,050	--	--
SECONDARY CLARIFIERS						
Secondary clarifier rehabilitation (2)	3,364,000	336,400	1,513,800	1,513,800	--	--
Secondary scum pumping station	404,000	--	--	404,000	--	--
New secondary clarifier (1)	2,734,000	--	820,200	1,913,800	--	--
SECONDARY TREATMENT PUMPING						
Intermediate pumping station rehabilitation (replace pumps)	631,000	157,750	157,750	157,750	--	--
Intermediate pumping station modifications (piping)	51,000	--	15,300	35,700	--	--
Secondary sludge pumping modifications	1,471,000	367,750	367,750	367,750	--	--
TERTIARY TREATMENT						
TERTIARY FILTERS						
Reroute backwash to 5th Street	151,000	--	--	151,000	--	--
Repair sodium hypochlorite tank and foundation (cracking)	123,000	123,000	--	--	--	--
Tertiary filter pump	135,000	--	135,000	--	--	--
Rehabilitate flash mixer at sand filter	18,000	--	18,000	--	--	--
Sand filter cover replacement	24,000	--	24,000	--	--	--
Rehabilitate compressor #1 and #2 at sand filters	50,000	--	50,000	--	--	--
DISINFECTION						
Chlorine Residual Analyzer	53,000	--	--	53,000	--	--
EFFLUENT PUMP STATION						
Pump station modifications	2,019,000	--	201,900	908,550	908,550	--
SOLIDS HANDLING						
DIGESTERS						
Digester rehabilitation	5,345,000	1,069,000	1,069,000	1,069,000	1,069,000	1,069,000
DAF	--	--	--	--	--	--
Cover DAF structures	65,000	--	--	--	19,500	45,500
DAF thickener No.1 modifications	145,000	--	--	--	--	145,000
DEWATERING						
Repair odor control system	94,000	94,000	--	--	--	--
Polymer mix equipment replacement - dewatering	315,000	--	--	--	--	315,000
Rehabilitate Centrifuge #1	94,000	--	94,000	--	--	--
GENERAL PLANT OPERATIONS						
PLANT WATER SYSTEM						
Plant water system rehabilitation	419,000	125,700	293,300	--	--	--
GENERAL PLANT						
Major access roads asphalt repairs	631,000	--	--	--	126,200	126,200
Install permanent discharge line at electrical vault and upgrade sum	21,000	21,000	--	--	--	--
Upgrades to offsite communications	42,000	--	42,000	--	--	--
ELECTRICAL						
Rehabilitation of plant back up generator	42,000	42,000	--	--	--	--
Electrical rehabilitation program	4,281,000	856,200	856,200	856,200	856,200	856,200



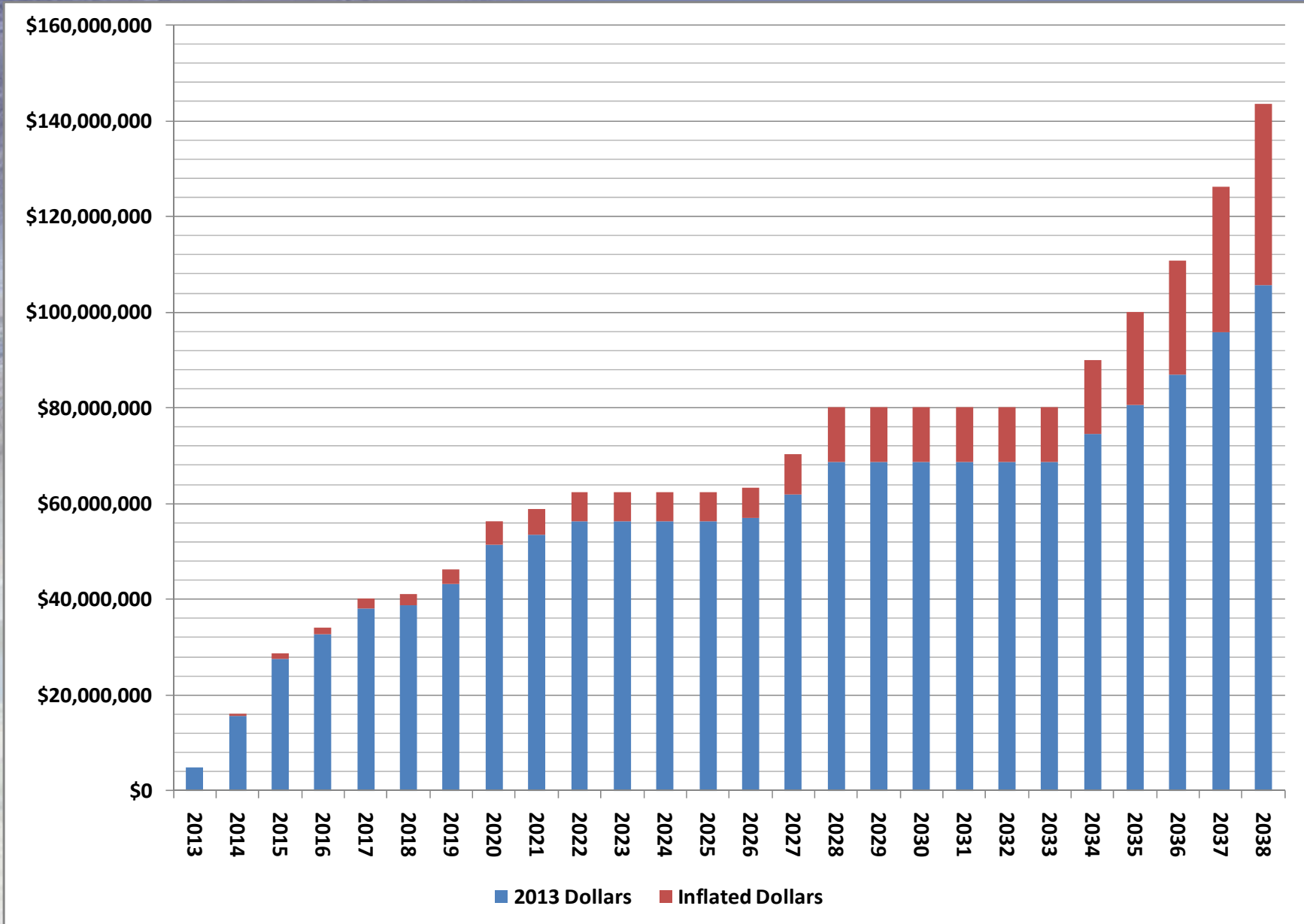
Annual Capital Expenditures

(Treatment)



Cumulative Capital Expenditures

(Treatment)



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Questions?

