

Water Reclamation Facility Master Plan



Community Workshop
November 14, 2016

Presentation Overview



- Introduction
- Project Goals
- Project Background
- Recent and Upcoming Schedule
- WRF Program Overview – “Big Picture”
- Draft Facility Master Plan Overview
- Project Financing
- Next Steps
- Q&A

WRF Project Community Goals



- **Produce Tertiary Disinfected Wastewater**
 - *Project to be designed accordingly*
- **Produce Reclaimed Wastewater Cost-Effectively**
 - *Master Reclamation Plan will address this*
 - *Including reclamation as early as possible reduces long-term costs*
- **Allow for Onsite Composting**
 - *Onsite composting is not recommended, regional facility will be more cost-effective*

WRF Project Community Goals



- **Design for Energy Recovery**
 - *Consideration included in FMP*
- **Design to Treat for Contaminants of Emerging Concern**
 - *Included in treatment evaluation criteria*
- **Allow for other Municipal Uses**
 - *Site planning in FMP allows for this possibility*

WRF Project Community Goals



- **Ensure Compatibility with Neighboring Land Uses**
 - *Siting was key to this*
 - *FMP required this in project design; EIR will analyze this*
- **Operational within 5 years**
 - *Project on schedule for beginning operation in 2021*

WRF Project Background



- **Jan 2013:** CCC denial of CDP for WWTP Upgrade
- **Dec 2013:** Site Options Report 17 sites narrowed to 7; Council direction to compare the best sites (in both Morro and Chorro Valley)
- **May 2014:** Report recommends Morro Valley, but Chorro Valley also suitable; Council direction to compare WRF in MV to regional facility at CMC
- **Dec 2014:** Report determines CMC facility not desirable (very high cost; logistical challenges); Council focus remains on Morro Valley
- **April 2015:** CSD decides to pursue separate project

WRF Project Background



- **Feb 2016:** Neighborhood concerns in Morro Valley lead to additional site analysis
- **May 2016:** Chorro Valley site (South Bay Boulevard) determined to be most achievable in 5-year timeframe when balancing cost and other logistical issues
- **June 2016:** City Council selects South Bay Boulevard site for detailed studies, FMP site planning, and EIR analysis

Project Schedule – 2016



Key Milestone	Scheduled Date	Actual Date
City Council Selects Site for Study (South Bay Blvd.)	June 2016	June 2016
Technical Studies (biology, cultural, geotech, survey work)	August 2016	August 2016
EIR Scoping Meeting	August 2016	August 2016
MOU with Property Owner	October 2016	October 2016

Project Schedule – 2016-17



Key Milestone	Scheduled Date	Actual Date
Draft Facility Master Plan	December 2016	November 2016
Draft Master Water Reclamation Plan	March 2017	On Schedule
Draft EIR Released	August 2017	On Schedule
Final EIR Certified	November 2017	On Schedule

Project Schedule – 2018-21



Key Milestone	Scheduled Date	Actual Date
Award Contract for Phase I WRF Improvements	May 2018	On Schedule
Begin Project Design	August 2018	On Schedule
Project Construction Begins	June 2019	On Schedule
Completion of Phase I WRF Improvements	May 2021	On Schedule

WRF Program Overview



What we know now ...

- We can build a WRF at South Bay Blvd site that meets the Community Project Goals
- “Total WRF Project” by June 2021 is possible
 - *Recycled water 2 years ahead of schedule*
- Groundwater injection & extraction appears feasible

WRF Program Overview



What we know now ...

- **Total WRF Project** can provide recycled water for groundwater injection to supplement the City's **water supply** and provide **water independence**
- **Advantages of Accelerating Recycled Water Component**
 - *Potentially eligible for more grant money*
 - *Long-term construction cost savings*
 - *Potential reduction in State Water Use = Cost Savings*

WRF Program Overview

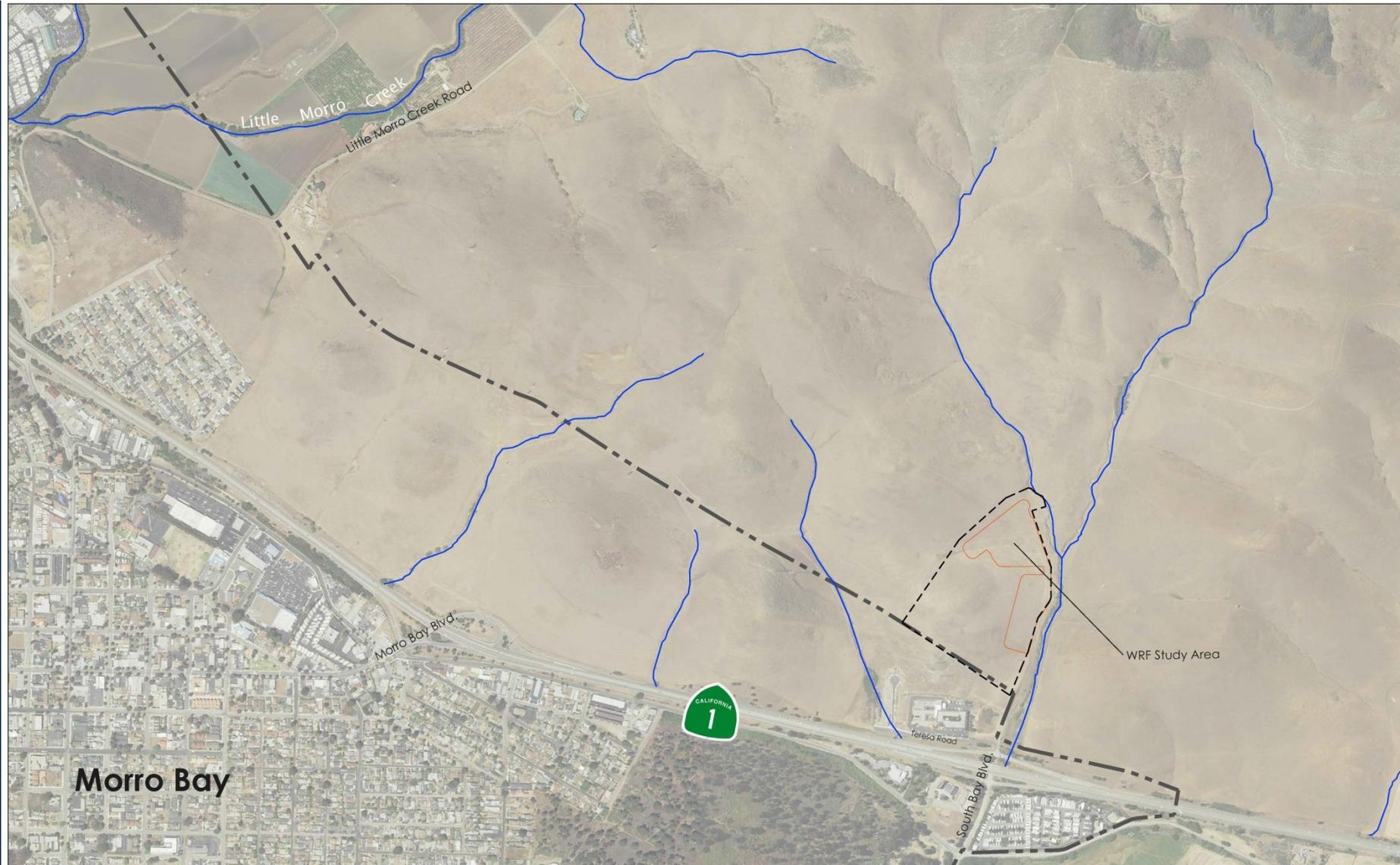


What we know now ...

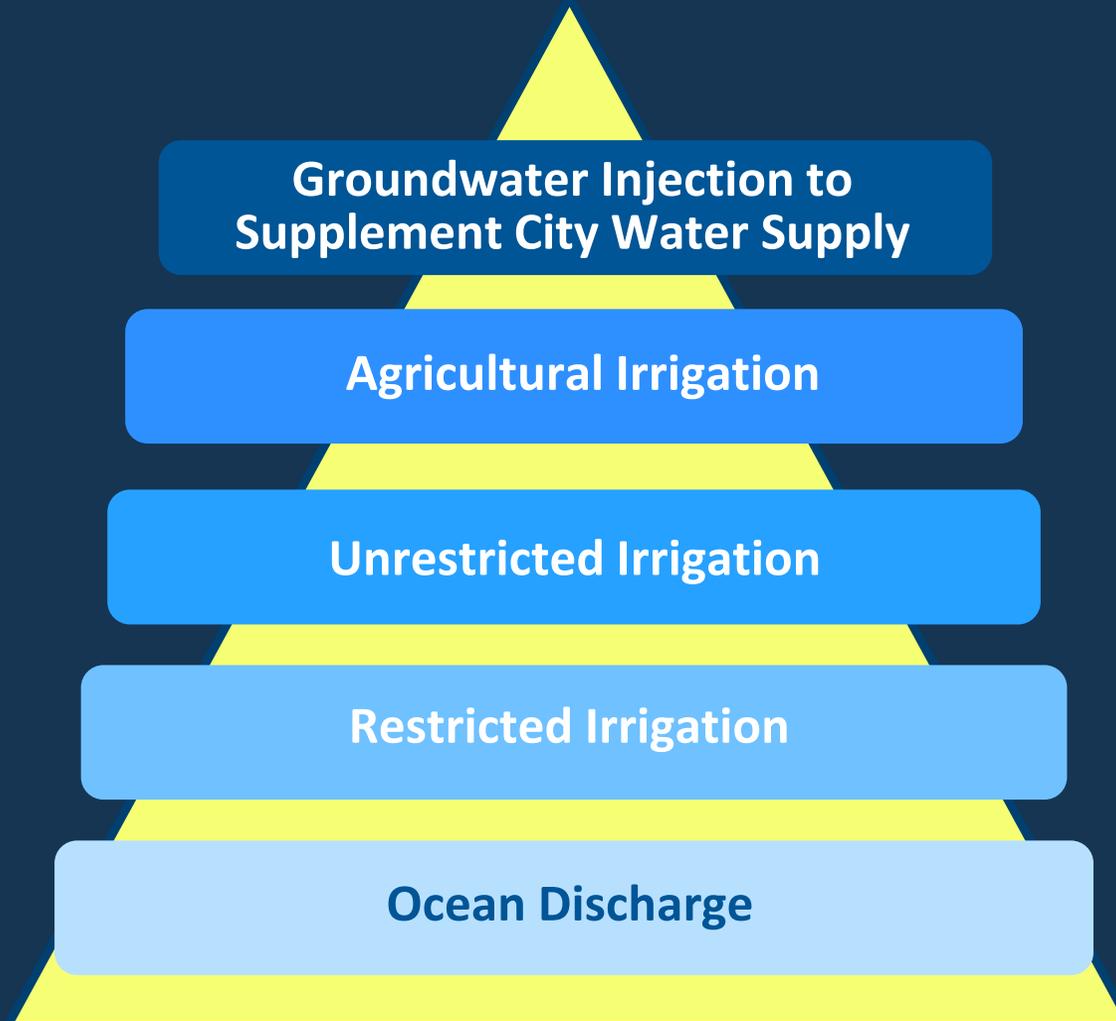
- Estimated Cost without recycled water: \$114M - \$136M*
- Estimated Total Cost with recycled water: \$125M - \$168M*
- *High includes Contingency + “High Cost” Reuse alternative
- Rates: Estimated Total Cost Effect on combined Water/Sewer

Average Monthly Rate Today	Approved Average 19/20 Monthly Rate	Estimated Average Monthly Rate with Total WRF project
\$114.50	\$150.00	\$177 - 224

WRF Site Context



WRF Provides City Ability to Make “Highest and Best Use” of New Water Supply Resource



*To Be Determined in
Master Water
Reclamation Plan*

Evaluation Criteria Align With Community Goals



Comparative Capital Cost

Comparative Operating Cost

Odor Mitigation

Technical Complexity

Reliability

Staff Requirements

Scalability

Product Water Quality

Flexibility for Title 22 Redundancy

Visual Impact/Footprint

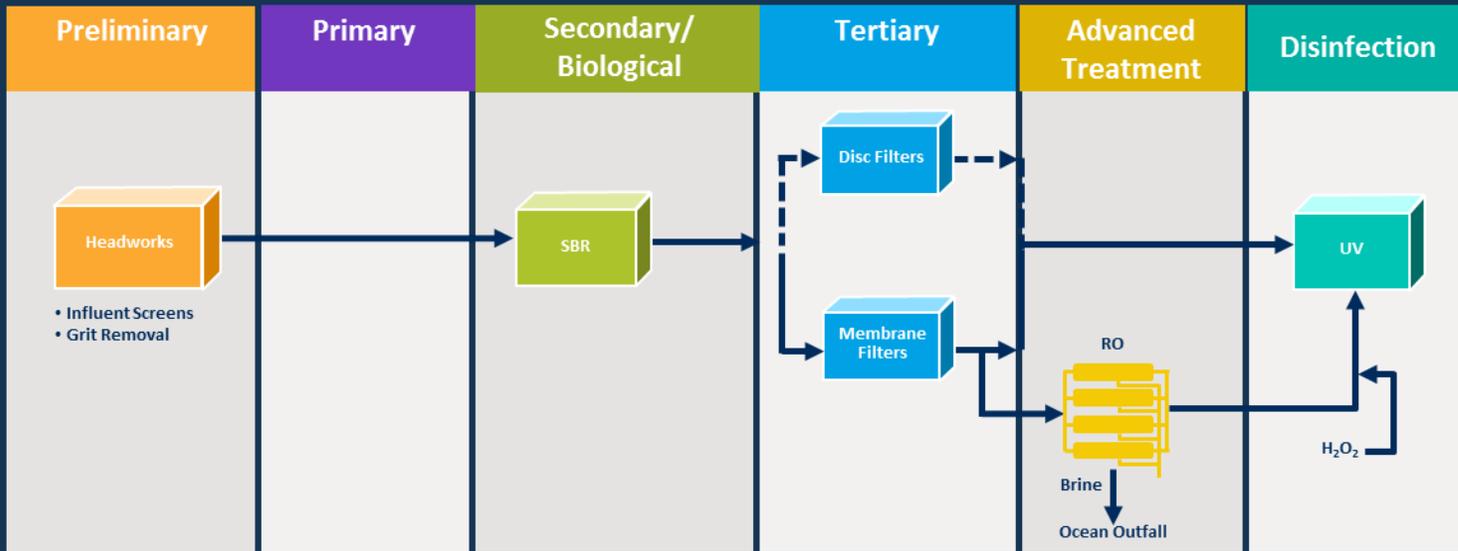
List of Treatment Technologies Considered Was Inclusive



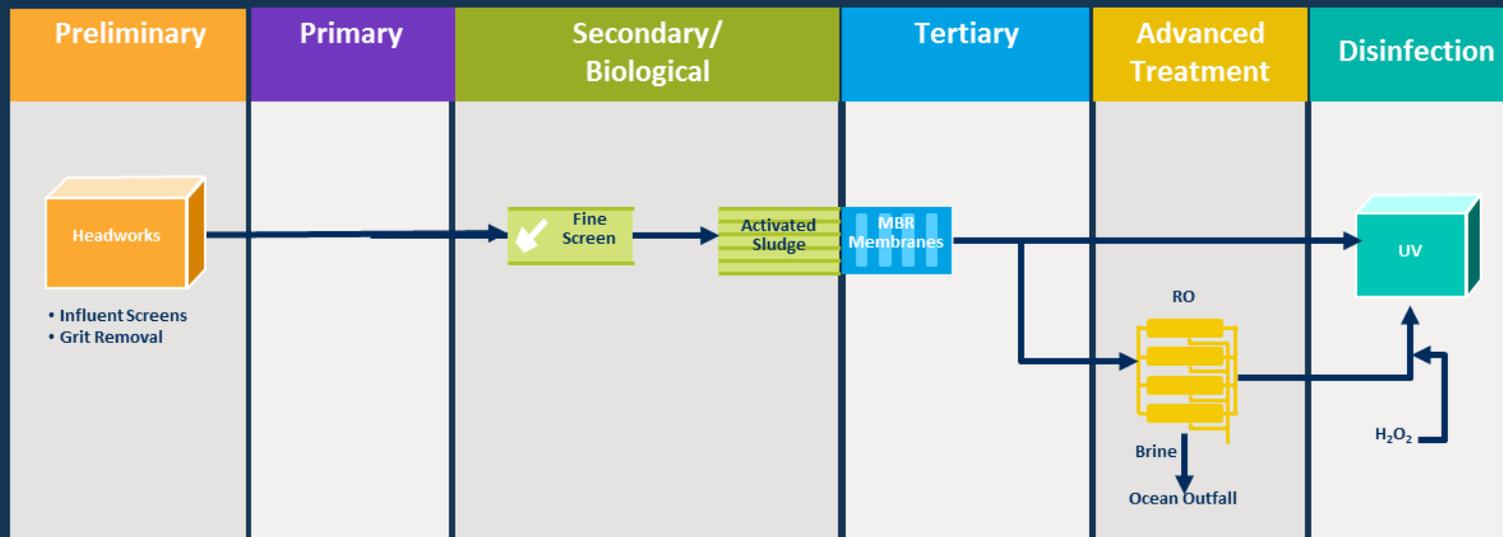
TREATMENT STEP	UNIT PROCESSES
Preliminary Treatment	<ul style="list-style-type: none"> ■ Influent Screens <ul style="list-style-type: none"> ● Shaftless Spiral Screen ● Mechanically-Cleaned Bar Screen ■ Grit Removal <ul style="list-style-type: none"> ● Horizontal Flow Grit Chambers ● Aerated Grit Chambers ● Vortex Grit Chambers
Primary Treatment	<ul style="list-style-type: none"> ■ Primary Clarifiers <ul style="list-style-type: none"> ● Rectangular Clarifiers ● Circular Clarifiers
Biological Treatment	<ul style="list-style-type: none"> ■ Suspended Growth Biological Treatment <ul style="list-style-type: none"> ● Activated Sludge (AS) ● Sequencing Batch Reactor (SBR) ● Oxidation Ditch ● Aerated Lagoons/ Pond Systems ■ Fixed Film Biological Treatment <ul style="list-style-type: none"> ● Trickling Filters (TFs) and Rotating Biological Contactors (RBCs) ● Moving Bed Bioreactors (MBBR) ● Biological Aerated Filter (BAF) ■ Hybrid Biological Treatment <ul style="list-style-type: none"> ● Integrated Fixed-Film Activated Sludge (IFAS) ■ Membrane Bioreactor (MBR)
Tertiary Treatment	<ul style="list-style-type: none"> ■ Disc Filters ■ Media Filters
Disinfection	<ul style="list-style-type: none"> ■ Chlorine ■ Ozone ■ Ultraviolet Light (UV)

- Achieve Highest and Best Use of Water
- Proven
- Cost-effective
- Achieve to regulatory compliance
- Appropriate to plants of this size and scale

Two Treatment Strategy Alternatives Provide for “Highest and Best” End Uses

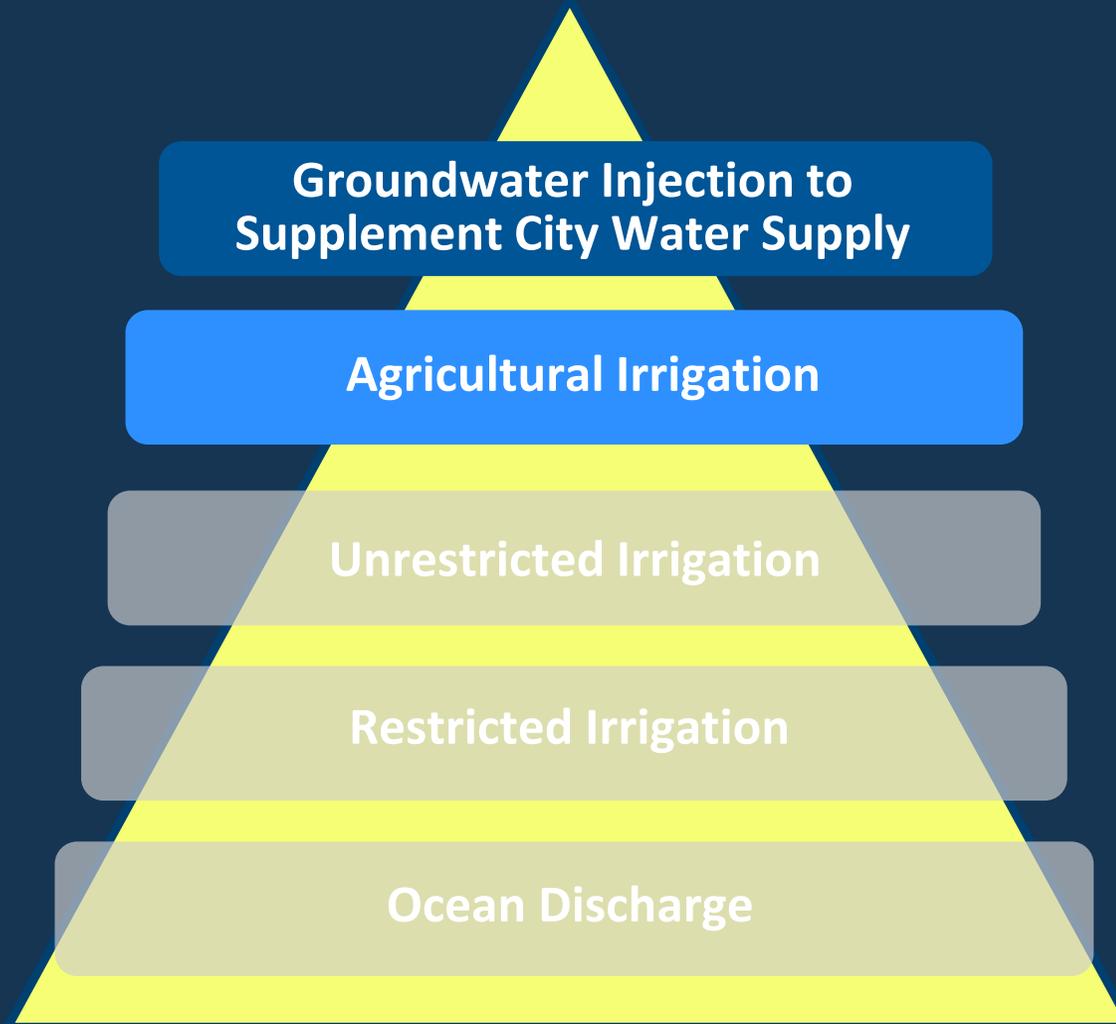


**Conventional Train:
 Sequencing Batch
 Reactor (SBR)**



**Combined
 Secondary/Tertiary
 Train:
 Membrane
 Bioreactor (MBR)**

Advanced Treatment Required to Achieve Community Goals for Highest and Best Uses of Product Water



- Advanced treatment is used to remove dissolved salts, viruses, TOCs, organic and inorganic chemicals, and emerging contaminants
- Title 22 requires MF/RO + AOP for IPR
- Many agricultural irrigation uses require salt removal (MF/RO)

New Pipelines and Pump Stations Needed to Connect WRF to City System

- Alignment Generally Follows Quintana Road
- Lower Cost
- Less Environmental Impact
- More Energy Efficient



New Pipelines and Pump Stations Needed to Connect WRF to City System



- Location Near Existing WWTP Most Efficient and Least Expensive
- Floodplain Issues to be Mitigated
- CCC Supportive of Location

Solid Material from Treatment Process Will Be Composted at a Regional Facility

Investigated opportunities to reduce costs for project by:

- Create marketable products processing materials on-site
- Use biosolids to generate energy

- City's current practice is most cost-effective
- Processing on-site or providing facilities to generate energy not cost-effective
- Liberty Composting in Kern County provides beneficial use of processed materials

Preliminary Architectural Concept Developed for Consistency with Highway 1 Corridor



- Farm or Dairy style buildings
- Color palette similar to buildings along Highway 1 between CMC and Morro Bay
- Landscaping screening envisioned near entrance

WRF Site Overview



WRF Site





WRF Site with Consolidated Maintenance Facilities

WRF

Looking South

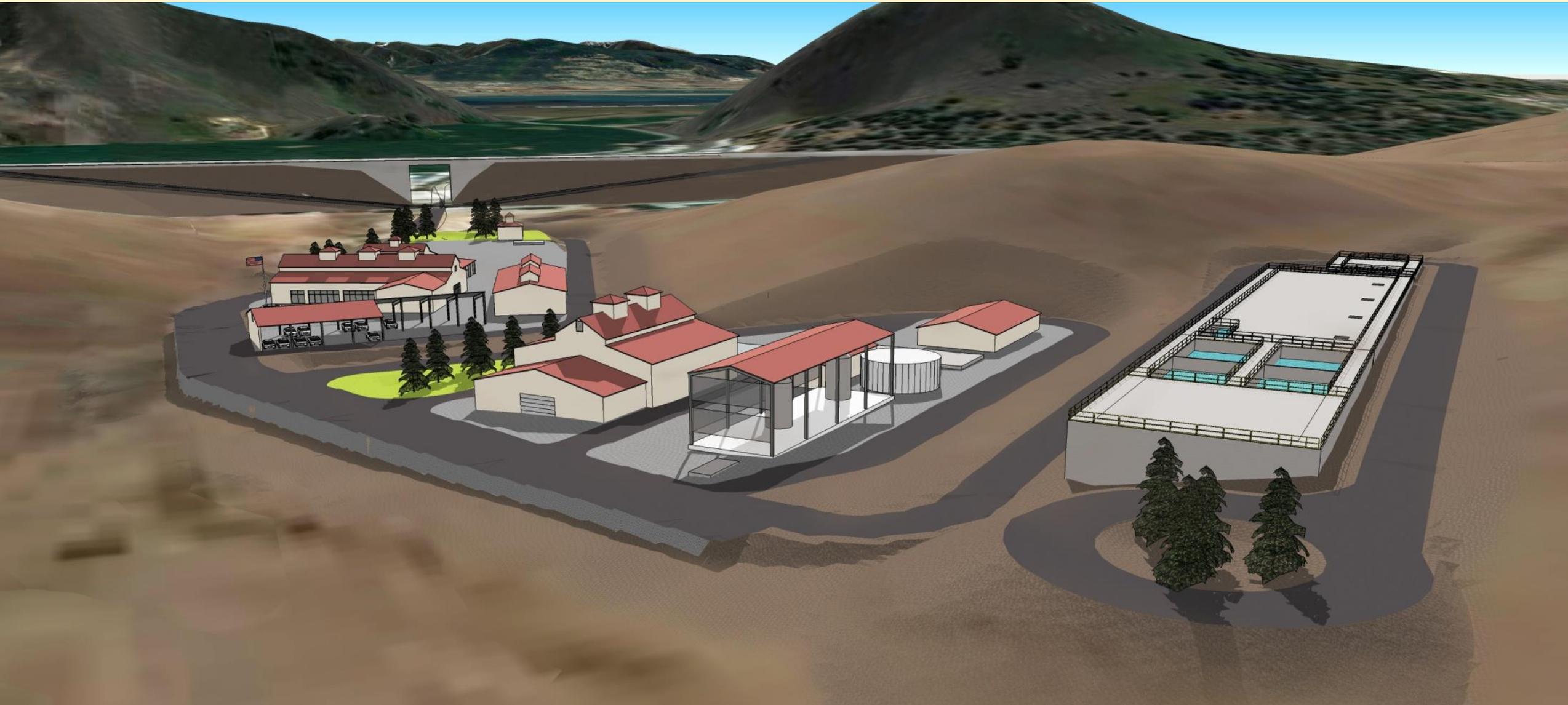


WRF with Consolidated Maintenance Facilities Looking South



WRF

Looking Southeast

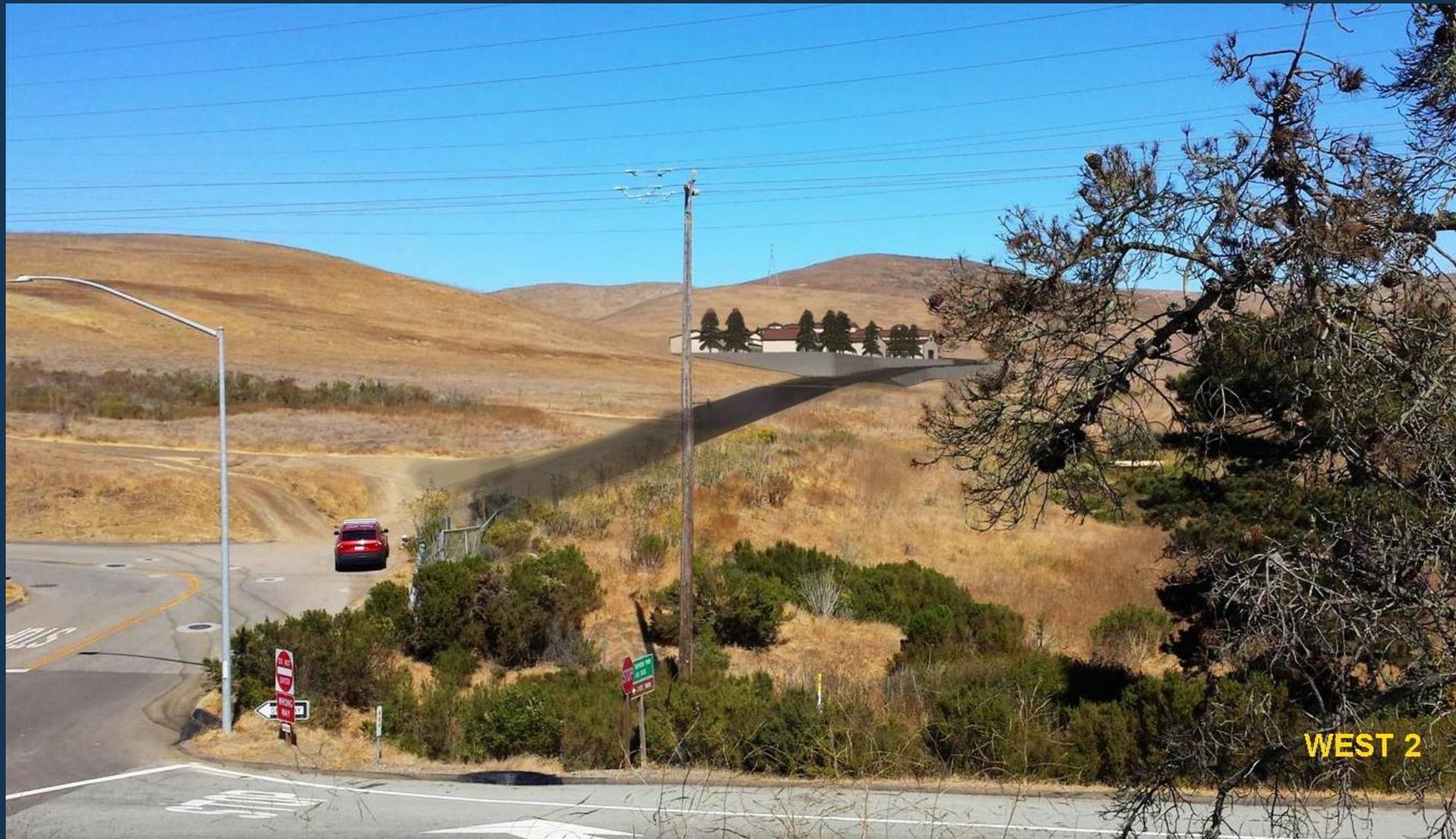


View From Highway 1 Heading West East of South Bay Boulevard



WEST 1

View From Highway 1 Heading West Just East of South Bay Boulevard



WEST 2

View From Highway 1 Heading West Just West of South Bay Boulevard



View From Highway 1 Heading West West of South Bay Boulevard



EAST 1

Why So Much Higher than 2013 Costs?

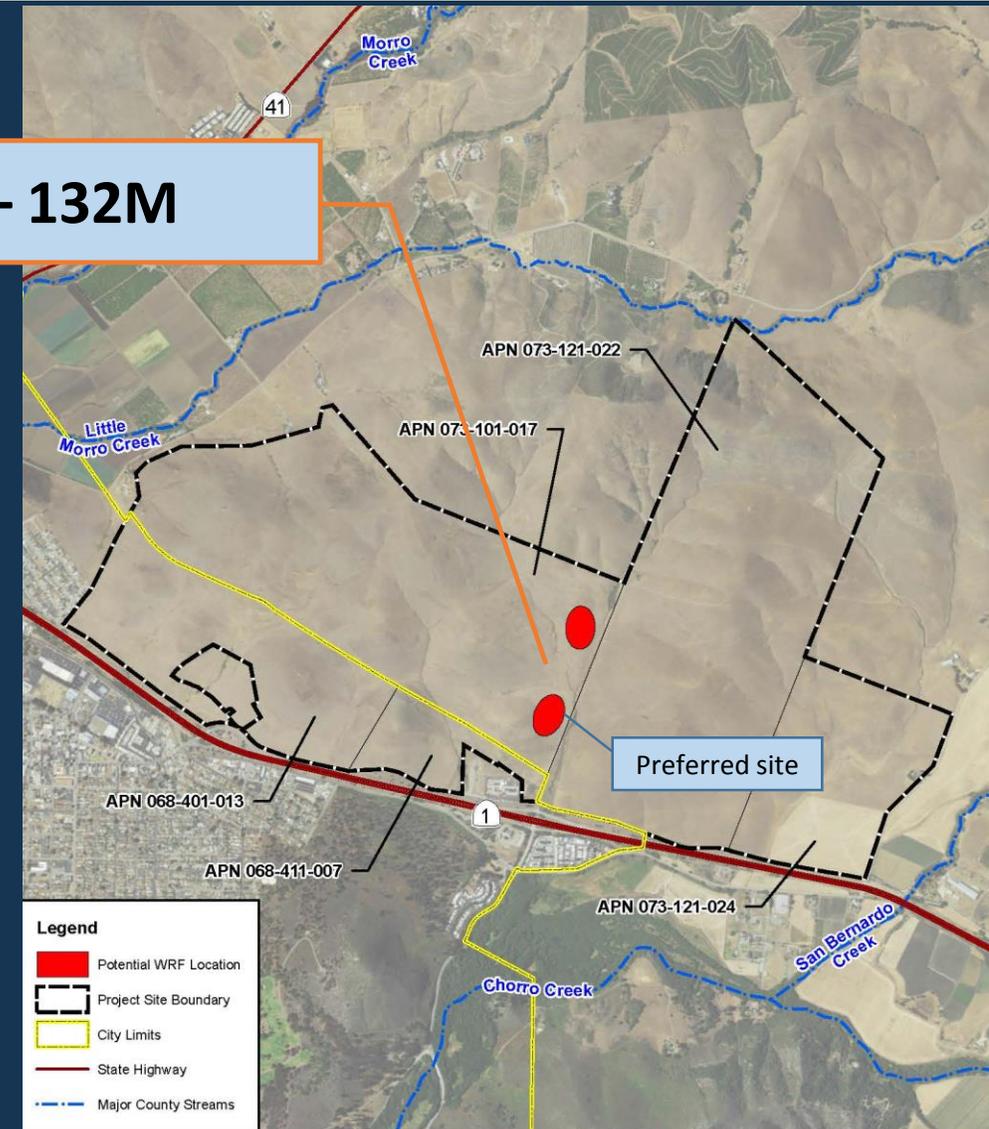


- \$100 M Estimate was mid-range for comparison of sites ONLY
- South Bay Boulevard is 10-15% higher than Morro Valley sites
- 3 Yrs of cost escalation was 8-9%
- Highest and best water recycling opportunities required higher-end treatment processes
- Ancillary facilities and work not known or included (plant decommissioning, recycled water delivery system, etc.)

May 2016 Site Analysis

- Goal was comparison of sites only
- Partial WRF Costs at South Bay Blvd site
 - Midpoint of cost range (based on 2014 assumptions) = \$107M
- 2013 siting studies assumed wide range of treatment technologies
- No regional recycled water system
- No decommissioning of existing site

\$84M – 132M



New Information from FMP and Studies

SBB site is preferred & has less delays

Standalone EQ storage is needed for advanced treatment

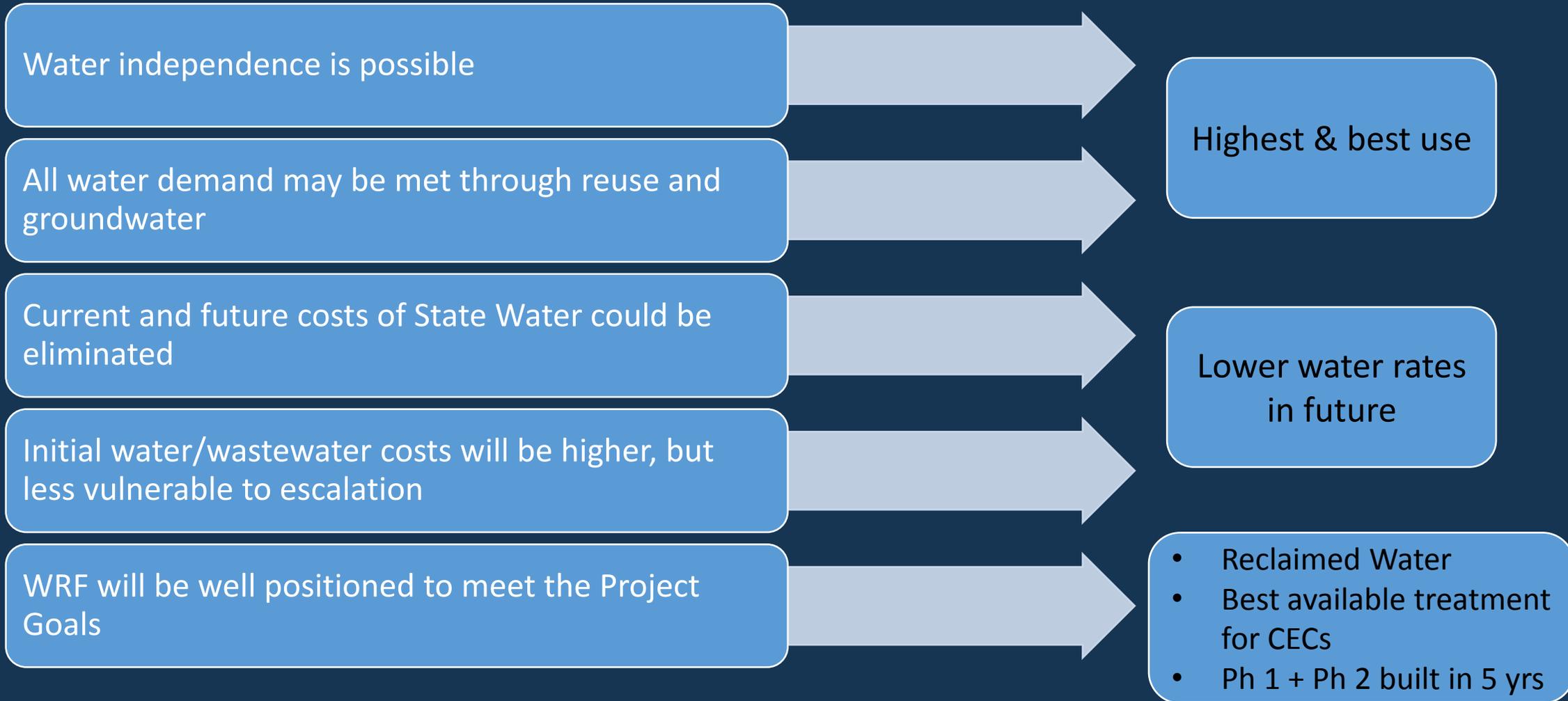
WWTP decommissioning costs are higher than previous estimates

SBR/MBR, membrane filtration, and UV disinfection are essential

Groundwater aquifer storage is available in the Morro Valley

Possible to offset State Water deliveries with groundwater injection

New Opportunities



WRF Cost to Customers

“Hard” Costs
(Construction, Demolition)

Operation & Maintenance
(Power, Staffing, and
Chemicals)

“Soft”
Costs

How Do We Predict Rate Impacts?

- What are the Total Project Costs (“Hard”, “Soft”, and Operation & Maintenance (ongoing))?
- Can the WRF Project reduce other customer utility costs?
 - Can we buy less imported water and what would that save?
- What will be the financing cost (interest rates & terms)?
- What grants can we pursue?
- Could project design include solar power to reduce ongoing costs?

WRF Project Contingency

- “Contingency” – Not a “soft cost”, but not used if not needed
 - “What we don’t know we don’t know”
 - Typically reduced as project moves forward

WRF Project Components

Phase 1 WRF

- Lift Station
- WRF for tertiary disinfected
- Pipeline to ocean outfall

Phase 2 onsite

- Advanced treatment
- Recycled water storage
- Recycled water pump station

Phase 2 offsite

- Recycled water distribution system options:
 - Groundwater Injection
 - Ag Exchange
 - Urban Irrigation

Phase 1 WRF Capital Cost Opinion



"Hard" and "Soft" Costs	2016 US \$MM
Phase I WRF Construction Cost Subtotal (FMP w/o contingency)	97.1
Procurement (4%)	4.3
Project Administration and CM (12%)	10.6
Permitting, Monitoring, and Mitigation (1%)	0.9
Existing WWTP Demolition	3.3
Property Acquisition	0.3
Phase 1 WRF Capital Cost Subtotal	114
Construction Contingency (25% of construction subtotal)	22
Phase 1 WRF Capital Cost Opinion Total	136

Note: Phase 1 WRF costs based on Draft Facility Master Plan (Nov 2016)

WRF Project Capital Cost Opinion



“Hard” and “Soft” Costs	Capital Cost Opinion (2016 US \$MM)
Phase 1 WRF	114
Phase 2 Recycled Water Facilities	11 – 26
Total WRF Capital Cost Subtotal	126 – 140
Construction Contingency	25 – 28
Total WRF Capital Cost Total	150 – 168

Note: Phase 1 WRF costs based on Draft Facility Master Plan (Nov 2016). Phase 2 costs are preliminary and to be further developed in the Master Reclamation Plan (Draft March 2017)

WRF Project O&M Costs



	Annual O&M Cost Opinion (2016 US \$MM)
Phase 1 WRF	\$1.3 – 1.6
Phase 2 Recycled Water Facilities	\$0.5 – 0.8
Total WRF	\$1.8 – 2.4

Note: Phase 1 WRF O&M costs are based on the Draft Facility Master Plan (Nov 2016). Phase 2 costs are preliminary and to be further developed in the City's Master Reclamation Plan (Draft March 2017)

Water Supply Costs

- Indirect potable reuse could offset State Water Costs
- State Water Project Costs
 - \$2,000 per acre foot (16/17)
 - \$2,200 - \$2,400 per AF (est. future)
- Morro Valley Groundwater costs
 - \$1,000 per acre foot
 - 580 AFY allocation
- Seawater desalination costs
 - \$1,600 per acre foot

Annual Cost of State Water



	Estimated Annual Cost
State Water at Current Rate (\$2,000/AF)	\$2.4M
State Water at Estimated Future Rate (\$2,200/AF)	\$2.64M

Note: Annual cost based on 1200 acre-feet (AF)

How Much Could We Reduce Costs?



	Potential Savings
30 Year SRF Loan Payment (2% vs. 2.5% Financing)	\$1.6M/yr
Savings without State Water Project costs	\$1.5M/yr
Grant Funding	10 – 20% of capital costs
Solar Power Purchase Agreement	Up to 1/3 of power costs

What Would be Impact on Utility Rates



	Current Water/Sewer Rate (FY 16/17)	Approved Rate (FY 19/20)	With Total WRF Project
Estimated Average Monthly Rate	\$114.50	\$150	\$177 – 224
Future Rate Increase			\$27 - 74

Average sewer rate for single family residential and water rate for 5 units/month

Next Steps

- Provide Input on Draft FMP – **Now until December 2016**
- WRFCAC Meeting - **December 6**
- City Council Meeting – **December 13**
- Draft Master Reclamation Plan – **March 2017**
- Rate Study – **Fall 2017**
- Draft EIR – **August 2017**
- Final EIR – **November 2017**

Q&A

BACK-UP SLIDES



Technical Memoranda Form Basis of FMP



TM-1 – Summary of Existing Documents Reviewed

TM-2 – Inf. Waste Characteristics, Flow Projections,
and Eff. Discharge Req.

TM-3 – Morro Bay WWTP Decommissioning

TM-4 – Onsite Support Facilities

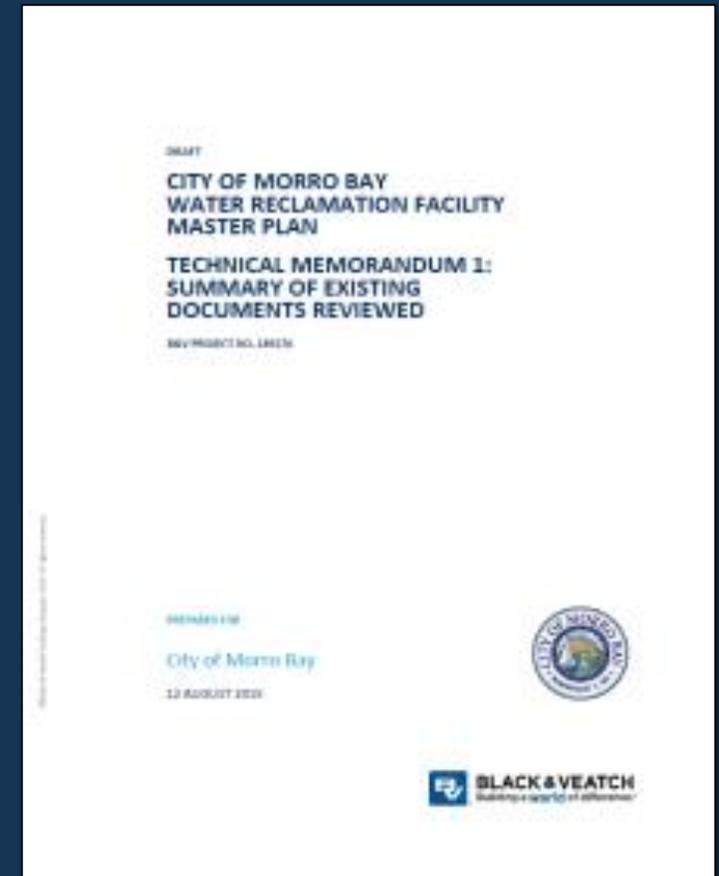
TM-5 – Offsite Support Facilities

TM-6 – Biosolids Treatment Evaluation

TM-7 – Liquid Treatment Technologies Evaluation

TM-8 – Potable Reuse Strategy

TM-9 – Organic Waste Treatment Feasibility



FMP Incorporates Valuable Input from Numerous Stakeholders



WHO PROVIDED INPUT

- Morro Bay Community
- Morro Bay City Council
- WRFCAC Committee Members
- Morro Bay Residents
- Regulatory Agencies (RWQCB, CCC, Morro Bay Nat'l Estuary Prog.)
- City Technical Staff
- Program Management Team

HOW INPUT WAS OBTAINED

- Community Workshops
- Presentations to WRFCAC and City Council
- Meetings with Stakeholders
- Meetings Workshops and Meetings with City and Program Staff
- Review and Comment on Draft Deliverables

SBR Rated Favorably in Evaluation for Conventional Train Options

- Single batch operation tank results in smaller footprint than AS or Oxidation Ditch
- SBRs do not require final clarifiers
- Modular design results in more efficient approach to process redundancy than AS or Oxidation Ditch
- Modular design provides enhanced flexibility for alignment with changing plant capacity needs

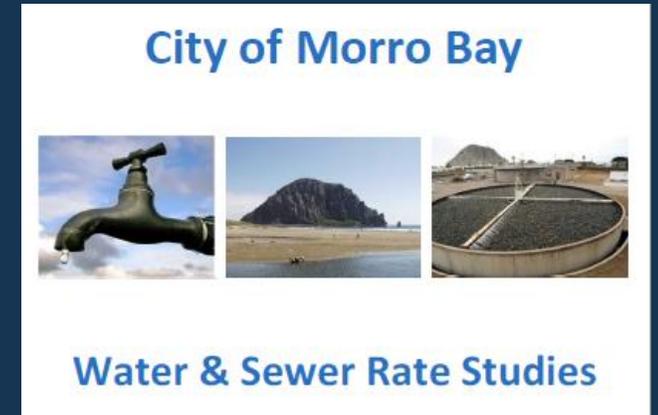
MBR Rated Favorably in Evaluation for Combined Secondary/Tertiary Train Options



- Provides simultaneous secondary and tertiary treatment
- Positive solids barrier provides superior and consistent product water quality that is equivalent to membrane filtration
- Produces water quality sufficient for RO feed
- Smaller footprint than conventional treatment
- Smaller volume of air scrubbed for odor control than conventional treatment

Project Financing

- FMP – First detailed construction cost estimate for WRF
- Initial rate increase passed in May 2015 for:
 - \$75M project from April 2014 Workplan
 - Prior to dissolution of City – CSD partnership
 - CSD would fund 25% of project
 - Intended to fund initial part of WRF Program
 - Costs to be developed through Facility Master Plan concurrent with identification of reuse alternatives



2015 Rate Increase

- May 2015 rate increase:
 - Source: “midpoint” of cost ranges from Dec 2014 Site Options Report (JFR)
 - Morro Valley – preferred site
 - Ph 1 WRF to produce tertiary disinfected wastewater (\$100M midpoint)
 - Partial RO treatment, recycled water pipeline to Hwy 41

\$75M - \$125M

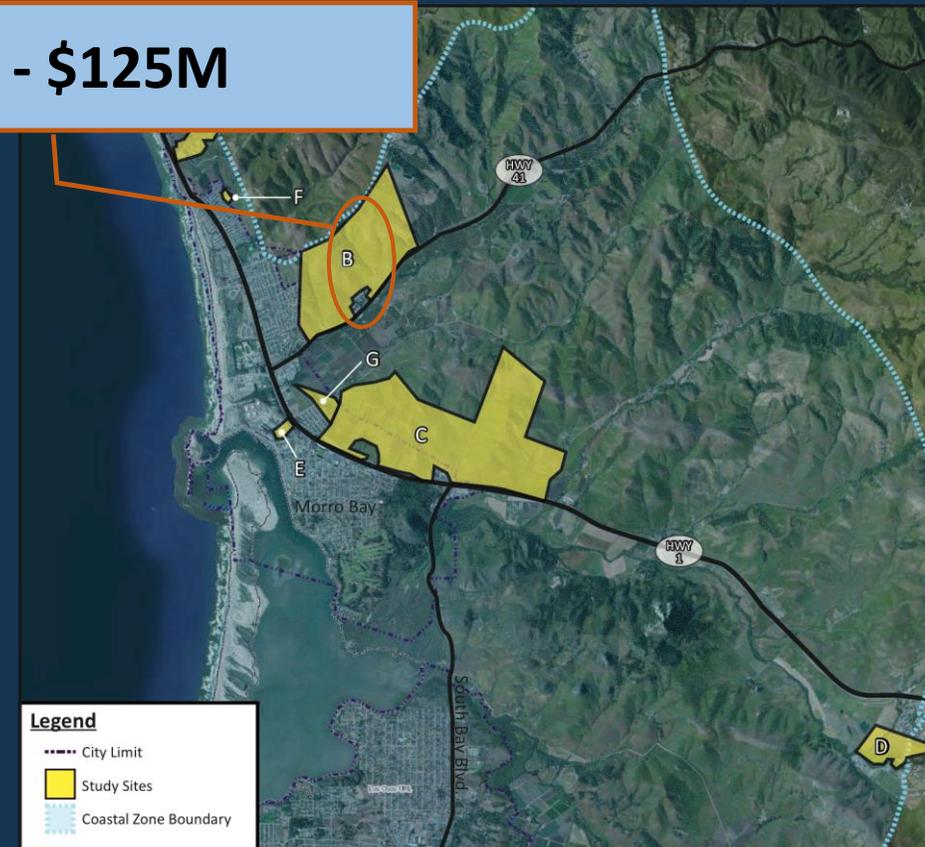


Figure 1: Overview of Study Sites



Note: Map data obtained from County Assessor's mapping database

0 0.4 0.8 mi

Study Sites Legend

Site A (Chevron)
Site B (Morro Valley)
Site C (Chorro Valley)
Site D (CMC Wastewater Site)

Site E (Power Plant - southern portion of property)
Site F (Panorama)
Site G (Giannini)

What if the WRF is at the Righetti site?



	Capital Cost Opinion (2016 US \$MM)
Phase 1 WRF at Righetti	107.8
Construction Contingency	20.8
Phase 1 WRF Capital Cost Total	128.6

WRF at the Righetti site – Phase 2



	Capital Cost Opinion (2016 US \$MM)
Phase 2 Recycled Water Project Subtotal	9 – 20
Construction Contingency	2 – 5
Phase 2 Capital Cost Range	11 – 25

WRF at the Righetti site – Ph 1 + Ph 2



	Capital Cost Opinion (2016 US \$MM)
Phase 1 WRF Total	128.6
Phase 2 Recycled Water Project Total	11 – 25
Phase 1+ Ph 2 Capital Cost Opinion Total	139.6 – 153.6

WRF at Righetti – Est. Monthly Rate Impact



	Current Water/Sewer Rate (FY 16/17)	Approved Rate (FY 19/20)	With Total WRF Project at SBB	With Total WRF Project at Righetti
Estimated Average Monthly Rate	\$114.50	\$150	\$177 – 224	\$169 – 212
Future Rate Increase			\$27 - 74	\$20 - 62

Average sewer rate for single family residential and water rate for 5 units/month

What if the WRF were a joint facility with CSD at the Toro Creek Site?



	Capital Cost Opinion (2016 US \$MM)
Partner Facility with CSD at Toro Creek	165 – 214
Construction Contingency	32 – 42
Phase 1 WRF Capital Cost Total	197 – 256

Partner Facility at Toro Creek Site



	Current Water/Sewer Rate (FY 16/17)	Approved Rate (FY 19/20)	With Total WRF Project at SBB	With Partner WRF Project at Toro Creek
Estimated Average Monthly Rate	\$114.50	\$150	\$177 – 224	\$177 – 248
Future Rate Increase			\$27 - 74	\$27 – 98

Average sewer rate for single family residential and water rate for 5 units/month

Phase 1 WRF Capital Cost Opinion



“Hard” and “Soft” Costs	2016 US \$MM
Phase I WRF Construction Cost Subtotal	88.5
Engineering, Design and Procurement (12%)	10.6
Project Administration and CM (12%)	10.6
Permitting, Monitoring, and Mitigation (1%)	0.9
Existing WWTP Demolition	3.3
Property Acquisition	0.3
Phase 1 WRF Capital Cost Subtotal	114.2
Construction Contingency (25% of construction subtotal)	22.1
Phase 1 WRF Capital Cost Opinion Total	136.3

Note: Phase 1 WRF costs based on Draft Facility Master Plan (Nov 2016)

Secondary disinfected WWTP at startup - Phase 1 Capital Cost Opinion



	Capital Cost Opinion (2016 US \$MM)
Phase 1 WWTP Subtotal	91.6
Construction Contingency	17.6
Phase 1 WWTP Capital Cost Total	109.2

Secondary disinfected WWTP at startup - Phase 2 Capital Cost Opinion



	Capital Cost Opinion (2016 US \$MM)
Phase 2 Recycled Water Project Subtotal	49 – 78
Construction Contingency	10 – 16
Phase 2 Capital Cost Range	59 – 94

Note: Phase 2 costs are preliminary and to be further developed in the Master Reclamation Plan (Draft March 2017)

Secondary disinfected WWTP at startup- Ph 1 + 2 Capital Cost Opinion



	Capital Cost Opinion (2016 US \$MM)
Phase 1 WWTP Total	109.2
Phase 2 Recycled Water Project Total	59 – 94
Phase 1+ Phase 2 Capital Cost Opinion Total	168.2 – 203.2

Note: Phase 2 costs are preliminary and to be further developed in the Master Reclamation Plan (Draft March 2017)

Cost for Secondary Disinfected WRF



	Current Rate (16/17)	Approved Future Rate (19/20)	Phase 1 Rate Impact (2021)	Phase 1 + 2 Rate Impact (2023)
Estimated Average Monthly Rate	\$114.50	\$150	\$172 - 175	\$192 – 247
Difference from approved rate (19/20)			\$22 - 25	\$42 - 97

Average sewer rate for single family residential and water rate for 5 units/month

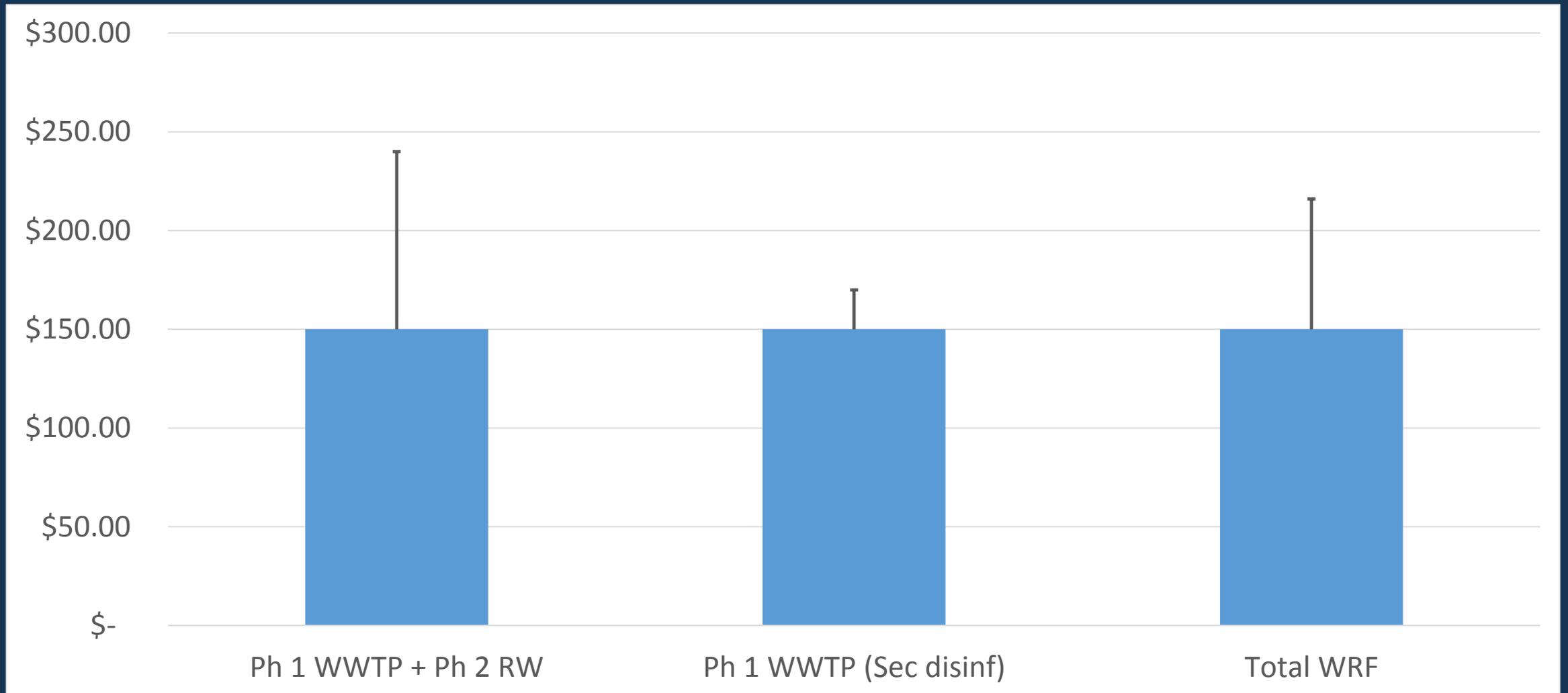
Anticipated Combined Water/Sewer Rate



	Current Rate (16/17)	Approved Future Rate (19/20)	With Total WRF Project	With Total “Startup at Secondary” Project
Estimated Average Monthly Rate	\$114.50	\$150	\$177 – 224	\$192 – 247
Difference from approved rate (19/20)			\$27 - 74	\$42 - 97

Average sewer rate for single family residential and water rate for 5 units/month

Average Monthly Water + Sewer Rate Impact from Approved 2019/2020 Increase



Legend

-  Potential WRF Site
-  Urban Reserve Boundary

Reuse Opportunities

-  Groundwater Injection
-  Agricultural Exchange
-  Commercial Irrigation
-  Parks and Landscape Irrigation



1 inch = 3,000 feet



Morro Bay WRF Recycled Water Opportunities for Reuse



Sources Cited:

1. Cayucos/Morro Bay Comprehensive Recycled Water Study, Carollo Engineers, 1999.
2. Recycled Water Feasibility Study, Dudek, 2012.
3. Water Reclamation Facility Project Final Options Report, John F. Rickenbach Consulting, 2014.



Annual Cost of GW Injection & Extraction



	Est Annual Cost
SRF Bond Service for WRF	\$6.5 – 8.0M
Total Annual O&M	\$1.3 – 1.7M
Extraction and Treatment of Groundwater	\$1.2M
Total Estimated Annual Cost to Supplement Water Supply	\$9.0 – 10.9M