

Biosolids Input Workshop

Regional Water Quality
Control Plant

July 1, 2025

www.paloalto.gov



Welcome & Introductions

City of Palo Alto

- Karin North, Assistant Director, Public Works
- Aaron Gilbert, Plant Manager
- Tina Pham, Senior Engineer
- Connie Li, Project Engineer
- Daniel Shih, Intern

Carollo Engineers

- Christine Polo, Principal Technologist - Biosolids
- Rashi Gupta, Wastewater Practice Director

Agenda

- Welcome
- Introduction to Regional Water Quality Control Plant
- Current Biosolids Management
- Overview of Biosolids Facility Plan Update
- Biosolids Technologies and Alternatives (Carollo)
- **Community Input Activities – Group Polling Exercise**
- Biosolids Alternatives Evaluation Process
- **Community Input Activities – Small Group Exercise**
- Recap/Next Steps



CITY OF
**PALO
ALTO**

Introduction to

Regional Water Quality Control Plant

July 1, 2025

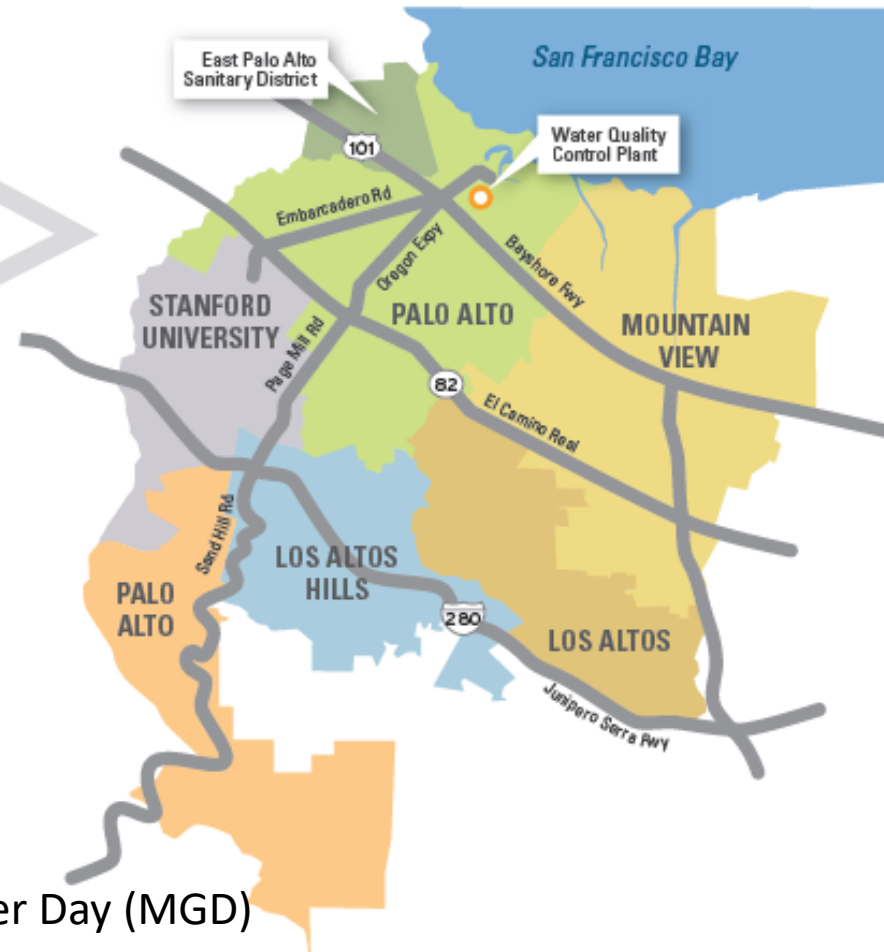
www.paloalto.gov



Regional Water Quality Control Plant Background Information

The Regional Water Quality Control Plant is operated by the City of Palo Alto and is a partnership among:

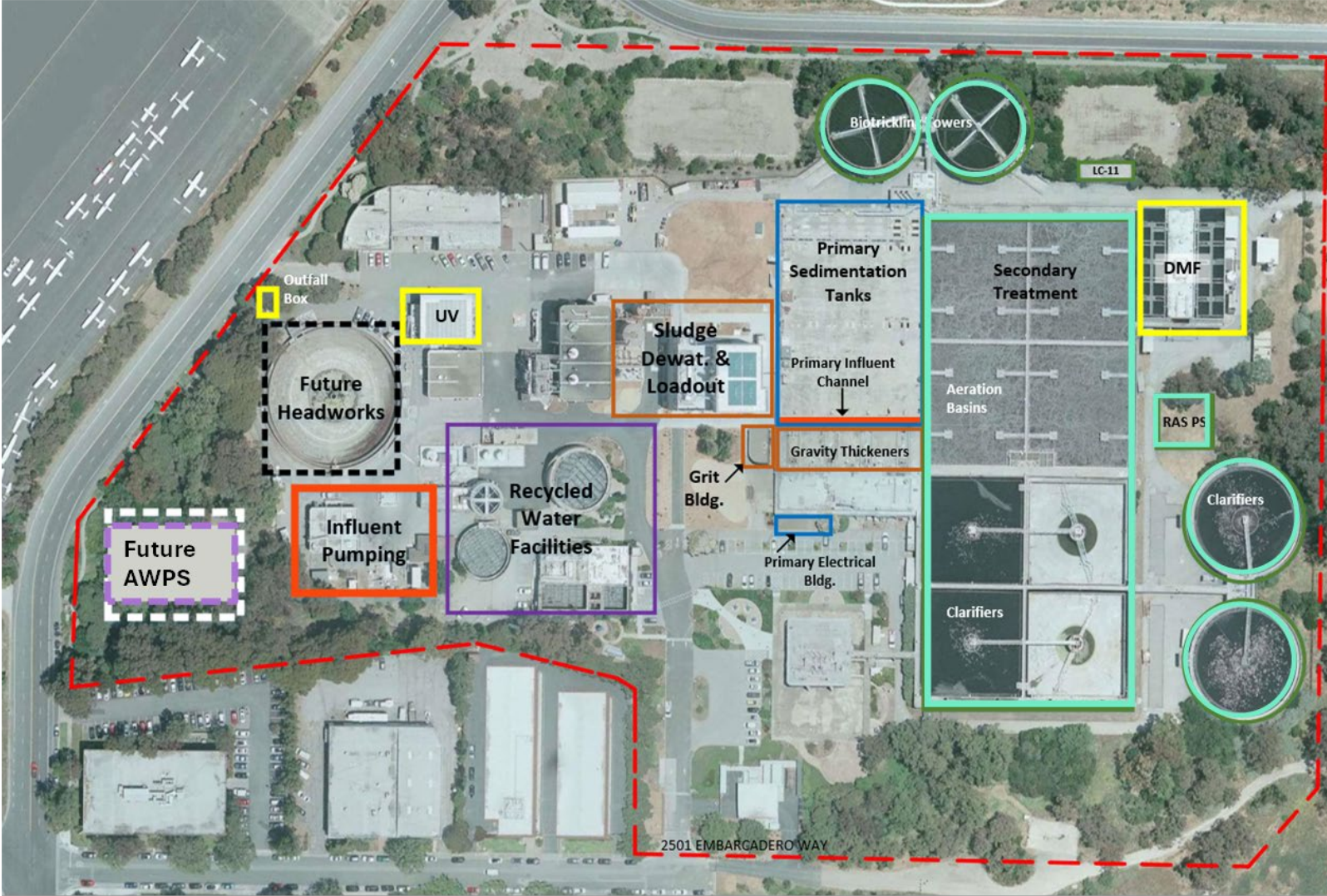
- East Palo Alto Sanitary District
- Los Altos
- Los Altos Hills
- Mountain View
- Palo Alto
- Stanford University



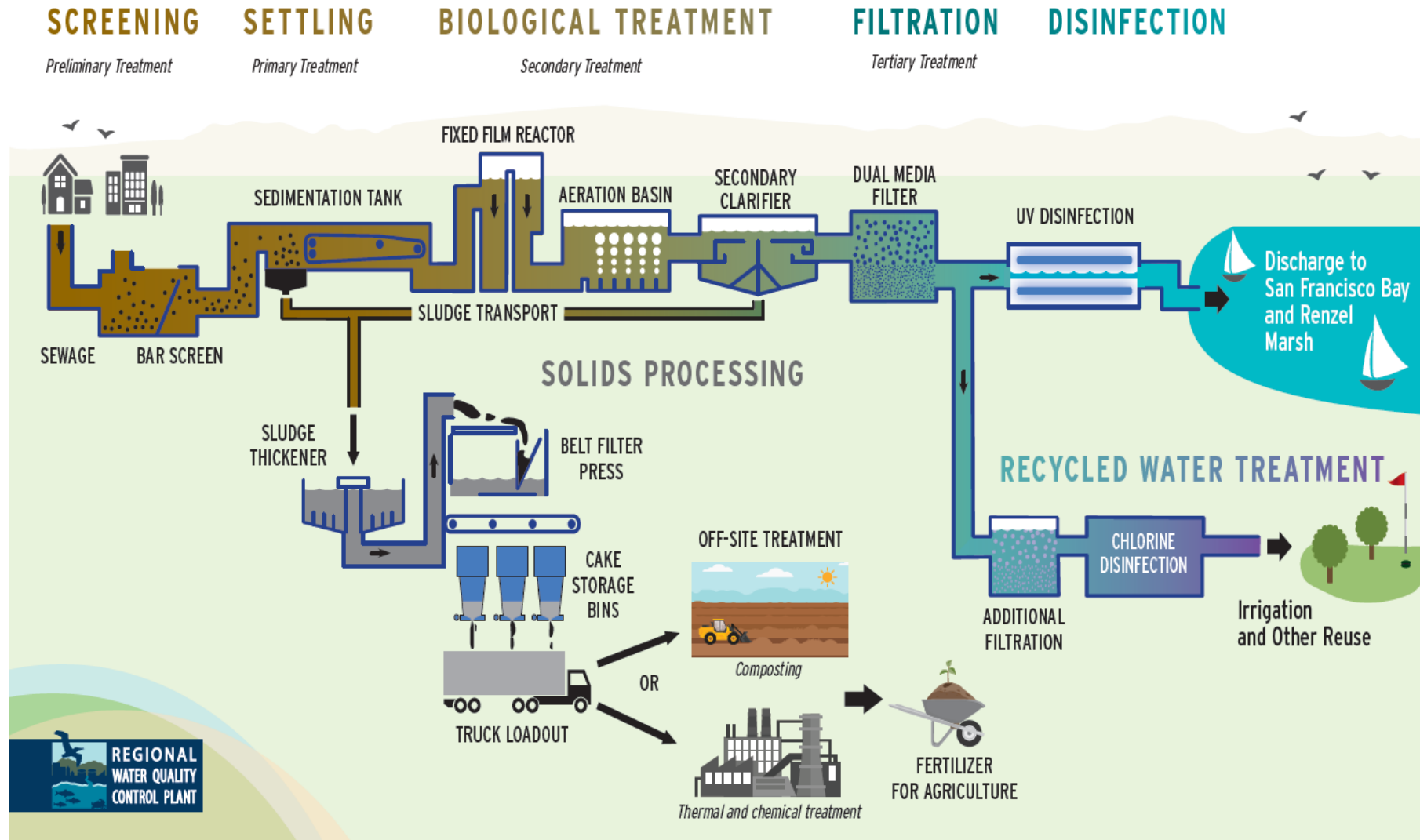
- Plant's permitted dry weather capacity: 39 Million Gallons Per Day (MGD)
- Wet weather capacity: 80 MGD
- 2024 average dry season flow: 19 MGD (May – October)

Ongoing Capital Improvement Program

Project	Status	Cost (Mil)
Primary Sedimentation Tanks Rehabilitation	Construction Completed 2024	\$16.5
Secondary Treatment Upgrades	Construction	\$193.0
12 kV Loop Rehabilitation (Phase 1 + 2)	Construction	\$13.5
Advanced Water Purification System	Construction	\$59.9
Headworks	Pre-Design	~\$100
Outfall Pipe Construction and Rehabilitation	Design	~\$17.8
Joint Interceptor Sewer Rehab (Phase 1)	Construction	\$8.9



Wastewater Treatment Process



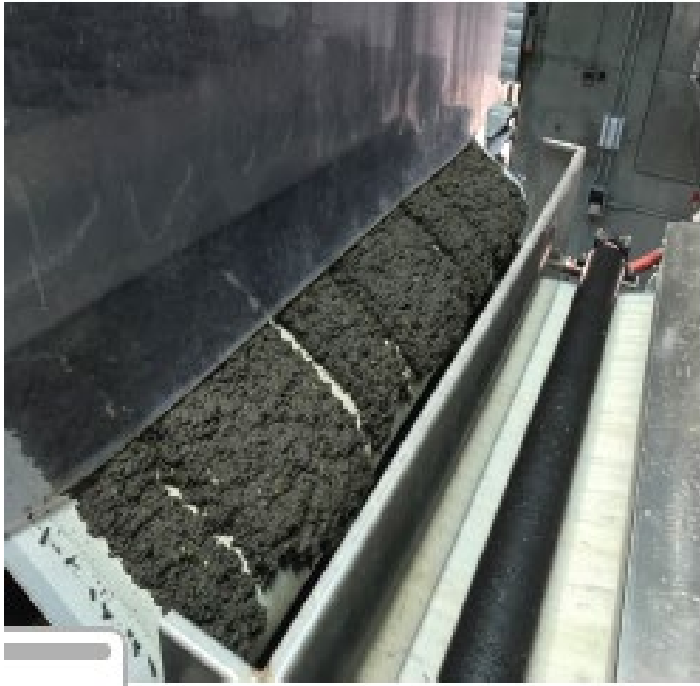


CITY OF
**PALO
ALTO**

Current Biosolids Management

Regional Water Quality Control Plant

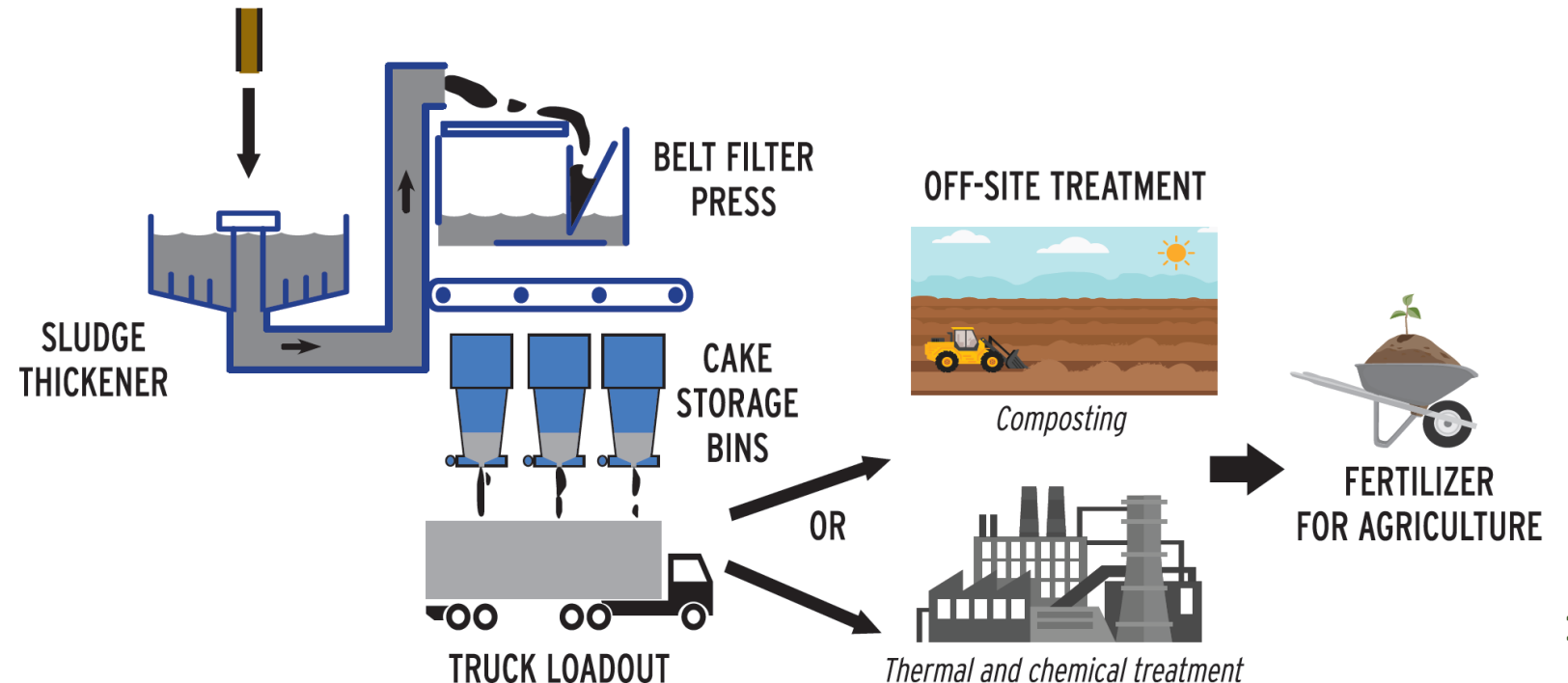
Current Solids Onsite Processes, Off-Site Hauling and Treatment



**Dewatered Biosolids
(Sludge Cake) from
Belt Filter Press**

Solids Become Compost/Fertilizer

- Solids are removed from wastewater, thickened, blended to a uniform size and dewatered on a belt filter press
- These “sludge cake” are emptied into cake storage bins for trucks to haul offsite for composting, or for thermal and chemical treatment
- All biosolids are ultimately used as an agricultural soil amendment





CITY OF
**PALO
ALTO**

Overview of Biosolids Facility Plan Update

Regional Water Quality Control Plant

Biosolids Facility Plan Update – 30-Year Strategy

Purpose of Project:

Evaluate long-term options for biosolids treatment, handling, and reuse and guide infrastructure investments through 2055

Past Studies:

- 2012 Long Range Facility Plan
- 2014 Biosolids Facility Plan
- 2019 Biosolids Facility Plan Update

Why It Matters:

- Supports future upgrades to biosolids treatment
- Ensures efficient, sustainable, and regulatory compliant operations
- Aligns with the City's infrastructure and environmental goals

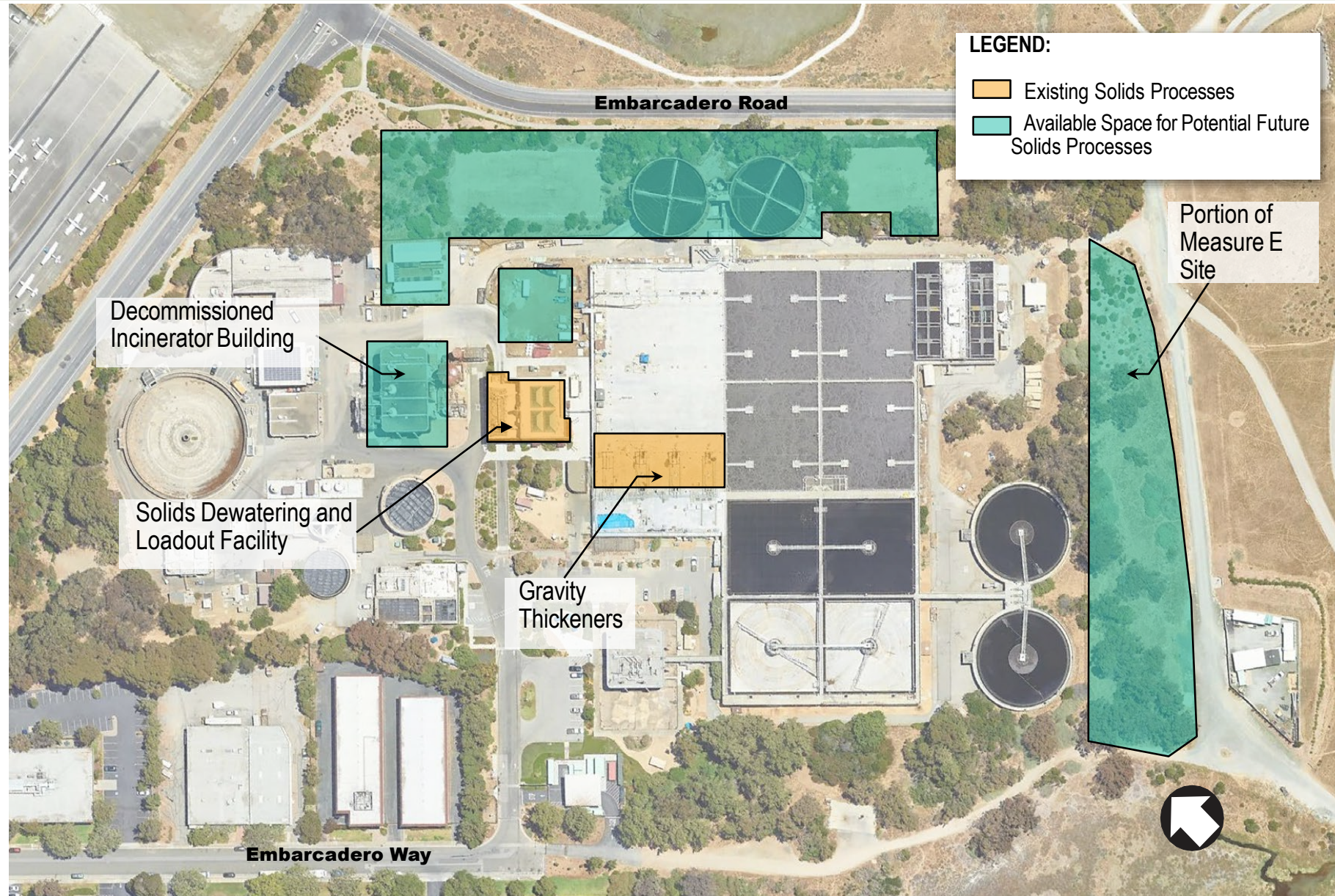




Changes Since LRFP and BFP Updates

1. New Dewatering Facility and decommissioning of Incineration Facility since 2019
2. Increased off-site sludge hauling and treatment services cost
3. New and potential regulations
4. Further development of emerging technologies and availability of potential regional partnership opportunities
5. Nutrient Watershed Permit
 - Increased future waste activated sludge production after Secondary Treatment Upgrade implementation
6. Council asked staff to evaluate if part of Measure E site (former parkland) should be used for biosolids facilities

Potential Sites for Biosolids Treatment Alternatives





CITY OF
**PALO
ALTO**

Biosolids Technologies and Alternatives

Regional Water Quality Control Plant

July 1, 2025

www.paloalto.gov

All Biosolids Technologies Considered

	Biosolids Technology
0	Current Practice: Dewater and Haul Off-site
1	Mesophilic Anaerobic Digestion (MAD)
2	MAD with recuperative thickening
3	Thermophilic anaerobic digestion (TAD)
4	MAD with Thermal Hydrolysis Process (THP)
5	Temperature-Phased Anaerobic Digestion (TPAD)
6	Thermochemical Hydrolysis (Lystek)
7	Thermal Drying - Belt
8	Thermal Drying – Rotary Drum
9	Thermal Drying - Electric
10	Greenhouse Solar Drying
11	Greenhouse Solar Drying with Supplemental Heating
12	Composting – Covered Aerated Static Pile
13	Composting – In-vessel
14	Drying + Pyrolysis
15	Drying + Gasification

Reasons for Exclusion:

- Insufficient space on-site
- Operational complexity
- Lack of proven technology or track record
- Safety concerns for staff

**Technology highlighted in green will be considered for detailed evaluation*

Proposed On-site Alternatives for Detailed Evaluation

Mesophilic Anaerobic Digestion (MAD)



MAD with Thermal Hydrolysis Process (THP)



Thermochemical Hydrolysis



Drying + Pyrolysis



Mesophilic Anaerobic Digestion (MAD)

What is MAD?

- Similar to our digestive systems, MAD uses natural microbes, in the absence of oxygen, to break down organic waste at moderate temperatures (~35°C). The result? Digester gas and Biosolids!

Benefits

One of the most used processes to treat wastewater solids

Relatively easy to operate and maintain

Produces energy-rich digester gas and Class B biosolids

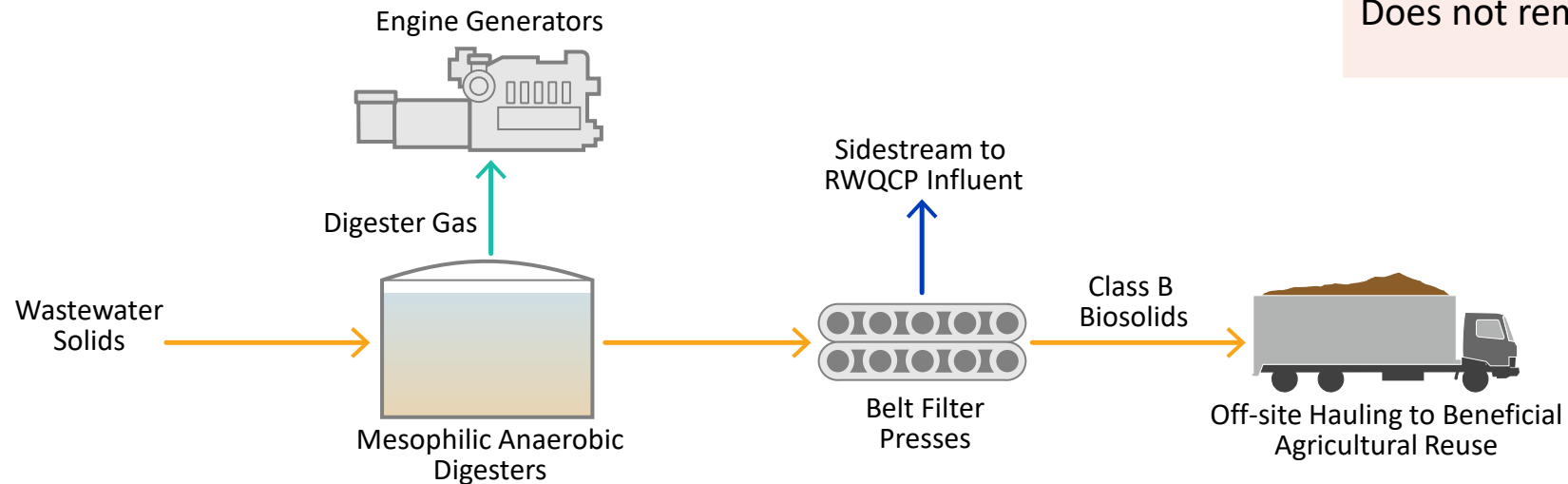
Challenges

Higher capital cost than current operation

More complex to operate and maintain than current operation

Produces ammonia-rich sidestream

Does not remove PFAS



MAD with Thermal Hydrolysis Process (THP)

What's different from MAD?

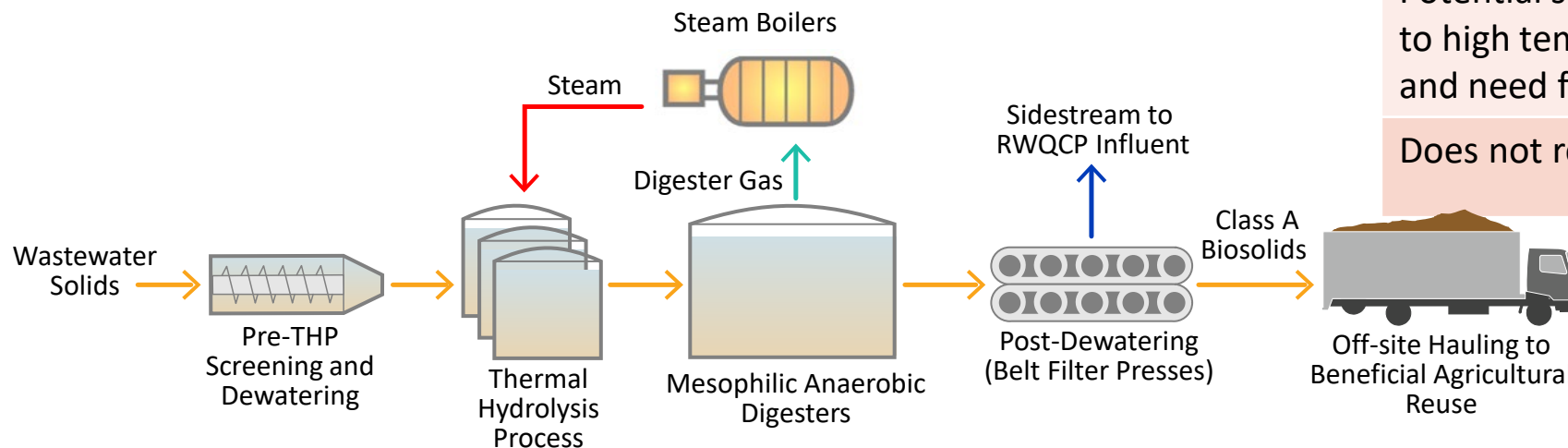
- Before digestion, solids are broken down using Thermal Hydrolysis Process (THP). THP “pressure-cooks” the solids, making them easier for microbes to digest – leading to more digester gas production.

Benefits

- Produces more digester gas
- Produces drier biosolids, reducing hauling costs
- Produces Class A biosolids, which can be used without restrictions

Challenges

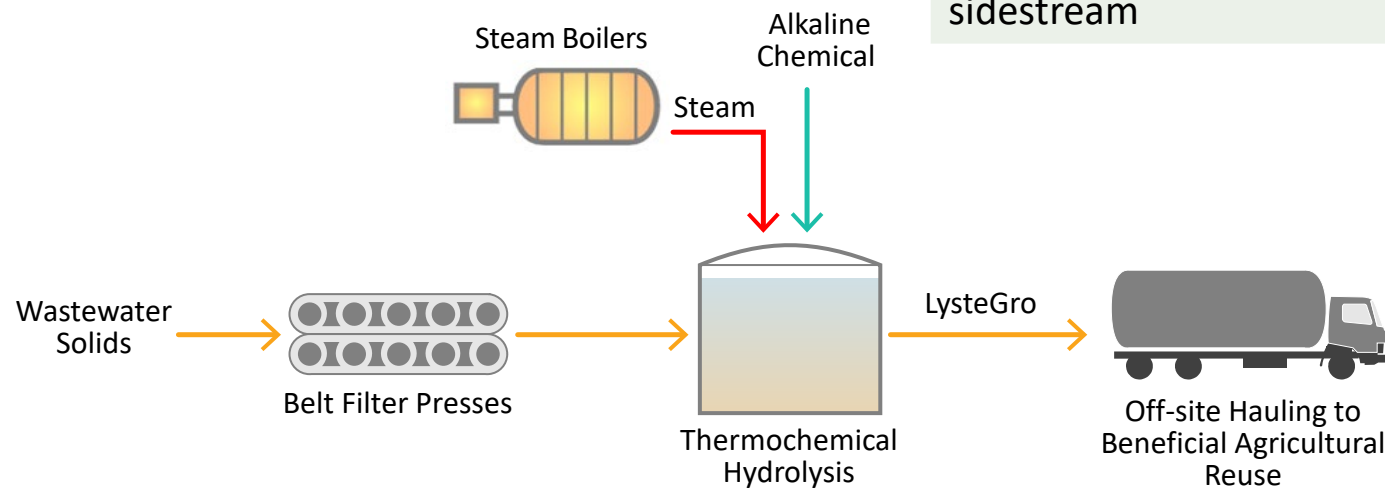
- Higher capital cost than current operation
- Much more complex to operate and maintain than MAD
- Produces more ammonia-rich sidestream than MAD
- Potential safety concerns related to high temperature, pressure, and need for steam
- Does not remove PFAS



Thermochemical Hydrolysis

How does it work?

- The process breaks down solids by using alkaline chemicals, steam, and fast mixing. This cracks open microbial cells, creating a liquid Class A Biosolids product certified in California as a fertilizer.



Benefits

- Relatively easy to operate and maintain
- Small footprint
- Produces Class A biosolids, which can be used without restrictions
- Does not produce ammonia-rich sidestream

Challenges

- Higher capital cost than current operation
- More complex to operate and maintain than current operation
- High chemical use and cost
- Produces a liquid product which increases hauling costs and truck traffic
- Few installations at WWTPs
- Does not remove PFAS

Drying + Pyrolysis

How does it work?

- Solids are first dried and then heated in a pyrolysis unit at 900-1,500°F with no oxygen. This converts the solids into biochar, a product similar to small bits of barbecue charcoal, that can be used in agriculture or other uses like concrete additive.

Benefits

Drastically reduces the amount of product (biochar), resulting in minimal hauling costs and truck traffic

Produces biochar and syngas

Does not produce ammonia-rich sidestream

May remove some PFAS from the biochar

Challenges

Very few installations at WWTPs

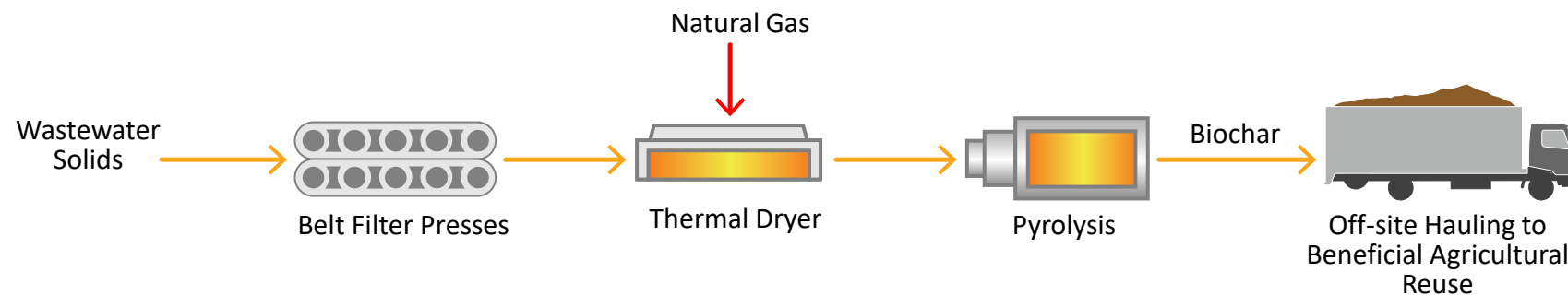
History of operational issues that impact reliability

Highest capital cost

High natural gas use

Less nutrients in biochar relative to other biosolids products

Some PFAS may end up in exhaust or condensate



Proposed Off-Site Alternatives for Detailed Evaluation

Base Alternative:

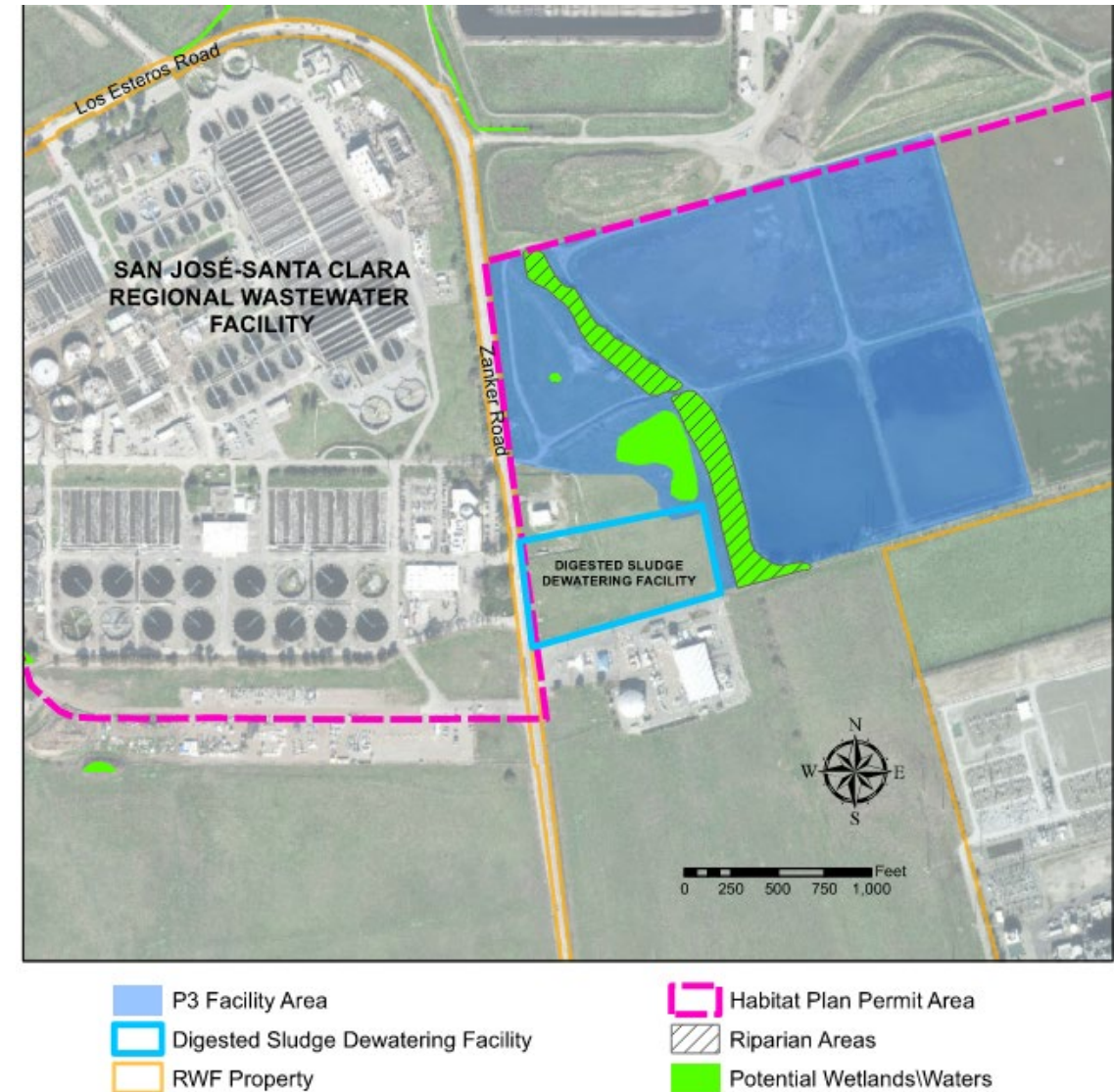
Continue with Current Practice

- Sludge hauling contract with Synagro WWT, Inc.
- Offsite treatment at 2 regional treatment facilities:
 - Synagro Central Valley Composting Facility
 - Lystek Solano County Facility

Alternative for Consideration:

Biosolids Facility at the San José-Santa Clara Regional Wastewater Facility

- To be delivered via a Public-Private Partnership (P3), which may accept biosolids from regional agencies
- Private partner to process biosolids into fertilizer product using commercially proven technology (*to be determined*)
- May require additional treatment at RWQCP to meet minimum quality requirements





CITY OF
**PALO
ALTO**

Community Input Activity

Group Polling Exercise

July 1, 2025

www.paloalto.gov

Group Polling Exercise – Create a Word Cloud Together!

1. Scan the QR Code or go to www.menti.com

- If applicable, enter the code: **5329 2058**

2. Type in a word or short phrase to help us understand:

“What should the Regional Water Quality Control Plant consider when evaluating biosolids technologies?”

4. **SUBMIT!**

5. Watch the **word cloud grow** in real time!



<https://www.menti.com/al2ykmqдно1n>



CITY OF
**PALO
ALTO**

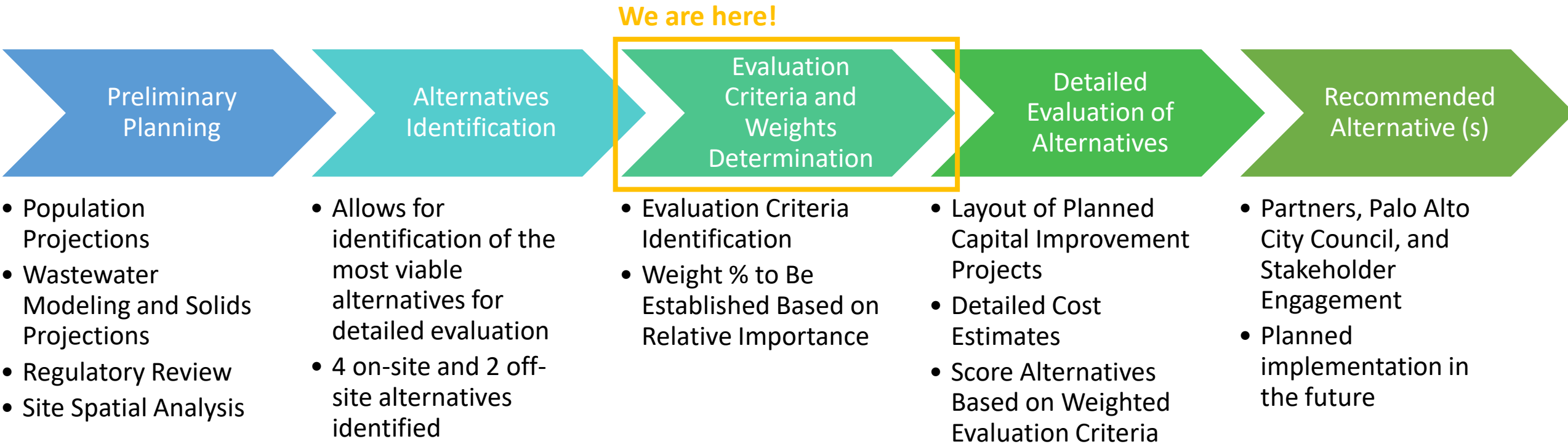
Biosolids Alternatives Evaluation Process

Regional Water Quality Control Plant

July 1, 2025

www.paloalto.gov

Biosolids Alternatives Evaluation Process



Evaluation Methodology - Example

Alternatives	Example Criteria		
	Proven Technology Performance	O&M Complexity	Community Impacts
Alternative A	3	3	3
Alternative B	3	4	4
Alternative C	1	3	3
Alternative D	5	5	2

***Example scoring – actual scoring of alternatives has not been performed yet.*

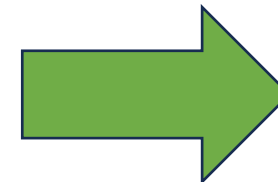
Example Final Weighted Score Calculation for Alternative C:

$$\begin{aligned}
 &\text{Tech} + \text{O\&M} + \text{Comm} = \\
 &1 * 55\% + 3 * 30\% + 3 * 15\% = 1.9 \\
 &0.55 + 0.9 + 0.45 = 1.9
 \end{aligned}$$



Example Weights

Criteria	Weight
Proven Technology Performance	55%
O&M Complexity	30%
Community Impacts	15%



Final Weighted Scores

Alternatives	Weighted Score
Alternative A	3.00
Alternative B	3.45
Alternative C	1.90
Alternative D	4.55

Review of Previous Evaluation Criteria

2012 Long Range Facility Plan:

1. Cost
2. Energy Use
3. GHG Emissions

2014 Biosolids Facility Plan Update:

1. Technical viability and reliability
2. Potential impacts on and benefits for the community and environment
3. Capital and O&M costs
4. Potential for revenue generation
5. Potential for other benefits and incentives

2019 Biosolids Facility Plan Update:

- Monetary (Costs)
- Quantitative:
 1. Net Energy Consumed
 2. GHG Emissions
 3. Onsite Facilities Footprint
- Qualitative:
 1. Beneficial Use of Biosolids
 2. Risk/Technology Maturity
 3. Level of O&M Complexity
 4. Local Control
 5. Community Impacts

Staff Proposed Evaluation Criteria and Weights

Evaluation Criteria		Description	Weights (%)
Financial	1) Net Present Value (NPV)	Considers capital, lifecycle, and O&M costs	25
Non-Financial	2) Proven Technology Performance	Technology maturity, track record, number of installations, vendor availability	11
	3) Environmental Impacts	GHG emissions, energy use, emerging contaminants, etc.	14
	4) Footprint, Site impacts, and Constructability	Area footprint, construction complexity, site disruption, etc.	9
	5) Treatment Plant Process Impacts	Effects on liquids process treatment due to return flows	11
	6) Operations & Maintenance Impacts	Ease of operation, maintenance effort, parts/vendor access, training requirements, etc.	14
	7) Community Impacts	Noise, odor, traffic, aesthetics, public acceptance, etc.	6
	8) Regulatory Resilience	Future flexibility to comply with upcoming regulations	10



CITY OF
**PALO
ALTO**

Community Input Activity

Small Group Exercise

July 1, 2025

www.paloalto.gov

Small Group Discussion Questions

1. **Review and Discuss** each of the eight evaluation criteria

2. **Questions for Discussion:**

1. Which is the most important criteria to you?
2. Is the relative weight percentage too high or too low?
3. Would the group like to change or modify any of the evaluation criteria?

The GROUP FACILITATOR will take notes and summarize the group's feedback to share with the larger group during debrief



CITY OF
**PALO
ALTO**

Recap/Next Steps

Regional Water Quality Control Plant

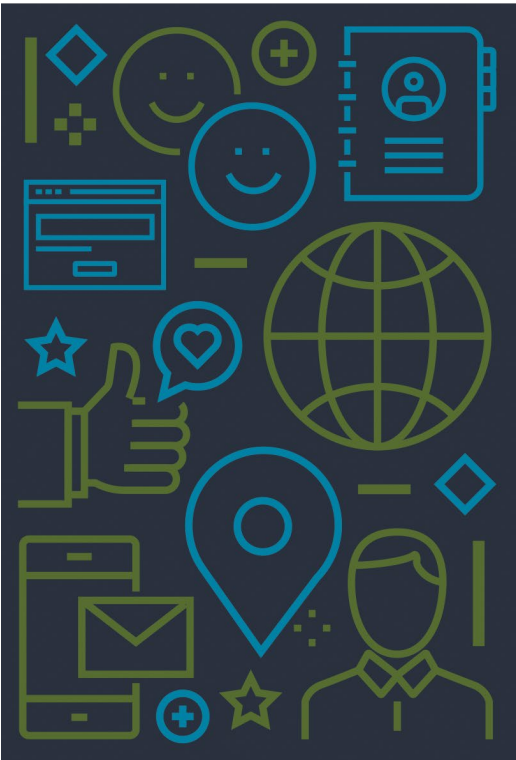


Potential Future Opportunities for Engagement

- Climate Action & Sustainability Committee (Fall 2025)
 - Present short list of top biosolids processing technologies
 - Share preliminary results of evaluation of alternatives
- City Council for Acceptance of Biosolids Facility Plan Update (2026)



CONTACT US



Tina Pham, P.E.

Senior Engineer

tina.pham@palloalto.gov

(650) 407-3024

Connie Li, Ph.D., P.E.

Project Engineer

connie.li@palloalto.gov

(650) 329-2238