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# Biosolids Input Workshop

## Regional Water Quality Control Plant

May 20, 2025

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# Welcome & Introductions

City of Palo Alto

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

Woodard & Curran

- Greg Sands, Program Manager

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

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# Introduction to

## Regional Water Quality Control Plant

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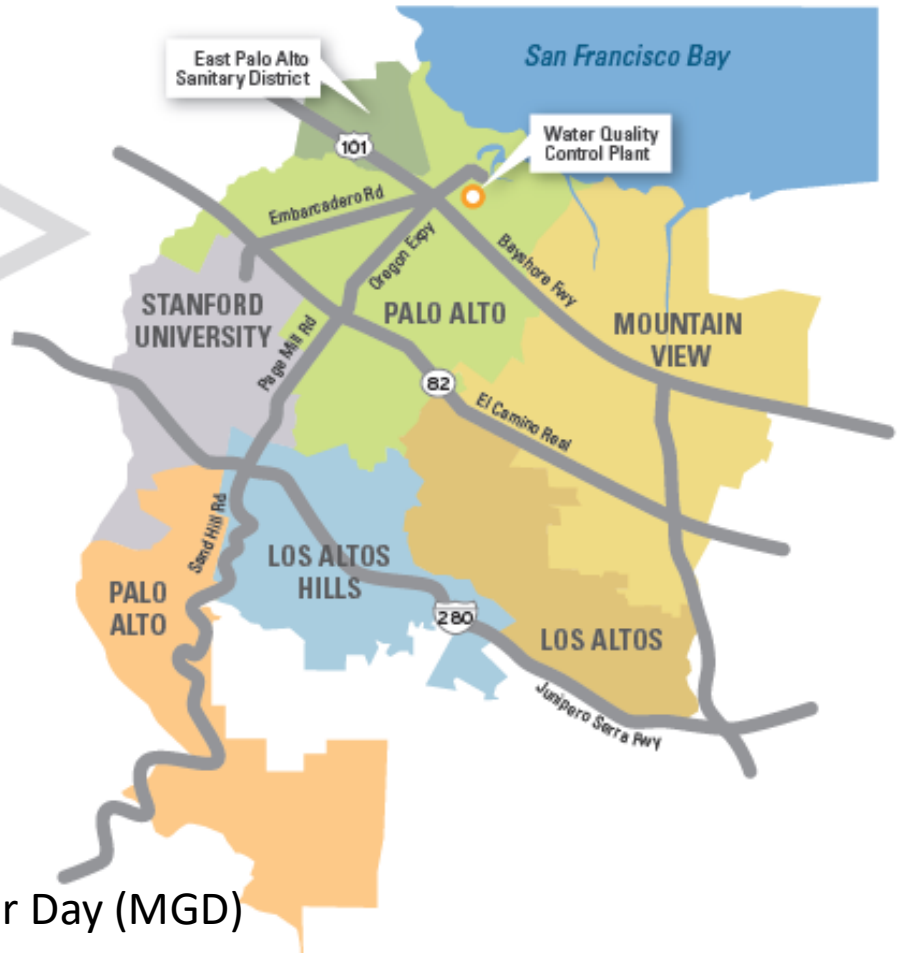
# Regional Water Quality Control Plant Background Information

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

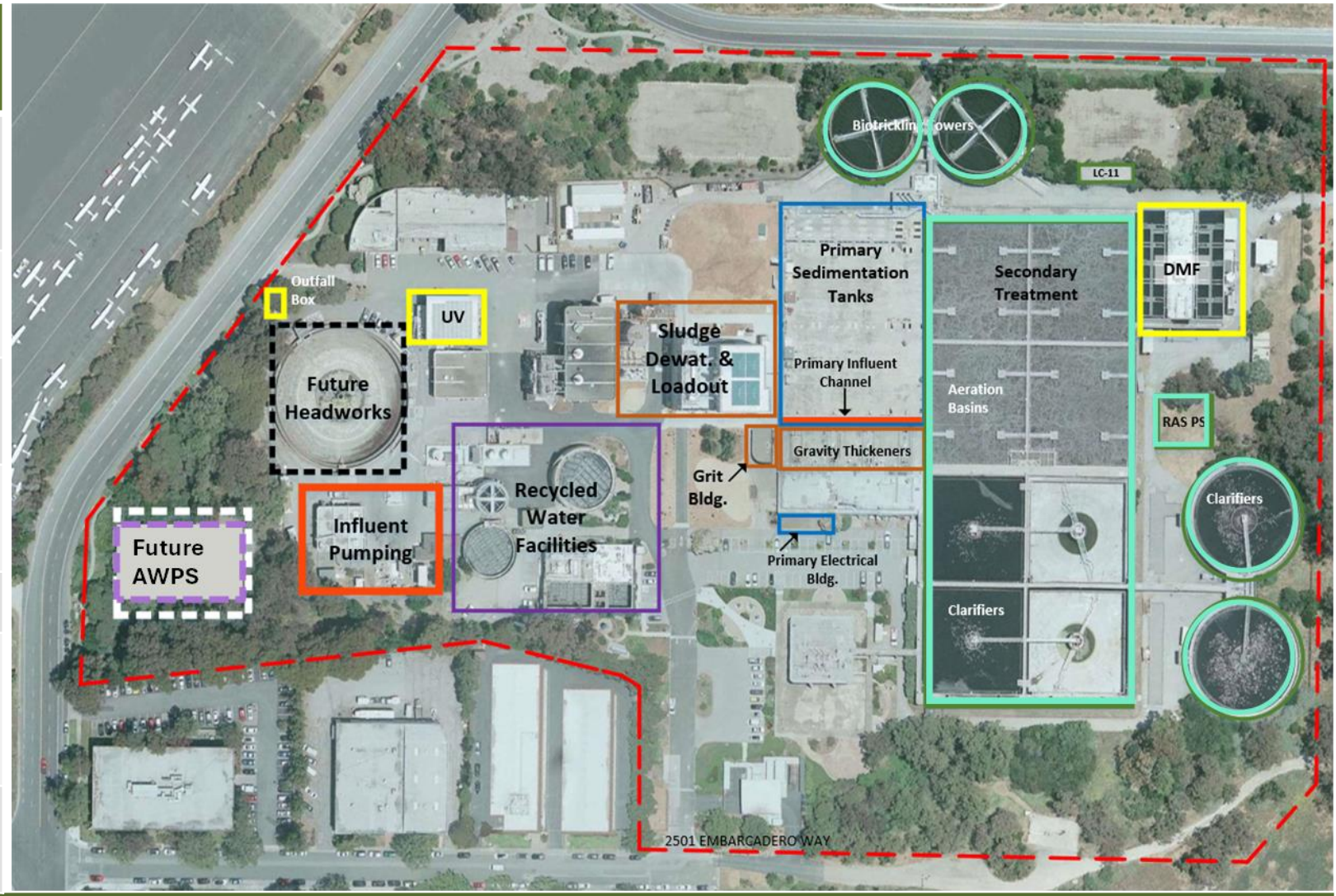
- East Palo Alto Sanitary District
- Los Altos
- Los Altos Hills
- Mountain View
- Palo Alto
- Stanford University



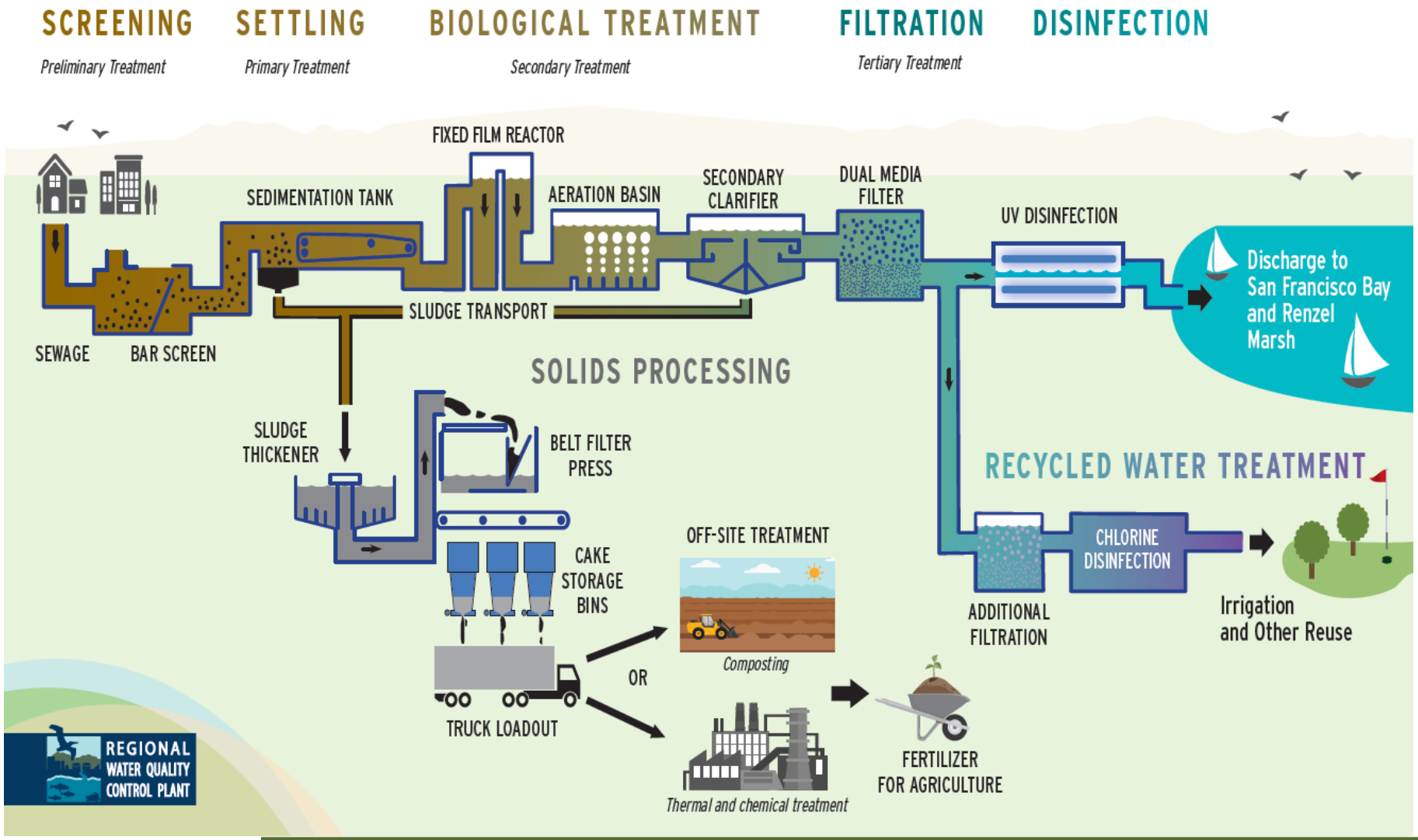

- Plant's permitted dry weather capacity: 39 Millon Gallons Per Day (MGD)
- Wet weather capacity: 80 MGD
- 2024 average dry season flow: 19 MGD (May – October)

# 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



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# Current Biosolids Management

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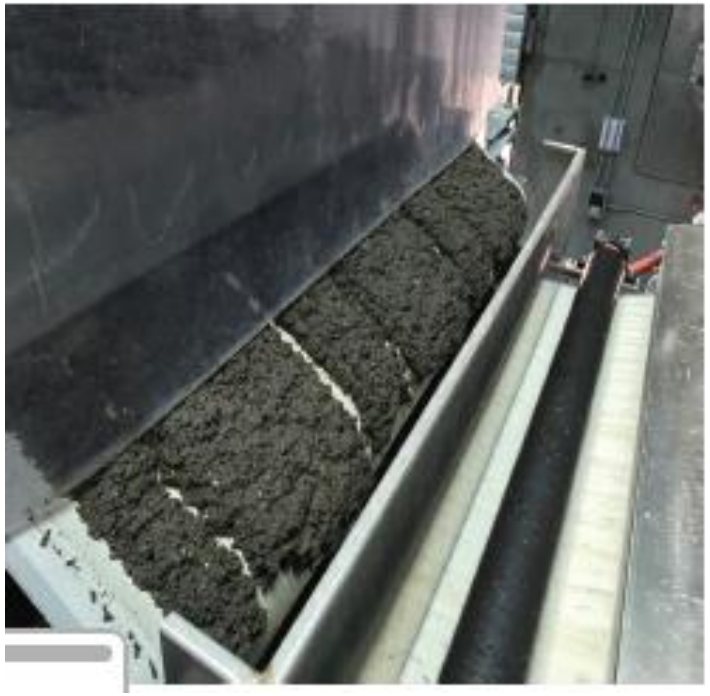
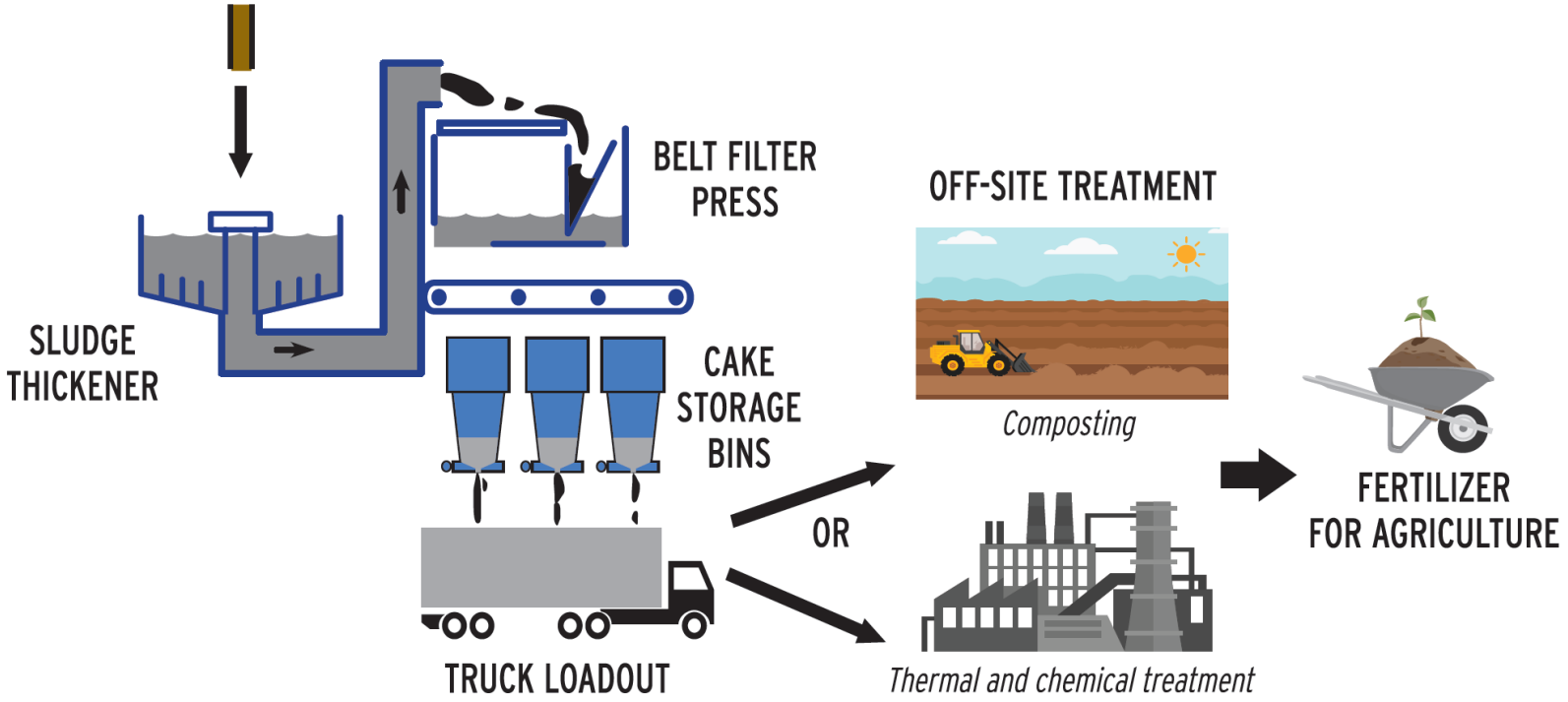
# Current Solids Onsite Processes, Off-Site Hauling and Treatment



**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



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# Overview of Biosolids Facility Plan Update

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# 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

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# Biosolids Technologies and Alternatives

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# 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

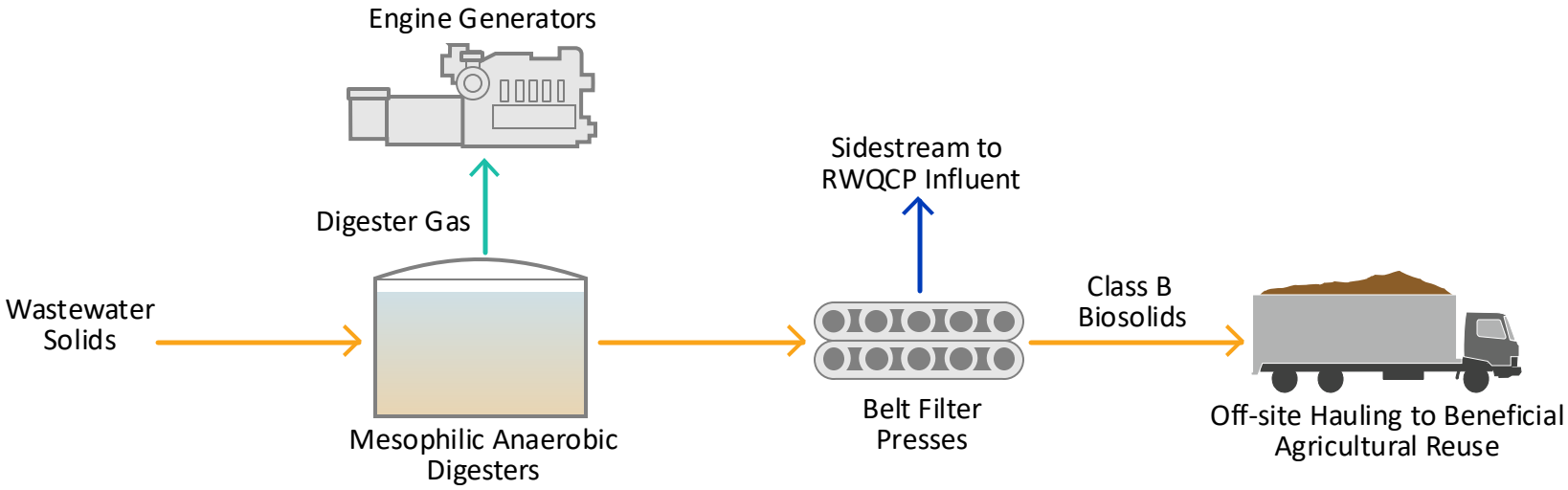
## Drying + Pyrolysis

# 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 | Challenges |
|---|---|
| One of the most used processes to treat wastewater solids | Higher capital cost than current operation |
| Relatively easy to operate and maintain | More complex to operate and maintain than current operation |
| Produces energy-rich digester gas and Class B biosolids | Produces ammonia-rich sidestream |

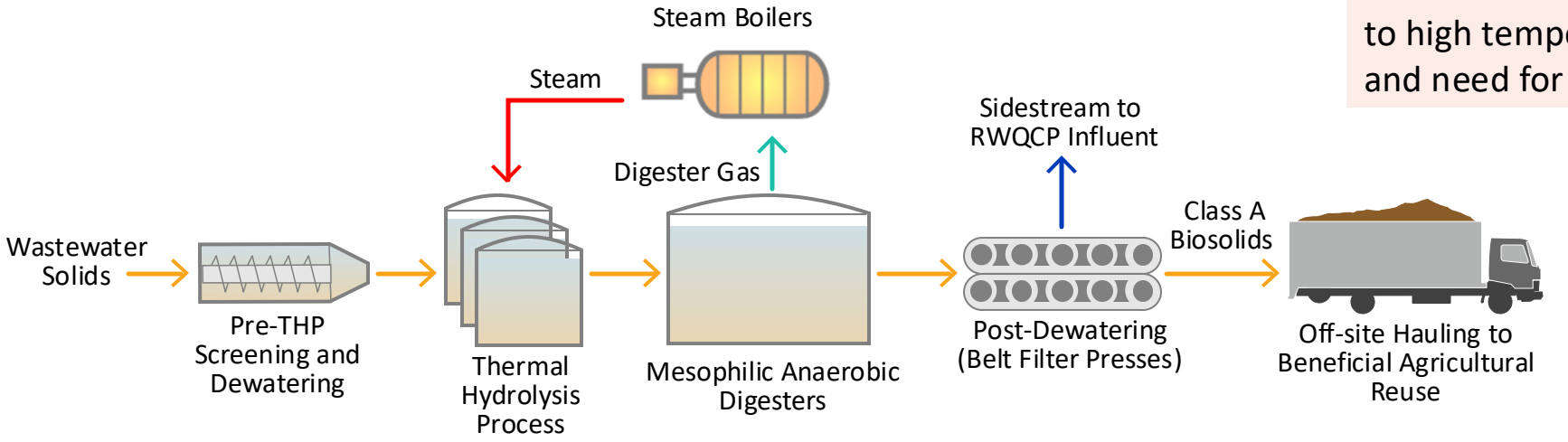


# MAD with Thermal Hydrolysis Process (THP)

## 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 | Challenges |
|---|---|
| Produces more digester gas | Higher capital cost than current operation |
| Produces drier biosolids, reducing hauling costs | Much more complex to operate and maintain than MAD |
| Produces Class A biosolids, which can be used without restrictions | Produces more ammonia-rich sidestream than MAD |
| | Potential safety concerns related to high temperature, pressure, and need for steam |

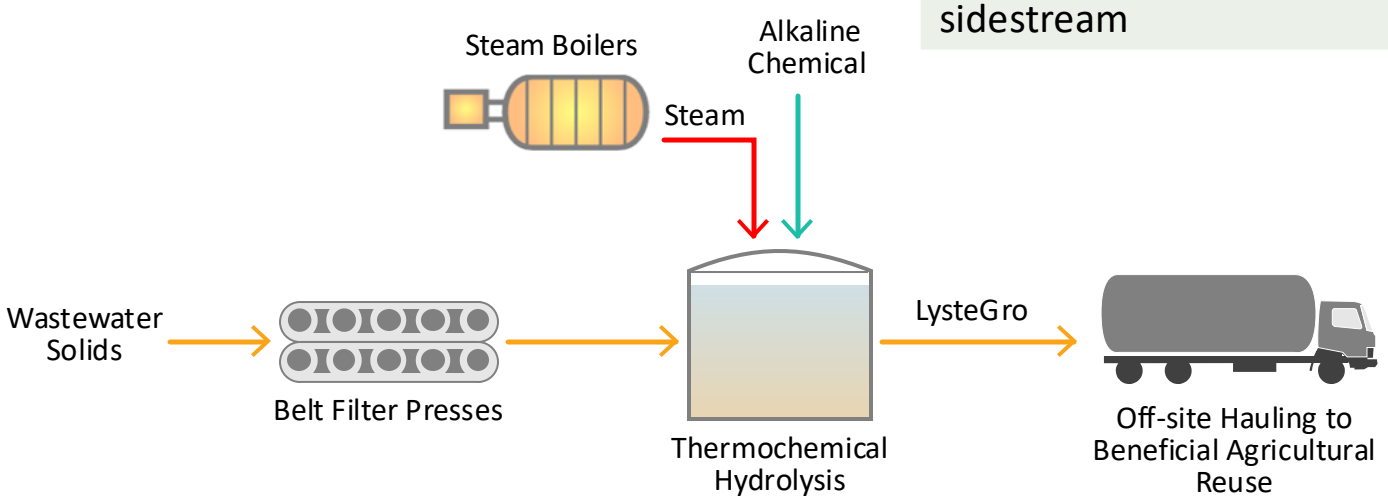


# Thermochemical Hydrolysis

## 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 | Challenges |
|---|---|
| Relatively easy to operate and maintain | Higher capital cost than current operation |
| Small footprint | More complex to operate and maintain than current operation |
| Produces Class A biosolids, which can be used without restrictions | High chemical use and cost |
| Does not produce ammonia-rich sidestream | Produces a liquid product which increases hauling costs and truck traffic |
| | Few installations at WWTPs |



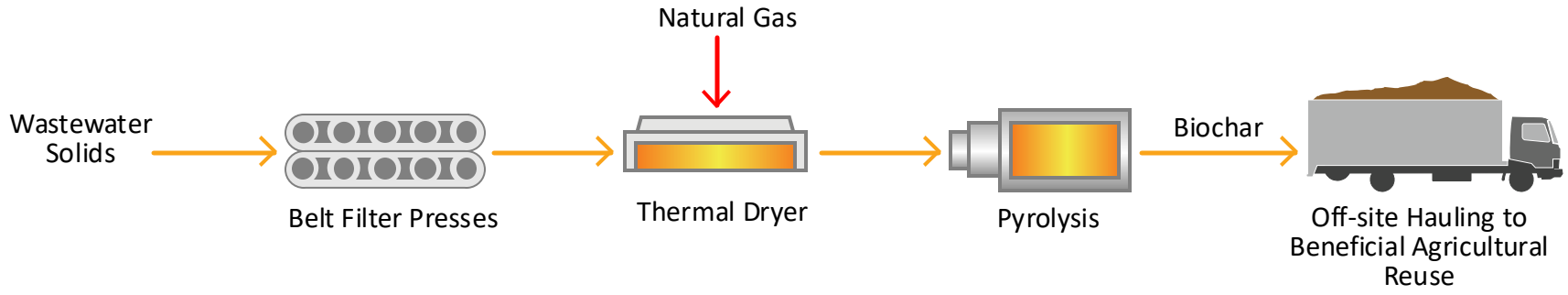
# Drying + Pyrolysis

## 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:

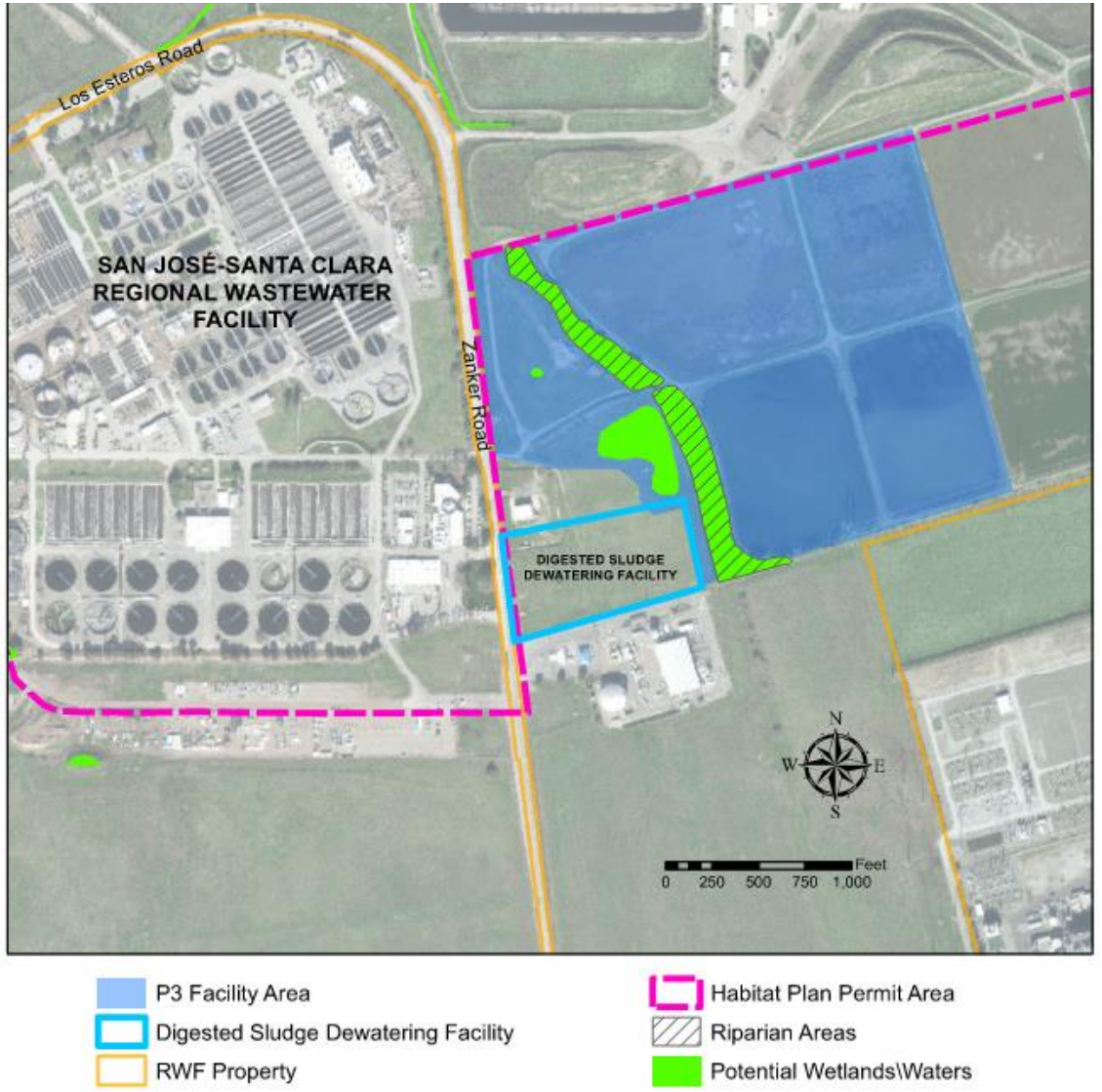
*Continue with Current Practice*

- 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



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# Community Input Activity

## Group Polling Exercise

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# Group Polling Exercise – Create a Word Cloud Together!

1. Scan the QR Code or go to www.menti.com
   - If applicable, enter the code: **5626 3230**
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/al2ykmqdno1n

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# Biosolids Alternatives Evaluation Process

## Regional Water Quality Control Plant

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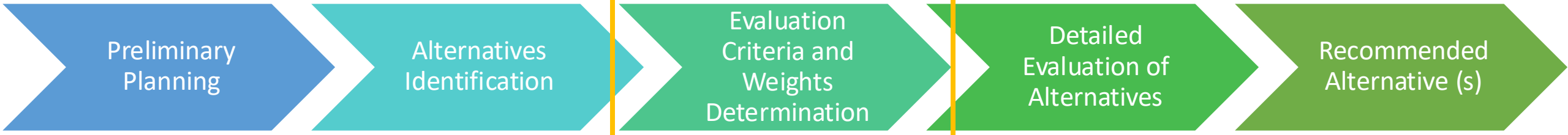
# Biosolids Alternatives Evaluation Process

We are here!




- Population Projections
- Wastewater Modeling and Solids Projections
- Regulatory Review
- Site Spatial Analysis

- Allows for identification of the most viable alternatives for detailed evaluation
- 4 on-site and 2 off-site alternatives identified

- Evaluation Criteria Identification
- Weight % to Be Established Based on Relative Importance

- Layout of Planned Capital Improvement Projects
- Detailed Cost Estimates
- Score Alternatives Based on Weighted Evaluation Criteria

- Partners, Palo Alto City Council, and Stakeholder Engagement
- Planned implementation in the future

# 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:

Tech + O&M + Comm =
1*55% + 3*30% + 3*15% = 1.9
0.55 + 0.9 + 0.45 = 1.9

**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 |

*Criteria in blue font were recommended for current evaluation*

# 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 |

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# Community Input Activity

## Small Group Exercise

# 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 RECORDER/FACILITATOR will take notes and summarize the group's feedback to share with the larger group during debrief**

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# Recap/Next Steps

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# 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


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