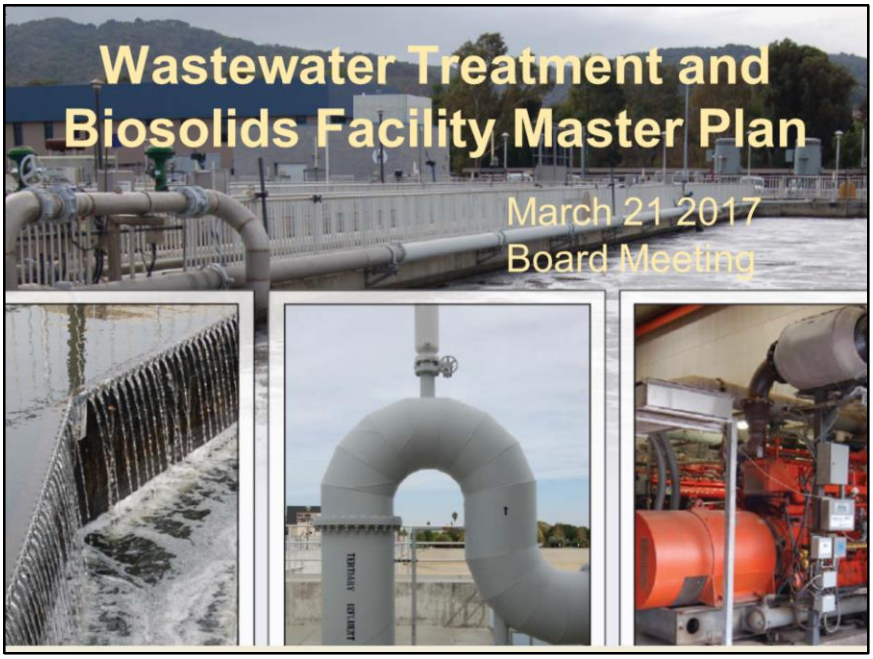
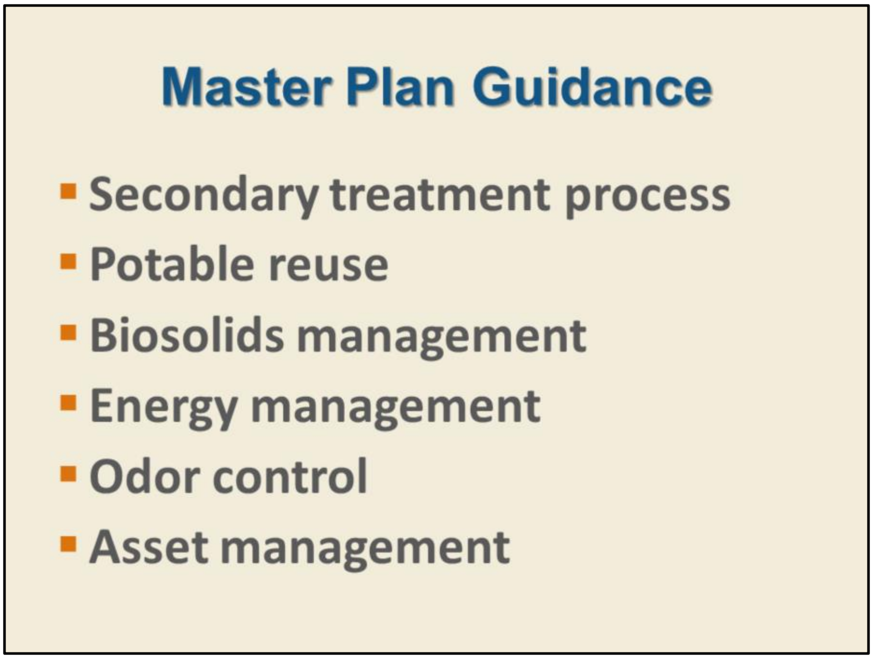


[Speaker: Judy Zavadil, DSRSD Engineering Services Manager and District Engineer.]

Consultant West Yost is very close to completing the draft Wastewater Treatment and Biosolids Facility Master Plan.

Even though it is only draft, I wanted to give you an overview of the Master Plan because it provides background for many of the decisions that will be before the Board in the next month or two, such as the capital improvement budget, the wastewater rate study, and the strategic plan.

I would like to introduce West Yost's project manager's Jeff Pelz and Kathryn Gies. They have done a fantastic job and I am very pleased with the incredibly comprehensive and well organized document they have put together. They are here to answer all the tough questions you may have.



The Master Plan provides guidance on several topics:

- Secondary treatment process – Not only does it provide a plan to mange increasing flows and loads with development, but also for evolving regulations, particularly anticipated limits on nutrient discharges into San Francisco Bay

- Potable reuse - Planning for facilities required for potable reuse, including facilities required for near zero discharge of treated effluent into the bay

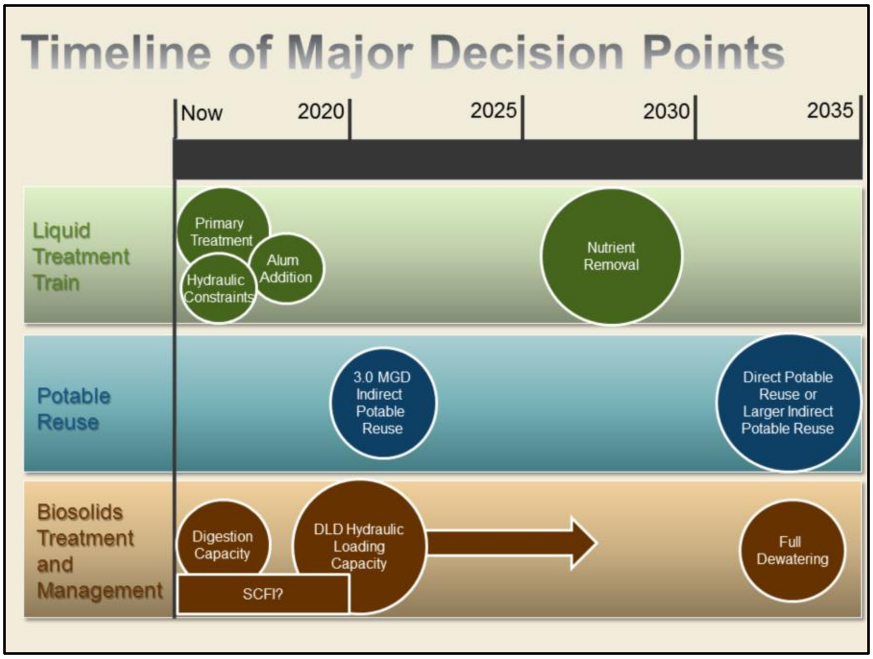
- Biosolids management - Selecting the best long-term options for diversifying existing biosolids management, including the extent of participation in the proposed SCFI/Synagro project

- Energy management - Optimizing energy production and use at the wastewater treatment plant (WWTP), including facilities required for net zero energy use

- Odor control - Maintaining the District's good relationships with the neighbors through effective odor control

- Asset management - Rehabilitating and replacing aging facilities, including the development of an asset management rehabilitation and replacement model for Regional fund assets

- There is a lot of great material here, but can be overwhelming, so I will be covering the first three topics this meeting and last three on April 18.



The Master Plan:

- estimates future treatment plant flows and solids loads
- identifies potential technology and regulatory changes
- charts a course for the next 5-10 years that will address the near-term requirements but keep the District's options open for possible future scenarios.

This graphic shows the three main processes at the treatment plant:

- Liquid treatment train
- Potable reuse, which is beyond our current recycled water program
- Biosolids

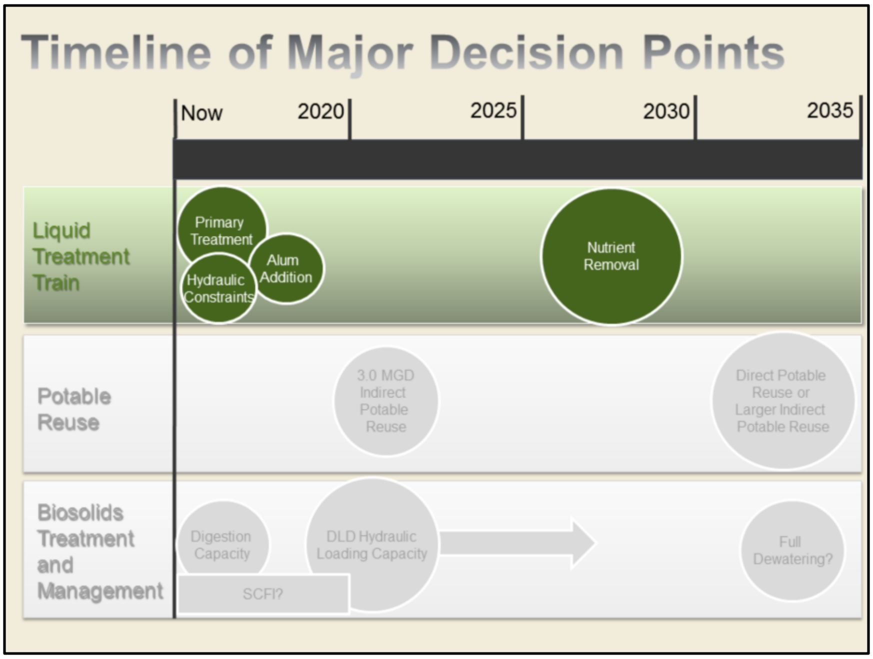
It shows an approximate timeline of major projects in each process. The size of the circles in this graphic indicates the relative cost of the required infrastructure. I will walk you through the process and tell you a little about some of the potential improvements.

Secondary Treatment Process

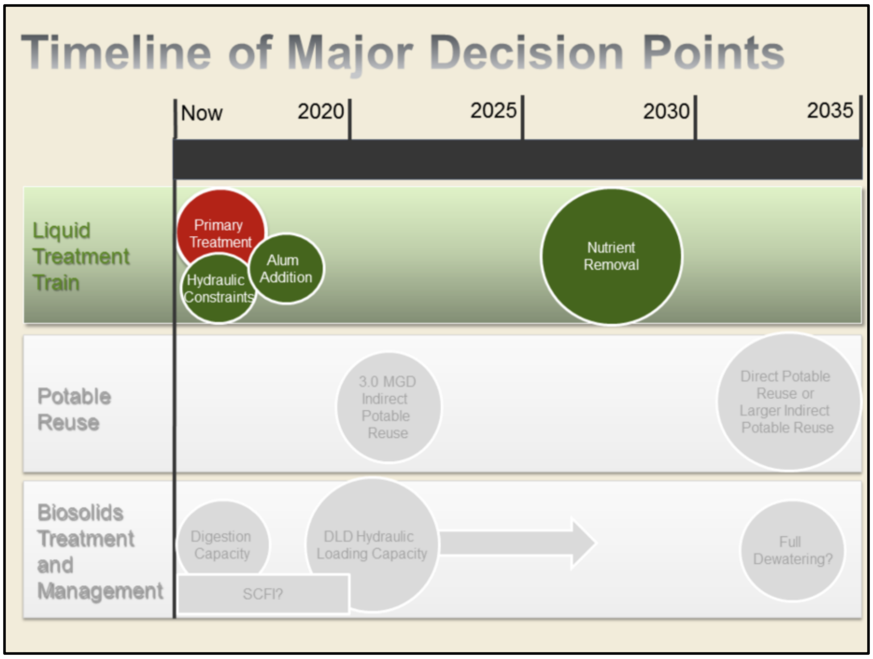
First I will focus on the liquid treatment train, or the secondary treatment process. [Speaker gave quick review of the secondary process.]

North is to the left, Val Vista Park would be at the top of the slide and highway 680 is off the bottom of the slide.

[Speaker identified entrance, administration building, influent, bar screens, influent pumps, grit tanks, primary tanks, aeration, clarifiers, chlorine contact tank.]



There are a few projects that are needed right now under our current flows and loads.



The most significant project is the expansion of our primary treatment capacity.

This project was in the previous master plans and we have anticipated needing it for some time. Actually it was initially included in Stage 4 improvements [2005] but was taken out with the intent to build in the future.

Primary Clarifier Expansion

Our primaries are overloaded.

Our primaries remove 45-55 percent of the total suspended solids; industry standards are closer to 65-80 percent.

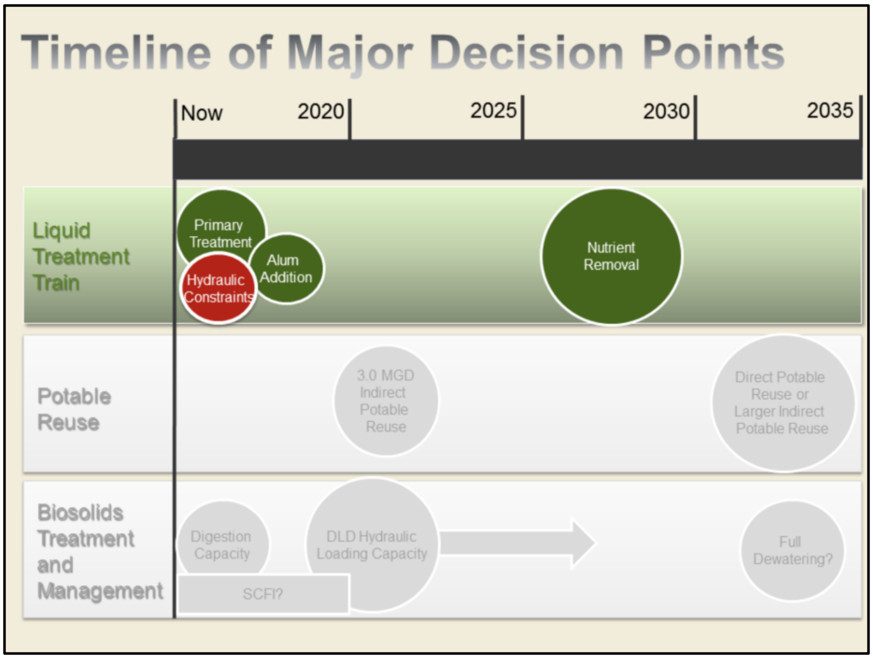
Although we can meet our permit requirements with the current process, it is inefficient.

If you remove solids early in the process, you send more high volatile content solids to the digesters, which will increase methane production. You also reduce the solids that need to be broken down in the aeration process.

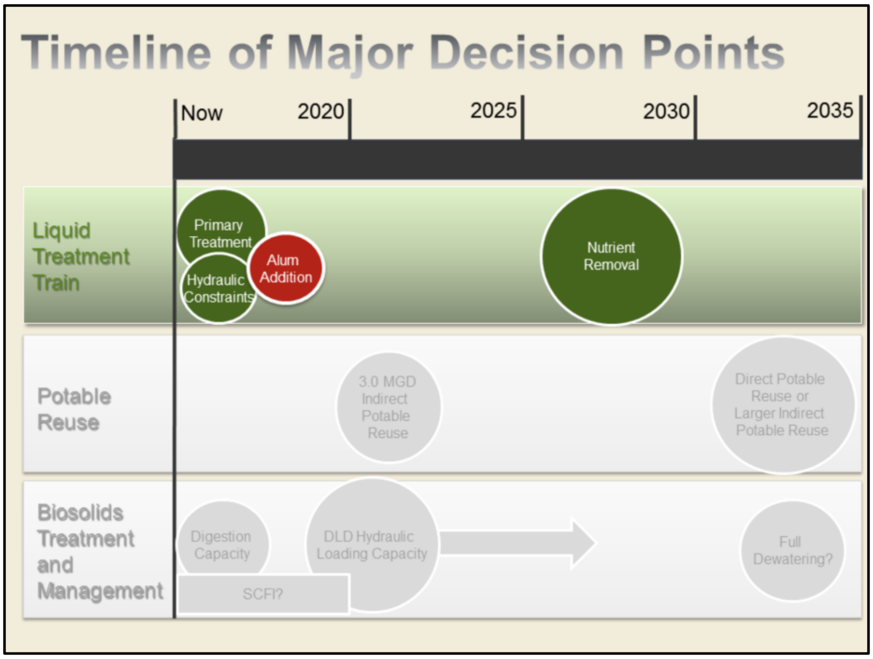
On April 18 when I talk about energy management, you will see that the aeration process is the most energy intensive.

The Master Plan estimates we need two to three additional primaries, depending on the design of the clarifiers and the target removal rate.

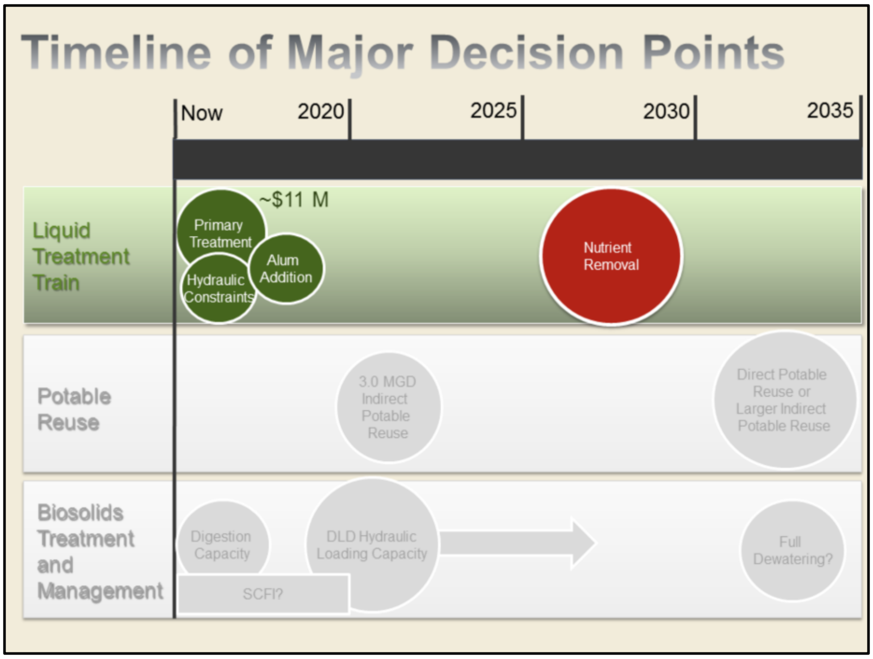
The estimated project cost is $9.6M, which is in current CIP budget. The project has been budgeted for in the past and has been included in past Capacity Reserve Fee studies. The Expansion fund (development fees)n will pay for 89 percent of this project. We have already put out an RFP for design of the primaries and are in the process of selecting a design consultant.



Another current project is eliminating a hydraulic bottle neck. The pipeline and structures between the clarifiers and chlorine contract tank are limited in capacity, which causes peak flows to back up into the clarifiers.

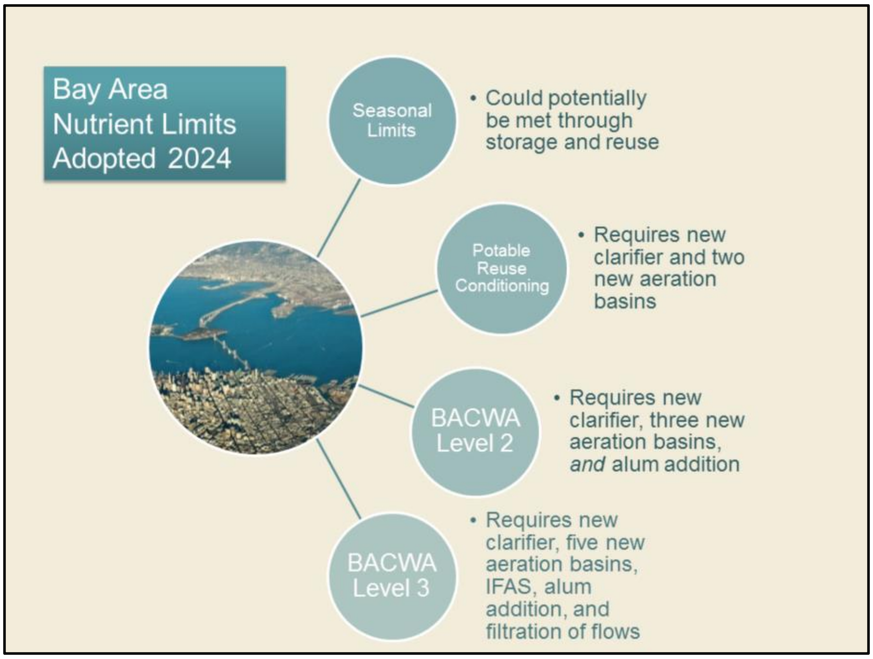


There is another small project which will add Alum to precipitate phosphorus out of water that we return from our Facultative Sludge Lagoons. This project is important in improving our ability to produce a well-settling sludge and better effluent.



So those three projects total about $11 million.

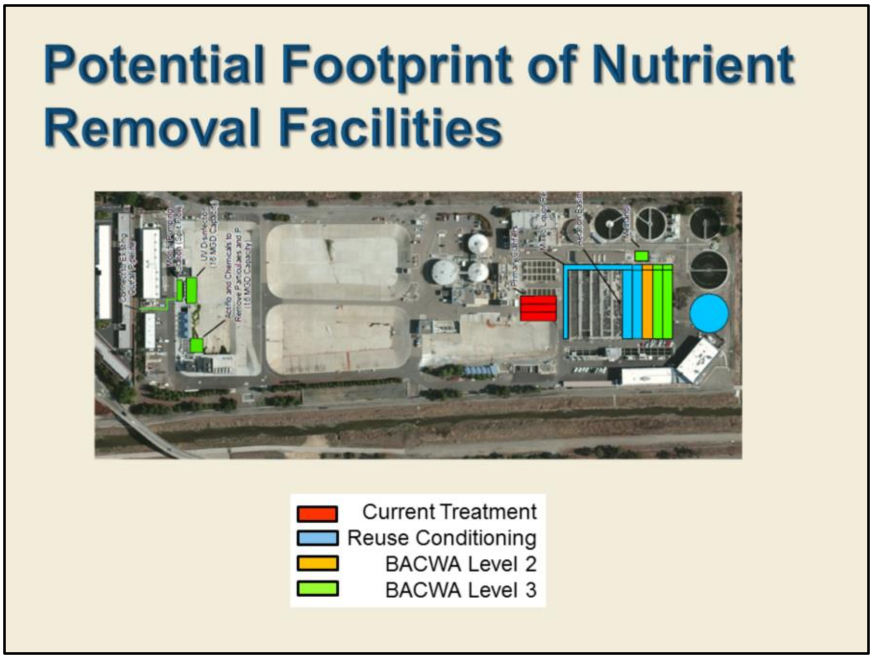
You can see out on the horizon there is a significant potential infrastructure cost related to **potential regulations to remove nutrients (ammonia , nitrogen, phosphorus) from effluent.**



The San Francisco Bay has been relatively resilient to nutrient loading but recently dissolved oxygen has decreased and algal blooms have increased. In response to these changes, the Regional Water Quality Control Board (RWQCB) is considering adding nutrient (ammonia, nitrogen and phosphorus) limits to WWTP discharge permits. The Bay Area Clean Water Agencies (BACWA), a group of 29 agencies of which DSRSD is a member, has been working with the RWQCB to complete studies to determine the appropriate level of nutrient removal by WWTPs. It is anticipated that ultimately effluent nutrient limits will be included in future discharge permits.

To meet these requirements, the District will need additional treatment processes. The Master Plan looked at several possible levels of nutrient removal and associated infrastructure. First is a seasonal limit, which we could possibly meet through our recycled water program since our effluent in the summer goes mostly to irrigation. Next we could make some changes that would reduce nutrients and improve the quality of effluent to a level that would be beneficial for potable reuse. Two levels additional levels are being considered by BACWA and the RWQCB.

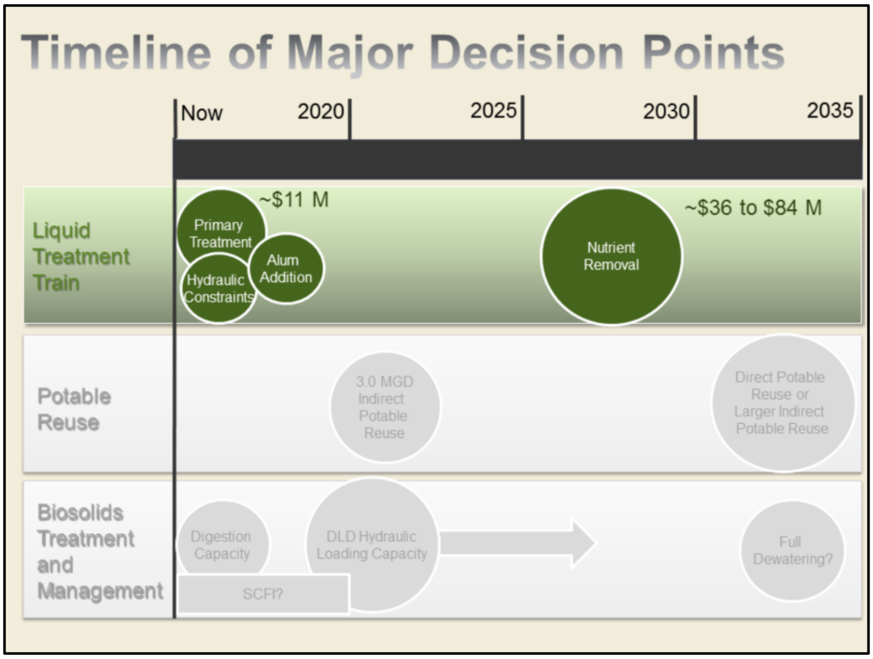
The more removal, the more infrastructure: for Potable reuse: one clarifier and two aerations basins; for BACWA level one: one and three; for BACWA level two: one and five, plus…



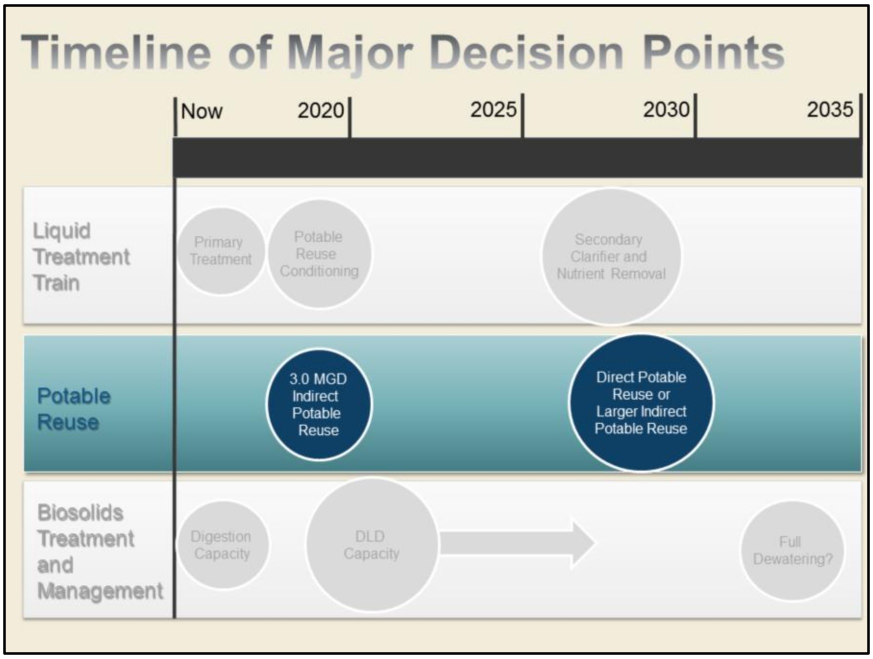
Here is where those potential facilities would be located. Each level of nutrient removal is a different color; **all of these are additions.**

- Red – has the current primaries, this is important to note because having these primaries reduces the loading on the downstream processes.
- Blue - indirect potable water conditioning
- Orange - BACWA Level 1
- Green - BACWA Level 2 - note using the current sand filtration systems in the winter season.

It should be noted that the space planning and cost estimates were based on current proven technology, but there are many research and pilots projects looking into processes for nutrient removal which may be less space- and energy-intensive. Hopefully by the time regulations are put in place, there will be opportunities to reduce capital and operating costs.



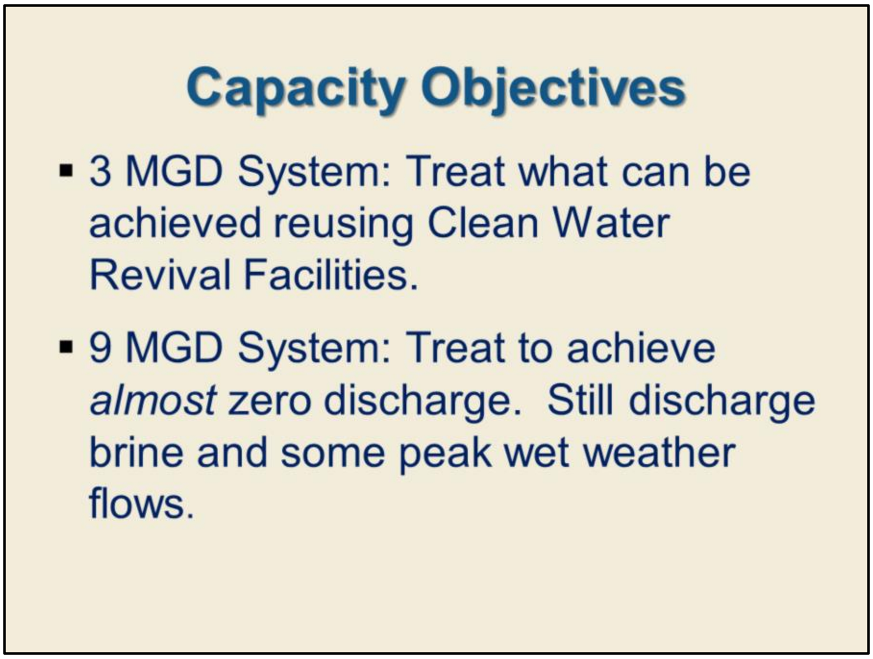
The nutrient removal facility costs range from $36M to $84M, depending on regulations.



Next is Potable Reuse. It is the Policy of the Board to increase reliability of water supply by diversifying the water supply portfolio, in particular, the goal is to have:

- At least 60% of demand locally or regionally and
- No more than 40% of supply originates from one source

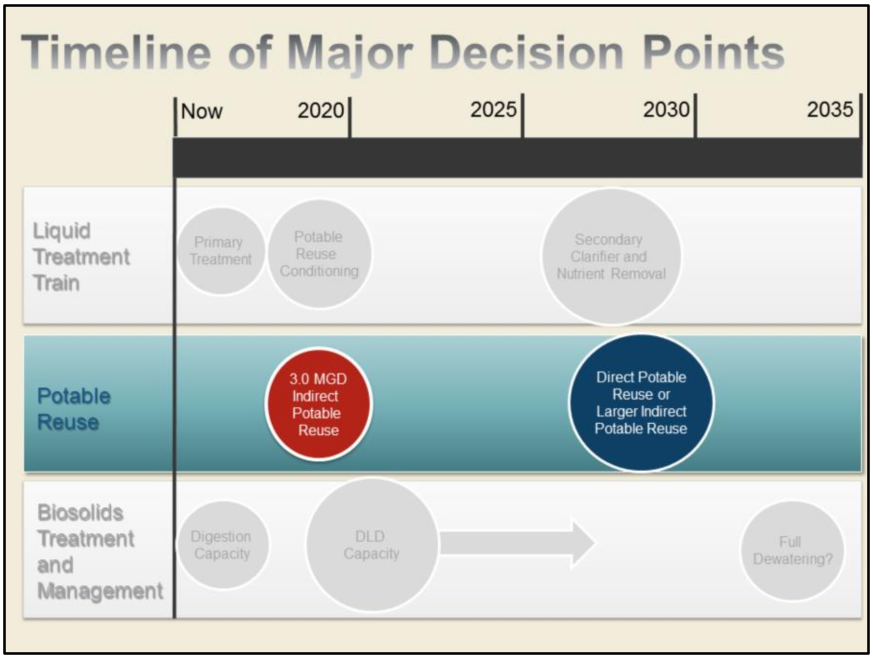
The Master Plan looked at a range of potable reuse alternatives to meet this policy.



We looked at two different potential facility capacities: 3 million gallons a day (MGD) and 9 MGD. For these two capacities we looked at three levels of potable reuse treatment because the **amount of treatment required depends on the ultimate use of the water.**

If you are injecting the water into the groundwater basin and it will remain there for over a year, you need far less treatment than if you are going to add it to a surface water reservoir that supplies a water treatment plant or put the water directly into the potable water system. One of the biggest factors the regulators look at is the time in an environmental buffer: groundwater or surface water storage. The smaller the buffer, the greater the treatment requirements.

Since there are no regulations yet regarding the latter scenarios, we had to make some assumptions on treatment requirements based on current projects in the works and industry experts.



The Master Plan assumed that we would construct a 3.0 mgd facility in the near term and looked at how that facility could be expanded to a 9.0 mgd down the road.

Because we use so much of our effluent for recycled water irrigation, it was assumed the facility would operate 7.5 months out of the year.

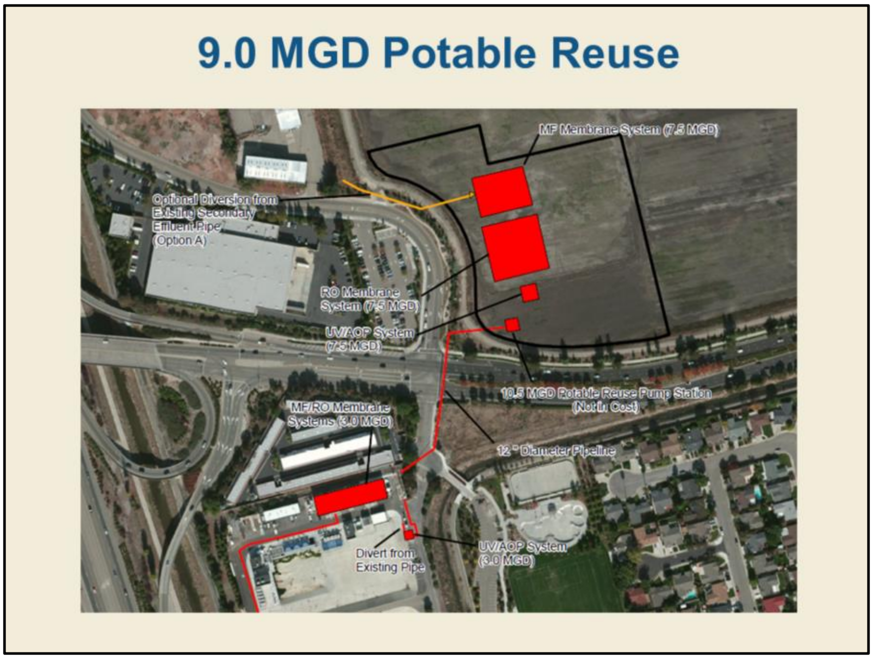
Here is a layout of the improvement required to rehabilitate and upgrade our current microfiltration (MF) process for potable reuse. Water would be treated to a level that we could inject it into the groundwater basin or store in a surface reservoir for over six months.

This alternative has the lowest level of treatment and is least costly.

3.0 MGD – Direct to Potable System

Here is the other end of the spectrum. This alternative assumes you would treat the water to a level that you could connect it directly to the potable system.

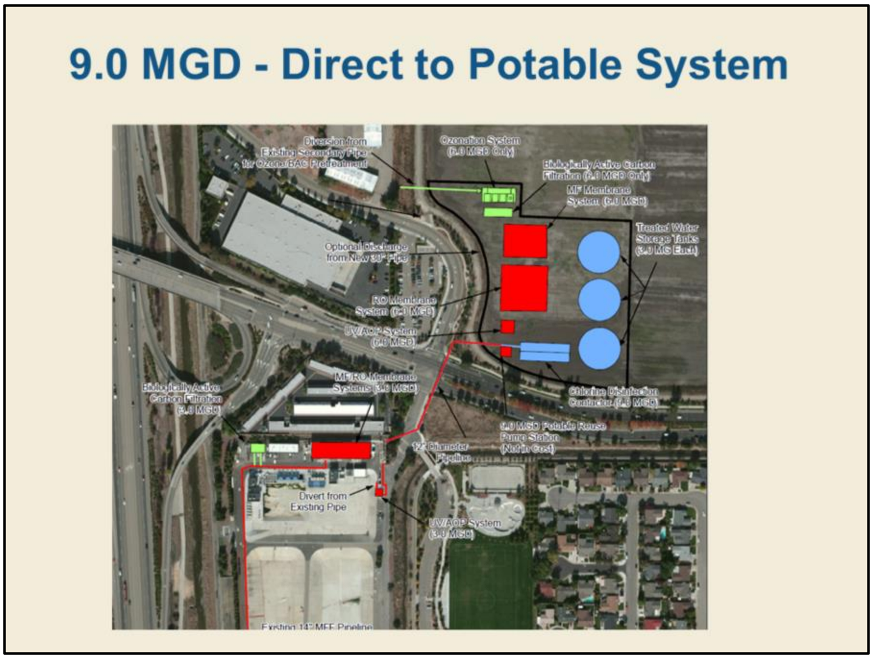
It has same facilities as previous alternative shown in red, but now we add pretreatment facilities shown in green and additional disinfection and post treatment storage shown in blue.



If we wanted to have zero discharge to the bay we would have a 9.0 MGD facility.

As with the basic 3 MGD facility, in this scenario we assume that we would inject the treated water into the groundwater basin or store in a surface reservoir for over 6 months.

We also assume we already have a proven 3 MGD facility and we would only construct a facility for the additional 6 MGD at the dedicated land disposal site across the street.



And here we estimate the facilities required if we were to have near **zero discharge** to the bay and **directly connect** to a potable system.

It has same facilities as previous alternative shown in red, but with added pretreatment facilities shown in green and additional disinfection and post treatment storage shown in blue.

3.0 MGD Alternatives

	Capital Cost,	Life Cycle Cost	Supply Cost
Groundwater recharge or surface water reservoir stored less than months	**$ 22M**	$ 47M	**$800/AF**
Surface reservoir stored more than 6 months	$ 75M	$ 137M	$2,200/AF
Direct to Potable System	$ 119M	$ 184M	$3,000/AF

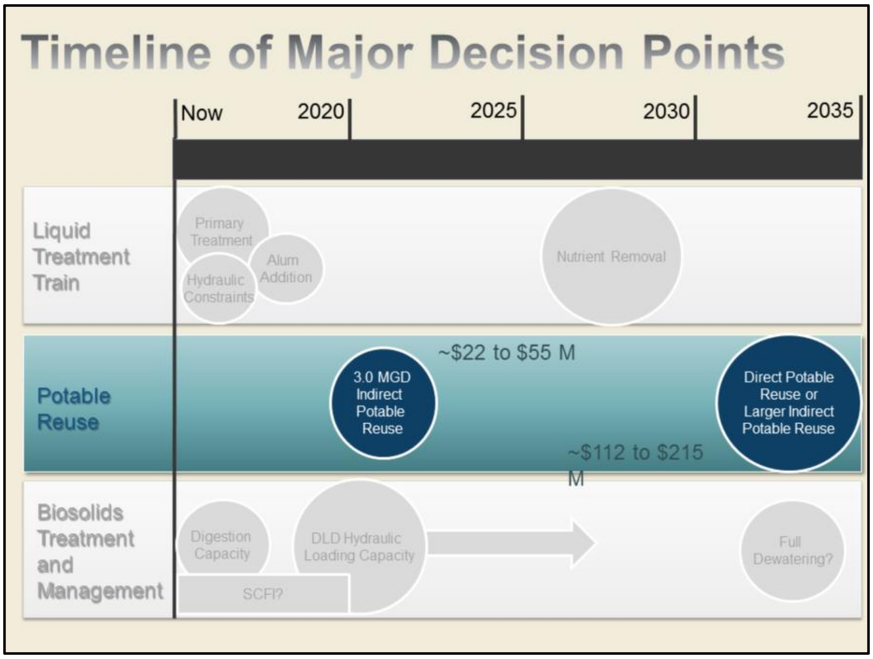
9.0 MGD Alternatives

	Capital Cost,	Life Cycle Cost	Supply Cost
Groundwater recharge or surface water reservoir stored less than months	$ 112M	$ 195M	$2,100/AF
Surface reservoir stored more than 6 months	$ 158M	$ 253M	$2,600/AF
Direct to Potable System	**$ 215M**	$ 311M	**$3,100/AF**

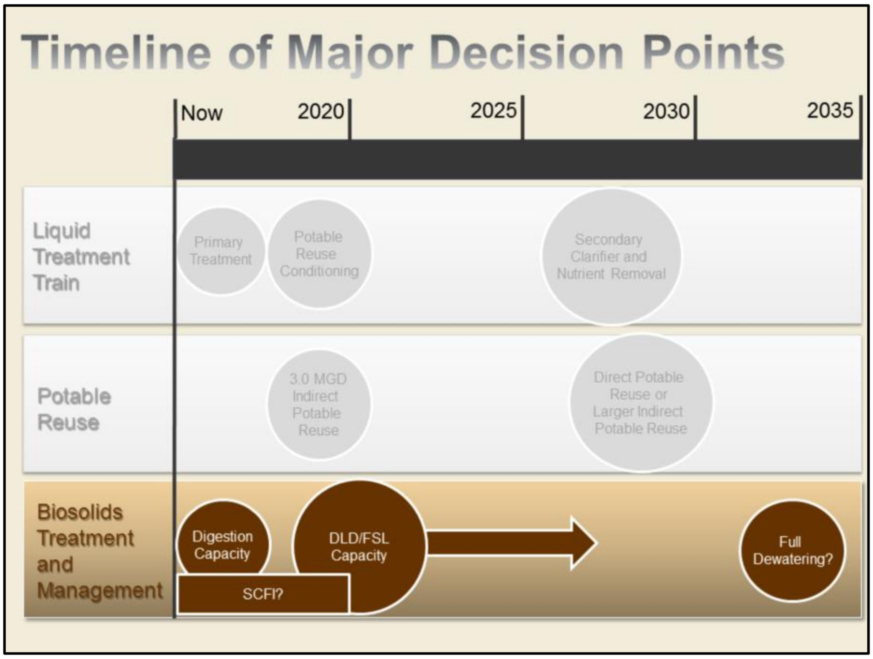
This table shows the full range of costs, going from a 3 MGD system that would be part of a groundwater or surface water project to a 9 MGD system that would provide water directly to the potable system.

These tables highlight the cost difference for different ultimate uses and gives you a sense of the value an environmental buffer such as groundwater or surface water storage.

For perspective:
Current DERWA treatment cost is $425/AF
Current Zone 7 cost (potable water) is $890/AF



Here is the summary slide for potable reuse.



Last line is biosolids. Both our current and proposed strategic plans include diversifying our biosolids management practice.

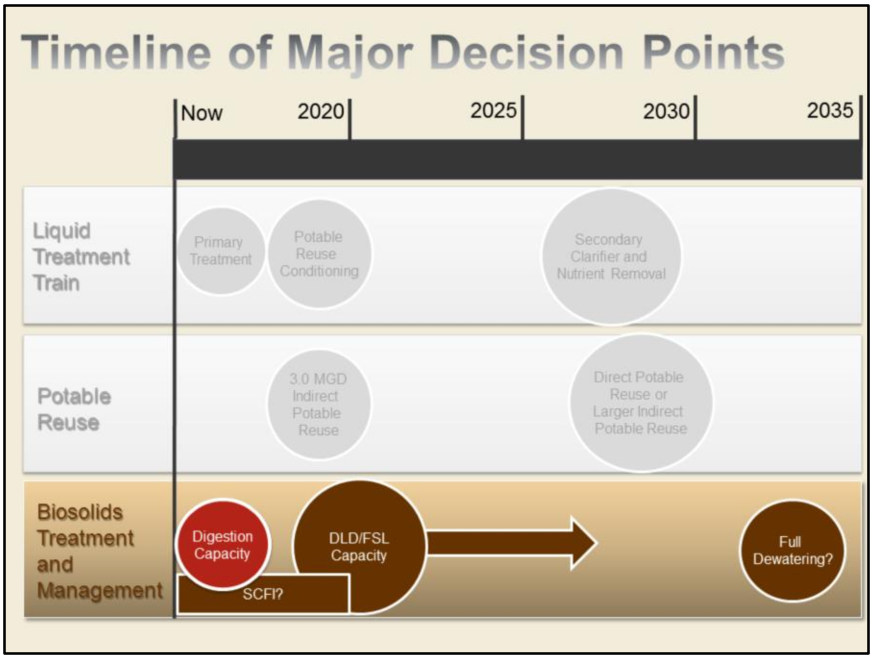
The Master Plan looked at how to best meet this goal.

Biosolids are defined as everything that settles or floats from liquid process.

First biosolids go to a dissolved air flotation thickener for thickening
Then to digester for breakdown of the volatile or organic portion of the solids
Then to Facultative Sludge Lagoons (FSLs), which further breaks down the solids
Then to Dedicated Land Disposal (DLD) site for disposal.

With the FSLs and the DLD, the District currently has—by far—the least expensive way of disposing of biosolids.

However, we have always been concerned that, with a biosolids disposal facility in the middle of an urban area, ultimately there will be pressure to discontinue our current practice.

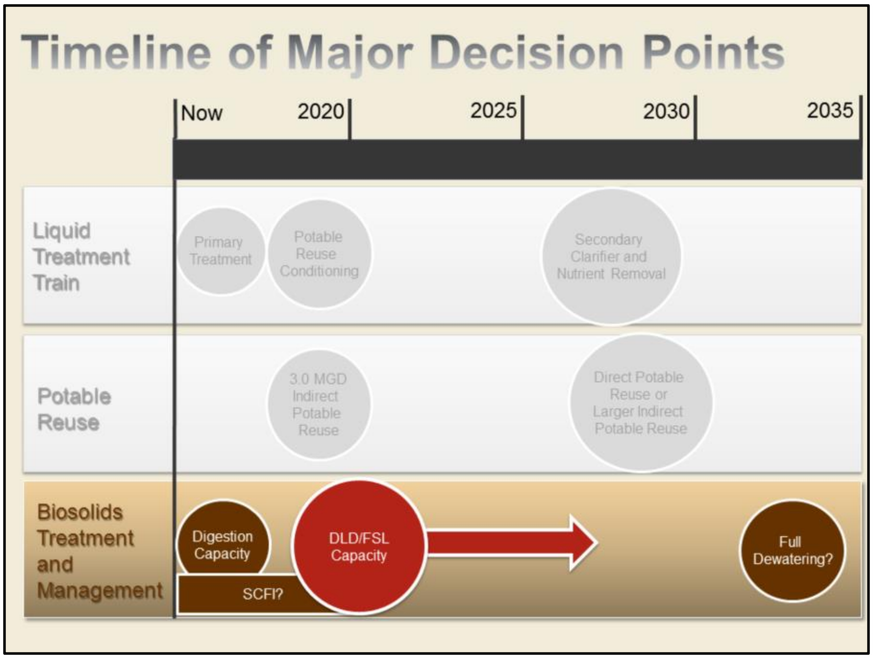


The required first biosolids improvement is a fourth digester.

Digesters need to be taken out of service every few years for cleaning and maintenance. With the largest digester out of service, we do not have adequate detention time and consequent biosolids decomposition.

The additional digester space will allow for future solids loading and for accepting fats, oil, and grease (FOG) and food waste, which I will discuss later when I talk about energy management.

This project has been in the works for a long time. The project was designed in 2010, and we're planning to request bids in a few months.



Beyond the digester, we need to address a limitation in the amount of biosolids we can apply to the DLD each year. The water content of the biosolids dredged from the bottom of the FSLs is too high. We can only plow in so much before the field gets too wet. Analyses indicate we are slowly accumulating sludge in the FSLs and will need to address this accumulation in the next few years.

We looked at several alternatives to address this current problem and then looked at how we could build on those alternatives should we need to discontinue using the DLD, or FSLs and DLD (latter is represented by the circle out near 2035). These alternatives included:

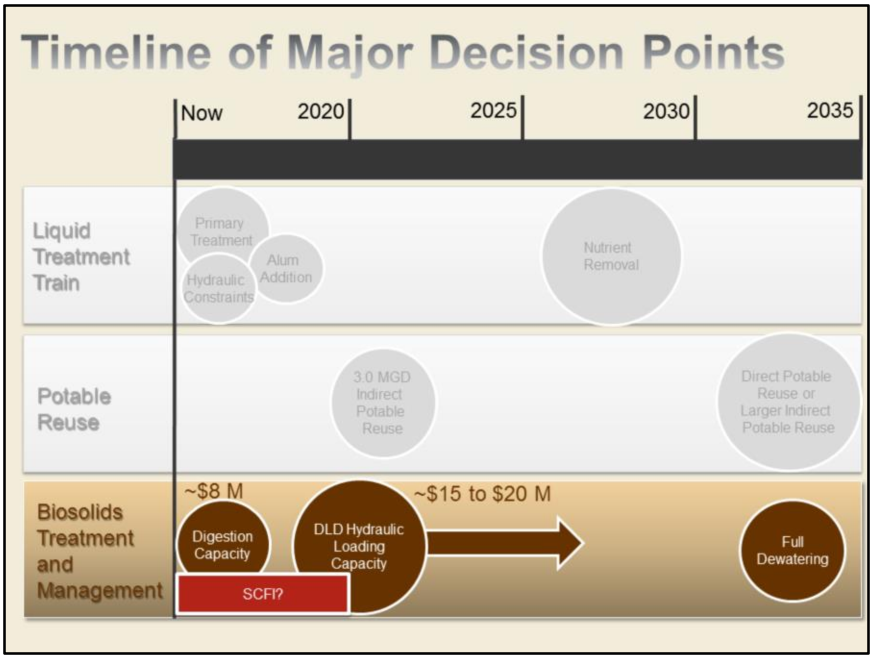
- Thicken the FSL biosolids that we apply to DLD (summer only, still use dredge)
- Dewater FSL biosolids and apply to DLD (different application method)
- Dewater some of the FSL biosolids for winter off-site disposal
- Dewater some of the digester biosolids for year-round offsite disposal

Lots of tradeoffs: water content of solids from FSLs and digesters, volatile content of biosolids, how odorous they are, if you run processes year round or seasonally.

The Master Plan considered a number of alternatives:

- Thicken FSL Solids and apply to DLDs
- Dewater a portion of digester solids for offsite disposal
- Dewater FSL solids for offsite disposal
- Dewater all FSL solids for DLD application in the summer

The most economical approach to reduce the current accumulation in the FSLs and to prepare for an event that would preclude the use of the DLD would be to dewater some of the FSL solids now for offsite disposal and add more dewatering facilities later should the use of the DLD or FSLs and DLD become prohibited. This is a big dot because it includes a building for dewatering equipment and for odor control.



The costs for these alternatives just mentioned range from $15M-$20M. But there is one other alternative we considered.

As part of the Bay Area Biosolids to Energy Coalition (BAB2E) we have been working with private companies Synagro and SuperCritical Fluids International (SCFI) to investigate a method of high-pressure and high-temperature biosolids destruction. We looked at how the proposed SCFI technology could help us solve our DLD capacity issue.

Key Findings

- Would require thickening of biosolids and using 55-65% of SCFI facility capacity to address DLD capacity limitation.
- If thickened biosolids could be used for the SCFI process, may save up to $4 million in dewatering costs.
- Actual lifecycle savings depend on tipping fees charged by SCFI.
- Would only provide solution to current DLD loading capacity issue, would not be sufficient for long-term retirement of DLD

For the project as proposed in the past, DSRSD would provide SCFI our dewatered biosolids to mix with other agencies' dewatered biosolids to get the required solids content for the SCFI process. Under that scenario, the SCFI process does not take enough of our biosolids to address our DLD capacity issue. We would still have to dewater solids and haul them off, albeit slightly less solids to haul off.

The Master Plan looked a variety of biosolids streams and concentrations to determine **how SCFI could be beneficial** to the District. Rather than providing low-solids-content water for blending, we could save some capital and operating costs if we could thicken rather than dewater. This assume we could thicken our FSL or digester biosolids and SCFI could reconstitute the appropriate water content with thickened sludge from others. Many "ifs."

However, we would need to use about 55- 65 percent of the SCFI facility capacity. We would then have to pay a tipping fee for disposal of our biosolids.

If thickened biosolids could be used for the SCFI process, we could save up to $4 million in dewatering costs.

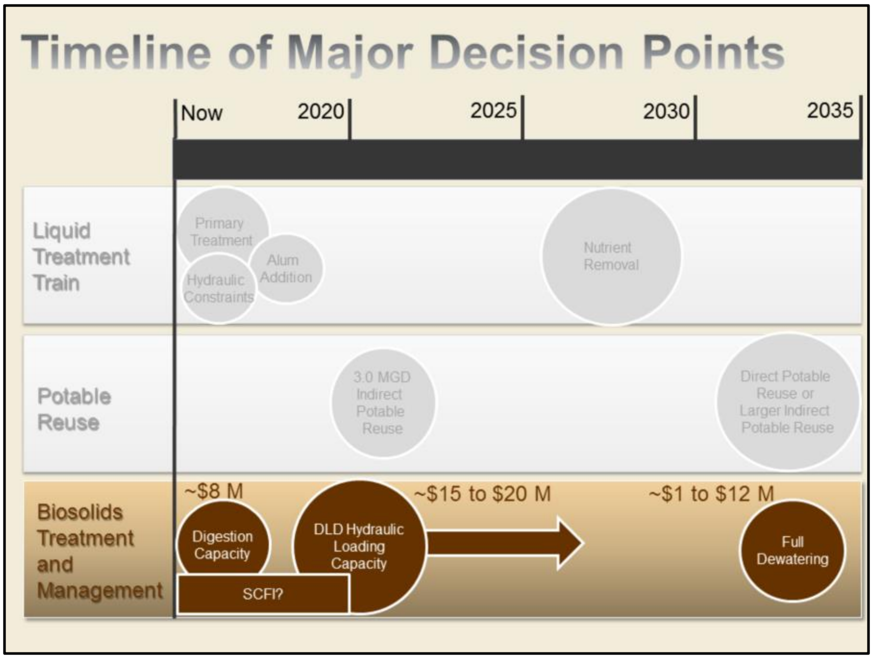
Actual lifecycle savings depend on tipping fees charged by SCFI. This is a big question right now. If you recall our last update on the project, the facility costs were three times their initial estimate. In addition, one of the grant funding opportunities fell through.

Also, this would not provide a long-term solution if we wanted to dispose of all our biosolids. We would need a facility with several times the capacity of the proposed facility. The facility is not modular; they don't just add more units. For more capacity, they would have a facility with larger piping.

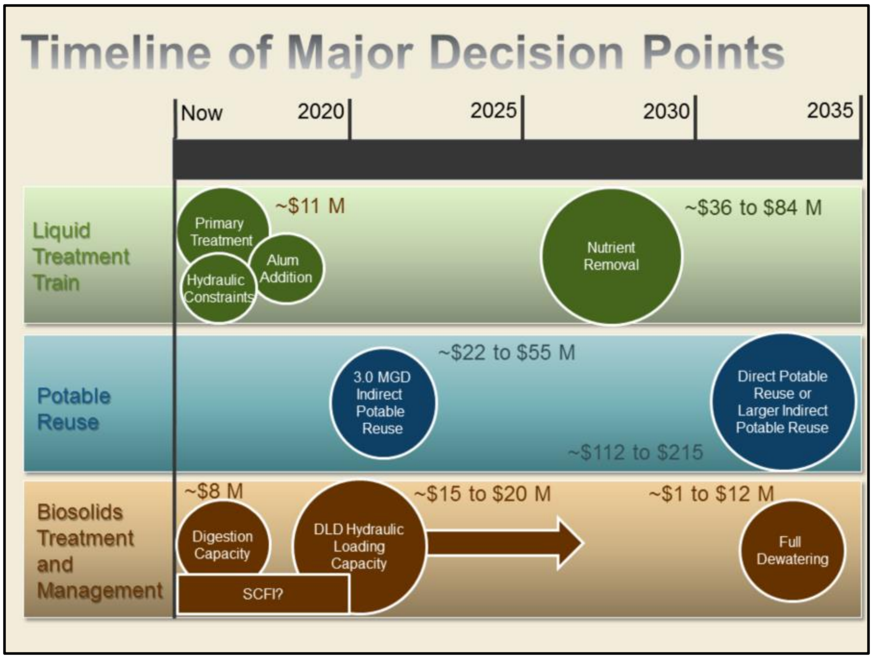
Considering the technology has not yet been proven with the proposed demonstration project, it would be very speculative to assume it could be a long-term solution.

Proposed SCFI Facility Location

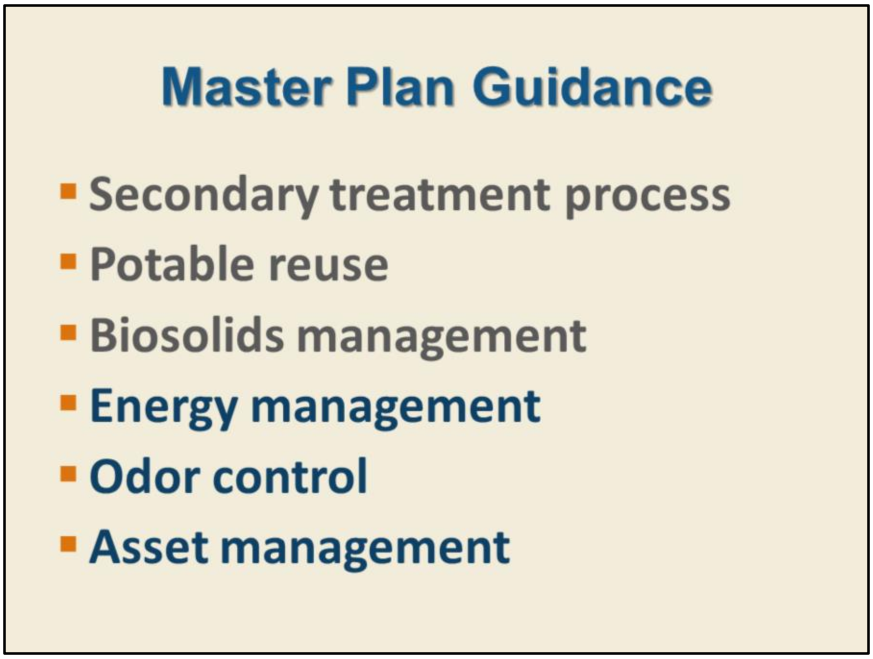
Here is a layout of the dewatering and SCFI facilities



Here are the biosolids facilities capital costs assuming we do dewatering in a few years and planning for dewatering all biosolids in future if necessary.



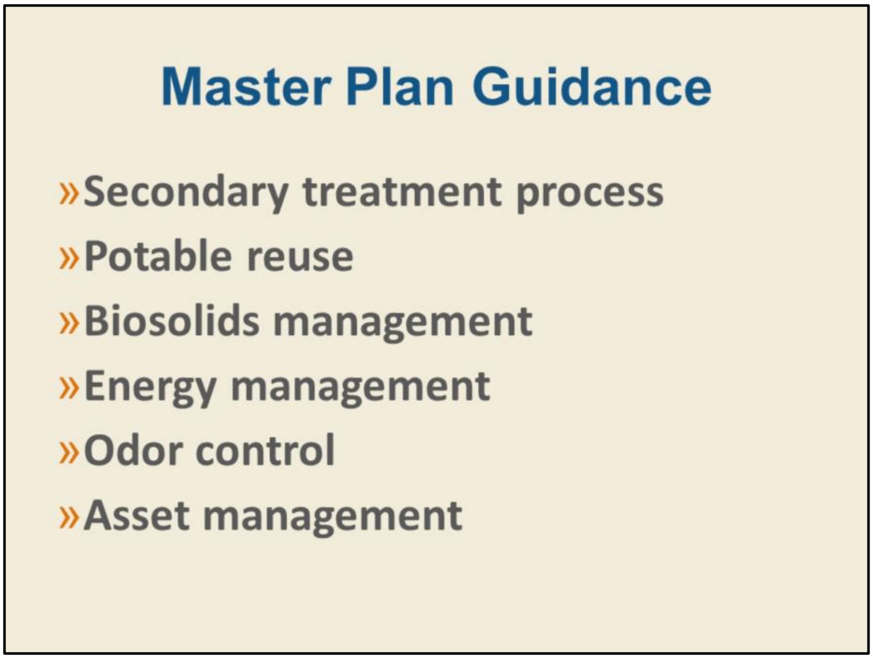
Here is the final summary of all three processes, timing and costs.



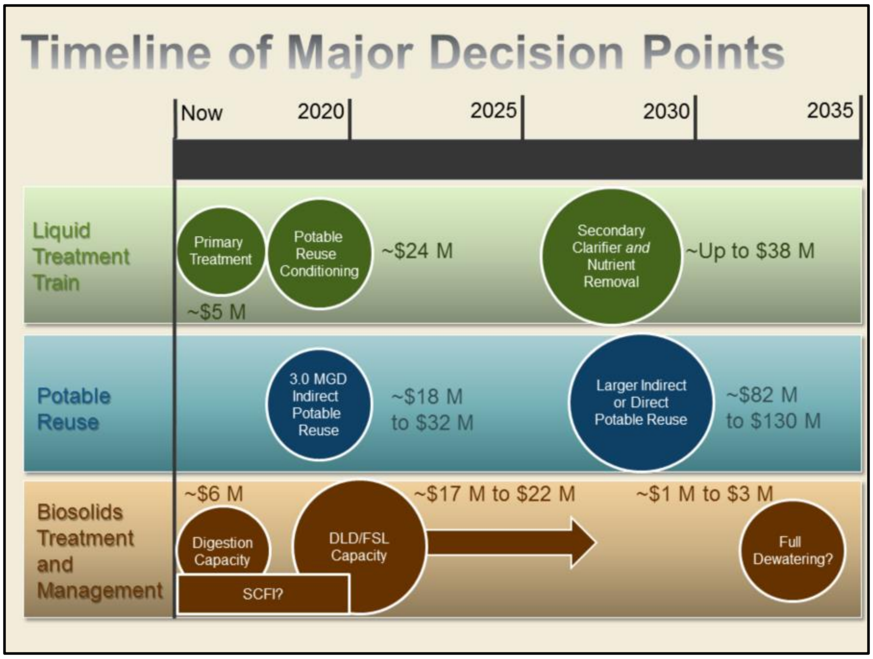
Before I finish, I would like to put in a plug for the next presentation in this series: Energy Management, Odor Control, and Asset Management. These topics will be covered on April 18.

[Speaker: Judy Zavadil, DRSD Engineering Services Manager and District Engineer]

President Halket, members of the Board, On March 18th I provided a presentation on the WWTP and Biosolids Master Plan. Tonight I will provide the second half of that presentation.



Before I begin the second half of the presentation I am going to give you a brief re-cap of the last presentation. In that presentation I covered the first three topics, secondary process, potable reuse and biosolids management.

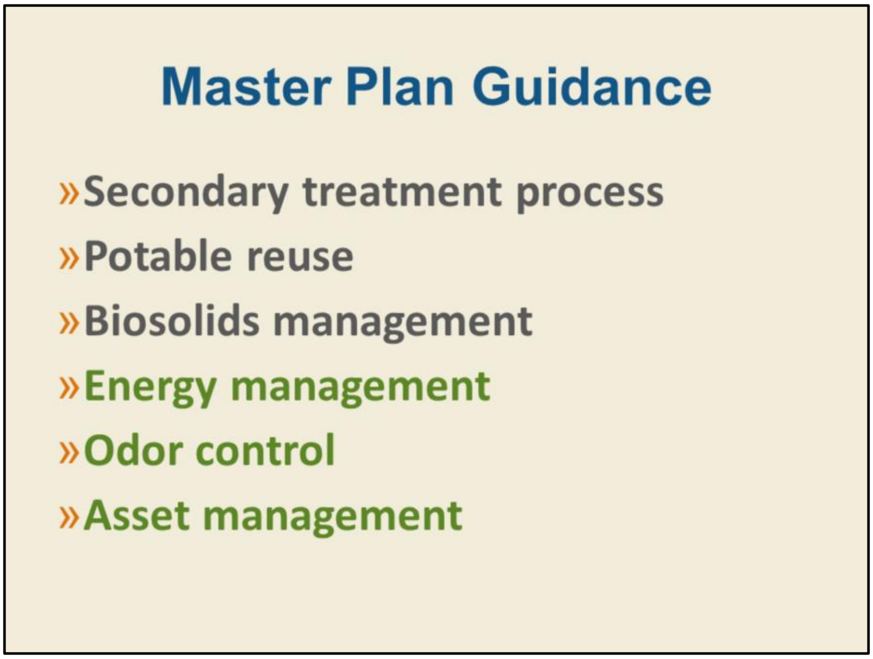


For **treatment process** we had a near-term project to add more primary treatment and we reviewed potential facilities that would be needed if we improved treatment for a potable reuse project, and we looked at potential facilities to meet different levels of nutrient removal regulations.

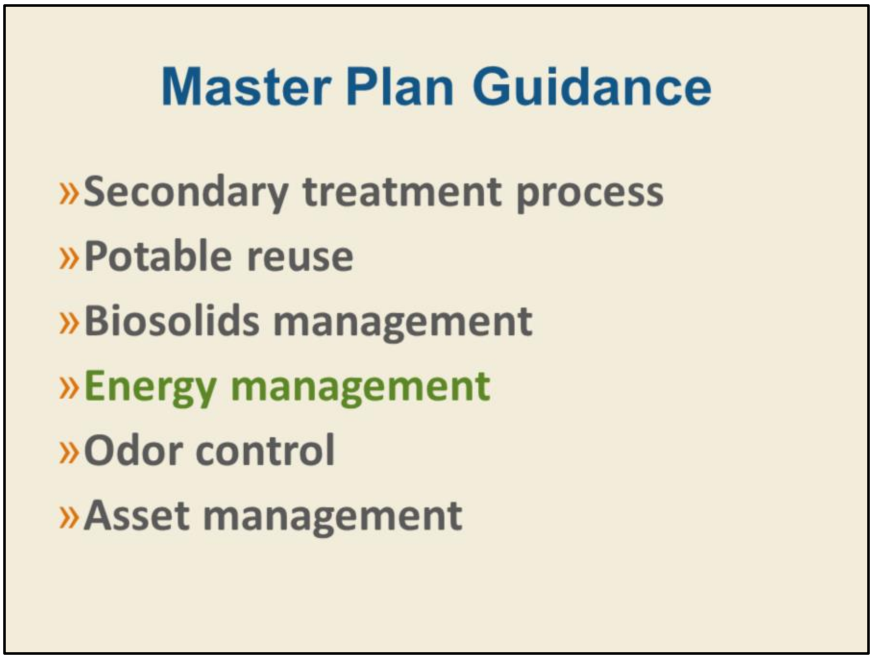
For **potable reuse –** we looked a two bookends: what would be required for a 3mgd facility that would maximize the use of our existing facility and what it would take if we would want near zero discharge to LAVWMA. Both of these alternatives did not consider the costs of facilities beyond treatment.

An then we looked **at biosolids disposal**. We intend to build that fourth digester in the next year or two. We talked about dewatering projects to address an accumulation of biosolids in our facultative sludge lagoons and how that project could ultimately be expanded for full dewatering.

We also talked about the **Biosolids to Energy project**. For that project to address our current biosolids needs, we would still need to do some dewatering, and then would need to use over half the facility capacity to avoid off-site disposal. The project could potentially reduce the cost of dewatering and hauling off the waste; but whether that facility would be economical for the district is still unknown since the technology has not yet been fully proven and the operating costs are still unknown.



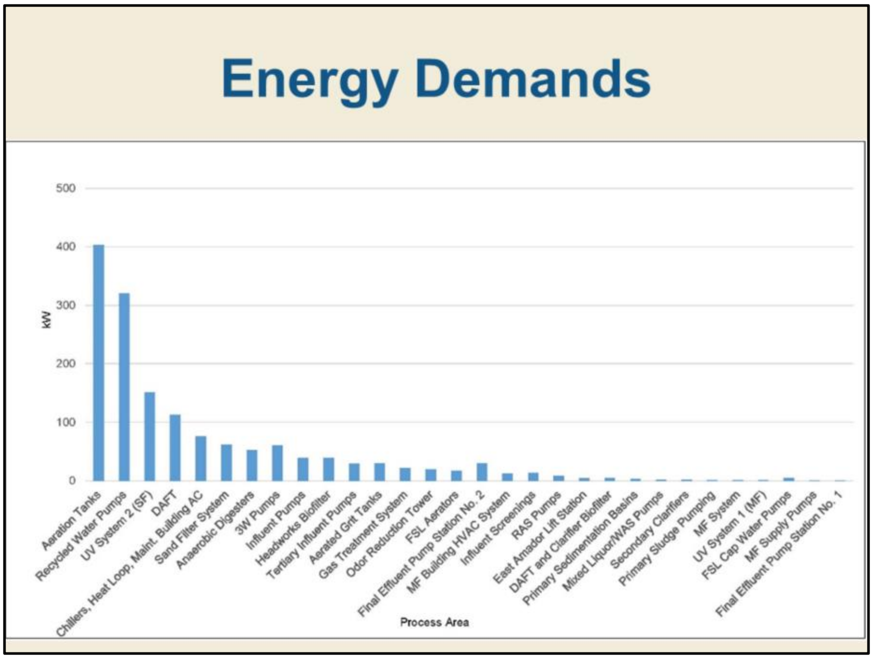
Tonight I am going to cover the last three topics on the list which **deal more with how we operate and maintain the treatment processes I discussed** the last time.



I will start with energy management. Energy efficiency has become a big issue in wastewater treatment.

As part of the Master Plan we looked at:

- Our energy demands
- Potential energy saving improvements
- How we could produce more energy
- What it would take to be a net-zero facility and whether that made sense for the district. I will explain net-zero further in a bit.



This chart shows the energy consumption of key processes at the WWTP. This is a chart for the summer months. As you can see:

- The biggest demand is the aeration tanks, which is where the wastewater is aerated to enhance biological breakdown of the wastewater.
- The next biggest use is the recycled water pumps station, which pumps the water up nearly 200 feet to the first reservoir in the recycled water system.
- That is followed by the Ultraviolet disinfection process for the recycled water plant.
- Not shown on this chart are the non-process energy demands.
- Non-process energy consumption, which ranges from 11 percent of the WWTP Energy demand in the summer to 18% in the winter.

HDR, as a subcontractor to West Yost, completed an independent evaluation of energy uses at the WWTP. They identified a few areas where we could potentially realize some energy savings:

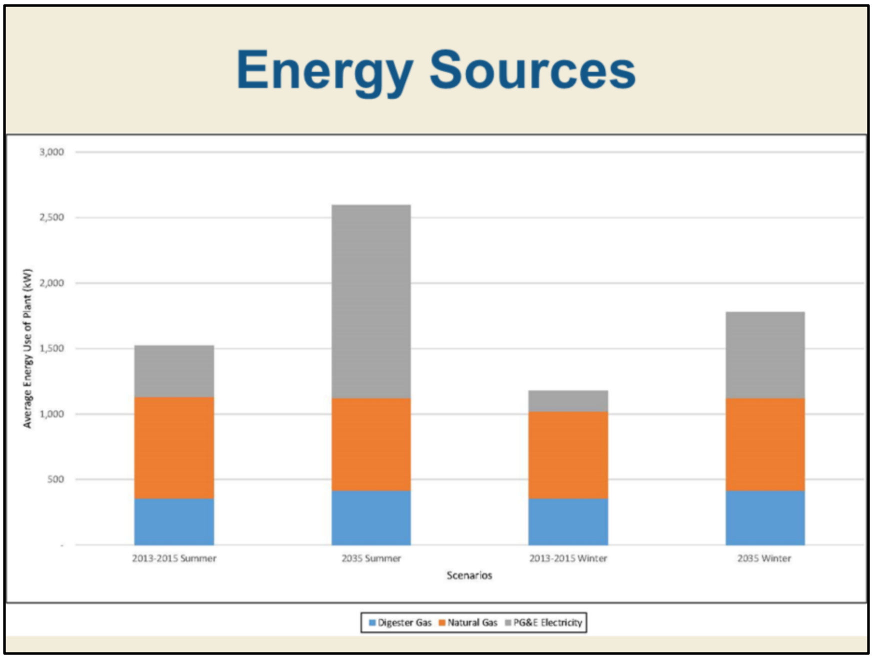
- Rebalancing the airflow to headworks biofilters; fans are oversized
- Making some changes to our digester gas treatment system
- Few other smaller process changes.

At DSRSD we generate energy by taking the biogas/methane produced in the digesters, cleaning up that gas in a gas treatment process, and burning it in cogeneration engines to **generate electricity and also capture and use the generated heat at the same time.**

The District has three cogeneration engines. We don't produce enough gas from the digesters to run all three engines so we supplement the biogas with natural gas from PG&E to generate additional energy. We also use the waste heat from these cogeneration engines to heat water. That hot water heats our buildings and keeps the sludge in our digesters at a cozy 98 degrees year round.

What is cost of energy burning natural as versus buying from PG&E?
$0.15/kWhr for PG&E Electricity
$0.31/therm of natural gas
1 therm = 100k BTU
Biogas 550 BTU/ft3

3 engines: Engine 1 – 500, Rich (cat convert); Engine 2 – 500, Lean – preferential; Engine 3 – 400, Rich (cat convert)



This graph shows the current and 2035 energy sources for the summer months on the left, and winter months on the right.

- Blue is energy from burning digester gas.
- Orange is energy from burning PG&E gas.
- And grey is purchased electricity.

Approximately 65-70% of the energy at the WWTP is supplied from the cogeneration engines. Approximately 21-23% of all energy generation is from biogas.

At the current cost of electricity and natural gas--$0.15/kWhr and $0.31/therm, respectively--the estimated cost savings would be $0.08 per kWhr produced. Thus, the cost to production a kWhr using the engines is $0.07/kWhr.
[1] Assumes a generator efficiency of 0.3.

Also from this graph, note that without any changes we will be buying more electricity from PG&E.

Given we have cogeneration. our path to net-zero is to maximize our cogeneration with biogas. To do that we will have to accept hauled waste into our digesters that will produce additional biogas.

Hauled waste:

- FOG – common – not only increases but boosts and produces no additional solids (restaurant grease traps).
- Food processing waster – good, but harder to find.
- Separated food waste – state regulations restricting organic waste going to landfills.

The Master Plan looked at a step-wise approach to slowly increase gas production. The first step to increasing gas production, without even accepting additional waste, is to increase the capture of solids in our primaries. I discussed the new primaries in my last presentation; we will be working on a design in the next year.

Our gas treatment skid is currently at its maximum capacity and, as noted earlier, is not very energy efficient. To accommodate gas from digestion of the primary solids, we will need a new gas treatment skid. This project is already in CIP.

The next step would be to add FOG, given the population in the valley and our convenient location (12000 gals/day FOG [4 trucks per day]). As discussed in my last presentation, we will be building a fourth digester; included in that design is a FOG receiving station.

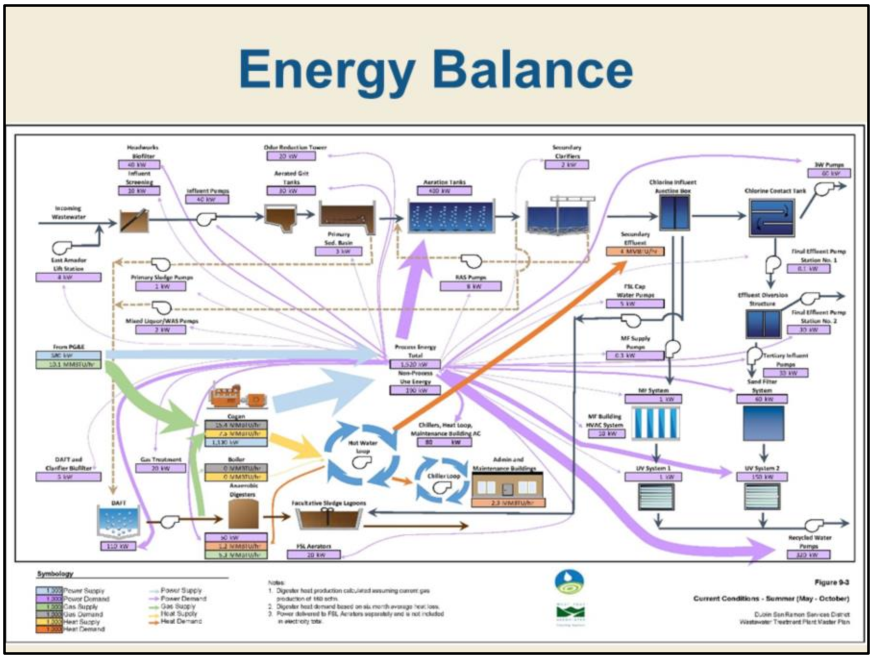
Next step is food waste. Food waste receiving requires much greater complexity. (Master Plan assumed we could potentially receive 2 trucks per day). At this point we would use all cogeneration engines. Next step would be to expand cogeneration capacity. Then limiting factor is digester capacity. Then recuperative thickening. Then limiting factor is truck loads per day. Then still need 20 acres of solar.

Problem is uncertainty: where from, how much, odor, impacts to digesters, impacts to biosolids disposal. The cost savings per kWhr of purchasing and burning natural gas, compared to purchasing power from PG&E can be determined from the following equation:

$$Cost\ Savings\ per\ kWhr\ Produced\ (\frac{\$}{kWhr}) =$$

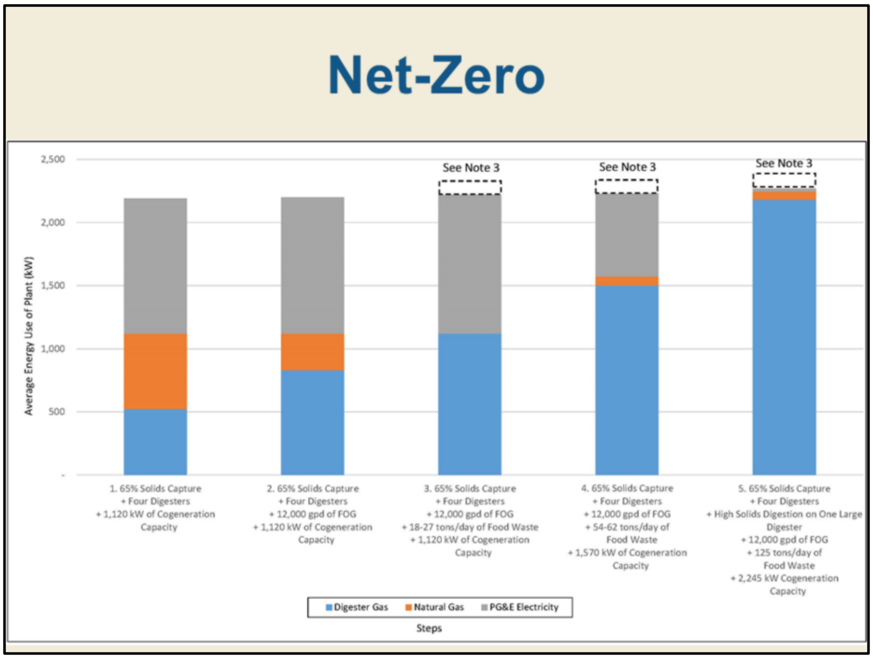
$$Cost\ of\ Electricity\ \left(\frac{\$}{kWhr}\right) - \frac{Cost\ of\ Natural\ Gas\ \left(\frac{\$}{therm}\right)}{8.8\,\frac{kWhr}{therm}}[1]$$

$$-\ Maintenance\ Costs\ of\ 0.03\ (\frac{\$}{kwhr})$$



The Master Plan developed an energy balance at the treatment plant for current conditions and planned and potential future conditions. Here is energy balance for summer months under current conditions. It's a busy diagram but I like it, as it is a comprehensive view of the sources of energy, heat, and the demands of each process: liquid treatment process, recycled water process. solids process, and cogeneration.

Green is gas – either from PG&E or from the digesters.
Blue into the system electricity – from PG&E or from cogeneration engines.
Purple is electricity demands.
Yellow and orange are heat supply and demand.
Width of lines indicates the magnitude. Note the thick purple lines to aeration and RW pumping, which correlates to the bar chart I showed you earlier with the demands. Not a big purple line.



The industry has been pursuing the idea of the net-zero-energy wastewater treatment.

Net-zero energy treatment plants are those able to produce all the energy required for their operations onsite.

So one large question the Master Plan considered was, “What would it take for the district to be a net-zero energy plant?”

Now I am going to take you through the steps outlined in the Master Plan that would be the most likely path to net-zero, if we were aiming for net-zero at 2035 planned.

In 2025, our annual average energy demand will be about 2200 kW.

Don’t bother trying to read the text here, I will walk you through it.

Given we have cogeneration, our path to net-zero is to maximize our cogeneration with biogas.

To do that we will have to accept hauled waste into our digesters that will produce additional biogas.

Hauled waste:
FOG (fats, oils, grease) – common – not only increases but boosts and produces no additional solids (restaurant grease traps)
Food processing waste – good, but harder to find
Separated food waste – state regulations restrict organic waste going to landfills

The Master Plan looked at a step-wise approach to slowly increase gas production.

The first step to increasing gas production, without even accepting additional waste, is to increase the capture of solids in our primaries.
I discussed the new primaries in my last presentation; we will be working on a design in the next year.

Our gas treatment skid is currently at its maximum capacity and, as noted earlier, is not very energy efficient.
To accommodate gas from digestion of the primary solids, we will need a new gas treatment skid. This project is already in the CIP.

The next step would be to add FOG, given the population in the valley and our convenient location (12000 gals/ day FOG (4 trucks per day). As discussed in my last presentation, we will be building a fourth digester; included in that design is a FOG receiving station.

Next step is food waste; food waste receiving is much more complex (Master Plan assumed we could potentially receive 2 trucks per day).

At this point we would use all cogeneration engines.

Next would be to expand cogeneration capacity. Note that at step 4 we are generating enough to meet our current WWTP energy demands.

Then limiting factor is digester capacity.

Then recuperative thickening.

Then limiting factor is truck loads per day.

Question is, does this make sense for the district.

Problem is uncertainty: where from, how much, odor, impacts to digesters, impacts to biosolids disposal.

Does the additional energy generation pay off?

Conservative estimates, assuming we install a new gas treatment system and a FOG facility, payback on steps 1 and 2 would be less than 12 years.

If you added third step, it would be less than 16 years.

Steps 4 and 5 are much less economical: <32 and < 47 years.

Because our wastewater treatment plant (WWTP) is located in an urban area with a park and homes nearby, we want to be good neighbors and manage odors emanating from the WWTP.

There is a long history with odor control at the WWTP. In 1994, an odor incident with the Facultative Sludge Lagoons (FSL) lead to numerous odor complaints and the district received an odor violation from the Bay Area Air Quality Management District. The violation was settled with an alteration in the sludge handling procedures. DSRSD continued to receive odor protests.

In recognition of the odor issues, the District completed a comprehensive Odor Control Master Plan in response to the neighbors concerns, which recommended odor control improvements. The neighbors also were concerned the planned expansion of the WWTP in 1999 would lead to increased odors. As part of the Mitigated Negative Declaration for the WWTP expansion, the District included recommended odor control projects in the CIP and committed to implementing measures until the off-site odors are reduced to at least 4 Dilutions to Threshold above ambient air.

Since then, the District added two biofilters to treat odorous air from the headworks and the Dissolved Air Flotation Thickener; reduced the airflow to odor reduction tower (ORT) to improve its performance; and reduced weir drop in primaries.

An Odor Control Master Plan update, completed in July 2004, indicated the district had met its off-site odor goal. Another update in July in 2008 had indicated we did not meet the goal. Staff recommends the District continue to be diligent in maintaining the odor control facilities we have and consider constructing additional facilities over time as plant flows increase. For example we noted last year that the larger biofilter was clogged.

Now I am going to go off on a little aside here on how odors are typically measured at WWTPS.

- D/T = Volume of Dilution Air /Volume of Odorous Air
- D/t is often used because there are no instruments or tests available that can detect odorous compounds at the level of the human nose.
- Panel of 5, smell three cones, increase concentrations until half the panel can detect the odor. (two times)
- The downside of D/T is what is used to measure overall odor but does not indicate what the odor is or what is causing it.

Since dilution to threshold indicates how many dilutions before the odor is just detected, you may be determining how to get rid of the most odorous compound but that may not be the measurement of the most offensive compound. For example, the odor panel may be able to detect an odor but it may not be the odor which your neighbors find most offensive.

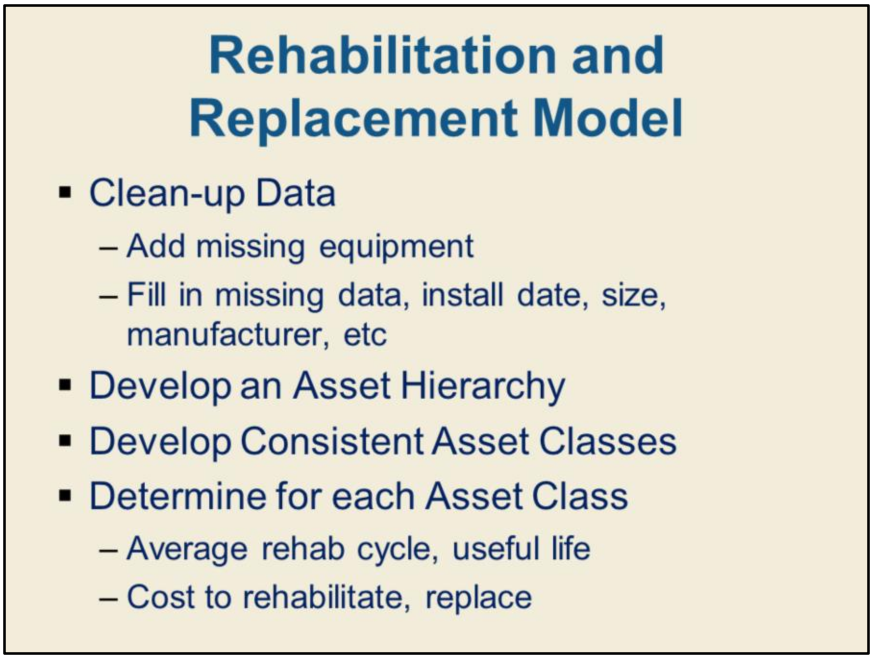
Here is map of the odor control facilities. The ORT has consistently been identified as one of the largest sources of odor at the WWTP. The ORT treatment method is outdated and the tower itself was constructed in 1984 and has been subjected to high sulfides for the duration of its operation.

The Master Plan identified options for just replacing the ORT or we can pipe the air flow to a new deeper enhanced biofilter, which would allow for more odor control in the future, potentially capturing odorous air over the primaries. The CIP includes replacing the ORT in five years and also includes covering the primaries and settled sewage channel and treating in future years beyond the 10 year CIP.

The previous Strategic Plan had as a work plan task to determine an end point for odor control. I think this was partially due to frustration in changes in the modeling results. The Board may wish to decide how to proceed.

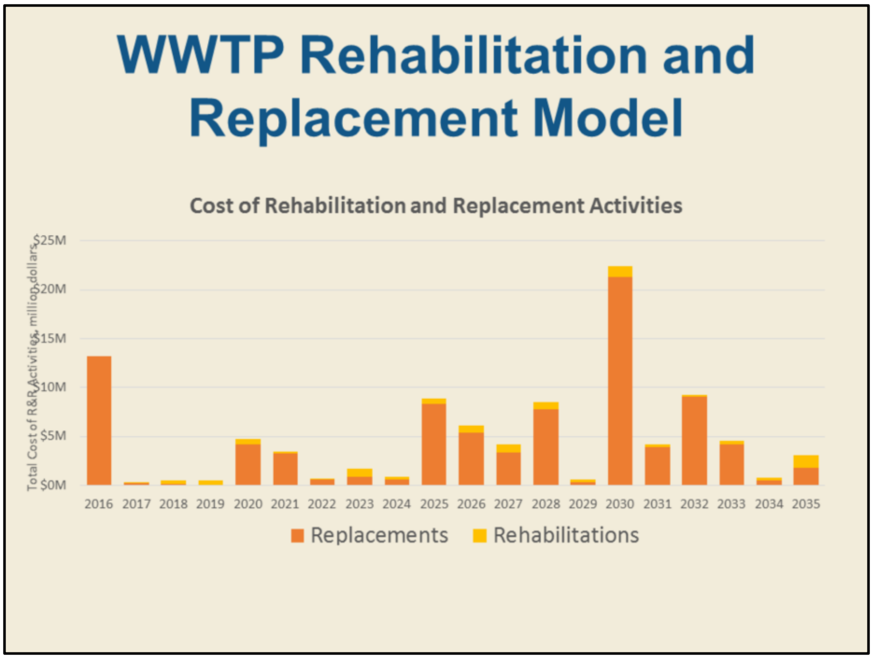
Staff has discussed the Asset Management Program at Board meetings in the past. The Asset Management Program first began with looking at all the sewer pipes in our collection system and determining when we would need to rehabilitate or replace those pipes and our expected cost to replace over next 50 years. We then looked at our water system: what pipes are failing and our long-term rehab and replacement cost is for water.

However, we did not have a similar projection of replacement and costs for all the equipment at the WWTP. So, as part of the Master Plan, West Yost helped us develop a very basic Rehabilitation and Replacement Model at the WWTP.



We have developed models for the sewer system and water system. We record and track some maintenance of WWTP equipment in our computerized maintenance and management system, Lucity. We first needed to clean up the data and organize it so that we could do analyses. We developed an asset hierarchy so we could easily find all the equipment associated with a process. We developed consistent asset classes, which is important to assign information to each class, such as useful life and cost to replace.

Once the data was cleaned up, we developed average rehabilitation frequency for equipment and the average useful life for each class of equipment. For example, all blowers would be rehabbed every 10 years and have an average useful life of 25 years. The average useful life was based on a Water Environment Research Foundation study and their project experience, as well as our mechanics' experience. The costs were based on vendors, DSRSD and West Yost Project experience. The cost are pretty general, and are equipment costs only. We then use percent multipliers for construction and installation, administration, construction management, overhead, and profit.



From that information we could determine, based on when each asset was installed, when it needed to be rehabbed or replaced and estimated a cost.
Here is a summary graphic of the results. Note the backlog in first year.

The model provides the detail for all the equipment for each year on this graph. This year, in putting together the capital outlay, we went over the list of to-be-replaced-now items with the mechanical maintenance supervisor and identified a number of items to be replaced--some that he was aware of and some that were not on his mind. The model was also considered in the rate study [Administrative Services Manager] Carol Atwood will present next. As you can see, there are some significant costs just outside the 10 year window.

I should note that these costs include all those multipliers I mentioned earlier; but in reviewing, one should note that much of the equipment will be rehabbed and replaced by our own staff, so we have to be careful not to double count labor and overhead.

Rehabilitation and Replacement Model

- Next steps
  - Add buildings
  - Add process pipelines
  - Refine remaining useful life
    - Condition
    - Maintenance
    - Operating Environment

So we now have a basic model to guide our maintenance activities and plan for funding. But it is pretty general and could be further refined.

Over the next year we want to:
Add buildings
Add process pipelines
Refine remaining useful life according to condition, maintenance and operating environment.

Overall, the Master Plan is a great document that will provide guidance for the near term and well into the future to:

- Inform capital budgets and rates
- Provide more clarity on the big questions we have pondered
- Answer what nutrient removal would look like and cost
- Answer what potable reuse would look like
- Outline first steps we should take towards biosolids disposal diversity and indicate how coalition project would fit in with our needs
- Answer, can we be energy self-sufficient
- Show how can we achieve greater odor control
- Outline our long term rehab and replacement needs