2022

CAWD WWTP Long-Term Coastal Hazards Planning Roadmap

Carmel Area Wastewater District

3/2/2022

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Abbreviations

CAWD – Carmel Area Wastewater District

CCC – California Coastal Commission

CDP – Coastal Development Permit

CEQA – California Environmental Quality Act

EIR – Enviromental Impact Report

M1W – Monterey One Water

MPWMD – Monterey Peninsula Water Management District

NAVD – North American Vertical Datum

NOAA – National Oceanic ant Atmospheric Administration

OPC – Ocean Protection Council

USGS – United States Geological Survey

WWTP – Wastewater Treatment Plant

Forward

This CAWD WWTP Long-Term Coastal Hazards Planning Roadmap was written by CAWD Plant Engineer Patrick Treanor with review by CAWD General Manager Barbara Buikema and input from the CAWD Sea Level Rise Committee.

Executive Summary

This report presents a roadmap for how CAWD intends to plan, develop, consider and implement a long-term solution to address flooding and related coastal hazards threats to the WWTP as these threats are increased by climate change. The roadmap that is outlined in this report lays out the general plan for the next 40 years. Specific detail is provided for the next 20-years as this is the current planning horizon.

The modeling presented in the 2018 Sea Level Rise Study indicated that our worst-case estimate of the timeline for major impacts to WWTP operations could be 60 years in the future (around 2080). At that time the greatest effects would occur during extreme precipitation events that have a low probability of occurring in any given year. See Figure 1 and Figure 2 in Section 2 from the 2018 Sea Level Rise Study which show future projections of "Backwatered Lagoon Inundation", and "100-year Fluvial Flooding" scenarios.

While the modeling indicates a timeline of 60-years before major impacts, to be conservative CAWD proposes a plan that will work towards achieving hazard mitigation in 40-years. CAWD proposes a three phase effort to plan and implement the ultimate solution as shown below. This is a simplified framework that will need to be re-evaluated at 5-year intervals based on new information as it arises from ongoing coastal hazards monitoring and/or planning efforts.

Planning for a major infrastructure project such as moving a wastewater treatment plant is a complex endeavor. Many unforeseen challenges will emerge during the process, and a simple path to a solution is not clear at this time. Further complexity is added by the potential for local floodplain dynamics to change and/or climate conditions to unfold contrary to projections. It seems prudent to establish a reasonable timeline that will achieve climate resiliency before impacts occur, but not be too hasty as to miss future opportunities that may arise with time. Future opportunities could include wastewater technology improvements, demographics changes, or societal changes resulting from climate change.

The three phases of the Long Term Planning Roadmap would begin with "Phase 1 - Alternatives Analysis" to take a broad view of possible approaches to mitigate effects of sea level rise while also continuing to define the timeline of impacts. The goal of Phase 1 is to determine a best course of action from a wide range of possible approaches. Phase 1 is the focus of this report and is proposed to take 20 years to complete. After that would be "Phase 2 –

Detailed Analysis" to get to shovel ready status, and then "Phase 3 – Implementation" which would be the construction phase.

Eleven major reports are proposed to be developed over the next 20 years. Reports would include alternatives analysis for adaptation in place, consolidation with Monterey One Water, and relocation of the CAWD WWTP. Furthermore, floodplain modeling would be updated, and five year progress reports would keep the Coastal Commission informed as work is completed.

Each alternative evaluation will contain the same analyses of costs, impacts, and feasibility so that each coastal hazard mitigation approach can ultimately be weighed, and a preferred approach selected by the end of the 20-year horizon. It is unclear at this point what direction CAWD will need to take and what factors will lead to the ultimate decision that will be made. However, this report outlines how CAWD intends to analyze a broad range of topics to provide as much information as possible for driving decisions on how and when to move forward with implementation.

Section 1: Introduction/Purpose

This report presents a roadmap for how CAWD intends to plan, develop, consider and implement a long-term solution to address flooding and related coastal hazards threats to the WWTP (including as these threats may be exacerbated by climate change). The roadmap that is outlined would occur over the next 40 years, with the current focus being on the next 20 years as the horizon for necessary planning work. This report is intended to meet the requirements of Special Condition 9 of the CAWD Coastal Development Permit repeated below:

> **9. Long-Term Coastal Hazards Plan.** WITHIN TWO YEARS OF APPROVAL OF THIS AMENDED CDP (i.e., no later than March 11, 2022), or as extended by the Executive Director for good cause, the Permittee shall submit two copies of a LongTerm Coastal Hazards Planning Roadmap to the Executive Director for review and approval. The Planning Roadmap shall describe the specifics that will be analyzed during the iterative planning process, building upon the work prepared in accordance with Special Condition 8's Coastal Hazards Monitoring Plan and Special Condition 7's five-year progress reports, and including identifying the triggers for when the Long-Term Coastal Hazards Plan must be prepared for Executive Director review and approval. Ultimately, the Long-Term Coastal Hazards Plan (Plan) will address the specific manner in which the Permittee intends to plan, develop, consider, and implement a long-term solution to address flooding and related coastal hazards threats to the WWTP (including as these threats may be exacerbated by climate change) in a manner with the least amount of coastal resource impacts. The Plan shall include the identification of periodic benchmarks describing the type and timing of actions to be taken to address coastal hazards and by which progress in implementing the Plan can be measured in accordance with the periodic, five-year check-in progress reports required under Special Condition 7.
>
> The objective of the Plan is to evaluate (in conjunction with, and, as appropriate, based on the information developed and provided as part of the "Coastal Hazards Monitoring Plan" identified in Special Condition 8) measures, including up to WWTP relocation, to address WWTP needs and functions in the long term in relation to coastal hazards risks without the use of armoring or similar large-scale coastal hazard abatement measures (e.g., berming, levees, substantial alteration of landforms, riprap, etc.) and their attendant coastal resource impacts. The Plan shall at a minimum identify capital costs, long-term life-cycle cost analyses, wastewater rate effects, environmental analysis, land use analysis, and impacts to current water resources and water recycling activities for a range of alternatives, including adaptation in place, relocation of the WWTP away from coastal hazards, consolidation with Monterey One Water, and other potential alternatives. Upon Executive Director approval of the Plan, the Permittee shall submit information regarding progress in implementing the Plan in conjunction with the required every-five-year progress reports (see Special Condition 7).

Section 2: Planning Timeline

2.1 Background

In 2018 CAWD completed a site-specific Sea Level Rise Study that informs current projected timelines for impacts associated with climate change. The 2018 study presented modeling of future flood conditions at the CAWD WWTP under the extreme sea level rise projections (i.e H++ scenario). Two types of flooding hazards were identified for the existing WWTP: "100-year Fluvial Flooding", and "Backwatered Lagoon Inundation". Fluvial flooding from a 100-year storm is and will continue to be the most extreme scenario of flooding at the WWTP (although the probability of this occurring in any given year is low). Projections of future fluvial flooding in the 2018 study took into account increases in downstream sea & sandbar levels as well as increases in storm intensity caused by climate change. The "100-year Fluvial Flooding" scenario involves short duration flooding (measured in hours/days) compared to "Backwatered Lagoon Inundation" which could be sustained over longer periods (measured in weeks/months). However, while "Backwatered Lagoon Inundation" would be longer duration the flood levels are much lower and pose less threats to WWTP Operations. "Backwatered Lagoon Inundation" is and will continue to be a more frequent type of flooding than the "100-year Fluvial Flooding".

The modeling presented in the 2018 Sea Level Rise Study indicated that our best worst-case estimate of the timeline for major impacts to WWTP operations could be 60 years in the future (around 2080). Furthermore, the greatest effects would occur during extreme precipitation events (100-year storms) that have a low probability of occurring in any given year. See Figure 1 and Figure 2 for the projections of flood levels under "Backwatered Lagoon Flooding" and "100-year Fluvial Flooding" that were presented in the 2018 Sea Level Rise Study.

The timeline indicated by the modeling is a starting basis for the timeline of planning efforts contained in this Long-Term Planning Roadmap. The roadmap can be adjusted if monitoring of conditions shows a trigger that could change the modeling projections (See Section 2.3).

Figure 1 - Projections of Lagoon Flooding During Closed Lagoon Conditions Over Time With Sea-Level Rise (CAWD 2018)

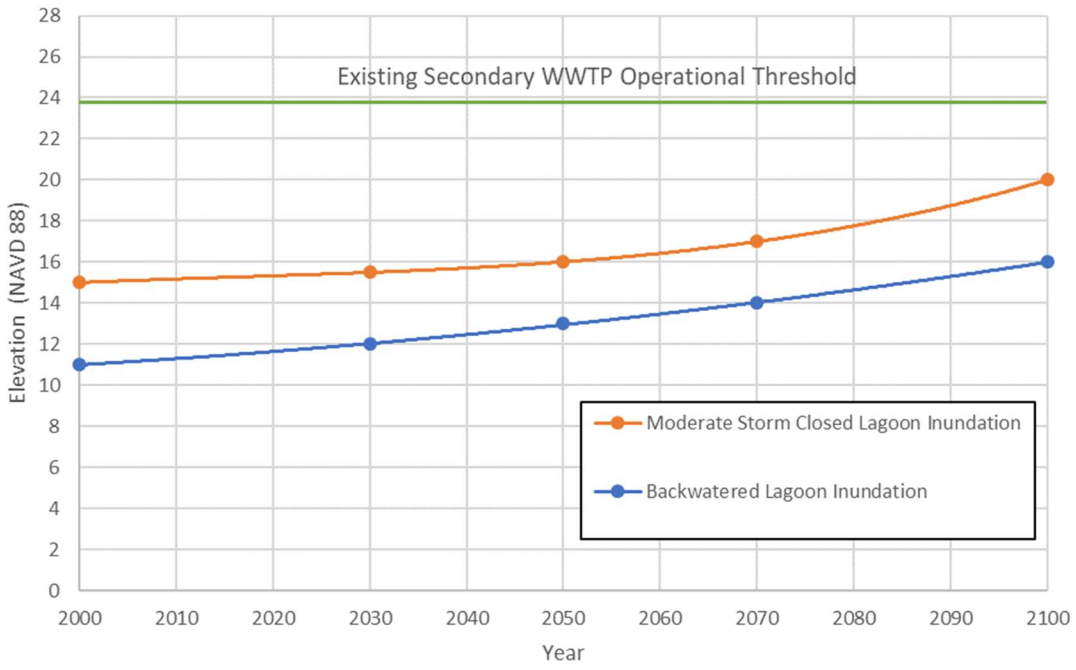
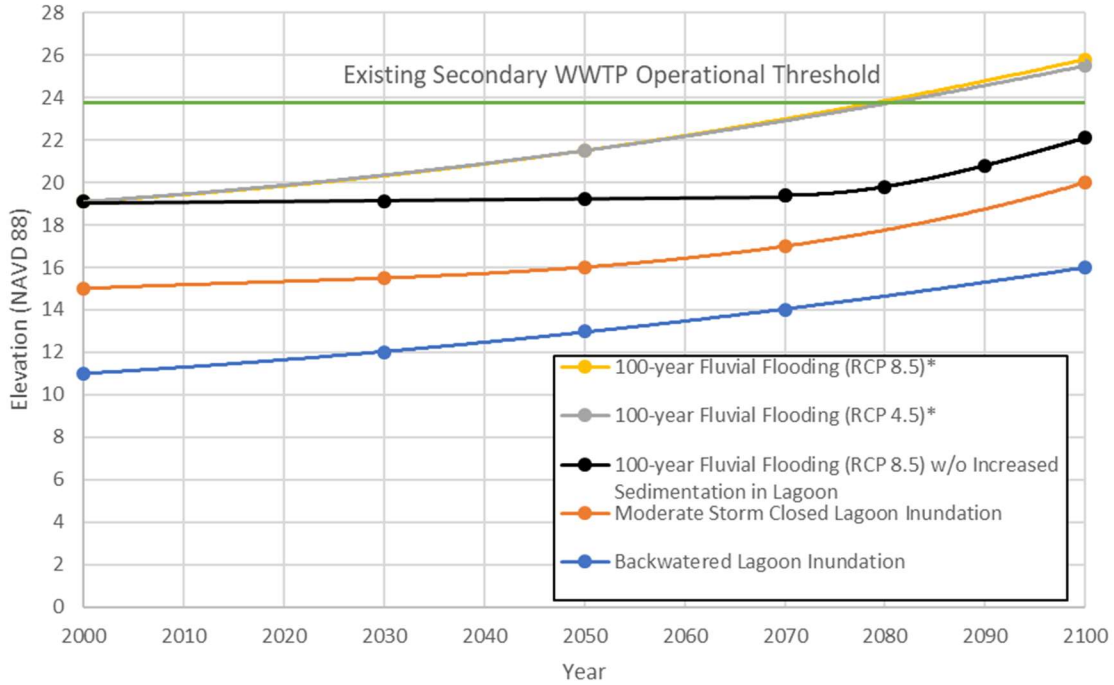


Figure 2 - Projections of WWTP Flood Elevation for 100-year Fluvial Flooding and Other Conditions (CAWD 2018)



2.2 Planning Structure and Timeline

Planning for a major infrastructure project such as moving a wastewater treatment plant is a complex endeavor. Many unforeseen challenges will emerge during the process, and a simple path to a solution is not clear at this time. Further complexity is added by the potential for local floodplain dynamics to change and/or climate conditions to unfold contrary to projections. It seems prudent to establish a reasonable timeline that will achieve climate resiliency before impacts occur, but not be too hasty as to miss future opportunities that may arise with time. Future opportunities could include wastewater technology improvements, demographics changes, or societal changes resulting from climate change.

2.2.1 Overall Planning Structure

As stated the best guess timeline for major impacts is 60-years. To be conservative CAWD proposes a plan that will work towards achieving hazard mitigation in 40-years. CAWD proposes a three phase effort (shown in Figure 3) to plan and implement the ultimate solution. This is a simplified structure that will need to be re-evaluated at 5-year intervals based on new information as it arises.

Figure 3 - Multi-Phase Approach

2.2.2 Timeline for Phase 1 – Alternatives Analysis – 2020 thru 2040

The first step in the overall process is the analysis of multiple hazard mitigation approaches to determine what appears to be the best path forward. During this phase CAWD will evaluate the three major approaches to mitigating coastal hazards related to climate change. These three major approaches are:

1) Adaptation in Place (*Protect, Accommodate*)
2) Build a new WWTP away from Coastal Hazards (*Retreat*)
3) Consolidation with the Monterey One Water (M1W) treatment plant (*Retreat*)

The work proposed for the current 20-year (Phase 1) planning horizon is presented in Figure 4. The timeline between 2020 and 2040 includes the following eleven (11) major milestone reports and 5-year updates:

2020 – Coastal Hazards Monitoring Plan (Draft Already Submitted to Coastal Commission)

2022 – Long Term Planning Roadmap (This Report)

2025 – *5-Year Review – Hazards and Local Projects Update* **(See Section 9)**

2026 – WWTP Adaptation Alternatives Analysis **(See Section 4)**

2028 – Evaluation of Consolidation with M1W Report **(See Section 5)**

2029 – Relocation Alternatives Analysis Report **(See Section 6)**

2030 – *5-Year Review – Alternatives Analysis Update* **(See Section 9)**

2032 – Sea Level Rise Impacts Modeling Update **(See Section 7)**

2035 – *5 Year Review - Sea Level Rise Impacts Timeline Update* **(See Section 9)**

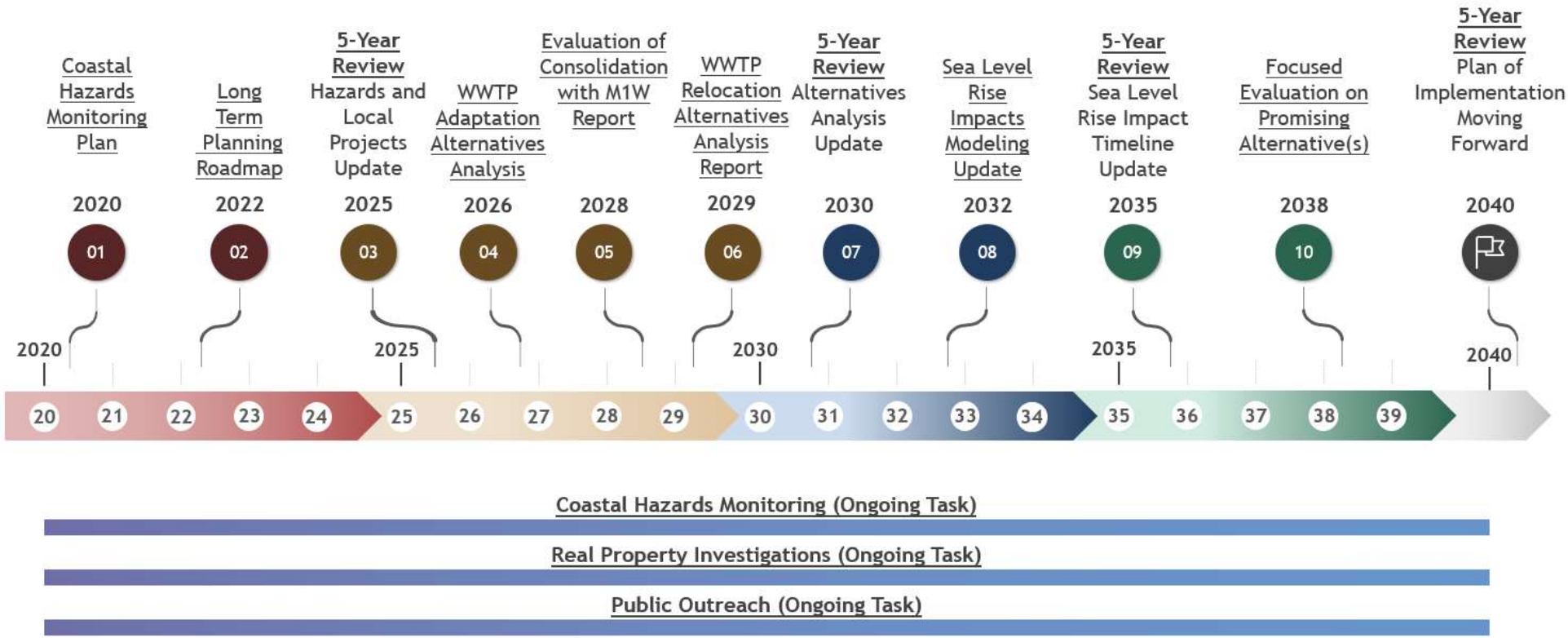
2038 – Focused Evaluation on Promising Alternative(s) **(See Section 8)**

2040 – *5 Year Review – Plan of Implementation Moving Forward* **(See Section 9)**

In addition to the numerous reports and evaluations to be undertaken over the next 20 years, CAWD needs to also conduct ongoing efforts including:

- Coastal Hazards Monitoring – To maintain awareness of the progression of Coastal Hazards over time.
- Real Property Investigations – To seek and obtain land rights for pipelines and or new treatment plant sites.
- Public Outreach - To gradually increase engagement with the public and other local government agencies into the process.

Figure 4 - Long Term Planning Roadmap Phase 1 – Alternatives Analysis - 2020 thru 2040



2.2.3 Coastal Hazards Monitoring

In parallel with the evaluation of alternatives during Phase 1, CAWD will also be tracking the progression of Coastal Hazards changes. Sea levels, precipitation intensities, flood plain projects, and sand bar dynamics are all factors that will be used to inform the rate of coastal hazards changes. CAWD submitted a Draft Coastal Hazards Monitoring Plan to the Coastal Commission in April 2020 that establishes the following monitoring measures:

1. Real Time Monitoring of Lagoon Levels
2. CAWD WWTP Monitoring Well
3. Real Time Monitoring of River Flows
4. Real Time Ocean Water Levels
5. Annual Sandbar Topographic Survey
6. Flood Modeling Updates
7. Monitor Effects of Regional Flood Control Projects

2.3 Potential Triggers or Modifications to Timeline

The proposed timeline of 40 years to plan and implement coastal hazard mitigation is a conservative timeline. However, it could be accelerated more if necessary, based on several triggers that would effect the flood modeling. Conversely, the rate of sea level rise and changes to local floodplain conditions could also potentially lead to a justifiable extension of the proposed timeline. The following paragraphs describe different factors that could impact the timeline or trigger accelerated action.

2.3.1 Sandbar Dynamics Changes

The sandbar that builds up at the mouth of the Carmel River during lower river flows is a significant factor in local flooding dynamics. The sandbar is breached mechanically by Monterey County every winter (except for abnormally dry winters). The breaching is done to avoid "Backwatered Lagoon Inundation" flooding at nearby homes north of the Lagoon that are at a lower elevation than the CAWD WWTP. There is documentation showing that mechanical breaching was occurring as far back as circa 1900. Natural breaching dynamics (without mechanical breaching) are not well documented or understood because mechanical breaching has been the normal practice for such a long time.

In the future, mechanical sandbar breaching activities could cease or be modified. The dynamics of natural breaching could effect beach morphology in any number of ways. Monterey County is currently studying the effect natural breaching would have on beach morphology as part of the CEQA studies for their Ecosystem Protection Barrier (EPB) and Scenic Road Protection Structure (SRPS) projects.

2.3.2 Actual Sea Level Rise Compared to Extreme Projections

The modeling conducted in 2018 assumed that sea level rise would follow the H++ Scenario (Extreme Risk Scenario). The actual progression of sea level rise over the next two decades will help to inform the timing for coastal hazards planning efforts as climate change evolves.

2.3.3 Precipitation Intensity and Flooding Drastically Increases

Extreme flood events caused by abnormal precipitation can happen any year, however they have a low probability of occurring. 500-year storms have a 0.2% probability of occurring any given year, and so the probability of a 500-year storm occurring in the next 20 years is 4%. If there was a significant flood event at the WWTP caused by a 500-year storm in the next 20 years that could trigger CAWD to accelerate relocation and/or adaptation measures, as it could signal the arrival of climate change impacts.

2.3.4 Local Floodplain Changes

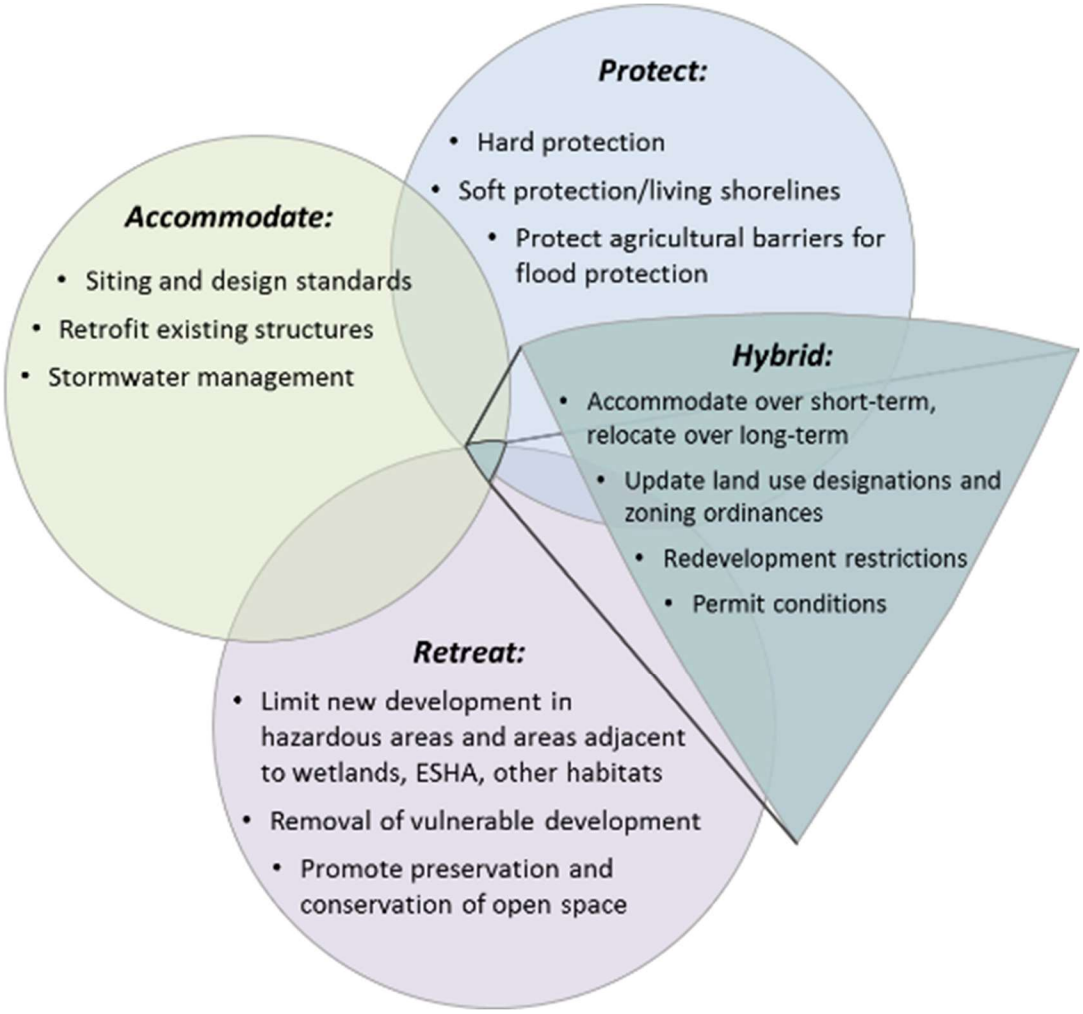
There are several floodplain projects, being spearheaded by the County of Monterey, that are in the works that will change the existing floodplain dynamics. These are: the Carmel River Floodplain Restoration and Ecosystem Enhancement (CRFREE) project, the Ecosystem Protection Barrier (EPB) project, and the Scenic Road Protection Structure (SRPS) project. The CRFREE project is believed to have a beneficial impact on flooding at the CAWD WWTP during "100-Year Fluvial Flooding" events. The EPB and SRPS would not significantly alter the floodplain, but could change sandbar morphology, which could also change the floodplain. As part of the ongoing Coastal Hazards Monitoring, CAWD is keeping up on the latest developments with these projects and will continue to do so with other projects when they come up.

Section 3: Mitigation Strategies Overview

3.1 Adaptation: Protect, Accommodate, Retreat, Hybrid

The general principles CAWD will utilize in Coastal Hazard Response are drawn from adaptation guidance from the California Coastal Commission. Figure 5 shows the general guidance for sea level rise adaptation from the Coastal Commission. How these principles will apply to CAWD is described in the following.

Figure 5 - General Adaptation Strategies



3.1.1 Protect

Protection work would not include a sea wall or similar land barriers as this is specifically prohibited in the Coastal Development Permit (CDP) for the WWTP. However, it may be too early to rule out possible projects that would involve living shorelines, horizontal levees, or

other natural protection that is compatible with sea level rise. At this early stage it may seem that these types of endeavors will be costly and may detract from alternatives involving retreat. Nonetheless, natural protection could be an alternative worth keeping an eye on.

3.1.2 Accommodate

There are instances at the CAWD WWTP where minor modifications to existing structures will provide a higher level of flood protection without conflicting with the need to protect coastal resources and without effecting long-term potential for coastal retreat. CAWD is extremely risk averse and would implement minor structural modifications to make sure critical assets will continue to operate reliably through a flood event.

Protection work could include:

- Installing watertight lids over any critical vaults and basins with low lying openings.
- Adding stem walls on top of existing structures to raise the level of flood protection.
- Elevating existing equipment.
- Anchoring temporary trailers and storage containers to the ground.

3.1.3 Retreat

CAWD will analyze options that involve retreating from the current WWTP location so CAWD would be prepared in the event that coastal hazards warrant retreat. Relocating a WWTP is not a simple endeavor. The cost to maintain existing services in a different location will be a burden on the local community, and so the decision to move must be well supported. Furthermore, there are a multitude of hurdles associated with a major public works project such as relocating a WWTP or constructing infrastructure to transport sewage to Monterey One Water. It will take considerable time to plan, develop, and implement such an endeavor.

3.1.4 Hybrid

Ultimately a hybrid approach may be taken to maximize use of the existing site location as long as there are no adverse impacts to coastal resources. This will allow CAWD sufficient time to implement the best retreat plan and develop funding sources.

Section 4: WWTP Adaptation Alternatives Analysis

4.1 Adaptation in Place (Protect, Accommodate)

Adaptation of the WWTP is a viable alternative for either shorter term or longer term mitigation of Coastal Hazards. CAWD understands that hard armoring of the wastewater treatment plant site is not allowed per our Coastal Development permit. There are however still ways to protect the ongoing operation of the WWTP during floodplain events that do not involve coastal armoring or levees.

CAWD proposes to commission a study (or studies) to evaluate various adaptation methods which may include any number of strategies such as:

1. **Increasing the top of wall elevation of critical treatment tanks**
2. **Raising any low lying critical equipment**
3. **Installing water tight lids on low lying vaults**
4. **Site drainage improvements**
5. **Vegetation Management**
6. **Sandbar Management**
7. **Flood Managed Aquifer Recharge**
8. **Living Shorelines**

The study of alternatives would include the following criteria as part of the evaluations in order to provide a basis for comparing alternatives.

Table 1 – Evaluation Criteria

Capital Costs	Environmental Analysis
Life Cycle Analyses	Land Use Analysis
Rate Impacts	Impacts to Water Resources/Recycling
Technical Feasibility	Greenhouse Gas Emissions/ Energy Efficiency

4.2 Work Already Begun

CAWD has been evaluating minor alterations to certain areas of the WWTP to mitigate flood impacts. CAWD installed one water tight manhole lid in one location at the WWTP to keep flood waters from potentially entering into the liquid treatment process. Similar lids are being installed in low lying residential areas to mitigate flooding of sewers when neighborhoods flood.

Section 5: Evaluation of Consolidation with Monterey One Water

5.1 Pump Wastewater to Monterey One Water Treatment Plant (Retreat)

CAWD will evaluate options to pump wastewater generated in the CAWD service area to the Monterey One Water (M1W) Treatment Plant located in Marina, CA. Pumping to the M1W Treatment Plant would represent a centralized wastewater treatment option for the entire Monterey Peninsula. Extensive new raw wastewater conveyance infrastructure would be required to convey wastewater from the CAWD service area to Marina, CA (crossing from the Carmel River wastershed to the Salinas River watershed). About 20 miles of new pipelines and several new pump stations would need to be built to move wastewater across the Monterey Peninsula. CAWD intends to conduct ongoing Real Property Investigations to identify and potentially secure easements and land for future development.

CAWD proposes to commission a study (or studies) to evaluate various conveyance methods and to evaluate likely treatment user fees CAWD would pay for treating water at M1W. Specific items to be evaluated include:

1. **Capacity of existing M1W Raw Wastewater Pump Stations (Wet Weather and Dry Weather Flow)**
2. **Hydraulic Evaluations of new Conveyance Systems (Wet Weather and Dry Weather Flow)**
3. **Potential Alignment Alternatives for New Pipelines**
4. **Conceptual Pump Station Designs**
5. **Identification of Pump Station Sites**
6. **Analysis of Future Treatment Costs and Liabilities at M1W Facilities**

The study of alternatives would include the following criteria as part of the evaluations in order to provide a basis for comparing alternatives.

Table 2 – Evaluation Criteria

Capital Costs	Environmental Analysis
Life Cycle Analyses	Land Use Analysis
Rate Impacts	Impacts to Water Resources/Recycling
Technical Feasibility	Greenhouse Gas Emissions/ Energy Efficiency

5.2 Work Already Begun

CAWD completed a high-level cost evaluation of future rate impacts associated with both relocating the WWTP as well as consolidating with Monterey One Water. See Appendix A for this cost evaluation.

Section 6: WWTP Relocation Alternatives Analysis

6.1 Relocate the CAWD WWTP (Retreat)

CAWD plans to evaluate options for continuing to provide wastewater treatment and recycled water to our constituents with facilities located within the immediate geographic area of the Carmel River watershed. This approach is an opportunity to develop next generation infrastructure local to the community. CAWD proposes to commission multiple studies to develop conceptual plans of new WWTP treatment infrastructure alternatives. Furthermore, CAWD intends to conduct ongoing Real Property Investigations to identify and potentially secure land for future development.

The scope of the studies and real property investigations will seek to evaluate the following:

1. **A new next generation WWTP conceptual design**
2. **Development of satellite wastewater treatment plant concepts (smaller decentralized facilities)**
3. **New conveyance infrastructure for raw wastewater, recycled water, and concentrated brine residuals**
4. **Available land for siting new infrastructure**
5. **Visual Aesthetics of new facilities for Public Outreach**

The study of alternatives would include the following criteria as part of the evaluations in order to provide a basis for comparing alternatives.

Table 3 – Evaluation Criteria

Capital Costs	Environmental Analysis
Life Cycle Analyses	Land Use Analysis
Rate Impacts	Impacts to Water Resources/Recycling
Technical Feasibility	Greenhouse Gas Emissions/ Energy Efficiency

6.2 Work Already Begun

CAWD has engaged a real estate professional to research potential future treatment plant sites in the area.

CAWD also completed a high-level cost evaluation of future rate impacts associated with both relocating the WWTP as well as consolidating with Monterey One Water. See Appendix A for this cost evaluation.

Section 7: Sea Level Rise Impacts Modeling Update

7.1 Sea Level Rise Impacts Modeling Update (Triggers Analysis)

Because future sea level rise and floodplain dynamics are still developing, CAWD needs to continue to evaluate triggers discussed in Section 2.3. Sandbar morphology, development of local floodplain projects, rate of sea level rise, changes in storm intensities are all factors that contribute to flood models. CAWD completed modeling of climate change impacts to the local floodplain in 2018. It is suspected that in the next ten years new information will be available to enhance and refine the previous floodplain modeling efforts.

CAWD proposes to conduct another floodplain modeling study like the work completed in 2018 but enhanced with new information and analyses. Some enhancements to build on prior modeling work could include:

1. **Analyze impact beach morphology changes created by natural sandbar breaching scenarios would have on flood model**
2. **Evaluate effect expanded floodplain hypsometry would have on timelines for elevated flood levels (i.e. expansion of floodplain boundaries in model)**
3. **Update flood model to incorporate any local flood control projects (such as CRFREE).**
4. **Update timeline of sea level rise levels based on new ocean data**

New modeling information will be evaluated for comparison to existing long-term plan timelines. If the new modeling information leads to changes in the current 40 to 60-year impact threshold timeline, then new timelines will be established and implemented. Potential Changes to the timeline will be discussed as part of the 5-year review process in 2035.

Section 8: Focused Evaluation of Promising Alternative(s)

8.1 Focused Evaluation of Promising Alternative(s)

The studies described previously to evaluate Adaptation of the Current WWTP (Section 4), Pumping to M1W (Section 5), and Relocation of the WWTP (Section 6) will all include the same "Evaluation Criteria" for comparison of disparate alternatives. A comparison of all the alternatives will be made based on the evaluation criteria to establish the most promising alternative(s). Then the most promising alternative(s) can be evaluated further to address remaining uncertainties with the goal of having enough information to drive a potential decision on what direction to pursue.

This evaluation will include the following key elements:

1. **Compare "Evaluation Criteria" for all alternatives studied thus far**
2. **Study remaining areas of uncertainty**
3. **Factor emerging societal changes into the evaluation**
4. **Develop a recommendation of the most promising alternative, or hybrid approach**
5. **Provide information to drive a potential decision on where to focus efforts during Phase 2 "Detailed Planning"**

With the completion of this focused evaluation CAWD would hope to have enough information to make a decision on how to proceed into Phase 2 "Detailed Planning" which would occur in the 2040s.

Section 9: Five Year Reviews

Special Condition 7 of the CAWD WWTP Coastal Development Permit requires that CAWD submit progress reports every five years. Special Condition 7 of the CAWD Coastal Development Permit is repeated below:

> **7. CDP Monitoring and Reporting.** The Permittee shall submit progress reports at five-year intervals by May 1st of each fifth year following approval of this CDP amendment (with the first report due on May 1, 2025, the next on May 1, 2030, etc.) that include and describe coastal hazard trends and changes since approval of this CDP amendment (for the first report in 2025) or since submission of the prior report, as well as cumulatively describing such changes over time, and that identify the status of efforts to monitor and address coastal hazards in both the short term (including through implementation of the "Coastal Hazards Monitoring Plan" as identified in Special Condition 8) and the long term (including through implementation of the "Long-Term Coastal Hazards Plan" as identified in Special Condition 9).
>
> If the Executive Director reviews the report and is satisfied with the progress made towards compliance with these short- and long-term requirements, then the Executive Director shall notify the Permittee of this determination, and this CDP authorization shall continue uninterrupted. If the Executive Director reviews the report and reasonably concludes that the Permittee is not making significant and diligent progress towards compliance with the terms and requirements of this CDP, based on the benchmarks set forth in the "Coastal Hazards Monitoring Plan" (Special Condition 8) and the "Long-Term Coastal Hazards Plan" (Special Condition 9), or if there is a reasonable risk in the next 10 years following submission of the most recent report of 100-year flood levels exceeding the flood protection design of as then currently-built, critical WWTP components, then the following shall take place: the Executive Director shall notify the Permittee of this determination, and the matter will be brought to the Commission for consideration and potential action, which may include, but not be limited to, modification of the terms and conditions of this CDP.

9.1 Five Year Reviews

This plan has laid out the planning work over the next 20-years that will be summarized in the progress reports to be submitted every 5-years. Any and all new developments will be summarized in each five-year progress update. Here are more details on what topics we anticipate will be the focus in each of the five-year progress reports:

9.1.1 Hazards and Local Projects Update (2025)

In 2025 CAWD intends to provide an update on Coastal Hazards Monitoring efforts especially as it relates to ongoing Monterey County floodplain projects. The CRFREE project is one project that will hopefully be underway in 2025. CAWD will also report on any sandbar morphology information provided by Monterey County as part of the EIR for the Ecosystem Protection Barrier/Scenic Road Protection Structure.

CAWD will also provide a brief update on the Alternative Analysis work however it is likely that this work will still be in the early stages.

9.1.2 Alternatives Analysis Update (2030)

By 2030 CAWD will have commissioned multiple studies of coastal hazard mitigation alternatives (adaptation and retreat options). CAWD will package these studies and provide a report contextualizing the information contained in the studies. At this time CAWD will start to identify gaps in information or where further progress is needed prior to assessing which alternative(s) will be the best path forward.

9.1.3 Sea Level Rise Impacts Timeline Update (2035)

By 2035 CAWD intends to have completed new floodplain modeling that builds on the modeling presented in the 2018 CAWD Sea Level Rise study. This progress update will focus on the specifics of the new modeling. The updated model will be used to determine if changes should be made to the current mitigation timeline.

9.1.4 Plan of Implementation Moving Forward (2040)

The goal for the 2040 progress update is to bring the "Phase 1 - Alternatives Analysis" (See Figure 3) to completion and decide on an alternative (or hybrid approach) to bring forward into "Phase 2 – Detailed Planning". The 2040 progress update will lay out the plan of future detailed planning efforts to occur, and also preliminary details regarding ultimate implementation timelines.

If at anytime a trigger has been hit CAWD will identify it and report it to the Coastal Commission at least during any 5-year progress report, or sooner if necessary.

Section 10: Other Ongoing Tasks and Conclusion

10.1 Ongoing Tasks

In addition to the numerous reports and evaluations to be undertaken over the next 20 years, CAWD needs to also conduct ongoing efforts to obtain land rights for pipelines and or new treatment plant sites. In addition, CAWD needs to get more and more engagement with the public and other local government agencies into the process.

10.1.1 Real Property Investigations

CAWD will need to continue to investigate property acquisition opportunities for future infrastructure including: pipeline easements, pump station properties, and potential treatment plant sites. This work will be ongoing.

10.1.2 Public Outreach

Involvement of the community and local governments will be critical in the success of the endeavors to be undertaken to address sea level rise impacts at the CAWD WWTP. There are some aspects of a large infrastructure project (such as relocating a wastewater treatment plant) that are outside the direct control of just CAWD, these include availability of land, and cooperation from local governments.

10.2 Conclusion

It is unclear at this point what direction CAWD will need to take in the future and what factors will lead to the ultimate decision that will be made. However, this report outlines how CAWD intends to analyze a broad range of topics to provide as much information as possible for driving decisions on how and when to move forward with detailed planning and implementation. What is clear is that addressing sea level rise and climate change impacts at the CAWD WWTP will be challenging, but hopefully not impossible with the support of the community at large.

Appendix A –

Draft of High Level Cost Evaluation of Relocating WWTP vs. Consolidating with M1W

Executive Summary

Two options for future wastewater treatment for Carmel Area were evaluated: **Build a New WWTP**, or **Pump to M1W**. Both alternatives were evaluated assuming direct participation from PBCSD, and assuming no participation from PBCSD. This yielded four alternative scenarios for evaluation:

1. Alternative 1A – New WWTP CAWD/PBCSD
2. Alternative 1B – New WWTP CAWD Only
3. Alternative 2A – Pump to M1W CAWD/PBCSD
4. Alternative 2B – Pump to M1W CAWD Only

The costs for each alternative were organized in a way to compare the new costs with the existing cost structure that is used for determining CAWD User Fees. Table E-1 summarizes the current costs used in the rate model, including operating and ongoing capital expenses. The current annual residential sewer rate for CAWD constituents is listed at the bottom of the table.

Table E-1 – Annual Costs – Current CAWD & PBCSD Flow

Administration	$1,200,000
Collection System	$1,900,000
Treatment	$6,800,000
Subtotal:	**$9,900,000**
PBCSD Cost Share:	**($1,200,000)**
CAWD Total:	**$8,700,000**
CAWD Residential Rate:	**$877 / Year**

The estimated range of Residential Rates for the proposed future alternatives was developed based on numerous assumptions for the cost of operations, maintenance, and amortized capital expenditures. The variability of assumptions led to initial high and low estimates for each alternative. However, the overall accuracy at this conceptual stage yields even more variability in the assumed actual cost. These estimates represent a "concept screening" level of development of each alternative of less than 2% detail. The expected accuracy range of the estimates is therefore set between -20% and +50%. These percentages were added to the high and low estimates to provide a total expected range of Residential Rates for each alternative.

When comparing alternatives, there is significant overlap within the range of costs for each, and therefore no alternative can be deemed to be the least, or most, expensive alternative. All costs are in current 2021 dollars. Table E-2 shows a summary of all the estimated Residential Rates for the Alternatives.

Table E-2 – Residential Rates for Future Treatment Alternatives

Alternative	Cost Range	Median of Range
Existing	$877 / Year	
Alternative 1A – New WWTP CAWD/PBCSD	$677 to $1,708 / Year	$1,193 / Year
Alternative 1B – New WWTP CAWD Only	$861 to $1,968 / Year	$1,415 / Year
Alternative 2A – Pump to M1W CAWD/PBCSD	$822 to $1,751 / Year	$1,287 / Year
Alternative 2B – Pump to M1W CAWD Only	$865 to $1,873 / Year	$1,370 / Year

Alternative 1A – New WWTP CAWD/PBCSD

This alternative includes new line items for capital costs associated with siting and building a new WWTP, as well as decommissioning the old WWTP. The size of the WWTP would accommodate PBCSD flows and PBCSD would be responsible for paying their share of the capital costs associated with the new facility. The following summarizes the basis for the cost estimate for this alternative.

Administration

It is assumed that the administrative function of the District would remain unchanged and therefore costs are same as existing.

Collection System

Assuming the location of the new WWTP is within the current service area of the District, it could be assumed that collection system O&M costs will not be significantly changed by relocating the treatment functions. There would be added capital costs to build new pipelines and one new pump station to convey wastewater to the new WWTP location, however these capital costs are included in the New Treatment Plant Capital Cost line item. The maintenance and operations of the new pipeline infrastructure would be relatively unnoticeable within the 50 to 100 year lifecycle of the new pipelines. The new pump station would only create a small difference in collections O&M costs over the 30 to 50 year lifecycle.

$100,000 per year is added to the existing Collection System Costs to account for one new pump station operation and maintenance.

New Treatment Plant Capital Costs

The capital costs for a new treatment plant can vary considerably based on the location, cost of land, and design of the facility. The current CAWD dry weather flows are about 1.1 MGD. A typical design for new treatment plants that treat to recycled water requirements is a membrane bioreactor (MBR) followed by reverse osmosis.

This estimate chose a cost of between $100 Million and $200 Million for the range of capital expenditures for siting and constructing a new WWTP in a new location in Carmel Area. This cost would include some of the costs for the Reclamation facilities as a new facility would likely integrate the recycled water and secondary treatment functions via the MBR process. Therefore, some of the recycled water sales would offset the cost of the overall new facility.

The estimated costs for the new treatment plant are converted to an annual cost based on a 30-year loan term at 3% interest.

Treatment

The operating and maintenance costs for a new treatment plant are assumed to be nearly equal to the current costs for treatment that CAWD currently spends (except for the current annual treatment CIP budget). It is assumed that treatment costs would not include significant capital improvements for the first 20 to 30 years. The current CAWD rate model includes about $1.8M in capital that would no longer be necessary to budget for a new WWTP.

Existing WWTP Decommissioning

The cost to decommission the existing WWTP and return the site to riparian habitat is estimated to be in the range of $10 Million to $20 Million. The annual cost is based on a 30 year loan at 3% interest.

Alternative 1A Summary

The following table summarizes the annual costs for operations, maintenance and debt service. This alternative includes revenue from PBCSD for capital reimbursement for the new WWTP and decommissioning of the old WWTP. SLR reserves are included in the bottom-line calculation as deductions to the total future cost.

A portion of recycled water sales could be contributed to the treatment operating and maintenance costs in a new integrated facility. In an MBR facility the secondary clarifiers are replaced by membranes which also provide tertiary treatment. This is accounted for by including a portion of water sales as revenue for the treatment plant.

Morro Bay WWTP Case Study:

The new Morro Bay WWTP, that is being built per Coastal Commission mandate, is about a 1-MGD dry weather flow facility slated to utilize a MBR treatment process, along with reverse osmosis for dissolved solids removal. Morro Bay is engaged in financing about ***$126 Million*** *for new facility construction costs. The plant is being sited East of Morro Bay which is sparsely developed agricultural land. There is less sparsely developed land East of Carmel-by-the Sea compared to Morro Bay, and therefore costs and challenges obtaining land are anticipated to be more extensive for CAWD than Morro Bay.*

For comparison Morro Bay has currently set their residential user rates at $996 / year. It is likely that the totality of debt financing is not fully integrated into the rates at this time because the project construction will not be complete until 2023.

Alternative 1A – Annual Costs – New WWTP CAWD/PBCSD

	Low Estimate	High Estimate	Notes
Administration	$1,200,000	$1,200,000	Same as Existing
Collection System	$2,000,000	$2,000,000	Slight Increase for One New Pump Station
New Treatment Plant Capital Costs	$5,000,000	$10,000,000	$100M to $200M CapEx Amortized over 30 years @ 3%
Treatment	$5,000,000	$5,000,000	Same as Existing Without CIP
Existing WWTP Decommissioning	$500,000	$1,000,000	$10M to $20M CapEx Amortized over 30 years @ 3%
Subtotal:	**$13,700,000**	**$19,200,000**	
PBCSD Cost Share:	**($3,500,000)**	**($5,300,000)**	Assume about 1/3 of All Treatment Capital, O&M Costs, and WWTP Decommissioning
SLR Fund Reserve:	**($1,000,000)**	**($1,000,000)**	Assume $30M in Accumulated SLR Reserve by 2050. ***This requires more than $1M annual investment factoring in present value and inflation.***
Water Sales (Treatment Share):	**($800,000)**	**($1,600,000)**	$1,000 to $2,000 per acre-foot could be included in Recycled Water Rates to offset MBR treatment costs. Assumes 800 acre-ft per year Recycled Water production.
CAWD Total:	**$8,400,000**	**$11,300,000**	
CAWD Residential Rate:	**$846 / Year**	**$1,139 / Year**	2021 dollars (Not Adjusted for Inflation)
Estimate Accuracy Adjustments	**$677 / Year**	**$1,708 / Year**	-20% to +50% Accuracy at Conceptual Level

Alternative 1B – New WWTP CAWD Only

This alternative includes new line items for capital costs associated with siting and building a new WWTP, as well as decommissioning the old WWTP. This alternative assumes that PBCSD does not remain connected to CAWD and finds other means for wastewater treatment. In this case PBCSD pays only for their share of the existing WWTP Decommissioning cost. The following summarizes the basis for the cost estimate for this alternative. This alternative would allow for a slightly smaller WWTP of about 0.75 MGD dry weather vs. the 1.1 MGD with PBCSD flows included.

Administration

It is assumed that the administrative function of the District would remain unchanged and therefore costs are same as existing.

Collection System

Same as Alternative 1A.

New Treatment Plant Capital Costs

In this alternative the size of the WWTP would be about 0.75 MGD instead of about 1.1 MGD. This would allow downsizing the facilities slightly and would reduce the capital cost from Alternative 1A.

This estimate chose a cost of between $100 Million and $150 Million for the range of capital expenditures for siting and constructing a new WWTP in a new location in Carmel Area. This cost could include the costs for the Reclamation facilities as a new facility would likely integrate the recycled water and secondary treatment functions via the MBR process.

The estimated costs for the new treatment plant are converted to an annual cost based on a 30-year loan term at 3% interest.

Treatment

The operating and maintenance costs for a new treatment plant are assumed to be about 25% less than the current costs for treatment that CAWD currently spends due to the reduction in flows without PBCSD.

It is assumed that treatment costs would not include significant capital expenditures for the first 20 to 30 years. The current CAWD rate model includes about $1.8M in capital that would no longer be necessary for a new WWTP.

Existing WWTP Decommissioning

Same as Alternative 1A.

Alternative 1B Summary

The following table summarizes the annual costs for operations, maintenance and debt service. This alternative includes zero revenue from PBCSD for capital reimbursement for the new WWTP and treatment O&M; but does include PBCSD share for decommissioning of the old WWTP. SLR reserves are included in the bottom-line calculation as deductions to the total future cost.

A portion of recycled water sales could be contributed to the treatment operating and maintenance costs in a new integrated MBR facility. It is likely that CAWD would find a user for recycled water whether PBCSD is part of the CAWD facility or not.

Alternative 1B – Annual Costs – New WWTP CAWD Only

	Low Estimate	High Estimate	Notes
Administration	$1,200,000	$1,200,000	Same as Existing
Collection System	$2,000,000	$2,000,000	Slight Increase for One New Pump Station
New Treatment Plant Capital Costs	$5,000,000	$7,600,000	$100M to $150M CapEx Amortized over 30 years @ 3%
Treatment	$3,750,000	$3,750,000	25% Less than Existing Without CIP
Existing WWTP Decommissioning	$500,000	$1,000,000	$10M to $20M CapEx Amortized over 30 years @ 3%
Subtotal:	**$12,450,000**	**$15,550,000**	
PBCSD Cost Share:	**($167,000)**	**($333,000)**	1/3 of Existing WWTP Decommissioning Only
SLR Fund Reserve:	**($1,000,000)**	**($1,000,000)**	Assume $30M in Accumulated SLR Reserve by 2050. ***This requires more than $1M annual investment if factoring in Inflation.***
Water Sales (Treatment Share):	**($600,000)**	**($1,200,000)**	$1,000 to $2,000 per acre-foot could be included in Recycled Water Rates to offset MBR treatment costs. Assumes 600 acre-ft per year Recycled Water production.
CAWD Total:	**$10,683,000**	**$13,017,000**	
CAWD Residential Rate:	**$1,076 / Year**	**$1,312 / Year**	2021 dollars (Not Adjusted for Inflation)
Estimate Accuracy Adjustments	**$861 / Year**	**$1,968 / Year**	-20% to +50% Accuracy at Conceptual Level

Alternative 2A – Pump to M1W CAWD/PBCSD

This alternative would significantly alter the structure of CAWD, which is shown by the multiple new line items comprising the basis of the user rate model including:

- New Conveyance Infrastructure Capital Costs (about 20 miles of new pipelines w/pump stations),
- New Conveyance System O&M Costs
- New Conveyance System Energy Costs
- M1W Connection Fee
- M1W Treatment Costs
- CalPERS Termination Costs
- Existing WWTP Decommissioning Costs

Administration

Although the structure of CAWD would change significantly, administrative costs would still be required to manage the District and the expanded collections and conveyance infrastructure. It is assumed that the cost for administration would be substantially similar to the existing cost.

New Conveyance Capital Costs

Conveyance to M1W involves about 18 to 20 miles of pipe (depending on routing) and an estimated three or four new pump stations. The infrastructure would need to be designed to convey the range of flows from dry weather (1.1 MGD Average) to wet weather flows of greater than 5 MGD peak.

The topography to the North includes significant elevation gain to cross into a different water shed North of Carmel/Pebble Beach. For instance, Hwy 1 gains about 550 feet of elevation from the CAWD WWTP to the high point near CHOMP over a distance of 3 miles. Two pump stations in series would be required to achieve the pumping pressures needed to reach the top of the hill. The remaining distance to the M1W Treatment Plant is about 15 to 17 additional miles. To overcome pumping friction and potential elevation changes over the remaining distance of 17 miles, it is assumed that one or two additional pump stations in series would be required.

To convey between 1.1 MGD to 5 MGD of flow, a pipeline diameter of 16-inch is assumed in the cost estimate.

Connecting to existing M1W infrastructure in Monterey or Seaside is not necessarily more cost effective for several reasons: 1) The pump stations are already at capacity during wet weather conditions, 2) because of the poor condition of the existing M1W pump stations/pipelines, and 3) several key M1W pump stations are extremely susceptible to Sea Level Rise (especially the Monterey, and Seaside Pump Stations which are located adjacent to the beach). All of these considerations would result in CAWD paying a portion for future improvements to these pump stations.

Calculations for Capital Cost for New Conveyance Infrastructure:

High Estimate: 20 miles X $2,500,000/mile for 16-inch diameter pipe = $50 Million

Low Estimate: 18 Miles X $1,500,000/mile for 16-inch diameter pipe = $27 Million

High Estimate 4 Pump Stations - $5 Million Each = $20 Million

Low Estimate 3 Pump Stations - $5 Million Each = $15 Million

Total Capital - $42 Million to $70 Million

The estimated costs for the new conveyance infrastructure are converted to an annual cost based on a 30-year loan term at 3% interest.

New Conveyance Maintenance Costs

About 20 miles of pipelines and 3 or 4 pump stations would require ongoing maintenance. It is assumed that 10% a year of the total capital cost would be spent on maintenance over the lifecycle.

New Conveyance Energy Costs

Assuming 1.1 MGD average dry weather flow and 10 wet weather days a year with 4 MGD total flow the total water that needs to be pumped to M1W annually would be 430 Million Gallons. This equates to an average of 820 gallons per minute (gpm) continuous. The water would need to be transported over a static head of 550 feet with friction losses along the 20 miles of pipeline of approximately 100 feet for a total dynamic head (TDH) of 650 feet.

The energy required to pump 820 gpm is calculated below.

HP = GPM x TDH / (Eff. X 3960)

KW = HP x 0.7457

Where:

HP = Horsepower

GPM = Gallons Per Minute Average = 820 gpm

TDH = Total Dynamic Head = 650 feet

Eff. = Pump wire to water efficiency = 50%

HP = 820 gpm x (650 feet) / (0.5 X 3960) = 269 HP

269 HP x 0.7457 = 200 kw x 30 days x 24 hours = **144,000 kwhr/month**

The energy required to pump to M1W would be about 144,000 kwhr/month which is similar to the amount of energy currently used for the wastewater treatment at the CAWD WWTP (not including Reclamation treatment energy). Assuming an electricity rate of $0.17 per kwhr the energy cost for conveyance would be about $300,000 per year.

Collection System

This alternative would constitute an expansion of the existing collection system to include an extensive new conveyance system including pipelines and pump stations. The additional piping would increase the CAWD pipeline infrastructure by about 25%, and would increase the number and complexity of pump stations by about 50%. Additional collection system staff would be needed to operate and maintain the

new conveyance system in addition to the existing collection infrastructure which will not be significantly changed. It is assumed that the additional infrastructure would add about 25% to the existing collection system costs to pay for new staff, vehicles, and supplies.

M1W Connection Fee

Similar to CAWD, M1W has connection fees (capacity charges) that are incurred when a new property is connected to the M1W sewer system. M1W publishes the connection charges on their website. The connection fees for each category (residential or various business categories) was cross referenced with the CAWD customer base to determine what CAWD would incur in connection fees. The calculation yielded a connection fee of about $42 Million. This is for CAWD only, PBCSD would also incur connection costs, however this is not included in the calculation for CAWD user rates for this alternative.

It is highly likely that this estimate is low, as in 30 years there will have been substantial capital investment in the M1W treatment plant. Currently M1W has significantly deferred maintenance and improvements at the wastewater treatment facility in favor of pursuing the Pure Water Monterey project. Future capital improvements will be added to the connection fee.

Connection Fee information is attached.

Treatment at M1W

The annual operating and maintenance costs for the M1W treatment plant are provided in the M1W FY20-21 Budget. The annual wastewater budget for FY20-21 was listed as $33 Million. However, the budget document provides a ten-year forecast for the wastewater fund and expects the budget to almost double in 10 years. This is most likely a result of deferred maintenance that will not be able to be deferred any longer. The ten-year forecast shows a wastewater fund budget of $62 Million. The M1W treatment plant currently has an average daily inflow of 17 MGD. Therefore, CAWD would comprise about 5% of the total flows and 5% of the cost of treatment. 5% of the $62 Million 10-year fund forecast would be about $3.1 Million per year.

The current M1W ten-year wastewater fund forecast is attached for reference.

CalPERS Termination Costs

As part of ending treatment services by CAWD, all treatment centered jobs would need to be ended. After a multitude of CAWD treatment positions are ended CalPERS obligations would continue until the employee liability is ended. Based on the current termination liability calculations from CalPERS, ending employment for 15 employees would result in a total liability of about $9 Million. The annual cost is based on a 30-year loan at 3% interest.

Existing WWTP Decommissioning

Same as Alternative 1A.

Alternative 2A Summary

The following table summarizes the annual costs for operations, maintenance, and debt service. There are major capital and operating costs to pump to M1W, and significant connection charges associated with this alternative. It is known that M1W has not been investing in capital reserves or conducting

capital improvements at the treatment plant. Therefore, costs for treatment shown at this time could be artificially low.

Alternative 2A – Annual Costs - Pump to M1W CAWD/PBCSD

	Low Estimate	High Estimate	Notes
Administration	$1,200,000	$1,200,000	Same as Existing
New Conveyance Capital Costs	$2,200,000	$3,600,000	$42M to $70M CapEx Amortized over 30 years @ 3%
New Conveyance Maintenance	$220,000	$320,000	10% Annually of New Conveyance Infrastructure Cost
New Conveyance Energy Cost	$300,000	$300,000	Extra Energy Use Required to Pump to M1W (In Perpetuity)
Collection System	$2,250,000	$2,250,000	Same as Existing + 25% of fixed costs for additional staffing for New Conveyance Infrastructure
M1W Connection Fee	$2,100,000	$2,100,000	$42M per Current M1W Connection Fees Amortized over 30 years @ 3%, doesn't include significant increase in connection fees from deferred maintenance/CIP projects
Treatment at M1W	$3,100,000	$3,100,000	Based on M1W 10-yr Fund Forecast
CalPERS Termination Costs	$450,000	$450,000	$9M Termination Liability Amortized over 30 years @ 3%
Existing WWTP Decommissioning	$500,000	$1,000,000	$10M to $20M CapEx Amortized over 30 years @ 3%
Subtotal:	**$12,320,000**	**$14,320,000**	
PBCSD Cost Share:	**($1,143,000)**	**($1,740,000)**	1/3 of New Conveyance Cost & WWTP Decommissioning
SLR Fund Reserve:	**($1,000,000)**	**($1,000,000)**	Assume $30M in Accumulated SLR Reserve by 2050. ***This requires more than $1M annual investment if factoring in Inflation.***
CAWD Total:	**$10,177,000**	**$11,580,000**	
CAWD Residential Rate:	**$1,026 / Year**	**$1,167 / Year**	2021 dollars (Not Adjusted for Inflation)
Estimate Accuracy Adjustments	**$822 / Year**	**$1,751 / Year**	-20% to +50% Accuracy at Conceptual Level

Alternative 2B – Pump to M1W CAWD Only

The organization of this alternative is the same as Alternative 2A. The only difference with this Alternative 2B is that the flows for the conveyance infrastructure would be less without PBCSD participation.

Administration

Same as Alternative 2A.

New Conveyance Capital Costs

Conveyance to M1W involves about 18 to 20 miles of pipe (depending on routing) and an estimated three or four new pump stations. The infrastructure would need to be designed to convey the range of flows from dry weather (0.80 MGD Average) to wet weather peaks of greater than 4 MGD.

The number of pump stations required would be the same as Alternative 2A. It is assumed that two pump stations would be needed to pump out of the Carmel River basin, and one or two additional pump stations in series would be required to pump the remaining 17 or so miles to M1W treatment plant North of Marina.

To convey between 0.8 MGD to 4 MGD of flow, a pipeline diameter of 14-inch is assumed in the cost estimate.

As explained in Alternative 2A, connecting to existing M1W pump stations in Monterey or Seaside would incur significant costs over the long term as these pump stations are not currently in a good state to receive CAWD flows. Therefore, this option is not being evaluated herein.

Calculations for Capital Cost for New Conveyance Infrastructure:

High Estimate: 20 miles X $2,000,000/mile for 14-inch diameter pipe = $40 Million

Low Estimate: 18 Miles X $1,200,000/mile for 14-inch diameter pipe = $22 Million

High Estimate 4 Pump Stations - $5 Million Each = $20 Million

Low Estimate 3 Pump Stations - $5 Million Each = $15 Million

Total Capital - $37 Million to $60 Million

New Conveyance Maintenance Costs

About 20 miles of pipelines and 4 pump stations would require ongoing maintenance. It is assumed that 10% a year of the total capital cost would be spent on maintenance over the lifecycle.

New Conveyance Energy Costs

Assuming 0.8 MGD average dry weather flow and 10 wet weather days a year with 3 MGD flow the total water that needs to be pumped to M1W annually would be 314 Million Gallons. This equates to an average of 598 gallons per minute (gpm) continuous. The water would need to be transported over a static head of 550 feet with friction losses along the 20 miles of pipeline of approximately 100 feet for a total dynamic head (TDH) of 650 feet.

The energy required to pump 598 gpm is calculated below.

HP = GPM x TDH / (Eff. X 3960)

KW = HP x 0.7457

Where:

HP = Horsepower

GPM = Gallons Per Minute Average = 820 gpm

TDH = Total Dynamic Head = 650 feet

Eff. = Pump wire to water efficiency = 50%

HP = 598 gpm x (650 feet) / (0.5 X 3960) = 196 HP

196 HP x 0.7457 = 146 kw x 30 days x 24 hours = **105,000 kwhr/month**

The energy required to pump to M1W would be about 105,000 kwhr/month. Assuming an electricity rate of $0.17 per kwhr the energy cost for conveyance would be about $215,000 per year.

Collection System

Same as Alternative 2A.

M1W Connection Fee

Same as Alternative 2A.

Treatment at M1W

Same as Alternative 2A.

CalPERS Termination Costs

Same as Alternative 2A.

Existing WWTP Decommissioning

Same as Alternative 1A.

Alternative 2B Summary

The following table summarizes the annual costs for operations, maintenance, and debt service. There are major capital and operating costs to pump to M1W, and significant connection charges associated with this alternative. It is known that M1W has not been investing in capital reserves or conducting capital improvements at the treatment plant. Therefore, costs for treatment shown at this time could be artificially low.

Alternative 2B – Annual Costs - Pump to M1W CAWD Only

	Low Estimate	High Estimate	Notes
Administration	$1,200,000	$1,200,000	Same as Existing
New Conveyance Capital Costs	$1,900,000	$3,100,000	$37M to $60M CapEx Amortized over 30 years @ 3%
New Conveyance Maintenance	$190,000	$310,000	10% Annually of New Conveyance Infrastructure Cost
New Conveyance Energy Cost	$215,000	$215,000	Extra Energy Use Required to Pump to M1W (In Perpetuity)
Collection System	$2,250,000	$2,250,000	Same as Existing + 25% of fixed costs for additional staffing for New Conveyance Infrastructure
M1W Connection Fee	$2,100,000	$2,100,000	$42M per Current M1W Connection Fees Amortized over 30 years @ 3%, doesn't include significant increase in connection fees from deferred maintenance/CIP projects
Treatment at M1W	$3,100,000	$3,100,000	Based on M1W 10-yr Fund Forecast
CalPERS Termination Costs	$450,000	$450,000	$9M Termination Liability Amortized over 30 years @ 3%
Existing WWTP Decommissioning	$500,000	$1,000,000	$10M to $20M CapEx Amortized over 30 years @ 3%
Subtotal:	**$11,905,000**	**$13,725,000**	
PBCSD Cost Share:	**($167,000)**	**($333,000)**	1/3 of Existing WWTP Decommissioning Only
SLR Fund Reserve:	**($1,000,000)**	**($1,000,000)**	Assume $30M in Accumulated SLR Reserve by 2050. ***This requires more than $1M annual investment if factoring in Inflation.***
CAWD Total:	**$10,738,000**	**$12,392,000**	
CAWD Residential Rate:	**$1,082 / Year**	**$1,249 / Year**	2021 dollars (Not Adjusted for Inflation)
Estimate Accuracy Adjustments	**$865 / Year**	**$1,873 / Year**	-20% to +50% Accuracy at Conceptual Level

Attachments:

- M1W Capacity Charges (Connection Fees)
- M1W 10-yr Wastewater Fund Forecast

Monterey One Water
Wastewater Capacity Charges

				2017/18	2018/19	2019/20	2020/21
Engineering News-Record Construction Cost Index (San Francisco)							
Beginning Index					11609.44		12014.72
Ending Index					12014.72		12764.52
Annual Adjustment %					3.5%		6.24%
RESIDENTIAL							
	102/103 107/109	Residential	Each living unit	$3,389.13	$3,507.44	$3,507.44	$3,726.33
COMMERCIAL/INSTITUTIONAL							
A.	001	Business/Government	Location/each business	2,076.75	2,149.25	2,149.25	2,283.38
D.	221	Hotel/Motel	Each room	1,287.00	1,331.93	1,331.93	1,415.05
E.	222	Bed & Breakfast Inn	Each room	838.50	867.77	867.77	921.92
F.	231	Supermarket	Location	24,717.09	25,579.95	25,579.95	27,176.31
G.	241	Medical Office	Each licensed physician	2,527.96	2,616.21	2,616.21	2,779.48
H.	242	Dental Office	Each licensed dentist	3,484.05	3,605.68	3,605.68	3,830.70
I.	243	Rest Home/Convalescent	Each bed of licensed capacity	786.11	813.55	813.55	864.32
J.	244	General Hospital	Each bed of licensed capacity	4,680.12	4,843.50	4,843.50	5,145.77
K.	245	Animal Hospital	Location/each business	5,338.26	5,524.62	5,524.62	5,869.39
L.	261	Restaurant–One Meal	Each restaurant seat	228.04	236.00	236.00	250.73
	262	Restaurant–Two Meals	Each restaurant seat	342.06	354.00	354.00	376.09
	263	Restaurant–Three Meals	Each restaurant seat	646.11	668.67	668.67	710.40
M.	264	Restaurant w/Bar	Each restaurant seat	646.11	668.67	668.67	710.40
N.	265	Bar	Location/each business	4,918.64	5,090.35	5,090.35	5,408.02
O.	266	Nightclub	Location/each business	14,717.20	15,230.97	15,230.97	16,181.49
P.	267	Takeout Food–Small	Location/each business	7,204.09	7,455.58	7,455.58	7,920.86
	268	Takeout Food–Medium	Location/each business	17,742.92	18,362.32	18,362.32	19,508.25
	269	Takeout Food–Large	Location/each business	32,329.29	33,457.89	33,457.89	35,545.89
Q.	270	Bakery	Location/each business	8,741.49	9,046.65	9,046.65	9,611.22
R.	281	Theater	Per screen at each location	6,691.75	6,925.36	6,925.36	7,357.55
S.	282	Bowling Center	Location/each business	20,341.50	21,051.61	21,051.61	22,365.37
T.	290	Mortuary	Location/each business	12,009.87	12,429.13	12,429.13	13,204.79
U.	291	School (Minimum)	Each business	2,076.75	2,149.25	2,149.25	2,283.38
	292	School (0-6)	School population	33.13	34.29	34.29	36.43
	293	School (7-College)	School population	66.26	68.57	68.57	72.85
	294	Boarding School	School population	768.30	795.12	795.12	844.74
V.	331	Service Station/Repair	Location/each business	2,297.94	2,378.16	2,378.16	2,526.57
	332	Service Station/Repair (11-20)	Location/each business	2,297.94	2,378.16	2,378.16	2,526.57
W.	353	Dry Cleaners	Location/each business	6,851.50	7,090.68	7,090.68	7,533.19
X.	354	Laundromats	Each washing machine	1,737.12	1,797.76	1,797.76	1,909.95
			Mobile washers	540.25	559.11	559.11	594.00
SPECIAL USERS (Billed Individually)							
		Separate Billed Industrial/Commercial					
		Flow ($ per gpd)		1,935.73	2,003.31	2,003.31	2,128.33
		BOD ($ per lb / year)		643.94	666.42	666.42	708.01
		SS ($ per lb / year)		809.46	837.72	837.72	890.00

1 Flow Factor = Wastewater Flow in gallons per day (gpd) / 150
2 Strength Factor = 0.5712 + [0.1900 x BOD strength / 300] + [0.2388 x SS strength / 300]
With BOD and SS strengths in milligrams per liter (mg/l)

Note: Ordinance 2017-02 indicates that fees shall increase based on the change in the ENR-CCI (San Francisco) from the prior Dec to Dec period.
Note: Capacity charges effective 2017/18 were based on a January 2017 ENR-CCI Index, hence the 2018/19 adjustment is from Jan-2017 to Dec-2017.
Note: Capacity charges effective 2020/21 were based on a January 2019 ENR-CCI Index, hence the 2020/21 adjustment is from Jan-2017 to Dec-2019.

C. Annual Increase in Capacity Charge

Commencing with Fiscal Year 2017-2018, the sewer capacity charge as determined here in above for a single-family residence and other uses shall increase on the first day of each fiscal year, that is, on July 1 of each year, by the same percent as the annual change in the December Construction Cost Index (CCI) for San Francisco of the prior year, published in the "Engineering News Record." If said annual change is less than two percent (2%), the change shall be deferred and combined with the increase for the next fiscal year.

CAWD User Categories

Category	Unit	Number	M1W 20/21	Total
Animal Hospital		3.00	5,869.39	17,608.17
Lg Animal Hospital		2.00	5,869.39	11,738.78
Bakery		4.00	9,611.22	38,444.88
Bar		28.00	5,408.02	151,424.56
Beauty Salon		32.00	2,283.38	73,068.16
Camera Shop		2.00	2,283.38	4,566.76
Church	ERU = 150	33.00	2,283.38	75,351.54
Cleaners		3.00	1,909.95	5,729.85
Convalescent	beds	108.00	864.32	93,346.56
Dental	dentists	17.00	3,830.70	65,121.90
Gym/Spa		3.00	2,283.38	6,850.14
Hotel	rooms	1,256.00	1,415.05	1,777,302.80
Laundromat	machines	48.00	1,909.95	91,677.60
Market	ERU = 150	19.00	2,283.38	43,384.22
Medical	physicians	21.00	2,779.48	58,369.08
Minimum/Vacant/Storage		131.00	2,283.38	299,122.78
Office	per 10 employees	428.00	2,283.38	977,286.64
Residential		7,113.00	3,726.33	26,505,385.29
Restaurant	seat/meal	11,619.25	376.09	4,369,883.73
Retail	per 10 employees	463.00	2,283.38	1,057,204.94
School (0-6)	Students/Employees	467.00	36.43	17,012.81
School (7-12)	Students/Employees	2,033.00	72.85	148,104.05
Service Station	per pump	5.00	2,526.57	12,632.85
Special	ERU = 150	57.00		1,700,000.00
Supermarket		2.00	27,176.31	54,352.62
Theater	seats	592.00	7,357.55	4,355,669.60
				42,010,640.31

The chart below provides an overview of M1W's projected expenses over the next ten years. The ten-year forecast includes the following assumptions:

- **Economy**
  Assumes no recession which would impact development related fees and the ability of M1W to raise fees to meet levels in its reserve policy.
- **Wages**
  Increases of approximately 3% annually. Future budgets assume the adding back of the staff positions frozen due to the fiscal impacts of COVID-19.
- **Health**
  Cost increases of 10% annually, assuming a 50% cost share by employees
- **Pensions**
  Includes the M1W's revised estimated pension contribution rates from CalPERS most recent actuarial.
- **Debt**
  Incorporates annual debt service on existing debt through their maturities. Assumes no additional debt during the 10 year period.
- **Capital Program**
  Projected Expenses from M1W's Capital Program have been included as part of the long-term forecast, assuming that projects will be funded out of reserves and revenues with no additional debt financing.
- **Reserves**
  Sets aside funds in order for M1W to meet its Operating and Capital Reserve policies within 5-10 years.
- **Other Expenses**
  Increases of 3-7% annually on non-personnel expenses representing estimated inflation rate, with some costs rising than rate of inflation.