M E E T I N G N O T I C E AND A G E N D A

TECHNICAL ADVISORY COMMITTEE OF THE SEASIDE BASIN WATER MASTER

DATE: Wednesday, February 13, 2019
MEETING TIME: 1:30 p.m.
Monterey One Water Offices
5 Harris Court, Building D (Ryan Ranch)
Monterey, CA 93940

If you wish to participate in the meeting from a remote location, please call in on the Watermaster Conference Line by dialing (515) 739-1015. Use the Meeting ID 355890617. Please note that if no telephone attendees have joined the meeting by 10 minutes after its start, the conference call will be ended.

OFFICERS
Chairperson: Nina Miller, California American Water Company
Vice-Chairperson: Jon Lear, MPWMD

MEMBERS
California American Water Company | **City of Del Rey Oaks** | **City of Monterey**
City of Sand City | **City of Seaside** | **Coastal Subarea Landowners**
Laguna Seca Property Owners | **Monterey County Water Resources Agency**
Monterey Peninsula Water Management District

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The next regular meeting will be held on Wednesday March 13, 2019 at 1:30 p.m. at the M1W Board Room.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2019
AGENDA ITEM:	2.A
AGENDA TITLE:	Approve Minutes from the January 9, 2019 Meeting
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Draft Minutes from this meeting was emailed to all TAC members. Any changes requested by TAC members have been included in the attached version.

ATTACHMENTS:	Minutes from this meeting
RECOMMENDED ACTION:	Approve the minutes

D-R-A-F-T
MINUTES

Seaside Groundwater Basin Watermaster
Technical Advisory Committee Meeting
January 9, 2019

Attendees: TAC Members

City of Seaside – Leslie Llantero
California American Water – Nina Miller
City of Monterey – Max Rieser
Laguna Seca Property Owners – Bob Costa
MPWMD – Jon Lear
MCWRA – Tamara Voss
City of Del Rey Oaks – No Representative
City of Sand City – Leon Gomez
Coastal Subarea Landowners – No Representative

Watermaster
Technical Program Manager - Robert Jaques

Consultants
Montgomery & Associates - Georgina King (via telephone)
Todd Groundwater – Gus Yates (via telephone)

Others
M1W – Bob Holden
MCWD – Patrick Breen

The meeting was convened at 1:33 p.m. after a quorum had been established.

1. Public Comments
There were no public comments.

2. Administrative Matters:

A. Approve Minutes from the December 12, 2018 Meeting
On a motion by Ms. Voss, seconded by Mr. Costa, the minutes were unanimously approved as presented.

B. Sustainable Groundwater Management Act (SGMA) Update
Mr. Jaques summarized the agenda packet materials for this item. There was no other discussion.

3. Continued Discussion of Basin Management Action Plan Update
Mr. Jaques summarized the agenda transmittal for this item and introduced the topic for discussion.

Ms. King described and discussed the two items covered in her "Description Paper" contained on pages 14-15 of the agenda packet.

With regard to the first item, she noted that using the long-term rather than the most recent five years of data is more consistent with the definition of Natural Safe Yield contained in the Decision. Ms. Voss asked if the Decision specified how to calculate Natural Safe Yield. Mr. Jaques and Ms. King responded that there was no specification for that in the Decision.

Mr. Lear asked if using the Natural Safe Yield approach would result in a higher or lower value than using the Sustainable Yield approach. Ms. King said that using the Natural Safe Yield approach would result in a higher value than using the Sustainable Yield approach.

Ms. Voss said that she favored using the long-term data period, rather than the most recent five years of data. Ms. King noted that using the most recent five years of data would result in a much lower value of Natural Safe Yield that using the 30 year (long-term) data period.

With regard to the second item, Ms. King reported that there is much more now known about the Basin than was the case when the Decision was prepared. She said that more water is now leaving the Basin and flowing into adjacent subbasins than is coming into the Basin. Consequently, her recommendation is to use the groundwater model to prepare a "Substantial Yield" analysis based on production quantities and where the wells are actually located. This would be done to optimize water management within the Basin. She went on to say that this is the same approach that is being used to develop groundwater sustainability plans for other basins under the Sustainable Groundwater Management Act. She also reported that groundwater sustainability plans, under the Sustainable Groundwater Management Act, must be reevaluated every five years to reflect changes in conditions.

Mr. Lear commented that a Sustainable Yield analysis should also be reevaluated to reflect operational changes as they occur.

Ms. King went on to say that she would need input from all of the pumpers in order to perform a Sustainable Yield analysis for the Basin.

Mr. Lear noted that it will be very complex to reevaluate each party's water rights under a Sustainable Yield approach, compared to the more simplistic Natural Safe Yield approach that was used in the Decision.

Mr. Yates recommended also taking into account salinity density effects in any new analysis, noting that this had not been done in developing the original Natural Safe Yield figure used in the Decision. He also went on to say that there are a number of legal precedents with regard to groundwater rights pertaining to storage of water in a basin.

Mr. Breen asked if the Pure Water Monterey project was a 100% recapture project, and Mr. Lear responded that it was.

Mr. Jaques proposed taking the following approach:

1. Request and receive from Montgomery and Associates a proposed scope of work and cost to perform a Sustainable Yield analysis.

2. Bring this proposal to the TAC for its consideration at the TAC's February 13 meeting.
3. If the TAC agrees with proceeding with the proposed scope of work, make that recommendation to the Board in conjunction with presenting to them the draft Updated Basin Management Plan at the Board's March meeting.

A motion was made and seconded to approve Mr. Jaques' proposed approach, and the motion passed unanimously.

Mr. Yates said he commended the TAC for making this decision.

4. Schedule

Mr. Jaques briefly summarized the agenda packet materials for this item and there was no other discussion.

5. Other Business

Ms. Llantero reported that a law firm is putting on a workshop in San Francisco in February regarding some aspects of the Sustainable Groundwater Management Act. There was no other discussion.

The meeting adjourned at 2:23 PM

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2019
AGENDA ITEM:	3
AGENDA TITLE:	Continued Discussion of Basin Management Action Plan (BMAP) Update
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

At its December 2018 meeting the TAC received a presentation from Georgina King of Montgomery & Associates on the Preliminary Draft Updated BMAP. At its January 2019 meeting the TAC received input from both Georgina King and Gus Yates of Todd Groundwater who had performed a peer review of the Preliminary Draft. Based on those discussions and input from the TAC and me, Ms. King has made revisions and the revised version, now simply called a "Draft" is the subject of Agenda Item No. 3.A.

As was discussed at those earlier TAC meetings, a significant finding of the Updated BMAP is that the Natural Safe Yield (NSY) of the Seaside Basin is less than the 3,000 AFY that the Adjudication Decision established. The new NSY recommended by the Updated BMAP is 2,370 AFY. This is significant because if the Watermaster adopts the lower NSY to replace the 3,000 AFY currently in the Adjudication Decision, and if the Court concurs with making that change, then water rights to the Standard Producers in the Basin will have to be recalculated. The recalculated water rights will be lower than they currently are based on the 3,000 AFY NSY.

Another recommendation of the BMAP Update is that instead of using NSY for Basin management, we instead begin using the Sustainable Yield approach. This, too, is significant for several reasons:

1. Performing the work to develop a Sustainable Yield for the Basin would be a complex and costly undertaking.
2. The Court would have to approve making the change from NSY to Sustainable Yield, and would then have to approve the Sustainable Yield approach once it is developed.
3. It would likely lead to reallocating water rights within the Basin.

For today's TAC meeting I am proposing that the TAC first consider approving the Draft Updated BMAP document as one action, and then as a second action begin its discussion of the Sustainable Yield approach. These are presented in Agenda Items No. 3.A and 3.B.

ATTACHMENTS:	None
RECOMMENDED ACTION:	Proceed to discuss these topics as two separate actions

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2019
AGENDA ITEM:	3.A
AGENDA TITLE:	Approve the Draft Updated Basin Management Plan
PREPARED BY:	Robert Jaques, Technical Program Manager

At the December 12, 2018 TAC meeting there was initial discussion of the Preliminary Draft Updated BMAP which had been prepared by Georgina King of Montgomery & Associates. Due to the significance of certain of the findings and conclusions in the Updated BMAP, I had Gus Yates of Todd Groundwater review the document and provide his comments on it and any recommendations he may have pertaining to it. At its January 9, 2019 meeting the TAC discussed Mr. Yates comments and recommendations with him and with Ms. King, both of whom participated in that meeting (via telephone).

Ms. King has revised the Preliminary Draft to reflect her discussions with Mr. Yates, comments received from Mr. Jaques, and input from the TAC into a version referred to simply as the Draft Updated BMAP. As with the agenda transmittal on this topic in the December 12 TAC agenda, because the Draft of the Updated BMAP is quite lengthy, only the Executive Summary from that document is attached. However, on January 24, 2019 a full copy of the document was posted for review on the Watermaster's website at:

http://www.seasidebasinwatermaster.org/Other/BMAP%20Updated%20Draft%201-21-19.pdf.

TAC members were notified of the posting of this revised document by email on January 25, 2019 to provide them sufficient time to review the entire document, if they chose to do so.

I believe that the Draft Updated BMAP fulfills Montgomery & Associates scope of work for this assignment, that it satisfactorily addresses the issues raised by Mr. Yates and the TAC, and that it should be approved by the TAC and forwarded to the Board for its consideration.

The two significant Draft Updated BMAP recommendations described in the preceding Agenda Item (to reduce the Basin's NSY to 2,370 AFY and to use the Sustainable Yield approach rather than NSY for Basin management) are discussed further in Agenda Item No. 3.B.

ATTACHMENTS:	The Executive Summary from the Preliminary Draft Updated BMAP
RECOMMENDED ACTION:	Approve the Draft Updated BMAP and forward it to the Board for their consideration

MONTGOMERY & ASSOCIATES

January 21, 2019

Seaside Groundwater Basin
2018 Basin Management Action Plan

SEASIDE GROUNDWATER BASIN WATERMASTER
MONTEREY COUNTY, CALIFORNIA

DRAFT
UPDATED BMAP

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1 EXECUTIVE SUMMARY

1.1 Introduction

The Seaside Groundwater Basin's (the Basin) court-appointed Watermaster's primary role is to administer and enforce the provisions of the Decision filed February 9, 2007 by the Superior Court in Monterey County under Case No. M66343 - California American Water v. City of Seaside et al. (the Decision). One provision of the Decision is the requirement to develop a Monitoring and Management Plan (M&MP), which the Watermaster developed in May 2006. The M&MP included a recommendation to prepare a Basin Management Plan. The first Basin Management Plan, titled the *Seaside Groundwater Basin Management Action Plan* (BMAP) was completed in February 2009 (HydroMetrics LLC, 2009a). This current report updates the previous BMAP with the benefit of nine additional years' worth of groundwater data and an enhanced understanding of the Basin.

1.2 Description and State of the Seaside Groundwater Basin

The Basin as delineated in Exhibit B of the Decision is bounded by the Pacific Ocean on the west, faults and bedrock on the south, bedrock on the east, and a groundwater flow divide on the northern boundary. The Decision subdivides the subbasins into four subareas: Northern Inland, Northern Coastal, Southern Inland, and Southern Coastal. The northern and southern subbasins are separated by the Laguna Seca Anticline. This feature, including the segment of the Ord Terrace Fault that offsets the anticline, forms a subsurface hydraulic barrier to groundwater flow (**Figure ES-1**). The coastal and inland subareas are not separated by any geologic features, and groundwater flow is continuous between coastal and inland subareas.

The Basin comprises three aquifers: a deep aquifer, a shallow aquifer, and surficial Aromas Sands. The deep aquifer generally consists of the Purisima Formation and Santa Margarita Sandstone. The shallow aquifer refers collectively to numerous discontinuous lenses of sand and gravel in the Paso Robles Formation overlying the Santa Margarita Sandstone and below the surficial Aromas Sand layer.

Figure ES-1. Seaside Basin Well Locations

Since the first BMAP, groundwater levels have continued to decline in all parts of the Basin except in the Southern Coastal Subarea and in shallow wells near the coast in the Northern Coastal Subarea. In those locations, groundwater levels remain stable. The continued groundwater level declines have not led to any observed seawater intrusion or other operational problems, other than the need to replace a monitoring well sampling pump so it can operate from a deeper depth. However, the declining groundwater level trend is not sustainable over the long-term.

The Basin's *Usable Stored Groundwater* is the amount of groundwater above protective groundwater elevations. It is estimated that the *Usable Stored Groundwater* is 6,350 acre-feet as of Fall 2017. The unsaturated area above the current groundwater table has approximately 90,600 acre-feet of *Total Usable Storage* space. Of the 90,600 acre-feet of total usable storage space, 62,020 acre-feet are in the Coastal and Northern Inland Subareas and 28,580 acre-feet are in the Laguna Seca Subarea. Using revised protective groundwater elevation surfaces, the sum of the *Usable Stored Groundwater* and the *Total Usable Storage* space is approximately 96,950 acre-feet.

The Basin has lost approximately 1,450 acre-feet per year of groundwater from storage since 1988. This equates to 43,500 acre-feet of groundwater lost from storage over 30 years. These losses are reflected in the lowered groundwater levels observed throughout the Basin.

A review of the Basin's Natural Safe Yield was conducted using the Basin's updated groundwater flow model. Using the same approach but different analysis period to that used in establishing the Natural Safe Yield in the Decision and in the first BMAP in 2009, the Natural Safe Yield was estimated to be 2,370 acre-feet per year over the past 30 years. This is less than the 2,850 acre-feet per year estimated in the 2009 BMAP, which was estimated over a six-year period between Water Years 2002 and 2007; and lower than the Natural Safe Yield of 3,000 acre-feet per year included in the Decision. Because the Natural Safe Yield estimate reflects the theoretical maximum amount of groundwater production that would have resulted in no decreases in groundwater in storage, it does not account for the uneven pumping distribution in the Basin which will cause localized groundwater level declines even at the lower Natural Safe Yield estimate.

Preventing future seawater intrusion requires raising groundwater levels near the coast to protective elevations. These groundwater elevations can be raised only if replenishment water is recharged into the Basin and not recovered, or pumping is reduced to less than the Natural Safe Yield.

1.3 Supplemental Water Supplies

Long-term supplemental supplies are needed to reduce pumping in the Basin to at or below the Natural Safe Yield; and to provide water which can be used to replenish the Basin. Developing these supplemental supplies is the strategy that will have the greatest impact on the Basin and allows for its long-term management and use in the future. Since the first BMAP, a number of projects have been developed by various project proponents and are in various stages of planning, environmental assessment, or construction. Most of these supplies are part of other larger programs.

The largest agency producers of groundwater in the Basin are California American Water Company (CAWC) and the City of Seaside. Supplemental water supply projects that have progressed the farthest focus on providing supplemental supplies to these two producers in order to meet their water rights as established by the Decision. These projects additionally provide water for CAWC to return to the Basin to restore the water it has over-pumped since the date of the Decision. A summary of supplemental water supply projects that are currently being considered, some of which are in the construction phase, is provided in **Table 1**. **Table 2** provides a summary of supplemental supply projects that have been implemented since the first BMAP was prepared in 2009. **Table 3** summarizes Basin management actions that have been implemented since 2009.

All of the projects and management actions, except one, are physical projects with capital costs associated with them. The exception is water conservation which does not produce additional supply but rather results in a demand reduction. Water conservation is already being given high priority by the Seaside Groundwater Basin Watermaster's (Watermaster) and its member agencies.

Table 1. Summary of Supplemental Water Supply Projects Currently Being Considered

Project	Project Proponent	Project Type and Capacity	Benefit to Seaside Basin	Status
Monterey Peninsula Water Supply Project (MPWSP)	California American Water Company (CAWC)	Desalinate (6.4 mgd plant capacity) saltwater extracted by slant wells; 7,167 AFY desalinated water, plus ASR wells for additional storage of desalinated water	Supplemental supply for CAWC so they can meet their adjudicated right, plus return to the Basin by in-lieu recharge, over a period of 25 years, the volume that they have historically over pumped Modeling predicts an increase in Basin groundwater levels	Draft EIR approved by California Public Utilities Commission (CPUC) in August 2018 CPUC approved project in September 2018
	Monterey One Water (M1W)	Inject purified wastewater from Pure Water Monterey (PWM) Project into the Seaside Basin; 3,500 AFY		EIR complete and infrastructure currently being constructed
Regional Urban Water Augmentation Project (RUWAP)	Marina Coast Water District (MCWD)	Distribute recycled water from the M1W Reclamation Plant; total of 1,727 AFY of recycled water to identified urban areas	Supplemental supply for two City of Seaside golf courses (Blackhorse and Bayonet, 450 AF) and 250 AF for a proposed golf course in Del Rey Oaks; total of 700 AFY supplemental supply to offset over-pumping of the Basin	Phase 1 under construction in 2018
Monterey Bay Regional Water Project (MBRWP or DeepWater Desal)	Deepwater Desal LLC (DWD)	Desalinate ocean water from a deep open ocean intake within the Monterey Canyon; 25,000 AFY potable water	Supplemental supply to meet water demand and keep pumping below the Safe Yield	Notice of Preparation/ Notice of Intent to prepare a Draft EIR/EIS issued in June 2015
People's Moss Landing Water Desalination Project (People's Project)	Moss Landing Green Commercial Park, LLC	Desalinate ocean water from an open ocean intake; 13,400 AFY potable water	Water to be used to meet needs of Monterey Peninsula area	Notice of Preparation for the People's Project issued in June 2015
Greater Monterey County Storm Water Resource Plan (SWRP)	Multiple entities	Provide more source water for PWM by identifying storm water capture opportunities and/or direct recharge of storm water	Water for use in recharging, or reducing pumping from the Basin	Planning stage

Table 2. Summary of Supplemental Supply Projects Implemented since 2009

Project	Project Proponent	Project Type and Capacity	Benefit to Seaside Basin	Status
Sand City Water Supply Project	Owner: City of Sand City Operator: CAWC	Desalinate brackish source water; up to 300 AFY desalinated water	Supplemental water supply helps reduce pumping from the Basin	Facilities completed and placed into operation in 2010
Carmel River Water Aquifer Storage and Recovery Project (aka Seaside ASR) – Phases 1 & 2	Monterey Peninsula Water Management District (MPWMD)	Divert excess Carmel River winter flows during high flow periods, treat, and inject into four ASR wells for recovery by CAWC during dry periods; Phase 1 (2 wells) = up to 2,400 AFY stored, with an average annual yield of 920 AFY; Phase 2 (2 wells) = up to 2,900 AFY stored, with an average annual yield of 1,050 AFY	Supplemental water supply for the Basin	Phase 1 completed in 2007 and operational in 2008; Phase 2 completed in stages with one ASR well operational in 2012 and the second ASR well operational in 2015
Pacific Grove Wastewater Reuse Project	City of Pacific Grove	Treat and distribute reclaimed waste water for irrigation; 100 – 125 AFY	No benefit to Basin	Facilities completed and placed into operation in 2017

Table 3. Summary of Management Actions Implemented since 2009

Action	Proponent	Project Type and Capacity	Benefit to Seaside Basin	Status
Water Conservation	All municipal suppliers	Public awareness	Reduced water demand	Ongoing.
Irrigate the Bayonet and Blackhorse Golf Courses with Water from the Ord Community Water System	City of Seaside	MCWD temporarily provided 2,160 AF to City of Seaside over a period of six years	Temporary supplemental water supply for the Basin used in-lieu of pumping by the City of Seaside	This source was used from 2010 – 2015

1.4 Groundwater Management Actions

A number of management actions could be implemented by various water agencies to delay the onset of seawater intrusion and maximize the use of groundwater. Any action that assists in appropriate management of the Basin should be encouraged and supported by the Watermaster. Of the near-term management actions reviewed in this BMAP, the following appear to be the most cost-effective, most likely to be implemented, and provide the greatest benefit to the Basin:

- Install Southern Coastal Subarea wells in coordination with the Watermaster to determine optimal pumping locations that do not cause groundwater levels to fall below protective elevations,
- Use recycled water in the Laguna Seca Subarea for golf course irrigation,
- Support water conservation,
- Coordinate with the Salinas Valley Basin Groundwater Sustainability Agency and Marina Coast Water District Groundwater Sustainability Agency to ensure that sustainable management criteria included in the neighboring Groundwater Sustainability Plans (GSPs) do not limit the Watermaster's sustainable management of the Basin, and
- Enhance storm water recharge of the City of Seaside's storm water.

The recommended near-term actions are not intended to provide long-term solutions for restoring groundwater levels in the Basin, although some near-term solutions may have long-term benefits.

1.5 Other Recommendations

This updated BMAP identifies other recommendations that need to be addressed and pursued by the Watermaster.

- Use the groundwater flow model to evaluate the combination of Basin management actions and supplemental water supply projects to determine their ability to raise groundwater levels to protective elevations.
- Re-evaluate the Basin's natural safe yield given the impacts of various projects currently being implemented.
- Continual annual analyses of groundwater levels and quality.

SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2019
AGENDA ITEM:	3.B
AGENDA TITLE:	Discuss Draft Updated BMAP Recommendations to: (1) Reduce the Basin's NSY to 2,370 AFY and (2) to Use Sustainable Yield Rather Than NSY for Basin Management
PREPARED BY:	Robert Jaques, Technical Program Manager

Reducing the NSY

The Discussion Paper contained in Attachment 3 quantifies approximately the pumping reduction impacts that would be incurred if the lower NSY of 2,370 AFY reported in the Updated BMAP were to replace the original 3,000 NSY established by the Adjudication Decision. As noted in the Discussion Paper, continuing to stay with the NSY approach but using the lower NSY value would have significant consequences on the Standard Producers.

Using Sustainable Yield Rather than NSY for Basin Management

Pages 14-15 of the agenda packet for the January 9, 2019 meeting contained a *Discussion Paper* prepared by Georgina King of Montgomery & Associates. The *Discussion Paper* was prepared to respond to the comments and suggestions made by Gus Yates when he performed a peer review of the *Preliminary Draft Updated Basin Management Action Plan* (BMAP). The second topic covered in the *Discussion Paper* pertained to the method used to develop the Natural Safe Yield (NSY) for the Seaside Basin. A copy of that portion of the *Discussion Paper* is attached as Attachment 1.

After discussing this topic at its January 9th meeting, the TAC approved soliciting a Proposal from Montgomery & Associates to prepare a Sustainable Yield (SY) analysis.

Attachment 2 contains the Proposal received from Montgomery & Associates. It is evident from the Proposal that performing an SY analysis will be a complex and costly undertaking. It will require considerable interaction with the TAC to develop basin-wide operational parameters and management targets. Examples of potential management targets would include managing the Basin's groundwater levels to meet the protective groundwater elevations at the coast, or setting groundwater elevation targets at Laguna Seca wells to halt declining groundwater levels at a level acceptable to the groundwater users. The SY analysis will rely entirely on the predictive portion of the Seaside Basin groundwater model. The underlying assumptions of the predictive model will need to be updated for the model to be comparable to groundwater models being used in the larger Salinas Valley. When the model was developed in 2009, the TAC provided substantial input on assumptions related to how long the predictive period was to be, what future climate to use, and what future pumping to include over the predictive period. While some of these are impossible to forecast exactly, it will be important to use assumptions that reflect current science and Basin understanding and therefore some updates, which will involve TAC discussion and input, will be necessary.

If the work described in Attachment 2 were to be undertaken then a Request for Service (RFS) would need to be issued to Montgomery & Associates. Undertaking this work was not included in the 2019 Monitoring and Management Plan (M&MP) or in the FY 2019 M&MP Operations Budget, because the recommendation to do this work did not arise until the Updated BMAP was received. In

AGENDA ITEM:	3.B (Continued)

order to proceed with this work, and in conjunction with seeking Board approval to do so, funding would need to be obtained by having the Board increase the Budget to cover these costs. The Contingency line-item in the 2018 M&MP Operations Budget is far too small to cover these projected costs, so I anticipate that, if the Board wished to pursue this work, it would defer it until 2020 so it could be included in the 2020 M&MP Work Plan and Operations Budget. I also anticipate that the Board would first wish to seek the Court's approval to make the change from NSY to SY. The Discussion Paper contained in Attachment 3 outlines the types of issues I anticipate would need to be addressed if such a change were to be pursued by the Watermaster.

Because of the complexity of these issues, I believe the Watermaster should proceed very thoughtfully and carefully in determining what, if any, changes to propose making to the Court. The approach I feel would be the best would be as follows:

1. Continue discussion of these two topics at the TAC's March meeting to better identify the pros and cons of each of them.
2. Have Watermaster staff then meet with representatives of the Standard Producers to discuss these topics with them and to solicit their input.
3. Obtain legal counsel input and advice on how these issues would need to be addressed by the Court and by revisions to the Adjudication Decision.
4. At the Board's June meeting:
    a. Have Montgomery & Associates present the Draft Updated BMAP.
    b. Highlight to the Board the pumping reduction impacts that would be associated with reducing the NSY to the 2,370 AFY level reported in the Draft Updated BMAP.
    c. Have Montgomery & Associates provide to the Board an introduction to the Sustainable Yield approach so Board members will understand the difference between the NSY approach and the Sustainable Yield approach, and why the Sustainable Yield approach could be a better method of managing the Basin than continuing to use the NSY approach.
    d. Inform the Board of input received from the Standard Producers and legal counsel on NSY and Sustainable Yield issues.
5. Obtain Board direction on whether they:
    a. Wish to stay with the NSY approach or pursue the Sustainable Yield approach.
    b. If they wish to stay with the NSY approach, do they wish to seek Court approval to use a value of 2,370 AFY in place of the 3,000 AFY established in the Decision.
6. Perform follow-up work in response to questions and direction from the Board and provide that information to them at one of their subsequent meetings.

ATTACHMENTS:	1. Excerpt from Ms. King's Discussion Paper Pertaining to the Method Used to Determine the Safe Yield of the Basin 2. Proposal from Montgomery & Associates to Perform a Sustainable Yield Analysis of the Seaside Basin 3. Discussion Paper of issues to be addressed if the NSY of the Basin were to be reduced to 2,370 AFY and if a change from using NSY to using SY were to be pursued
RECOMMENDED ACTION:	Provide direction to the Technical Program Manager on proceeding with further discussion and/or action on these issues

Attachment 1

Excerpt from Ms. King's Discussion Paper Pertaining to the Method Used to Determine the Safe Yield of the Basin

Ms. King's comments on this topic are as follows: Although not implicitly included in Mr. Yates' BMAP review Memo, but included in his report comments and in his evaluation of the long- and short-term water budgets, he suggests that the method used since 2005 to estimate Natural Safe Yield is not complete enough given changing operations and conditions in the Basin.

The Natural Safe Yield is defined in the Decision as the quantity of groundwater existing in the Seaside Basin that occurs solely as a result of natural replenishment. The only truly natural replenishment is from percolation of rainfall into the aquifers. Through the use of the groundwater model, we have come to understand that although some replenishment occurs from inflow from neighboring basins, more subsurface groundwater leaves the Seaside Basin than enters it, and there is a net subsurface loss from the Basin to neighboring basins. The amount of net outflow from the Basin over the past five years is more than the long-term average (1988-2017). If you assume rainfall recharge has remained essentially the same, then the biggest change to natural replenishment is increased outflow to neighboring basins. Increased injection for temporary storage of imported water and decreased native groundwater pumping, has changed how groundwater moves within, and in and out of the Basin. Another way to look at it is that increased Basin outflows are due to groundwater levels in the neighboring basins being lower than those in the Seaside Basin thereby causing increased flows out of the Seaside Basin.

The method used to estimate Natural Safe Yield is now recognized as not being complete enough to take into account the complexities of inflows and outflows that are occurring, and which ultimately effect the amount of groundwater that can sustainably be pumped from the Basin. A more robust method would be to use the groundwater model to optimize the amount of pumping that can be sustained (Sustainable Yield) at existing (and/or new) wells, given management targets such as meeting protective groundwater elevations and/or stopping declining groundwater levels. The TAC should be involved in determining all the operational parameters and management targets to include in such optimization runs. The scope of this modeling was not included in the update to the BMAP because the level of effort was assumed to be the same as for the 2009 BMAP, but aided with the long-term water budget data from the model.

The draft updated BMAP includes a recommendation (Recommendation 2) to use the groundwater model to conduct additional model runs to simulate a combination of basin management actions and supplemental water supply projects that would be able to raise groundwater levels to protective levels. This would be part of the improved approach to estimating Sustainable Yield using the groundwater model.

Attachment 2

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February 1, 2019

Mr. Bob Jaques
Seaside Watermaster Technical Program Manager
83 Via Encanto
Monterey, CA 93940

SUBJECT: COST PROPOSAL FOR SEASIDE BASIN SUSTAINABLE YIELD ANALYSIS

Dear Mr. Jaques:

Montgomery & Associates (M&A) appreciates the opportunity to present this scope of work and cost for estimating the Sustainable Yield of the Seaside Basin (Basin).

As described in the recent BMAP Update, the simplified method used to estimate Natural Safe Yield is now recognized as not being complete enough to take into account the complexities of inflows and outflows that are occurring in the Basin, and which ultimately affect the amount of groundwater that can be sustainably pumped from the Basin without causing negative effects. A more complete approach to managing the Basin is to use the Seaside Basin Watermaster model (model) to optimize the amount of pumping that can be sustained (Natural Sustainable Yield) at existing and/or new wells. This Natural Sustainable Yield acknowledges management targets such as stopping declining groundwater levels or meeting protective groundwater elevations. The model is the appropriate tool for integrating the effects of various pumping rates with operating or planned projects in the Basin. It is important that the Technical Advisory Committee (TAC) provide input for determining all the operational parameters and management targets to include in the analysis of Sustainable Yield.

This scope of work outlines tasks to estimate the Natural Sustainable Yield. Tasks include developing management targets and updating the predictive portion of the model. Additional tasks include simulating and optimizing a combination of management actions and supplemental water supply projects to estimate the Natural Sustainable Yield.

The tasks described below may be more than the TAC would like to include in the modeling for the Natural Sustainable Yield analysis, and therefore some tasks are identified as optional tasks in the task heading.

TASK 1. DEVELOP OPERATIONAL PARAMETERS & MANAGEMENT TARGETS

M&A will support the TAC in developing basin-wide operational parameters and management targets to be used in the Natural Sustainable Yield optimization modeling runs. Examples of potential management targets would include managing the Basin's groundwater levels to meet the protective groundwater elevations at the coast, or setting a groundwater elevation target at Laguna Seca wells to halt declining groundwater levels at a level acceptable to the groundwater users.

We anticipate attending and participating in up two TAC meetings in person for this task. The costs for TAC meetings are included in Task 7.

TASK 2. EXTEND PREDICTIVE MODEL CLIMATE

The analysis of Natural Sustainable Yield relies entirely on the predictive portion of the model. There are a number of aspects and underlying assumptions of the predictive model that need to be updated for the model to be comparable to groundwater models being used in the larger Salinas Valley. These updates were not part of the recent model update as that effort was purely to update and calibrate the historical Model.

When the model was developed in 2009, the TAC provided substantial input on assumptions related to how long the predictive period was to be, what future climate to use, and what future pumping to include over the predictive period. We acknowledge that some of these are impossible to forecast exactly, but it is important to use assumptions that reflect current science and Basin understanding and therefore some updates are necessary.

TASK 2.1. EXTEND HISTORICAL HYDROLOGY BASELINE SCENARIO

Since 2009, all predictive simulations using the model have been based on repeating the historical hydrology from the 22-year model calibration period of 1987 – 2008. The current predictive simulation runs from 2009 through 2042. While maintaining this approach allows for direct comparison between new simulations and previous simulations, it does not take advantage of the additional nine years of hydrologic and climatic data that have been incorporated into the historical model. The historical model was updated in 2014 and 2018, and now includes a continuous 31 year hydrologic record from 1987 through 2017. Significantly, this 31-year hydrologic record includes the recent 2012-2015 drought. We propose that this full 31-year historical hydrology and climate dataset be used as basis for all predictive modeling, as this incorporates a broader range of potential climate variability.

There are two options for extending the hydrology for the historical predictive baseline:

1. Simply repeat the 31-year hydrology from 1987 – 2017, so that the baseline scenario is extended out 31-years from 2018 to 2048.

2. Extend the predictive model, based on repeating the new extended historical climate record out to 2070, which is more consistent with the long-term planning horizon that will be used in neighboring basins under SGMA compliance.

From the perspective of the Natural Sustainable Yield analysis, there is a strong benefit to having a longer extended predictive simulation period (e.g. out to 2070 instead of 2048). As will be further discussed below in Task 5, the analysis consists of first identifying a shorter-term Basin yield which allows groundwater levels to reach their management targets within a defined time-frame, and then estimating an increased longer-term Natural Sustainable Yield that keeps levels at these targets into the future. Having a longer extended simulation period allows for more flexibility on selecting a reasonable time-frame over which management targets can be met without having to ramp production down too quickly, and it also provides a longer period over which to evaluate the longer-term Natural Sustainable Yield, taking into account historical variability in hydrology and climate.

The updated and extended baseline model will be run and processed to produce a baseline water budget and hydrographs to be used for comparison against subsequent simulations.

TASK 2.2. CONVERT HISTORICAL CLIMATE BASELINE SCENARIO MODEL TO FUTURE CLIMATE CONDITION MODEL (OPTIONAL)

Previous predictive model simulations for the basin have not taken the effects of likely climate change into account: including projected changes in precipitation, temperature, and evapotranspiration. These are projected future conditions that would impact the magnitude and timing of both natural groundwater recharge and surface water deliveries to the Basin. If the TAC feels that management of the Basin should take into account climate change, we propose modifying the baseline predictive simulation model with projected future climate conditions.

For this task we will leverage new California-specific climate change datasets, data preparation tools, and guidance that have been developed by DWR in support of SGMA Groundwater Sustainability Plan development (DWR, 2018). DWR provides basin-specific climate change factors that allow historical hydrology and climatological data to be converted into datasets representative of projected near-future climate conditions in 2030, and late-future climate conditions in 2070. Depending on the degree of climate change uncertainty to be considered, datasets can be chosen that represent three different climate scenarios including Central Tendency, Drier with Extreme Warming, and Wetter with Moderate Warming. A single climate change scenario will be selected in consultation with the TAC, and the DWR climate change factors will be applied to inputs of the historical climate model to represent future climate conditions and hydrology.

TASK 3. INCORPORATE SEA LEVEL RISE AT OCEAN BOUNDARIES (OPTIONAL)

In this task we will incorporate estimates of projected sea level rise over the next century into the predictive model simulation by adjusting the head boundary conditions specified along the ocean boundary. Generally speaking, sea level rise is expected to increase seawater intrusion and/or the risk of sea water intrusion in coastal aquifers, though the magnitude of the effects due to sea level rise alone are highly dependent on local conditions. The sea level rise estimates will be based on the projected levels for Monterey Bay from the 2018 update of the State of California Sea-Level Rise Guidance document recently released by the California Ocean Protection Council (OPC, 2018). It should be noted that adjustments to the sea level elevations will also entail simple equivalent adjustments to the protective head elevations as they are tied to sea level.

TASK 4. INCORPORATE ALL EXISTING AND APPROVED/PLANNED SUPPLEMENTAL SUPPLY PROJECTS INTO BASELINE MODEL

We will update the predictive model to include various supplemental supply projects likely to be, or are in the process of being, constructed, as described in the 2019 BMAP Update. TAC involvement will be crucial to developing a predictive model that incorporates all of the projects envisioned over the predictive period, such as the Monterey Peninsula Water Supply Project (MPWSP), the Regional Urban Water Augmentation Project (RUWAP), Carmel River water ASR, and potentially other projects such as stormwater recharge projects. M&A will work with the TAC to finalize a list of projects and their planned implementation schedule. For costing purposes we have assumed incorporating up to three new projects not previously modeled and extending previously modeled projects.

The Pure Water Monterey project and existing phases of the Carmel River water ASR have already been modeled through 2041 but operational assumptions will need to be extended through the end of the predictive model period if it is extended, and other operational changes may be incorporated, such as increasing recharge if additional water sources such as RUWAP are included. We assume we will receive technical support from MPWMD who will provide recharge volumes based on climate, similar to what they have provided us before.

TASK 5. OPTIMIZATION SCENARIO SIMULATIONS

TASK 5.1. PREPARE SCENARIO INPUTS AND SETUP SUSTAINABLE OPTIMIZATION MODEL

M&A will work with the TAC to identify production wells that will be used in optimization. This may include only the Standard Producers, or a combination of Standard and Alternate Producers. There are other potential management actions such as installing new wells in either the Southern Coastal Subarea or the Northern Inland Subarea, or shifting a portion of production to these new wells, but this will likely require development of a separate scenario and therefore additional budget. Costs for development of additional scenarios are provided as an optional line item in the budget.

Given the management targets from Task 1 and wells identified for use in optimization, the USGS MODFLOW Groundwater Management Optimization process (GWM) will be configured to optimize average production rates at a predetermined set of wells such that the defined management targets at specific locations (e.g. groundwater levels) are met within a specified time frame and then maintained at those levels in the future. There will be two different Basin yields estimated. The first will be the yield that allows the Basin to achieve its management targets, and the second will be the Natural Sustainable Yield. Reaching management targets will require pumping less than the Natural Sustainable Yield until targets are achieved, thereafter, the Basin yield can be increased to the Natural Safe Yield that keeps groundwater levels at Basin management targets.

For costing purposes, we assume that a single set of management targets to be met within a single defined time frame will be used for the scenario, and that if multiple scenarios are developed, they will be based on the same baseline climate model (e.g. either Historical Climate or Climate Change Baseline).

TASK 5.2. RUN AND PROCESS OPTIMIZATION SCENARIO

In this task we will run the optimization model and process the model results, and document the scenario and the results with hydrographs and maps, along with a brief text summary.

TASK 6. PREPARE TECHNICAL MEMORANDUM

We will prepare a technical memorandum which documents Task 1 through 5, with a synthesis of the model optimization results and water budgets and Natural Sustainable Yield analysis for the Basin based on the identified management targets. For costing purposes we assume preparing one draft, responding to and addressing one round of review comments, and one final version of the report. The report will be provided in MSWord and PDF formats.

TASK 7. ATTEND TAC AND BOARD MEETINGS

In support of Tasks 1 – 5, to get input and direction from the TAC, and to report on progress and findings, we will prepare presentations and attend those monthly TAC meetings at which this work will be discussed. For costing purposes we assume preparing for and attending up to five TAC meetings. One in-person Board meeting is also included to present the findings of the analysis. Should the number of meetings be more than those assumed above, additional budget will be required to prepare for and attend those meetings.

MODELING CONTINGENCY

Modeling the long-term optimization of integrated groundwater management at a basin-wide scale is a complex process with several technical challenges that can arise and can lead to additional effort not originally scoped out. For this reason we have allocated a contingency budget corresponding to 40 additional hours of modeling effort (11% of the lead modeling effort for Tasks 2- 5) to address unexpected model integration or optimization issues that may arise during the modeling components of the project. This contingency task budget will not be used without prior consultation and approval from the client.

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PROJECT BUDGET AND SCHEDULE

We anticipate that this work can be completed within an eight month period, though the timing may depend on the scheduling of TAC and Board meetings. We can begin work on this immediately following notice to proceed.

The total estimate costs for these tasks is $133,035 as detailed in the attached cost table. As mentioned previously, there are a few optional tasks that we have included which may need to be discussed at the Technical Advisory Committee level.

Please feel free to contact us with any questions about the proposed scope of work and budget.

Sincerely,

Derrik Williams

Derrik Williams, Principal Hydrogeologist
E.L. MONTGOMERY & ASSOCIATES

Georgina King, Senior Hydrogeologist
E.L. MONTGOMERY & ASSOCIATES

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Cost Estimate for Seaside Basin Watermaster Sustainable Yield Modeling Analysis									
		Montgomery & Associates Labor						Other Direct Costs	TOTALS
		Scientist VIII	Scientist VI	Scientist V	Scientist III	Labor Total			
		D. Williams	G. King	P. Benito	N. Byler				
Task	Hourly Rates	$225	$200	$185	$145	Hours	($)	($)	
1.0	**Develop Operational Parameters & Management Targets**								
	Support TAC in developing Operational Parameters & Management Targets	8	32	36	0	76	$14,860	$0	$14,860
	Task 1 Subtotal	*8*	*32*	*36*	*0*	*76*	*$14,860*	*$0*	*$14,860*
2.0	**Extend Predictive Model Climate**								
2.1	Option 1: Extend Historical Hydrology Baseline Scenario to 2048	0	2	24	0	26	$4,840	$0	$4,840
	Option 2: Extend Historical Hydrologic Baseline Scenario to 2070	0	2	32	0	34	$6,320	$0	$6,320
	Run and Process Model Results	0	0	12	0	12	$2,220	$0	$2,220
	Document Results and Water Budget	1	1	12	4	18	$3,225	$0	$3,225
2.2	Convert Historical Climate Baseline Model to Future Climate Condition Model (Optional)	2	4	60	0	66	$12,350	$0	$12,350
	Run and Process Model Results	0	0	12	0	12	$2,220	$0	$2,220
	Document Results and Water Budget	1	1	12	4	18	$3,225	$0	$3,225
	Task 2 Subtotal (with Option 2 for Task 2.1)	*4*	*8*	*140*	*8*	*160*	*$29,560*	*$0*	*$29,560*
3.0	**Incorporate Sea Level Rise at Ocean Boundaries (Optional)**								
	Adjust General Head Boundaries to account for predicted sea level rise rate over model period	2	4	16	0	22	$4,210	$0	$4,210
	Optional Task 3 Subtotal	*2*	*4*	*16*	*0*	*22*	*$4,210*	*$0*	*$4,210*
4.0	**Incorporate All Existing and Approved/Planned Supplemental Supply Projects Into Baseline Predictive Model**								
	Set up modified input files including projects	2	4	32	4	42	$7,750	$0	$7,750
	Run and Process Model Results	0	0	12	0	12	$2,220	$0	$2,220
	Document Results and Water Budget	1	1	12	4	18	$3,225	$0	$3,225
	Task 4 Subtotal	*3*	*5*	*56*	*8*	*72*	*$13,195*	*$0*	*$13,195*
5.0	**Optimization Scenario Simulations**								
5.1	Prepare Scenario Inputs and Setup Sustainable Optimization Model	2	8	40	0	50	$9,450	$0	$9,450
5.2	Run and Process Optimization Scenario								
	Run and Process Model Results	0	1	12	0	13	$2,420	$0	$2,420
	Document Results and Water Budget	2	2	12	4	20	$3,650	$0	$3,650
	Task 5 Subtotal	*4*	*11*	*64*	*4*	*83*	*$15,520*	*$0*	*$15,520*
6.0	**Prepare Technical Memorandum**								
	Synthesize Simulation Results and Develop Sustainable Yield	8	30	40	32	110	$19,840	$0	$19,840
	Task 6 Subtotal	*8*	*30*	*40*	*32*	*110*	*$19,840*	*$0*	*$19,840*

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		Montgomery & Associates Labor						Other Direct Costs	TOTALS
		Scientist VIII	Scientist VI	Scientist V	Scientist III	Labor Total			
		D. Williams	G. King	P. Benito	N. Byler				
Task	Hourly Rates	$225	$200	$185	$145	Hours	($)	($)	
7.0	**TAC and Board Meetings**								
	Prepare for and attend up to five onsite TAC meetings and one Board meeting	16	80	16	0	112	$22,560	$1,050	$23,610
	Task 7 Subtotal	*16*	*80*	*16*	*0*	*112*	*$22,560*	*$1,050*	*$23,610*
	Modeling Contingency (11%)								
	Contingency for Modeling Tasks 2-5	0	0	40	0	40	$7,400	$0	$7,400
	Task 9 Subtotal	*0*	*0*	*0*	*0*	*40*	*$7,400*	*$0*	*$7,400*
	Total (with Option 2 for Task 2.1)	**45**	**172**	**392**	**52**	**701**	**$131,985**	**$1,050**	**$133,035**
	Total without Optional Task 2.2. and 3	**40**	**163**	**292**	**48**	**583**	**$109,980**	**$1,050**	**$111,030**

Additional Optimization Scenarios								
Prepare for and Setup Optimization Model	2	8	32	0	42	$7,970	$0	$7,970
Run and Process Optimization Scenario								
Run and Process Model Results	0	1	12	0	13	$2,420	$0	$2,420
Document Results and Water Budget	2	2	12	4	20	$3,650	$0	$3,650
Additional Optimization Scenario Total	*4*	*11*	*56*	*4*	*75*	*$14,040*	*$0*	*$14,040*

Attachment 3

Discussion Paper of Issues to be Addressed if a Change were to be Made to the Basins' Natural Safe Yield, and if a Change were to be Pursued from Using Natural Safe Yield to Using Sustainable Yield

Natural Safe Yield Approach

The Adjudication Decision ("Decision") uses the Natural Safe Yield (NSY) approach to establish the total quantity of water that producers may pump from the Seaside Basin, and to allocate that quantity amongst the various producers. Under the NSY approach used in the Decision, Alternative Producers have first rights to the NSY, and Standard Producers share in the amount of NSY remaining after the Alternative Producer allocations have been made. The Decision established an initial Basin-wide NSY at 3,000 AFY, and allocated 1,387 AFY of this NSY to Alternative Producers. That left 3,000 – 1,387 = 1,613 AFY to be divided among the Standard Producers. If the lower NSY of 2,370 AFY reported in the Updated BMAP were to replace the Decision's initial NSY of 3,000 AFY, the Standard Producers would need to reduce their collective annual pumping to 2,370 – 1,387 = 983 AFY. This means they would have to reduce their pumping by an additional 630 AFY.

There were originally a total of 4 Standard Producers, but at this time there are 5, since one of the original Alternative Producers converted to a Standard Producer several years. Of the Standard Producers Cal Am would receive approximately 90% of the available NSY and the City of Seaside's Municipal System would receive approximately 7% of the available NSY. The other 3 Standard Producers would receive the remaining approximately 3% of the NSY. If the lower NSY of 2,370 AFY were to replace the initial NSY of 3,000 AFY, Cal Am would need to further reduce its pumping by approximately 570 AFY and the City of Seaside's Municipal System would have to reduce its pumping by approximately 44 AFY.

It would likely be very difficult if not impossible for these two large producers to accomplish making these additional pumping reductions while still supplying the water demands of their customers.

Sustainable Yield Approach

If Sustainable Yield (SY) were used instead of NSY a new method of allocating pumping rights to each producer would have to be developed. The SY for the entire Basin would be the sum of the production quantities that each well could produce and still prevent Material Damage from occurring. The SY analysis would involve making numerous assumptions, and alternative pumping scenarios that could involve redistribution of pumping locations and quantities could be some of those assumptions. Therefore, developing an SY that would have the least adverse impact on each producer would be a complex and iterative process.

Changing to the SY approach would first have to be approved by the Court. The SY analysis would then need to be prepared and submitted to the Court for its review and approval before it could be used to replace the NSY approach used in the Decision. If the Court approved using the SY analysis, then the Decision would need to be amended to reflect this. All of this would involve considerable staff and legal counsel time and effort.

SEASIDE GROUNDWATER BASIN

SUSTAINABLE YIELD

MONTGOMERY & ASSOCIATES

Presented to the Seaside Basin Technical Advisory Committee

February 13, 2019

SAFE YIELD

- Assumes the “safe” amount to pump cannot be more than the rate of natural recharge
- This is referred to as the “Water-Budget Myth”
- It is an oversimplification of information needed to understand the effects of using a groundwater system
- As human activities change the system, the components of the water budget (inflows, outflows, and changes in storage) change and must be accounted for in any management decision

GROUNDWATER (1988 – 2017) BUDGET

Recharge Source	Northern Coastal Subarea	Northern Inland Subarea	Southern Coastal Subarea	Laguna Seca Subarea	Total
	Acre-feet per Year				
Basin Inflows					
Percolation from streams	0	0	0	0	0
Deep Percolation					
Rainfall	510	1,670	130	900	3,210
Irrigation & System Losses	150	20	100	10	280
Injection wells	260	0	0	0	260
Groundwater inflow					
From adjacent subareas	2,900	1,520	520	360	5,300
From adjacent basins	130	400	50	770	1,350
From offshore area	490	0	10	0	500
Total inflows	4,440	3,610	810	2,040	10,900
Basin Outflows					
Wells	3,660	70	170	680	4,580
Groundwater outflow					
To adjacent subareas of the Basin	290	2,710	550	1,750	5,300
To adjacent basins	280	1,310	70	490	2,150
To offshore area	260	0	60	0	320
Total outflows	4,490	4,090	850	2,920	12,350
Storage Change					
Based on Inflows-Outflows	-50	-480	-40	-880	-1,450

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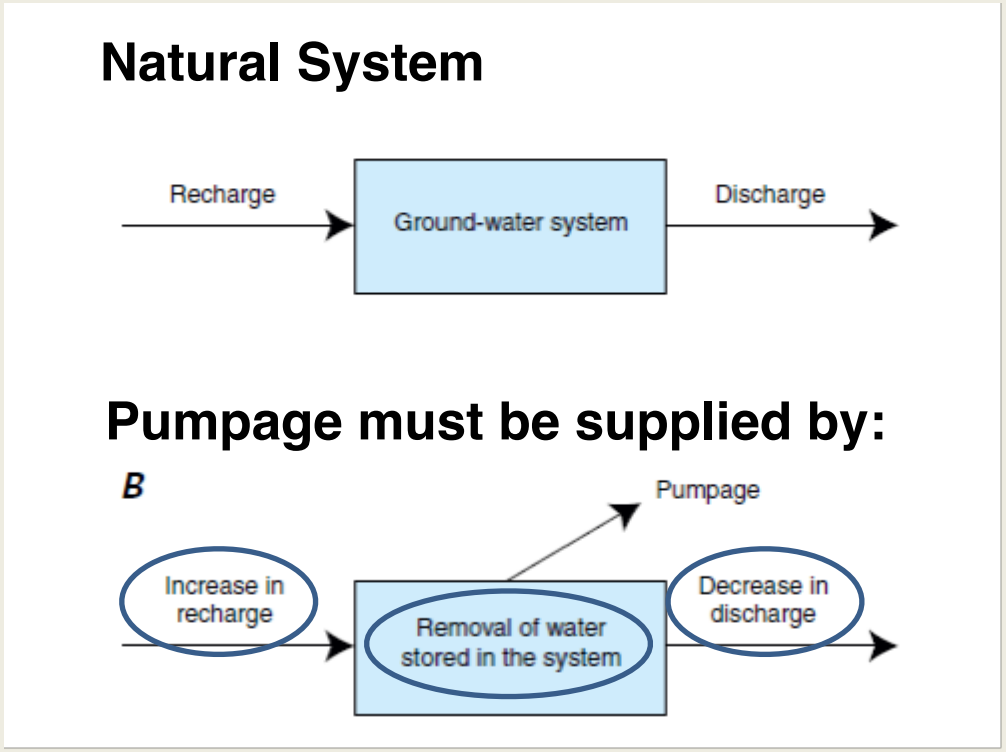
NATURAL FLOW SYSTEM CHANGES

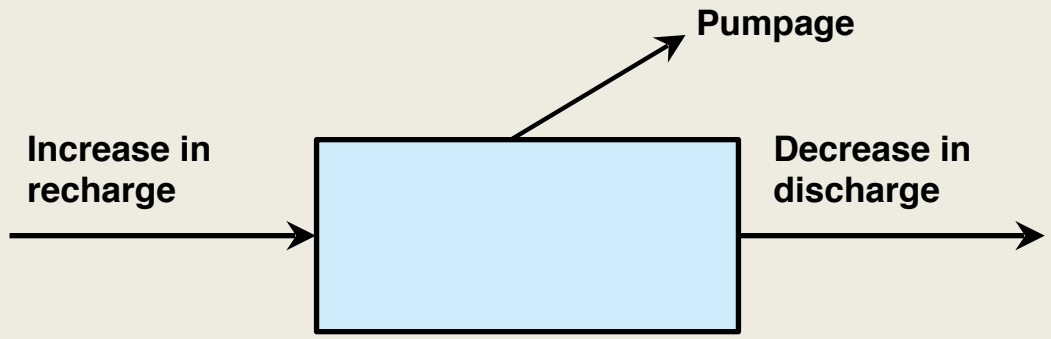
- We change the natural flow system by pumping water for use, changing recharge patterns by irrigation and urban development, changing the type of vegetation, and other activities



BALANCED SYSTEM

- Pumping starts and the groundwater system readjusts
- Initial response to pumping is change in storage
- If system comes to equilibrium, changes in storage stop and inflows will again balance outflows:

  Pumpage = Increased recharge + Decreased discharge



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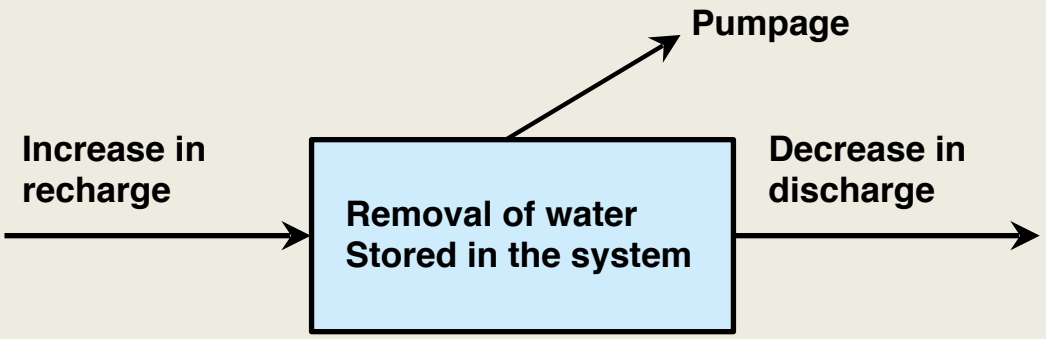
UNBALANCED SYSTEM

- If system does not comes to equilibrium, changes in storage continue (i.e. falling groundwater levels):

  Pumpage = Increased recharge + Decreased discharge + Decreased storage



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SUSTAINABLE YIELD

- How much ground water available for use depends upon how changes in inflow and outflow affect the surrounding environment and what the users define as undesirable effects on the environment or groundwater system

  - Changes to inflows and outflows are very complex
  - Not possible to use the water budget to determine how much groundwater is available for use
  - Groundwater model is the best tool to use because it allows for spatial effects

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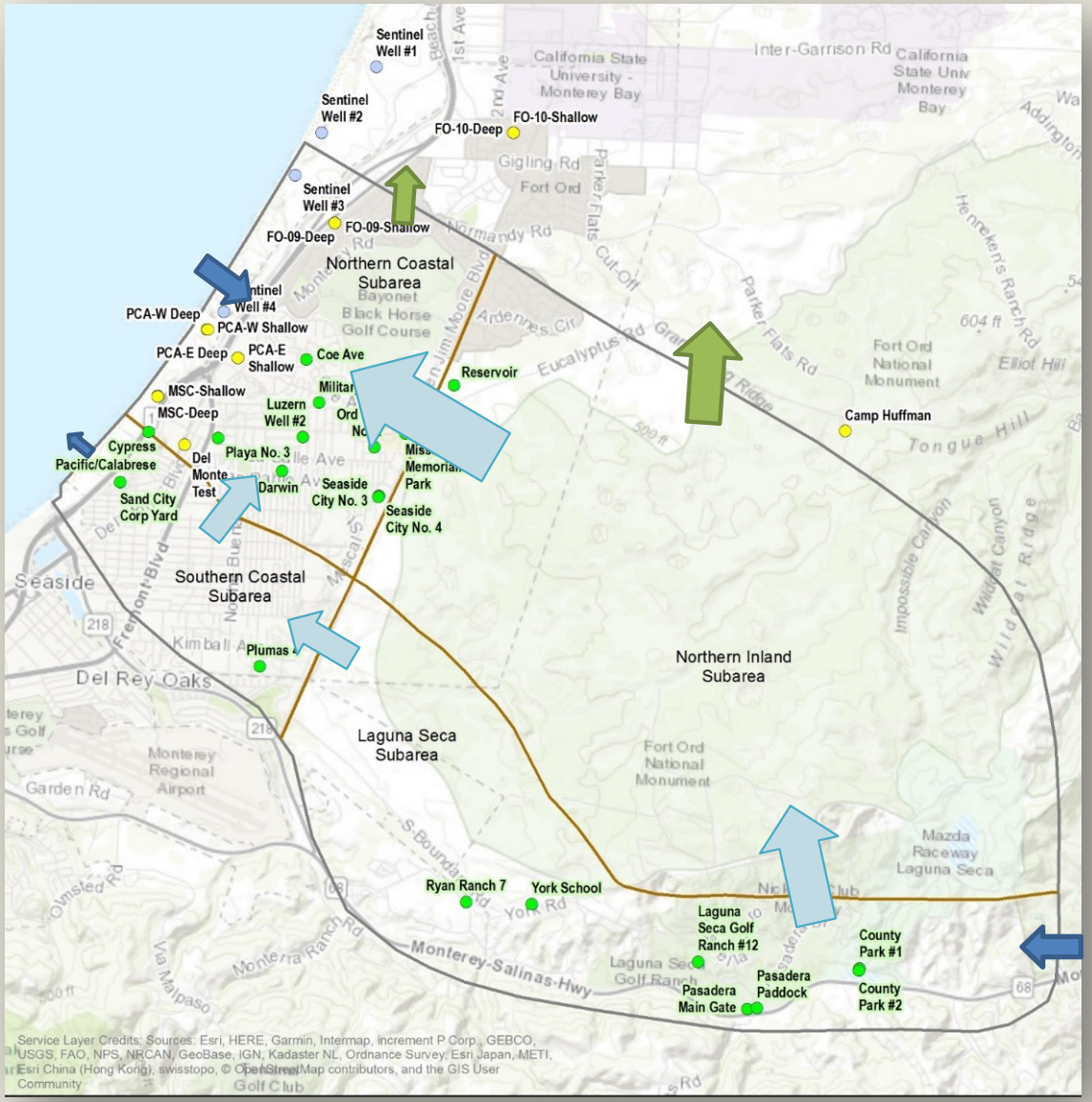
SUBSURFACE FLOWS BETWEEN SUBAREAS, OCEAN & OTHER BASINS



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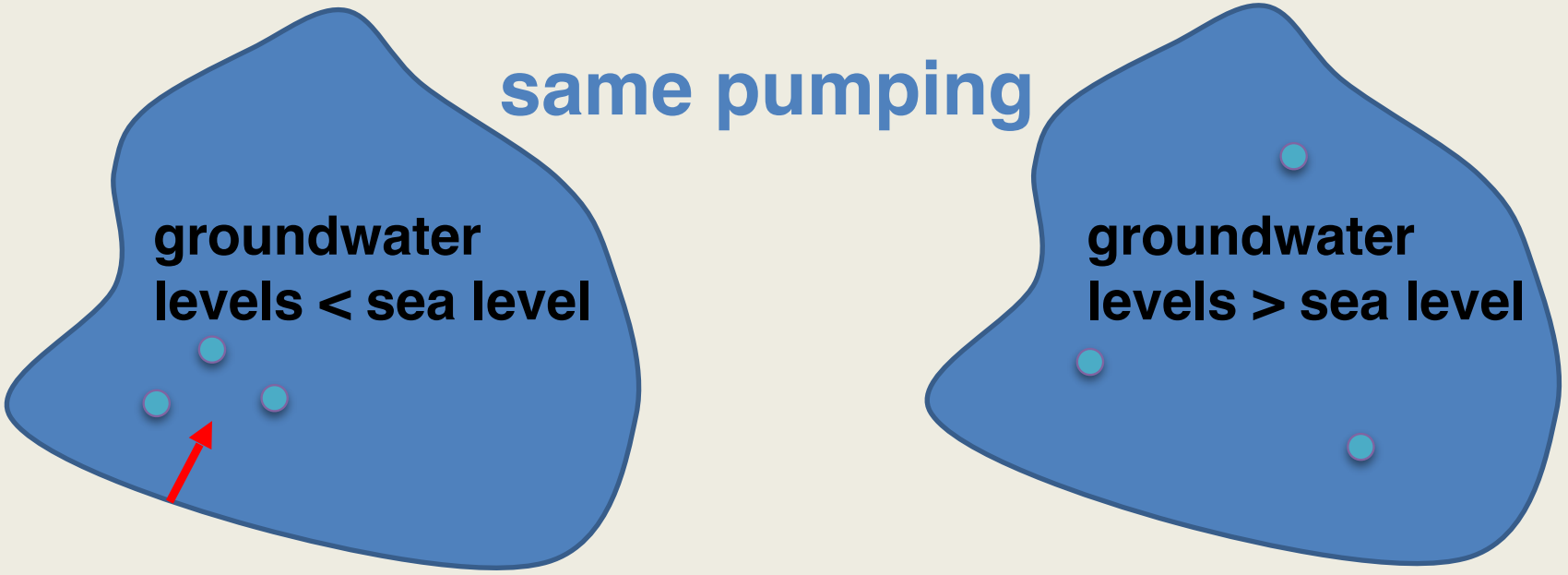
LOCALIZED EFFECTS

- Localized effects of pumping need to be accounted for

same pumping



Greater impact on local groundwater levels

Lesser impact on local groundwater levels

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MODELING APPROACH FOR DETERMINING SUSTAINABLE YIELD

Task 1: Develop Operational Parameters & Management Targets

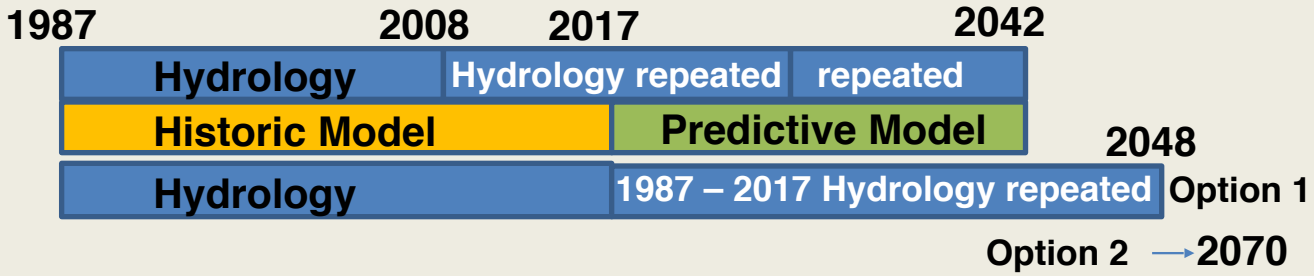
- Operational parameters include how each well is expected to be pumped in the future

- Management targets are groundwater levels that the basin should be managed to. Examples are:
  - Meet protective groundwater elevations at the coast
  - To stop declining groundwater levels
  - Recover groundwater levels in the basin to a certain level

MODELING APPROACH FOR DETERMINING SUSTAINABLE YIELD

Task 2: Extend Predictive Model Climate

- Extend Historical Hydrology Baseline Scenario



- Convert Historical Climate Baseline Scenario Model to Future Climate Condition Model (Optional)

Task 3: Incorporate Sea Level Rise at Ocean Boundaries (Optional)

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MODELING APPROACH FOR DETERMINING SUSTAINABLE YIELD

Task 4: Incorporate All Existing & Approved/Planned Supplemental Supply Projects into Baseline Model

Task 5: Optimization Scenario Simulations

- **Use Sustainable Optimization Model to optimize pumping to achieve management targets**
- **Prepare Scenario Inputs - Need TAC input Two yield numbers will result**
  - **Interim Yield needed to achieve management targets (lower than Sustainable Yield)**
  - **A Sustainable Yield that maintains targets (this will be a higher yield than the Interim Yield**

Task 6: Prepare Technical Memo

Task 7: Attend TAC and Board Meetings

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QUESTIONS?

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& ASSOCIATES

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2019
AGENDA ITEM:	4
AGENDA TITLE:	Proposed Drainage Improvements at the Del Monte Manor in Seaside
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:

Scott Ottmar reports that the City of Seaside is submitting a grant application to the local Integrated Regional Water Management Plan (IRWMP) to construct drainage improvements at the Del Monte Manor Park housing complex located at 1466 Yosemite Street in Seaside. The goal of the project is to increase the quantity of runoff retained and infiltrated within an open space drainage easement at the Del Monte Manor. Mr. Ottmar reports that the grant application requires the Seaside Groundwater Basin Watermaster TAC to review the project for conformance to the adjudication requirements. He asked that this review be conducted as soon as possible.

Mr. Ottmar provided this link where one can download the preliminary design and drainage analysis for the project: https://fs.ci.seaside.ca.us:5001/sharing/gDf0ogTLV. He noted that this information is still subject to review and subject to minor alterations.

I reviewed the 30% Design Review Report that Whitson Engineers prepared for the City for this project, which is one of the documents on the link above. A copy of the body of that Report is attached. It states that on average an estimated 2.9 AFY is currently being infiltrated into the ground from the existing onsite stormwater retention pond, and that on average the proposed modifications will increase this to approximately 14 AFY.

Also attached is an excerpt from a report prepared by Geosyntec in September 2015 for Darla Inglis, PhD, with the Central Coast Low Impact Development Initiative. It presents information regarding water quality impacts from infiltration of stormwater. Due to the shallow depth of the proposed infiltration facilities and the small volume of water that will be infiltrated, I believe that the proposed facilities will not have any adverse effect on water quality in the aquifers of the Seaside Basin.

I did not find any language in the Adjudication Decision that addresses this type of project, and I am not aware of any language in the Adjudication Decision with which it would be in conflict. Therefore, I believe that the project is in conformance with the Adjudication Decision.

ATTACHMENTS:	1. Body of the Del Monte Manor Park L.I.D. Improvements 30% Design Report 2. Excerpt from Geosyntec report regarding water quality impacts from stormwater infiltration facilities
RECOMMENDED ACTION:	Find that the proposed Del Monte Manor Park L.I.D. storm drainage improvements are in conformance with the Adjudication Decision

Del Monte Manor Park
L.I.D. Improvements
30% Design Report

January 8, 2019

Prepared For:

City of Seaside
Public Works Department
440 Harcourt Ave.
Seaside, CA 93955

Prepared By:

Whitson Engineers

6 Harris Court ▪ Monterey, CA 93940
831 649-5225 ▪ Fax 831 373-5065

Job No.: 3910.00

Whitson ENGINEERS

Civil Engineering • Land Surveying
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whitsonengineers.com

Job No.: 3910.00

DATE: **January 8, 2019**

TO: **Rick Riedl, City of Seaside City Engineer**

FROM: **Nathaniel Milam, PE**

SUBJECT: **Del Monte Manor Park L.I.D. Improvements – 30% Design Report**

Purpose

This 30% Design Report outlines the work completed and basis of design for the Preliminary 30% Plans included in Appendix A. This Report builds off the 10% concept design prepared by Geosyntec Consultants.

Mapping and Field Observations

We performed a topographic survey of the project site in November 2018. The survey included surveying storm drainage structures outside the immediate project area as needed for modeling the storm drain system. We also plotted record parcels and easements, and utility system information as provided by utility owners. The resulting Existing Conditions Map is included in Appendix A, page 1.

We utilized available topographic mapping (AMBAG, 2007) and the city's storm drain system map to delineate watersheds and performed field observations to identify the watershed limits and storm drain elements and connections. Appendix B provides the resulting watershed areas and storm drain routing.

The pond overflow is currently controlled by a soil berm along Yosemite Street, with a controlling elevation of 112.9'. If the soil berm were removed (or eroded) the sidewalk along Yosemite would control overflow. The controlling back of sidewalk elevation is 112.1'.

The finish floor elevation of both of the buildings adjacent to the pond is 113.8'. The buildings therefore are not at risk of flooding from the pond. The lowest adjacent grades around these buildings are as low as 112.3', and the walkways between the buildings and pond are as low as 112.5', and are therefore subject to occasional flooding.

The play area located northeast of the existing pond was reconfigured recently, and new play equipment was installed. The low point in the temporary fencing around the play equipment is elevation 112.3'. The play area is therefore also subject to occasional flooding.

The pond outlet structure consists of a catch basin located at the southwest corner of the pond. The catch basin grate is at elevation 109.4'. The structure was clogged with soil (sand) during our initial site visit in October 2018. City crews subsequently cleaned out the inlet. The catch basin was clear and functioning during the first storm of the season in November 2018.

Photo 1. Pond outlet structure and approximate limits of buried AC apron, 10/16/18

According to city staff, during the winter of 2017-2018 water ponded up to and near the face of the adjacent buildings. Based on the surveyed grades, this would correspond to an elevation above 112', and below elevation 112.9', assuming the pond did not overtop the soil berm along Yosemite Street. It is not known if the pond outlet structure was clogged with soil at the time, or was clear and functioning.

We obtained utility maps from utility owners, as noted in Appendix A, page 1. Private utility information was not obtained. The topographic survey found a light pole and sewer cleanout near the middle of the existing pond. We therefore anticipate

relocation of private sewer and electrical lines to accommodate the proposed improvements. There may be additional utility lines within the project footprint which may also need to be relocated.

Soil Infiltration

Percolation (infiltration) testing was performed by Earth Systems Pacific under subcontract to Whitson Engineers. Two 10'-deep, 8"-diameter bore holes were drilled and logged, cased with 3"-diameter perforated pipe, backfilled with gravel, then tested. The resulted field-saturated hydraulic conductivity (calculated using the Porchet Method) is greater than 20 in/hr. (See Appendix F for additional details.)

A design infiltration rate of 5 in/hr was selected for design to account for soil clogging over the life of the proposed facility. This infiltration rate also corresponds to the rate recommended for the proposed Bioretention Soil Mix.

Watershed Characteristics

Runoff was estimated using the HEC-HMS computer program and the NRCS Curve Number method as outlined in NRCS (formerly SCS) Technical Release 55 (commonly known as the TR-55 Method or SCS Method). A Curve Number of 68 was used for pervious areas, and 98 for impervious areas. Impervious areas were modeled as directly connected. A Time of Concentration of 15 minutes (a Lag Time of 10 minutes) was used for all watersheds.

Table 1: Watershed Characteristics

Watershed	Area (acres)	Percent Impervious	Comments
A	1.1	40% *	Directly tributary to pond
B	10	60%	Tributary to SDMH #6
C	4.7	65%	Tributary to SD #7, which is currently clogged; therefore, Watershed C is currently not tributary to the pond, but will be tributary after repair of SD #7
D	5.5	75%	Tributary to SDMH #4
E	4.5	65%	Tributary to SDMH #4

* Pond area is counted as impervious for modeling.

Selected precipitation depths are given in the table below. Appendix D provides more detailed information.

Table 2: Precipitation

Event Analyzed	24-hr Depth	Reference
11/27/18 Event	0.47"	Mesonet observations, Monterey Airport
85th percentile	0.8"	85th percentile map, CCRWQCB
11/28/18 Event	0.99"	Mesonet observations, Monterey Airport
95th percentile	1.2"	95th percentile map, CCRWQCB
2-year	1.94"	NOAA Atlas 14
10-year	3.06"	NOAA Atlas 14

Post-Rain Event Field Observations

The pond was observed after over-night rains on November 27~28, 2018 and on November 28~29, 2018. This was the first significant storm of the season.

11/27/18 Event

We reviewed the pond on 11/28/18 at 7:50 am and noted that there were some debris and scour from the pipe outfall (into the pond), and that the AC apron at the outlet structure had been exposed (scoured) by storm drainage flowing out of the pond. This indicates that storm drain flows had entered the pond via the pipe outfall, but only a small amount. A ponded high water mark was not observed; the debris line sloped with the pond flow line.

Photo 2. Pond outlet structure, 10/28/18

Photo 3. Pond inlet pipe, 10/28/18

Photo 4. Pond bottom, 10/29/18

11/28/18 Event

The following day (11/29/18 at 7:50 am) we again reviewed the pond. There was a high water mark at the pond's outlet, 9 inches above the pond outlet's grate (approximately elevation 110.2'). We also noted more soil erosion downstream of the pipe outfall than was observed the previous day. These observations indicate that more flow had entered the pond than the previous day; and because the outlet structure has a capacity of over 10 cfs at 9" depth, the storm drain system either "backed up" at SDMH #6 to approximately elevation 110.2', or the inlet was clogged.

Photo 5. Pond outlet structure, 11/29/18

Photo 6. High water mark at pond outlet structure, 11/29/18

Photo 7. Debris deposition across pond bottom, 11/29/18

Photo 8. Scour at pond inlet pipe, 11/29/18

Existing System Model

The existing watersheds, pond, and storm drain system were modeled using the HEC-HMS computer program. Because HEC-HMS cannot model looped systems, and the pond is in a "loop" with the adjacent storm drain, the model was built to best fit the operation of the pond during smaller storm events, so as to return the most accurate results for annual pond infiltration.[1]

The existing storm drain system which was modeled consists of junction structures SDMH #4 and #6, the existing pond, and the 8"-diameter storm drain from SDMH #4 to SDMH #9. The storm drain system capacity is limited by the 8" storm drain downstream of SDMH #6 to approximately 2 cfs; when its capacity is exceeded the storm drain "bubble ups" into the pond from SDMH #6. This occurs at approximately 0.8 inches of rainfall in 24 hours.

It is also noteworthy that runoff from storms smaller than approximately 0.4 inch in 24 hours (which creates over 90% of the runoff from the watershed on an annual basis) is

[1] The looped system was approximated using assumed splits at SDMH #4 and #6. The splits were based on analyses of the 11/27/18 and 11/28/18 events. The splits would be different for large events (e.g., the 10-year event), and therefore the results of large events are considered approximate. Also the discharges reported by HEC-HMS from SDMH #6 are not representative because pond discharge is double-counted.

unable to enter the existing pond from the storm drain because of the elevation of the storm drain lateral which connects SDMH #4 to the pond. Lowering the storm drain lateral will allow smaller storms to enter the pond, thus capturing and infiltrating much more water than in existing conditions.

Proposed Design

The proposed design is shown in Appendix A, sheets 2 and 3. The primary project elements are:

1. Remove the 12" storm drain which routes drainage from SDMH #4 into the pond, and construct a new 12" storm drain at a lower elevation. This will allow storm drainage to enter the bioretention pond during smaller storm events than in existing conditions. Currently the storm drain must surcharge in SDMH #4 to a depth of 4.7' before the storm drain overflows into the pond.
2. Reconstruct storm drain segment #7 (the failed 12" storm drain lateral at SDMH #1), to capture and route Watershed C into the pond. This will increase the drainage area tributary to the pond by 42%.
3. Re-grade the existing pond and import soil amendments to create a 6,000 s.f. landscaped bioretention pond.
4. Reconstruct the pond outlet structure (the drain inlet at the southwest corner of the pond) so that the pond inundates to a depth of 12 inches before overflowing.
5. Addresses the Trash Amendments by either sizing the pond to infiltrate the 1-year, 1-hour storm event without overflowing; or provide an approved trash capture device on the pond outfall structure. (The calculations show that the proposed pond is sized to infiltrate the 1-year, 1-hour storm. For budgeting purposes, a trash capture device is included in the preliminary estimate.)
6. Raise a portion of the existing pond footprint to above the typical ponding elevation so that it can continue to be used as a park.
7. Construct a secondary pond overflow consisting of an under-sidewalk drain and a lined overflow channel. This secondary overflow will reduce the pond overflow to elevation 111.8', thus reducing the frequency of inundation of the park redevelopment area (which is above elevation 112').
8. Provide fencing and signage around the bioretention pond. The fencing will protect the pond from foot traffic, and signage will highlight the facility to the property owners and the public, and can also be used to promote storm water awareness in general.

Alternative Design

An alternative design is shown in Appendix A, sheet 4. In this alternative design a portion of the proposed bioretention pond is replaced with an underground chamber system. The chamber system would be sized to provide an equivalent volume and

area as the portion of the pond which it is replacing. The Alternative Design could be implemented if additional developable park space is desired.

Because the underground chambers would be sized so that the overall system would operate similarly to the Proposed Design, the Alternative Design is not analyzed separately herein.

As a variation, additional underground chambers could be incorporated into the project in order to provide the volume needed to reduce flooding of the park area and/or the frequency of the pond overflowing to the street.

Continuous Simulation Analysis

A continuous simulation was used to estimate the increase in groundwater recharge (pond infiltration). Because of the federal government shutdown, NOAA data was unavailable. We therefore used 1-hour precipitation data from the Fort Ord #2 rain gage. A total of 10 years of data were available (2001 to 2011).

The simulation indicates that, on average, 2.9 ac-ft/year are infiltrated by the existing pond. This corresponds to 12% of the annual runoff from Watersheds A through E, and 19% not counting Watershed B. Post-project, on average 14 ac-ft/year are predicted to be infiltrated by the pond, which corresponds to 58% of annual runoff from Watersheds A through E, and 95% of runoff not counting Watershed B. (In both existing and proposed conditions, Watershed B "bubbles up" into the pond, which does not occur during smaller, more frequent storm events.)

Single Event Analysis

In order to better estimate peak runoff rates during the 2- and 10-year design storms, runoff was estimated using an NRCS Type I synthetic hydrograph as outlined in NRCS (formerly SCS) Technical Release 55 (commonly known as the TR-55 Method or SCS Method). The single-event analysis indicates that the existing pond would not overflow during the 2-year event, but may overflow during the 10-year event. This agrees with the results of the continuous simulation analysis.

Post-project, the model indicates the proposed pond would overflow (via the new under-sidewalk drain) during both the 2- and 10-year scenarios. This primarily due to the addition of the under-sidewalk drain, which reduces the pond overflow elevation from 112.9 (pond volume = 0.93 ac-ft) to elevation 111.8 (pond volume = 0.46 ac-ft).

Conclusion

Because the storm drain lateral into the pond at SDMH #4 is set 4.7 feet higher than the storm drain main, and because the existing pond outlet structure is set at the pond

bottom elevation, only 19% of the annual storm drainage volume from Watersheds A, C, D and E is currently able to enter the pond and infiltrate. Lowering this storm drain lateral and raising the outlet structure grate will enable "first flush" storm drain flow to enter the pond and infiltrate, thus increasing the capture volume to 95% of the watersheds' annual runoff.

This will mean that the pond will be inundated much more frequently, and to greater depths and for longer periods of time, than in its current condition. The pond footprint currently contains a volleyball net, tether ball pole, and is used for activities typical of a park setting. In order to maintain the use of a portion of the site as a park, the project proposes to re-grade the existing pond bottom to two levels: a smaller primary pond footprint (which will be frequently inundated); and a raised area which could be redeveloped with park amenities in the future. This park redevelopment area would still be subject to flooding from the pond, though less frequently.

An alternative project which creates additional ponding volume in underground chambers could be implemented to increase the area available for park uses, and/or reduce the frequency of flooding of the park area.

We hope this Study is helpful in your planning efforts. Please let us know if you have any questions or would like to discuss anything further.

Prepared by:

Nathaniel Milam, PE
Senior Civil Engineer

DRAFT
Date

Reviewed by:

Richard P. Weber, PE
Principal

DRAFT
Date

Excerpt from Geosyntec Report
Regarding Water Quality Impacts from Infiltration of Stormwater

PERCEIVED AND ASSESSED RISK OF GROUNDWATER CONTAMINATION FROM INFILTRATING STORMWATER

While many stormwater BMPs are designed to infiltrate urban stormwater runoff, concerns have been raised as to whether there is an added risk of groundwater quality impact with drywells which provide a more direct conduit to groundwater. Therefore there is a need to provide a standardized BMP design that specifies pre-drywell treatment components to provide a minimum standard pollutant removal for the pollutants that are typically found in urban stormwater runoff. Priority pollutants in urban stormwater runoff generally include nutrients (i.e., nitrogen and phosphorus), heavy metals (e.g. cadmium, copper, lead and zinc), organics (i.e., petroleum hydrocarbons), pathogens (i.e., fecal coliforms, enterococcus), and suspended solids. The dissolved and colloidal (or planktonic, in the case of bacteria cells) fraction for each of these priority pollutants represents the greatest threat to groundwater quality given the effectiveness of biofiltration for removing particulate bound pollutants. However, typical dissolved concentrations of most urban stormwater pollutants are below drinking water standards (which are typically applicable to the beneficial use of underlying aquifers). An exception to this is bacteria and pathogens, where biofilter effluent concentrations are not expected to consistently meet drinking water standards, therefore vadose zone treatment is required to further mitigate this water quality issue.

Acknowledgment of the contamination risk to groundwater as a potential barrier to using enhanced stormwater infiltration techniques has prompted a number of studies to investigate contamination risks associated with stormwater infiltration BMPs, including drywells. Over all, studies however have found that treated stormwater infiltrated from BMPs does not pose a significant risk to impairment of groundwater quality and in some cases found to improve the quality of groundwater (Jurgens, 2008; Weiss, 2008, Los Angeles and San Gabriel Rivers Watershed Council, 2010). Studies found that nitrates in drinking water can pose human health risks, and tend to be poorly retained in BMPs due to high solubility (Pitt et al., 1999), however the amount of nitrates typically found in stormwater is less than the drinking water standard (U.S. EPA, 1999), and therefore nitrates are not considered a concern as long as nutrient hot spot areas are avoided (e.g., agriculture, nurseries) and sources of nitrates within biofiltration media are limited and controlled. Metals were found to largely be absorbed by BMPs, however there is a potential for breakthrough if the soil becomes saturated with contaminants, and satisfactory treatment depends on soil replacement at set intervals (i.e. a dedicated maintenance regime); typically maintenance intervals will be controlled by surface clogging of the biofilter rather than pollutant accumulation (Pitt and Clark, 2010). BMPs are known to remove bacteria through straining in the soils (Diez and Clausen, 2005; Rusciano and Obropta, 2007), however the treatment efficiency, and migratory potential for pathogens is highly variable (US EPA, 1999), and contamination of groundwater by pathogens has been documented (Pitt, 1999). However, any groundwater consumption as a potable water source requires treatment, and therefore bacteria contamination from stormwater infiltration is not deemed a threat to human health. Organic pollutants such as hydrocarbons are a concern for groundwater contamination since they are found to typically occur in quantities above regulatory levels (Shepp, 1996), have been shown to migrate into groundwater (Pitt et al, 1999), and can cause acute toxicity (U.S. EPA, 1999). Most hydrocarbons will be attenuated by soil in biofiltration systems (Hsieh and Davis, 2005), however, Wilson et al (1990) found that while undetected in stormwater samples, volatile organic sediments were present in dry-well sediments and groundwater samples, though at levels below the EPA human health criteria. Therefore the expected risk of groundwater contamination from stormwater infiltration is considered to be low for typical stormwater pollutants of concern.

SEASIDE BASIN WATER MASTER
TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2019
AGENDA ITEM:	5
AGENDA TITLE:	Schedule
PREPARED BY:	Robert Jaques, Technical Program Manager

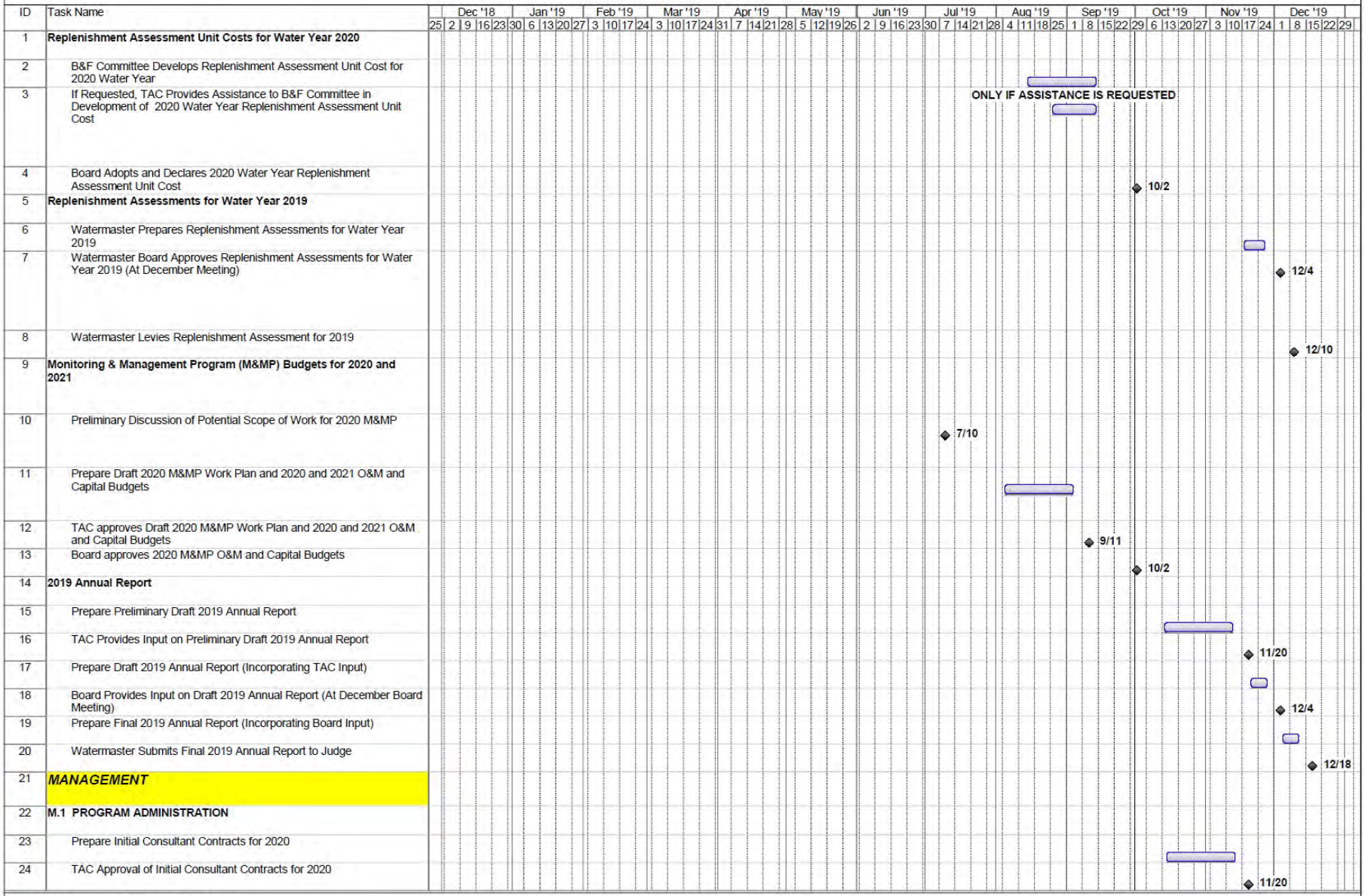
SUMMARY:

As a regular part of each monthly TAC meeting, I will provide the TAC with an updated Schedule of the activities being performed by the Watermaster, its consultants, and the public entity (MPWMD) which are performing certain portions of the work.

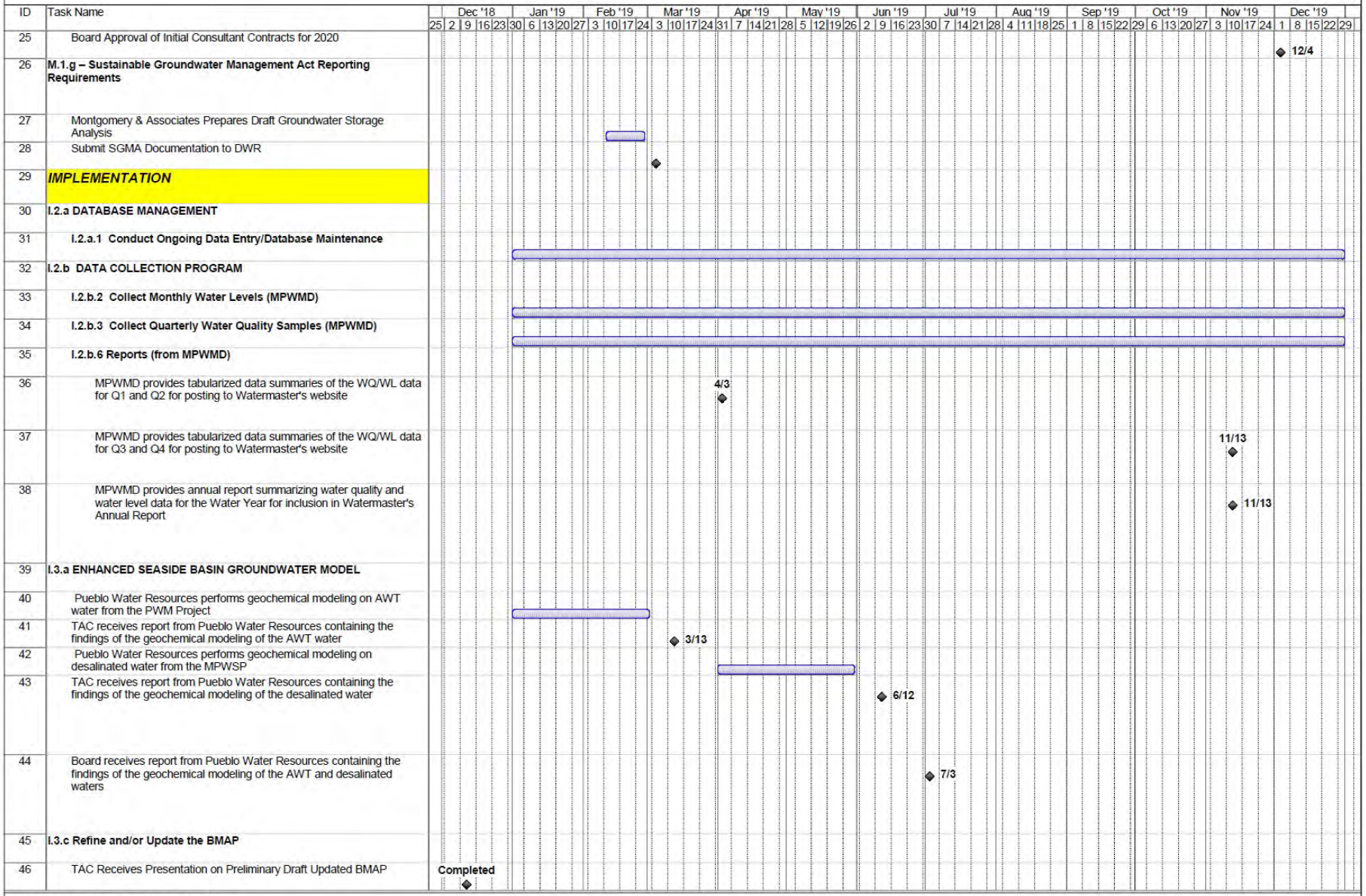
Attached is the proposed Work Schedule for FY 2019.

ATTACHMENTS:	Schedule of Work Activities for FY 2019
RECOMMENDED ACTION:	Provide Input to Technical Program Manager Regarding Any Corrections or Additions to the Schedule

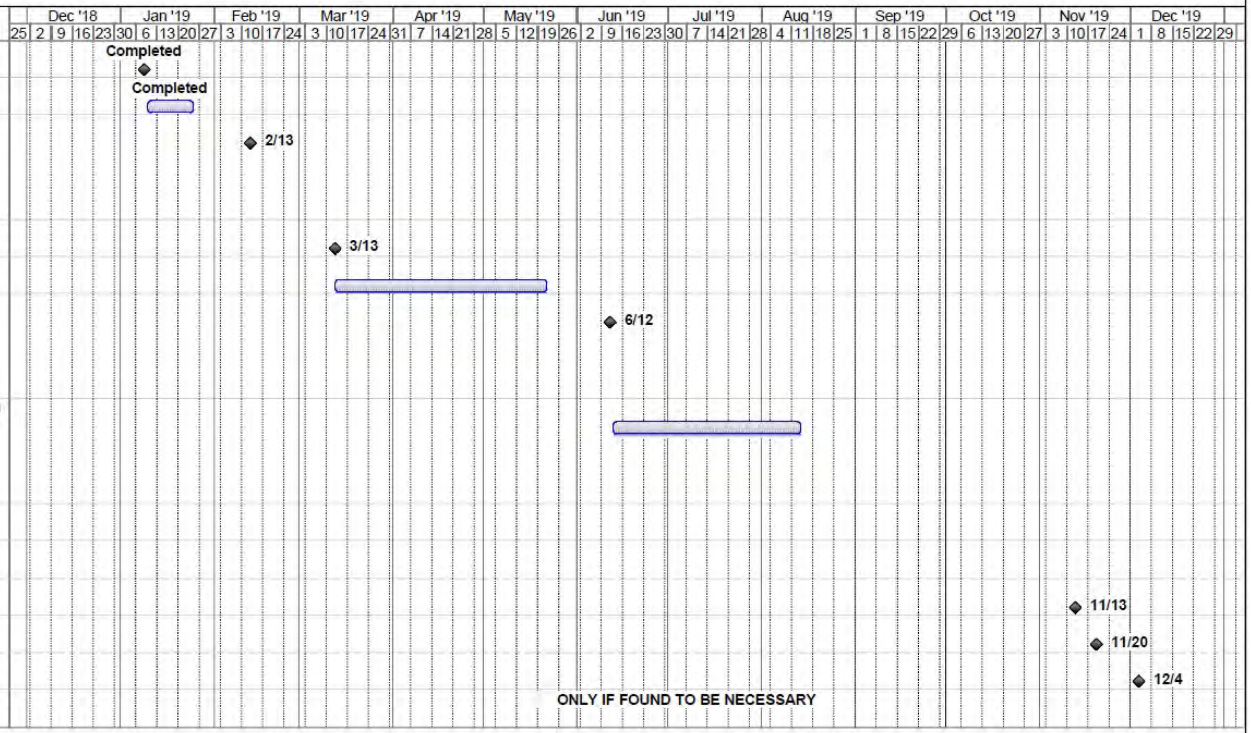
Seaside Basin Watermaster
2019 Monitoring and Management Program
Work Schedule



Seaside Basin Watermaster
2019 Monitoring and Management Program
Work Schedule



Seaside Basin Watermaster
2019 Monitoring and Management Program
Work Schedule



SEASIDE BASIN WATER MASTER TECHNICAL ADVISORY COMMITTEE

** * * AGENDA TRANSMITTAL FORM * * **

MEETING DATE:	February 13, 2019
AGENDA ITEM:	6
AGENDA TITLE:	Other Business
PREPARED BY:	Robert Jaques, Technical Program Manager

SUMMARY:
The "Other Business" agenda item is intended to provide an opportunity for TAC members or others present at the meeting to discuss items not on the agenda that may be of interest to the TAC.

ATTACHMENTS:	None
RECOMMENDED ACTION:	None required – information only