

MEETING OF THE BOARD OF DIRECTORS OF THE
MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
Jointly with the
PLANNING & OPERATIONS COMMITTEE
May 4, 2020, 8:30 a.m.

Due to the spread of COVID-19 and as authorized by the Governor's Executive Order, MWDOC will be holding all upcoming Board and Committee meetings by Zoom Webinar and will be available by either computer or telephone audio as follows:

Computer Audio: You can join the Zoom meeting by clicking on the following link:
<https://zoom.us/j/8828665300>

Telephone Audio: (669) 900 9128 fees may apply
(877) 853 5247 Toll-free
Webinar ID: 882 866 5300#

P&O Committee:

Director McVicker, Chair
Director Dick
Director Yoo Schneider

Staff: R. Hunter, K. Seckel, J. Berg,
H. De La Torre, K. Davanaugh,
V. Osborn

Ex Officio Member: Director Tamaribuchi

MWDOC Committee meetings are noticed and held as joint meetings of the Committee and the entire Board of Directors and all members of the Board of Directors may attend and participate in the discussion. Each Committee has designated Committee members, and other members of the Board are designated alternate committee members. If less than a quorum of the full Board is in attendance, the Board meeting will be adjourned for lack of a quorum and the meeting will proceed as a meeting of the Committee with those Committee members and alternate members in attendance acting as the Committee.

PUBLIC COMMENTS - Public comments on agenda items and items under the jurisdiction of the Committee should be made at this time.

ITEMS RECEIVED TOO LATE TO BE AGENDIZED - Determine there is a need to take immediate action on item(s) and that the need for action came to the attention of the District subsequent to the posting of the Agenda. (Requires a unanimous vote of the Committee)

ITEMS DISTRIBUTED TO THE BOARD LESS THAN 72 HOURS PRIOR TO MEETING -- Pursuant to Government Code section 54957.5, non-exempt public records that relate to open session agenda items and are distributed to a majority of the Board less than seventy-two (72) hours prior to the meeting will be available for public inspection in the lobby of the District's business office located at 18700 Ward Street, Fountain Valley, California 92708, during regular business hours. When practical, these public records will also be made available on the District's Internet Web site, accessible at <http://www.mwdoc.com>.

ACTION ITEMS

1. OC REGIONAL DISTRIBUTION SYSTEM HYDRAULIC MODEL – BUILD & CALIBRATION

DISCUSSION ITEMS

2. ECONOMIC BENEFIT STUDIES TO SUPPORT DECISION-MAKING FOR LOCAL PROJECTS SERVING ORANGE COUNTY
3. UPDATE ON COVID-19 RELATED ITEMS (ORAL REPORT)

INFORMATION ITEMS (The following items are for informational purposes only – background information is included in the packet. Discussion is not necessary unless a Director requests.)

4. COLORADO RIVER SALINITY ECONOMIC IMPACT MODEL (SEIM) UPDATE
5. STATUS REPORTS
 - a. Ongoing MWDOC Reliability and Engineering/Planning Projects
 - b. WEROC
 - c. Water Use Efficiency Projects
6. REVIEW OF ISSUES RELATED TO CONSTRUCTION PROGRAMS, WATER USE EFFICIENCY, FACILITY AND EQUIPMENT MAINTENANCE, WATER STORAGE, WATER QUALITY, CONJUNCTIVE USE PROGRAMS, EDUCATION, DISTRICT FACILITIES, and MEMBER-AGENCY RELATIONS

ADJOURNMENT

NOTE: At the discretion of the Committee, all items appearing on this agenda, whether or not expressly listed for action, may be deliberated, and may be subject to action by the Committee. On those items designated for Board action, the Committee reviews the items and makes a recommendation for final action to the full Board of Directors; final action will be taken by the Board of Directors. Agendas for Committee and Board meetings may be obtained from the District Secretary. Members of the public are advised that the Board consideration process includes consideration of each agenda item by one or more Committees indicated on the Board Action Sheet. Attendance at Committee meetings and the Board meeting considering an item consequently is advised.

Accommodations for the Disabled. Any person may make a request for a disability-related modification or accommodation needed for that person to be able to participate in the public meeting by telephoning Maribeth Goldsby, District Secretary, at (714) 963-3058, or writing to Municipal Water District of Orange County at P.O. Box 20895, Fountain Valley, CA 92728. Requests must specify the nature of the disability and the type of accommodation requested. A telephone number or other contact information should be included so that District staff may discuss appropriate arrangements. Persons requesting a disability-related accommodation should make the request with adequate time before the meeting for the District to provide the requested accommodation.



ACTION ITEM

May 20, 2020

TO: Board of Directors

FROM: **Planning & Operations Committee**
(Directors McVicker, Yoo Schneider, Dick)

Robert Hunter, General Manager

Staff Contact: Karl Seckel
Charles Busslinger

SUBJECT: OC Regional Distribution System Hydraulic Model – Build & Calibration

STAFF RECOMMENDATION

Staff recommends the Board of Directors authorize the General Manager to enter into a professional services agreement with Black & Veatch to build and calibrate an OC regional distribution system hydraulic model based upon the findings of the Orange County Regional Distribution System Hydraulic Model Investigation Report at a cost of \$188,520 plus a 10% contingency for a total not to exceed cost of \$207,372.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

Multiple operational issues such as low flow situations, instances of nitrification, ensuring the base loading of local supply projects in winter months, and integration of future water supply projects will continue to raise water flow and water quality issues within the Orange County regional distribution system. Multiple water supply projects are currently under consideration in OC that include; desalinated water, pumping water into regional pipelines during emergency events, percolation of treated recycled water, and capture of stormwater into groundwater basins for subsequent pumping and treatment. Without proper planning, the possible integration of multiple treated water sources into the OC regional water

Budgeted (Y/N): Y	Budgeted amount: FY'19-20 \$77,372 FY'20-21 \$130,000	Core X	Choice __
Action item amount: \$207,372		Line item: 7010	
Fiscal Impact (explain if unbudgeted): FY'19-20 Allocated from current year budget FY 20-21 Budgeted \$130,000			

distribution system at various points, or simply the reduction in demands, could result in unintended water quality consequences.

On April 17, 2019, the Board of Directors authorized the General Manager to enter into a professional services agreement with Black & Veatch Corporation to complete an investigation phase of work and provide recommendations for development of a hydraulic and water quality model for the regional pipeline system in Orange County.

Black & Veatch completed the Orange County Regional Distribution System Hydraulic Model Investigation Report in February 2020 with a recommendation that Innovyze's InfoWater is the best-fit software application for OC. The report is available on the MWDOC website at: <https://www.mwdoc.com/wp-content/uploads/2020/02/MWDOC-Hydraulic-WQ-Model-Report-20200225.pdf>

On March 18, 2020, the Board of Directors concurred with the staff recommendation to proceed with issuance of a Request for Proposals (RFP) to build and calibrate an OC regional distribution system hydraulic and water quality model based upon the Investigation Report findings.

Staff issued a RFP on March 19, 2020 seeking professional services to develop an OC Distribution System Hydraulic Model. MWDOC requested proposals from consultants with demonstrated successful track records of requisite hydraulic modeling expertise and in-depth knowledge of the OC Distribution system. To allow sufficient time for consultants to provide a detailed proposal, the proposals were not due until April 16, 2020.

Proposals were received from engineering consultants Black & Veatch, Carollo, and Dudek. MWDOC staff have reviewed and evaluated the proposals and are providing its recommendations to the P&O Committee for review and discussion in time for Board consideration on May 20, 2020.

DETAILED REPORT

Background

On August 31, 2018, MWDOC held a workshop that included water quality consultants Black & Veatch (B&V), Hazen & Sawyer (H&S), and Means Consulting; along with staff from Metropolitan, OCWD, and multiple OC retail agencies. The collaborative discussions identified a number of potential issues that could arise within the OC regional distribution system resulting from the simultaneous introduction of multiple sources of water. Potential issues include:

- The impact of potential low volumes (flows) of imported water deliveries in portions of pipelines at certain times of the year leading to low chloramine residuals and water quality deterioration (e. g. nitrification). Chloramine loss due to reactions with low levels of bromide in seawater permeate could further exacerbate low chloramine residuals.
- Mixing of desalinated seawater with multiple other sources of water of varying quality.

- Flows of ocean desalination water moving northerly in a traditionally southerly flowing distribution system.
- Agencies receiving water blends which may be further blended with local water supplies from their own systems. The pH, alkalinity, Total Organic Carbon (TOC), bromide, chloramine residual, and other water quality characteristics may vary among these water sources daily, monthly and seasonally.
- Stranding of assets; being able to operate base loaded local supply projects in winter months.

Planning needs to account for the water quality and operational considerations with a goal of understanding the breadth and depth of these issues prior to any of the potential projects going on-line.

The outcome of the workshop was the identification of follow-up items and recommendations:

1. Develop White Papers to document potential issues for further investigation regarding:
 - Doheny desalinated water integration,
 - Poseidon Huntington Beach desalinated water integration, and
 - Local water (groundwater and/ or desalinated water) integration into the East OC Feeder # 2 pipeline.
2. Leverage existing information and data for creation of a hydraulic and water quality model of the OC regional distribution system to gain a better understanding of the implications of different operating strategies.
3. Development, delivery, and testing of a hydraulic model.

Model Investigation

On April 17, 2019, the Board of Directors authorized the General Manager to enter into a professional services agreement with Black & Veatch Corporation to complete an investigation phase of work and provide recommendations for development of a hydraulic model for the regional pipeline system in Orange County.

B&V completed the investigation and the findings are contained in the report which is available on the MWDOC website at: <https://www.mwdoc.com/wp-content/uploads/2020/02/MWDOC-Hydraulic-WQ-Model-Report-20200225.pdf>.

Based on the software evaluation and Orange County's needs, the recommended best-fit software application is Innovyze's InfoWater.

Model Use and Maintenance Framework

MWDOC staff presented a framework for use of the model (below) to both the MWDOC Member Agencies Managers and to the P&O Committee for input and discussion:

- MWDOC will develop and pay for the regional model & calibration to ensure the model works appropriately. Initially, the model will have source tracing and water

age analysis. The model shall be developed in such a way that additional water quality modules can be added, if and when needed.

- MWDOC will then maintain and utilize the model for MWDOC-wide benefits.
- MWDOC will be the custodian of the model (including Non-Disclosure Agreements/Certificates).
- MWDOC will make the model available to member agencies for their use, at their cost. The model could be used for any number of issues including to allow project proponents to examine impacts of new supply integration. *The MWDOC Member Agency managers recommended that the costs for use of the model by project proponents include a 'cost recovery' aspect to repay MWDOC's general fund over time for the investment made.*
- MWDOC's consultant will conduct the work with member agencies and project proponents to ensure model consistency.

On March 2, 2020, staff and member agency recommendations were brought to the P&O Committee for discussion. The P&O Committee viewed the 'cost recovery' aspect akin to 'members paying twice' and indicated that a MWDOC service area wide tool should be paid for by MWDOC with individual project proponents paying for the costs of using the model when specifically applied to their project. Thus, the P&O Committee did not support a cost-recovery aspect. However, they also asked staff to review the cost-recovery issue with the member agencies and bring back a recommendation.

A number of the member agencies do not support MWDOC moving forward with this item as a Core activity and have suggested to MWDOC that it should be a Choice activity. Staff does not feel the Choice activity works because someone has to make the initial investment to have the model as a tool to utilize. In addition, there are circumstances where the model benefits the entire service area, and this should be Core activity. The staff recommendation on the model options did not include all of the water quality options, as these are not currently needed, but they may be needed in the future and can be added by those needing those features. In this manner more of our agencies will be benefitted compared to not having the tool available at all.

Proposal Evaluation

On March 19, 2020, MWDOC staff issued a Request for Proposals (RFP) for professional services to develop a Hydraulic Model to preselected firms with demonstrated requisite expertise (Black & Veatch, Carollo, Woodard & Curran, and Dudek). To allow sufficient time for consultants to prepare a detailed proposal, the proposals were not due until April 16, 2020. Three proposals were received from Black & Veatch, Carollo, and Dudek.

MWDOC staff have reviewed and evaluated the proposals and are bringing its recommendations to the P&O Committee for review and discussion in time for Board consideration on May 20, 2020.

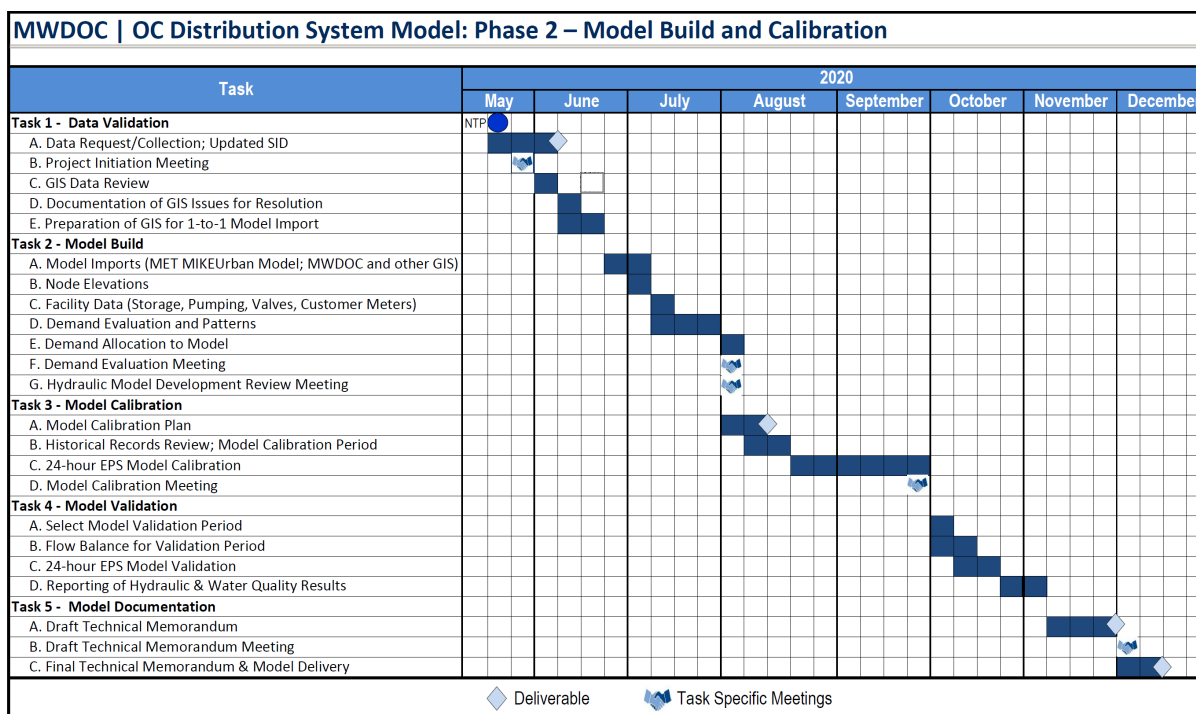
Staff was impressed with the quality of the proposals, as all three proposals demonstrated that the respondents were highly qualified and had a detailed understanding of the project. Each proposal brought its own strengths and options.

All three proposals went beyond the RFP requirements and offered additional optional services that could be utilized in the initial model build or at a later time, if and when needed. The offerings by the consultants were impressive with how the models have benefitted their clients in other projects.

Overall, staff evaluated the Black & Veatch as the best investment at this time, as it was the lowest cost and provided a number of options. One of the options was the Microsoft Power BI data visualization tool which provides a seamless user interface to explore the model output to quickly visualize and compare system demand variations over time, while also enabling the data to be exported for quick preparation of new scenarios in the hydraulic model. The B&V proposal also offered optional staff training on the use of the model, to empower staff to review the utilization of the hydraulic model, the utilization of the Power BI Dashboard and how to create new modeling scenarios using data gathered from the Power BI tool. Finally, the B&V proposal offered a faster delivery schedule. Staff therefore recommends that the professional services agreement be awarded to Black & Veatch.

Schedule

Black & Veatch's proposed schedule is based on the requested project timeline in the RFP. **Because we are high on the learning curve, we provide a completed project before the end of 2020, faster than the schedule in the RFP.** We are fully prepared to execute the Phase 2 services within this schedule assuming the various stakeholder meeting and workshop dates can be set in a timely manner. These frequent meetings and workshops will also provide opportunities for project management (status) update reports. This approach results in an efficient delivery of the project by keeping the project team on schedule and allow for continuous feedback and input from MWDOC.



MWDOC | OC DISTRIBUTION SYSTEM HYDRAULIC MODEL - PHASE 2 - HYDRAULIC MODEL BUILD & CALIBRATION

BLACK & VEATCH | 18

Attachment: Black & Veatch Proposal

BOARD OPTIONS

Option #1:

- Proceed with building and calibrating an OC regional distribution system hydraulic model. Do not include a 'cost recovery' aspect to repay MWDOC's general fund over time for the investment made.

Fiscal Impact: FY'19-20 –\$77,372, FY'20-21 – \$130,000

Business Analysis: Creates an important tool for improving our understanding of potential water quality and operational issues prior to new local supply projects going on-line with the goal of avoiding unintended consequences.

Option #2:

- Proceed with building and calibrating an OC regional distribution system hydraulic model. Include a 'cost recovery' aspect to repay MWDOC's general fund over time for the investment made.

Fiscal Impact: FY'19-20 –\$77,372, FY'20-21 – \$130,000 with the cost to be repaid to the General Fund over time by member agencies that use the model, based on marking up the consultant costs by 20% for each project undertaken.

Business Analysis: Creates an important tool for improving our understanding of potential water quality and operational issues prior to new local supply projects going on-line with the goal of avoiding unintended consequences.

Option #3:

- Do not build an OC regional distribution system hydraulic model.

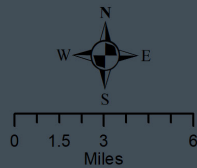
Fiscal Impact:

Business Analysis: Moving forward without an investigative tool for regional system integration planning is not recommended.

STAFF RECOMMENDATION

Option # 1

April 16, 2020



MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

PROFESSIONAL SERVICES FOR OC DISTRIBUTION SYSTEM HYDRAULIC MODEL

PHASE 2 -
HYDRAULIC MODEL BUILD & CALIBRATION



BLACK & VEATCH
Page 9 of 55

April 16, 2020

Municipal Water District of Orange County
Attn: Charles Busslinger
18700 Ward Street
Fountain Valley, CA 92708

RE: Professional Services for OC Distribution System Hydraulic Model Phase 2 – Hydraulic Model Build & Calibration

Dear Mr. Busslinger:

Thank you for the opportunity to provide this proposal to continue our service to Municipal Water District of Orange County (MWDOC) through development of the Orange County Distribution System Hydraulic Model and its calibration.

Once complete later this year, the OC Distribution System Hydraulic Model will provide MWDOC and its Member Agencies new analytical tools to support their on-going water supply reliability planning, including operational and emergency planning. Those efforts will now be enhanced with the model's capability to evaluate water quality parameters under operational and emergency outage conditions.

The OC Distribution System Hydraulic Model will also provide MWDOC, its Member Agencies, and in some cases other project proponents, the analytical tools to support the feasibility assessments and technical evaluations needed for development of new local water supply projects and their integration into the existing Orange County supply system.

Black & Veatch is proud to have been MWDOC's partner over the last several years supporting technical evaluation of potential new water supply projects. Specifically, Black & Veatch has assisted MWDOC with:

- Development of conceptual strategies for introducing water from the proposed Huntington Beach Desalination Plant into the East Orange County Feeder No. 2 (EOCF2).
- Collaborative workshops with MWDOC's Member Agencies and Metropolitan Water District of Southern California (Metropolitan) to discuss their issues and concerns associated with introducing new water supplies into existing systems.
- Preparation of a White Paper on integration of the proposed Huntington Beach Desalination Plant into the OC distribution system via Metropolitan facilities. While focused on Huntington Beach, the White Paper provided an overview of water quality related issues and technical approaches to addressing them that are applicable to any new water supply integration.
- Preparation of the recently completed OC Hydraulic Model Investigation Report. Within that effort, we collected model and GIS data from MWDOC's Member Agencies, participated in meetings with Metropolitan to coordinate modeling efforts and establish a basis for non-disclosure agreements between parties, and participated in workshops with MWDOC Member Agencies to continue to build support for the modeling effort.

Black & Veatch Is Your Ideal Partner to Develop the OC Distribution System Hydraulic Model

As a result of the above efforts in partnership with MWDOC, Black & Veatch brings a profound understanding of the data available to support hydraulic model development and its calibration. We are therefore well suited to efficiently and effectively apply our knowledge to Phase 2 – building and calibrating the OC Distribution System Hydraulic Model.

We have proven the value we can provide during Phase 1. A key goal in that Phase was to not just select the right model platform to address the analytical needs for new water supply integration planning and implementation. It was to develop a work plan, inclusive of programmatic budgets and schedules, that would reflect input and support from Metropolitan and MWDOC's Member Agencies and in so doing, help you garner support from MWDOC's Board of Directors to move forward with Phase 2. Our effort helped make that happen.

Likewise, our efforts in Phase 2 will add value to future modeling uses, whether to be conducted by MWDOC, its Member Agencies, or other project proponents. Specifically, we will be setting up the model with an eye toward facilitating future hydraulic and water quality analyses needed for local water supply and reliability projects under consideration such as the Doheny Beach Desalination Plant and others. **The ultimate purpose of the model is to support those needs – the combination of our knowledge of those projects, the OC Distribution system and how it is operated, the stakeholders involved, and overall water supply integration expertise will assure the model is prepared cost-effectively and provides long-term value.**

As was the case for Phase 1, Black & Veatch provides the following benefits to the Phase 2 model build:

- **New Water Supply Integration Expertise.** Black & Veatch brings unparalleled expertise in integration of new water supplies into existing systems, which is one of the reasons we were selected by MWDOC to assist with the Workshop with Metropolitan and MWDOC's Member Agencies, and to develop the White Paper on next steps. We will apply global experience from projects like Tampa Bay Water to assure that the model cost-effectively provides the robust technical results needed by MWDOC, Metropolitan, and MWDOC's Member Agencies to support moving new local water supply projects forward.
- **Water System Modeling Expertise.** Black & Veatch's Planning and Asset Management practice has supported new water supply integration projects globally and brings experience with InfoWater. Combined with our keen knowledge of what the models need to do to satisfy your, Metropolitan's and your Member Agencies' concerns, we will efficiently and effectively develop the model to fit for new water supply integration needs.
- **Knowledge of Orange County Distribution System and Proposed Projects.** Our professionals' involvement in concept development for new OC water supply projects dates back to Matt Thomas' work on the Doheny conceptual design while at Boyle Engineering. Black & Veatch's more recent efforts include assessment of the EOCF2, and collection and assessment of modeling data under Phase 1. In sum, we are already high on the learning curve about how these projects could integrate into the existing OC Distribution System, what Member Agencies can be served, and what impacts will need to be addressed to implement the projects. Our knowledge will make us efficient in model development and calibration.
- **Relationships with Metropolitan and MWDOC Member Agencies.** Black & Veatch brings a strong working relationship with Metropolitan's hydraulic modeling team, with whom we are also currently working on projects to assess impacts of improvements to the Second Lower Feeder and Rialto Pipeline. Our relationships will facilitate obtaining and sharing information about the facilities and operations in Orange County, and development of a calibrated model. We also bring experience in water system modeling and planning for a significant number of MWDOC's Member Agencies, facilitating our understanding of their models and how their information may be utilized in conjunction with your OC Distribution System model.

In total, Black & Veatch brings the combination of new water supply integration expertise, background knowledge about your projects, and Metropolitan and Member Agency relationships that will contribute to successfully preparing and calibrating the model and moving your projects forward.

It has been our pleasure to have assisted MWDOC so far in its efforts to develop new, reliable local water supplies for Orange County. The ability to leverage existing conveyance infrastructure to implement these projects allows them to provide greater capacity, making them more cost-effective and enhancing stakeholder support and the regional reliability benefit they provide. Having a robust model will be a game-changer in making that vision a reality.

If you have any questions about the details of our proposal, please feel free to contact me at (949) 788-4250 or thomasml@bv.com. Thank you for the opportunity.

Yours truly,
Black & Veatch Corporation



Matt Thomas, PE
Project Manager, Associate Vice President

Understanding and Approach

PROJECT UNDERSTANDING

In our cover letter, we described the deep technical expertise, project experience, and project understanding that Black & Veatch will provide to make not just the Phase 2 Hydraulic Model Build & Calibration a success but will also help MWDOC be successful in supporting implementation of new local water supplies for Orange County.

Also, as highlighted in our cover letter, this Phase 2 effort needs to:

- Provide a hydraulic model that accurately represents the MWDOC water transmission system and is readily expandable to connect Member Agency systems if and when needed.
- Develop an efficient and effective model calibration plan to calibrate and validate the model to ensure it is accurate for MWDOC's intended uses.
- Deliver an accurate and user-friendly model that will support MWDOC's current and future needs, including studies needed to support new water supply integration projects.

In this section of our proposal, we describe our general approach to building and calibrating MWDOC's hydraulic model to achieve these goals.

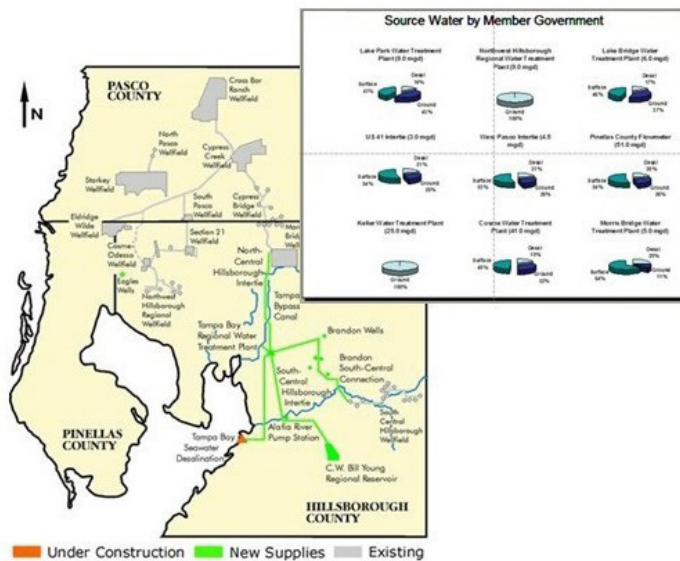
INTRODUCTION

Prior to completing the Phase 1 Model Investigation, we had met with MWDOC and other key stakeholders about this project to establish an understanding of MWDOC's short-term and long-term needs. Our understanding was further solidified through our participation in the Stakeholder Outreach workshop conducted during Phase 1. While the scope of the Phase 2 RFP is focused on building and calibrating a hydraulic model, it is important to understand MWDOC's long-term needs and intended future uses for the model. The work plan figure on the following page provides an updated overview of the Phase 2 work tasks as well as summary of potential future "Phase 3+" model uses and system evaluations including the key results and outcomes to be expected.

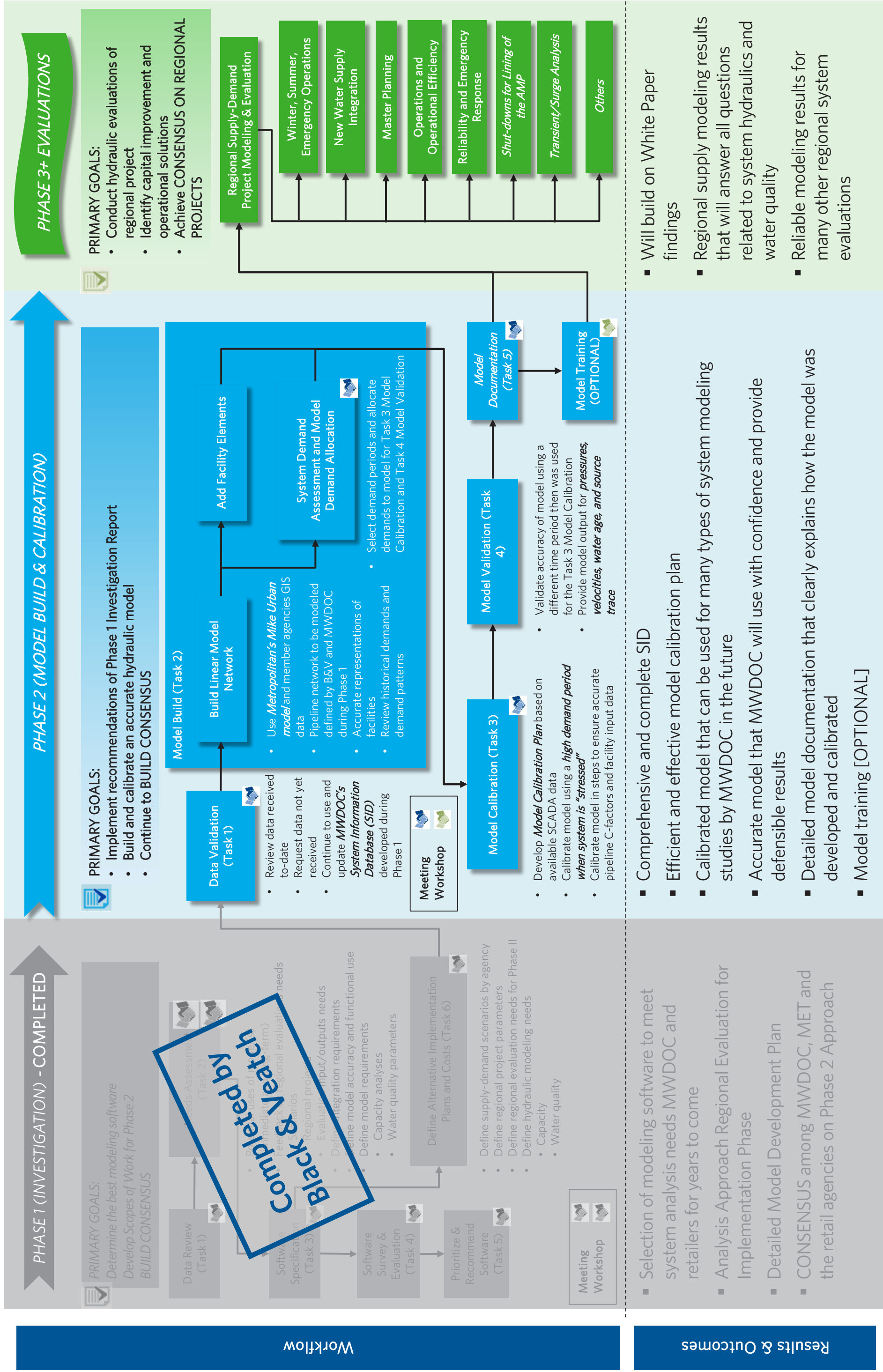
The success of Phase 2 will dictate the potential for success for future phases. We understand MWDOC's needs and intended future model uses and will ensure that the hydraulic model build and calibration efforts conducted during Phase 2 will directly support future model uses and system evaluations.

Following the work plan figure, we have detailed our technical approach for the project. Our technical approach focuses on the Phase 2 tasks requested in the RFP but also addresses the potential Phase 3 tasks at a higher level.

Following the technical approach, we have included a formal Scope of Services for the tasks requested in the RFP based on our proposed technical approach. The proposed project Schedule and Budget provided in those sections of our proposal are based on our approach and the Scope of Services.



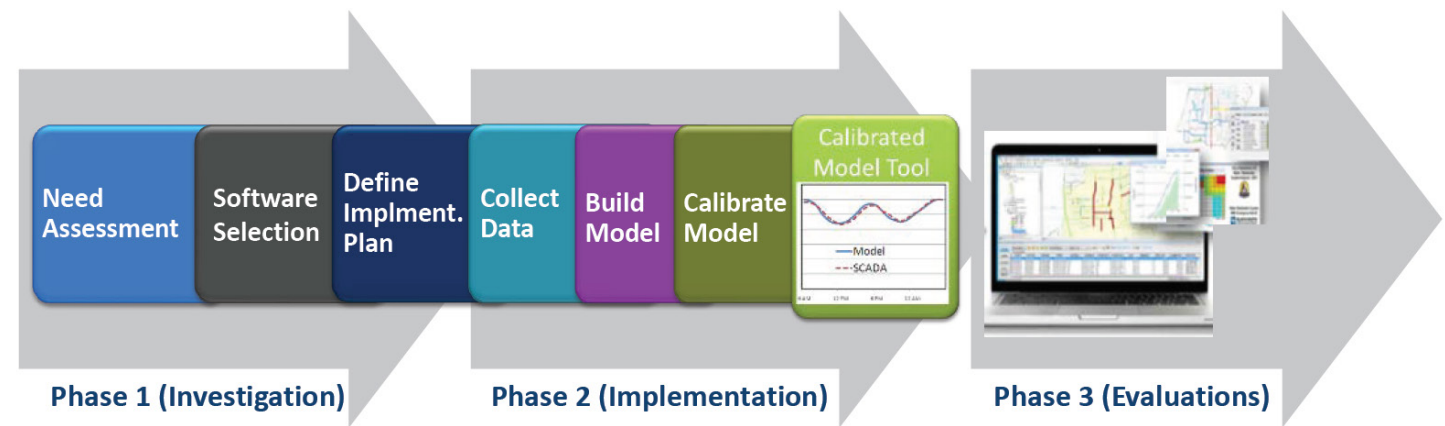
TAMPA BAY WATER: Black & Veatch's experience building Tampa Bay Water's **INFOWATER** hydraulic model and using it to evaluate water quality supplied to its retail agency systems will help ensure a successful project for MWDOC.



TECHNICAL APPROACH: PHASE 2 – MODEL BUILD AND CALIBRATION

As part of the previously completed Phase 1, Black & Veatch worked with MWDOC staff to develop the recommended implementation plan. In order to provide an accurate and stable representation of the distribution system hydraulics, the recommendations of the Investigation Report were to build and calibrate the OC distribution conveyance network model using Innovyze's InfoWater software. A smooth and efficient implementation of the recommendations from Phase 1 is the focus of Phase 2. Our implementation team for Phase 2 builds on key staff from our Phase 1 team, so we are completely familiar with the status of data collection and other work activities and are ready to seamlessly initiate Phase 2.

Model Development Plan



The Phase 2 Implementation efforts will be staged to follow the data collection and implementation plan development under Phase 1 and provide the necessary model and evaluation tools to evaluate regional supply options under Phase 3.

Task 1: Data Validation (Collect, Review, Validate and Convert Existing Data)

The data validation task primarily involves a final, more detailed review of the available physical network data/GIS for the conveyance system and subsequent revisions and conversions to ensure that the data can suitably be utilized for the purposes of model build. Key outcomes of this task are:

- Review and validation of the pipe network data/GIS for the conveyance system infrastructure.
- Review and conversion of the available demand / supply data for each of the key flow meters and Service Connections to a format that can readily be used for a flow balance of the conveyance system.
- Conversion of the various data formats that may be provided for the different segments of the conveyance system. It is anticipated that data will be provided as a combination of GIS shapefiles, .KMZ files, and exported shapefiles from the existing MIKE Urban model. The critical information of each of these sources will be compiled for ease of import during the model build task.
- Compilation of the key modeling attributes for each facility to be modeled (treatment plants, pump stations, pressure control facilities, reservoirs, etc.).

The work already conducted during Phase 1 of this project has provided the Black & Veatch team with intimate knowledge of the data available to build MWDOC's model. This information, combined with our extensive knowledge of the proposed new local water supply projects in OC and key system integration issues, will make this task straightforward. The team will follow rigorous documentation and processes to inventory data by continuing to update the System Information Database (SID) produced and documented in Phase 1. This data collection and review task will include the pipe information, facilities (pumps, reservoirs, pressure control facilities, retail agency connections, treatment plants, etc.), demand data, and GIS data review.

Black & Veatch believes that identifying, collecting, and documenting the right data at the beginning of the project is essential for being able to quickly and smoothly develop and build the hydraulic model. The project team will continue to work with MWDOC staff to gather the available system data that was not already provided during Phase 1. The existing System Information Database demonstrates that demand and supply data has already been received from 2014 to 2018. This will be extended to include additional data periods, if it is desired to have a calibration/validation period outside this timeframe. This may be needed to capture water demand patterns and system operation scenarios that represent boundary conditions for long-range planning. The team will continue to collect the remaining pipeline GIS and facility information for the different parts of the system that are necessary to build a robust regional hydraulic model.

Any remaining data gaps will be communicated to MWDOC to verify if further information or data is readily available to fill these gaps. Any new or updated data will also be added to the SID. The remaining gaps where data is not readily available will be documented and suitable assumptions will be verified with MWDOC before proceeding to model build. The outcomes of the data validation and any assumptions required for the model build will be documented in a technical memorandum for MWDOC's review. The memo will also include recommendations for any additional work that should be completed to answer any significant unknowns and/or address significant data gaps before the model build commences.

The GIS data, which is extremely important for building a model, will be checked for connectivity accuracy and the pipeline attribute data (i.e. diameter, material and install year) will be verified for completeness. Any missing data or feature in the GIS will also be identified.

All the facility information (pumps, pressure control structures, treatment plants, reservoirs, etc.) will be summarized in tables for easy reference during model build.

System Information



Municipal Water District of Orange County OC Distribution System Water Supply Integration Hydraulic Model Phase 1 - Model Investigation System Information Database (Requested date: May 2, 2019)						
Priority Legend: High Medium Low Reviewed						
#	Description	Format	Source	Responsible Person	Date Needed	Date Received
A. DEMAND AND SUPPLY DATA						
A1	Historical supply data from MET to MWDOC agencies for past 5 years (including specific turnouts)	Digital (GIS or Excel)	MET		5/20/2019	6/3/2019
A2	Historical supply data from OCWD to MWDOC agencies for past 5 years	Digital (GIS or Excel)	MWDOC		5/20/2019	6/3/2019
A3	Historical other local supply data for past 5 years	Digital (GIS or Excel)	MWDOC / Agencies		5/20/2019	
A4	Future supply portfolios (including timing of any new supplies)	Any	MWDOC / Agencies		5/20/2019	5/9/2019
A5	Location of all existing and future water supplies	GIS	MWDOC / Agencies		5/20/2019	
A6	Existing and future demands for MWDOC member agencies	Digital (GIS or Excel)	MWDOC / Agencies		5/20/2019	5/9/2019
B. WATER QUALITY DATA						
B1	Historical imported water quality data for source and supplied water (to member agencies) such as disinfection concentration (chlorine/chloramines)	Any	MWDOC / MET		5/20/2019	
B2	Locations of water quality data collection or sampling points (TRC and other such locations)	Any	MWDOC / MET		5/20/2019	
B3	Water quality reports/studies by member agencies	Any	MWDOC / Agencies		5/20/2019	
C. HYDRAULIC MODEL DATA						
C1	List of agencies with hydraulic models, software used, and last calibration date	Spreadsheet	MWDOC / Agencies		5/20/2019	
C2	List of uses of hydraulic model by agencies including water quality modeling and new source water integration analysis	Spreadsheet	MWDOC / Agencies		5/20/2019	
C3	MET's MIKE Urban model	MIKE Urban file	MET		5/10/2019	
D. GIS DATA						
D1	GIS database for all regional pipelines, distribution pipelines, reservoirs, pump stations, treatment plants, pressure control facilities, valve vaults, etc.	GIS geodatabase	MWDOC / MET		5/10/2019	
E. OPERATIONAL DATA						
E1	Reports and documents describing/outlining the operations of MWDOC/MWDOC regional system under different supply, demand, and seasonal variations	Word / PDF	MWDOC		5/20/2019	
F. MISCELLANEOUS DATA						
F1	Any previous reports/study on the hydraulics or modeling of MWDOC's system	Word / PDF	MWDOC		5/10/2019	5/13/2019
F2	Any previous reports/study on MWDOC's water conveyance system	Word / PDF	MWDOC		5/10/2019	5/13/2019

Black & Veatch's SID and data tracking procedures will help to seamlessly and quickly transition into Phase 2 from the data identified and provided during Phase 1 of this project. It will be a valuable reference for MWDOC moving forward and it will help to ensure that previous efforts are not duplicated.

Name	Model ID	From Zone	To Zone	Elevation (ft)
La Brea Regulating Station	RE38014	579	477	477
Owensland Regulating Station	RE59006	865	477	455

Regulating Station Name	Model IDs	From Zone	To Zone	Setting (psf)
Grand & Venice	V_6606298	477	205	54
	V_4406299			54
	V_4406300			54
Jefferson & Sep	V_3019690	477	205	82
	V_3019684			82
	V_3019675			82
Palm & Stewart	V_4359923	477	205	48
	V_4359926			48
	V_4359923			48
Regulating Station #1	V_2279152	477	205	71
	V_2279148			71
	V_2279136			71

Diameter (in)	Length (ft)	%
7 - < 8	8,511	2%
6 - < 8	114,335	29%
8 - < 12	65,145	17%
12 - < 16	12,325	3%
16 - < 24	81,668	21%
24 - < 36	2,448	1%
>= 36	101,443	24%

Reservoir Name	Capacity (MG)	Footprint Dimensions (ft)	Base Elevation (ft-amsl)	Overflow Level (ft)	Fill Pressure (psf)
Reservoir 1	0.5	Rectangular (varies with depth)	75.25	42.5	65
Reservoir 2	18.7	Circular (diameter = 297.5)	45.7	86	75
Total Capacity				28.2	

Manufacturer	Model	Type (power source)	Capacity (gpm)	TDH (ft)	Speed (rpm)	Manufacturer	Model	Size (hp)
Johnston Pumps	SL-200	Vertical Turbine (gas)	2,500	130	1,200	Waukesha Engines	F1197G	137
Johnston Pumps	SL-100	Vertical Turbine (gas)	2,500	47	1,200	Waukesha Engines	F1197G	137
Worthington Pumps	N/A	N/A (electric)	1,000	N/A	1,200	U.S. Electric Motors	364VP	40
N/A	N/A	N/A (gas)	4,200	N/A	N/A	Waukesha Engines	F2895G	369
N/A	N/A	N/A (gas)	4,200	N/A	N/A	Waukesha Engines	F2895G	369

Existing system data will be summarized in simple tables to identify gaps and as easy reference during model build.

Task 2: Model Build

The “Model Build” task will utilize the compiled pipeline network and facility data from Task 1 in order to construct a hydraulic model that represents the actual physical system. At the end of this stage, the hydraulic model will include all critical pipeline and facility data, allocated demands and other boundary conditions necessary to run an extended simulation of the model (although it will not yet be a calibrated model until completion of Tasks 3 and 4). Key outcomes of this task include:

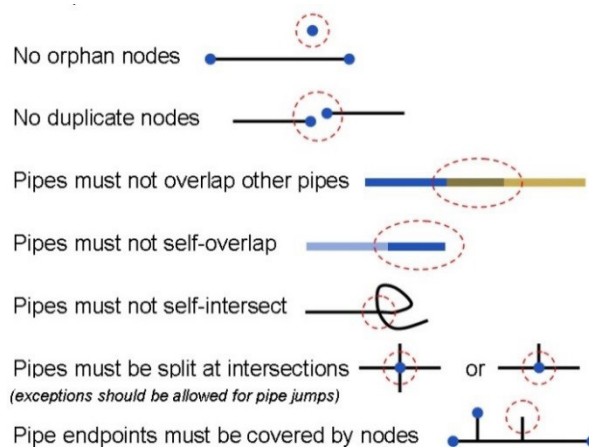
- Incorporation of the compiled pipeline network from the various sources reviewed during Task 1 (GIS files, KMZ files, MIKE Urban exported GIS, as-builts, etc.). Once compiled and validated, this data is imported into the hydraulic model using InfoWater’s “Import Manager” tool.
- Key facility elements of the network will be constructed in the hydraulic model based on available as-builts and facility layout drawings.
- Subsequent to the physical network being incorporated, additional data attributes will be added to the necessary components that would not be incorporated in the GIS, such as pipeline C-Factors, junction elevations, and other facility/pipeline attributes.
- Establish and assign water demands for the various customer Service Connection points within the modeled system. Prior to allocating these demands and associated demand patterns to the model, a demand assessment task is needed to assess historical system demands with MWDOC and determine which system demand conditions should be incorporated into the model, in order to cover sufficient seasonal variation.

2.1. Build Linear Model Network

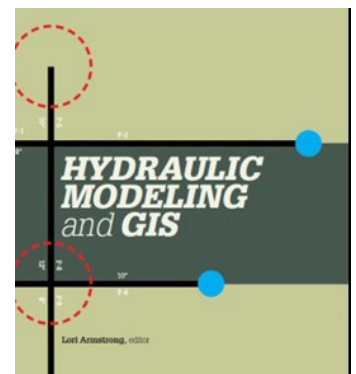
Based on the data review from Task 1, the Black & Veatch team will build a geometric GIS network for MWDOC’s system. This will include all the necessary pipes, pumps, pressure control facilities, Service Connections, treatment plants, etc. Creation of a well-connected and complete GIS network will simplify and standardize the model build process for MWDOC. This will also help with maintenance and future update of the model.

Hydraulic model infrastructure development will begin with a review of the Metropolitan Mike Urban model data and most current GIS data transmission system data provided by MWDOC Member Agencies. Development of a “1-to-1” model (1 model element for each GIS element) is planned. Necessary attributes that are to be included in the data include: pipe diameter, pipe material, pipe installation year, node elevation data, and node subtype data.

With a 1-to-1 relationship between the model and the GIS being desired, it will be necessary to ensure that the connectivity in the GIS network maintains these features. Should issues or missing and incomplete data (including any missing or duplicate asset IDs) be identified, these will be presented and discussed with MWDOC for input and resolution. Efforts to research and implement appropriate resolution of missing or incomplete data by Black & Veatch can be provided as Additional Services if significant upgrades are required to the GIS. Based on our review of the data driving Phase 1, this is not expected to be necessary. This data will be prioritized for resolution by MWDOC based on how critical it is to the model performance and accuracy. Network connectivity will also be



Pipe topology tools (shown above) will help to address discrepancies between the GIS data and what should be incorporated into the model.



Black & Veatch staff were primary authors of Hydraulic Modeling and GIS, an Esri reference guide. Our team has extensive experience in building models from and integrating with our clients’ GIS database systems.

reviewed in the GIS prior to model import. A variety of different GIS and modeling tools are used to help efficiently identify GIS errors that would impact the model build process such as duplicate nodes; overlapping pipes; pipes not split at intersections; pipes not overlapping; and more. Examples of what some of these errors look like are provided in the preceding graphic. Any GIS network connectivity issues that are found will be documented and provided to MWDOC for review. Upon completion of the data attribute and network connectivity review and resolution of any missing data or connectivity issues, GIS pipes and nodes will be transferred into the model.

For nodes in the model, if node elevation data is not available in the GIS, then readily available Digital Elevation Model (DEM) data (from Google Earth or USGS, for example) will be used to assign node elevations. These elevations will represent an estimate of ground elevation at the node location and are commonly used as the best estimate for elevation.

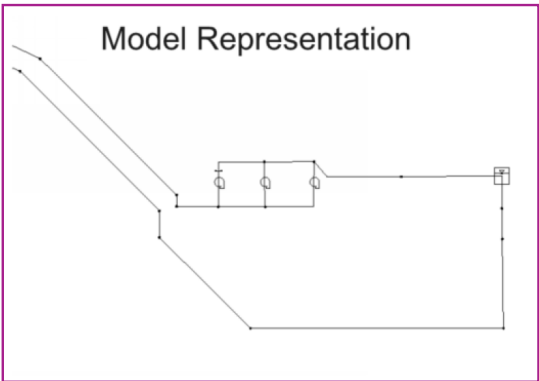
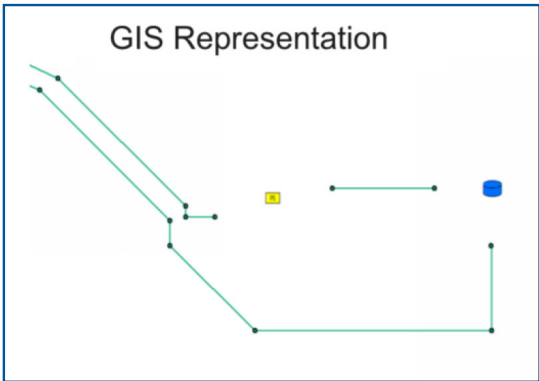
Our Model Build and Calibration Team is comprised of modeling and GIS experts that have years of experience in developing and integrating water and network models from GIS. Our understanding of the MWDOC system and our team’s expertise in model build and calibration will allow us to efficiently and accurately build the physical network of the MWDOC network from the various sources.

2.2. Add Facility Elements

Once the pipe network is established in the model, system facilities will be added. Facilities (pumps, reservoirs, pressure control facilities, Service Connections, treatment plants, etc.) will be manually added into the model using the facility tables generated in Task 1. Furthermore, detailed drawings or facility schematics, if available, will be utilized so that a realistic, but simplified, version of the facility be included in the hydraulic model. When updating the facility in the model, aerial information will be overlaid in GIS, so that the contents of the facility are more accurately established within the footprint of the respective buildings. This will allow for more accurate length, geospatial location, and connectivity at these locations. The example below shows how a more accurate representation of facilities can be added to the hydraulic model, where for example, additional nodes and suction/discharge piping are added for each individual pump. Using a facility layout consistent with drawings and the actual facility footprint helps to increase the accuracy for facility elements and data attribution for minor losses and other features which affect the hydraulic characteristics of the model across facility elements. It also allows easier “what-if” scenarios for any isolations conducted within facilities.



Linear water system infrastructure to be included in the model build of the MWDOC system as determined by Black & Veatch and MWDOC during Phase 1.



Accurate representation of the facilities in the model is essential for more advanced analysis using the hydraulic model. And GIS does not have that level of detail as would be found in As-Built.

A key advantage of our team is our knowledge of the Metropolitan facilities and how they operate, derived from our previous study of water supply integration concepts for the EOCF #2. Matt Thomas and Rob Kaessner on our team will help the modeling team translate that knowledge into a model that reflects actual system configuration and operation.

2.3. System Demand Assessment and Model Demand Allocation

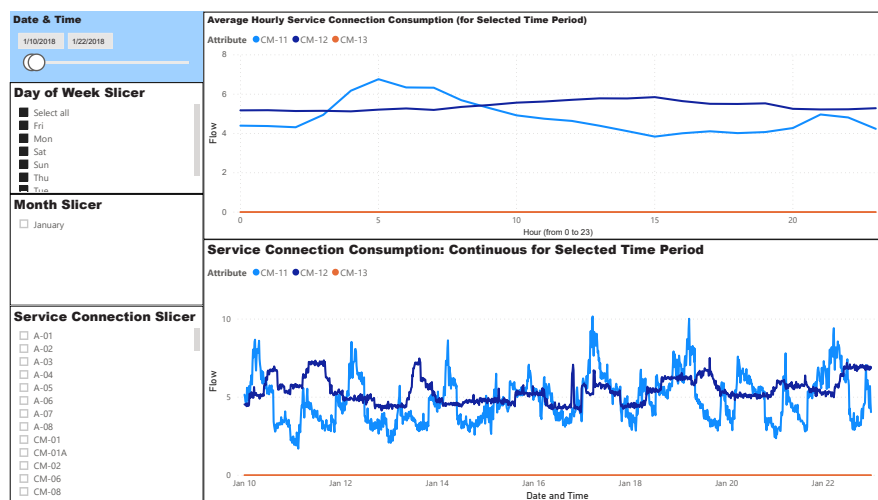
The final stage of model development is to establish and assign water demands for the various customer Service Connection points within the modeled system. Prior to allocating these demands and associated patterns to the model, a demand assessment task is needed to assess historical system demands with MWDOC and determine what system demand conditions should be incorporated into the model. The demands will be analyzed to look at historical patterns and to determine peak factors for maximum day, peak hour and minimum day.

MWDOC and its member agencies receive imported water supply from Metropolitan and groundwater supply from Orange County Water District (OCWD). The historical data from these supplies are essential to building the hydraulic model since they will be used as inputs (source and demands) into the hydraulic model. Metropolitan has flow meters at all its turnouts and flow data in spreadsheet format which is available at 15-minute intervals. Our team has already conducted a high-level review for the 5-year period from 2014 to 2018 during Phase 1 and is aware of some of the seasonal variation that must be considered when determining different historical patterns for model scenarios.

Black & Veatch will conduct a detailed review of the customer demand/flow records for 2014 through 2019 for each of the Service Connection points within the extents of the hydraulic model. Due to the large number of Service Connections that need to be considered, our team's PowerBI experience will be used to efficiently transfer the flow/demand records into an easy to visualize dashboard that demonstrates the demand over time and provides the ability to quickly filter results to specific time periods when seasonal variations led to higher than normal demand conditions. The below graphic demonstrates a simple dashboard that can rapidly filter results for any time period and for any piece of SCADA (Service Connection/facility flow/pressure or level). It was prepared using data from one of the existing Service Connections in Orange County.

After the detailed review, Black & Veatch will discuss the demand trends with MWDOC staff to determine the most appropriate demand conditions to incorporate in the model. Each of these demand conditions will be associated with a specific time period based on feedback from MWDOC/MET. These discussions will take place during a recommended "Demand Review Meeting". The goal of these discussions is to ensure that system demands representing various system conditions (low, high and emergency flows) are established for the model.

This evaluation will identify historical wet and dry periods and help to ensure that impacts of water restrictions during drought periods are recognized. Once the demand conditions are established, the demands and patterns will be finalized and added to the model. In the hydraulic model, all customer (Member Agency) Service Connection points (wholesale meters) will be modeled based on available demand/flow records for the selected time period/demand condition. If a Service Connection point's demand/flow data is recorded on an hourly or continuous basis, a 24-hour demand pattern will be developed for that Service Connection point based on a review of the demand/flow records. If a particular Member Agency demand/flow data is recorded on a daily (or less) basis, a 24-hour pattern will be assumed for that Service Connection point.



Sample PowerBI dashboard of MWDOC Service Connection daily flow data developed by Black & Veatch to visualize historical SCADA data.

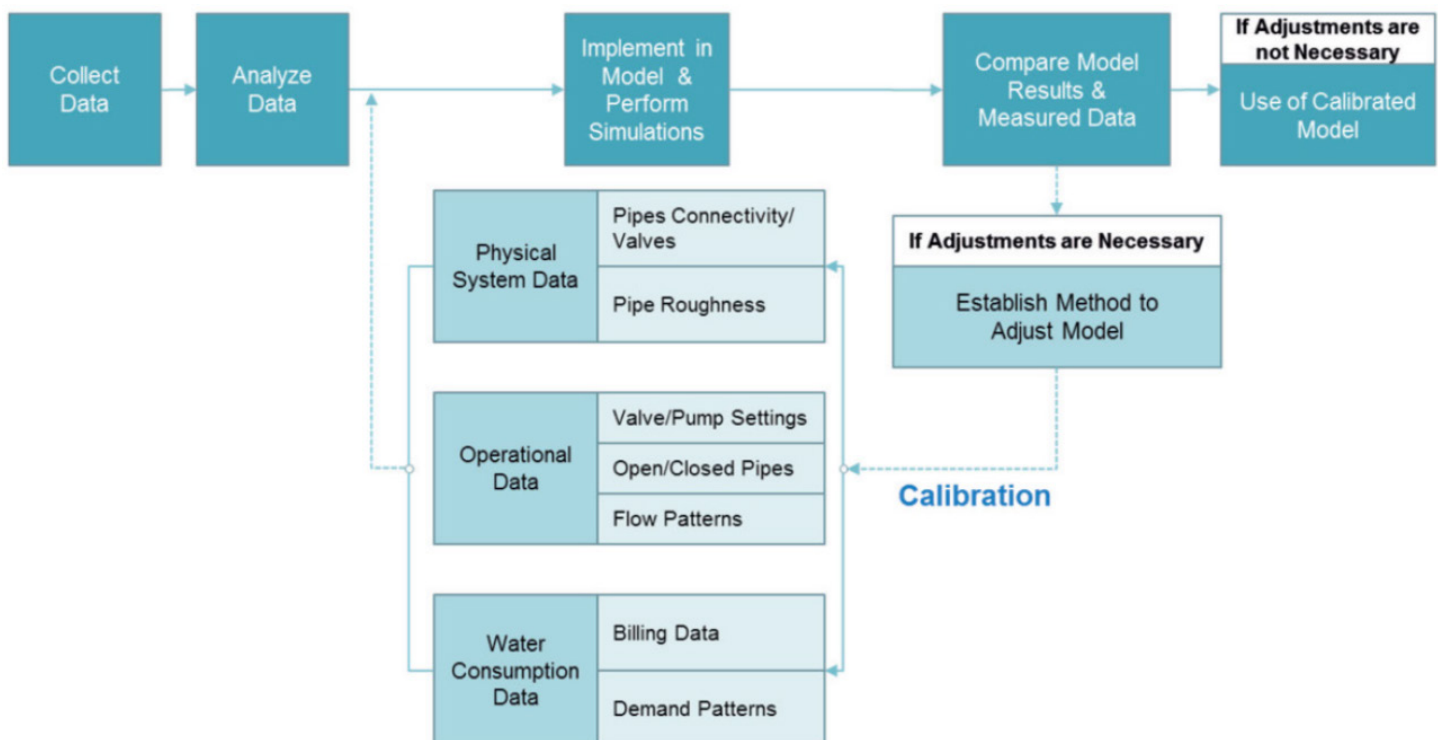
Task 3: Model Calibration

The “Model Calibration” task primarily involves adjusting appropriate hydraulic model parameters such that the hydraulic model accurately simulates the actual operation of the system. Key outcomes of this task include:

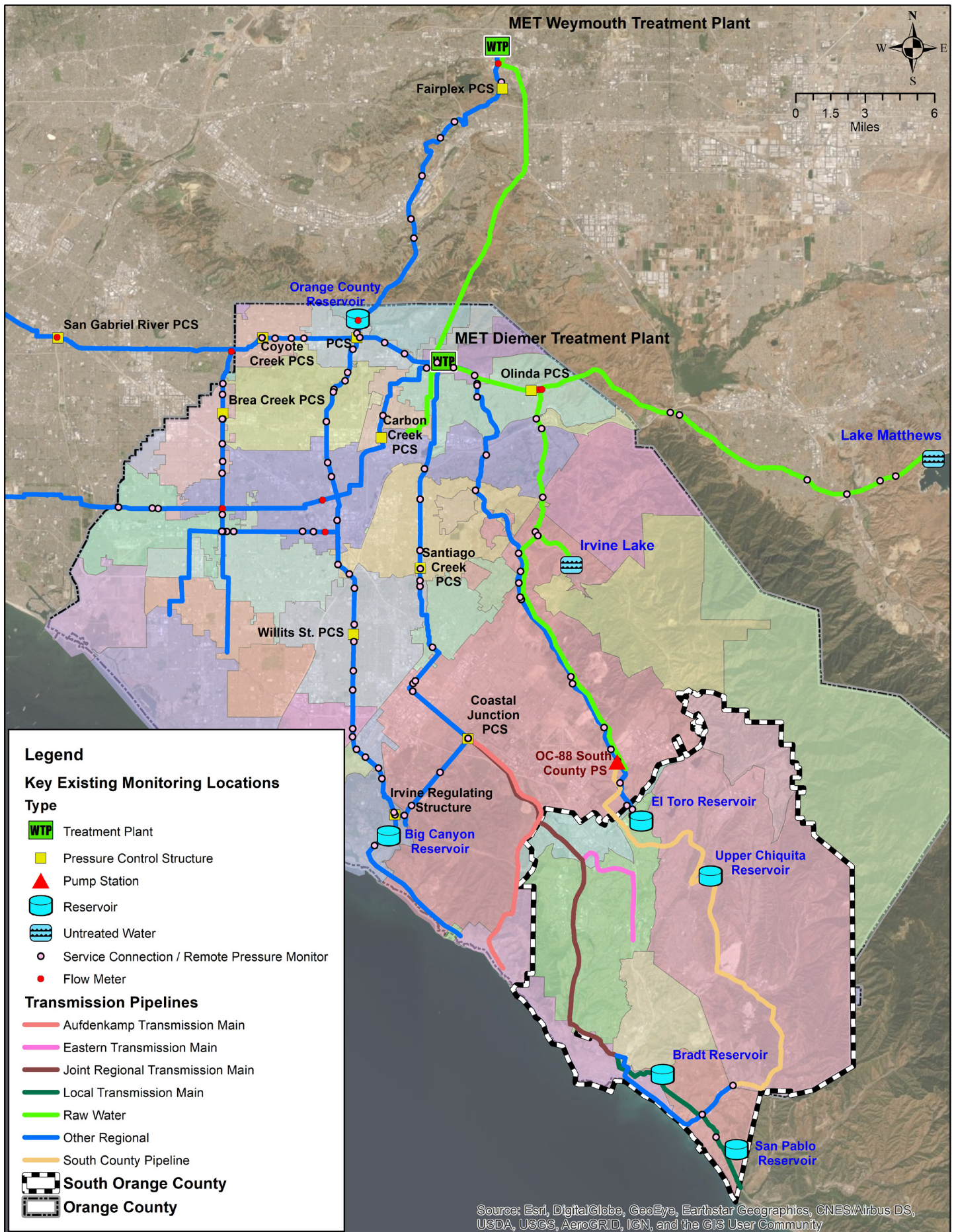
- Develop a model calibration plan that identifies any additional testing and monitoring (flow/pressure) that is needed to ensure successful calibration of the hydraulic model.
- Selection of an appropriate 24-hour period to conduct an Extended Period Simulation calibration of the model.
- Refine the hydraulic model parameters until the hydraulic model sufficiently simulates the results obtained from SCADA.

Hydraulic model calibration is the process of comparing the model output results to actual system operational data and adjusting appropriate model input parameters, if/as needed, to improve how well the model is simulating actual system conditions. Built on our work during Phase 1 and subsequent data gathering efforts, our team already has a strong understanding of what flow, pressure and level data is monitored in the water system based on our knowledge of the facilities and Service Connections. Our team has developed the figure on Page 9, which highlights the various monitoring points (facilities, Service Connections, etc.) that are available for use during the calibration. This demonstrates that the system is well-monitored for the purposes of calibration. With our data familiarity and our understanding of what will be needed to calibrate the hydraulic model, we are confident that no extra pressure/flow monitoring will be needed for the model calibration/validation stages of this project.

Development of the plan will also involve reviewing historical operational records to identify an appropriate 24-hour period of time for model calibration. In general, we will look for periods of time when system demands were higher than normal causing the system to be more “stressed”, but also when nothing unusual was occurring, such as a major main break or system transmission main or facility outage.



Black & Veatch has a proven methodology to calibrate water distribution models implemented across multiple utilities of various sizes.



In order to accurately simulate actual system operations, it is essential to complete a calibration under Extended Period Simulation (EPS) that uses actual known conditions based on field testing results. This usually involves a minimum 24-hour EPS simulation selected during a high demand period. When calibrating a transmission system model, our process generally consists of two main stages of calibration: “Negative Demand” Calibration and Facility Calibration. “Negative demand” calibration focuses on the transmission system watermain and determining the actual C-Factors in the system. It is named “Negative demand” calibration because the actual flows recorded by SCADA are input into the model as “negative demands”. By first inputting the SCADA recorded flows at the facility discharges, we can first remove any unknowns and/or errors with the pump curves and minor losses. This ensures that we are calibrating the transmission main C-Factors accurately. Subsequently, during the facility calibration, we remove the “negative demands” and add the actual pump ON/OFF controls for each facility to ensure that the pump curves at that station are being simulated accurately.

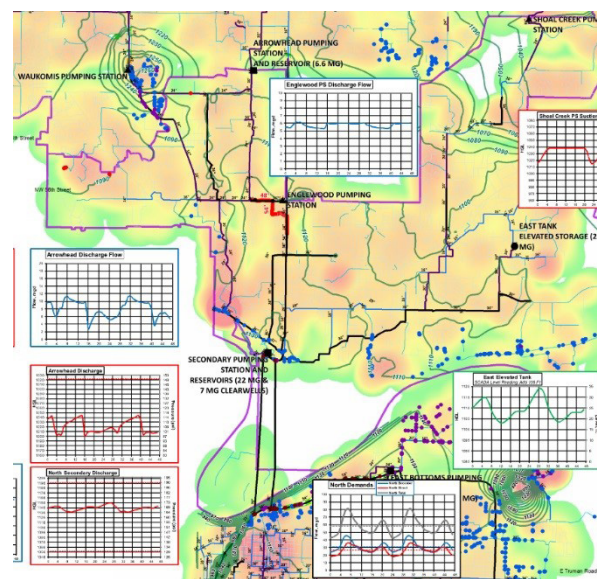
Comparisons of the model results to the SCADA and other operational data provided by MWDOC will be completed. This includes verification that the model simulates flows, pressures, and storage facility levels reasonably well at each of the locations where this data is available from SCADA or other operational records provided by MWDOC. Graphics will be prepared, similar to the sample below, that show the system map along with the individual comparison plots of each of the SCADA monitoring locations (pressure/flow/level).

Task 4: Model Validation

The “Model Validation” task is a similar task to model calibration, except that, rather than adjusting the model parameters, this stage is a verification that the previously established parameters still lead to an accurate model simulation during a different time period. Key outcomes of this task include:

- Further comparison graphics (model vs. SCADA) of the validation scenario.
- Simulation results for the calibration & validation scenarios documenting pressure, velocity, flow direction, water age and source trace results.

The calibrated model will be validated under other demand conditions such as average demands. The process and tolerance for validation will be similar to the calibration criteria. Subsequent to the completion of the calibration and validation scenarios, maps will be created to document the pressure, velocity, water age and source trace results along the modeled network for the model validation period.



Black & Veatch documents calibration results in easy to understand graphic that overlays the individual plots on the system map.

Task 5: Model Documentation

As each task is completed, the process used for the model build, model calibration and the subsequent simulation of pressure, velocity, water age and source trace will be documented into a report. Wherever possible, step-by-step guides will be provided to document processes that should be continued for future updates, such as data import and data cleanup. The model calibration plan and results will also be documented succinctly.

We understand that one of MWDOC’s goals is to be able to run their new hydraulic model in-house. Following the completion of Tasks 1 to 4, MWDOC will have a calibrated and working hydraulic model of their system that can be used for many system simulations and evaluations. While not requested in the Phase 2 RFP, Black & Veatch could at this time provide Model Training for MWDOC staff as an Additional Service.

Scope of Services

The Scope of Services requested in the RFP has been replicated below and also enhanced to reflect Black & Veatch's technical approach and identify key deliverables and meetings.

In general, the overall modeling effort is separated into five general tasks:

1. Data Validation
2. Model Build
3. Model Calibration
4. Model Validation
5. Model Documentation

Task 1: Data Validation

Black & Veatch will review the existing MWDOC System Information Database (SID) and prepare and submit a prioritized list of remaining system information and data needs to build and calibrate the hydraulic model. This list will address items not already in Black & Veatch's possession and needed for all tasks including, but not limited to, existing hydraulic model and GIS data, system physical and infrastructure data, operations data and descriptions, and SCADA and/or other system monitoring data. Data formats will be specified by Black & Veatch with the expectation that MWDOC, Metropolitan, and/or other Member Agencies will be able to provide the data in the desired (optimal) format.

A copy of the preliminary data request list will be submitted prior to the Project Initiation Meeting. This list will be reviewed during the meeting. Data received will be collected and recorded in the SID by Black & Veatch.

Black & Veatch will schedule and facilitate a Project Initiation Meeting. It is assumed the meeting will be web-based and not in-person. Black & Veatch will prepare the Project Initiation Meeting agenda in advance and issue meeting minutes for distribution afterward. Black & Veatch will also follow up on action items from the meeting.

Hydraulic model development will begin with a review of the Metropolitan Mike Urban model data and most current GIS data transmission system data provided by MWDOC Member Agencies. Development of a "1-to-1" model (1 model element for each GIS element) is planned. It is assumed that the GIS data is already segmented reasonably. The GIS data will be evaluated for completeness and compatibility with the modeling software to facilitate a 1-to-1 relationship.

Should issues or missing and incomplete data (including any missing or duplicate asset IDs) be identified, these will be presented and discussed with MWDOC for input and resolution. Effort to research and implement appropriate resolution of missing or incomplete data by Black & Veatch can be provided as Additional Services. This data will be prioritized for resolution by MWDOC based on how critical it is to the model performance and accuracy. Network connectivity will also be reviewed in the GIS prior to model import. Any GIS network connectivity issues that are found will be documented and provided to MWDOC for review. Upon completion of the data attribute and network connectivity review and resolution of any missing data or connectivity issues, GIS pipes and nodes will be transferred into the model.

Deliverables and Meetings:

- Project Initiation Meeting
- Data Request List
- Updated System Information Database (SID)

Task 2: Model Build

Once the GIS and/or model data has been reviewed and compiled into a suitable format for model import, the physical network of pipes and nodes will be imported into the hydraulic model using InfoWater's Import Manager Tool.

Once the pipe network is established in the model, system facilities will be added to the model. These facilities include MET Water Treatment Plants (limited to high-service pump station and clearwell) and the other pump stations, storage reservoirs, and pressure control structures (PCS). Needed data for these facilities will be obtained from MET's Mike Urban model and as-built drawings and/or other records provided by MWDOC, MET, and/or Member Agencies. Needed facility data will include the following:

- Number of pumps and pump control valve size and type
- Pump manufacturer performance curves and/or recent field-tested pump curves
- Current pump operations descriptions and/or settings (i.e. on/off setpoints)
- Storage facility (clearwells and reservoirs) volume, dimensions, and elevations
- Number of PCS valves, valve size and type, operations descriptions and/or pressure/flow setpoints
- Wholesale water meter locations and sizes for all locations within MWDOC's system

The final stage of model development is to establish and assign water demands for the various Service Connection points from the MET system to MWDOC and other customers. Prior to allocating these demands and patterns to the model, demand assessment is needed to assess each of the Service Connection points in the model.

Black & Veatch will conduct an initial review of the customer demand/flow records for 2014 through 2019 for each of the Service Connection points within the extents of the hydraulic model. Subsequent to the initial review, Black & Veatch will discuss the overall demand trends with MWDOC staff to determine the most appropriate demand condition(s) for incorporation to the hydraulic model. Each of these demand conditions will be associated with a specific time period based on feedback from MWDOC and based on the historical data review. These discussions will take place during a web-based "Demand Evaluation Review Meeting". The goal of these discussions is to ensure that accurate demands are established for the full envelope of potential demand conditions. If demand or system operation conditions from a different period are needed for the model, it is assumed that MWDOC or MET can provide such data. For any future demand scenario, it is assumed that MWDOC will be able to provide projected low & high demands for each Service Connection in the model.

Once the demand conditions are established, the demands and patterns will be finalized and added to the model. In the hydraulic model, all customer (Member Agency) Service Connection points (wholesale meters) will be modeled based on available demand/flow records for the selected time period/demand condition. If a Service Connection point's demand/flow data is recorded on an hourly or continuous basis, a 24-hour demand pattern will be developed for that Service Connection point based on a review of the demand/flow records. If a particular Member Agency demand/flow data is recorded on a daily (or less) basis, a 24-hour demand pattern will be assumed for that Service Connection point. Similarly, any incoming/outgoing transfers will need to be established in the model. Flow data is assumed to be available for these transfers, such as the Lower Feeder and Second Lower Feeder.

As part of the base scope, it is currently assumed that two demand conditions will be selected and that specific demands and demand patterns will be established for each of these demand conditions (e.g. Low Flow; High Flow)

Deliverables and Meetings:

- Meeting with MWDOC to discuss demand evaluation results

Task 3: Model Calibration

Calibration of the treated water system will be conducted with an initial focus on the south Orange County area with near-term needs (Doheny, San Juan Basin projects). Calibration efforts include utilizing available pressure and flow data from Metropolitan, MWDOC, and Member Agencies. This phase will provide a reliable model for simulation of pressures and water age/water quality evaluations. The model will have the ability to also simulate water source blending.

Model Calibration Plan

Based on a review of available system operational records (i.e. SCADA and/or data logger) to understand what system operational parameters (i.e. pressure, flow, level) are recorded and at what locations within the system, Black & Veatch will develop a hydraulic model calibration plan. This plan will define the key locations in the system where operational parameters will be compared. Based on our knowledge of available monitoring points in the OC distribution system, we are confident that no extra pressure/flow monitoring will be needed for the model calibration/validation stages of this project. Our team has developed the figure on Page 9, which highlights the various monitoring points (facilities, Service Connections, etc.) that are available for use during the calibration. This demonstrates that the system is well-monitored for the purposes of calibration. If upon more detailed review of the data, certain monitoring locations are found to be erroneous or missing from SCADA, then additional pressure/flow monitoring may be recommended to address any data gaps.

Development of the plan will also involve reviewing historical operational records to identify an appropriate 24-hour period of time for model calibration. In general, we will look for periods of time when system demands were higher than normal causing the system to be more “stressed”, but also when nothing unusual was occurring, such as a major main break or system transmission main or facility outage. Once the plan is finalized and any potential additional system monitoring/testing data is obtained, model calibration can commence.

24-Hour EPS Calibration

Black & Veatch will conduct a continuous simulation for the selected 24-hour calibration period to verify that the model responds similarly to actual conditions. Comparisons between model results and field results will be completed. This includes verification that the model simulates flows, pressures, and storage facility levels reasonably well at each of the locations where this data is available from SCADA or other operational records provided by MWDOC.

For any areas of the system where the model results do not match the measured system data well after reasonable model input parameter adjustments, Black & Veatch will document the potential reasons for these discrepancies and provide recommendations for improving these discrepancies during future model calibration efforts.

Deliverables and Meetings:

- Model Calibration Meeting (web-based)
- Model Calibration Plan

Task 4: Model Validation

Subsequent to the completion of the calibration, the hydraulic model will be used to simulate a separate time period than the calibration to verify that the modeling parameters are valid for different operating and demand conditions.

Similar to the calibration task, Black & Veatch will conduct a continuous simulation for the separate 24-hour validation period to verify that the model responds similar to actual conditions. Comparisons between model results and field results will be completed. This includes verification that the model simulates flows, pressures, and storage facility levels reasonably well at each of the locations where this data is available from SCADA, other operational records provided by MWDOC, or temporary flow/pressure monitors.

Subsequent to the completion of the calibration and validation scenarios, maps will be created to document the pressure, velocity, water age and source trace results along the modeled network.

Task 5: Model Documentation

Black & Veatch will document the work performed during each of the prior tasks in a draft technical memorandum (TM). The TM will document model development and calibration results. An electronic (PDF) copy of the complete draft TM will be provided.

Following a web-based meeting with MWDOC staff to discuss the draft report, Black & Veatch will incorporate comments from the meeting and update the TM to address these comments. An electronic copy (PDF) of the final Technical Memorandum will be provided. Final deliverables will also include an electronic copy of the completed hydraulic model and necessary supporting materials.

Deliverables and Meetings:

- Draft Report Review Meeting
- Draft and Final Technical Memorandum
- Hydraulic Model Files for MWDOC's System

Team

This section provides an overview of our core team and organization. Matt Thomas, Kevin Laptos, and Steve Jobson are the same team that delivered MWDOC's final Phase 1 model evaluation. They bring the key knowledge of the OC distribution system and how it operates, MWDOC's Member Agencies' and stakeholders' issues and concerns, and about the details of Metropolitan's and other available data. Altogether they are ideally suited to efficiently and effectively deliver the completed, calibrated model in Phase 2 and to support using the model for hydraulic and water quality studies as future needs occur.



Matt Thomas, PE

PROJECT MANAGER | 25% AVAILABILITY

Matt brings nearly 30 years of experience in planning and design of major water conveyance infrastructure in southern California. **As he did in delivering Phase 1, Matt will serve as Project Manager for the model development, supported by a deep team of water system modeling and new water supply integration experts.** He and his teammates bring tremendous background knowledge about the proposed new local water supply projects

and the concepts for how they will be integrated into the regional distribution network, making model implementation and calibration efficient. **Matt will also bring strong communication skills and current working relationships with Metropolitan and MWDOC Member Agencies.**

EDUCATION

- BS, Civil Engineering, California Polytechnic State University

YEARS OF EXPERIENCE

- 29

PROFESSIONAL REGISTRATION

- PE, CA, #C52858



Steve Jobson, P.ENG

LEAD ENGINEER | 40% AVAILABILITY

Steve will serve as Lead Engineer for preparation of the hydraulic model and its calibration. Steve served as lead engineer for the modeling software evaluation during Phase 1, so has deep understanding of the data available for the model build and calibration, and the needs for the model for future technical evaluations. Steve is a water system hydraulic engineer with diverse experience in modeling and master planning. With his knowledge of geographic information systems, his primary focus is on developing hydraulic models and conducting a variety of analyses related to water distribution systems. Mr. Jobson has significant knowledge and experience in the use of modeling software and GIS tools including InfoWater, the proposed platform for Phase 2.

EDUCATION

- AS, Civil Engineering, University of Toronto, 2010, Canada

YEARS OF EXPERIENCE

- 9

PROFESSIONAL REGISTRATION

- P.Eng, Ontario, #100165372



Kevin Laptos, PE

TECHNICAL ADVISOR | 25% AVAILABILITY

Kevin serves as Black & Veatch's National Practice Leader for Distribution System Modeling and Planning. He has 29 years of professional experience in engineering practice and management involving the planning, design, construction, operation, and rehabilitation of water and wastewater systems. His experience includes technical advisory roles for Tampa Bay Water, FL for hydraulic and transient modeling of their water transmission system. **As a**

Technical Advisor for the project, he will help ensure appropriate technical resources are available to the project and QC procedures are implemented to provide high quality deliverables to MWDOC.

EDUCATION

- MS, Civil Engineering - Hydrosystems, Virginia Tech
- BS, Civil Engineering, Virginia Tech

YEARS OF EXPERIENCE

- 29

PROFESSIONAL REGISTRATION

- PE, NC, #35367
- PE, PA, #PE045490E



Justin Joseph, PE

MODELING SUPPORT | 25% AVAILABILITY

Justin will provide support to Steve through development and calibration of the hydraulic model. Justin brings a decade of extensive professional experience in updating, developing and calibrating hydraulic models, performing hydraulic analyses with and without the assistance of hydraulic models and preparing master plan reports. He is proficient in the use of several modeling platforms, including in particular InfoWater.

EDUCATION

- BS, Civil Engineering, California Polytechnic State University, San Luis Obispo, 2010

YEARS OF EXPERIENCE

- 9

PROFESSIONAL REGISTRATION

- PE, CA, #C84036

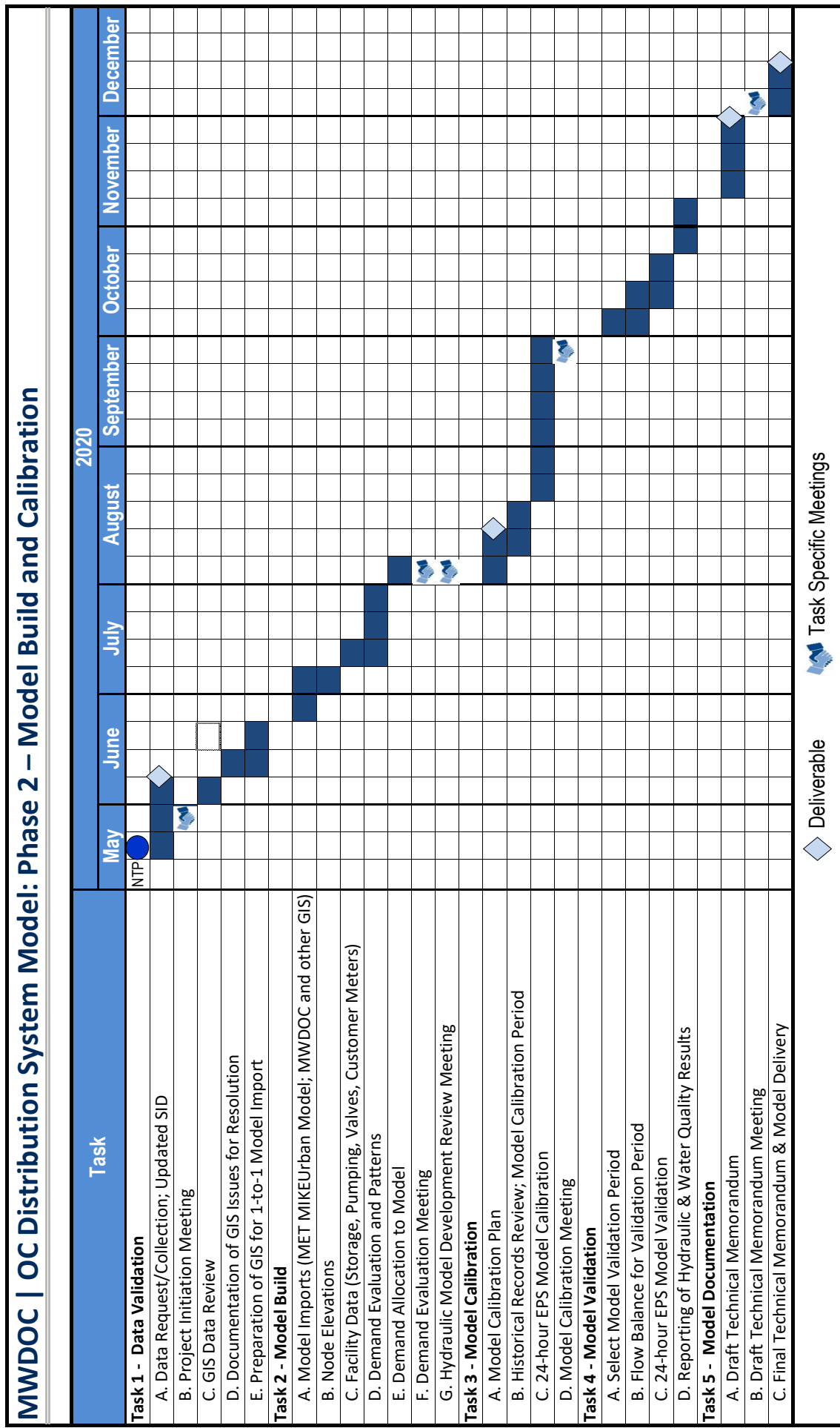
ADDITIONAL TECHNICAL RESOURCES

Black & Veatch provides a deep team to support our core modeling experts. They bring technical and manpower resources to the project to make sure the model development is successful in achieving MWDOC's long-term needs. The table below summarizes how each of our professionals will contribute to the project. Detailed resumes are available upon request.

PROFESSIONAL	YEARS EXPERIENCE	ROLE AND BENEFIT TO PROJECT
Meghan Merlihan	1	Meghan served as an Assistant Engineer for Phase 1. She brings familiarity with all of the OC Distribution facilities and will contribute her knowledge to model and calibration development as needed.
Brandy Thigpen, PE	22	Brandy is another hydraulic modeling expert in our Planning and Asset Management practice. She is on the org chart to provide technical and manpower depth to the team. She will provide a technical resource to the team to help tackle challenging modeling situations and provides a senior resource to keep the project on schedule if needed.
James Maher, PE	15	James is a hydraulic modeling expert in our Planning and Asset Management practice and will provide technical input and additional modeling and calibration assistance if needed. Like Brandy, James provides technical and manpower depth to the team.
Rob Kaessner, PE	18	Rob was lead technical engineer for Black & Veatch's assistance to MWDOC in developing initial concepts for integration of new local water supply projects into the East Orange County Feeder #2. He also authored the White Paper sections on hydraulics and physical facility integration issues. Additionally, he has worked on numerous MET projects, including the Second Lower Feeder Rehabilitation. He is an expert on the EOCF2 facilities and MET operations in Orange County generally – he will assist the team with technical advice to assure the model reflects real life operations in the MET facilities.
Lee Portillo	8	Lee was a lead researcher and author of the White Paper Black & Veatch prepared for MWDOC on the water quality issues related to integration of new water supplies into the EOCF#2/OC Distribution System. He is a water quality analyses expert. He will assist the team to assure the model is set up to facilitate the future water quality analyses needed to support integration of new water supplies as identified in the White Paper.
Gil Hurwitz, PhD	8	Gil is a water quality expert in our Water Technology Group who assisted Lee and the team in development of the White Paper. He will assist Lee if needed to assure the model is set up to facilitate the future water quality analyses needed for future new supply projects.
Brian Lendt, GISP	20	Brian is one of Black & Veatch's GIS experts. He will support the team in converting the GIS data from MET and others into the InfoWater model.

Schedule

Black & Veatch's proposed schedule is based on the requested project timeline in the RFP. **Because we are high on the learning curve, we provide a completed project before the end of 2020, faster than the schedule in the RFP.** We are fully prepared to execute the Phase 2 services within this schedule assuming the various stakeholder meeting and workshop dates can be set in a timely manner. These frequent meetings and workshops will also provide opportunities for project management (status) update reports. This approach results in an efficient delivery of the project by keeping the project team on schedule and allow for continuous feedback and input from MWDOC.



Budget

Presented below is our budget estimate, which reflects our approach and proposed scope of work for completing your project in a thorough manner. It should be noted that this budget is well within the programmatic budgets provided by us in Phase 1. The programmatic budgets were developed for planning purposes and were therefore intentionally conservative. Our budget below is based on the detailed Scope of Services provided herein, including a more detailed review of data available for calibration. Thus it is more refined (and lower than) the budgetary figures from Phase 1.

With Black & Veatch, you will get a flexible partner who will adjust any element of our approach and scope of work to assure expectations are met within the project schedule. We recognize that every project has budget limitations, and therefore, we are very flexible in working with you to adjust the approach, scope of work, and deliverables to meet your planning process and budgetary needs.

TASK NO.	TASK NAME/ DESCRIPTION	PRINCIPAL/PROJECT MANAGER	ASSISTANT MANAGER	CLERICAL/ ACCOUNTING	PROJECT CONTROLS	TECHNICAL SUPPORT	SR PLANNING MANAGER	SR PLANNING ENGINEER	GIS	TOTAL PROJECT HOURS	TOTAL
		\$305	\$245	\$110	\$150	\$155	\$230	\$165	\$170		
Task 1: Data Validation		5	—	—	—	70	9	32	8	124	\$21,185
Task 2: Model Build		9	—	—	—	162	12	48	—	231	\$38,735
Task 3: Model Calibration		9	—	—	—	174	32	80	—	295	\$50,375
Task 4: Model Validation		3	—	—	—	84	11	34	8	140	\$23,435
Task 5: Model Documentation		8	8	—	—	76	9	24	10	135	\$24,010
Project Management & Administration		4	24	8	10	—	—	—	—	46	\$9,480
TOTAL		38	32	8	10	566	73	218	26	971	\$167,220

Conflict of Interest

Black & Veatch has been a successful company for more than 100 years. We carefully consider each project we undertake to ensure there is no conflict of interest. We are confident that MWDOC's proposed project poses no known or potential conflicts with other agencies or projects.

Contract

During our 30 years in California, Black & Veatch has negotiated contracts with some of the State's most prestigious agencies. We anticipate no difficulties in the negotiation of a contract with MWDOC. If possible, we ask that the following revision to the Insurance Requirements section of Standard Consulting Agreement be considered:

- *Article VI.B requires that the Professional Liability policy includes a provision that requires the insurer to provide 30 days notice of cancellation to the District. Similarly Article VI. C states that CGL, auto, worker's compensation and employer's liability will contain similar clauses. Our insurance policies do not contain this provision. We request that this language be struck or modified to state that Black & Veatch will endeavor to provide thirty days notice of any cancellation.*

MUNICIPAL WATER DISTRICT OF ORANGE COUNTY
OC Distribution System Model - Phase 2 - Model Build and Calibration

Level of Effort and Fee Estimate

Task	Principal/ Project Manager	Assistant Manager	Clerical/ Accounting	Project Controls	Technical Support	Sr. Planning Mgr	Sr. Planning Engineer	GIS	Total Hours	Total Labor	Direct Expense	Sub Expense	Total Cost
	Rate	\$305	\$245	\$110	\$150	\$155	\$230	\$170					
PHASE 2 - MODEL BUILD and CALIBRATION													
Task 1 - Data Validation	5				70	9	32	8	124	\$21,085	\$0		\$21,085
Task 2 - Model Build	9				162	12	48		231	\$38,535	\$0		\$38,535
Task 3 - Model Calibration	9				174	32	80		295	\$50,275	\$0		\$50,275
Task 4 - Model Validation	3				84	11	34	8	140	\$23,435	\$0		\$23,435
Task 5 - Model Documentation	8	8			76	9	24	10	135	\$23,910	\$0		\$23,910
Project Management & Admin	4	24	8	10					46	\$9,480	\$0		\$9,480
SUBTOTAL - PHASE 2 CORE TASKS	38	32	8	10	566	73	218	26	971	\$166,720	0		\$166,720
OPTIONAL TASKS													
Power BI - Demand Analysis Tools Training	4				60	6	20		90	\$15,200	\$0		\$15,200
							40		40	\$6,600	\$0		\$6,600
SUBTOTAL - OPTIONAL TASKS	4	0	0	0	60	6	60	0	130	\$21,800	\$0		\$21,800
TOTAL	42	32	8	10	626	79	278	26	1,101	\$188,520	\$0	\$0	\$188,520



DISCUSSION ITEM

May 4, 2020

TO: Planning & Operations Committee
(Directors McVicker, Dick, Yoo Schneider)

FROM: Robert Hunter, General Manager

Staff Contact: Karl Seckel

SUBJECT: Economic Benefit Studies to Support Decision-Making for Local Projects Serving Orange County

STAFF RECOMMENDATION

Staff recommends the Committee and Board defer any actions on authorizing economic benefit studies until the June 1, 2020 P&O Committee to provide additional time for final scope development and member agency discussions.

COMMITTEE RECOMMENDATION

The P&O Committee (to be determined at the meeting).

SUMMARY

MWDOC staff provided information to the MWDOC Board on April 15, 2020 to consider authorizing staff to retain consultants to proceed with economic benefit studies. Staff had recommended the completion of economic benefit studies to describe and quantify the benefits of new local supplies to the MWDOC service area. Staff is of the opinion that the studies will be useful in helping MWDOC and our agencies to understand better the reliability benefits of potential future water project actions in the County. The studies are being approached from a broad perspective to help inform decisions by any water agency with respect to any project in the County. Input at the committee was provided by a number of agencies requesting further discussion and time to digest the need for and the scope of the reliability studies.

At the April 15 Board meeting, the item was referred back to committee and staff was directed to engage further with the member agencies regarding the studies. Other

Budgeted (Y/N): N	Budgeted amount: n/a	Core _X_	Choice __
Action item amount: \$0	Line item:		
Fiscal Impact (explain if unbudgeted):			

discussions with the member agencies have raised questions about MWDOC's role and mission and how decisions are made in the County between MWDOC and its member agencies. The following meetings have been undertaken to allow input, dialogue and discussions on the various issues identified further below:

- April 16, 2020 Regularly Scheduled Member Agency Manager's meeting (10:30 to 12:30)
- April 23, 2020 Special Member Agency Manager's meeting (9:30 to Noon)
- Upcoming April 30, 2020 Special Member Agency Manager's meeting (9:30 to Noon)
- Additional meetings are likely

SUMMARY OF ISSUES FROM APRIL 16 MEETING

At the start of the meeting, upcoming MWDOC Board committee dates were identified as well as suggested potential follow-on meeting dates, if needed. Three major discussion topics were identified: the Economic Benefit Study, the MWDOC Budget, and the MWDOC Rate Resolution & Ordinance.

Substantive discussion ensued with the Economic Benefit Studies topic and included broader issues. GM Hunter requested that the focus be on the issues rather than specific comments. Written comments can be sent and will be included in the Board packages. He asked that if there are comment(s) that require a specific response from him to please note such requests within the comments. He stated that if it were a policy question, it would need to go to the Board for them to respond. Hunter also stated that he would like to discuss potential processes to resolve the issue(s). He inquired as to what the managers felt were the issues with the Economic Benefit Study as well as the broader concept of process.

- Input regarding "processes" in general, included the development and implementation of a "protocol" whereby items would normally be discussed in the MWDOC Member Agency Managers meeting prior to committee or board actions.
- In the case of the Economic Benefit Studies, there was a specific request that the item go to the full board and there was no intervening Member Agency Managers meeting. This is a very rare occurrence. Hunter stated that communication could be improved simply by phoning and discussing questions or concerns. He requested that the managers call him on these items.
- Several comments were made that there is a perception from some of the member agencies that they are not being heard. All agencies monitor each other, but individual choices are based on the policy of individual Boards and community wants/needs. It was suggested that this discussion is not specific to any one project, that it is a larger issue.

- Statements were made that the perception is that MWDOC wants to expand their role, take on projects, and then spread the cost over all member agencies. Some suggested a survey or study is not necessary at this point, nor would it provide fruitful regional results. Substantial discussion and comments were made regarding Core and Choice designations for potential projects.
- There was general consensus that there is not agreement on MWDOC's role or mission with some pointing out that MWDOC was formed for representation at Metropolitan and to deal with MET imported water. Hunter pointed out that MWDOC's mission statement has referenced "other water supplies" for at least 35 years.
- Customer contact was discussed in the context of the Economic Benefits Studies. It was noted that the retail agencies are deeply invested in their customer relationships and are sensitive to messaging, particularly on supply reliability. It was also noted that the same customers are the constituents of MWDOC's elected board and cannot be "off-limits" to MWDOC. It was generally agreed that all parties should closely communicate on survey activities.
- Ultimately, whether or not a project is to be funded by Core or Choice funding is not a topic that is within the scope of the Economic Benefit Studies but it was a significant part of the discussions. In particular, the resolution of core and choice project designation was of interest but not resolved. This will be an important topic in continuing discussions.
- While the economic studies came up in context of Doheny, the Economic Benefits Study is not directed at Doheny but at how the MWDOC Board can make decisions. Hunter explained that these decisions are broader in nature and that over the last several years member agencies and private entities have asked MWDOC to participate in projects in various ways. Whether it is Doheny, Poseidon, Cadiz, or Strand Ranch, these issues come to the MWDOC Board and the board needs a better basis for decision-making.
- Statements were made that the Economic Benefits Study purpose and scope is important, and should be reviewed and discussed with the Member Agency Managers prior to action being taken. It was stated that the member agency's expectations of MWDOC, MWDOC's expectation from its member agencies and MWDOC's role in OC need to be discussed and possibly agreed to. Some agencies indicated that they have previous studies or surveys dealing with willingness-to-pay or economic benefits. Those studies were requested for review and potential modification of the study scope.
- SCWD GM Rick Shintaku brought to the group's attention that the SCWD Board President made a comment during the MWDOC Board meeting to discuss the Doheny Project further with the Member Agency Manager's Meeting. Shintaku indicated there was indeed a timing issue here. He stated that SCWD is moving

forward on this project because they are in the permitting stage. They are conducting due diligence studies and in the process of developing a contract. Including oversized components into the contract documents would result in significant additional costs. As an information gathering exercise, SCWD wanted to see if anyone else was interested in participating, including a regional agency or through a Joint Powers Authority. He stated that SCWD wants the agency managers to be part of the process.

- Hunter again pointed out that he is available to discuss such items with anyone. He concurred that there needs to be some resolution on MWDOC's role and the member agency's role.
- At the end of the meeting time, Rob suggested scheduling a subsequent meeting.

SCOPE OF DISCUSSIONS FROM APRIL 23 MEETING

Near-term issues with Board Items

- Economic Studies
- MWDOC 5th Draft Budget
- Rate Resolution and Ordinance

Broader Underlying Issues

- Communication between MWDOC and Member Agencies
- Overlapping jurisdictions
 - This has been discussed in past – there has been no consensus
 - Understanding/sensitivity of the Member Agencies and MWDOC Board
- MWDOC's role and mission
- Funding issues

How to provide input

- Issue
- Process to reach solutions
- Comments (Agency letter suggested)



INFORMATION ITEM

May 4, 2020

TO: Planning & Operations Committee
(Directors McVicker, Yoo Schneider, Dick)

FROM: Robert Hunter, General Manager

Staff Contact: Charles Busslinger

SUBJECT: Colorado River Salinity Economic Impact Model (SEIM) Update

STAFF RECOMMENDATION

Staff recommends the Planning & Operations Committee receive and file this report.

COMMITTEE RECOMMENDATION

Committee recommends (To be determined at Committee Meeting)

SUMMARY

Staff is reporting on current efforts to update salinity damage cost estimates stemming from Colorado River water to the Lower Colorado River Basin (LCRB) and the Metropolitan Water District of Southern California (MET) service area. The Salinity Economic Impact Model (SEIM) estimates the annual quantified costs incurred from increased salinity in metropolitan and agricultural areas in the LCRB and MET service area. The SEIM is currently undergoing an update. The update is on-going and new information will be forwarded to the Board once the update is completed.

A draft Technical Memorandum (TM) and the updated model were released for review and comments on April 6, 2020. Through MET; MWD OC staff and some of its member agencies that have previously expressed interest in obtaining updated salinity damage cost estimates, have had an opportunity to comment on the TM and the model. The comments are now under review by the SEIM Study Team for additional changes to the model. Some of the changes to the model; most notably changes to the salinity damage threshold for alfalfa hay from TDS of 500 mg/L to 1,066 mg/L, and increases to the useful life for several

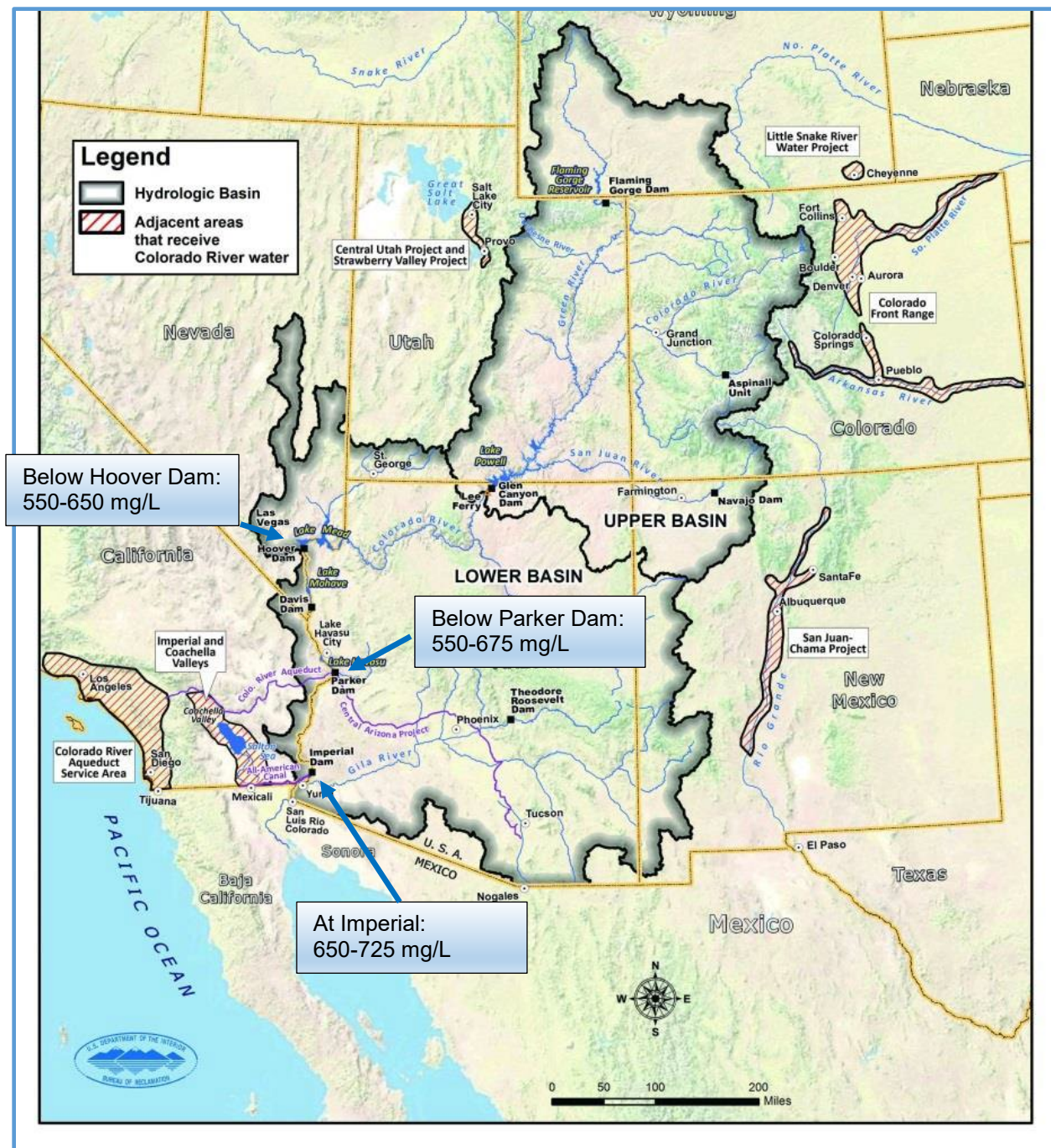
Budgeted (Y/N):	Budgeted amount:	Core X	Choice __
Action item amount: 0	Line item:		
Fiscal Impact (explain if unbudgeted):			

residential appliances, are under review as they have resulted in decreases to the total salinity damage cost calculations.

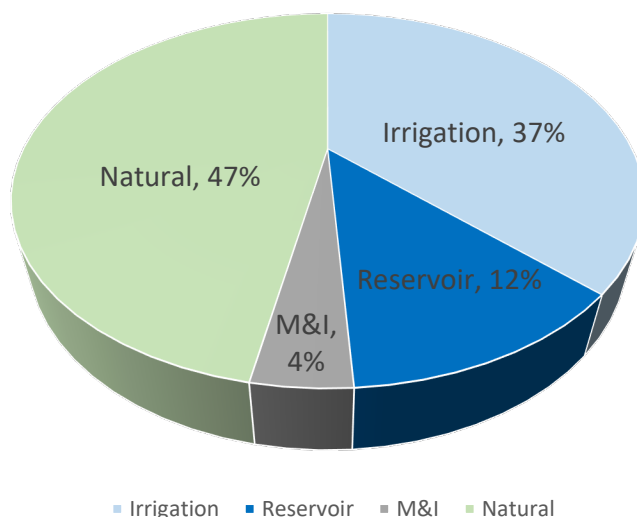
DETAILED REPORT

Background

Colorado River Salt Concentrations Since 2000



Colorado River Sources of Salinity
(from 1971 EPA Study)



The Salinity Economic Impact Model (SEIM), is administered by the U.S. Bureau of Reclamation. The Colorado River Basin Salinity Control Forum (Forum)¹ uses the model to evaluate the potential economic benefits of lowering salinity concentrations in the future and the economic costs averted by the current Colorado River Basin Salinity Control Program (Program) controls. The SEIM uses three Colorado River diversion points at Hoover Dam, Parker Dam, and Imperial Dam to estimate salinity damages based on modeled salinity concentrations. Those concentrations are measured as total dissolved solids (TDS) (mg/L). The SEIM model runs on a collection of integrated Microsoft Excel spreadsheets (a.k.a. Excel workbook).

The SEIM is the current version of a salinity model that was originally developed in the late 1980s. The SEIM estimates economic costs attributed to salinity levels greater than a baseline value of 500 mg/L² of total dissolved solids (TDS) on:

- household water-using appliances,
- the treatment and infrastructure replacement costs in the commercial, industrial and water utilities sectors, and
- income losses to agriculture.

The SEIM also estimates the additional costs related to meeting California water quality standards for groundwater and recycled and publicly-owned treatment works (POTW) water use in the MET service area. The model does not calculate an absolute value of the

¹ Created in 1973, the Colorado River Basin Salinity Control Forum (Forum) is an organization of the seven Colorado River Basin states of Arizona, California, Colorado, Nevada, New Mexico, Utah and Wyoming. The purposes of the Forum are to coordinate salinity control efforts among the states, coordinate with federal agencies on the implementation of the Colorado River Basin Salinity Control Program (Program), work with Congress on the authorization and funding of the Program, act to disseminate information on salinity control and otherwise promote efforts to reduce the salt loading to the Colorado River.

² U.S. EPA's secondary drinking water quality standard

economic costs due to salinity. The model estimates salinity costs from a baseline condition and then calculates the change in economic costs when salinity rises or declines in the Colorado River water used in the LCRB and the MET service area.

Economic Sector Impact Category Items Included in the SEIM	
Economic Sector	Impact Category Items
Residential	Water Pipes, Water Heater, Faucet, Garbage Disposal, Clothes Washer, Dishwasher, Water Softener, Detergent
Commercial	Sanitary, Cooling, Irrigation, Kitchen, Laundry, Misc.
Industrial	Process Water, Cooling Tower, Boiler, Sanitation, Irrigation
Water Utilities	Treatment Plant, Distribution System
Groundwater	Direct Recharge, Indirect Recharge, Incidental Recharge
Recycled Water & POTW	Irrigation, Direct Groundwater Recharge, Indirect Groundwater Recharge
Agriculture	MWD Subareas Crops: Strawberry, Nursery, Cut Flowers, Misc. Vegetable, Citrus, Avocado, Vineyard, Pasture/grain, Deciduous, Field Crops
	All Other Subareas Crops: Head Lettuce, Leaf Lettuce, Romaine Lettuce, Broccoli, Cauliflower, Alfalfa Hay, Onions, Avocados, Cantaloupe, Carrots, Oranges, Tangerines, Lemon/Limes, Grapefruit, Table Grapes, Potatoes, Corn, Wheat, Cotton, Barley, Olives, Honeydews, Tomatoes, Leaching Management Costs



Figure 1

Model Updates

Variable Baseline - The costs estimated by previous versions of the SEIM for changes in Colorado River salinity levels were based on the change in economic costs from a 500 mg/L baseline condition and the projected elevated salinity concentrations from the Colorado River Simulation System (CRSS) long term planning model which incorporates current and future salinity control projects (mainly in the Upper Colorado River Basin).

The model's baseline value has now been modified to allow for analysis of TDS baselines below 500 mg/L. This opens the opportunity for additional analyses, including analyzing individual project salinity benefits on blended TDS levels for Orange County. The current model documentation lacks the necessary details that would allow for such analyses. An upcoming training session in May 2020 will provide additional guidance on how these analyses can be completed using the SEIM.

Updated Costs - Prices and cost values in the 2020 SEIM have been updated to 2018 dollar values.

Useful Life of Residential Appliances - Most SEIM estimates of residential salinity costs are based on the reduced useful life of water using appliances and fixtures from increased average annual salinity. The calculated useful life of several water-using residential

appliances have been increased based upon research from a 1993 review of a previous version of the model. The increased useful life is resulting in a lowering of total salinity damage costs. This modification is under review.

Salinity Impact Threshold for Agricultural Crops - The threshold for when salinity causes impacts to alfalfa crops has been raised from 500 mg/L to 1,066 mg/L based upon some research that demonstrates that alfalfa is more tolerant to salinity than previously thought. This change has resulted in a decrease in salinity damage costs. These findings are also under review.

Preliminary Findings

Note: These findings are currently under review and will likely change

Comparison of Current Version of the SEIM to the Previous Version of the SEIM

Projected Salinity Costs in 2035

(Note: The numbers below are based on 2014 dollars to allow for a comparison between the new version of the model and the previous version of the model.)

Area and Subarea	Total		
	Previous Version of SEIM	2020 Version of SEIM	Difference
Central Arizona			
Phoenix AMA	\$24,466,430	\$23,565,074	-\$901,356
Pinal AMA	\$2,796,916	\$1,102,189	-\$1,694,727
Tucson AMA	\$4,371,303	\$4,215,886	-\$155,417
Mainstem Arizona			
Mohave Co	\$2,797,480	\$1,816,090	-\$981,391
La Paz, Co	\$9,421,600	\$1,553,955	-\$7,867,645
Yuma Co	\$74,294,337	\$61,403,028	-\$12,891,309
Mainstem Nevada			
Clark County	\$53,785,756	\$25,315,679	-\$28,470,077
Mainstem California			
Imperial Co	\$171,247,080	\$73,929,010	-\$97,318,070
San Bernardino Co	\$9,536,330	\$5,251,197	-\$4,285,133
Riverside Co	\$22,556,267	\$34,153,004	\$11,596,738
MWDSC	\$121,531,409	\$112,945,023	-\$8,586,386
Total	\$496,804,907	\$345,250,135	-\$151,554,772
			-30.5%

Compared to the previous version of the model, the percentage of damages by sector in the 2020 SEIM (new version of the model) generally remained consistent. In the 2020 SEIM, the Agricultural, Residential, and Commercial sectors account for 86% of the damages (compared to 88% in the previous version of the model). The overall costs in the 2020 SEIM decreased by 30% compared to the previous version.

- Residential costs decreased in the 2020 SEIM by \$17 million (11% of the total reduction in cost). Factors such as the cost of appliance either stayed the same or increased, however the useful life for several residential appliances increased due to a change in useful life TDS functions.
- Agricultural costs decreased in the 2020 SEIM by \$117 million (77% of the total reduction in costs). The primary cause for the decrease in cost is a change in the salinity threshold for alfalfa hay from 500 mg/L to 1,066 mg/L.
- The overall commercial costs decreased in the 2020 SEIM by \$7 million (4.7% of the total reduction in costs). However commercial costs increased for all areas except Mainstem Nevada and Mainstem California primarily because the price per category (\$/AF) increased for all commercial categories.
- The overall industrial costs increased by \$4.5 million is primarily due to an increase price per category (\$/AF). All categories, except Sanitation and Irrigation, increased in price per acre-foot.

Percentage of Total Cost Incurred Between Sectors

2020 SEIM		Previous Version of the SEIM	
Agricultural	51%	Agricultural	59%
Residential	25%	Residential	21%
Commercial	9.8%	Commercial	8.0%
Industrial	3.7%	Industrial	32.0%
Utilities	0.3%	Utilities	3.0%
Groundwater	5.2%	Groundwater	5.0%
Recycled Water	5.0%	Recycled Water	2.0%

MWDOC and MWDOC Member Agency Comments:

The following comments on the SEIM were passed on to the U.S. Bureau of Reclamation through MET:

General Comments from the Municipal Water District of Orange County:

- In general, Metropolitan needs to drill down; either through member agencies or through a workshop with agencies on what agencies see as important. The majority of the report is interesting and has good information, but it is not relevant to the Metropolitan service area.
- The report should include a table listing the specific assumptions in the model as compared with the 1999 model. What were the major differences? Also, are there ranges on the dollar impacts instead of just averages?
- Will the model enable determination of economic benefits of a lower TDS standard? 500 mg/L is the current secondary limit and the model evaluates impacts from this baseline. However, can the model can also be used with a starting TDS of say 250 mg/L and look at impacts above this amount? This would allow for agencies to determine if there is a benefit to a lower TDS and if projects are warranted.
- The weighted TDS in the Metropolitan service area should be able to be broken up to better reflect the quality of water delivered between 100% State and 100% Colorado and cost impacts.

- The spreadsheet and the write up explanation in the report are somewhat confusing. The initial spreadsheet values when first opening the model are very high, and once the Initialize Damage Year button is clicked on the Summary Results tab the damages drop dramatically. This gives an impression that something is not calculating correctly.
- The spreadsheet results do not mirror the write up example in Section 3.3 Model Results.
- There appears to be a mismatch between the unit cost of water heaters and the associated life expectancy used in the model. It appears from the Appendix that the unit price is an overall average price of water heaters with levels of warranties varying from 6 to 12 years; however, the Life Expectancy for water heaters stated in the model is 12 years. The current Home Depot water heater unit price (without tax and installation) for a 12 year warrantied 40 gallon gas water heater is at minimum \$700 (much higher than the unit price used in the model). Either the life expectancy or the unit price needs adjusting in the model to match. The 'grey literature' available on the web indicates that water heater warranties are a good indicator of likely unit life expectancies.

ENGINEERING & PLANNING	
Doheny Ocean Desalination Project	<p>South Coast WD continues working on the project. South Coast WD has submitted their NPDES permit application on March 13, 2020 with an estimated six-month review time by the Regional Board.</p> <p>Work is progressing on the Financial Analysis for a 2 mgd and 5 mgd scenario. The Study is anticipated to be complete by mid-May.</p> <p><u>Next Steps by South Coast WD:</u></p> <ol style="list-style-type: none"> 1. Look for partners 2. High Level Schedule (has slipped a bit due to the Regional Board schedule) <ol style="list-style-type: none"> a. Environmental permitting Late Summer 2020 b. DBOM Contract Develop Early 2020 c. DBOM Contract Award Early 2021 d. Construction Completion Early 2023
SMWD San Juan Watershed Project	<p>Santa Margarita WD continues to focus on diversifying its water supply portfolio for south Orange County residents, businesses, schools, and visitors. On June 21, 2019, the San Juan Watershed Environmental Impact Report (EIR) was approved.</p> <p>The original project had three Phases; Phase 1 was three rubber dams recovering about 700 AFY; Phase 2 added up to 8 more rubber dams with the introduction of recycled water into the creek to improve replenishment of the basin for up to 6,120 AFY, and Phase 3 added more recycled water topping out at approximately 9,480 AFY. Under this arrangement, most or all of the production and treatment involved the existing San Juan Groundwater Desalter with expansions scheduled along the way to increase production over 5 mgd. Fish passage and regulatory hurdles to satisfy subsurface travel time requirements are presenting some difficulties.</p> <p>SMWD is working with the Ranch on the next phase of development within SMWD and have access to riparian groundwater from the Ranch. Furthermore, they have discovered that the local geology has high vertical percolation rates and sufficient groundwater basin travel time to potentially allow percolation of treated recycled water with an ability to meet the required travel time. SMWD is of opinion that groundwater production and treatment of the groundwater can be initiated in a relatively short time-frame while permitting for percolation augmentation using recycled water from the nearby Trampas reservoir can be added as permitting allows. They believe the new project area may be able to ultimately produce 4,000 to 5,000 AF per year; they believe the original project will continue to be developed for production out of the wells and treatment provided by San Juan Capistrano as the two agencies merge. Ultimate production out of the basin could exceed 10,000 AF per year if all goes well.</p>
Local Supply Integration	<p>On August 18, 2020 the MWDOC Board concurred with the staff recommendation to proceed with the issuance of an RFP to build and calibrate</p>

	<p>an OC regional distribution system hydraulic model. On March 19, 2020 MWDOC staff issued a Request for Proposals (RFP) for professional services to develop an OC Distribution System Water Supply Integration Hydraulic Model to preselected firms with demonstrated requisite expertise. MWDOC staff have reviewed and evaluated the proposals and are providing its recommendations to the P&O Committee for review and discussion in time for Board consideration on May 20, 2020.</p> <p>See write up for additional information.</p>
South Orange County Emergency Service Program	<p>MWDOC, IRWD, and Dudek have completed the study to determine if the existing IRWD South Orange County Interconnection capacity for providing emergency water to South Orange County can be expanded and/or extended beyond its current time horizon of 2030.</p> <p>Dudek participated in the November 6th SOC workshop to re-engage with the SOC agencies on this project. Support from the agencies was expressed to take a small next step to install Variable Frequency Drives at a pump station within IRWD which would be paid for by SOC to help move water from the IRWD system to SOC in an emergency. The Variable Frequency Drives will provide more flexibility to the IRWD operations staff to allow additional water to be sent to SOC while meeting all of the IRWD needs.</p>
Strand Ranch Project	<p>A meeting was held on February 14, 2020 between MWDOC, MET, and IRWD to further exchange ideas on how to implement the program to capture the benefits that can be provided by the development of “extraordinary supplies” from the Strand Ranch Project. Based on the meeting, staff from MWDOC and IRWD will need to continue to discuss methods of quantifying the benefits of the program.</p>
Poseidon Resources Huntington Beach Ocean Desalination Project	<p>The Santa Ana Regional Water Quality Control Board (SARWQCB) continues to work with Poseidon on renewal of the National Pollutant Discharge Elimination System (NPDES) Permit for the proposed HB Desalination Project.</p> <p>The renewal of the NPDES permit for the proposed desalination facility requires a California Water Code section 13142.5(b) determination in accordance with the State’s Ocean Plan (a.k.a. the Desalination Amendment). To make a consistency determination with the Desalination Amendment, the Regional Board is required to analyze the project using a two-step process:</p> <ol style="list-style-type: none"> 1. Analyze separately as independent considerations, a range of feasible alternatives for the best available alternative to minimize intake and mortality of all forms of marine life: <ol style="list-style-type: none"> a. Site b. Design c. Technology d. Mitigation Measures

	<p>2. Then consider all four factors collectively and determine the best combination of feasible alternatives.</p> <p>Regional Board staff reviewed hundreds of documents and input from both an independent reviewer and a neutral 3rd party reviewer to develop Tentative Order R8-2020-0005.</p> <p>The key areas required by the Ocean Plan on which the Santa Ana Water Board is required to make a determination, includes:</p> <ul style="list-style-type: none"> • Facility onshore location; • Intake considerations including subsurface and surface intake systems; • Identified need for the desalinated water; • Concentrated brine discharge considerations; • Calculation of the marine life impacts; and • Determination of the best feasible mitigation project available. <p>In evaluating the proposed project, Santa Ana Regional Board staff interpreted “the identified need for the desalinated water” as whether or not the project is included in local area water planning documents, rather than a reliability need as analyzed in the OC Water Reliability Study. The Regional Board staff referenced several water planning documents; Municipal Water District of Orange County’s (MWDOC) 2015 Urban Water Management Plan (UWMP), the OC Water Reliability Study, OCWD’s Long Term Facilities Plan, and other OCWD planning documents in their evaluation of Identified Need.</p> <p>On December 6, 2019, SARWQCB, Regional Board staff conducted a workshop in Huntington Beach that was heavily attended with a considerable range of views expressed at the meeting. Several of the SARWQCB members were somewhat confused about the evaluation of “Identified Need” for the project (inclusion in local water planning documents vs. an identified reliability need for the project) and requested staff to help them understand the issue better.</p> <p>The SARWQCB scheduled a Special Board Meeting for a Poseidon Workshop on April 3, 2020. The special meeting was postponed and has been rescheduled for May 15, 2020 via video and teleconference. The next SARWQCB Regular Board Meeting is scheduled for May 8, 2020 via video and teleconference.</p> <p>Assuming success, Poseidon would then seek its final permits from the California Coastal Commission (CCC). The CCC has committed to reviewing the permit within 90 days of the SARWQCB NPDES permit issuance.</p>
Trampas Canyon Dam and Reservoir	<p>Trampas Canyon Reservoir and Dam (Trampas Reservoir) is a seasonal recycled water storage reservoir, with a total capacity of 5,000 AF, of which 2,500 AF is available to meet Santa Margarita Water District’s projected base</p>

	<p>recycled water demands, and 2,500 AF to meet future water supply needs. When completed, the Trampas Reservoir will allow SMWD to store recycled water in the winter and draw on that water during the peak summer months.</p> <p>The construction of the Trampas Canyon Recycled Water Seasonal Storage Reservoir consists of three main components:</p> <ol style="list-style-type: none"> 1. Trampas Canyon Dam (Dam) 2. Conveyance facilities to transport recycled water into and out of the Reservoir (Pipelines) 3. Trampas Canyon Pump Station (Pump Station) <p>The construction of the facilities is being completed in three phases:</p> <ol style="list-style-type: none"> 1. Preconstruction/Site Preparation for the Dam and Pump Station Construction <ol style="list-style-type: none"> a. Project Status - Complete 2. Dam and Pipelines <ol style="list-style-type: none"> a. Project Status - The Construction Contract was awarded in December 2017 and is approximately 83% complete. 3. Pump Station <ol style="list-style-type: none"> a. Project Status - The pump station construction began in January and will continue thru August. <p>The project is currently projected to conclude at or before mid-September 2020.</p>
AMP Shutdown in Early 2021 to Replace PCCP Sections	<p>MWDOC staff was notified that the recent internal inspection of the AMP which included an electromagnetic surveys of the pipeline revealed two pipe segments with increased wire breaks within the PCCP portion South of OC-70. Metropolitan Engineering considers this section of the pipeline high-risk which will require relining. They are proposing to reline this section of the pipe in early 2021. The minimum relining length needed would be approximately 1,000 feet, which would require a minimum 1-month shutdown only South of OC-70. A longer shutdown duration would allow Metropolitan to reline approximately 3,300 feet, which would reduce the number of shutdowns needed for future relining of the entire PCCP portion of the AMP and would reduce the overall construction and shutdown costs. MET had originally scheduled the AMP PCCP relining to begin in about 5 years, but based on the survey, the relining of this initial section has been accelerated.</p> <p>Staff is currently working with affected agencies and will keep both the Board and the AMP Participants informed as more information becomes available.</p>
Other Shutdowns	<p>MET is planning a relining of the Orange County Feeder from Bristol Ave to Corona Del Mar – this is the last section of this pipeline to be lined.</p> <p>MET has also proposed a summer 2020 shutdown of the Second Lower Feeder just below the Diemer Treatment Plant because a recent pipeline survey identified increased wire breaks in the PCCP sections that require an accelerated replacement schedule. The shutdown is estimated to take 60 days and will</p>

	<p>impact Golden State Water Company's service connection OC-56. MWDOC and GSWC have been coordinating with MET on this proposed shutdown.</p> <p>SCWD is planning a rehabilitation project for their CM-10 service connection in early 2021. We are coordinating with MET and SCWD so the above referenced AMP shutdown and this project do not overlap.</p>
Meetings	
	Karl Seckel, Charles Busslinger, and Chris Lingad participated in a conference call on April 2, 2020 with MET and Golden State Water Company to discuss the details of the proposed Second Lower Feeder Shutdown in summer 2020.
	Charles Busslinger, Cathy Harris, & Chris Lingad participated in a Zoom meeting on April 15, 2020 with consultants ABS and IDS regarding a value engineering review of the Admin building seismic retrofit and remodel. The review has been completed as we await the City's 3 rd Plan Review comments.
	Karl Seckel, Charles Busslinger, and Chris Lingad participated in a conference call on April 20, 2020 with SCWD to discuss the details of their CM-10 rehabilitation project to avoid a concurrent shutdown with the AMP.
	Charles Busslinger, and Chris Lingad participated in a conference call on April 21, 2020 with MWDOC owner's representative ABS Consulting to discuss the preparation of bid documents for the admin building rehab.
	Karl Seckel and Charles Busslinger participated in a call with MET staff responsible for operating and maintaining the EOCWD OC-70 facility to engage met on rehabilitation and repairs needed on the pumps. EOCWD GM Lisa Ohlund and her staff participated in the discussion. MET also provided an update on the Utah State Labs testing of the OC-70 meter structure which indicated Utah State Lab testing in July with field testing as such time as it can be coordinated thereafter; this work will help resolve the long-standing metering issue at the facility. MET also seemed open to discussions to transfer the facility from MET ownership to EOCWD ownership.

Planning and Operations Committee WEROC Status Report

April 2020

COVID-19 (CORONA VIRUS) COORDINATION

- On-going information is being shared with WEROC Member Agencies Point of Contacts as it becomes available.
 - WEROC is conducting bi-weekly a conference calls with agencies for information sharing and continuity planning for phased resumption of business practices.
 - WEROC is coordinating logistics and supporting agencies with resource requests.
 - WEROC is coordinating resource requests if received from the county. Example, coordination of a FEMA water trailers to support a County run homeless shelter operation in Trabuco Canyon which was completed and released back to El Toro Water District.
 - All water and wastewater agencies are maintaining alternative work schedule or processes to protect critical and essential functions.
 - WEROC is in constant contact with County Emergency Operations Center and the Orange County Health Care Agency.
 - There are no changes to water and waste water treatment and disinfections. WEROC is monitoring the CDC and WHO for updates.
 - Information shared with all agencies on reconnections and water quality concerns posted by Department of Water Resources and CDC.
 - WEROC is supporting agencies with recovery questions and cost tracking in relation to State and FEMA public assistance grant programs.
 - Email sent to the County as requested by agency managers to be included of the recovery and resumption of services.
 - WEROC sent a survey to all agencies on 4/6 regarding assessing the community needs, and impacts to billing and revenue.
 - Agencies are tracking Revenue Loss based on non-payment, use demand, and property tax impacts. Member agencies were briefed on the Federal Cares Act and its purpose. This consists of 18 parts and the funding is directed for programs such as healthcare and not revenue loss.
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COMMUNICATION & COORDINATION WITH MEMBER AGENCIES

- Before COVID-19, each Friday, WEROC is providing an informational email to members containing updates on events or recapping important actions from the past week. During a critical event or disaster with imminent threat, information will be forwarded in real time including weather and earthquake follow up
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WEROC PROGRAM ASSESSMENT

- Vicki continues to work on the WEROC program assessment as the new Director and is developing a strategic plan for the organization.
 - A written review was previously identified to be completed in April, but due to the current COVID-19 situation, Vick is assessing processes and policies during this event to be included. This has provided a prime opportunity to analyze what is in place and what agencies require for the future.
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AMERICA'S WATER INFRASTRUCTURE ACT (AWIA)

- WEROC and its consultant, Herndon Solutions Group (HSG) are continuing to work with the WEROC agencies to achieve compliance with America's Water Infrastructure Act (AWIA).
 - As a reminder, AWIA requires utilities to conduct a Risk and Resilience Assessment (RRA) of their community water systems.
 - All Tier I agencies meet their March 31st self-reporting compliance deadline to Environmental Protection Agency (EPA) which has not been extended due to the current COVID-19 Pandemic as the Risk and Resilience Assessment documents were delivered to agencies via workshops over the first two weeks of March.
 - We are currently working on virtual plans to move forward with Phase III, the Emergency Response Plans, which are due 6 months later in September 2020.
 - Virtual solutions are in progress for Tier II Agencies (RRA Due December 2020) as majority of the Phase II workshops scheduled for March and April were cancelled. These meetings will be conducted virtually and will resume in May.
 - The AWIA Scope of work has been modified to reflect the changes to the project.
-

PUBLIC SAFETY POWER SHUTOFF (PSPS) AND CA PUBLIC UTILITIES COMMISSION HEARINGS

- On-going: California Public Utilities Commission (CPUC) proceedings regarding the Impacts from De-Energization with a Focus on First Responders and Local Government. MWDOC has received party status to these proceedings. Party Status was intended to ensure that we receive all communications regarding the proceedings and that our comments are included officially for consideration. Due to the COVID19 Pandemic, the legislation and CPUC hearings have been reduced but as of the last week of April, hearings and public notifications are beginning again. WEROC is monitoring and will work with government affairs on any items pertaining to water and wastewater agencies.
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COORDINATION WITH COUNTY OF ORANGE AND OUTSIDE AGENCIES

- WEROC continues to support California Water/Wastewater Agency Response Network (CalWarn). There has been 12 new members added since March 26th.
 - WEROC has agreed to be a distribution point in collaboration with CalWarn to distribute face coverings to member agencies within Orange County. This should occur the first week of May.
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TRAINING AND EXERCISES

- All of Basic SEMS and NIMS courses were approved by the state. Vicki is working on offering this training virtually to members in May and June.
 - Communications tests conducted in conjunction with the County 800 MHz system has been cancelled for April and May. Member agencies can still reach out to WEROC if they want to test their systems during this time.
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Respectfully Submitted by: Vicki Osborn

Status of Water Use Efficiency Projects

April 2020

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Smart Timer Rebate Program	MWDSC	Ongoing	Ongoing	In March 2020, 200 smart timers were installed in Orange County. To date, 26,942 smart timers have been installed through this program.
Rotating Nozzles Rebate Program	MWDSC	Ongoing	Ongoing	In March 2020, 81 rotating nozzles were installed in Orange County. To date, 570,447 rotating nozzles have been installed through this program.
SoCal WaterSmart Residential Indoor Rebate Program	MWDSC	Ongoing	Ongoing	In March 2020, 196 high efficiency clothes washers and 8 premium high efficiency toilets were installed in Orange County. To date, 120,978 high efficiency clothes washers and 60,545 high efficiency toilets have been installed through this program.
SoCal WaterSmart Commercial Rebate Program	MWDSC	Ongoing	Ongoing	In March 2020, 20 commercial premium high efficiency toilets were installed in Orange County. To date, 109,718 commercial devices have been installed through this program.
Industrial Process/ Water Savings Incentive Program (WSIP) Industrial Process/ Water	MWDSC	Ongoing	Ongoing	This program is designed to improve water efficiency for commercial customers through upgraded equipment or services that do not qualify for standard rebates. Incentives are based on the amount of water customers save and allow for customers to implement custom water-saving projects.

Item 5c

Description	Lead Agency	Status % Complete	Scheduled Completion or Renewal Date	Comments
Savings Incentive Program (WSIP) (cont.)				Total water savings to date for the entire program is 1,257 AFY and 4,730 AF cumulatively.
Turf Removal Program	MWDOC	Ongoing	Ongoing	<p>In March 2020, 23 rebates were paid, representing \$108,090.57 in rebates paid this month in Orange County.</p> <p>To date, the Turf Removal Program has removed approximately 22.7 million square feet of turf.</p>
Spray to Drip Rebate Program	MWDOC	Ongoing	Ongoing	<p>This is a rebate program designed to encourage residential and commercial property owners to convert their existing conventional spray heads to low-volume, low-precipitation drip technology.</p> <p>To date, the Spray to Drip Rebate Program has converted approximately 912,670 square feet of area irrigated by conventional spray heads to drip irrigation.</p>
Recycled Water Retrofit Program	MWDSC	Ongoing	Ongoing	<p>This program provides incentives to commercial sites for converting dedicated irrigation meters to recycled water.</p> <p>To date, 160 sites, irrigating a total of 1,576 acres of landscape, have been converted. MWDOC has paid a total of \$56,950.00 in grant funding to 20 of those sites. The total potable water savings achieved by these projects is 3,419 AFY and 12,586 AF cumulatively.</p>