AGENDA
IRVINE RANCH WATER DISTRICT
ENGINEERING AND OPERATIONS COMMITTEE
TUESDAY, NOVEMBER 17, 2020

*Due to COVID-19, this meeting will be conducted as a teleconference pursuant to the provisions of the Governor's Executive Orders N-25-20 and N-29-20, which suspend certain requirements of the Ralph M. Brown Act. Members of the public may not attend this meeting in person.*

Participation by members of the Committee will be from remote locations. Public access and participation will only be available telephonically/electronically.

To virtually attend the meeting and to be able to view any presentations or additional materials provided at the meeting, please join online via Webex using the link and information below:

Via Web:
https://irwd.my.webex.com/irwd.my/j.php?MTID=ma8e0ab388002b2e772ef3565cdc317af
Meeting Number (Access Code): 126 327 9786
Meeting Password: hjUKvB9DS42 (45858293 from phones and video systems)

After joining the meeting, in order to ensure all persons can participate and observe the meeting, please select the "Call in" option and use a telephone to access the audio for the meeting by using the call-in information and attendee identification number provided.

*As courtesy to the other participants, please mute your phone when you are not speaking.*

**PLEASE NOTE:** Participants joining the meeting will be placed into the Webex lobby when the Committee enters closed session. Participants who remain in the "lobby" will automatically be returned to the open session of the Committee once the closed session has concluded. Participants who join the meeting while the Committee is in closed session will receive a notice that the meeting has been locked. They will be able to join the meeting once the closed session has concluded.

CALL TO ORDER 1:30 p.m.

ATTENDANCE Committee Chair: Doug Reinhart _____
Committee Member: John Withers _____

| | | | | | |
|---|---|---|---|---|---|
| ALSO PRESENT | Paul Cook _____ | Kevin Burton _____ | Wendy Chambers _____ |
| | Jose Zepeda _____ | Paul Weghorst _____ | Cheryl Clary _____ |
| | Rich Mori _____ | Eric Akiyoshi _____ | Richard Mykitta _____ |
| | Kelly Lew _____ | Jim Colston _____ | Ken Pfister _____ |
| | Lars Oldewage _____ | Malcolm Cortez _____ | Scott Toland _____ |
| | John Dayer _____ | Bruce Newell _____ | Mitch Robinson _____ |
| | Belisario Rios _____ | _____ _____ | _____ _____ |

PUBLIC COMMENT NOTICE

If you wish to address the Committee on any item, please submit a request to speak via the "chat" feature available when joining the meeting virtually. Remarks are limited to three minutes per speaker on each subject. You may also submit a public comment in advance of the meeting by emailing comments@irwd.com before 10:30 a.m. on Tuesday, November 17.

**ALL VOTES SHALL BE TAKEN BY A ROLL CALL VOTE.**

## COMMUNICATIONS

1. Notes: Burton
2. Public Comments
3. Determine the need to discuss and/or take action on item(s) introduced that came to the attention of the District subsequent to the agenda being posted.
4. Determine which items may be approved without discussion.

## INFORMATION

5. UPCOMING PROJECTS STATUS REPORT – CORTEZ / AKIYOSHI / LEW / MORI / BURTON

   Recommendation: Receive and file.

6. WATER QUALITY LABORATORY NEEDS ASSESSMENT – OLDEWAGE / COLSTON / BURTON

   Recommendation: Receive and file.

## ACTION

7. DAM SAFETY PROGRAM CONSULTANT SELECTION – MOEDER / MORI / BURTON

   Recommendation: That the Board authorize the General Manager to execute a Professional Services Agreement in the amount of $389,200 with HDR for the second phase of the Dam Safety Program, Projects 10452 and 10456.

## OTHER BUSINESS

8. Directors' Comments

9. Adjourn

Availability of agenda materials: Agenda exhibits and other writings that are disclosable public records distributed to all or a majority of the members of the above-named Committee in connection with a matter subject to discussion or consideration at an open meeting of the Committee are available for public inspection in the District's office, 15600 Sand Canyon Avenue, Irvine, California ("District Office"). If such writings are distributed to members of the Committee less than 72 hours prior to the meeting, they will be available from the District Secretary of the District Office at the same time as they are distributed to Committee Members, except that if such writings are distributed one hour prior to, or during, the meeting, they will be available electronically via the Webex meeting noted. Upon request, the District will provide for written agenda materials in appropriate alternative formats, and reasonable disability-related modification or accommodation to enable individuals with disabilities to participate in and provide comments at public meetings. Please submit a request, including your name, phone number and/or email address, and a description of the modification, accommodation, or alternative format requested at least two days before the meeting. Requests should be emailed to comments@irwd.com. Requests made by mail must be received at least two days before the meeting. Requests will be granted whenever possible and resolved in favor of accessibility.

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November 17, 2020
Prepared by: M. Cortez / E. Akiyoshi/
K. Lew / R. Mori
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

# UPCOMING PROJECTS STATUS REPORT

## SUMMARY:

A status report of Irvine Ranch Water District's Upcoming Projects is presented to the Committee for information.

## BACKGROUND:

The information, which is provided as Exhibit "A", is a status report submitted quarterly to the Committee for review.

## FISCAL IMPACTS:

Not applicable.

## ENVIRONMENTAL COMPLIANCE:

Not applicable.

## RECOMMENDATION:

Receive and file.

## LIST OF EXHIBITS:

Exhibit "A" – Upcoming Projects Status Report

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# EXHIBIT "A"

## IRWD UPCOMING PROJECTS STATUS REPORT

| Project Name | Start Planning | Start Design | Construction Award | Construction Final Acceptance |
|---|---|---|---|---|
| Gillette/Morse DW Pipeline Relocation | | | Winter 2021 | Spring 2021 |
| Turtle Ridge DW, RW Pipeline Rehabilitation | | | | Winter 2021 |
| University Drive Widening Appurtenance Relocations (RA w/ Irvine) | | | | Fall 2020 |
| Aliso Creek Remediation | | | Winter 2021 | Spring 2021 |
| 2020 Vault Lid Replacement | | | | Summer 2021 |
| MWRP Tertiary Filter Rehabilitation | | Fall 2020 | Summer 2021 | |
| MWRP MBR Fall Protection | | | Winter 2021 | |
| MWRP Primary Tanks Replacement Covers | | | | Summer 2021 |
| MWRP Compressed Natural Gas Fueling Station | | Winter 2021 | | |
| HATS Diversion Structure Relining | | | Fall 2020 | |
| Crystal Cove RW PRV | | | Winter 2021 | |
| San Joaquin Reservoir Filtration Facility | | | Fall 2020 | |
| Rattlesnake Outlet Pipe Assessment | | Fall 2020 | | |
| Silverado Bridge 174 DW Improvements | | Winter 2021 | Spring 2022 | |
| Silverado Bridge 175 DW Improvements | | | Summer 2021 | |
| Santiago Canyon Pump Station Improvements | | | Winter 2021 | |
| Sewer Siphon Improvements | | | | Spring 2021 |
| Baker Campus Entrance Improvements | | | | Fall 2020 |
| Turtle Rock RMS | Fall 2020 | Winter 2021 | | |
| Lake Forest Woods Sewer Improvements | Fall 2020 | Winter 2021 | Summer 2021 | |
| Wells 1, 11, and 13 Rehabilitation | | | Fall 2020 | Spring 2021 |
| DATS Miscellaneous Repairs | | | Winter 2021 | |
| Lake Forest Zone C Pipeline | | | | Spring 2021 |
| Well OPA-1 PFAS Treatment | | Fall 2020 | | |
| 15 MG Zone 1 Reservoir Coating Replacement and Improvements | | | Spring 2021 | |
| Well ET-1 PFAS Treatment | | Winter 2021 | | |
| Eastwood Zone A-B BPS and Zone A-C BPS | | | | Winter 2021 |
| Zone A to Rattlesnake Reservoir BPS | | | | Spring 2023 |
| Lake Forest Zone B-C BPS | | | Winter 2021 | |
| Serrano Creek Outlet Structure Improvements | | | | Fall 2020 |
| SAC Pipeline Relocation in Santiago Creek at Irvine Regional Park | | | Spring 2021 | |
| Zone C+ Reservoir Strainer Improvements | | | | Fall 2020 |
| Sewage Treatment Plant Master Plan | | Spring 2021 | | |
| PDF Sodium Hypochlorite Storage and Feed System | | | | Spring 2022 |
| Santiago Creek Dam Improvements | | | Spring 2023 | |
| Santiago Canyon Fleming Zone 8 Tank and Zone 8-9 BPS | | | Fall 2021 | |
| MWRP Unit Substation T-1 Replacement | | | | Winter 2021 |
| MWRP Biosolids and Energy Recovery Facilities | | | | Winter 2021 |

# IRWD UPCOMING PROJECTS STATUS REPORT

| Project Name | Start Planning | Start Design | Construction Award | Construction Final Acceptance |
|---|---|---|---|---|
| Syphon Reservoir Improvements | | Fall 2020 | | |
| PA 1, Orchard Hills Neighborhood 3 RW (RA w/ICDC) | | | | Winter 2021 |
| PA 6, Neighborhood 5B and C Phase 2 RW (RA w/ICDC) | | | | Winter 2021 |
| PA 12, Innovation Park DW and RW (RA w/ICDC) | | | | Spring 2021 |
| PA 12, Innovation Park DW (RA w/ICDC) | | | | Spring 2021 |
| PA 12, Innovation Park Regional RW (RA w/ICDC) | | | Winter 2021 | |
| PA 1, Jeffrey Road Extension RW (RA w/CDC) | | | Winter 2021 | |
| Tustin Legacy, Moffett at Peters Canyon Channel DW, RW (RA w/Tustin) | | | | Winter 2021 |
| Tustin Legacy, Flight Drive RW (RA w/Tustin) | | | | Winter 2021 |
| Tustin Legacy, Neighborhood South Phase 1, S (RA with/Tustin) | | | | Summer 2021 |
| PA 51, Marine Way DW, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, South C St and LY St, S, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Alton Pkwy from Technology to Muirlands, DW S, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Marine Way from Barranca Pkwy to Alton Pkwy, DW S, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Alton Interceptor Sewer (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Marine Way from Alton to Barranca Sewer (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Sociable from Z St to B St, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, GP1 St DW, S, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, GP2 St, DW, S, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Magnet from Ridge Valley to Bosque RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Cadence South DW, S, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, District 5 A St DW, RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Chinon from Cadence South to Cadence (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, Marine Way Reach C Sewer RW (RA w/Heritage Fields) | | | | Winter 2021 |
| PA 51, District 5, F and N St DW, RW | | | | Spring 2021 |
| PA 51, District 5, E St RW (RA w/Heritage Fields) | | | | Spring 2021 |
| PA 51, District 5, Astor DW, RW (RA w/Heritage Fields) | | | | Spring 2021 |
| PA 51, District 5, Merit DW, RW (RA w/Heritage Fields) | | | | Spring 2021 |
| PA 51, District 5, BB St RW (RA w/Heritage Fields) | | | | Spring 2021 |
| PA 51, District 5, P St and Cadence DW, RW (RA w/Heritage Fields) | | | | Spring 2021 |
| PA 51, Marine Way from Alton Pkwy to Bake Pkwy DW, RW (RA w/Heritage Fields) | | | | Fall 2021 |
| Biennial Capital Budget and Long-Term Capital Program | Fall 2020 | | | |
| Capital Improvement Program (CIP) Asset Management | In-Process | | | |
| Phase 2 Water Demand Factor Calibration | Winter 2021 | | | |
| Non-Potable Hydraulic Model Updates | In-Process | | | |
| Potable Hydraulic Model Updates | Fall 2020 | | | |
| Generator Fuel Storage Upgrades and Site Evaluations | In-Process | | | |
| Updates to Water Resources Master Plan for 2020 Urban Water Management Plan | Fall 2020 | | | |
| | | | | |

IRWD UPCOMING PROJECTS STATUS REPORT

| Project Name | Start Planning | Start Design | Construction Award | Construction Final Acceptance |
|---|---|---|---|---|
| | | | Category | Months |
| | | | Winter | Jan. Feb. & Mar. |
| | | | Spring | Apr. May & June |
| | | | Summer | Jul. Aug. & Sep. |
| | | | Fall | Oct. Nov. & Dec. |

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November 17, 2020
Prepared by: L. Oldewage
Submitted by: J. Colston / K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

# WATER QUALITY LABORATORY NEEDS ASSESSMENT

## SUMMARY:

At the Committee meeting, staff will provide an update on current and potential future instrumentation, staffing, and facility needs for IRWD's Water Quality Laboratory.

## BACKGROUND:

IRWD's Water Quality Laboratory is a California Environmental Laboratory Accreditation Program (ELAP) accredited laboratory for the analysis of regulatory samples for the Clean Water Act (CWA) and Safe Drinking Water Act (SDWA) programs. The laboratory also provides analyses for process control of natural treatment systems (NTS), wastewater and potable water treatment facilities, and project support. The current main laboratory, constructed in 1994, is an approximately 5,600 square-foot facility located in the Michelson Water Recycling Plant (MWRP) Operations Center. This lab is equipped to fulfill nearly all of the District's inorganic chemistry, organic chemistry and microbiology testing needs. This year, a Biosolids laboratory was added as part of the new facility, and small process laboratories are located onsite at the Baker Water Treatment Plant and the Los Alisos Water Recycling Plant.

When IRWD's Water Quality Laboratory was built, the Water Quality Department had seven analytical staff and two supervisors performing microbiology and inorganic chemistry analyses for the distribution systems and one treatment plant – the MWRP. The laboratory has since expanded its analytical capabilities, including the addition of an organic chemistry section. Staffing has expanded to 15 regular scientists and one temporary scientist, and three section supervisors who perform a broader range of analyses for the significantly expanded distribution systems, six treatment plants, the NTS program, and two additional open recycled water reservoirs. The following table summarizes the growth in analytical workload and staff:

| Calendar Year | Analyses Requested | Results Recorded | Total Staff |
|---|---|---|---|
| 1998 | 75,949 | 132,417 | 10 |
| 2019 | 126,949 | 344,034 | 20 |

Over 99% of all analyses are conducted by the IRWD Water Quality Laboratory with the remainder conducted by contract laboratories. Samples analyzed by contract laboratories include whole effluent toxicity (which requires the use of living organisms) and Per- and Polyfluorinated Alkyl Substances (PFAS), which require the use of advanced instrumentation in order to meet the low-level detection required for compliance purposes. Staff has completed a review of the need for new analytical capabilities as part of this assessment. A draft of the powerpoint presentation that will be provided during the Committee meeting is attached as Exhibit "A".

Cost Analysis PFAS, Perchlorate, and Other Emerging Constituents:

PFAS are emerging contaminants that are currently covered by several monitoring orders issued by the State Water Resources Control Board, and the Division of Drinking Water (DDW) has announced its intent to develop Maximum Contaminant Levels (MCLs) for multiple PFAS compounds. With the growing demand for the analysis of PFAS compounds across the District's potable and non-potable systems and wells, staff conducted an assessment for the need to move this test in-house. The analysis for PFAS compounds is performed using solid phase extraction and a Liquid Chromatograph Tandem Mass Spectrometer (LC-MS-MS); the current quoted price for this equipment is $410,000 and the equipment has a minimum life expectancy of 10 years. The annual operations and maintenance cost are estimated at $52,000. In addition, one new Senior Scientist staff position would likely be needed to operate and maintain the instrument. This instrument can also analyze for other contaminants such as perchlorate, and other constituents that could be regulated in the future.

Staff evaluated if the costs warrant the purchase of the instrumentation and the hiring of a new staff member to operate the equipment. IRWD expects to run approximately 50 PFAS samples per month ($350 per sample) with PFAS removal systems added to Well OPA-1, Well ET-1 and possibly the Shallow Groundwater Unit (SGU). Additionally, there is a demand for perchlorate for 20 samples per month ($175 per sample). Together, this would equal nearly $250,000 per year in contract laboratory charges. The result of the cost comparison of utilizing a contract laboratory versus utilizing staff and District-owned equipment is shown below. This does not include additional analyses for pesticides and emerging constituents. It also does not consider the advantage of internal control over the timing of the process.

| **Contract Laboratory Cost** | |
|---|---|
| Total Annual PFAS Samples | 588 |
| Average Monthly PFAS Samples | 49 |
| Annual Cost for PFAS Analysis at $350 per Sample | $205,800 |
| Annual Cost for Current Perchlorate Analysis at $175 per Sample | $42,000 |
| ***Annual Cost*** | ***$247,800*** |
| **District Staff/Equipment Cost** | |
| LC-MS-MS Purchase Price | $410,000 |
| Annualized Over 10 Years | $41,000 |
| Annual Support Contract (Years 2 through 10) | $40,000 |
| Annual Operating Supplies | $12,000 |
| Senior Scientist (Midrange including benefits) | $148,500 |
| ***Annual Cost*** | ***$237,500*** |

Based on expected demands for PFAS monitoring at the planned wellhead treatment facilities, water recycling facilities, non-potable wells, and dewatering facilities, in addition to current perchlorate monitoring requirements, the cost for the LC-MS-MS instrument and staff member are justified as compared to a contract laboratory. Staff recommends beginning the purchase process approximately one year before the proposed commissioning of the PFAS treatment facilities to allow sufficient time for method development and to receive ELAP accreditation.

Laboratory Facilities Evaluation:

The current laboratory facility at the MWRP is aging and available space is limited. The laboratory and associated office space are filled to capacity, and the ventilation system, cabinetry and counter tops are approaching the end of their useful lives. Two rooms in the laboratory have been identified for possible reconfiguration which could provide near-term relief on space constraints. These rooms are laboratory-conditioned spaces totaling 650 square feet and 300 square feet each that currently serve non-analytical functions which could be performed in office- or warehouse-type spaces. Once practical alternative or temporary spaces are identified for sample receiving and storage functions, these two laboratory rooms could be converted for analytical work.

The existing laboratory is aging but remains functional and safe. In 2019, the laboratory experienced a short circuit and power outage to the two main circuit panels. The issue was caused by a neutral wire that pulled loose when the uninterruptable power supply was moved for planned maintenance. A subsequent review of the laboratory power system equipment and loads was conducted. The primary finding is the 150kVA transformer feeding the laboratory is nearing the end of its useful life and should be closely monitored until it is replaced. Overall, staff expects that a rehabilitation or replacement of the primary laboratory would be necessary in five to10 years. Until that time, staff will optimize the use of existing facilities. Potential alternative space options for non-analytical needs include storage in the biosolids facility, shipping containers or temporary prefabricated workspace. No other changes are needed at this time.

FISCAL IMPACTS:

In 2012 IRWD established a General Plant Capital (GPC) fund to address existing and expected laboratory needs. This program allows the laboratory to replace expensive equipment at the end of its useful life while maintaining a more consistent GPC budget each fiscal year. Since a pool of funds is available to draw on for replacements, staff can extend the useful life of some equipment and has the flexibility to reprioritize replacement instrumentation as the situation changes.

Beginning in Fiscal Year (FY) 2012-13 through FY 2019-20, 81% of the funds budgeted for five-year life equipment and 35% for 10-year life equipment have been expended to date. Major pieces of equipment that remain to be purchased include a Gas Chromatograph for sulfur compounds in air, a Gas Chromatograph Mass Spectrometer for siloxanes in digester gas, and a Biogas Potential analyzer. Estimated new equipment costs for PFAS and perchlorate monitoring include $410,000 for a LC-MS-MS instrument and $40,000 for the annual maintenance contract and support. Staff will propose adjustments to the GPC and staffing levels for the next two-year budget to meet planned needs.

ENVIRONMENTAL COMPLIANCE:

Not applicable.

RECOMMENDATION:

Receive and file.

LIST OF EXHIBITS:

Exhibit "A" – Water Quality Laboratory Needs Assessment Draft Presentation

# Water Quality Laboratory Needs Assessment

Engineering and Operations Committee

November 17, 2020

1

## Agenda

- Background
- General Plant Capital Funds
  - Replacement Equipment
  - New Biosolids Laboratory Equipment
- New Instrumentation for PFAS
- Laboratory Facilities

Irvine Ranch WATER DISTRICT



2



Irvine Ranch WATER DISTRICT

## Background

- Current Laboratory Facility completed in 1994
- Since then Laboratory staffing has doubled
- Data produced increased commensurately:
  - Six treatment facilities and four open reservoirs
  - Natural Treatment System facilities
  - Expanded distribution systems and storage reservoirs



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## General Plant Capital Funds

- In 2012 Began Budgeting and accumulating funds to replace laboratory assets and for new equipment for biosolids testing
- Accumulated replacement funds to smooth peaks and valleys in General Plant Capital Budgeting over fiscal years, maximize equipment life, and provide flexibility
- Accumulated funds for Biosolids Laboratory equipment are sufficient to complete acquisitions for the project

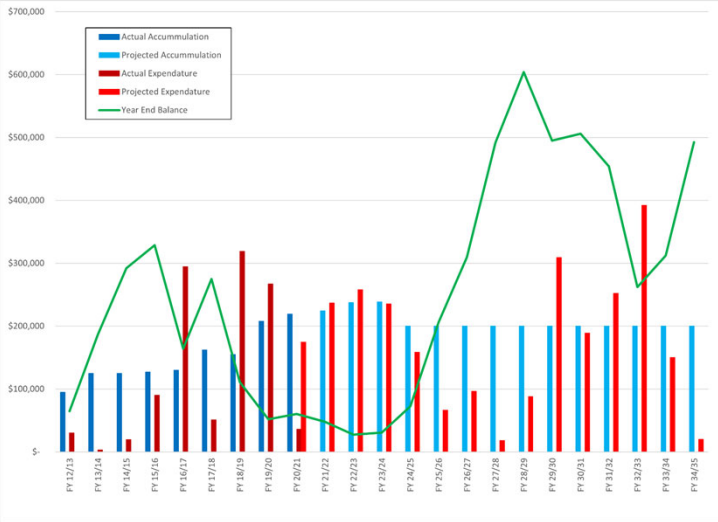


4



Irvine Ranch WATER DISTRICT

## GPC Equipment Replacement Funds






5

## New Instrumentation for PFAS

- Liquid Chromatograph Tandem Mass Spectrometer (LC-MS-MS)
- State of the Art, Extremely Sensitive, Likely the Basis for Many Future Trace-Level Analytical Methods



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Irvine Ranch WATER DISTRICT

## New Instrumentation for PFAS

- Liquid Chromatograph Tandem Mass Spectrometer (LC-MS-MS)
  - PFAS Compounds (50 Samples per Month)
  - Perchlorate (20 Samples per Month)
  - Contaminants of Emerging Concern
- Benefits of In-House Analysis
  - Quicker Turn Around of Analyses
  - Data Availability for Process Decisions



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## Laboratory Facilities

- Main Laboratory plus on-site process labs at LAWRP, Baker WTP, and Biosolids
- Main Laboratory is aging, but remains functional
  - Cabinetry, counters and ventilation system
  - 2019 Main Laboratory electrical outage
  - Limited space for growing workload
- Up to 950 square feet available to repurpose from non-analytical to analytical functions



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Irvine Ranch WATER DISTRICT

Questions?




Irvine Ranch
WATER DISTRICT

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November 17, 2020
Prepared by: J. Moeder / R. Mori
Submitted by: K. Burton
Approved by: Paul A. Cook

ENGINEERING AND OPERATIONS COMMITTEE

# DAM SAFETY PROGRAM CONSULTANT SELECTION

## SUMMARY:

IRWD's current Dam Safety Program (DSP) includes routine monitoring, inspection, and reporting activities for Rattlesnake, San Joaquin, Sand Canyon, Santiago Creek, and Syphon dams. IRWD contracted with HDR to review and enhance the District's current DSP and to integrate the process of Risk-informed Decision Making (RIDM) into the overall program. The DSP will proceed in two phases. Phase 1 focused on data-gathering and establishment of the initial DSP framework. Phase 2 will focus on risk analyses, risk evaluation, and completion of the final DSP framework. HDR completed the first phase; staff recommends proceeding with Phase 2. Staff recommends the Board authorize the General Manager to execute a Professional Services Agreement in the amount of $389,200 with HDR for the second phase of the DSP.

## BACKGROUND:

IRWD owns and operates five jurisdictional dams that were constructed between 1933 and 1966. Traditionally, dam safety assessments, which are integral components of any DSP, utilize a standards-based approach (SBA) that follows established rules and guidelines for design events and loads, structural capacities, and defensive design measures. Historically, the SBA to dam safety has proven to be good practice, but that approach omits consideration of other dam safety elements such as human factors and operational issues that could potentially expose dam owners to increased levels of risk.

Another approach to dam safety that has primarily been used at the federal level is RIDM, which is a more rigorous, systematic, and thorough process to dam safety that focuses on identifying and reducing risks. In the late 1990s, the Bureau of Reclamation was the first agency to incorporate RIDM into its dam safety program. Since that time, RIDM is now used by several dam regulators and dam owners throughout the United States. Earlier this year, the Division of Safety of Dams (DSOD) announced to California dam owners that it will be integrating RIDM into its regulatory oversight of dams under its jurisdiction.

### Consultant Selection Process:

In June 2020, IRWD contracted with HDR to review and enhance the District's current DSP and to integrate the RIDM process into the overall program. HDR is an industry leader in dam safety, and in particular, a leader in RIDM processes and approaches. Staff is executing the project in two phases with the first phase focused on data gathering and establishment of the initial DSP framework, and the second phase focused on risk analyses, risk evaluation, and completion of the final DSP framework. HDR has completed the first phase, and staff is prepared to proceed with the second phase. The scope of work for the second phase is provided as Exhibit "A".

A draft of the powerpoint presentation that will be provided during the Committee meeting is attached as Exhibit "B".

FISCAL IMPACTS:

Projects 10452 and 10456 for Capital Planning Support are included in the FY 2020-2021 Capital Budget. Project 10452 will fund 20% of the project through Potable Water Regional Split, and Project 10456 will fund 80% of the project through Recycled Water Regional Split. The current approved budgets are sufficient to fund the project.

ENVIRONMENTAL COMPLIANCE:

This project is not subject to the California Environmental Quality Act (CEQA) as authorized under the California Code of Regulations, Title 14, Chapter 3, Section 15061 (b) (3), in that CEQA applies only to projects that may result in a direct physical change in the environment or reasonably foreseeable indirect physical change in the environment.

RECOMMENDATION:

That the Board authorize the General Manager to execute a Professional Services Agreement in the amount of $389,200 with HDR for the second phase of the Dam Safety Program, Projects 10452 and 10456.

LIST OF EXHIBITS:

Exhibit "A" – HDR Scope of Work
Exhibit "B" – Dam Safety Program Consultant Selection Draft Presentation

November 5, 2020

Mr. Jacob Moeder
Project Manager
Irvine Ranch Water District
15600 Sand Canyon Avenue
Irvine, California 92618

**Subject: Updated Scope of Work for Phase 2 of RIDM Dam Safety Program**

Dear Mr. Moeder,

## Introduction

As discussed, we are providing this updated proposal for Phase 2 of the RIDM Dam Safety Program. The updates are recommended in response to the work completed and lessons learned from Phase 1 regarding the amount of available information, range of potential failure modes, and information gaps that we have identified.

## Scope of Services

Phase 2 of the RIDM Dam Safety Program development will be a continuation of activities initiated under Phase 1 and updated to reflect the information reviewed, findings, and expected needs for completing the program development. The phases of the work identified in our original proposal are still appropriate and would generally accomplish the following objectives:

| | |
|---|---|
| Phase 1: | Complete activities (data review, site visits, etc.) required to set up the portfolio risk assessment. This includes the development of an initial draft document summarizing the enhanced dam safety framework. |
| Phase 2: | Complete the portfolio risk assessment, present results, update the program framework document and complete activities related to prioritization and implementation of the program plan. |

Task 1 Project Management activities span both Phases. The scope for Task 1 has been updated to reflect only Phase 2 activity requirements. In addition, we have added a Task 2A item to help develop hydrologic information for each dam to include load probabilities for flood events necessary for the SQRA activities under Task 7.

### TASK 1 | PROJECT MANAGEMENT

Project management activities will continue during Phase 2. Activities include monitoring and updates of a project plan, staff coordination, schedule and budget monitoring, and coordination of internal quality assurance reviews. This task includes the following:

- Project Management Plan
- Monthly Progress Reports
- QA/QC Activities
- Meetings/Conference Calls

For purposes of estimating the level of effort and direct costs associate with project management, we have assumed that the duration of the Phase 2 work will be up to 4 months. A total of up to 4 additional progress reports and up to four monthly coordination calls with the District are included under this task.

## PHASE 2

### TASK 2A | PERFORM SQRA LEVEL EVAULATION OF HYDROLOGIC LOADING FOR EACH DAM

The SQRA will require estimates of return periods for various flood loading events including an estimate of the flood return period that results in incipient overtopping of each dam. Under this task, the available hydrologic data for each dam will be leveraged to minimize the work required to provide the required input to the SQRA workshop.

The objective of this task is to develop inflow volume-frequency curves for 2 of the 5 reservoirs to describe hydrologic loading for the dam over-topping event. The results from the 2 reservoirs will be compared to the other 3 reservoirs to determine if results can be used to estimate the hydrologic loading for all 5 reservoirs. Depending on the results, it may be determined that the full volume-frequency approach be applied to the other 3 reservoirs, as well. This assessment will leverage existing information and studies to the extent practicable. The following section describe the steps to develop the reservoir inflow information and the reservoir storage information.

**2A.1 Gather and review existing studies and watershed information**.

It is anticipated the following information will be collected and reviewed as available:

a. Hydrologic studies, including PMF Studies for Santiago Creek (GEI, 2020), Sand Canyon (Stetson, 2019) and Syphon Reservoir (GEI, 2012);
b. National Oceanic and Atmospheric Administration (NOAA) Atlas 14 annual maximum precipitation depth-duration-frequency estimates;
c. Reservoir depth-storage rating curves;

**2A.2 Develop design precipitation events for a wide range of frequencies.**

NOAA Atlas 14 provides precipitation frequency estimates for selected durations and frequencies based on analysis of the historical precipitation record. To develop design precipitation events, we will:

a. Start with the NOAA Atlas 14 annual maximum precipitation depth estimates for the 5-min to 7-day durations, ranging from the “2-yr” event to the “1,000-yr” event. These are provided in a gridded format varying spatially across the watershed.
b. Apply HMR 59 depth-area reduction factors (ARFs) to convert the precipitation estimates to areal average precipitation for each watershed.
c. Extrapolate the precipitation values for up to a “25,000-year” event.

**2A.3 Use the NOAA Atlas 14 precipitation-frequency curves to estimate runoff volume.**

Using a simplified conservative approach, runoff volumes will be estimated from the contributing watershed of each dam.

a. Obtain the depth-volume rating curve for each dam.

b. Obtain the drainage area for each watershed.
c. Assuming no soil loss within the watershed and no outflow from the reservoir, estimate inflow volume-frequency curve (volume = precipitation x drainage area).

**2A.4 Estimate frequency for over-topping event.**

Based on the inflow volume-frequency curves and the depth-volume rating curves, the frequency for the over-topping event will be estimated for each of the five dams.

**2A.5 Develop Draft and Final TM summarizing the Hydrologic Loading information for SQRA**

### TASK 6 | PRESENTATION/WORKSHOP FOR REVIEW OF PROPOSED DAM SAFETY PROGRAM FRAMEWORK

To facilitate and initial review of the draft dam safety program framework and to support the planned portfolio dam safety and risk assessment under the subsequent task, HDR will perform the following:

- Preparation of presentation and workshop materials
- Conduct a 4 hour framework workshop with the District
- Prepare minutes summarizing the workshop outcomes and action items

### TASK 7 | PORTFOLIO DAM SAFETY AND RISK ASSESSMENT

A key tool for the development of an effective, risk informed dam safety management framework is a portfolio dam safety and risk assessment completed using screening to semi-quantitative risk analysis (SQRA) methods. This assessment, using the identified potential failure modes (Task 3) and other available site and design related information (Tasks 2 and 2A), provides an important first look at potential failure risks at each dam within an overall context that helps identify key priorities for further evaluation and possible corrective actions. Under this task, we will perform individual SQRA assessments for each dam (excluding Syphon which has already been completed) and then combine those results into a portfolio assessment of the five district dams. The following is a list of the specific subtasks/actions to be performed to complete this assessment.

- Update the workshop plan drafted during Phase 1 based on input from the District
- Work with the District to identify the full team of risk assessment participants and roles. Note that HDR's current estimate include providing a facilitator (Osmun), note taker (TBD), information manager (Kelly Flint and/or Andrew Little) and 2 risk estimators (Ferguson, Krivanec). Based on information obtained during Phase 1, it is recommended that a third risk estimating cadre member be added for hydrology and hydraulic structures risk estimating. This would either be Mr. William Fiedler or Mr. Ed Zapel. This team will be capable of estimating risks for all categories of PFM's considered at each dam. It is recommended that the District provide several observers and one risk estimator for the workshop.
- Complete the collection and evaluation of available information on each dam (excluding Syphon) and the data reports for each dam initiated during Phase 1. These reports will be provided for review by the risk assessment team members, and for use during the SQRA workshop.
- Using information on each dam included data packages, perform an initial screening of identified PFMs to identify the key risk driving failure modes for evaluation during the workshop. It is anticipated that 3 to 5 risk driving PFMs will be identified for each dam.
- Prepare updated PFM descriptions for the risk driving failure modes.

- Prepare briefing presentation materials and data sets containing information needed by risk team members to estimated risk. Data sets may include such items as summary spreadsheets on boring, instrumentation and laboratory testing information that is searchable or sortable prior to, or during the workshop. Data sets may also include information assembled for filter/drain evaluations, assessment of drain and undrained shear strength or other engineering properties that are needed for seepage and stability analyses. Most recent seepage, stability and seismic response analyses will be identified and summarized for the workshop. Likewise hydraulic and structural analyses and evaluation for critical structures and identified failure modes will be assembled for ready access, review and discussion during the workshop.
- Conduct an initial training session by conference call to prepare all risk assessment participants
- Conduct a risk assessment workshop estimated to take up to 36 hours of time per workshop participant. The workshop will be attended by 6 key personnel from HDR including Ferguson, Osmun, Krivanec, Fiedler/Zapel, Williams and Flint/Little. Technical support will be provided by Risher, Mauney, and Baker.
- Prepare individual dam SQRA summary reports.
- Complete portfolio assessment and initial recommendations
- Present assessment results to District (via conference call)
- Prepare a draft Dam Safety Portfolio Assessment Report
- Finalize Dam Safety Portfolio Assessment Report based on comments received from all assessment team members and other appropriate District and HDR independent reviewers

**DISCUSSION:**

Example risk matrix that could be incorporated into the Districts Dam Safety Program Framework is shown below on Figure 3. This specific matrix was obtained from the FEMA Federal Guidelines for Dam Safety Risk Management (FEMA, 2015).

The portfolio risk assessment begins with an SQRA for each individual dam. During the workshop a day is dedicated to each dam where each PFM is presented, discussed, updated if appropriate and a decision is made to perform a risk estimate. The failure progression of each PFM are well documented in the workshop and a summary of the PFMs and semi-quantitative risk estimates for each dam are prepared and presented on the risk matrix as shown below on Figure 4.

The PFM estimates can then be assessed to identify PFMs where no action is needed, or potential actions the District could take. Potential actions consider not only the level of risk, but the level of confidence in the risk estimate. Potential actions that might be taken to reduce risk on an interim basis, reduce uncertainty or increase confidence in the risk estimate, or reduce risks are identified.

A typical framework for evaluation of the initial risk estimates is summarized below:

- For PFMs that have low risk, with high confidence in the risk estimate, there would be no further action; or possibly additional actions with a lower priority.
- For PFMs that have low to moderate risk, with low confidence in the risk estimate, there may be follow up actions such as new monitoring (e.g. piezometers) or engineering studies to reduce uncertainty, better define risk, and increase confidence in the risk level (see Engineering Studies bullet below).
- For PFMs that have high risk with high confidence in the risk level, immediate interim risk reduction measures might be justified. However, it is unlikely that risks levels would be judged to

have high confidence with the proposed SQRA level of effort. Long term risk reduction measures might involve structural modifications or replacement. Additional engineering studies to better define the risk are likely not justified, and engineering efforts should focus on risk reduction.

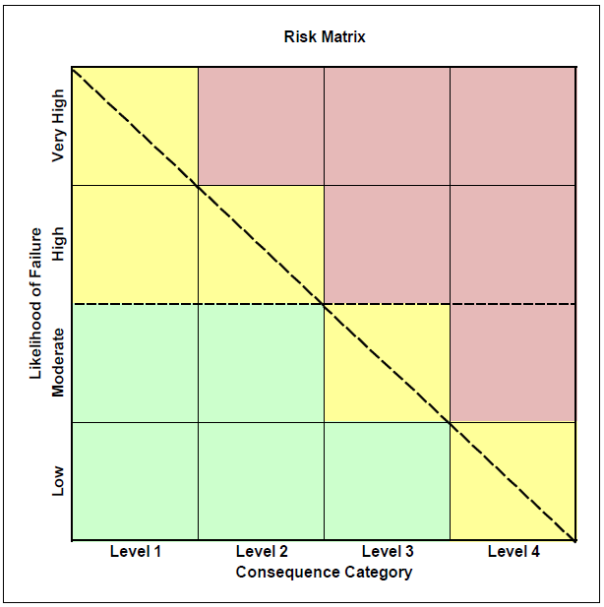


Figure 3: Example Risk Screening Matrix to be Adapted for IRWD Purposes and then for Portfolio Assessment under Task 7.

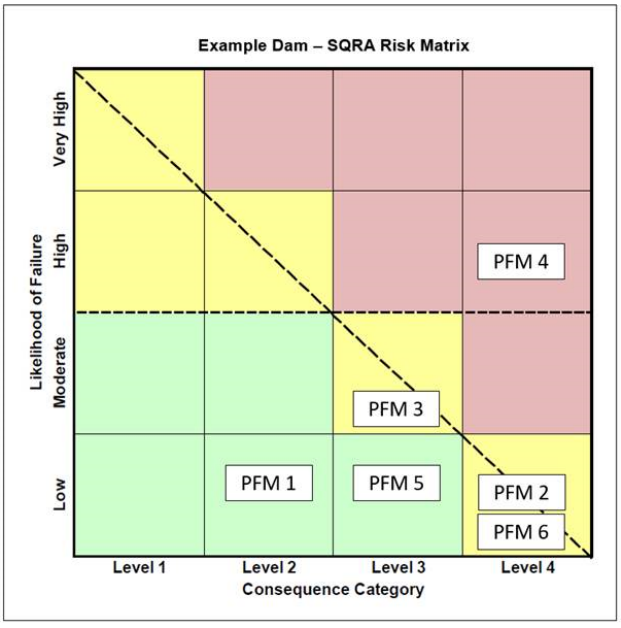

Figure 4: Example Outcome of SQRA for Individual dam showing the building block for the Portfolio Assessment and Basis for Developing Implementation Plan

- For PFMs that have high risk with low confidence in the risk level (this can occur because lack of sufficient information can lead people to be over conservative when estimating risk level), interim risk reduction measures might be considered (each situation is different) but structural modifications to reduce risk would not likely be justified. Follow up actions would focus on actions such as new monitoring (e.g. seepage flow measurement), investigations or engineering studies to better define the risk, reduce uncertainty and increase confidence in the risk level (see studies bullet below).

Engineering Studies: Engineering studies to better define risk, reduce uncertainty and increase confidence might be phased, starting with a simplified approach and increasing in complexity only as needed. Field investigations (e.g. inspections, concrete coring and testing; geotechnical drilling, etc.), as necessary, will be conducted to collect data to support engineering studies. Factors brought out during the SQRA will help inform what type of study and the scope of the studies that are needed. After studies are completed, subsequent risk analyses might indicate risk levels for PFMs could remain the same (with reduced uncertainty and/or greater confidence) or could change. If risk levels decrease, no further action is needed (or action becomes low priority). If risk levels increase, follow up actions might include interim risk reduction measures and/or long term structural modifications to reduce risk.

### TASK 8 | FINALIZE DAM SAFETY PROGRAM FRAMEWORK AND DEVELOP IMPLEMENTATION PLAN

Based on the draft program framework prepared under Tasks 5 and 6, and the results of the portfolio dam safety and risk assessment completed under Task 7, HDR will finalize the overall Program Framework Technical Memorandum and will then assist the District in the development of an implementation plan that includes specific actions, timelines, budget guidelines and other information needed/requested by the District as part of the plan.

- Prepare Final Dam Safety Program Framework Technical Memorandum
- Prepare Draft Implementation Plan
- Prepare Final Implementation Plan based on comments from IRWD

Other work efforts anticipated under this task include:

- Support implementing the new Dam Safety Framework including assistance with any policy or cultural changes.
- Support developing and executing additional hazard characterization, engineering evaluations, and field investigation programs;
- Helping set, communicate, and implement priorities to correct the risks identified in Task 7;
- Updating the Portfolio Dam Safety and Risk Assessment as actions are taken;
- Other support as may be identified or requested by the District.

### Summary of Phase 2 Deliverables:

The following is a summary of the deliverables that will be produced under the scope of work outlined above:

Phase 2:

| | |
|---|---|
| Task 2A: | Summary TM on floods and recurrence intervals |
| Task 6: | Framework workshop materials |
| Task 7: | Briefing Documents, and Individual SQRA Reports for each dam |
| | Portfolio Assessment Report (draft and final) |
| Task 8: | Final Dam Safety Framework Document |
| | Draft and Final Implementation Plans |

### Proposed Phase 2 Budget

The estimated fees to complete the tasks outlined above are summarized below. A spreadsheet showing the hours, unit rates, and expenses forming the basis of the estimated costs for each task is provided as Attachment A.

| **Phase 2** | | |
|---|---|---|
| Task 1 | Project Management | $ 17,300 |
| Task 2A | SQRA Level Evaluation of Hydrologic Loading | $ 51,900 |
| Task 6 | Framework/Recommendations Workshop | $ 34,800 |
| Task 7 | Portfolio Dam Safety and Risk Assessment | $ 246,500 |
| Task 8 | Final Framework/Implementation Plan | $ 38,700 |
| | Total Phase 2 | $ 389,200 |

A detailed breakdown of the hours and expenses associated with each task is provided in Attachment A.

### Closure

HDR genuinely appreciates the Districts vision and commitment to developing a model dam safety program. We look forward to continuing our assistance during Phase 2. Please let us know if you have any questions or desire further information. We stand prepared to discuss and update the scope of work and level of effort necessary to meet the need of the District going forward.

Attachment A

**Irvine Ranch Water District**
**Phase 2 of RIDM Dam Safety Program**
**Estimated Level of Effort and Fee**

| NO. | TASK DESCRIPTION | LEVEL OF EFFORT, HOURS | | | | | | | | | | | | | | | FEE, DOLLARS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Quality Reviewer | Project Manager | Sr Program Engineer | Sr. Technical Advisor | Sr. Technical Advisor | Sr. Technical Advisor | Sr. Technical Advisor | Sr. Technical Consultant | Sr. Technical Geologist | Project Eng., Geol. | CAD / BIM Manager | CAD / BIM Technician | Accountant | Project Coordinator | TOTAL LABOR | LABOR | Raw Direct Costs | Travel Per Diem | DIRECT COSTS | TOTAL | TOTAL |
| | Client Billing Rates | $343 | $313 | $343 | $304 | $304 | $304 | $201 | $278 | $268 | $196 | $206 | $155 | $206 | $125 | $250 | | 1.00% | | | | |
| 1 | **Project Management** | | | | | | | | | | | | | | | | | | | | | |
| 1.1 | Project Management Plan | 1 | 8 | 1 | 1 | | | | | | | | | | | 11 | 3,495 | 35 | | 35 | 3,530 | |
| 1.2 | Monthly Progress Report | | 12 | 4 | | | | | | | | | | 5 | | 21 | 6,159 | 62 | | 62 | 6,221 | |
| 1.3 | QA/QC Activities | 3 | | | | | | | | | | | | | | 3 | 1,029 | 10 | | 10 | 1,039 | |
| 1.4 | Meetings/Conference Calls | | 8 | 8 | 4 | | | | | | | | | | | 20 | 6,464 | 65 | | 65 | 6,529 | |
| | **Subtotal 1 \| Project Management** | **4** | **28** | **13** | **5** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **5** | **0** | **55** | **17,147** | **172** | **0** | **172** | **17,319** | **17,300** |
| 2.A | **SQRA Level Evaluation of Hydrologic Loading** | | | | | | | | | | | | | | | | | | | | | |
| | Hydrologic Loading Evaluation (2 dams) | | | | | | 34 | | | | 200 | | 6 | | 8 | 248 | 51,403 | 514 | | 514 | 51,917 | |
| | **Subtotal 2 \| SQRA Level Hydrologic Loadings** | **0** | **0** | **0** | **0** | **0** | **34** | **0** | **0** | **0** | **200** | **0** | **6** | **0** | **8** | **248** | **51,403** | **514** | **0** | **514** | **51,917** | **51,900** |
| 6 | **Presentation / Workshop for Review of Proposed Dam Safety Program Framework** | | | | | | | | | | | | | | | | | | | | | |
| 6.1 | Workshop Materials | | 8 | 8 | 4 | 4 | 4 | | | 6 | | | | | | 34 | 10,502 | 105 | | 105 | 10,607 | |
| 6.2 | Workshop | | 6 | 8 | 6 | 16 | 3 | | | | | | | | | 39 | 12,219 | 122 | 3,000 | 3,122 | 15,341 | |
| 6.3 | Workshop Summary | 2 | 8 | 6 | 4 | 2 | 4 | | | | | | | | 4 | 30 | 8,788 | 88 | | 88 | 8,876 | |
| | **Subtotal 6 \| Presentation / Workshop for Review of Proposed Dam Safety Program Framework** | **2** | **22** | **22** | **14** | **22** | **11** | **0** | **0** | **6** | **0** | **0** | **0** | **0** | **4** | **103** | **31,510** | **315** | **3,000** | **3,315** | **34,825** | **34,800** |
| 7 | **Portfolio Dam Safety and Risk Assessment** | | | | | | | | | | | | | | | | | | | | | |
| 7.1 | Workshop Workplan and Risk Assessment Participants | | | 2 | 6 | | | | | | | | | | | 8 | 2,509 | 25 | | 25 | 2,534 | |
| 7.2 | Data Review Completion and Initial PFM Screening for Each Dam | | 18 | 14 | 6 | | 6 | | | | 32 | | | | | 76 | 20,348 | 203 | | 203 | 20,551 | |
| 7.3 | Updated description for risk driving PFM's | | 8 | 2 | 4 | | 2 | | | | 6 | | | | | 22 | 6,189 | 62 | | 62 | 6,251 | |
| 7.4 | Data Sets/Briefing Document for Risk Assessment Team Members | | 12 | 8 | 4 | | 4 | 8 | | 6 | 60 | 2 | 12 | | | 116 | 26,154 | 262 | | 262 | 26,416 | |
| 7.5 | Initial Training Session | | 2 | 2 | 6 | | 2 | 2 | | | | | | | | 14 | 4,145 | 41 | | 41 | 4,186 | |
| 7.6 | Risk Assessment Workshop | | 36 | 36 | 44 | 8 | 20 | 6 | | | 88 | | | | | 238 | 63,927 | 639 | 3,600 | 4,239 | 68,166 | |
| 7.7 | Draft and Final SQRA Reports for Each Dam | | 28 | 8 | 24 | 8 | 8 | 8 | | | 156 | 2 | 24 | | 24 | 290 | 62,922 | 629 | | 629 | 63,551 | |
| 7.8 | Portfolio Assessment and Initial Recommendations | | 4 | 8 | 16 | 4 | | | | | 24 | | | | | 56 | 14,770 | 148 | | 148 | 14,918 | |
| 7.9 | Results Presentation | | 8 | 12 | 5 | | | | | | 8 | 2 | 8 | | 6 | 49 | 12,104 | 121 | | 121 | 12,225 | |
| 7.10 | Draft Portfolio Assessment Report | 3 | 6 | 12 | 32 | | 6 | | | | 32 | | | | | 91 | 24,833 | 248 | | 248 | 25,081 | |
| 7.11 | Finalize Portfolio Assessment Report | | 1 | 3 | 4 | | | | | | | | | | | 8 | 2,557 | 26 | | 26 | 2,583 | |
| | **Subtotal 7 \| Portfolio Dam Safety and Risk Assessment** | **3** | **123** | **107** | **151** | **20** | **48** | **24** | **0** | **6** | **406** | **6** | **44** | **0** | **30** | **968** | **240,458** | **2,404** | **3,600** | **6,004** | **246,462** | **246,500** |
| 8 | **Final Framework/Implementation Plan** | | | | | | | | | | | | | | | | | | | | | |
| 8.1 | Final Framework Document | | 2 | 12 | 6 | 20 | 4 | | 4 | | 12 | | | | 18 | 78 | 19,569 | 196 | | 196 | 19,765 | |
| 8.2 | Implementation Plan - Draft | 2 | 2 | 8 | 4 | 6 | 4 | | | | | | | | 8 | 34 | 9,311 | 93 | | 93 | 9,404 | |
| 8.3 | IP - Final | 2 | 2 | 4 | 2 | 2 | 2 | | | | | | | | 4 | 18 | 5,008 | 50 | | 50 | 5,058 | |
| 8.4 | Allowance for other Services | | 4 | 4 | 4 | | 2 | | | | | | | | | 14 | 4,448 | 44 | | 44 | 4,492 | |
| | **Subtotal 8 \| Final Framework/Implementation Plan** | **4** | **10** | **28** | **16** | **28** | **12** | **0** | **4** | **0** | **12** | **0** | **0** | **0** | **30** | **144** | **38,335** | **383** | **0** | **383** | **38,718** | **38,700** |
| | **TOTAL, hours** | **13** | **183** | **170** | **186** | **70** | **105** | **24** | **4** | **12** | **618** | **6** | **50** | **5** | **72** | **1,518** | | | | | | |
| | **TOTAL, dollars** | | | | | | | | | | | | | | | | **378,854** | **3,788** | **6,600** | **10,388** | **389,242** | **389,200** |

# IRWD's Dam Safety Program

Engineering and Operations Committee
November 17, 2020

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## Presentation Outline

- Background
- Risk-Informed Decision Making
- Enhancements to Dam Safety Program
- Next steps



2

## Background

- IRWD owns and operates five dams
  - DSOD Hazard Potential Classification – Extremely High


Santiago Creek


Rattlesnake


Syphon


San Joaquin


Sand Canyon

Enhance IRWD's Dam Safety Program utilizing IRWD's guiding principles for dam safety.





## IRWD's Guiding Principles for Dam Safety

- Prioritize public safety and earn the public's trust by developing and implementing a state-of-the-art dam safety program
- Enhance the clarity and transparency of IRWD's dam safety program with IRWD's customers and the community
- Establish "Risk Informed Decision Making" strategies for dam and reservoir management consistent with industry best practices that maximize safety and water supply reliability
- Ensure that the District's dams maintain the highest condition rating issued by DSOD
- Ensure ongoing dam safety through dam and reservoir facility monitoring, inspection, maintenance

## Enhancing IRWD's Dam Safety Program

- HDR retained to develop initial draft framework for enhancing IRWD's dam safety program
- HDR is a leading consultant in the dam industry with vast Risk-Informed Decision Making (RIDM) experience

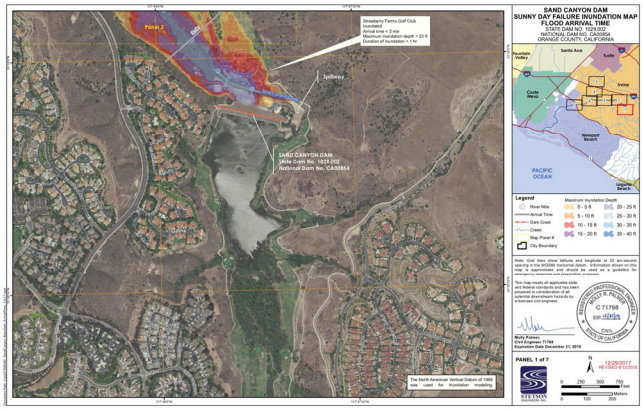
Approach to Enhancing Program:

- *Phase 1*: Collect and review relevant dam information, consider dam performance, and develop draft framework for enhanced dam safety program
- *Phase 2*: Perform risk analysis, develop implementation plan, and finalize framework for dam safety program



## Background – Current Dam Safety Measures

- Emergency Action Plans
- Surveillance and Monitoring
  - Survey Monuments
  - Piezometers
  - Subdrains
  - Visual inspections
- OP 10 – Dam/Reservoir Emergency



## General Approaches to Dam Safety Assessment

- Standards Based Approach (SBA):
  - Long-standing traditional approach
- Risk-Informed Decision Making (RIDM):
  - Process of making safety decisions by evaluating if existing risks are tolerable and present risk reduction measures are adequate
- Opportunity to enhance IRWD's existing dam safety program by including RIDM



## Risk Informed Decision Making

- FEMA issued 1st Federal Guidelines for Dam Safety in 1979
- Bureau of Reclamation is the first agency to implement RIDM in 1997
- Department of Water Resources (DWR) – Division of Safety of Dams (DSOD) will start integrating RIDM into its dam safety program

US Army Corps of Engineers®

U.S. Department of the Interior Bureau of Reclamation

FEMA

Federal Energy Regulatory Commission

## What is RIDM?

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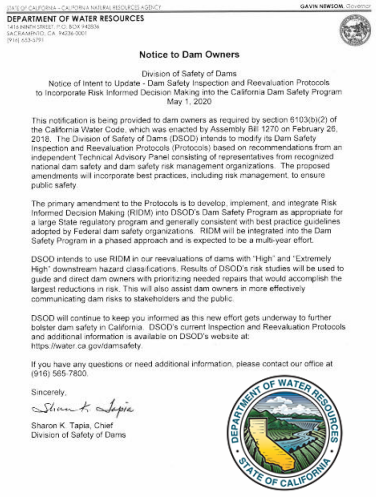
## DSOD Implementation of RIDM

- In May 2020, DSOD announced transition to RIDM
  - Based upon “best practices” at the federal level
  - DSOD plans on performing a comprehensive re-evaluation and identification of deficiencies for each dam
  - DSOD has 650 high and extremely high hazard dams within the state
  - Develop initial screening indicators to prioritize the re-evaluation
- Opportunity to shape DSOD’s Dam Safety Program and ensure IRWD’s program aligns with DSOD



DEPARTMENT OF WATER RESOURCES

GAVIN NEWSOM, Governor

**Notice to Dam Owners**

Division of Safety of Dams
Notice of Intent to Update - Dam Safety Inspection and Reevaluation Protocols to Incorporate Risk Informed Decision Making into the California Dam Safety Program
May 1, 2020

This notification is being provided to dam owners as required by section 8103(b)(2) of the California Water Code, which was enacted by Assembly Bill 1270 on February 26, 2018. The Division of Safety of Dams (DSOD) intends to modify its Dam Safety Inspection and Reevaluation Protocols (Protocols) based on recommendations from an independent Technical Advisory Panel consisting of representatives from recognized national dam safety and dam safety risk management organizations. The proposed amendments will incorporate best practices, including risk management, to ensure public safety.

The primary amendment to the Protocols is to develop, implement, and integrate Risk Informed Decision Making (RIDM) into DSOD's Dam Safety Program as appropriate for a large State regulatory program and generally consistent with best practice guidelines adopted by Federal dam safety organizations. RIDM will be integrated into the Dam Safety Program in a phased approach and is expected to be a multi-year effort.

DSOD intends to use RIDM in our reevaluations of dams with "High" and "Extremely High" downstream hazard classifications. Results of DSOD's risk studies will be used to guide and direct dam owners with prioritizing needed repairs that would accomplish the largest reductions in risk. This will also assist dam owners in more effectively communicating dam risks to stakeholders and the public.

DSOD will continue to keep you informed as this new effort gets underway to further bolster dam safety in California. DSOD's current Inspection and Reevaluation Protocols and additional information is available on DSOD's website at: https://water.ca.gov/damsafety.

If you have any questions or need additional information, please contact our office at (916) 565-7800.

Sincerely,

Sharon K. Tapia, Chief
Division of Safety of Dams



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## Enhancing IRWD's Dam Safety Program – Phase 1

- Reviewed and summarized existing data and documents for each dam
- Developed list of potential failure modes (PFMs)
- Identified potential earthquake and flood hazards
- Identified downstream consequences
- Developed overall framework for the program




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## IRWD's Dam Safety Program - Framework

- Dam inventory, dam record keeping, inspections, dam surveillance/monitoring, dam safety/risk analyses, risk/safety evaluation, and dam design/construction
- Periodic Updates to Risk Assessment
  - Every 5-10 years
- Develop written policies and procedures
- Develop and maintain 5-year strategic plans, annual reports and work plans



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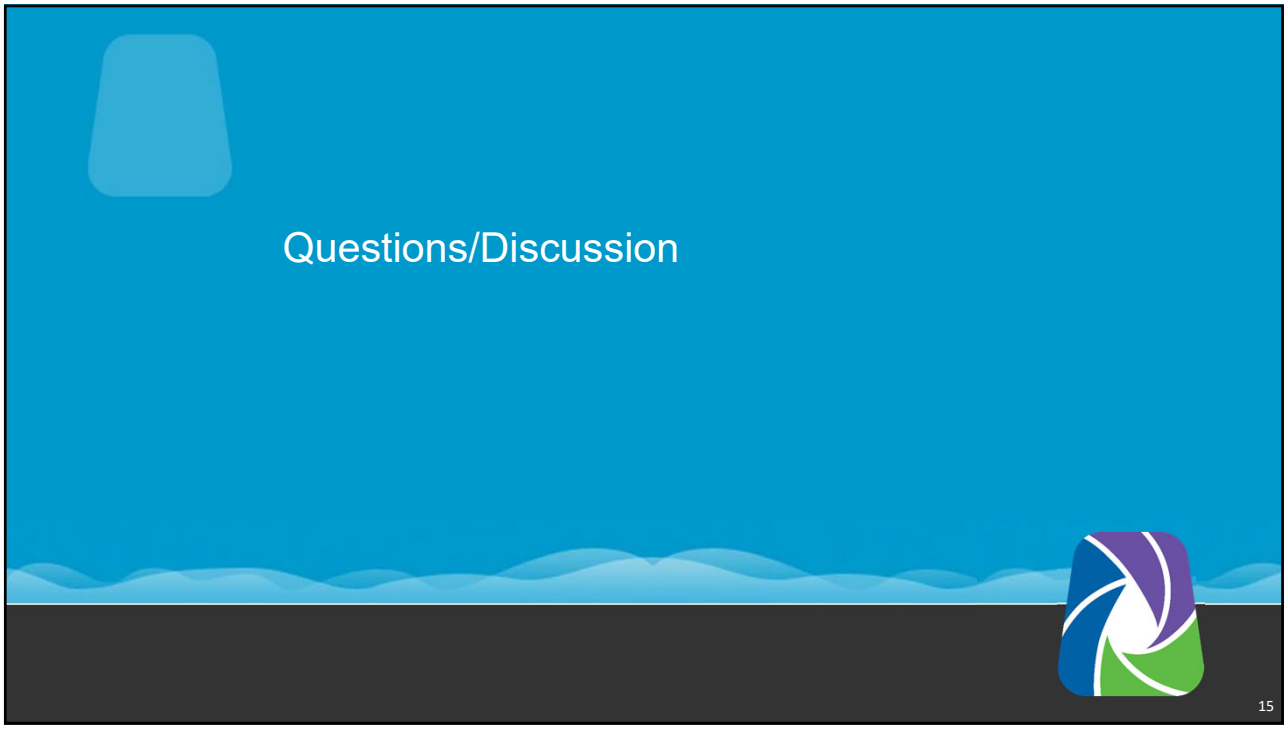
## Next Steps

- Discuss IRWD's RIDM-based Dam Safety Program with DSOD
- Proceed with Phase 2 work
  - Perform risk analysis
  - Develop implementation plan
  - Complete Dam Safety Program framework



## Recommendation

- Staff recommends that the Board authorize the General Manager to execute a Professional Services Agreement in the amount of $389,200 with HDR for the second phase of the Dam Safety Program

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