

FINAL

**Long Range Financial Plan  
Update 2021**

Honolulu Board of Water  
Supply

February 2021



This page intentionally left blank.

# Table of Contents

---

<b>Table of Contents .....</b>	<b>i</b>
<b>Table of Figures .....</b>	<b>ii</b>
<b>Table of Tables .....</b>	<b>iii</b>
<b>Abbreviations and Acronyms.....</b>	<b>iv</b>
<b>Section 1 Impetus for Update .....</b>	<b>1-1</b>
<b>Section 2 Review Current Status vs Long Range Financial Plan .....</b>	<b>2-1</b>
2.1 Comparison of Actuals vs Plan.....	2-1
2.2 Revised Baseline .....	2-4
2.2.1 Operations & Maintenance .....	2-4
2.2.2 Capital Improvement 6-Year Plan .....	2-5
2.2.3 Revised Baseline Cashflow Forecast.....	2-6
<b>Section 3 Trends and Sensitivity Analysis Update .....</b>	<b>3-1</b>
3.1 Update of Scenarios based on Revised Baseline.....	3-1
3.1.1 Aggressive Conservation .....	3-2
3.1.2 Aggressive Growth .....	3-4
3.1.3 Climate Change.....	3-7
3.2 Pandemic Scenario.....	3-9
3.2.1 Water Demands and Sales.....	3-9
3.2.2 Delinquencies .....	3-15
3.2.3 Uncollectable Revenue.....	3-19
3.2.4 Expense Impacts.....	3-23
3.3 Concurrent Pandemic and Hurricane Scenario .....	3-23
<b>Section 4 Conclusions .....</b>	<b>4-1</b>

# Figures

Figure 2-1. Annual Operations and Maintenance Expense Comparison, near-term..... 2-2

Figure 2-2. Annual Operations and Maintenance Expense Comparison, Coincident Years..... 2-6

Figure 2-3. Capital Encumbered Projection Comparison, Coincident Years ..... 2-7

Figure 2-4. Capital Encumbered and Sources of Funding..... 2-8

Figure 2-5. Revised Baseline Operating Fund Balance ..... 2-9

Figure 3-1. Long-Term Revenue and Revenue Requirements Trends Under Approved Rates..... 3-1

Figure 3-2. Additional Revenue Needs Trend as a Percent of Existing Rate Based Revenue..... 3-2

Figure 3-3. Revenue Impact due to Aggressive Conservation ..... 3-3

Figure 3-4. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue,  
Aggressive Conservation..... 3-4

Figure 3-5. Revenue Impact due to Water Master Plan High Range Demand Growth..... 3-5

Figure 3-6. Revenue Impact due to Water Master Plan High Demand and Aggressive Growth ..... 3-5

Figure 3-7. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue, Water  
Master Plan High Demand Case ..... 3-6

Figure 3-8. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue,  
Aggressive Growth..... 3-7

Figure 3-9. Revenue Requirements Impact due to Climate Change and Aggressive Conservation.... 3-8

Figure 3-10. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue, Climate  
Change + Aggressive Conservation..... 3-9

Figure 3-11. Total Island Potable Water Production since March 1, 2020 ..... 3-10

Figure 3-12. Rainfall Index for the Honolulu Watershed Area..... 3-11

Figure 3-13. Single-Family Residential Monthly Demand ..... 3-12

Figure 3-14. Single-Family Residential Monthly Demand vs 5-Year Average ..... 3-13

Figure 3-15. Multi-Unit Residential Monthly Demand vs 5-year Average..... 3-13

Figure 3-16. Non-Residential Monthly Demand vs 5-Year Average..... 3-14

Figure 3-17. Water Sales by Customer Class since January 2016 ..... 3-15

Figure 3-18. Percentage of Water Accounts 30 days Past Due, 2017 to Present..... 3-16

Figure 3-19. Monthly Residential Water Customer Delinquency, 2017 to 2020, Accounts..... 3-17

Figure 3-20. Monthly Residential Water Customer Delinquency, 2017 to 2020, \$ ..... 3-17

Figure 3-21. Monthly Commercial Water Customer Delinquency, 2017 to 2020, Accounts..... 3-18

Figure 3-22. Monthly Commercial Water Customer Delinquency, 2017 to 2020, \$ ..... 3-19

Figure 3-23. Residential Delinquency Scenarios ..... 3-20

Figure 3-24. Commercial Delinquency Scenarios ..... 3-21

Figure 3-25. Revenue Requirements Impact due to Pandemic..... 3-22

Figure 3-26. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue,  
Pandemic ..... 3-23

## Tables

Table 1-1. Scenarios.....	1-1
Table 2-1. Operations and Maintenance Comparison.....	2-1
Table 2-2. Capital Improvement Comparison - Historical and Budget Year .....	2-2
Table 2-3. Capital Improvement Comparison - 6-Year Forecast (10/1/2020).....	2-3
Table 2-4. Capital Improvement Historical Cash Comparison .....	2-3
Table 2-5. Comparison of Forecast and Actual Billed Water, mg.....	2-4
Table 2-6. Comparison of Forecast and Actual Rate-Based Revenue, \$M .....	2-4
Table 2-7. Operations and Maintenance Forecast through FY 2027, \$M.....	2-5
Table 2-8. Revised 6-Year Capital Budget, 11/25/2020.....	2-5
Table 2-9. Historical Encumbrances.....	2-5
Table 2-10. Projected Capital to be Funded, FY 2021 - FY 2031, \$M.....	2-7
Table 2-11. Projected Capital Sources and Uses of Funds, \$M .....	2-8
Table 2-12. Revised Cashflow, FY 2021-FY 2031.....	2-10

## Appendices

Appendix A Delinquency Recovery Model

This page intentionally left blank.

# Abbreviations and Acronyms

---

Board	BWS Board of Directors
BWS	Board of Water Supply
City	City and County of Honolulu
COVID-19	Novel coronavirus
DSCR	Debt Service Coverage Ratio
FY	Fiscal Year
M	Million
LRFP	Long Range Financial Plan
mg	Million gallons
mgd	million gallons per day
SRF	State Revolving Fund
WHO	World Health Organization
WMP	Water Master Plan
WSFC	Water System Facilities Charges

This page intentionally left blank.



# Section 1

## Impetus for Update

The City and County of Honolulu Board of Water Supply (BWS) for the City and County of Honolulu (City) provides an average of 145 million gallons per day (mgd) of potable water and 10 mgd of non-potable water to nearly one million people on O’ahu. The BWS has about 170,000 potable water service customer accounts. The municipal potable water system provides dependable service through a complex system of 2,100 miles of pipe, 386 source and booster pumps, 212 water sources (wells, tunnels, and shafts), and 172 water storage reservoirs. The BWS provides non-potable water for irrigation and industrial uses through a water recycling facility and several separate brackish sources. Groundwater is the only source for the BWS potable water supply, coming from naturally filtered aquifers that can withstand periods of drought. The BWS water system delivers high quality water at quantities to provide for the health and safety of the community and has built-in redundancies and resiliency; but, as is typical with water systems of this size, some of the infrastructure is aging and needs attention. In October of 2016, the Board of Directors (Board) adopted the Water Master Plan, giving the BWS a roadmap to meet future needs, establish priorities, and adopt sustainable financing strategies. In March 2018, the Board adopted the Long Range Financial Plan as the policy document that establishes financing strategies, helping the BWS to effectively implement its Water Master Plan. In August 2018, the Board adopted revisions to its Schedule of Water Rates and Charges for the Furnishing of Water and Water Service for fiscal years (FY) 2019 through 2023 to support the implementation of the Long Range Financial Plan and Water Master Plan.

In addition to identifying the revenue requirement for an initial 10-year period (FY 2019 through FY 2028), the Long Range Financial Plan considered longer-term financial trends for a 30-year planning horizon. As part of this evaluation, the plan evaluated the potential impacts of uncertainties in water demands, water quality, economic factors, regulatory requirements, and climate change by considering six different scenarios, as shown in Table 1-1.

**Table 1-1. Scenarios**

Scenario	Uncertainties Considered
Aggressive conservation	Water demands
Aggressive growth	Water demands, water quality
Major natural disaster	Water demands, water quality, economic factors
Major source water contamination	Regulatory requirements, water quality
Climate change	Climate change, water demands, water quality, economic factors
Economic cycle	Economic factors

On March 11, 2020, the World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak a global pandemic. Recognizing that a global pandemic was not among the six scenarios previously evaluated, the BWS decided to proactively review their financial position and planned operations and maintenance and capital expenditures given the resulting economic impacts. In particular, like other water and wastewater utilities, the BWS was concerned about impacts to water demands, delinquency rates, and unrecoverable revenues and if adjustments to budgeted expenditures would need to be made in case of reduced revenues. The BWS also wanted to update the long range model based on its financial position at the end of FY 2020 and in light of potential impacts from the pandemic.

## Section 2

# Review Current Status vs Long Range Financial Plan

## 2.1 Comparison of Actuals vs Plan

The update started with comparing actual operations and maintenance and capital expenditures versus those forecasted in the Long Range Financial Plan that was adopted in 2018. This comparison was used to determine if any course-correction was needed before addressing any pandemic-related issues.

Table 2-1 compares adopted budgets, actual historical operations and maintenance expenditures, and the modeled operations and maintenance expenditures in the Long Range Financial Plan through fiscal year (FY) 2021. As is common among its peer agencies, the BWS typically does not expend its full budgeted amount of operations and maintenance. However, over the period FY 2018 through FY 2020, the BWS increasingly spent larger amounts than projected in the Long Range Financial Plan. These additional expenditures contributed to reductions in the days cash on hand (working capital), which lowered from 257 days in FY 2018 to 111 days in FY 2020. While this FY 2020 value is within the stated financial policies of maintaining 60 to 180 days of working capital, continuing this trend could bring the BWS close to or below the minimum of 60 days working capital as stated in its Board-adopted financial policies.

**Table 2-1. Operations and Maintenance Comparison**

	FY 2018	FY 2019	FY 2020	FY 2021
Adopted Budget	\$159,820,692	\$164,633,099	\$182,008,638	\$183,634,937 (1)
Actual Expenditures	\$139,706,497	\$147,091,259	\$164,751,000	NA (3)
Long Range Model	\$136,853,600	\$138,374,800	\$142,913,300	\$148,362,000
Difference (2)	\$2,852,897	\$8,716,459	\$21,837,700	

(1) Initially adopted budget as of May 26, 2020.

(2) Actual less Long Range model.

(3) Since FY 2021 is not complete, actual expenditures are not available.

Figure 2-1 shows the adopted annual budgets, actual expenditures, the 10-year budget developed as part of the Long Range Financial Planning process, and the modeled operations and maintenance expense from FY 2013 through FY 2027. From FY 2013 through FY 2017, actual operations and maintenance expenditures averaged 78 percent of adopted budgets. Prior to considering updates to its water rates, in 2018, the BWS implemented procedures to tighten this gap through a more rigorous budgeting process. This was reflected in the Long Range model, which presumed 85 percent of budget would be spent. Actual expenditures in FY 2018 and FY 2019 were 88 percent of budget. In the short-term, the modeled gap may have been reasonable, but over the long-term it appears to be too big and suggests the need for a revised baseline. Additionally, by FY 2020 and FY 2021, adopted budgets started deviating from the initial 10-year budget considered in the Long Range Financial Plan. The drivers for the FY 2020 operations and maintenance budget increases occurred in each major category except salary-related. Almost \$9 million was due to materials, supplies and expenses for items such as replacing

the reverse osmosis line for the recycled water system, an advanced treatment study, and the risk resiliency assessment required by the federal America’s Water Infrastructure Act of 2018. Fixed charges related to the employee retirement system and electricity added \$4 million to the budget. Therefore, a new baseline for operations and maintenance costs was developed reflecting 1) the tighter gap between budget and actual and 2) that the BWS downward revised its adopted FY 2021 operating budget to be closer to the original 10-year budget.

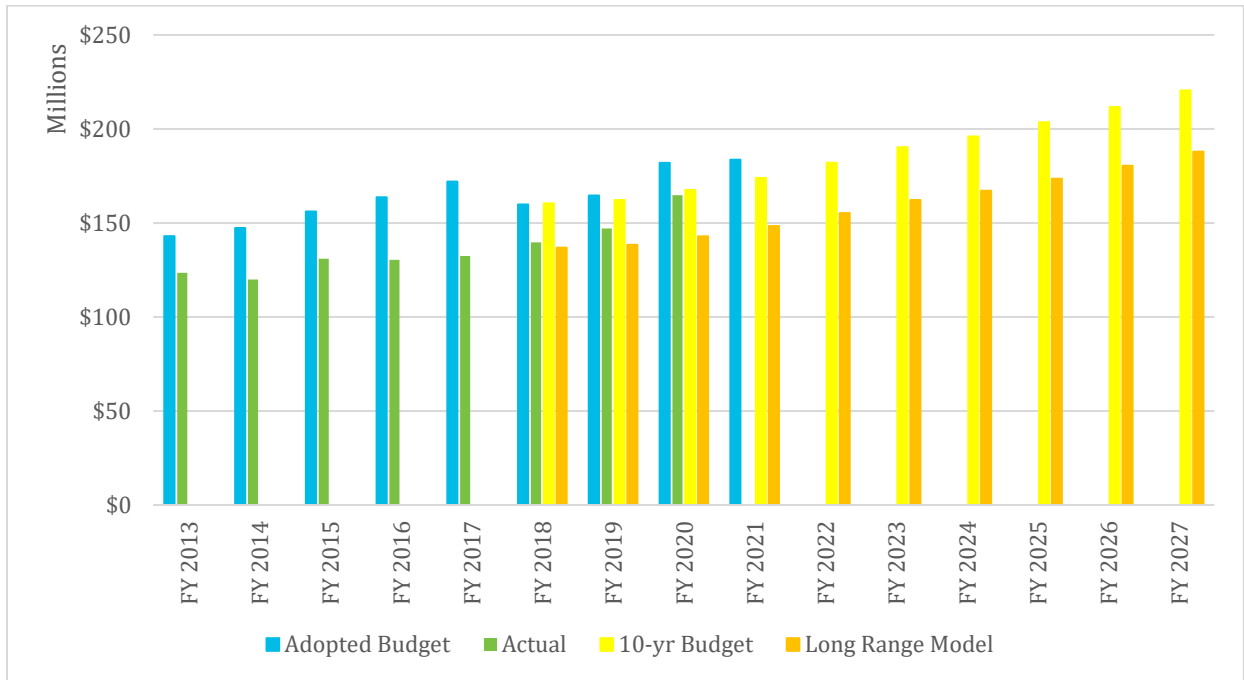


Figure 2-1. Annual Operations and Maintenance Expense Comparison, near-term

The other key expenditure category is capital improvements. Table 2-2 compares the adopted capital improvement budgets, the actual amounts encumbered, and the modeled encumbrances for FY 2018 through FY 2021. In two of the three years of historical data shown, the Long Range model was more conservative than actual, forecasting an additional \$15.8 million in encumbrances than was realized over the period. Modeling is typically conservative in this manner to reduce the risk of revenues not being sufficient to cover revenue requirements. Additionally, this amount is overshadowed by the potential overage in FY 2021. The FY 2021 budget includes \$21.3 million for the Kalawahine 180 Reservoir project.

Table 2-2. Capital Improvement Comparison – Historical and Budget Year

	FY 2018	FY 2019	FY 2020	FY 2021
Adopted Capital Budget	\$144,340,200	\$138,461,000	\$166,305,000	\$200,937,500 (1)
Encumbered Capital	\$121,674,415	\$108,604,775	\$135,772,180	NA
Long Range Model	\$118,358,800	\$119,965,600	\$143,553,500	\$129,731,700
Difference (2)	\$3,315,615	-\$11,360,825	-\$7,781,320	NA

(1) Capital budget as of July 2020.

(2) Encumbered less Long Range model.

Based on this initial review, the BWS revised the 6-Year capital improvement plan in October, which is shown in Table 2-3. Over the timeframe shown, the full capital planning is within \$5 million of the Water Master Plan. However, when compared to the amounts presumed to be encumbered based on the historical encumbrance rate of 82 percent (calculated over FY 2006 – FY 2016), the capital projection is \$95.5 million more than projected in the Long Range model. Note that the plan value for FY 2021 is lower than in the approved Budget Amendment No. 1 from September 28, 2020 of \$201.6 million.

**Table 2-3. Capital Improvement Comparison –6-Year Forecast (10/1/2020)**

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
6-Year (10/1/2020), 2020\$(1)	\$197,738,000	\$154,691,000	\$188,648,000	\$202,367,000	\$176,460,000	\$221,567,000
6-Year (10/1/2020), inflated	\$203,670,140	\$164,111,682	\$206,140,763	\$227,765,841	\$204,565,503	\$264,562,585
WMP, inflated	\$158,209,400	\$211,947,400	\$190,247,100	\$230,290,100	\$250,094,600	\$234,764,800
6-Year less WMP	\$45,460,740	-\$47,835,718	\$15,893,663	-\$2,524,259	-\$45,529,097	\$29,797,785
Long Range Model	\$129,731,700	\$173,796,900	\$156,002,600	\$188,837,900	\$205,077,600	\$192,507,100
Difference (2)	\$68,006,300	-\$19,105,900	\$32,645,400	\$13,529,100	-\$28,617,600	\$29,059,900

(1) 6-Year capital budget October 1, 2020

(2) Capital projection less Long Range model

Based on these comparisons, a further revision and re-baselining of capital expenditures was also deemed appropriate.

Table 2-4 compares the dollar amount of capital projects that were anticipated to be funded with cash in the Long Range Financial Plan to the actual amount of cash spent on capital projects in FY 2018 – FY 2020. The model had forecast more use of cash than actually occurred because the BWS took advantage of favorable interest terms to use bonds to finance part of the capital program and the encumbered CIP over these three years was lower than forecast in the model (Table 2-2).

**Table 2-4. Capital Improvement Historical Cash Comparison**

	FY 2018	FY 2019	FY 2020
Actual Capital Cash Expenditures	\$44,672,987	\$70,795,088	\$86,060,702
Long Range Model	\$106,126,000	\$105,731,100	\$138,553,500
Difference (1)	-\$61,453,013	-\$34,936,012	-\$52,492,798

(1) Actual less Long Range model.

A check of billed water volume and rate-based revenue between the Long Range model and historical was also performed. That comparison is presented in Table 2-5 and Table 2-6, respectively. Forecasted water volumes are within 2 percent of actual billed volumes. Forecasted revenues are within 3 percent. Both of these percentages represent normal variability, especially given that changes in the BWS's water sales are strongly influenced by changes in weather. The lower revenue, without a corresponding reduction in expenses, also contributed to lowering the days cash on hand.

**Table 2-5. Comparison of Forecast and Actual Billed Water, mg**

	FY 2018	FY 2019	FY 2020
Actual	130.1	130.2	126.7
Actual Adjusted	128.3	128.0	124.4
Long Range Model	130.5	130.0	129.5
Difference (1)	-0.4	0.2	-2.8

(1) Actual less Long Range model.

**Table 2-6. Comparison of Forecast and Actual Rate-Based Revenue, \$M**

	FY 2018	FY 2019	FY 2020
Actual (1)	\$229.5	\$226.3	\$228.5
Long Range Model	\$232.7	\$231.9	\$235.7
Difference (2)	-\$3.2	-\$5.6	-\$7.2

(1) Financial Statements and Supplementary Information with Independent Auditor's Report Fiscal Years Ended June 30, 2019 and 2018. Financial Statements and Supplementary Information with Independent Auditor's Report Fiscal Years Ended June 30, 2020 and 2019.

(2) Actual less Long Range model.

## 2.2 Revised Baseline

The major revisions to the baseline were to the operations and maintenance assumptions and to the capital improvement assumptions. The discussion starts with operations and maintenance as it represents a larger portion of the BWS' annual cash expenditures and has less flexibility in shifting costs. In contrast, the capital improvement program can adjust financing strategies and defer some projects to help stay within budget and meet financial policies, if needed.

### 2.2.1 Operations & Maintenance

Two major assumptions had to be re-evaluated regarding the operations and maintenance expenditures: 1) dollar amounts for the current fiscal year plus 6 years and 2) whether to use budgeted values scaled to estimated expenditures based on historical actual vs budget expenditures or to directly forecast actual expenditures. Based on discussions with the BWS staff, the model continues to use budgeted values, which were updated on October 23, 2020. However, the percent of budget expended was increased to 92 percent based on the near-term expenditure rate of 88 percent. This higher rate applies a more conservative forecast for operations and maintenance expenses and recognizes that the latest revised budget represents even further reductions from what the BWS initially planned. Annual percentage increases for FY 2022 – FY 2027 range from 1.2 percent to 2.7 percent. After FY 2027, the modeled expenditures escalate at 3.5 percent per year, consistent with the long-term annual average escalation used in the Long Range Financial Plan. Table 2-7 shows a BWS operations and maintenance forecast as of October 23, 2020 and the revised baseline for modeled expenditures based on 92 percent of budget.

**Table 2-7. Operations and Maintenance Forecast through FY 2027, \$M**

Fiscal Year	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027
Personnel Services	\$51.1	\$52.8	\$53.4	\$53.9	\$54.4	\$55.5	\$56.6
Materials & Supplies	\$72.1	\$72.8	\$73.5	\$74.3	\$75.8	\$78.0	\$80.8
Equipment	\$6.6	\$6.6	\$6.7	\$6.8	\$6.9	\$7.1	\$7.4
Fixed Costs	\$53.9	\$54.4	\$55.3	\$56.2	\$57.2	\$58.4	\$59.6
Total	\$183.6	\$186.7	\$188.9	\$191.2	\$194.3	\$199.1	\$204.4
Annual Increase		1.7%	1.2%	1.2%	1.6%	2.4%	2.7%
Revised Baseline	\$168.9	\$171.8	\$173.8	\$175.9	\$178.8	\$183.1	\$188.1

## 2.2.2 Capital Improvement 6-Year Plan

The BWS has considered revisions to its 6-Year capital improvement budget, as provided on November 25, 2020. Table 2-8 shows this version and the inflated values used in the modeling of budgeted capital. The inflation assumption of 3 percent per year remains unchanged from the Long Range Financial Plan.

**Table 2-8. Revised 6-Year Capital Budget, 11/25/2020**

	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026
6-Year Capital, 2020\$ (1)	\$197,738,000	\$167,841,000	\$168,194,000	\$193,002,000	\$189,000,000	\$195,126,000
6-Year Capital, Inflated	\$203,670,100	\$178,062,500	\$183,790,100	\$217,225,500	\$219,102,800	\$232,990,600

(1) November 25, 2020

In reviewing historical encumbrances against the capital budgets and against the capital budgets without adjustments for construction cost index and contract adjustment account, it was observed that the total encumbered amount over the period is close to the budget without adjustments. Additionally, the encumbrance rate versus the budget including adjustments has increased from the average 82 percent used in the Long Range Financial Plan, which looked at data from FY 2006 to FY 2016. The more recent data indicate that a higher encumbrance rate may be warranted in the near-term modeling.

**Table 2-9. Historical Encumbrances**

Fiscal Year	Budgeted	Budgeted w/o Adjustments	Encumbered	% Encumbered vs Budget	% Encumbered vs Budget w/o Adjustments
2014	\$87,578,800	\$74,312,000	\$82,683,020	94.4%	111.3%
2015	\$75,511,300	\$68,100,500	\$69,307,781	91.8%	101.8%
2016	\$118,667,500	\$104,680,000	\$112,888,438	95.1%	107.8%
2017	\$80,790,500	\$67,435,000	\$75,670,740	93.7%	112.2%
2018	\$144,340,200	\$112,768,000	\$121,674,415	84.3%	107.9%
2019	\$138,461,000	\$119,855,000	\$108,604,775	78.4%	90.6%
2020	\$166,305,000	\$143,950,000	\$135,772,180	81.6%	94.3%
Total	\$811,654,300	\$691,100,500	\$706,601,349	87.1%	102.2%

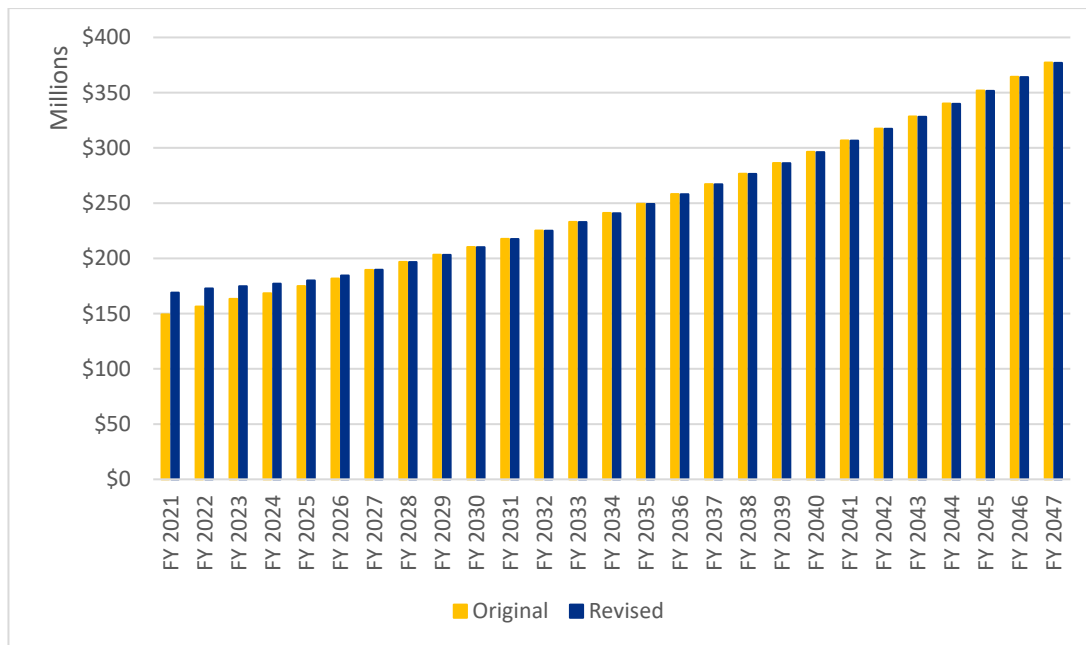
(1) November 25, 2020

FY 2027 through FY 2047 uses the projected capital from the original Long Range Financial Plan modeling. FY 2048 – FY 2050 is based on an average of the three prior years.

### 2.2.3 Revised Baseline Cashflow Forecast

Based on the revisions to the baseline operations and maintenance and capital improvement budgets described in Sections 2.2.1 and 2.2.2, respectively, a revised baseline cashflow was developed. In addition to the revised operations and maintenance and 6-Year capital budgets, the revised baseline keeps the revenue adjustments the same as the Long Range Financial Plan through FY 2031, maintains the debt service coverage ratio above 1.6, and maintains the days of working capital above 60. This is done by adjusting the amount of 6-Year capital budget to be encumbered and adjusting the mix of debt and cash used each year to see how much capital the BWS can afford to encumber each year. Debt options for financing the capital budget include revenue bonds and State Revolving Fund low cost loans.

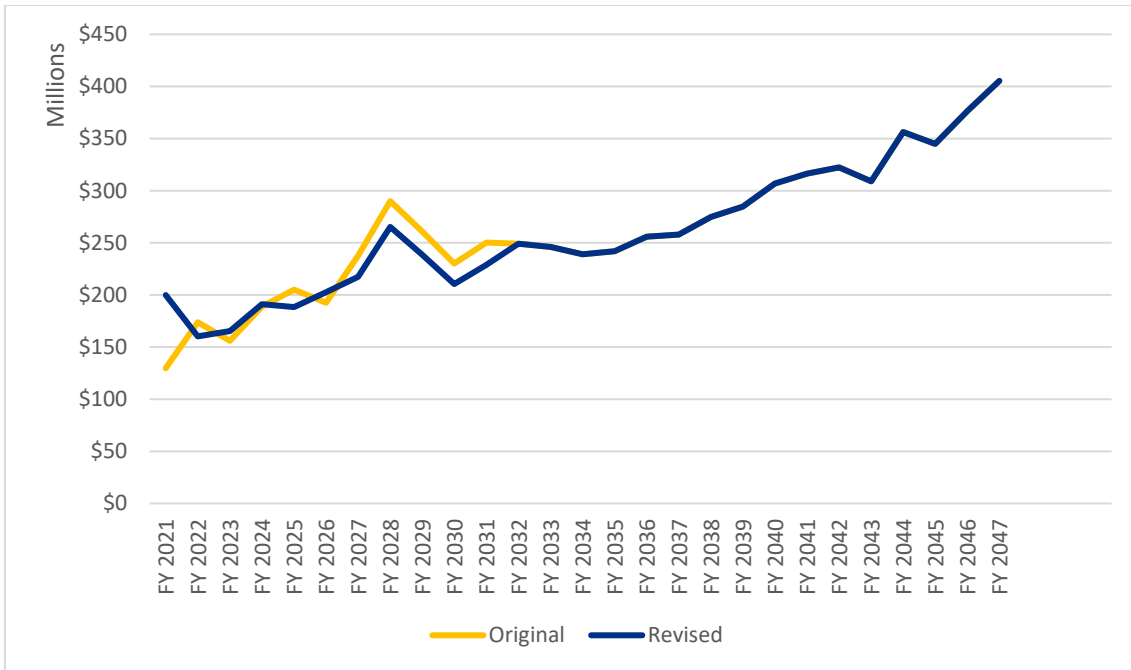
Figure 2-2 compares the operations and maintenance expense from the original Long Range Financial Plan with the revised expense used in this update. Between FY 2021-FY 2031, expenses in the revised baseline are forecast to be \$63.5 million higher, reflecting the narrowing of the gap between budget and actual expenditures. In the long-term, the two forecasts converge, reflecting an anticipated long-term trend of aligning the budgeting process with the Long Range Financial Plan.



**Figure 2-2. Annual Operations and Maintenance Expense Comparison, Coincident Years**

Figure 2-3 compares the forecasted capital to be funded from the original plan with the revised baseline. To keep the revenue adjustments the same through FY 2031, the amount of capital encumbered is projected to be slightly lower between FY 2026 and FY 2031. From FY 2032 through FY 2047, the capital encumbered remains the same.





**Figure 2-3. Capital Encumbered Projection Comparison, Coincident Years**

Table 2-10 shows the annual projected capital encumbrances for FY 2021 through FY 2031 for the original Long Range model and the revised baseline. The new forecast anticipates \$46 million (or 2 percent) less capital encumbrances over these coincident years.

**Table 2-10. Projected Capital to be Funded, FY 2021 – FY 2031, \$M**

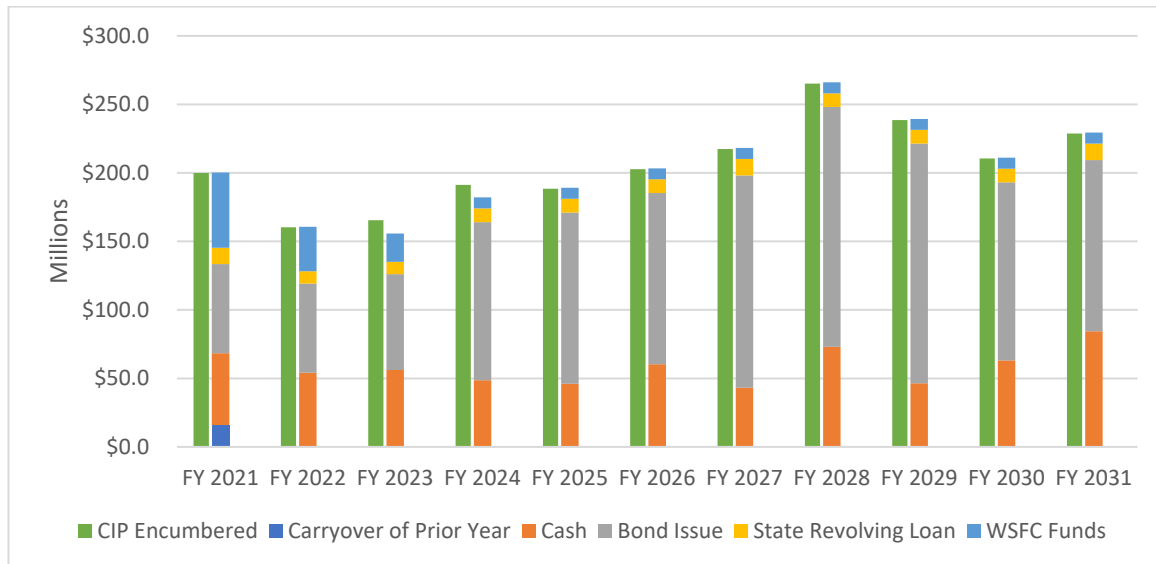
Fiscal Year	Original	Revised
2021	\$129,731,700	\$199,902,200
2022	\$173,796,900	\$160,256,300
2023	\$156,002,600	\$165,411,100
2024	\$188,837,900	\$191,158,400
2025	\$205,077,600	\$188,428,400
2026	\$192,507,100	\$202,701,800
2027	\$237,684,900	\$217,394,900
2028	\$289,942,300	\$265,191,400
2029	\$260,792,800	\$238,530,200
2030	\$230,121,700	\$210,477,200
2031	\$250,179,100	\$228,822,400
Total	\$2,314,674,600	\$2,268,274,300

The BWS has several mechanisms for funding the capital program including cash, bonds, State Revolving Fund loans, and water system facilities charges (WSFC) funds. Table 2-11 shows the projected sources and uses of funds for capital projects through FY 2031. WSFC funds are conservatively based on historical annual average funds received as new charges have not yet been adopted. If new charges are adopted and the pace of development stays similar to historical, then additional funds would be available to fund deferred growth projects.

**Table 2-11. Projected Capital Sources and Uses of Funds, \$M**

Item	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
Carryover of Prior Year	\$16	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
<b>Sources</b>											
Cash	\$52.4	\$54.2	\$56.1	\$48.7	\$46.1	\$60.3	\$43.2	\$73.1	\$46.4	\$63.1	\$84.4
Bond Issue	\$65.0	\$65.0	\$70.0	\$115.4	\$125.0	\$125.0	\$155.0	\$175.0	\$175.0	\$130.0	\$125.0
State Revolving Loan	\$12.0	\$9.0	\$19.0	\$19.6	\$10.0	\$10.0	\$12.0	\$10.0	\$10.0	\$10.0	\$12.0
WSFC Funds	\$54.9	\$32.4	\$20.6	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0	\$8.0
<b>Total Sources</b>	<b>\$184.2</b>	<b>\$160.6</b>	<b>\$165.8</b>	<b>\$191.7</b>	<b>\$189.1</b>	<b>\$203.3</b>	<b>\$218.2</b>	<b>\$266.1</b>	<b>\$239.4</b>	<b>\$211.1</b>	<b>\$229.4</b>
<b>Uses</b>											
Capital Encumbered	\$199.9	\$160.3	\$165.4	\$191.2	\$188.4	\$202.7	\$217.4	\$265.2	\$238.5	\$210.5	\$228.8
Bond Cost of Issuance	\$0.3	\$0.3	\$0.4	\$0.6	\$0.6	\$0.6	\$0.8	\$0.9	\$0.9	\$0.7	\$0.6
<b>Total Uses</b>	<b>\$200.2</b>	<b>\$160.6</b>	<b>\$165.8</b>	<b>\$191.7</b>	<b>\$189.1</b>	<b>\$203.3</b>	<b>\$218.2</b>	<b>\$266.1</b>	<b>\$239.4</b>	<b>\$211.1</b>	<b>\$229.4</b>
Unused Funds	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

An estimated \$1,325 million in bonds and \$134 million in State Revolving Fund loans are projected to be issued during the next 11 fiscal years. While the initial period shown above relies more on bonds, over the 30-year period cash and WSFC funds are projected to fund 52 percent of capital needs consistent with the long-term goal of funding the capital program with not more than a 50:50 ratio of bonds to cash. Figure 2-4 graphically displays the sources and uses of funds including any annual carryover.



**Figure 2-4. Capital Encumbered and Sources of Funding**

Figure 2-5 shows the operating fund balance for the revised baseline as well as the annual projected revenue and expenditures. The operating fund balance is projected to stay within the equivalent of 60 to 180 days of cash, which complies with the Board’s financial policy.

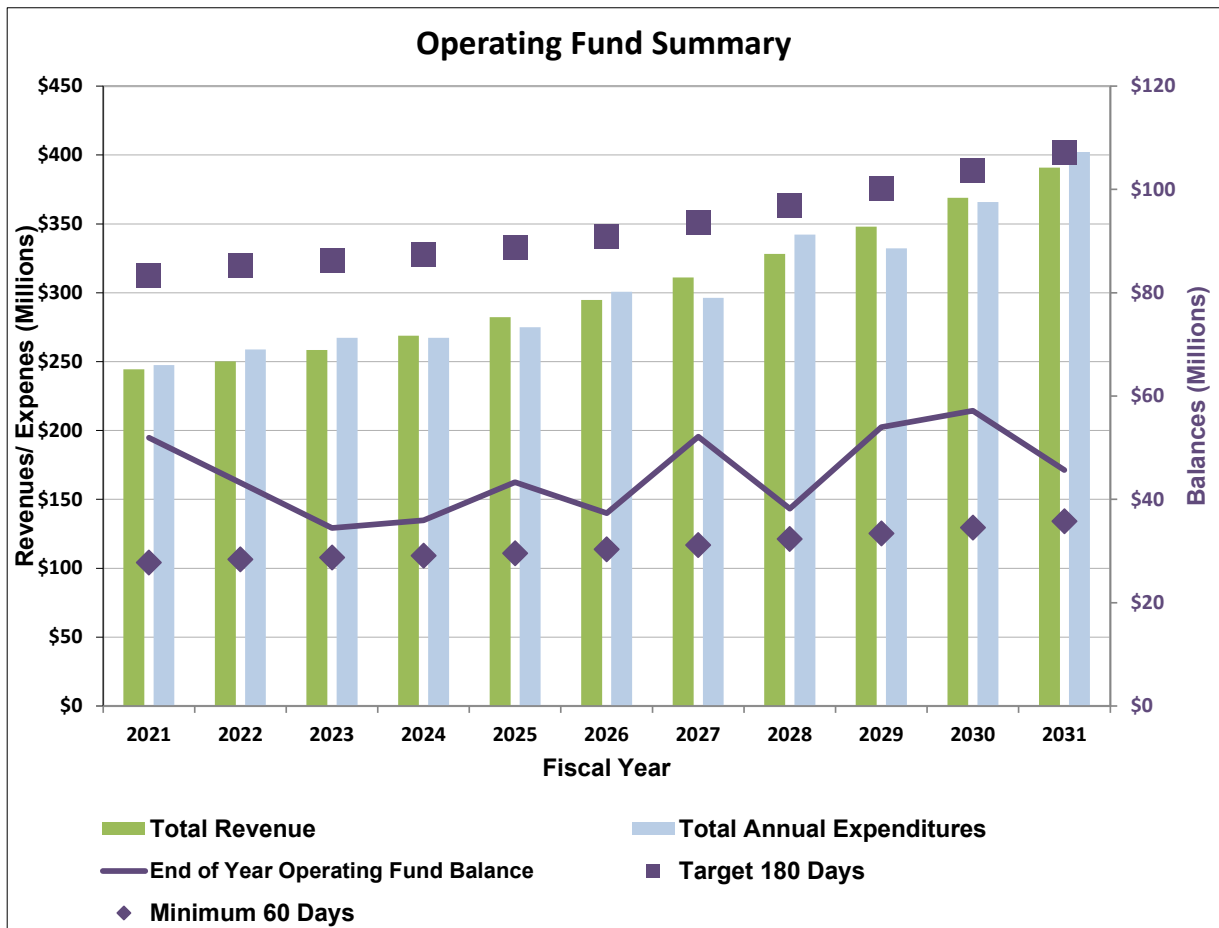


Figure 2-5. Revised Baseline Operating Fund Balance

Table 2-12 presents the detailed cashflow for FY 2021 through FY 2031. The revenue adjustments in FY 2021-FY 2023 show as zero because the modeling already uses the Board-approved rates (August 2018) for estimating rate-based revenue in those fiscal years. The FY 2023 approved rate is used to project the “Billed Wtr User Charges Under Approved Rates” for FY 2024 through FY 2031. While this revision shows a possible path forward for future rate adjustments, a 5-year rate study should be conducted that focuses on the near-term as well as costs of service and affordability.

Section 2 • Review Current Status vs Long Range Financial Plan

**Table 2-12. Revised Cashflow, FY 2021-FY 2031, \$M**

	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY	FY
	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<b>Billed Wtr User Charges Under Approved Rates [1]</b>											
Single-family	\$99	\$104	\$110	\$110	\$110	\$110	\$110	\$110	\$110	\$111	\$111
Multi-unit	\$46	\$46	\$46	\$46	\$46	\$46	\$46	\$47	\$47	\$47	\$47
Non-Residential	\$82	\$83	\$85	\$85	\$85	\$85	\$85	\$85	\$85	\$85	\$85
Agricultural	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
Non-Potable	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
R-1 Golf	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
R-1 Other	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3	\$3
RO (Subject to Published Rates)	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2	\$2
Private Fire Service	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
<b>Total Water Billed Charges</b>	<b>\$236</b>	<b>\$243</b>	<b>\$252</b>	<b>\$251</b>	<b>\$251</b>	<b>\$252</b>	<b>\$252</b>	<b>\$252</b>	<b>\$252</b>	<b>\$253</b>	<b>\$253</b>
<b>User Charge Revenue Adjustment First Year</b>											
Year	Adjustment	Effective Months									
2021	0.0%	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2022	0.0%	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2023	0.0%	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2024	4.5%	12	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11	\$11
2025	5.0%	12	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13	\$13
2026	5.0%	12	\$14	\$14	\$14	\$14	\$14	\$14	\$14	\$14	\$14
2027	5.5%	12	\$16	\$16	\$16	\$16	\$16	\$16	\$16	\$16	\$16
2028	5.5%	12	\$17	\$17	\$17	\$17	\$17	\$17	\$17	\$17	\$17
2029	6.0%	12	\$19	\$19	\$19	\$19	\$19	\$19	\$19	\$19	\$19
2030	6.0%	12	\$21	\$21	\$21	\$21	\$21	\$21	\$21	\$21	\$21
2031	6.0%	12	\$22	\$22	\$22	\$22	\$22	\$22	\$22	\$22	\$22
<b>Water User Charge Revenue Adjustment</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$11</b>	<b>\$24</b>	<b>\$38</b>	<b>\$54</b>	<b>\$71</b>	<b>\$91</b>	<b>\$111</b>	<b>\$133</b>
<b>Total Billed Water User Charge Revenue</b>	<b>\$236</b>	<b>\$243</b>	<b>\$252</b>	<b>\$262</b>	<b>\$276</b>	<b>\$290</b>	<b>\$306</b>	<b>\$323</b>	<b>\$343</b>	<b>\$364</b>	<b>\$386</b>
Contractual Water Revenue	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
Miscellaneous Income [2]	\$6	\$6	\$6	\$6	\$6	\$4	\$4	\$4	\$4	\$4	\$4
Uncollected Revenues	(\$0)	(\$0)	(\$1)	(\$1)	(\$1)	(\$1)	(\$1)	(\$1)	(\$1)	(\$1)	(\$1)
Interest Income	\$2	\$1	\$1	\$0	\$0	\$0	\$0	\$0	\$0	\$1	\$1
<b>Total Revenue</b>	<b>\$244</b>	<b>\$250</b>	<b>\$259</b>	<b>\$269</b>	<b>\$282</b>	<b>\$295</b>	<b>\$311</b>	<b>\$328</b>	<b>\$348</b>	<b>\$369</b>	<b>\$391</b>
<b>Annual Expenditures</b>											
Operation and Maintenance Expense	\$169	\$173	\$175	\$177	\$180	\$184	\$190	\$197	\$203	\$210	\$217
Debt Service											
Existing Debt - Bonds	\$19	\$20	\$21	\$21	\$21	\$21	\$21	\$21	\$21	\$21	\$21
Existing Debt - SRF & JABSOM	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$6	\$6
SRF Fees - Existing Loans	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$0	\$0
Proposed Debt - Bonds	\$0	\$4	\$7	\$11	\$17	\$24	\$31	\$39	\$49	\$58	\$65
Proposed Debt - SRF	\$0	\$1	\$1	\$2	\$3	\$4	\$4	\$5	\$5	\$6	\$6
SRF Fees - Proposed Loans	\$0	\$0	\$0	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
<b>Subtotal Debt Service</b>	<b>\$26</b>	<b>\$32</b>	<b>\$36</b>	<b>\$42</b>	<b>\$49</b>	<b>\$56</b>	<b>\$63</b>	<b>\$73</b>	<b>\$83</b>	<b>\$93</b>	<b>\$100</b>
<b>Transfers to:</b>											
Cash Funded Capital	\$52	\$54	\$56	\$49	\$46	\$60	\$43	\$73	\$46	\$63	\$84
<b>Total Annual Expenditures</b>	<b>\$247</b>	<b>\$259</b>	<b>\$267</b>	<b>\$267</b>	<b>\$275</b>	<b>\$301</b>	<b>\$296</b>	<b>\$342</b>	<b>\$332</b>	<b>\$366</b>	<b>\$402</b>
Beginning of Year Balance	\$55	\$52	\$43	\$34	\$36	\$43	\$37	\$52	\$38	\$54	\$57
Annual Increase (Decrease)	(\$3)	(\$9)	(\$9)	\$1	\$7	(\$6)	\$15	(\$14)	\$16	\$3	(\$11)
<b>End of Year Operating Fund Balance</b>	<b>\$52</b>	<b>\$43</b>	<b>\$34</b>	<b>\$36</b>	<b>\$43</b>	<b>\$37</b>	<b>\$52</b>	<b>\$38</b>	<b>\$54</b>	<b>\$57</b>	<b>\$46</b>
Target 180 Days of O&M [3]	\$83	\$85	\$86	\$87	\$89	\$91	\$94	\$97	\$100	\$104	\$107
Minimum 60 Days of O&M [3]	\$28	\$28	\$29	\$29	\$30	\$30	\$31	\$32	\$33	\$35	\$36
Estimated Days of Working Capital	112	91	72	74	88	74	100	71	97	99	77
DSCR - Bonds	4.00	3.24	3.03	2.90	2.70	2.47	2.36	2.20	2.08	2.01	2.01
DSCR - Aggregate	2.88	2.42	2.30	2.21	2.09	1.97	1.91	1.82	1.75	1.72	1.73

[1] Calculated using the approved water rates.

[2] Includes system facilities charges, fire protection installations, billing services for ENV and other misc income.

[3] 180 Days of O&M within 10 years of FY2018, minimum of 60 days.

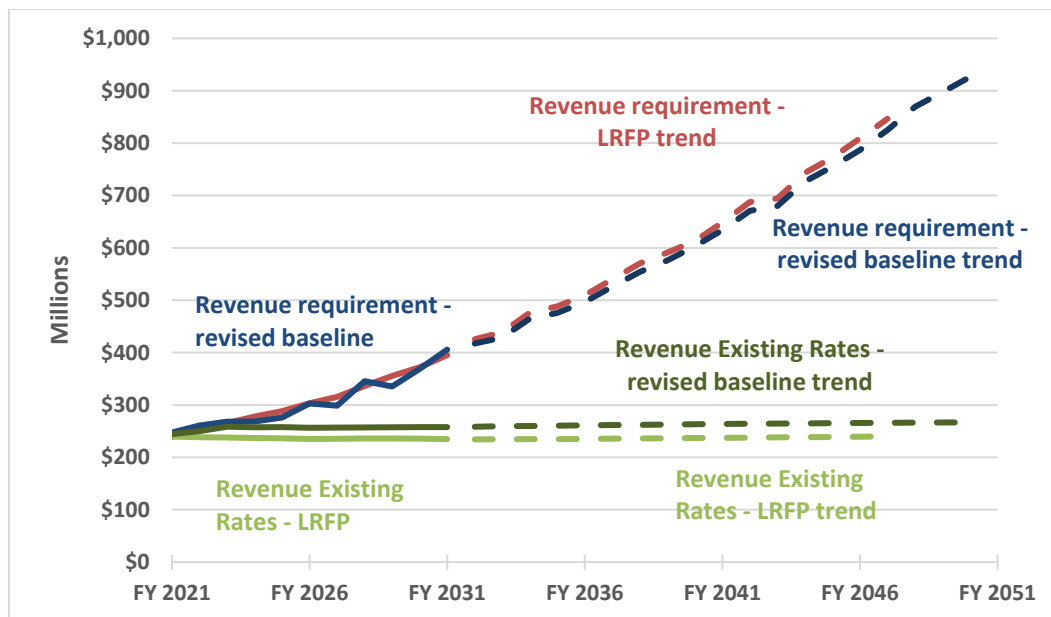
## Section 3

# Trends and Sensitivity Analysis Update

Since the degree of uncertainty grows with time over the duration of the study period, a trend analysis, rather than detailed modeling, was performed in the Long Range Financial Plan. The trend analysis looks at possible financial changes from the revised baseline based on identified scenarios.

### 3.1 Update of Scenarios based on Revised Baseline

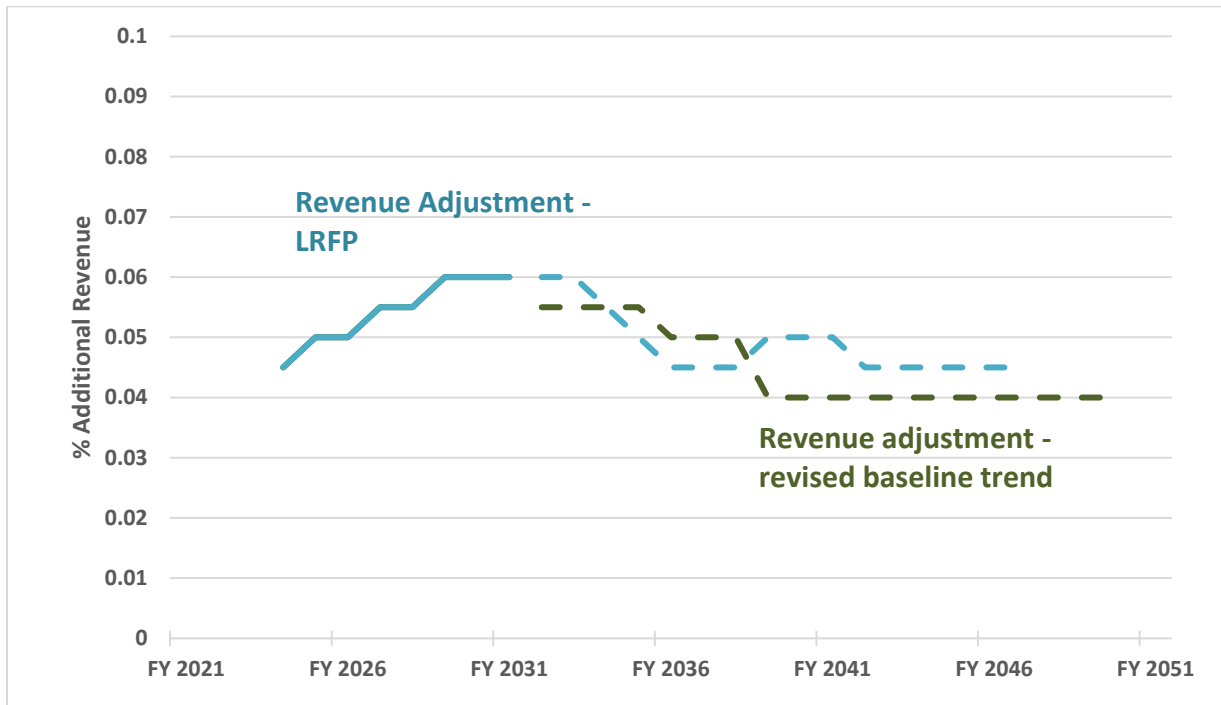
Figure 3-1 shows the revised baseline revenue requirements over the near and long terms and compares the revenues under approved (or existing) rates between the Long Range Financial Plan (identified on graphs as LRFP) and the revised baseline. Years 1 – 11 are shown as solid lines and Years 12 – 30 are the trend analysis and are shown as dashed lines. The long-term revenue requirements trend upward is due to an increased capital program, an increase in staffing to support that program, and escalation. However, due to the adjustments discussed in the prior section, revenue requirements are expected to be lower under the revised baseline due to tighter operations and maintenance budgets and lower initial capital program. Over the forecast period, the revised baseline revenues under existing rates are expected to be higher than those projected in the Long Range Financial Plan because they reflect the subsequently adopted rates that are effective through FY 2023.



**Figure 3-1. Long-Term Revenue and Revenue Requirements Trends Under Approved Rates**

Figure 3-2 presents the projected additional revenue needs (beyond FY 2023) expressed as a percent of rate-based revenue. The revised baseline shows a trend that stays a little higher than the Long Range Financial Plan in the middle years and then drops lower in the later years. The

two lines overlap each other in Years 1 – 11 as the revenue adjustments deliberately remain the same between the two.



**Figure 3-2. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue**

Three scenarios evaluated in the Long Range Financial Plan model have been updated based on the revised baseline: aggressive conservation, aggressive growth, and climate change. The remaining three scenarios, major natural disaster, major source water contamination, and economic cycle, were evaluated as events as opposed to long-term trends. Accordingly, those analyses do not warrant updating at this time.

### 3.1.1 Aggressive Conservation

The assumption in the Long Range Financial Plan is that demand will decrease ~0.25 percent per year due to conservation. To evaluate the potential impacts of more aggressive conservation, this analysis considers the following scenario:

---

Aggressive Conservation – Assume that demand decreases 1 percent per year. In this scenario, it is assumed that the percentage of usage within the existing tiers remains the same, or an across the board drop, with no expectation that only high users conserve.

---

Figure 3-3 shows that the aggressive conservation scenario will have the impact of reducing revenues from water sales. In 30-years’ time, this reduction could be about 24 percent. This will then increase the revenue shortfall throughout the 30-year planning horizon, which may be partially or wholly offset by deferral of growth-related projects, depending on timing and location. To be conservative, potential decreases in costs due to lower demand have not been analyzed. For example, aggressive conservation could result in lower power usage that may or may not decrease costs for the BWS due to Hawaiian Electric’s Energy Cost Recovery Factor or

energy cost increases, or possibly delay the need for additional growth-related infrastructure. Project deferral is, however, recognized as a mitigation strategy. Since the impact of these on revenue requirements is highly uncertain, a trend analysis on the revenue requirements was not performed for this scenario.

Figure 3-4 shows the anticipated trends in additional revenue needs under this scenario. The impacts of lower demand due to aggressive conservation begin immediately and compound throughout the planning period. Annual increases as a percentage of existing rate-based revenues are generally 1 to 2 percent higher per year than with the revised baseline. However, this should not be interpreted to mean that either customers or the BWS should not actively pursue conservation objectives, particularly given the potential impacts of climate change.

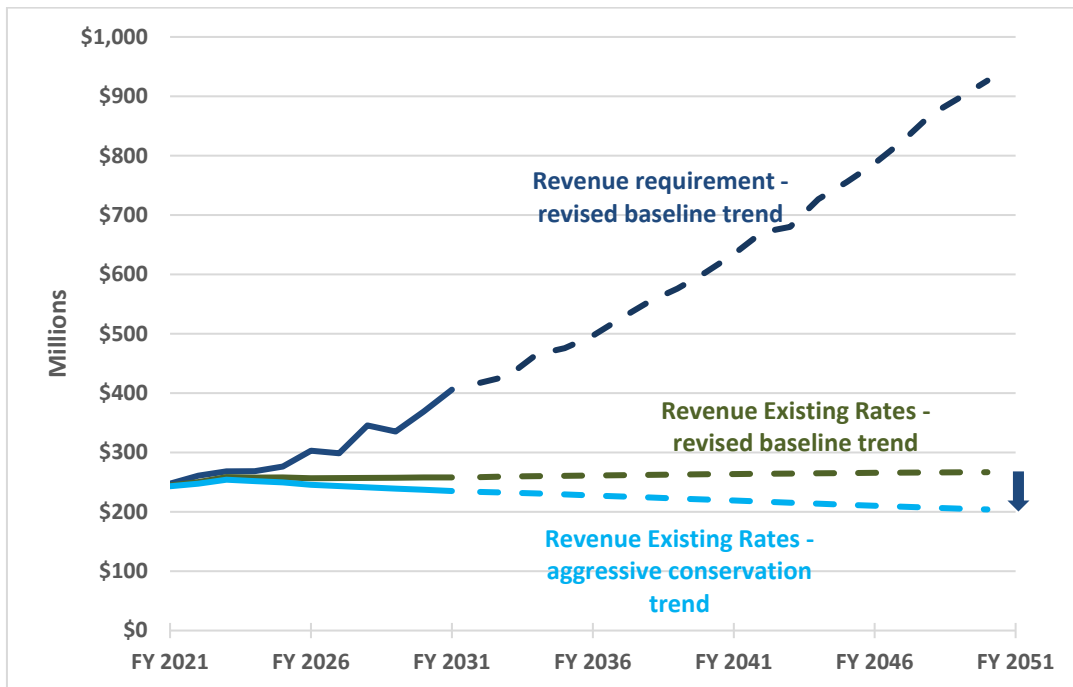
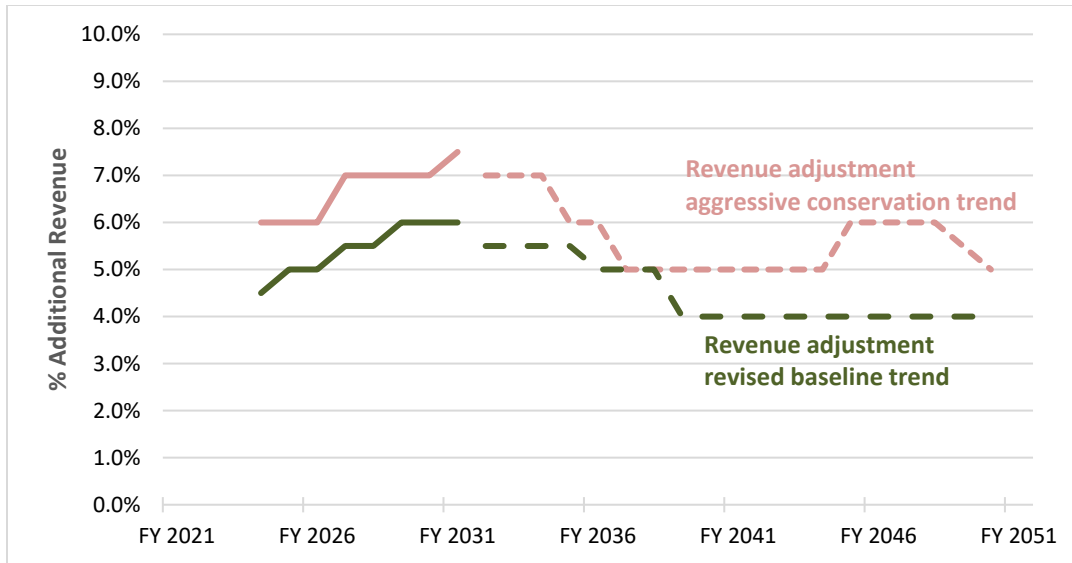


Figure 3-3. Revenue Impact due to Aggressive Conservation



**Figure 3-4. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue, Aggressive Conservation**

### 3.1.2 Aggressive Growth

The Long Range Financial Plan evaluated two sub-scenarios: growth per Water Master Plan assumptions and even greater growth.

Water Master Plan High Range Demand Projection Assumptions – Assume 0.6 percent per year growth in usage through FY 2025, then 0.4 percent per year through FY 2040, then 0.5 percent per year through FY 2050. (no change in percent usage within existing tiers)

Aggressive Growth above Water Master Plan Assumptions – Assume 1 percent per year growth in usage (no change in percent usage within existing tiers)

Both sub-scenarios would have increases in O&M costs; however, these costs are anticipated to be offset by additional rate-based revenue generated under existing rates due to the increased demand.

Figure 3-5 and Figure 3-6 show that under the aggressive growth assumptions revenues from water sales will increase. By year 30, that shift is in the 12 – 30 percent range. This increase in water sales revenue will then decrease the revenue shortfall throughout the 30-year planning horizon.



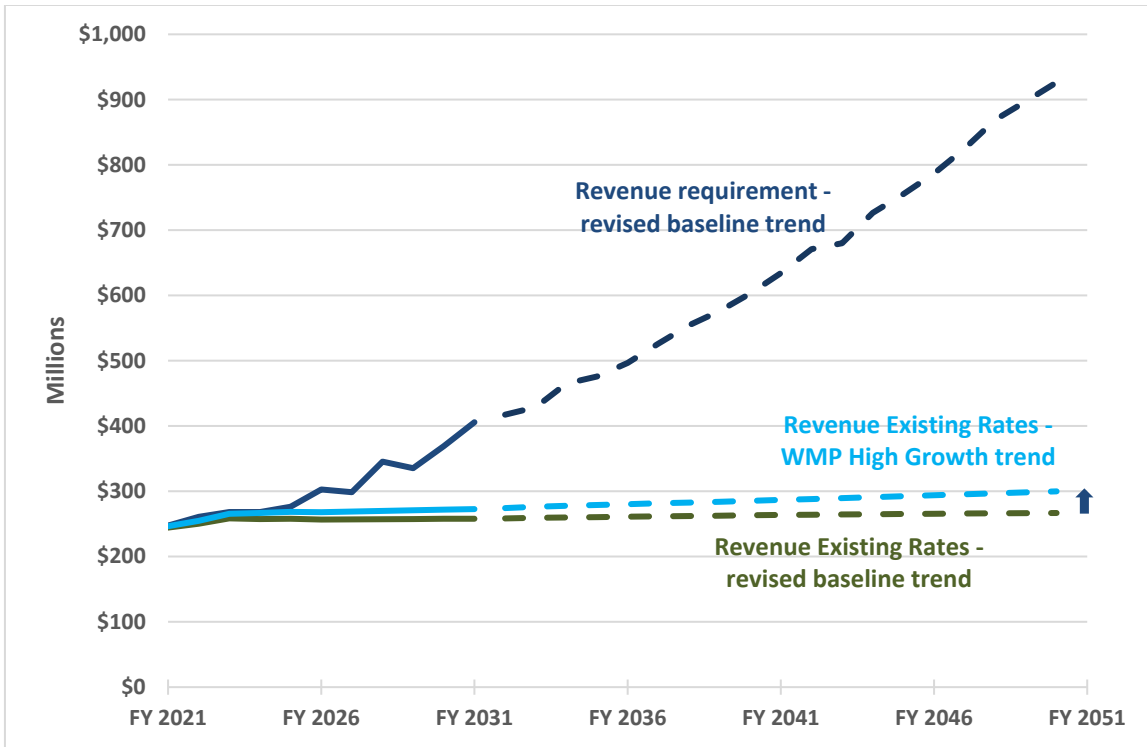


Figure 3-5. Revenue Impact due to Water Master Plan High Range Demand Growth

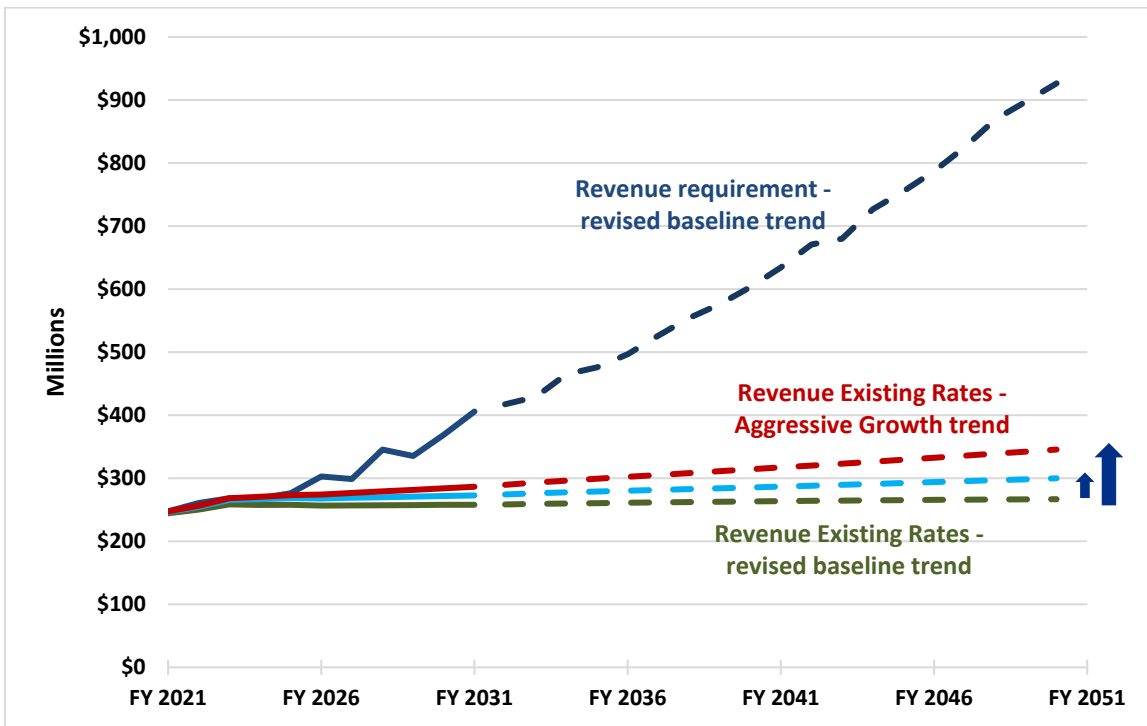


Figure 3-6. Revenue Impact due to Water Master Plan High Demand and Aggressive Growth

Figure 3-7 and Figure 3-8 show the anticipated trends in additional revenue needs under the high demand and aggressive growth scenarios, respectively. Projections show additional revenue needs as generally lower than in the revised baseline. A small upward adjustment is needed just after Year 11 to keep the days working capital above the minimum and then the trend continues to be lower than the baseline. It is assumed that costs for growth-related facilities (e.g., new wells, additional storage) are either a) provided for by developers or b) fully recovered from the Water System Facilities Charge.

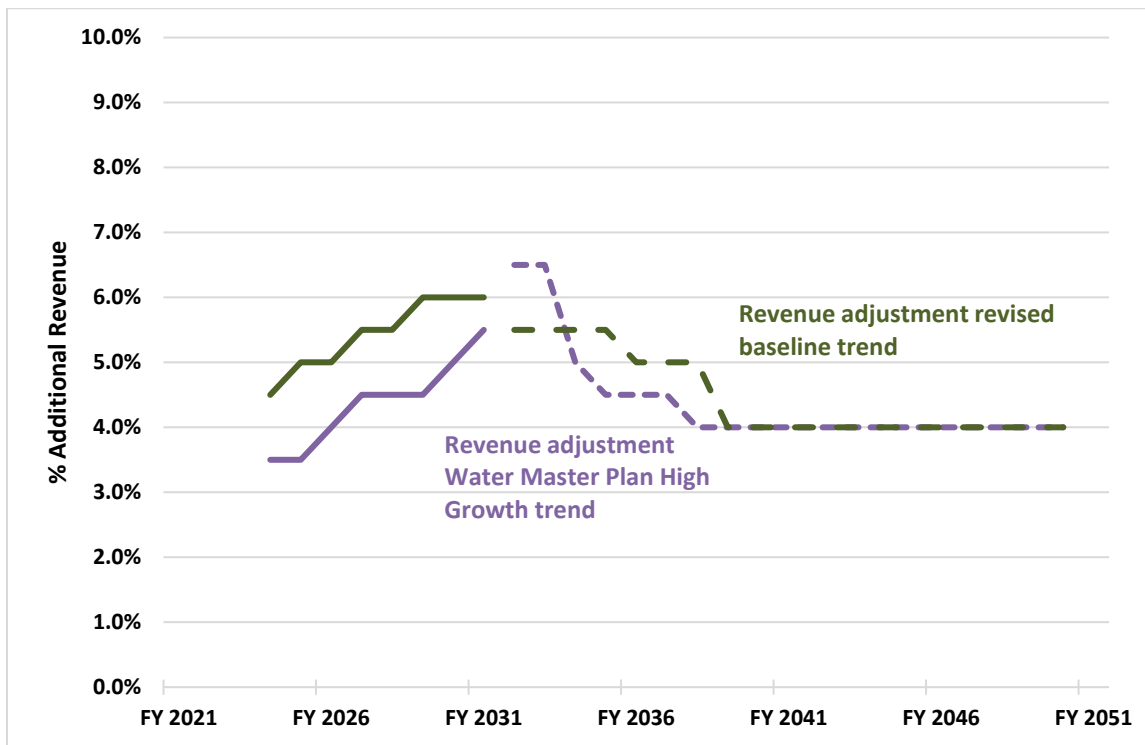


Figure 3-7. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue, Water Master Plan High Demand Case

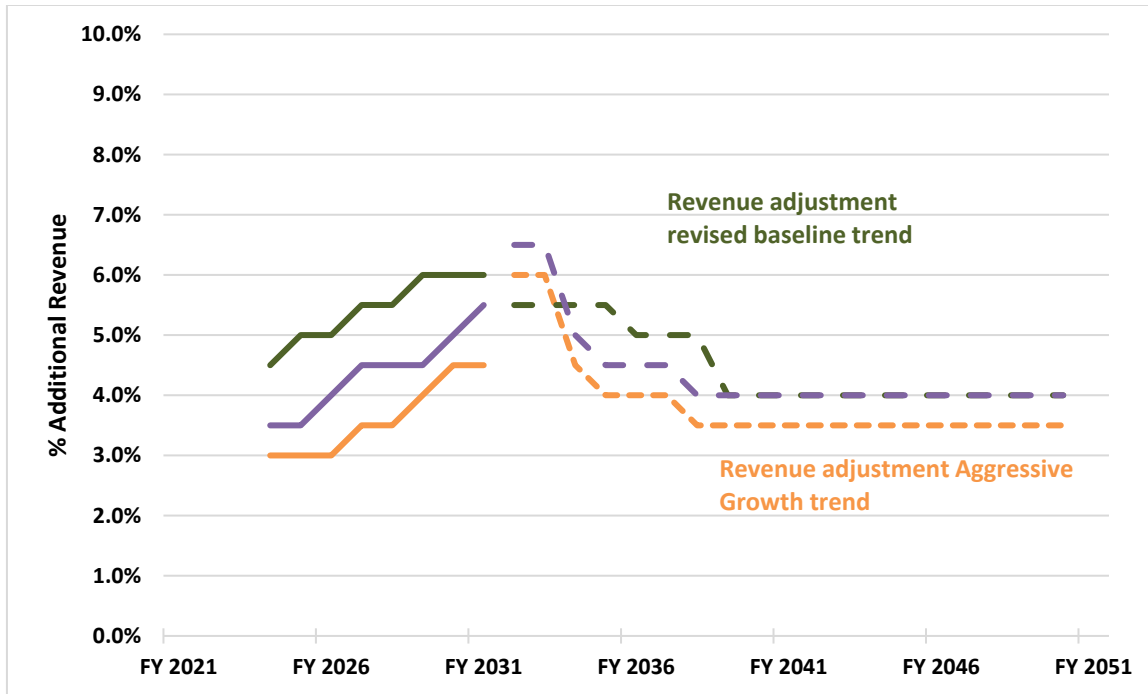


Figure 3-8. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue, Aggressive Growth

### 3.1.3 Climate Change

The Long Range Financial Plan defined the climate change scenario as follows:

Climate Change – Assume that higher capital replacement is needed due to increased groundwater salinity (resulting in loss of source yields) and that additional sources are needed to replace failing groundwater sources. Assume 25 percent of infrastructure is low enough and close enough to the coast to be impacted and that the impact will halve the useful life.

Assume that demand decreases 1 percent per year. In this scenario, it is assumed that the percentage of usage within the existing tiers remains the same, or an across the board drop, with no expectation that only high users conserve.

The assumptions of aggressive conservation and sea level rise in this scenario are aligned with both the Primary Urban Center Watershed Management Plan (BWS, in progress) and the Water Research Foundation’s Impacts of Climate Change on Honolulu Water Supplies and Planning Strategies for Mitigation (Water Research Foundation, 2019). These envision reductions in aquifer sustainable yield during low rainfall conditions and significant sea level rise. By mid-century, nuisance flooding associated with sea level rise will commonly occur and as it worsens, tourism in Waikiki could decrease. At 3 feet and more of sea level rise, much of Waikiki will experience flooding during high tide and much of the beach is expected to disappear. This could be expected to affect tourism as well as potentially increasing outmigration due to limited inland

area and/or economic impacts. Consequently, capital expenditures would be expected to increase to address infrastructure that could be impacted by regular flooding, and water demands could decrease due to reductions in sustainable yield and/or lower tourism and increased net outmigration.

As seen in Figure 3-9, in the near term, no appreciable difference in revenue requirements is seen. However, over the long term, revenue requirements would begin to increase as assets had to be replaced sooner than originally planned, possibly by 6 percent over the revised baseline by the 30<sup>th</sup> year. Figure 3-9 also shows a potential decrease in revenue due to the associated conservation assumptions in this scenario. By year 30, revenues could be about 23 percent lower than the revised baseline. Figure 3-10 shows the anticipated trends in additional revenue needs under the climate change scenario. Projections show additional revenue needs varying between 5 and 8 percent per year, or 0.5 to 2 percent per year above the revised baseline.

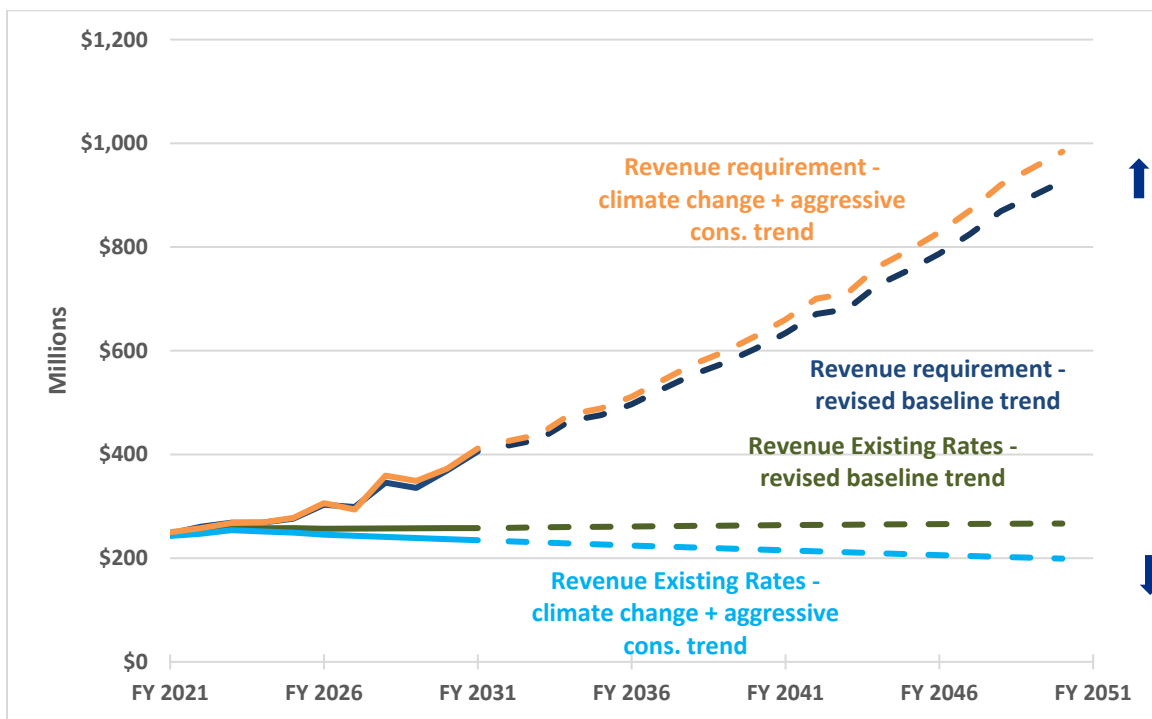
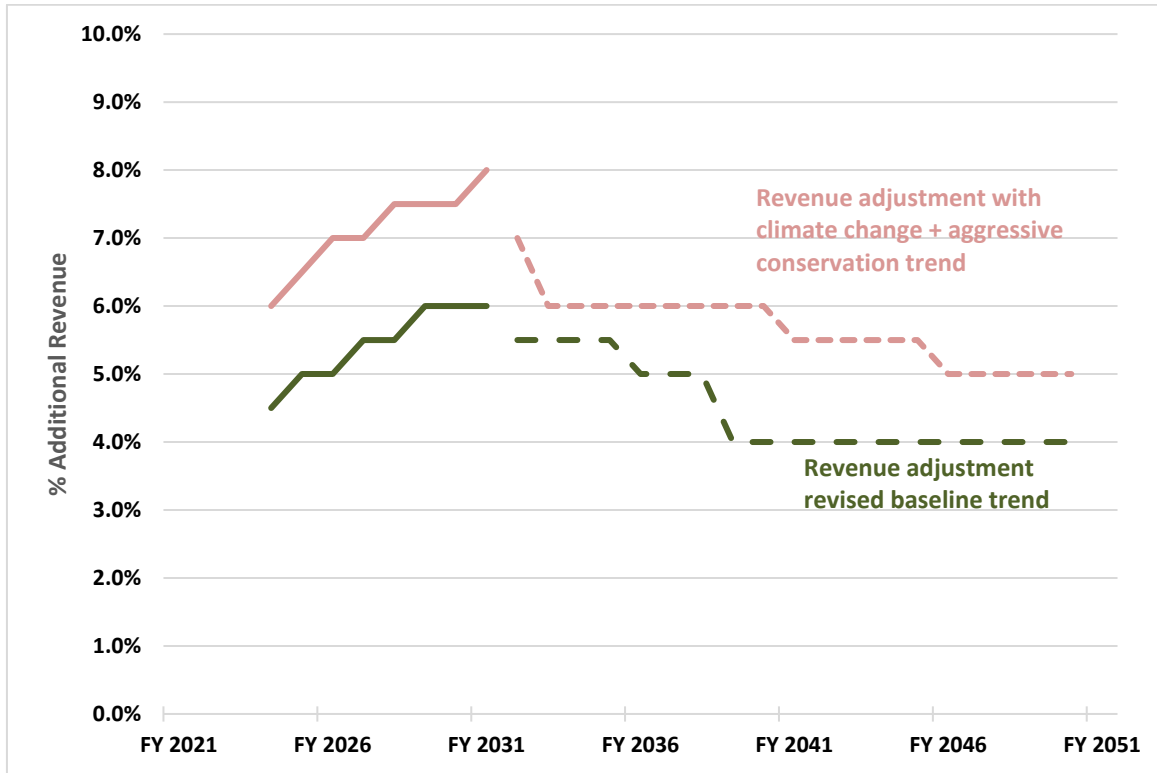


Figure 3-9. Revenue Requirements Impact due to Climate Change and Aggressive Conservation



**Figure 3-10. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue, Climate Change + Aggressive Conservation**

## 3.2 Pandemic Scenario

The Long Range Financial Plan did not include a pandemic scenario. However, on March 11, 2020, the WHO declared COVID-19 a global pandemic. Discussions within the water industry regarding the potential impacts of the COVID-19 pandemic on a utility's ability to meet its mission have centered around concerns over reduced revenues and increased expenses. Indications are that these impacts vary widely from utility to utility. The pandemic scenario evaluates these impacts resulting from the current COVID-19 pandemic specific to the BWS. The intent is to provide guidance in support of current decision-making, in addition to documenting impacts to help guide future response in the event of another pandemic. Key areas of investigation were water demands and delinquencies.

While the long range modeling and trend analyses evaluate annual impacts, for this pandemic scenario, we have analyzed monthly data as far back as January 2016 to provide context to current conditions and to identify trends. Variables to consider in a pandemic scenario include water sales; delinquencies, duration to repay, and uncollectable debt; stimulus funding; changes in operations and maintenance expenses; and changes to the capital improvement program.

### 3.2.1 Water Demand and Sales

Figure 3-11 shows the BWS's daily potable water production and 30-day moving average for the island between March 1 and December 31, 2020 against the 5-year monthly average. Throughout

the pandemic, the BWS has continually monitored water production because it serves as an early indicator of revenues, which lag by at least a month due to the meter reading and billing cycle. Immediately following the WHO’s March 11 pandemic declaration and the stay-at home orders and tourism restrictions that followed, daily water production dropped precipitously, from about 130 million gallons per day (mgd) to less than 115 mgd.

Due to COVID-19 restrictions and the resulting dramatic impact to Hawaii’s tourism-driven economy, by May 2020, the unemployment rate in Hawaii soared to 22.6 percent, the second highest in the nation following Nevada. At the same time, daily water production rose steeply from its March decline and was exceeding the 5-year monthly average due to a drought from April 2020 through December 2020 impacting Windward and East Honolulu, along with unusually high temperatures (90F and higher). With the return of a hot, dry summer, and with the notable exception on July 26 when Hurricane Douglas came within 30 miles of Oahu, water production increased over the five-year monthly average and generally remained there until mid-October.

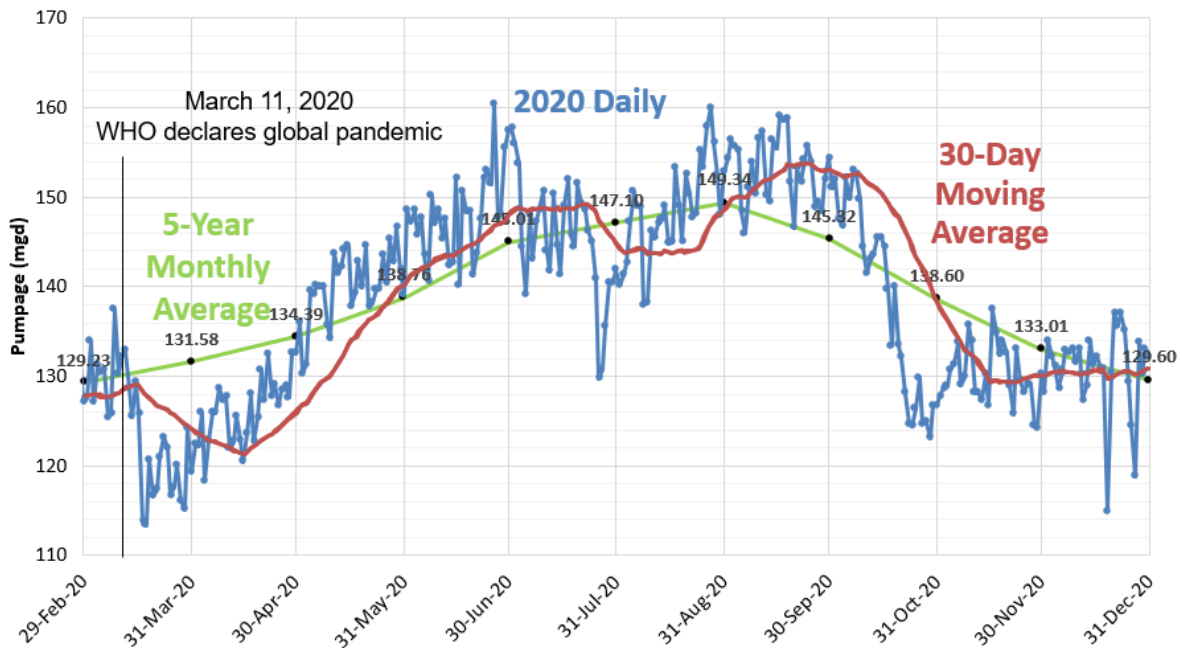
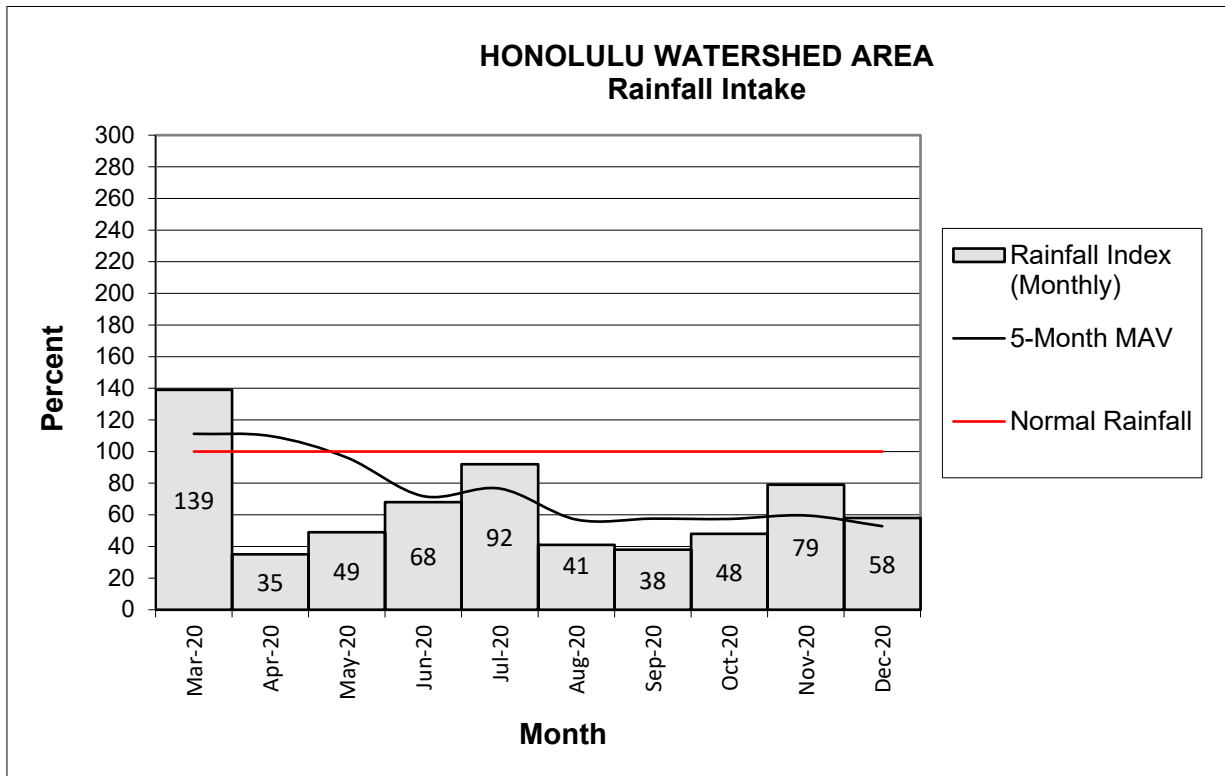


Figure 3-11. Total Island Potable Water Production since March 1, 2020

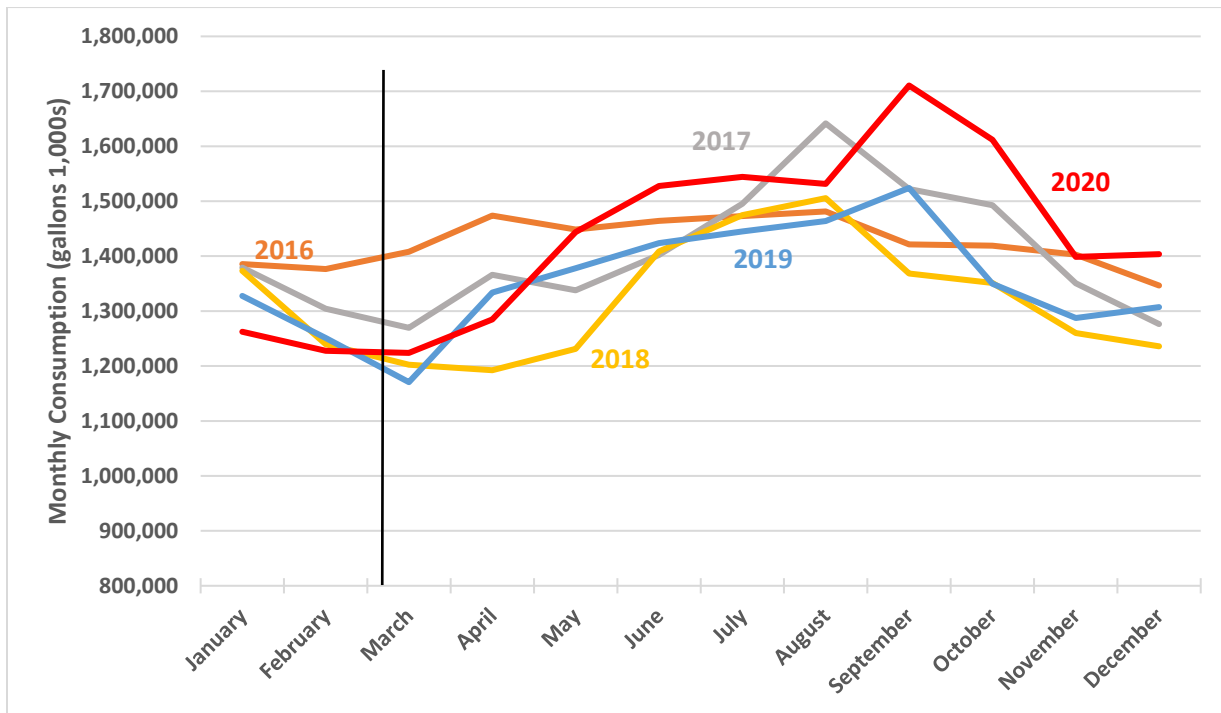
While the BWS’s high water demands throughout the summer may seem surprising when considering the near-total shuttering of tourism and the resulting economic impacts, changes in the BWS’s water demands were strongly driven by the drought and high temperatures mentioned above. Figure 3-12 shows the rainfall index for the Honolulu Watershed Area. An index of 100 is normal (average) for any given month and shown with the red line. March was much wetter than normal, with an index of 139, and April was dramatically drier, with an index of only 35. The very dry trend continued throughout the summer and into fall, excepting Hurricane Douglas in July, and is inversely correlated to water demands. In fact, a multivariate statistical analysis completed by the BWS in 2018 documented that weather alone accounts for about half of the variability in the BWS’s water demands, more than any other factor.



**Figure 3-12. Rainfall Index for the Honolulu Watershed Area**

The water production data discussed above provide an aggregated view of island-wide water demands. It is observed that, despite the closure of restaurants and hotels associated with the near-total shutdown of tourism, overall water demands appear virtually unimpacted by the pandemic. To better understand this, monthly billing data were analyzed to evaluate changes in water usage across various customer segments: single-family residential, multi-unit residential, and non-residential.

The following figures present the monthly water demand from January 2016 through December 2020 for the three major customer groups: single-family residential, multi-unit residential, and non-residential. Calendar years were chosen for the presentation of these data to better illustrate the seasonal changes in water demands. Because changes in the BWS's water demands are so dependent upon changes in weather, point comparisons such as one month to the previous month or the previous year are of limited value. To illustrate, Figure 3-13 shows monthly single-family residential water demand for the most recent 5-year period.



**Figure 3-13. Single-Family Residential Monthly Demand**

As a result, it was decided to compare 2020 monthly water demands to the 5-year average water demands. The results for single-family residential, multi-unit residential, and non-residential are shown in Figure 3-14, Figure 3-15 and Figure 3-16, respectively. Both residential customer classes (shown in Figure 3-14 and Figure 3-15) reflect increased demand, due in part to the stay at home requests and due in part to warmer weather, which lead to increased discretionary water demand. As seen in the non-residential chart (Figure 3-16), demand decreased sharply between March and May. However, as businesses were allowed to re-open with precautions (e.g., take out service only), the demand rebounded into the low end of the range. These graphs indicate that the pandemic had little overall impact to total water demand; that weather is still the single-most important driver for water demand.



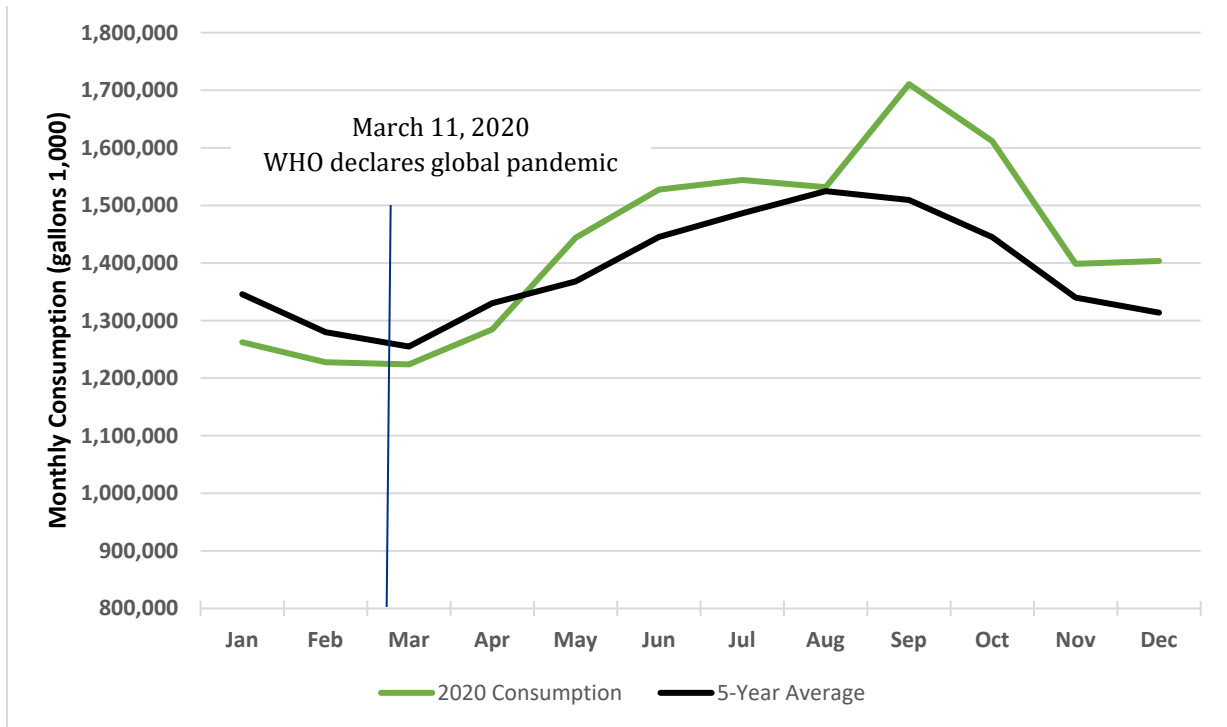


Figure 3-14. Single-Family Residential Monthly Demand vs 5-Year Average

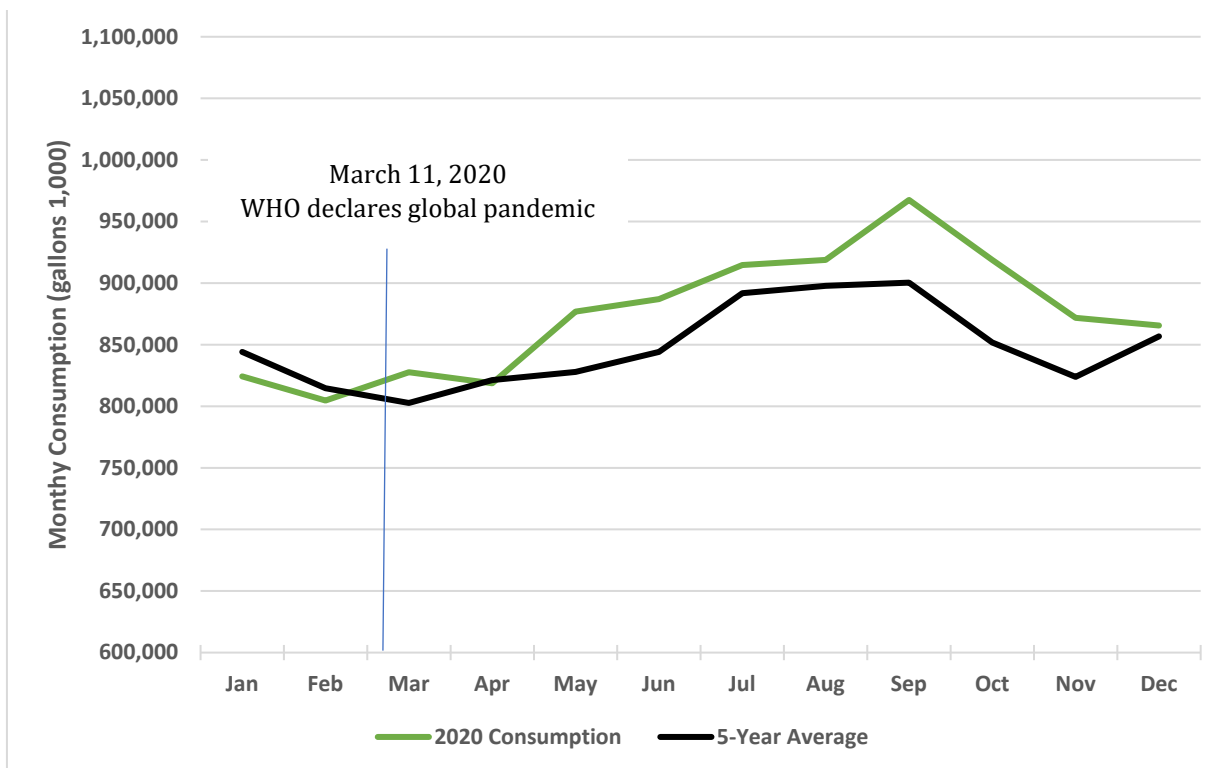
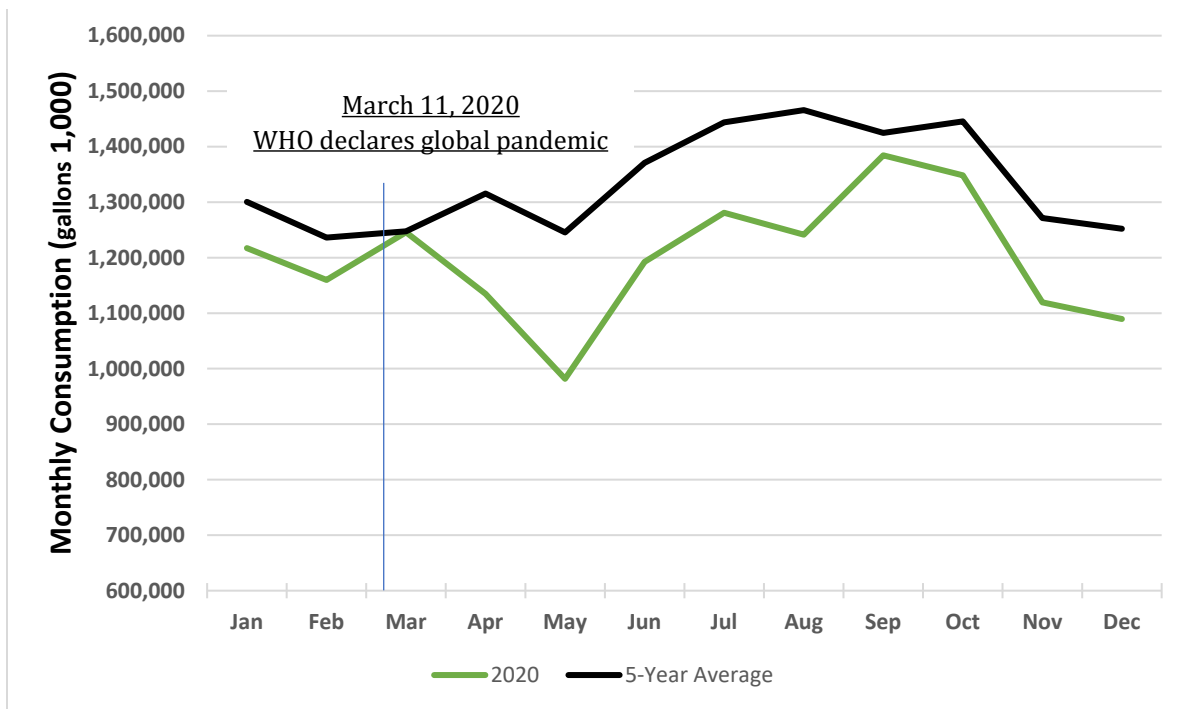


Figure 3-15. Multi-Unit Residential Monthly Demand vs 5-Year Average



**Figure 3-16. Non-Residential Monthly Demand vs 5-Year Average**

Figure 3-17 presents a timeline series of water consumption for each of the four customer classes from January 2016 through December 2020. After March 2020, a noticeable dip in non-residential is seen along with a corresponding increase in single-family residential water sales. While non-residential sales have somewhat rebounded since then, single-family residential consumption continues to be higher than previous because people are spending more time at home (working from home or temporarily unemployed due to decreased tourism and restaurant closures/scaling-back). Multi-unit residential water sales have also increased since the global pandemic was declared.

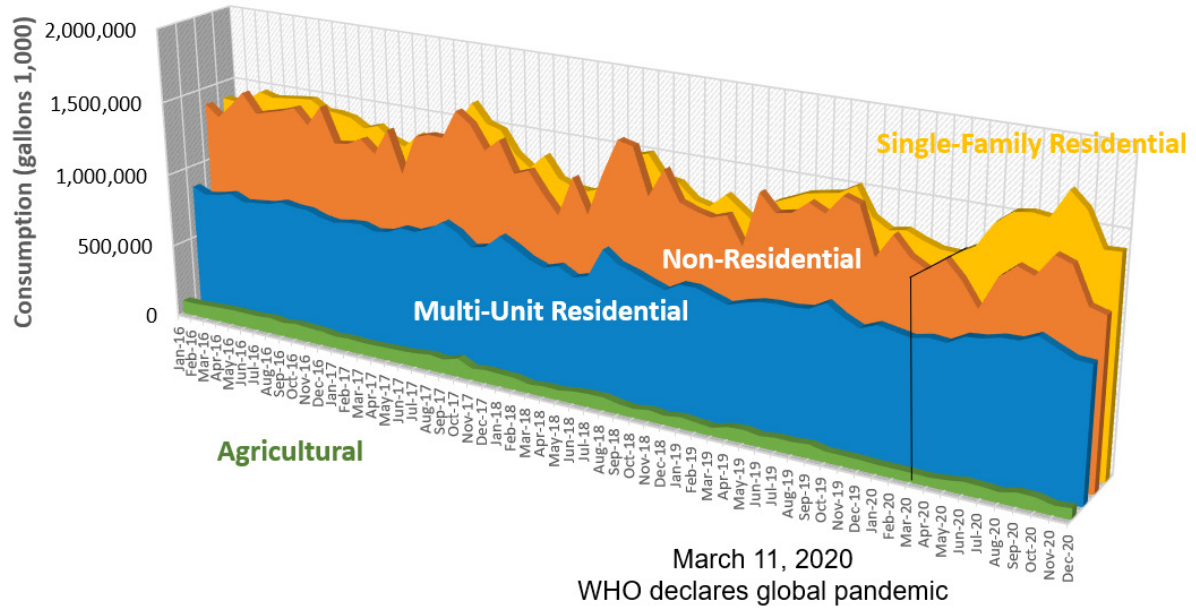
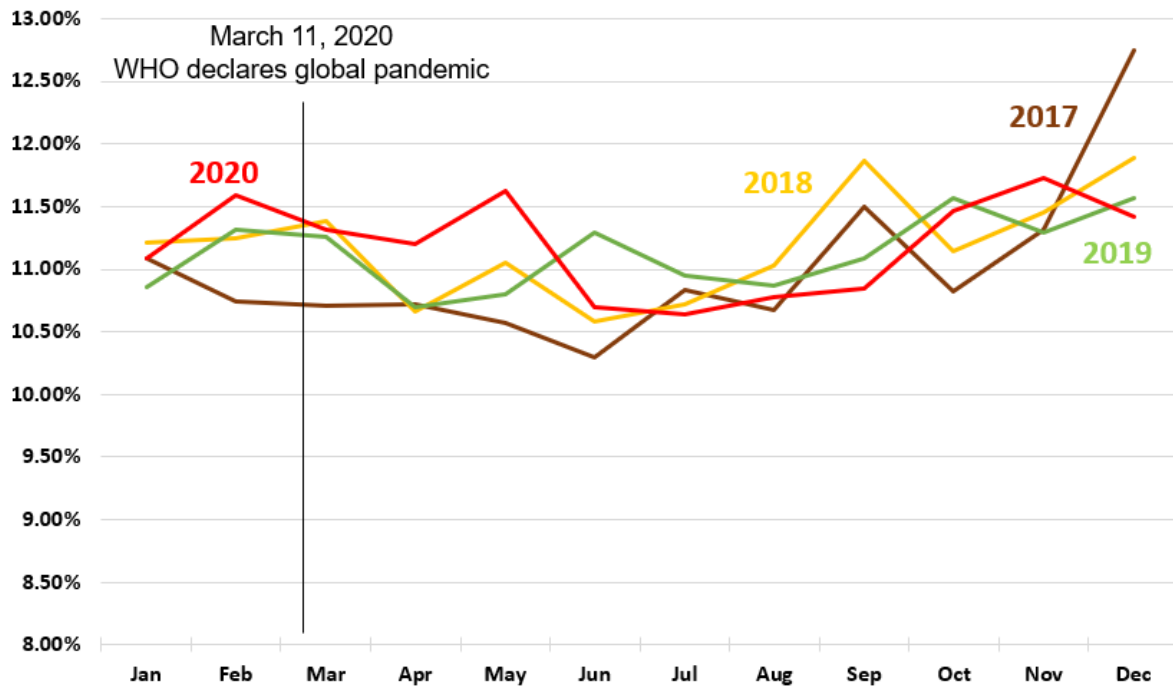


Figure 3-17. Water Sales by Customer Class since January 2016, gallons 1,000s

### 3.2.2 Delinquencies

While water demand remained high, customers' ability to pay their bills may have been impacted by pandemic-related restrictions. Between 2015 and 2019, the amount of uncollected revenue averaged 0.2 percent of rate-based revenue (or less than \$500,000 per year). Uncollected revenue are those delinquent accounts for which the BWS has determined they will be unable to collect. If more accounts are delinquent, then it's possible that uncollected revenues will also increase. Figure 3-18 shows the percentage of water accounts that are 30 days or more past due since January 2017. While the number of delinquent accounts in April and May 2020 appears a little higher than historical, by June the number of accounts has dropped to the lower end of the range.



**Figure 3-18. Percentage of Water Accounts 30 days Past Due, 2017 to 2020**

The focus then turned to the residential and commercial accounts. As shown in Figure 3-19, for the first five months of 2020, the number of residential delinquencies was at the high end of the range. However, in June through September 2020, the number of delinquent accounts dropped to the lower end of the range. The number of delinquent accounts has stayed in the middle range through the rest of 2020. Figure 3-20 shows the dollar amount of delinquencies in residential accounts. The general trend is that the dollar amount of delinquencies increases each year, in part due to rate increases. After March 2020, the amount of delinquent revenue starts to trend higher than historical. Given that the number of delinquent accounts has leveled off, this seems to indicate that the same accounts may be getting further and further behind.

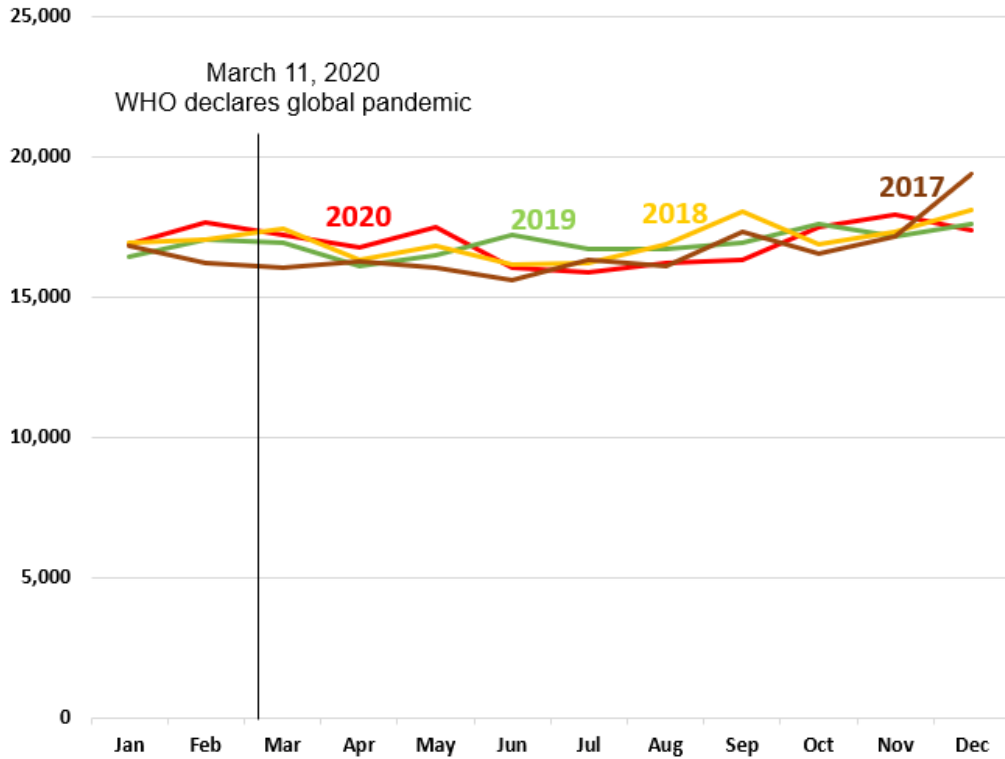


Figure 3-19. Monthly Residential Water Customer Delinquency, 2017 to 2020, Accounts

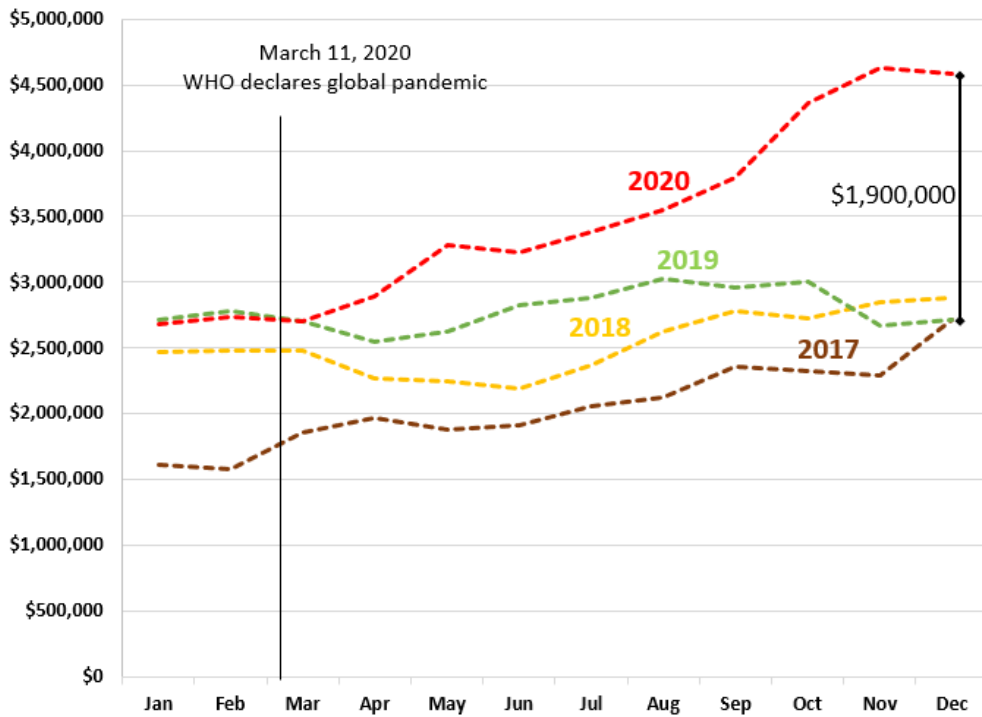


Figure 3-20. Monthly Residential Water Customer Delinquency, 2017 to 2020, \$

Figure 3-21 shows that the number of delinquent commercial accounts spiked shortly after the World Health Organization declared the global pandemic. That number dropped some in June, possibly due to use of stimulus payments to pay past-due amounts, but not all the way back to historical levels. The number of delinquent commercial accounts also appears to have started declining since October 2020. Figure 3-22 shows the dollar amount of delinquencies in commercial accounts. It shows a similar trend to residential except that it appears to be decreasing since September 2020.

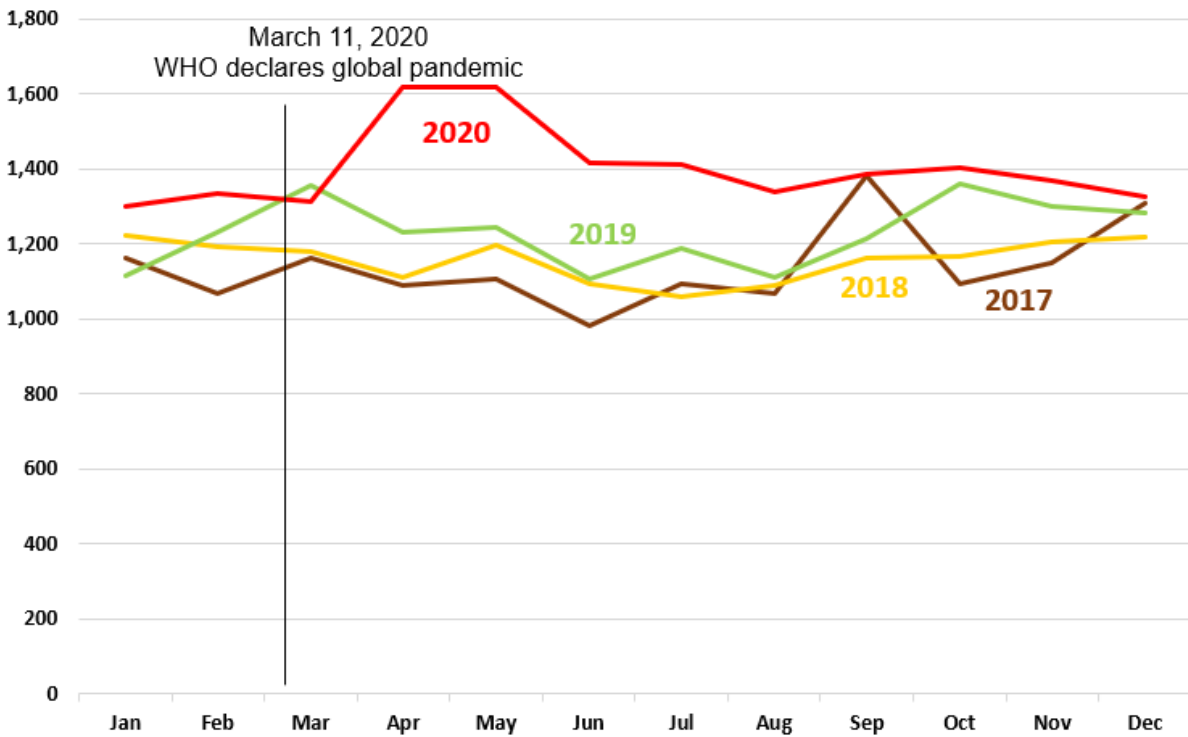


Figure 3-21. Monthly Commercial Water Customer Delinquency, 2017 to 2020, Accounts

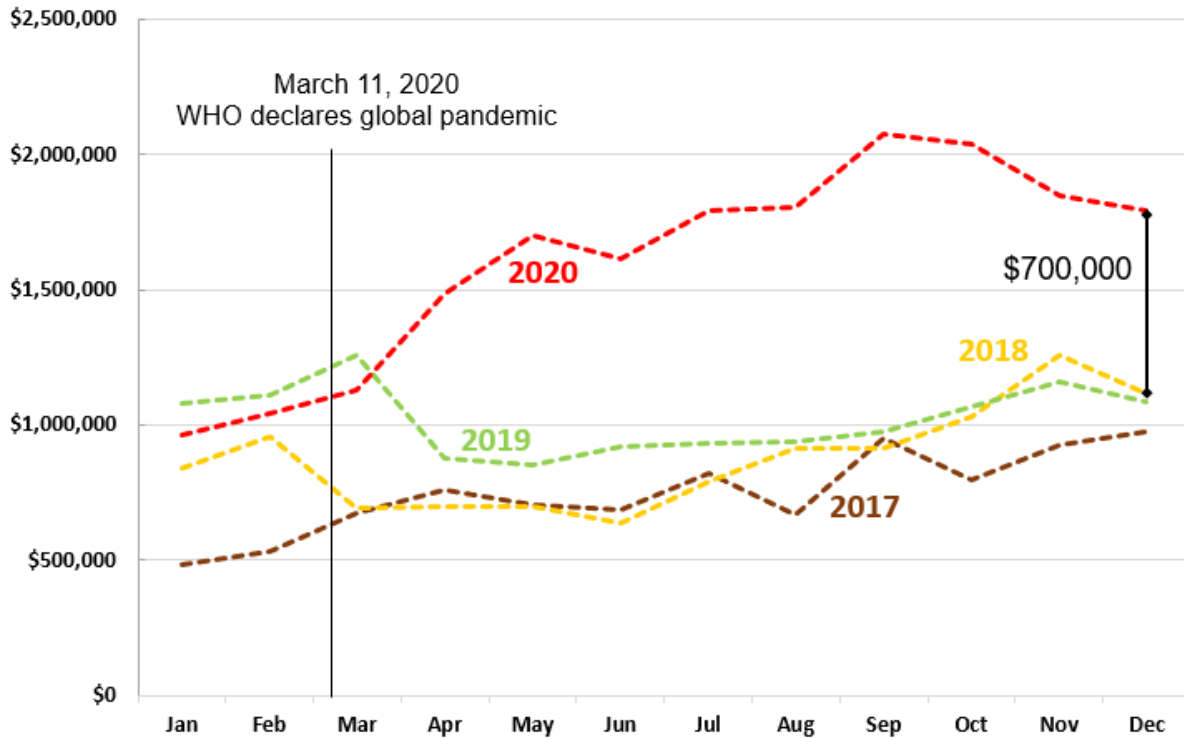


Figure 3-22. Monthly Commercial Water Customer Delinquency, 2017 to 2020, \$

### 3.2.3 Uncollectable Revenue

A separate spreadsheet model included in Appendix A was built to test the magnitude of month-to-month delinquencies and estimate overall additional uncollectable revenue under three variations of the pandemic scenario tied to “reopening” tourism. These three scenarios were informed by the University of Hawaii Economic Research Organization’s Annual Hawaii Forecast with Global Outlook (December 11, 2020). The forecast uses test-based reopening and access to a vaccine as predominant factors in reopening tourism. We identify rapid testing and effective contact tracing to also be important. The forecast does not use masking, physical distancing, minimizing social gatherings and good hygiene as differentiators in any of its three scenarios.

- A. Optimistic timeframe for test-based reopening, optimistic timeframe for rapid testing and effective contract tracing, no third wave, and independent of a vaccine due to extensive testing and contract tracing.
- B. Moderate timeframe for test-based reopening, no third wave, and vaccine is widely available Summer 2021.
- C. Pessimistic timeframe for test-based reopening, no rapid testing and effective contract tracing, third wave occurs, and vaccine is widely available late 2021.

Calendar year 2019 monthly delinquency amounts were used as the baseline. Monthly percentages are estimated for each of the scenarios representing a larger percentage of baseline delinquency dollars. Under Scenario A, delinquency amounts would return to normal by the end

of calendar year 2021. Under Scenarios B and C, delinquency amounts would return to normal by the end of calendar year 2022.

The BWS's typical uncollectable percent is 0.2 percent of revenues. For the pandemic scenarios, we presumed 5 percent of delinquencies for Scenario A, 10 percent of delinquencies for Scenario B, and 15 percent of delinquencies for Scenario C. Figure 3-23 shows the monthly projected residential delinquent billed revenue for the three scenarios. Uncollected revenue is projected to increase between \$136,000 to \$466,000 over normal levels.

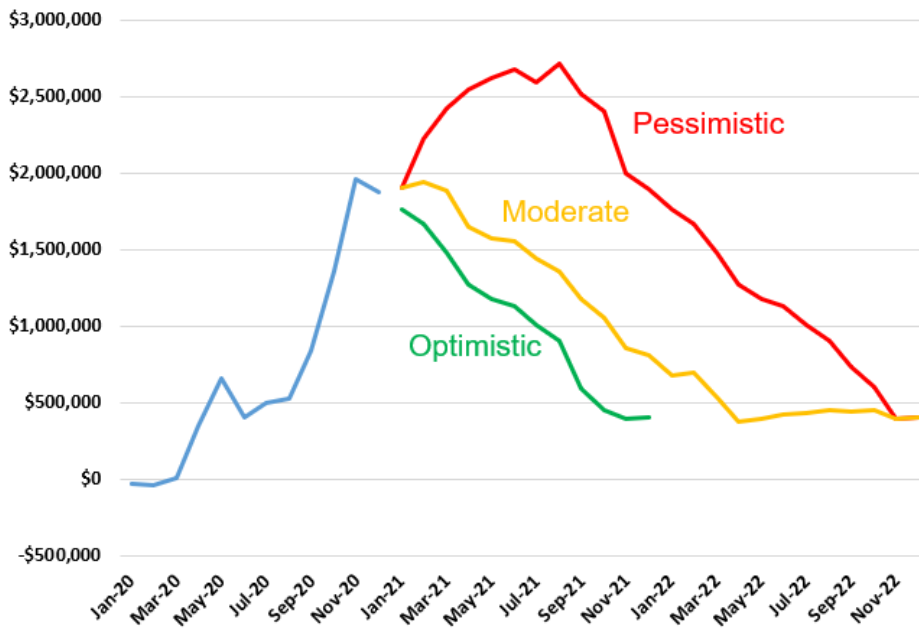
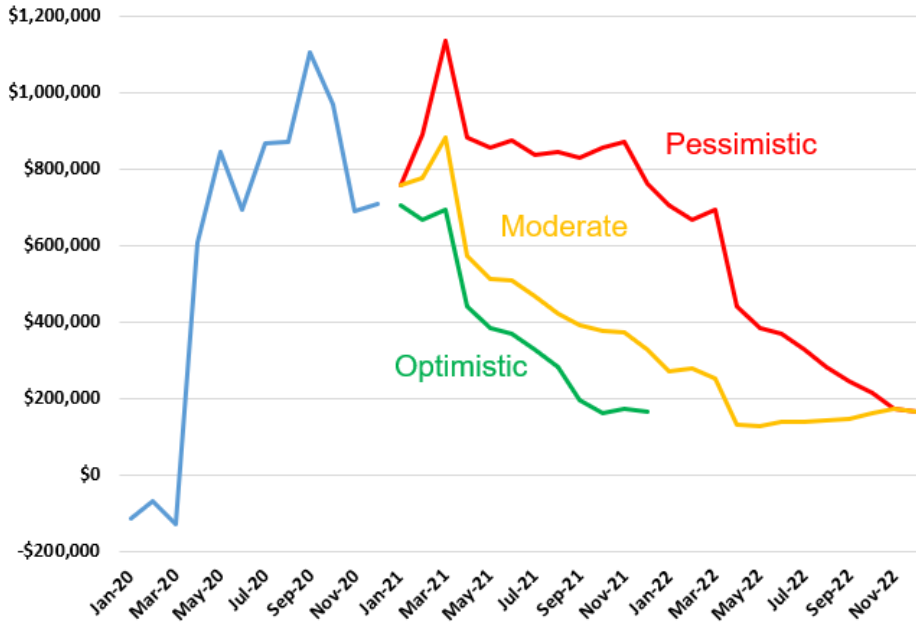


Figure 3-23. Residential Delinquency Scenarios

Figure 3-24 shows the monthly projected commercial delinquent billed revenue for the three scenarios. Uncollected revenue is projected to increase between \$22,000 to \$133,000 over normal levels.

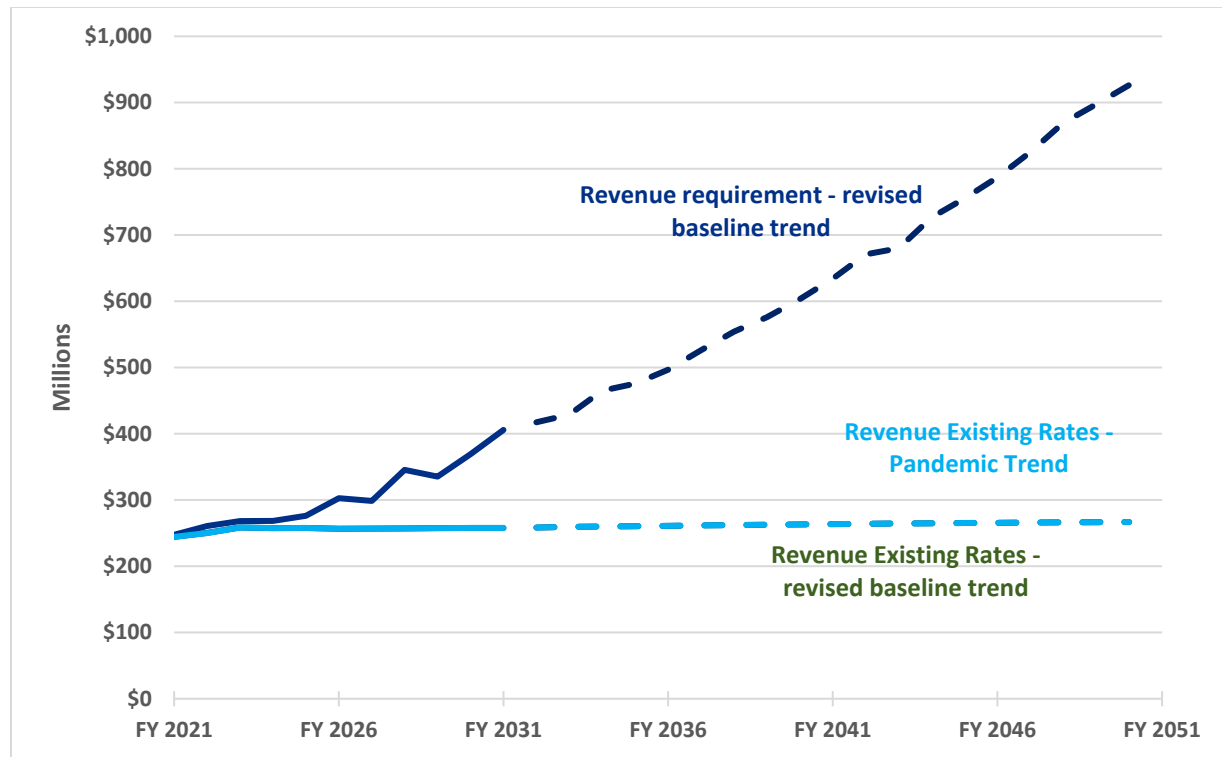




**Figure 3-24. Commercial Delinquency Scenarios**

The worst of these scenarios, C, was modeled at the annual level. Delinquencies were modeled to be about \$3.8 million in FY 2021 and \$2 million in FY 2022. All but 15 percent of these delinquency amounts were then paid back over FY 2023 through FY 2025. Delinquencies are normally paid back sooner, but to be conservative, we have made this assumption.

As seen in Figure 3-25, the revenue lines between the revised baseline and the pandemic scenario overlay each other. This indicates that these monthly cashflow issues, at the annual level, do not impact the long term trending.



**Figure 3-25. Revenue Requirements Impact due to Pandemic**

Consistent with Figure 3-25, Figure 3-26 shows that projected revenue adjustments for the pandemic scenario do not change from the revised baseline. Therefore, at an annual level, currently-projected impacts appear to be relatively minor and may be mitigated to some extent in the future by COVID-19 stimulus funds that may be made available. However, it is imperative to recognize that, as of this report date, the COVID-19 global pandemic is not over and the conditions necessary for comprehensive economic recovery have not been met. Moreover, there continues to be high uncertainty in the timing of when these conditions will be met. Additionally, multiple COVID-19 variants that are 70 percent<sup>1</sup> more contagious are circulating globally with scientists working to learn more about how easily they might spread, whether they could cause more severe illness, and whether currently authorized vaccines will protect people against them.

<sup>1</sup>UC Davis Health, Public Affairs and Marketing. “New, More Contagious Strains of COVID-19 May Be Spreading Quickly.” *UC Davis Health*, 13 Jan. 2021, [health.ucdavis.edu/health-news/newsroom/new-more-contagious-strains-of-covid-19-may-be-spreading-quickly/2021/01](https://health.ucdavis.edu/health-news/newsroom/new-more-contagious-strains-of-covid-19-may-be-spreading-quickly/2021/01).

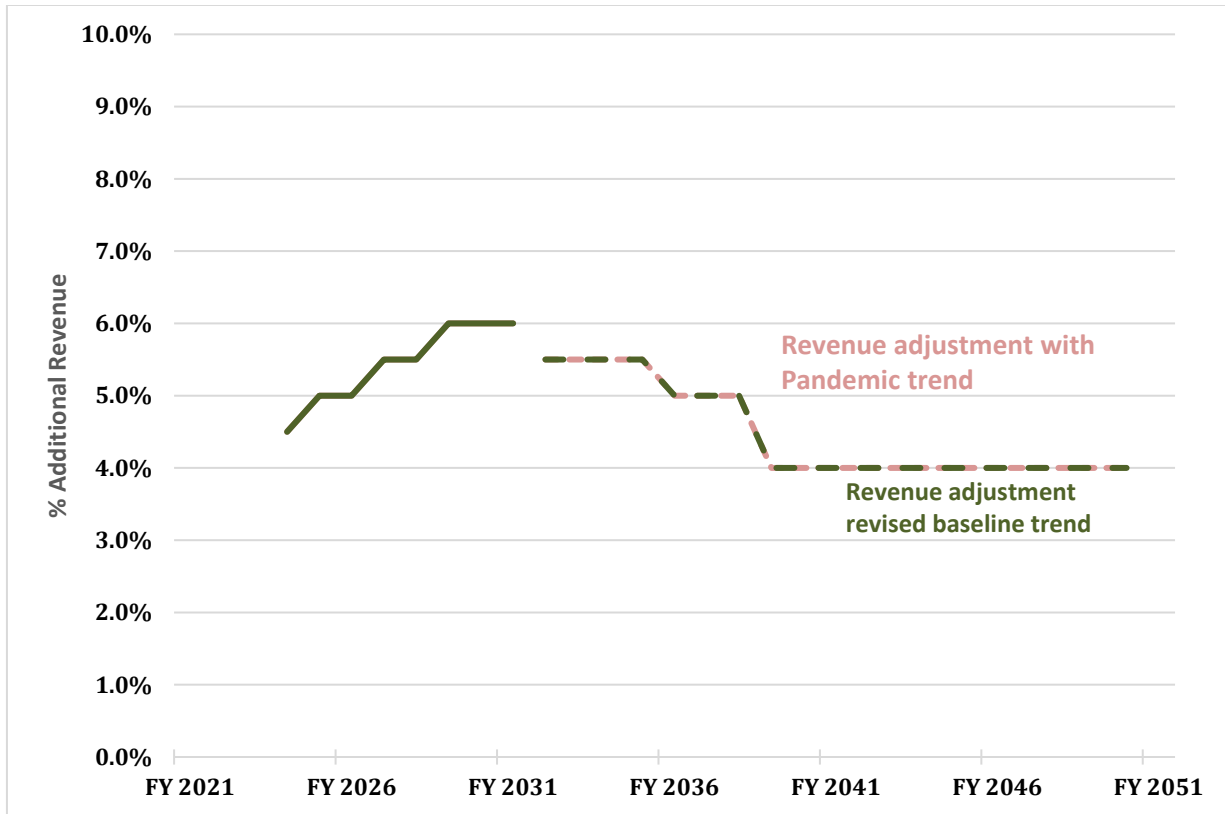


Figure 3-26. Additional Revenue Needs Trend as a Percent of Existing Rate-Based Revenue, Pandemic

### 3.2.4 Expense Impacts

The BWS has incurred additional expenses due to COVID-19 and is seeking reimbursement with the Coronavirus Aid, Relief, and Economic Security (CARES) Act funds. Expense types include installing touchless faucets, cleaning supplies, personal protective equipment, air filters, thermometers, COVID-19 impact study, and lobby renovations. Additional expenses are estimated to be about \$1.5 million. About \$900,000 of that has been reimbursed with CARES funds and another \$350,000, approximately, has been approved for funding. The remaining is either pending approval or is yet to be submitted for approval. Additional expenses continue to be evaluated for potential CARES fund reimbursement.

## 3.3 Concurrent Pandemic and Hurricane Scenario

The Long Range Financial Plan qualitatively discussed the impact of a major natural disaster (such as a hurricane or earthquake), which was defined as:

---

Major Natural Disaster – Assume damage to infrastructure causing capital needs and revenue loss as water service is interrupted or rate collection is reduced. Sampled disaster events caused capital damage ranging from 1.3 to 4.8 percent of net assets and revenue loss of 1.9 to 24 percent over the first year following the event.

---

From a planning perspective, it is instructive to consider the concurrent events of a major natural disaster and a global pandemic. It must be realized, however, that such consideration is speculative and should not be used or relied upon to guide either the implementation or avoidance of any current or future actions. Rather, decisions regarding specific financial actions should be made in the context of conditions at the time, were such an unfortunate combination of events could actually occur.

In the Long Range Financial Plan, the potential financial impacts to the BWS resulting from a major natural disaster were determined to be much more severe than what has been realized to date as a result of the COVID-19 global pandemic. For example, with the pandemic to date, there has been no apparent change to total water sales nor has there been any physical damage to facilities, and customers are largely able to pay their bills on time.

On September 11, 1992, Hurricane Iniki, the strongest hurricane to hit the Hawaiian Islands in recorded history, struck the island of Kauai. In 2008 US\$, it caused an estimated \$7.4 billion in damage. Coffman and Noy (June 2009)<sup>2</sup> estimated that it took 7-8 years for Kauai's economy to return to pre-Iniki levels, and that even after 17 years, it had not recovered in terms of population and labor force. Their work documents that Kauai experienced an outmigration of about 10 percent that was still persistent in 2009. In contrast, based upon a review of the County of Kauai, Department of Water Financial Statements as of June 30, 1994 and 1993, water sales for FY 1993 and FY 1994 were \$200,000 (3.4 percent) lower and \$369,000 (6.4 percent) higher, respectively, than the year preceding the hurricane. Therefore, even with a long, slow economic recovery, the water utility appeared to rebound quickly based on a review of water sales. This indicates that the water demands are relatively inelastic.

Given these uncertainties in the potential financial impacts associated with a concurrent global pandemic and natural disaster, appropriate planning actions that should be taken include an assessment of the potential risks and vulnerabilities to the BWS water system and utility personnel that would result from these events and the development of appropriate emergency response plans to be implemented as a result. In 2020, in accordance with the requirements of America's Water Infrastructure Act of 2018 the BWS completed both of these major activities and certified their completion to the United States Environmental Protection Agency.

---

<sup>2</sup> Coffman, Makena and Ilan Noy. "A Hurricane's Long-Term Economic Impact: the Case of Hawaii's Iniki." *ResearchGate*, July 2009, [https://www.researchgate.net/publication/228613232\\_A\\_Hurricane%27s\\_Long-Term\\_Economic\\_Impact\\_The\\_Case\\_of\\_Hawaii%27s\\_Iniki](https://www.researchgate.net/publication/228613232_A_Hurricane%27s_Long-Term_Economic_Impact_The_Case_of_Hawaii%27s_Iniki). Accessed January 2021.

## Section 4

### Conclusions

In response to the financial uncertainties posed by the COVID-19 global pandemic, the BWS has taken proactive steps to review both its operations and maintenance budget and capital budget, closely monitor water sales and revenues, analyze water production and rainfall trends, and track delinquencies. Reviews conducted to check financial conditions at the end of FY 2020 compared to the Long Range Financial Plan indicated that budgets needed to be reviewed to facilitate the BWS staying on course and within its financial policies. Accordingly, adjustments were made to the projected expenses, particularly in the near-term (through FY 2031), resulting in a revised baseline. Overall, near-term expenses are projected to be \$17 million more than in the Long Range Financial Plan. However, by imposing some austerity to increases in the operations and maintenance budget through the global pandemic and ensuing economic recovery, adjusting the timing of some capital expenditures, and adjusting the mix of bonds and cash to fund the capital improvement program, the revised baseline provides a roadmap for the BWS to meet its goals within the currently approved rate schedule and near-term revenue adjustments anticipated in the Long Range Financial Plan. Additionally, while estimated revenues were within 3 percent of actual, representing normal variability, the lower amount of revenues also contributed to the erosion of days of working capital. Of note, revenues from the Water System Facilities Charge, which has not been updated since the 1990's, are insufficient to cover the costs of all growth-related projects. Updating this charge is recommended. The charges are currently being reviewed and planned for Board consideration in FY2022.

Through the use of both debt and cash and strategic timing of projects, long-term projected revenue adjustments are expected to be similar to those projected in the Long Range Financial Plan. However, as seen already since the plan was created, actual conditions have resulted in deviations from the plan, requiring adjustments to budgeting processes as well as model assumptions. Accordingly, a rate study should be conducted to evaluate both actual and anticipated near-term conditions for the subsequent rate setting period that begins with FY 2024. This study should also consider updates to costs of service and affordability.

Under the revised baseline, impacts from different scenarios modeled in the Long Range Financial Plan yield similar results. This demonstrates the benefits of the BWS's active management of its financial conditions, which continue to be robust and flexible enough to address near-term realities.

With the shutdown of Hawaii's tourism-dependent economy due to the pandemic, coupled with stay at home orders, the BWS has predictably observed decreases in non-residential water demands. However, those decreases have been offset by increases in residential water usage, with no discernable impact to overall water use. Consequently, the BWS's water sales have been sustained throughout the pandemic. Close examination of delinquencies has shown that the stress on some individual customers is significant. The BWS has worked diligently with these customers to help them establish payment plans; thus, helping to limit the overall amount of delinquencies. The total amount of delinquencies at the end of December 2020 was

approximately \$2.6 million, or about 1.1 percent of the BWS's annual revenue. Consequently, the impact to the BWS's revenues seems limited to managing cashflow at the month-to-month level, with little-to-no impact on annual and long range modeling.

Potential long-term impacts from the pandemic are uncertain, depending on both the speed and vigor of the economic recovery, which is dependent on the virus and the actions taken to respond to it. However, coupled with the potential for a major natural disaster during a pandemic, the uncertainty only increases. Because there are no modern examples of this occurring, the evaluation of this scenario is speculative. One potential manifestation could be a decrease in Oahu's population if the tourism industry does not rebound quickly and robustly from a pandemic event, in combination with the sustained damage to tourism infrastructure that would be anticipated from a concurrent hurricane. If customers migrate to areas less economically impacted, then water consumption could decline commensurately, mimicking the water conservation scenario. Conversely, water demands could rebound relatively quickly, as occurred on Kauai after the extensive damage of Hurricane Iniki even with the sustained 10 percent decrease in population that followed.

In addressing potential future scenarios, the BWS still has access to the full range of mitigation strategies discussed in the Long Range Financial Plan. The trend analysis indicates that with diligent implementation of the Water Master Plan, on-going monitoring using the Water Master Plan scorecard and other available metrics, adherence to the financial policies, and proactive management and mitigation, any single year's revenue adjustment could remain below 10 percent. The possible exception is the scenario of a concurrent pandemic and major natural disaster that was not analyzed quantitatively due to its speculative nature. To avoid double-digit rate increases in this scenario, when customers will be least able to pay, the magnitude of mitigation adjustments could be much more significant than in other scenarios. These mitigations provide valuable tools to the BWS that will help it navigate successfully through the potential uncertainties of such an event.

Despite the relatively minor financial impacts to BWS documented thus far, it is imperative to recognize that, as of this report's date, the COVID-19 global pandemic is not over and the conditions necessary for comprehensive economic recovery have not been met. Moreover, high uncertainty in the timing of when these conditions will be met continues. Additionally, multiple COVID-19 variants are circulating globally with scientists working to learn more about how easily they might spread, whether they could cause more severe illness, and whether currently authorized vaccines will protect people against them.

## Appendix A

### Delinquency Recovery Model

A spreadsheet model was developed to project month-to-month delinquent amounts for the residential and commercial customer classes and to project the possible increase in uncollectable revenue due to more delinquencies.

Three variations of the pandemic scenario were created based on UHERO scenarios from its quarterly reports that are tied to “reopening” tourism. These three scenarios were informed by the University of Hawaii Economic Research Organization’s Annual Hawaii Forecast with Global Outlook (December 11, 2020). The forecast uses test-based reopening and access to a vaccine as predominant factors in reopening tourism. We identify rapid testing and effective contact tracing to also be important. The forecast does not use masking, physical distancing, minimizing social gatherings and good hygiene as differentiators in any of its three scenarios.

- A. Optimistic timeframe for test-based reopening, optimistic timeframe for rapid testing and effective contract tracing, no third wave, and independent of a vaccine due to extensive testing and contract tracing.
- B. Moderate timeframe for test-based reopening, no third wave, and vaccine is widely available Summer 2021.
- C. Pessimistic timeframe for test-based reopening, no rapid testing and effective contract tracing, third wave occurs, and vaccine is widely available late 2021.

The model uses calendar year 2019 monthly delinquency amounts as the baseline. Monthly delinquencies in 2019 ranged from \$2.5 million to \$3.0 million. Monthly delinquencies in 2020 ranged from \$2.7 million to \$4.6 million. The difference between these two years shows an increasing amount of delinquent revenues, up to 69 percent of the baseline. Analysis of historical delinquencies in 2018 and 2019 showed an approximate 15 percent increase in the dollar amount of annual average delinquencies. This 15 percent increase is considered the “return to normal” level in the model.

Informed by this comparison, the model projects monthly delinquencies for 2021 and 2022 for the three scenarios. Under Scenario A, delinquency amounts would return to normal by the end of calendar year 2021. Under Scenarios B and C, delinquency amounts would return to normal by the end of calendar year 2022.

The model also estimates the amount of delinquent revenue that will be uncollectable. The BWS’s typical uncollectable percent is 0.2 percent of revenues. For the pandemic scenarios, we presumed 5 percent of the maximum monthly delinquent amount for Scenario A, 10 percent for Scenario B, and 15 percent for Scenario C. This uncollectable amount would be in addition to the BWS’s historical uncollectable revenue.

The model works by having the user enter in the forecasted percent of the baseline delinquent amount for the month due to the pandemic scenario. For Scenario A, the additional delinquent amount starts at 65 percent and lowers to the baseline amount of 15 percent by the end of 2021. For Scenario B, the additional delinquent amount starts at 70 percent and steps down to 15 percent by the end of 2022. For Scenario C, the delinquent amount climbs from 70 percent to 100 percent over the first five months of 2021, then begins to decrease to 15 percent by the end of 2022.

The residential and commercial models, respectively, are shown on the following pages. Additional uncollectable residential revenue is projected to range from \$88,300 to \$408,000. Additional uncollectable commercial revenue is projected to range from \$35,200 to \$170,000.



### Residential Scenarios

Year	Month	2019 Baseline	Actuals	Actual - Baseline	%	Scenario A		Scenario B		Scenario C	
						Forecast %	Forecast \$	Forecast %	Forecast \$	Forecast %	Forecast \$
2020	Jan-20	\$2,717,884	\$2,685,569	-\$32,315	-1%						
	Feb-20	\$2,779,836	\$2,741,430	-\$38,406	-1%						
	Mar-20	\$2,698,650	\$2,706,883	\$8,234	0%						
	Apr-20	\$2,544,860	\$2,898,249	\$353,389	14%						
	May-20	\$2,624,874	\$3,282,881	\$658,006	25%						
	Jun-20	\$2,824,394	\$3,226,074	\$401,680	14%						
	Jul-20	\$2,883,057	\$3,379,100	\$496,043	17%						
	Aug-20	\$3,022,286	\$3,549,276	\$526,990	17%						
	Sep-20	\$2,957,969	\$3,798,822	\$840,853	28%						
	Oct-20	\$3,005,123	\$4,359,696	\$1,354,573	45%						
	Nov-20	\$2,671,364	\$4,629,303	\$1,957,939	73%						
	Dec-20	\$2,709,943	\$4,588,706	\$1,878,763	69%						
2021	Jan-21	\$2,717,884				65%	\$1,766,625	70%	\$1,902,519	70%	\$1,902,519
	Feb-21	\$2,779,836				60%	\$1,667,902	70%	\$1,945,885.36	80%	\$2,223,869
	Mar-21	\$2,698,650				55%	\$1,484,257	70%	\$1,889,054.78	90%	\$2,428,785
	Apr-21	\$2,544,860				50%	\$1,272,430	65%	\$1,654,159.32	100%	\$2,544,860
	May-21	\$2,624,874				45%	\$1,181,194	60%	\$1,574,924.68	100%	\$2,624,874
	Jun-21	\$2,824,394				40%	\$1,129,757	55%	\$1,553,416.55	95%	\$2,683,174
	Jul-21	\$2,883,057				35%	\$1,009,070	50%	\$1,441,528.45	90%	\$2,594,751
	Aug-21	\$3,022,286				30%	\$906,686	45%	\$1,360,028.75	90%	\$2,720,057
	Sep-21	\$2,957,969				20%	\$591,594	40%	\$1,183,187.68	85%	\$2,514,274
	Oct-21	\$3,005,123				15%	\$450,769	35%	\$1,051,793.20	80%	\$2,404,099
	Nov-21	\$2,671,364				15%	\$400,705	32%	\$854,836.51	75%	\$2,003,523
	Dec-21	\$2,709,943				15%	\$406,491	30%	\$812,982.77	70%	\$1,896,960
2022	Jan-22	\$2,717,884						25%	\$679,471.01	65%	\$1,766,625
	Feb-22	\$2,779,836						25%	\$694,959.06	60%	\$1,667,902
	Mar-22	\$2,698,650						20%	\$539,729.94	55%	\$1,484,257
	Apr-22	\$2,544,860						15%	\$381,729.07	50%	\$1,272,430
	May-22	\$2,624,874						15%	\$393,731.17	45%	\$1,181,194
	Jun-22	\$2,824,394						15%	\$423,659.06	40%	\$1,129,757
	Jul-22	\$2,883,057						15%	\$432,458.54	35%	\$1,009,070
	Aug-22	\$3,022,286						15%	\$453,342.92	30%	\$906,686
	Sep-22	\$2,957,969						15%	\$443,695.38	25%	\$739,492
	Oct-22	\$3,005,123						15%	\$450,768.51	20%	\$601,025
	Nov-22	\$2,671,364						15%	\$400,704.62	15%	\$400,705
	Dec-22	\$2,709,943						15%	\$406,491.38	15%	\$406,491

Enter actuals in column D  
 Enter forecast % in columns G, I, and K  
 Enter Uncollectable % in cells G44, I44 and K44

Maximum Delinquency Amount		\$1,766,625		\$1,945,885		\$2,720,057
Uncollectable %	5%		10%		15%	
Uncollectable Amount		\$88,331		\$194,589		\$408,009

### Commercial Scenarios

Year	Month	2019 Baseline	Actuals	Actual - Baseline	%	Scenario A		Scenario B		Scenario C	
						Forecast %	Forecast \$	Forecast %	Forecast \$	Forecast %	Forecast \$
2020	Jan-20	\$1,081,867	\$965,841	-\$116,027	-11%						
	Feb-20	\$1,109,851	\$1,041,587	-\$68,263	-6%						
	Mar-20	\$1,258,911	\$1,130,103	-\$128,808	-10%						
	Apr-20	\$880,459	\$1,488,070	\$607,611	69%						
	May-20	\$855,638	\$1,699,130	\$843,492	99%						
	Jun-20	\$920,374	\$1,612,603	\$692,229	75%						
	Jul-20	\$930,561	\$1,795,977	\$865,417	93%						
	Aug-20	\$937,117	\$1,808,170	\$871,053	93%						
	Sep-20	\$973,196	\$2,076,008	\$1,102,812	113%						
	Oct-20	\$1,070,958	\$2,037,669	\$966,711	90%						
	Nov-20	\$1,159,024	\$1,848,766	\$689,742	60%						
	Dec-20	\$1,089,322	\$1,795,913	\$706,591	65%						
2021	Jan-21	\$1,081,867				65%	\$703,214	70%	\$757,307	70%	\$757,307
	Feb-21	\$1,109,851				60%	\$665,910	70%	\$776,895.53	80%	\$887,881
	Mar-21	\$1,258,911				55%	\$692,401	70%	\$881,237.71	90%	\$1,133,020
	Apr-21	\$880,459				50%	\$440,230	65%	\$572,298.41	100%	\$880,459
	May-21	\$855,638				45%	\$385,037	60%	\$513,382.67	100%	\$855,638
	Jun-21	\$920,374				40%	\$368,150	55%	\$506,205.73	95%	\$874,355
	Jul-21	\$930,561				35%	\$325,696	50%	\$465,280.38	90%	\$837,505
	Aug-21	\$937,117				30%	\$281,135	45%	\$421,702.64	90%	\$843,405
	Sep-21	\$973,196				20%	\$194,639	40%	\$389,278.42	85%	\$827,217
	Oct-21	\$1,070,958				15%	\$160,644	35%	\$374,835.29	80%	\$856,766
	Nov-21	\$1,159,024				15%	\$173,854	32%	\$370,887.71	75%	\$869,268
	Dec-21	\$1,089,322				15%	\$163,398	30%	\$326,796.67	70%	\$762,526
2022	Jan-22	\$1,081,867						25%	\$270,466.84	65%	\$703,214
	Feb-22	\$1,109,851						25%	\$277,462.69	60%	\$665,910
	Mar-22	\$1,258,911						20%	\$251,782.20	55%	\$692,401
	Apr-22	\$880,459						15%	\$132,068.86	50%	\$440,230
	May-22	\$855,638						15%	\$128,345.67	45%	\$385,037
	Jun-22	\$920,374						15%	\$138,056.11	40%	\$368,150
	Jul-22	\$930,561						15%	\$139,584.11	35%	\$325,696
	Aug-22	\$937,117						15%	\$140,567.55	30%	\$281,135
	Sep-22	\$973,196						15%	\$145,979.41	25%	\$243,299
	Oct-22	\$1,070,958						15%	\$160,643.69	20%	\$214,192
	Nov-22	\$1,159,024						15%	\$173,853.61	15%	\$173,854
	Dec-22	\$1,089,322						15%	\$163,398.33	15%	\$163,398

Enter actuals in column D  
 Enter forecast % in columns G, I, and K  
 Enter Uncollectable % in cells G44, I44 and K44

Maximum Delinquency Amount		\$703,214		\$881,238		\$1,133,020
Uncollectable %	5%		10%		15%	
Uncollectable Amount		\$35,161		\$88,124		\$169,953

This page intentionally left blank.

