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EAST BAY PLAIN SUBBASIN GROUNDWATER SUSTAINABILITY PLAN CHAPTER 4 – PROJECTS AND MANAGEMENT ACTIONS

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- 4.B. EBMUD GSA Management Actions Supporting Information
- 4.C. Hayward GSA Projects Supporting Information
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LIST OF ACRONYMS AND ABBREVIATIONS

ACWD	Alameda County Water District	CASGEM	California State Groundwater Elevation Monitoring Program
AF	acre-feet		
AFY	acre-feet per year	CCR	California Code of Regulations
ASR	aquifer storage and recovery	CEQA	California Environmental Quality Act
bgs	below ground surface	CWC	California Water Code

DDW	California Division of Drinking Water	LSCE Team	GSP consultant team: LSCE, Geosyntec, ESA, BC, Dr. Moran, and Farallon Geographics
DMS	Data Management System		
DWR	California Department of Water Resources	MA	Management Actions
		MCL	maximum contaminant level
EBMUD	East Bay Municipal Utility District	µg/L	micrograms per liter
		mg/L	milligrams per liter
EBP	East Bay Plain	MGD	million gallons per day
ft	foot, feet	MO	Measurable Objective(s)
GAMA	Groundwater Ambient Monitoring and Assessment	MT	Minimum Threshold(s)
		NA	Not Applicable
GW	groundwater	RMS	Representative Monitoring Sites
GDE	groundwater dependent ecosystem	RWQCB	Regional Water Quality Control Board
gpd	gallons per day	SFPUC	San Francisco Public Utilities Commission
gpd/ft	gallons per day per foot		
GSA	Groundwater Sustainability Agency	SGMA	Sustainable Groundwater Management Act of 2014
GSP	Groundwater Sustainability Plan	SWRCB	State Water Quality Control Board
Hayward	City of Hayward		
HCM	Hydrogeologic Conceptual Model	TAC	Technical Advisory Committee
		TBD	To Be Determined
LBNL	Lawrence Berkeley National Laboratory	TDS	total dissolved solids
		TNC	The Nature Conservancy
LSCE	Luhdorff & Scalmanini Consulting Engineers	WDR	Waste Discharge Requirements

4. SUBBASIN PROJECTS AND MANAGEMENT ACTIONS

(California Code of Regulations) [CCR] Title 23, Section 354.42)

In accordance with GSP requirements, this chapter describes-is intended to describe the proposed projects and management actions (PMAs) necessary to maintainachieve sustainability goals and measurable objectives while avoiding undesirable results (UR) for the East Bay Plain (EBP) Subbasin. However, since the Subbasin groundwater extraction is only a quarter of its sustainable yield and the Subbasin is already sustainable, no PMAs are needed. Therefore, this chapter instead describes potential future water supply development opportunities (WSDOs) that may be implemented by EBMUD and Hayward that are still well within the overall sustainable yield. In addition, this chapter describes implementation actions (IA) that will help with the detection and avoidance of any UR that may be associated with potential future additional groundwater development. The detailed discussion of SMC for each of the sustainability indicators in Chapter 3, including graphics for individual RMS wells in the appendices, demonstrates how ~~undesirable resultsUR~~ are avoided with implementation of the ~~projects and management actions~~potential future WSDO described in this chapter.

The ~~project and management actions~~potential future WSDOs are described in accordance with ~~of~~ CCR Title 23, Sections 354.42 and 354.44, and are described separately for each GSA since each GSA will implement the ~~projects and managements actions~~potential future WSDO within the portion of the EBP Subbasin underlying its service area (see Chapter 1). A general description of ~~anticipated projects and management actions~~potential future WSDO and the associated costs ~~areis~~ presented in **Tables 4-1 and 4-2**, while **Table 4-3** further summarizes the total gross benefits and costs of the ~~projects~~potential future WSDO developed for each GSA.

The GSAs are committed to maintaining sustainability within the EBP Subbasin, and the ~~proposed projects and management actions~~potential future WSDO and IA reflect the GSA's desire to fill data gaps and let science-based decision-making drive the feasibility of additional future groundwater pumping.

4.1. EBMUD GSA ~~Projects~~Potential Future Water Supply Development Opportunities and ManagementImplementation Actions (CCR Title 23, Section 354.44)

The ~~proposed projects~~potential future WSDO and ~~management actionsIA~~ within the EBP Subbasin underlying EBMUD's service area reflect EBMUD's desire to maintain sustainability with the EBP Subbasin, fill known data gaps, and let science-based decisions drive the feasibility and size of potential future groundwater projects. Consequently, only EBMUD's potential future Bayside Phase 1 facility (if a replacement well is proposed for implementationinstalled) is

~~presented here as a potential future WSDO~~, while the proposed ~~management implementation~~ actions will fill data gaps, monitor the EBP Subbasin, and allow EBMUD to evaluate whether three ~~other~~ potential future ~~projects~~ WSDO (Additional Bayside Phase(s), Irrigation with Groundwater, and ~~Chabot Recovery~~ San Leandro Creek Supplemental Flows) are feasible. EBMUD's plans for financing ~~proposed projects~~ potential future WSDO and ~~management actions~~ A, along with coordination with other GSAs, ~~is~~ are also presented.

4.1.1. EBMUD's Bayside Phase 1

Construction of the Bayside Groundwater Project Phase 1 facilities was completed in 2010 (**Figure 4-1**), with construction of a facility that enable~~s~~ EBMUD to inject potable drinking water into the deep aquifer of the EBP Subbasin during years with surplus water and also to extract, treat, and use groundwater as a supplemental supply during times of drought. The Phase 1 facility ~~consists~~ originally consisted of an injection/extraction well, a water treatment plant, and pipelines connecting the treatment plant to the well, a subsidence monitoring system, and a network of groundwater monitoring wells. The wells were destroyed in 2026, and the pipeline to the injection/extraction well was disconnected and plugged, but the remaining Phase 1 facility components remain. The original injection/extraction system use~~d~~ an approximately 650-foot deep well located on property leased from the Oro Loma Sanitary District in San Leandro. When operated in injection mode, treated water from EBMUD's distribution system ~~is~~ was directed through the injection/extraction well into the deep aquifer of the East Bay Plain Subbasin. The injection mode operation ~~will~~ was planned to take place during years when surplus water ~~is~~ was available for storage. During droughts, water ~~will~~ was to be extracted and treated to meet all federal and state drinking water standards prior to distribution to customers. EBMUD Bayside Phase 1 is presented herein as a potential future WSDO in case the well is replaced at an adjacent site.

Table 4-1. Existing and Potential Future Projects <u>WSDQ</u> and Water Sources in the East Bay Plain Subbasin								
GSA	Existing Facilities or Potential Future	Project Type	Estimated Average Annual Operating Cost (\$/year)	Project Mechanism	Water Source			
					East Bay Hills Watershed	Tuolumne River Watershed	East Bay Plain Subbasin	Treated Wastewater
EBMUD	Existing <u>Potential Future</u>	Bayside Phase 1 Injection	\$30,000 to \$40,000	Increase Recharge	X			
EBMUD	Potential Future	Bayside Phase 2 Injection ¹	TBD ²	Increase Recharge	X			
EBMUD	Potential Future	Bayside Phase 3 Injection ¹	TBD	Increase Recharge	X			
EBMUD	Existing <u>Potential Future</u>	Bayside Phase 1 Extraction	\$30,000 to \$200,000	Expand Dry-Year Water Supply Portfolio			X	
EBMUD	Potential Future	Bayside Phase 2 Extraction ¹	TBD	Expand Dry-Year Water Supply Portfolio			X	
EBMUD	Potential Future	Bayside Phase 3 Extraction ¹	TBD	Expand Dry-Year Water Supply Portfolio			X	
Hayward	Existing	Extraction	\$60,000 to \$500,000	Emergency Water Supply			X	
Hayward	Potential Future	Extraction	TBD	Expand Dry-Year Water Supply Portfolio			X	
EBMUD	Existing	Recycled Water for Irrigation	See EBMUD Recycled Water Master Plan (2019)	Reduce SW Use and/or GW Pumping				X
EBMUD	Potential Future	Groundwater for Irrigation ¹	TBD	Reduce SW Use			X	
EBMUD	Potential Future	Groundwater for Supplemental Surface Water Flows ¹	TBD	Conserve Reservoir Storage			X	

¹ Implementation of this project will be based on science (i.e., collection of monitoring data with implementation of existing projects, filling data gaps, and additional data analysis).

² To Be Determined (TBD) if this potential future project is implemented.

Table 4-2. East Bay Plain Subbasin Management Implementation Actions							
GSA	Action	First Year of Implementation	Completion Date	Number of Monitoring Stations	Minimum Frequency	Estimated Capital Cost	Estimated 5-Year Operating Costs
EBMUD	RMS ¹ GW ² Level Monitoring	2022	Ongoing	19 15	Semi-Annual	NA ³	\$72,500 97,000
EBMUD	Non-RMS GW Level Monitoring	2022	Ongoing	Additional Evaluation Needed	Semi-Annual	NA	\$100 28,000
EBMUD	RMS GW Quality Monitoring	2022	Ongoing	19 14	Annual	NA	\$110,000
EBMUD	Baseline GW Quality Sampling	2023	2024 ⁷	19 14	Semi-Annual	NA	\$88 100,000
EBMUD	Synoptic Stream Monitoring	2023	2030	NA ³	NA ³	NA	\$75,000
EBMUD	Isotopic Sampling	2024	2024	NA	NA	NA	\$100 116,000
EBMUD	Subsidence Monitoring	2022	Ongoing	2 18	Continuous	NA	\$77,500 90,000
EBMUD	Baseline GDE ⁴ /Biologic Survey	2023	2023 ⁵	NA	NA	NA	\$150,000 0
EBMUD	Biological Surveys	2023	Ongoing	NA	Every 5 Years	NA	\$50 60,000
EBMUD	Install Shallow RMS Wells Near Creeks	2023	2024 ⁸	10 7	NA	\$115 587,000	NA
EBMUD	Monitoring Shallow Wells for GW Levels	2024	Ongoing	10 7	Semi-Annual	NA	\$21,000 24,500
EBMUD	Monitoring Shallow Wells for GW Quality	2024	Ongoing	10 7	Annual	NA	\$30,000 52,500
EBMUD	Install New Nested Monitoring Wells	2023	2024 ⁵	3	NA	\$400,000	NA
EBMUD	Monitoring New Nested Wells for GW Levels	2024	Ongoing	9 3	Semi-Annual	NA	\$21,000
EBMUD	Monitoring New Nested Wells for GW Quality	2024	Ongoing	9 3	Annual	NA	\$30,000 22,500
EBMUD	Install Stream Gages	2024 ⁸	2024 ⁸	2	NA	\$65 374,000	NA
EBMUD	Monitor Stream Gages	2024 ⁸	Ongoing	2	Monthly	NA	\$87,500 100,000
Hayward	RMS GW Level Monitoring ⁸	2022	Ongoing	8 3	Semi-Annual	NA	\$27,500 32,000
Hayward	Non-RMS GW Level Monitoring	2022	Ongoing	Additional Evaluation Needed	Semi-Annual	NA	\$25 29,000
Hayward	RMS GW Quality Monitoring ⁸	2022	Ongoing	7 3	Annual	NA	\$40,000 46,500
Hayward	Baseline GW Quality Sampling	2023	2024 ⁸	7 3	Semi-Annual	NA	\$32 37,000
Both	Annual Reporting	2022	Ongoing	NA	Annual	NA	\$275 195,000
Both	GSP Five-Year Updates Periodic Evaluations	2027	Ongoing	NA	Every 5 Years	NA	\$23 50,000
Both	DMS ⁵	2022	Ongoing	NA	Annual	NA	\$50 170,000
Both	Update Plume Info	2023	Ongoing	NA	Every 2 Years	NA	\$20,000 23,500
Both	Fate/Transport Modeling	TBD ⁶	TBD	NA	TBD	NA	\$100 116,000

¹ Representative Monitoring Site (RMS)

² Groundwater (GW)

³ Not Applicable (NA), No capital costs associated with this project, or Number of Monitoring Stations/Frequency do not apply to this Action

⁴ Groundwater Dependent Ecosystems (GDE)

⁵ Data Management System (DMS)

⁶ To Be Determined (TBD), the need for fate/transport modeling is uncertain/unknown

⁷ Additional baseline water quality sampling is still needed for some RMS

⁸ Costs are representative of the current RMS network, however, more RMS wells may be installed within the implementation plan period

Table 4-3. Summary of East Bay Plain Subbasin ~~Projects~~ WSDO by GSA

GSA	Gross Average Annual Benefit at Full Implementation	Estimated Capital Cost	Estimated Average Annual Operating Cost
EBMUD	Recharge = 47 AFY; Extraction = 134 AFY; Net Extraction = 87 AFY; Average Annual over 50 years	\$0 ¹ <u>\$1,000,000</u> ¹	\$3035,000 to \$200232,000 ²
Hayward	Extraction = 1,062 AFY (in years when operated)	\$0 ¹	\$6070,000 to \$5800,000
Total	Recharge = 47 AFY; Extraction = 134 AFY + 1,062 AFY in Years Hayward Emergency wells operate³		

¹ ~~Hayward~~ project is already built and does not have additional future capital costs; ~~the EBMUD Bayside well was destroyed in 2026, and the estimated capital cost assumes well replacement only, and that other existing facilities can still be utilized. Costs will be greater if a new pump is needed, additional piping needs to be installed, and/or if broader overall pump station design is needed.~~

² Average estimated annual operating costs are ~~\$3035,000~~/year with no injection/extraction operations; \$40,000/year with injection operations; and ~~\$200232,000~~/year with extraction operations.

³ EBMUD recharge is 196 AFY in the years for which injection occurs or 47 AFY on average over 50 years based on an assumed 12 years of operation during that 50-year period; EBMUD extraction is 1,120 AFY in years for which extraction occurs or 134 AFY on average over 50 years based on an assumed 6 years of operation during that 50-year period; Hayward Emergency wells extraction is 1,062 AFY for years in which an emergency is declared, and Hayward wells would operate.

4.1.1.1. Historical Operations

Bayside Phase 1 ~~is~~has operated in accordance with ~~the~~ General Waste Discharge Requirements (WDR) of Order No. R2-2007-0038, adopted by the San Francisco Regional Water Quality Control Board (RWQCB) on May 9, 2007. In accordance with permit requirements, the annual reports include groundwater level and quality measurements and injection and extraction amounts each year. ~~RWQCB terminated the Bayside Phase 1 WDR in 2025 ahead of the Bayside well destruction.~~

The Bayside Phase 1 Well ~~has~~sd an operational injection capacity of approximately 0.35 MGD and an extraction capacity of 2 MGD. Between 2009 ~~and~~ 2011, a total of about 29 million gallons of potable water was injected into the Deep Aquifer of the EBP Subbasin as part of startup testing of the facility (**Table 4-4**). Between 2017 ~~and~~ 2019, a total of about 18 million gallons of potable water was injected, as shown in **Table 4-4**. Injection of water into the Bayside Phase 1 Well ~~can~~could only occur during years when surplus water ~~is~~was available, if pre-1914 water ~~is~~was available from the San Leandro Creek watershed, and if EBMUD's Upper San Leandro Water

Treatment Plant ~~is was~~ operational and in use at the time of injection. The extraction volumes from 2009 to 2020 were relatively minor, ranging from 4,545,000 to 113,000,000 gallons per year. However, as shown in **Table 4-4**, since conducting startup testing of the facility in 2009 and a pump test in 2010, no extraction has occurred except for groundwater sampling and maintenance ~~operation-operations~~. Prior to the destruction of the Bayside well, EBMUD ~~still needs to obtain~~had not obtained a drinking water permit ~~before piloting~~needed to pilot extraction for use in EBMUD's distribution system.

Table 4-4. Summary of Historical Bayside Phase 1 Well Operations			
Year	Extraction (gallons)	Injection (gallons)	Comments
2009	4,545,000	445,000	Startup Testing
2010	113,000,000	0	Aquifer Test: Extraction from August 4 to September 29 associated with <u>a</u> regional aquifer test at <u>a</u> continuous pumping rate of 1,400 gpm (2.0 MGD).
2011	0	28,432,401	Startup testing injection occurred from June 1 to August 1; <u>the</u> average rate of injection was 318 gpm (0.459 MGD).
2012	0	0	
2013	0	0	
2014	0	0	
2015	0	0	
2016	0	0	
2017	0	1,310,000	Injection occurred from February 10 to February 15 at rates ranging from 160 to 250 gpm (0.216 to 0.360 MGD).
2018	0	8,340,000	Injection occurred from October 9 to November 1 at an average rate of 252 gpm (0.363 MGD).
2019	0	8,390,000	Injection occurred from November 18 to December 11 at an average rate of 253 gpm (0.365 MGD).
2020	0	0	
<u>2021</u>	<u>0</u>	<u>0</u>	
<u>2022</u>	<u>0</u>	<u>0</u>	
<u>2023</u>	<u>0</u>	<u>0</u>	

Table 4-4. Summary of Historical Bayside Phase 1 Well Operations

<u>2024</u>	<u>0</u>	<u>0</u>	
<u>2025</u>	<u>0</u>	<u>0</u>	
Total	117,545,000	46,917,401	

4.1.1.2. Project Benefits, Planned Injection, and Planned Extraction Operations

For evaluation purposes in the GSP only, it was assumed EBMUD ~~will begin~~ began implementing the Bayside Phase 1 project in 2022, where injection only occurs when surplus water is available, which for the purposes of this evaluation ~~is was~~ assumed to occur for each year defined as a wet year, and extraction in the third (and any subsequent) year of a drought for a period of up to 6 months. EBMUD expects that the project will be operated in approximately one out of every three years on average for either injection or extraction over the long term (i.e., 50 years or more).

Injection wells provide groundwater benefits by recharging the EBP Subbasin when surface water is abundant. The estimated project benefits developed for the GSP are based on representative average hydrologic conditions. Based on a hydrologic and operations analysis covering the future 50-year period from 2022 to 2071, and the resulting frequency and rate of injection expected, the average annual net recharge benefit for the existing Bayside well would be 47 AFY as a 50-year annual average. The benefit in a year in which the injection occurs is 196 AF. The reliability of source water is based on historical hydrology being a good projection of future hydrology. **Table 4-5** summarizes the estimated annual net recharge benefit, expected probability of water year type, and the weighted-average annual recharge for the injection well.

Table 4-5. EBMUD Bayside Phase 1 Well Average Injection Recharge

Year Type	Total Annual Volume (AF)	% of Years	Weighted Average Volume (AFY)
Wet (Surplus water available)	196	24%	47
Average	0	40%	0
Drought	0	36%	0
Average Annual			47

Extraction ~~will~~would help make EBMUD’s overall water supply portfolio during droughts more diversified and resilient. Based on a hydrologic and operations analysis covering the future 50-year period from 2022 to 2071 and the resulting frequency and rate of extraction expected, the average annual net extraction benefit for the existing Bayside well would be 134 AFY as a 50-year annual average. The benefit in a year in which extraction occurs is 1,120 AF. The reliability of source water is based on historical hydrology being a good projection of future hydrology. **Table 4-6** summarizes the estimated annual net extraction benefit, expected probability of water year type, and the weighted-average annual water supply from the extraction well.

The EBP Subbasin is not overdrafted, and current groundwater pumping is a relatively small fraction of ~~the~~ estimated sustainable yield. ~~Potential~~ implementation of this project is consistent with meeting measurable objectives, avoiding the exceedance of minimum thresholds, and avoiding undesirable results for all six sustainability indicators. There will be notice provided to the public and other agencies regarding possible future implementation of other EBMUD GSP projects through GSA stakeholder outreach (e.g., website postings, meetings, press releases), and the California Environmental Quality Act (CEQA) process.

Table 4-6. EBMUD Bayside Phase 1 Well Average Extraction			
Year Type	Total Annual Volume (AF)	% of Years	Weighted Average Volume (AFY)
Wet (Surplus water available)	0	24%	0
Average	0	40%	0
First/Second Year in Drought	0	24%	0
Third Year or later in Drought	1,120	12%	134
Average Annual			134

4.1.1.3. Water Source

Water for injection during years when surplus water is available ~~will~~would be obtained from pre-1914 waters from San Leandro Creek watershed either through direct diversion or withdrawal from previously collected pre-1914 waters in Upper San Leandro Creek Reservoir. Water for extraction will be derived from the Deep Aquifer in the EBP Subbasin. Some of the water extracted from the Deep Aquifer will have been sourced from surface water supply from the San Leandro Creek watershed injected into the Deep Aquifer. The remaining water extracted from the Deep Aquifer will be derived from native/local recharge in the EBP Subbasin.

4.1.1.4. Project Costs

Future costs relate only to ongoing annual maintenance and operation costs, which are estimated at \$~~30~~35,000 (years with no extraction) to \$~~200~~232,000 per year (years with extraction).

4.1.2. ~~Management~~Implementation Actions

EBMUD GSP ~~management actions (MA or actions)~~IA include a number of items to address sustainable groundwater management of EBP Subbasin. These actions can be grouped into broad categories that include monitoring, construction of new monitoring facilities, special studies, biological surveys, GSP reporting, and other actions. These actions will help fill existing data gaps and facilitate ongoing sustainable management in the EBP Subbasin in accordance with this GSP. These actions are described in more detail in this section.

4.1.2.1. ~~Management~~Implementation Actions Overview

The ~~MA~~IAs to be conducted by EBMUD are summarized in **Table 4-7**, along with estimated capital costs and annual operating costs. In some cases (e.g., ~~Five-Year GSP Update Report~~Periodic Evaluation), costs are incurred in one year but are spread out over time to derive the reported average annual operating cost in **Table 4-7**. More detailed estimated costs by year are provided in **Appendix 4.B**.

4.1.2.1.1 Monitoring

The RMS wells in the groundwater level monitoring network are shown ~~on~~in **Figure 3-1**. The costs for RMS groundwater level monitoring includes both existing RMS wells and RMS wells ~~planned for construction~~recently installed under a DWR Proposition 68 grant ~~that are anticipated to be completed by the end of 2022~~. Most of these wells have (or will have) transducers installed for automated water level monitoring, and semi-annual manual measurements and transducer downloads will be conducted as part of this action. In addition to the RMS groundwater level monitoring wells, a broader network of groundwater level monitoring wells (non-RMS wells) is ~~being investigated for inclusion~~included in the overall monitoring network (**Appendix 3.G**). Non-RMS wells ~~being investigated in the network~~ include ~~current~~former CASGEM wells that are not RMS wells, Port of Oakland monitoring wells, and EBMUD monitoring wells that are not currently ~~CASGEM or RMS wells. The current status of Port of Oakland wells is unknown and will require further coordination and investigation with the Port of Oakland. It is anticipated that the initial network of non-RMS wells to be included in the broader GSP monitoring network will be established by the end of 2023.~~RMS wells.

Table 4-7. EBMUD EBP Subbasin ~~Management~~Implementation Actions

Project	First Year of Implementation	Completion Date	Number of Monitoring Stations	Minimum Frequency	Estimated Capital Cost	Estimated Five-Year Costs
Monitoring Actions						
RMS ¹ GW ² Level Monitoring	2022	Ongoing	19 <u>15</u>	Semi-Annual	NA ³	\$72,500 <u>\$97,000</u>
Non-RMS GW Level Monitoring	2022	Ongoing	TBD ⁴ <u>15</u>	Semi-Annual	NA	\$100 <u>\$28,000</u>
RMS GW Quality Monitoring	2022	Ongoing	19 <u>14</u>	Annual	NA	\$110,000
Baseline GW Quality Sampling	2023 <u>22</u>	2024 ⁵ <u>25</u>	19 <u>14</u>	Semi-Annual	NA	\$88 <u>\$100,000</u>
Subsidence Monitoring	2022	Ongoing	2 <u>15</u>	Daily	NA	\$77,500 <u>\$90,000</u>
Synoptic Stream Monitoring	2023	2030	NA ⁵	NA ⁵	NA	\$75,000
Construction of New Monitoring Facilities						
Install Shallow RMS Wells Near Creeks	2023 <u>27</u>	2024 <u>28</u>	10 <u>7</u>	NA	\$115 <u>\$587,000</u>	\$115 <u>\$587,000</u>
Monitoring Shallow Wells for GWL	2024 <u>28</u>	Ongoing	10 <u>7</u>	Semi-Annual	NA	\$21,000 <u>\$24,500</u>
Monitoring Shallow Wells for GWQ	2024 <u>28</u>	Ongoing	10 <u>7</u>	Annual	NA	\$30,000 <u>\$52,500</u>
Install Stream Gages	2024 <u>27</u>	2024 <u>28</u>	2	NA	\$65 <u>\$374,000</u>	\$65 <u>\$374,000</u>
Monitor Stream Gages	2024 <u>28</u>	Ongoing	2	Monthly	NA	\$87,500 <u>\$100,000</u>
Install New Nested Monitoring Wells	2023	2024 <u>25</u>	3	NA	\$400,000	\$400,000 <u>0</u>

Table 4-7. EBMUD EBP Subbasin ~~Management~~Implementation Actions

Project	First Year of Implementation	Completion Date	Number of Monitoring Stations	Minimum Frequency	Estimated Capital Cost	Estimated Five-Year Costs
Monitoring New Nested Wells for GWL	202 4 <u>5</u>	Ongoing	9 <u>3</u>	Semi-Annual	NA	\$21,000
Monitoring New Nested Wells for GW Quality	202 4 <u>5</u>	Ongoing	9 <u>3</u>	Annual	NA	\$30,000 <u>22,500</u>
Special Studies						
Isotopic Sampling	2028	2028	NA ⁴	NA	NA	\$400 <u>116,000</u>
GDE/Biological Monitoring						
Baseline GDE/Biological Surveys	202 3 <u>4</u>	202 3 <u>5</u>	NA	NA	NA	\$150,000 <u>0</u>
Biological Surveys	202 3 <u>5</u>	Ongoing	NA	Every 5 Years	NA	\$50 <u>60,000</u>
Reporting						
Annual Reporting	2022	Ongoing	NA	Annual	NA	\$178,750 <u>127,000</u>
GSP Five-Year Updates <u>Periodic Evaluations</u>	2027	Ongoing	NA	Every 5 Years	NA	\$162,500 <u>228,000</u>
Other						
DMS	2022	Ongoing	NA	Annual	NA	\$25 <u>85,000</u>
Update Plume Info	2023	Ongoing	NA	Every 2 Years	NA	\$13,000 <u>15,500</u>
Fate/Transport Modeling	TBD ⁶	TBD	NA	TBD	NA	\$65,000 <u>75,500</u>

¹ Representative Monitoring Site (RMS)

² Groundwater (GW)

³ Not Applicable (NA); no associated capital costs

⁴ ~~To Be Determined (TBD); candidate non-RMS wells need further evaluation~~

⁵⁴ Not Applicable (NA), Number of Monitoring Stations/Frequency does not apply to this Action

⁵ Additional baseline water quality sampling is still needed for some RMS

⁶ To Be Determined (TBD); Start Date, Completion Date, and Frequency are unknown at this time

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The RMS groundwater quality wells are the same group of wells as for RMS groundwater level monitoring, with the exception of MW-8D (Figure 3-11). In the long-term, these wells will be sampled annually for arsenic, nitrate, chloride, and TDS, and a more comprehensive constituent analysis suite will occur every five years (e.g., full general mineral suite). In addition, baseline sampling of the groundwater quality RMS wells for key constituents ~~is needed~~ was conducted over the initial four years of GSP implementation to confirm the baseline for establishing MO and MT. Baseline sampling will include a minimum of four samples collected in both spring and fall over at least two different years, preferably different water year types (e.g., wet and dry). ~~The non-RMS monitoring well network (Appendix 3.G) will be evaluated for supplemental water quality sampling for selected key constituents that may inform characterization of basin conditions (e.g., chloride samples in non-RMS wells along Bay margin that may be useful as sentinel wells for seawater intrusion).~~

Synoptic (also known as hydrometric) stream monitoring involves collecting stream discharge measurements along the course of a stream on the same day as close together in time as possible to improve understanding of gaining and losing reaches along a length of stream. Typically, stream discharge measurements will be collected at four or more locations along a stream for each synoptic event. Synoptic stream monitoring events during different seasons and different water year types enable a more comprehensive understanding of gaining and losing reaches. ~~These~~ Stream synoptic monitoring events ~~in EBP Subbasin will initially focus~~ were conducted on San Pablo, ~~Wildcat,~~ and San Leandro Creeks as part of the stream isotope study completed in 2023 (Figure 2-6). The need for additional synoptic monitoring will be evaluated after obtaining data from the future stream gages and shallow monitoring wells near creeks.

4.1.2.1.2 Construction of New Monitoring Facilities

New monitoring facility construction will largely correspond to streamflow measurement and understanding the interaction between streams and shallow groundwater levels. ~~±~~ Seven new shallow single completion monitoring wells (likely 20 to 40 feet deep) will be installed at locations to be determined along major creeks (San Pablo, ~~Wildcat,~~ and San Leandro, ~~and possibly San Lorenzo~~ Creeks) and in potential GDE areas (Figure 2-6 and 2-38). Groundwater levels (with transducers installed) and potentially groundwater quality will be monitored at these locations to establish baseline conditions, and then MT and MO will be assigned and incorporated into the RMS monitoring network. These wells are planned to help address the surface water depletion sustainability indicator, along with the chronic groundwater level decline sustainability indicator.

New monitoring facility construction will also include installation of two new stream gages; one will be located on San Pablo Creek and another on San Leandro Creek (**Figure 2-6**). The locations of the new gages remain to be determined; potential locations for the gages will be identified from which to select the optimal locations. Automated stream stage data collection equipment would then be installed, a rating curve established (between stream stage and stream discharge), and ongoing measurements collected. These stream gages will be used in conjunction with ~~synoptic stream monitoring and~~ shallow groundwater monitoring wells ~~and any potential future synoptic monitoring~~ to better inform ~~the~~ overall understanding of the surface water depletion sustainability indicator.

A third component of new construction ~~will include~~included drilling and installation of ~~up to~~ three new ~~deep-nested well~~ monitoring ~~sites with up to three different well depth completions at each site wells~~. One of these sites is ~~planned to be~~ located in ~~north-central Oakland~~San Pablo in the northern portion of the EBP Subbasin to fill a data gap in that area. The ~~two other locations remain to be determined following an updated assessment of~~ second location is in Berkeley near the shoreline in another data gap ~~areas-area~~. The third well is located in Hayward near the Transition Zone Boundary. Baseline water level and water quality sampling ~~would be~~is being conducted at these new monitoring facilities for subsequent incorporation into the RMS monitoring network.

4.1.2.1.3 Special Studies

Periodic special studies are anticipated to fill data gaps and enhance the understanding of groundwater basin conditions. A special study ~~is currently underway~~was completed in 2023 under a DWR Proposition 68 grant to conduct stream discharge and isotope sampling along San Pablo and San Leandro Creeks to improve the understanding of stream-aquifer interaction. ~~Results from this ongoing isotopic~~This study ~~are expected by the end of 2022, along~~will be integrated with other GSP Implementation work related to streams to help refine the understanding of stream-aquifer interactions. Additional studies using isotopes may be identified to further refine the understanding of stream-aquifer interaction. It is assumed ~~that~~ one additional study may occur within the initial ten years of the GSP Implementation Period.

Another special study ~~being conducted~~completed in 2026 under the DWR Proposition 68 grant involves~~sd~~ developing additional data related to the hydrogeologic boundary that occurs between ~~the~~ EBP Subbasin and ~~the~~ Niles Cone Subbasin. This special study ~~involves a combination of long term regional aquifer testing and collection of~~involved collecting groundwater isotope data. It builds upon previous work conducted by USGS (2019), LSCE

(2003), Fugro (2011), and the HCM for this GSP (Chapter 2). Other presently unidentified studies that support sustainable groundwater management may be conducted in the future.

4.1.2.1.4 Biological Surveys

Biological surveys ~~planned to be conducted include~~ were completed in 2025 and included a baseline field investigation to further characterize and validate potential GDEs, including the identification of specific species at each location to allow more specific evaluation of rooting depths. Work conducted ~~to date has~~ through 2022 included a review of available GDE databases provided by TNC and others; however, no fieldwork ~~has~~ been conducted at that time to further refine and validate potential GDE locations and species identification. The ~~planned~~ subsequently implemented baseline field investigation ~~would also establish~~ established current conditions for ecological health at ~~each~~ several potential GDE locations (Figure 2-38) to provide a basis for comparison for future surveys to be conducted every five years.

During the baseline map refinement and field verification of potential GDEs, biologists ~~would~~ classified the vegetation communities, recorded ed the dominant plant species present, specifically noting any native riparian phreatophyte species, and ~~took~~ notes on water sources. They ~~will~~ also review ed available survey data for salmonids in San Pablo, San Leandro, and Wildcat Creeks from EBMUD and East Bay Regional Parks, habitat mapping where available, and survey data for California red-legged frogs and other special-status species. ~~If possible,~~ Representative areas within each major system of GDEs ~~will be~~ were visited, where public access ~~is~~ was available. ~~If~~ Where access ~~is~~ was limited, bridges or other overlook areas ~~will be~~ were used where possible, using binoculars, if needed. If ground-level visual assessment ~~is~~ was not possible, aerial photo interpretation, groundwater mapping, and potentially other information (e.g., historical topography maps) ~~will be~~ were used to make an assessment. Where site access ~~is~~ was feasible, biologists ~~will~~ also recorded ed habitat suitability for special-status species so that this information ~~can~~ could be incorporated into the baseline data for each GDE and evaluated later to determine whether groundwater conditions in the basin may have potential effects on GDEs that support these species and whether negative effects may occur. Local information on sensitive species and the potential relationship to groundwater ~~will be~~ was incorporated during this step.

The information from the field assessments ~~will be~~ was integrated into the GDE mapping data, with the main goal of determining which of the 537 acres of potential GDEs that were identified as requiring additional assessments should be classified as likely GDEs, based on available field data. The product of the baseline map refinement and field verification ~~will be~~ is a data layer with refined GDE boundaries and attributed vegetation community information. Areas determined ~~to~~

not ~~to~~ meet the criteria ~~will~~ have documentation for the basis for determining no hydrologic connection between the vegetation community and groundwater.

A subset of verified GDEs ~~will be~~was selected for baseline and ongoing ecological condition assessment. Wherever possible, sites ~~will be~~were selected that are representative of a plant community type, at a location near a groundwater well, and where other hydrologic data (e.g., stream gauge data) or biological survey data ~~is~~are available. Sites ~~will~~were also ~~be~~ selected based upon ecological value, such as GDEs supporting populations of special status species (e.g., Western pond turtle). Ecological condition is a measure of how a GDE is functioning with respect to providing habitat and performing water quality functions. At each location, the vegetation and hydrology ~~will be~~were assessed within a discrete monitoring area. The locations ~~will be~~were recorded using a GPS unit. Each of the locations will be chosen to be publicly accessible.

~~Following the baseline survey to be conducted within the initial five years of GSP implementation,~~
There will be periodic biological surveys every five years prior to ~~Five-Year Update Report~~the
Periodic Evaluations to allow for assessment of the ecological health of potential GDEs compared to the baseline survey. These GDE biological surveys will be analyzed in conjunction with groundwater level and quality data collected from the planned shallow monitoring wells. The ~~Five-Year Update Report would~~Periodic Evaluation will describe the results of the GDE biological surveys, along with a discussion of shallow zone groundwater level fluctuations and groundwater quality.

4.1.2.1.5 GSP Reporting

The GSAs will prepare GSP Annual Reports in accordance with GSP regulations to document groundwater levels, groundwater storage change, basin water balance conditions, progress on implementation of projects and management actions, and comparisons to MT, IM, and MO. In addition, a ~~Five-Year Update Report~~Periodic Evaluation will be prepared beginning in 2027 and every five years thereafter. The ~~Five-Year Update Reports~~Periodic Evaluations will be more detailed than Annual Reports, as these are key checkpoints during the GSP Implementation Period to report on groundwater basin status compared to Interim Milestones and to report the status of ~~projects and management actions~~potential future WSDO compared to the schedule presented in the GSP. ~~A~~Groundwater model ~~update is also likely to~~updates may occur at certain Five-Year intervals to incorporate new data, refine model structure as needed, and potentially recalibrate the model to recent water levels and streamflow data. In addition, the ~~Five-Year Update Report~~Periodic Evaluation will include more detailed reporting on other data sets being collected, such as groundwater quality data and subsidence (extensometer) data.

4.1.2.1.6 Other Actions

Other actions following submittal of the GSP include data input and maintenance of the DMS, periodic assessment of contaminant plumes that may be in proximity to GSA projects, and possible fate and transport modeling related to potential future groundwater quality issues.

4.1.2.2. Implementation

Implementation ~~of management~~ actions ~~will begin~~were initiated in 2022 following ~~the~~ GSP submittal. Certain actions ~~will begin~~began immediately (e.g., RMS groundwater level monitoring), while other activities will require additional time to identify and vet optimum construction locations (e.g., installation of shallow monitoring wells along creeks) and resolve other logistical issues (e.g., property access, permitting, consultant/contractor retention). The GSP implementation schedule is discussed in more detail in Chapter 5.

4.1.2.3. ~~Management~~Implementation Action Operations and Monitoring

EBMUD will be responsible for ~~MAIA~~ operations and monitoring. EBMUD is already conducting groundwater level monitoring and groundwater quality sampling in selected wells. EBMUD will likely implement the various ~~MAIA~~ listed above using a combination of EBMUD staff, consultants to provide specific professional services, and outside contractors.

4.1.2.4. ~~Management~~Implementation Action Benefits

The benefits of ~~implementation~~ the ~~MAIA~~ outlined above are primarily two-fold: 1) allows for good groundwater basin management and meeting GSP/SGMA requirements; and 2) provides a significantly improved understanding of groundwater basin conditions, including stream-aquifer interaction. The ~~MA are~~IA is expected to greatly improve the spatial and vertical distribution of data needed to optimize groundwater basin management. Data gaps will be further evaluated as identified ~~MAIAs~~ are implemented to determine if additional ~~MAIAs~~ are warranted to further enhance the understanding of the EBP Subbasin and its management.

~~MA are~~IA is also expected to provide substantial benefits towards tracking MO, IM, and MT, and assist with avoiding the occurrence of UR. Notification of the public and other agencies regarding ~~the~~ implementation of ~~MAIA~~ will occur through EBMUD GSA stakeholder outreach, meetings, and press releases.

4.1.2.5. ~~Management~~Implementation Action Costs

The estimated costs for EBMUD ~~management actions~~IA are summarized in **Table 4-7½** with a more detailed year-by-year estimate provided in **Appendix 4.B**. The overall costs for the ~~first~~

~~ten~~ next five years of the implementation period amount to an estimated \$~~3,301,250~~ 2,313,500, or an average of \$~~330,125~~ 462,700 on an annual basis.

4.1.3. Future EBMUD Projects Pending Data and Science

EBMUD has and will continue to look for opportunities to diversify its water supply portfolio to help improve resiliency to changing climate, regulations, and water supply needs. Consequently, EBMUD has identified three potential local groundwater projects that may be investigated in the future once data gaps are filled and there is sufficient information to evaluate their feasibility relative to maintaining sustainability within the EBP Subbasin while avoiding undesirable results. The three projects include:

- Future Phases of Bayside
- Irrigation with Groundwater
- Chabot Recovery (San Leandro Creek Supplemental Flows)

Each is briefly described below.

4.1.3.1. Future Phases of Bayside

Future phases of Bayside would involve constructing additional ASR wells. Data collected as part of the proposed management actions will be used to make science-based decisions regarding whether future phases are feasible. ASR well locations and diameter/depth of ASR wells would be selected to maximize recharge efficiency and benefits to the EBP Subbasin to maintain sustainability and avoid undesirable results.

If Bayside Phases 2 and 3 are developed, these ~~projects~~ potential future WSDOs will probably ~~not occur until late in the GSP Implementation Period or~~ during the Sustainability Period after 2042. Studies for Phase 2 and/or Phase 3 ASR facilities would include: identifying sites that are good locations and conducting feasibility studies for the construction of ASR wells, initiating permitting and environmental documentation, and identifying and securing financing for construction. It can be anticipated that if additional ASR phases are developed in the future, the overall process will require about 10 years to complete for each phase.

4.1.3.2. Irrigation with Groundwater

This potential future ~~project~~ WSDO would use groundwater in lieu of using imported surface water supplies to irrigate large parcels (e.g., parks, golf courses, cemeteries). Implementation of this ~~project~~ potential future WSDO will depend on filling data gaps and will be based on science.

4.1.3.3. Chabot Recovery

This potential future ~~project~~WSDO would ~~use~~add groundwater during the dry season to supplement flows in San Leandro Creek that EBMUD voluntarily releases, lowering water temperatures to ~~approximate the historic leakage flows from Lake Chabot to the creek prior to the repairs to the Chabot Dam outlet works~~enhance local fish habitats. Implementation of this ~~project~~potential future WSDO will depend on filling data gaps and will be based on science.

4.1.4. EBMUD Project and Management Action Financing

Pursuant to CCR Title 23, Sections 354.44 and 354.6, EBMUD has evaluated the ability to cover ~~project~~potential future WSDO and ~~management~~implementation action costs. EBMUD may pursue available state and federal grants or loans to help with the construction of new monitoring facilities and special studies. The remaining costs will be financed from revenues raised through water rates and/or fees and assessments. EBMUD will conduct the necessary studies and decision processes (including Proposition 218 elections, if needed) to approve rates, fees, or assessments to provide the required funding.

4.1.5. Coordination with Other GSAs and Planning Agencies

As part of the EBP Subbasin GSP implementation, EBMUD GSA will coordinate with Hayward GSA, as well as the neighboring GSAs in adjacent subbasins. Planning and coordination for various projects in the past have occurred between the GSAs (EBMUD and Hayward within EBP Subbasin, ACWD in Niles Cone Subbasin) and Alameda County. Coordination will continue among these and other agencies as needed to implement ~~projects and management~~potential future WSDO and implementation actions successfully. EBMUD GSA and Hayward GSA will work cooperatively to maximize the opportunities for recharge and groundwater extraction benefits for the southern portion of the EBP Subbasin. Coordination could potentially include the pursuit of grant funding, additional injection/recharge opportunities, design and construction efforts, and additional special studies.

4.2. Hayward GSA Potential Future Water Supply Projects and Management Implementation Actions (CCR Title 23, Section 354.44)

The City of Hayward (Hayward) has identified one primary ~~project~~potential future WSDO to include in its implementation of the GSP. It involves the use of the City's existing groundwater extraction wells for emergency supply purposes. Hayward has also specified other ~~management actions to be implemented~~As to meet sustainability objectives. The project description is based on information developed during the GSP process and previous studies. The ~~project~~potential

~~future WSDO~~ and ~~management action~~^{1A} operations and integration as part of the overall GSP are described in Chapter 5.

4.2.1. Extraction

~~Emergency~~Hayward's existing supply wells are planned for emergency use ~~as extraction-only wells~~, to provide a supplemental water supply to Hayward in the event of a short-term emergency, such as may occur with an earthquake that interrupts surface water supplies. ~~The size, location,~~Each of Hayward's existing wells was designed and ~~performance of each extraction well depends~~installed based on site-specific characteristics and performance requirements that were assessed ~~by Hayward for~~at the time of their ~~existing emergency wells~~construction.

4.2.1.1. Project Overview

Hayward ~~has already~~ constructed five¹ emergency ~~extractions~~supply wells (in the 1990s) that are screened primarily in the Deep Aquifer (Well A has one screen section in the Intermediate Aquifer Zone). Three of the five emergency wells are located within the EBP Subbasin – Well A, Well D, and Well E (**Figure 4-1**). These wells are currently permitted as standby sources and thus can operate for 15 days over the course of one year; the GSP Project Scenario assumes these three emergency wells would operate for two months in a given year when needed. It is assumed that 15-day emergency use may be inadequate, and that the state would allow the wells to run beyond the initial 15 days in a true emergency where sufficient municipal water service is not restored in that period of time. The 60-day period is reflective of a San Francisco Public Utilities Commission (SFPUC) Regional Water System disruption scenario due to a large earthquake. Additional information regarding the Hayward emergency wells is provided in **Appendix 4.C**.

4.2.1.2. Implementation

~~Implementation has already begun with~~As the three emergency supply wells have already been constructed, implementation of the extraction WSDO has already begun, although they have not yet been used for extended periods of extraction. Hayward previously conducted feasibility studies for the emergency well system in the 1980s and early 1990s and developed the project for full operations by the late 1990s. The three existing ~~three~~ emergency wells located within EBP Subbasin have extraction capacities of 1.73, 1.22, and 3.74 MGD for Wells A, D, and E, respectively. The ~~future~~GSP Project Scenario in this GSP assumes that the three wells would

¹ Four of the five emergency wells are currently active and operational; Well B, located in Niles Cone Subbasin, is inactive and no longer operational.

each operate on schedules of 5 days on and 1 day off (i.e., the average pumping rate over the 60-day period is 16 percent less than stated well pumping capacities). Hayward will monitor ~~extraction~~ well performance and impacts from the existing emergency wells to inform the potential for expanded production in the future.

4.2.1.2.1 Construction Activities and Requirements

No new construction activities are anticipated to be needed to operate the existing emergency ~~water~~ supply wells.

4.2.1.2.2 Water Source

Water ~~for extraction will be derived~~ pumped by the emergency supply wells comes primarily from the Deep Aquifer in the EBP Subbasin (a portion of Well A production ~~will be derived~~ comes from the Intermediate Aquifer). The extracted water will be derived from native/local recharge in the EBP Subbasin.

4.2.1.2.3 Conditions or Constraints on Implementation

The Hayward emergency supply wells are an existing project for the GSP, and ~~its~~ continued implementation /operation of the wells does not depend on the performance of other projects or activities. Hayward will continue to monitor conditions in the GSA and adjacent areas to determine the impacts of ~~the extraction well during its~~ operations. An expanded monitoring program being implemented for the GSP will provide additional information related to Hayward emergency well operations.

4.2.1.2.4 Permitting Process and Agencies with Potential Permitting and Regulatory Control

The Hayward emergency wells are operated in accordance with permits from the SWRCB Division of Drinking Water.

4.2.1.3. Project Operations and Monitoring

Hayward will be responsible for emergency supply well project operations and monitoring. Extractions will be metered, and transducers will be installed in production and monitoring wells where feasible to collect ongoing groundwater level data.

4.2.1.4. Project Benefits

The emergency ~~extraction~~supply wells provide benefits to the Hayward water supply portfolio utilizing EBP Subbasin groundwater storage when surface water supplies are severely interrupted by a major emergency (e.g., an earthquake that interrupts surface water delivery to Hayward). The estimated project benefits developed for the GSP are based on representative average hydrologic conditions. The emergency use of water supply wells by Hayward is not tied to hydrologic year type, because an emergency interruption could occur in any type of water year (i.e., wet, average, or drought). Therefore, the GSP ~~future~~Project Scenario (described in **Appendices 4.C and 6.E**) is designed to allow for evaluation of Hayward emergency well operations in different water year types and under different GSA project operation conditions (e.g., with and without EBMUD Bayside Well operations). In any given year that the Hayward emergency wells would operate, extraction from the three wells combined over two months is estimated to total 1,062 AF.

The EBP Subbasin is not overdrafted, and current groundwater pumping is a relatively small fraction of the estimated sustainable yield. Implementation of this project is consistent with meeting measurable objectives, avoiding the exceedance of minimum thresholds, and avoiding undesirable results for all six sustainability indicators. There will be notice provided to the public and other agencies regarding possible future implementation of other Hayward GSP projects through GSA stakeholder outreach (e.g., website postings, meetings, press releases), and the CEQA process.

4.2.1.5. Project Costs

Hayward completed construction of the emergency well facilities between the late 1980s and late 1990s. Thus, the construction of the facilities was completed more than twenty years ago, and there are no additional capital costs. Future costs relate only to ongoing annual maintenance and operation costs, which are estimated to range from \$~~60~~70,000 in years when the wells are not operated for emergency supply to between \$3~~50~~0,000 and \$5~~80~~0,000 during years when the wells are operated for emergency purposes. If treatment facilities (e.g., for manganese) ~~are~~were to be ~~built~~needed in the future, ~~related~~additional capital ~~costs~~expenditures for a treatment system at the existing well site(s) ~~may~~would be needed at that time. Additional development costs for a water treatment system may include project administration, legal, permitting, and environmental review. Given the uncertainty regarding whether water treatment facilities will be built by Hayward, no estimated costs for treatment facilities are presented in this GSP.

4.2.2. ~~Management~~Implementation Actions

Hayward ~~management actions include~~ IA includes a number of items to address EBP Subbasin management. These actions can be grouped into broad categories, including monitoring, special studies, GSP reporting, and other actions. These actions will help address existing data gaps and sustainably manage the EBP Subbasin. These actions are described in more detail in this section.

4.2.2.1. Management Actions Overview

The ~~management~~ implementation actions planned by Hayward are summarized in **Table 4-8**, along with estimated ~~annual operating~~ 5-year costs. In some cases (e.g., ~~Five-Year GSP Update Report~~ Periodic Evaluation), costs are incurred in a single year but are spread out over time to derive the reported average annual cost in **Table 4-8**. More detailed estimated costs by year are provided in **Appendix 4.D**.

Table 4-8. Hayward EBP Subbasin ~~Management~~Implementation Actions

Project	First Year of Implementation	Completion Date	Number of Monitoring Stations	Minimum Frequency	Estimated Capital Cost	Estimated Five-Year Costs
Monitoring Actions						
RMS ¹ GW ² Level Monitoring ⁷	2022	Ongoing	83	Semi-Annual	NA ³	\$27,500 <u>\$32,000</u>
Non-RMS GW Level Monitoring	2022	Ongoing	TBD⁴⁵	Semi-Annual	NA	\$25 <u>\$29,000</u>
RMS GW Quality Monitoring ⁷	2022	Ongoing	83	Annual	NA	\$40,000 <u>\$46,500</u>
Baseline GW Quality Sampling	2023	2024	83	Semi-Annual	NA	\$32 <u>\$37,000</u>
Special Studies						
Isotopic Sampling	TBD	TBD	NA ⁵⁴	NA ⁵⁴	NA	TBD ⁶⁵
Reporting						
Annual Reporting	2022	Ongoing	NA	Annual	NA	\$96,250 <u>\$68,000</u>
GSP Five-Year Updates <u>Periodic Evaluations</u>	2027	Ongoing	NA	Every 5 Years	NA	\$87,500 <u>\$122,000</u>
Other						
DMS	2022	Ongoing	NA	Annual	NA	\$25 <u>\$85,000</u>
Update Plume Info	2023	Ongoing	NA	Every 2 Years	NA	\$7 <u>\$8,000</u>
Fate/Transport Modeling	TBD ⁷⁶	TBD	NA	TBD	NA	\$35,000 <u>\$40,500</u>

¹ Representative Monitoring Site (RMS)

² Groundwater (GW)

³ Not Applicable (NA); no associated capital costs

⁴ ~~To Be Determined (TBD); candidate non-RMS wells need further evaluation~~

⁵⁴ Not Applicable (NA), Number of Monitoring Stations/Frequency does not apply to this Action

⁶⁵ To Be Determined (TBD); it is uncertain if additional isotopic studies will be needed; no cost is provided at this time

⁷⁶ To Be Determined (TBD); Start Date, Completion Date, and Frequency are unknown at this time

⁷ Costs are representative of the current RMS network, however, more RMS wells may be installed within the implementation plan period

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4.2.2.1.1 Monitoring

RMS wells in the groundwater level monitoring network are shown ~~on~~ in **Figure 3-1**. The costs for RMS groundwater level monitoring include both existing RMS wells and ~~RMS wells planned for construction~~ an RMS well recently constructed in 2025 under a DWR Proposition 68 grant ~~that is anticipated to be completed by the end of 2022. Most of~~. These wells have ~~(or will have)~~ transducers installed for automated water level monitoring, and semi-annual manual measurements and transducer downloads will be conducted as part of this action. In addition to the RMS groundwater level monitoring wells, a broader network of groundwater level monitoring wells (non-RMS wells) is ~~being investigated for inclusion into the~~ included in the overall monitoring network. ~~Non-RMS wells being investigated include Hayward wells not included as RMS wells (Appendix 3.G). The initial network of non-RMS wells in the broader GSP monitoring network is anticipated to be established by 2023.~~

The RMS groundwater quality wells are the same group of wells as for RMS groundwater level monitoring (**Figure 3-11**). In the long-term, these wells will be sampled annually for arsenic, nitrate, chloride, and TDS, and a more comprehensive sampling would occur every five years (e.g., a full general minerals suite). Baseline sampling of the RMS groundwater quality wells for key constituents ~~is needed~~ was conducted over the initial four years of GSP implementation for Well D to confirm the basis for establishing MO and MT. Additional baseline sampling is still needed for two wells, Well E and MW-S2I, that were recently added as groundwater quality RMS wells. Baseline sampling will include a minimum of four samples collected in both spring and fall over at least two different years, preferably different water year types (e.g., ~~wet, and dry~~). The non-RMS monitoring well network (**Appendix 3.G**) ~~will be evaluated for supplemental water quality sampling for selected key constituents to characterize basin conditions (e.g., chloride samples in non-RMS wells along Bay margin that may be useful as sentinel wells for seawater intrusion).~~ wet and dry).

4.2.2.1.2 Special Studies

A special study ~~currently (was completed in 2021 and 2022) being conducted~~ 2026 under the DWR Proposition 68 grant involves developing additional data and information related to the hydrogeologic boundary between the EBP and the Niles Cone Subbasin. This special study involves ~~a combination of long-term regional aquifer testing and~~ the collection of groundwater isotope data. It builds upon previous work conducted by USGS (2019), LSCE (2003), Fugro (2011), and the HCM for this GSP (Chapter 2). Other unidentified special studies may be conducted in the future.

4.2.2.1.3 GSP Reporting

The GSAs will prepare annual GSP reports each year documenting groundwater levels, groundwater storage change, basin water balance conditions, progress on implementation of ~~projects and management actions~~ PMA, and comparisons to MT, IM, and MO. In addition, a ~~Five-Year Update Report~~ Periodic Evaluation will be prepared beginning in 2027, and every five years thereafter. The ~~Five-Year Update Reports~~ Periodic Evaluations will be more detailed than Annual Reports, as these are key checkpoints during the GSP Implementation Period to report on groundwater basin status compared to ~~Interim Milestones~~ IM, and to report the status of ~~project and management action~~ PMA implementation compared to the schedule presented in the GSP. A periodic groundwater model update is likely to incorporate new data, refine model structure as needed, and potentially recalibrate to recent water levels and streamflow data. In addition, the ~~Five-Year Update Report~~ Periodic Evaluation will include more detailed reporting on other data sets being collected, such as groundwater quality data.

4.2.2.1.4 Other Actions

Other actions following submittal of the GSP include data input and maintenance of the DMS, periodic assessment of contaminant plumes that may be in proximity to GSA projects, and fate and transport modeling related to potential future groundwater quality issues.

4.2.2.2. Implementation

Implementation of ~~management implementation~~ actions ~~will begin~~ began in 2022 following submittal of the GSP. The implementation schedule is provided in Chapter 5.

4.2.2.3. ~~Management Implementation~~ Action Operations and Monitoring

Hayward will be responsible for ~~management action~~ IA operations and monitoring. Hayward will conduct groundwater level monitoring and groundwater quality sampling in selected RMS wells and other wells within Hayward GSA, including in the broader monitoring network. Hayward will likely implement the various management actions listed above using a combination of Hayward staff, consultants to provide specific professional services, and outside contractors.

4.2.2.4. ~~Management Implementation~~ Action Benefits

The benefits of ~~management action implementation~~ IA outlined above are primarily two-fold: 1) allows for good groundwater basin management and meeting GSP/SGMA requirements; and 2) improves understanding of groundwater basin conditions. The ~~management actions are~~ IA is expected to greatly significantly improve the spatial and vertical distribution of data needed to

optimize groundwater basin management. Data gaps will be further evaluated as identified ~~management actions are implemented~~ As occur to determine if additional ~~management actions~~ As are warranted to advance the understanding of the EBP Subbasin and its sustainable management.

~~Management~~ Implementation actions are also expected to provide substantial benefits towards tracking MO, IM, and MT, and assist with avoiding the occurrence of UR. Notification of the public and other agencies regarding the implementation of ~~MAIA~~ will occur through Hayward GSA stakeholder outreach and meetings.

4.2.2.5. Management Action Costs

The estimated costs for Hayward ~~management actions, IA~~, are summarized in Table 4-8; a more detailed year-by-year estimate is provided in **Appendix 4.D**. The overall costs for the ~~first ten~~ next five years of the implementation period amount to an estimated ~~\$713,250~~ \$468,000, or an average of ~~\$71,325~~ \$93,600 on an annual basis.

4.2.3. Hayward Project Financing

Pursuant to CCR Title 23 Sections 354.44 and §354.6, Hayward has evaluated the ability to cover ~~project and MAPMA~~ costs. The ~~project~~ potential future WSDO and ~~management action IA~~ costs will be financed from revenues raised through water rates, and/or fees, and assessments. Hayward will conduct the necessary studies and decision processes (including Proposition 218 elections, if needed) to approve rates, fees, or assessments to provide the required funding.

4.2.4. Coordination with Other GSAs and Planning Agencies

As part of the EBP Subbasin GSP, Hayward GSA will coordinate with EBMUD GSA, as well as the neighboring GSA (ACWD) in the Niles Cone Subbasin. Planning and coordination for previous projects have occurred between the GSAs (Hayward and EBMUD within EBP Subbasin, ACWD in Niles Cone Subbasin) and Alameda County. Coordination will continue among these and other agencies as needed to implement ~~projects~~ WSDO and ~~management actions~~ IA successfully. Hayward GSA and EBMUD GSA will work cooperatively to maximize the opportunities for recharge and groundwater extraction benefits for the southern portion of the EBP Subbasin. Coordination could potentially include the pursuit of grant funding, additional injection/recharge opportunities, design and construction efforts, and additional special studies.

4.3. References

- East Bay Municipal Utility District. 2010. *East Bay Municipal Utility District Bayside Groundwater Project*. 2009 Annual Report, Order No. R2-2007-0038.
- Woodard & Curran, Brown and Caldwell, and Cubed, M. 2018. *Recycled Water Master Plan Update, East Bay Municipal Utility District*. Final Interim Report,
- Woodard & Curran and Brown and Caldwell. 2019. East Bay Municipal Utility District, Updated Recycled Water Master Plan.