APPENDIX F-7

WATER SUPPLY ASSESSMENT

BENCHMARK RESOURCES

Water Supply Assessment
For The
CEMEX Eliot Quarry SMP-23 Reclamation Plan
Amendment Project
Alameda County, California

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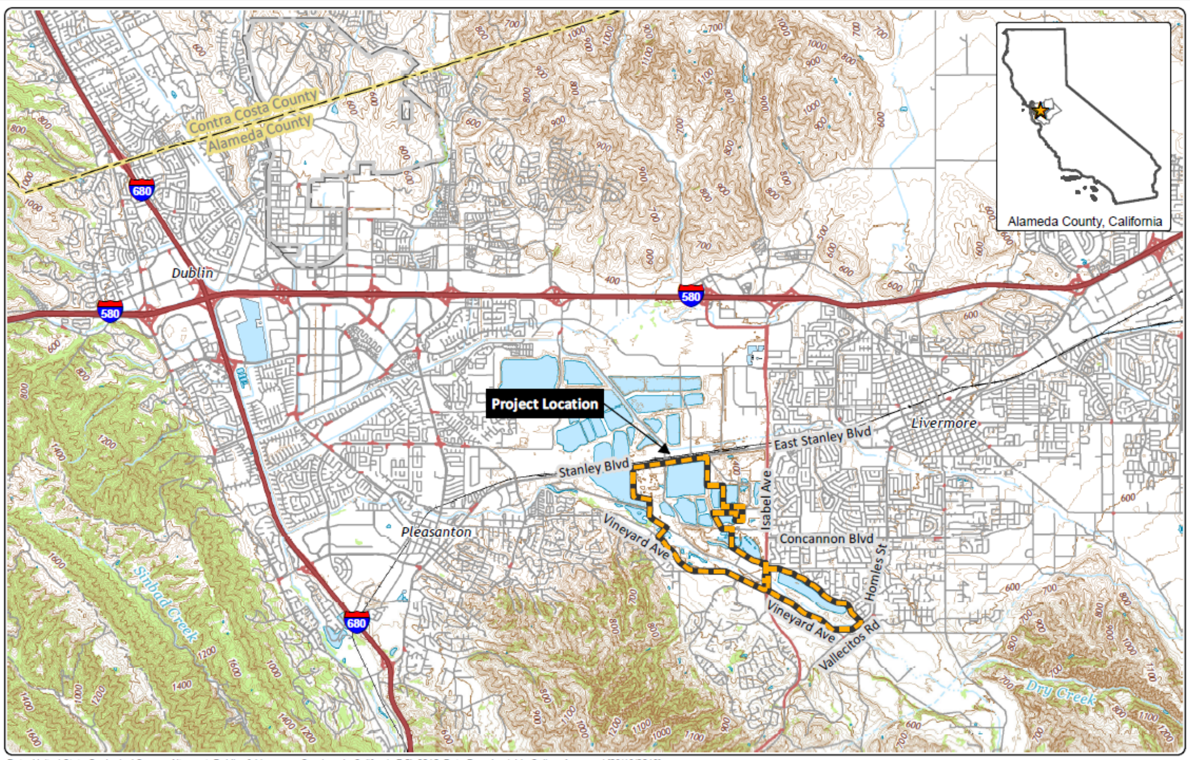
1.0 INTRODUCTION

The CEMEX Eliot Quarry site is located in unincorporated Alameda County, California between the cities of Livermore and Pleasanton (Figure 1). This report has been prepared to identify the water demand of the proposed Project, as identified in Section 2.0, below, and provide an analysis of the available water supply to support the current Application for Reclamation Plan Amendment and California Environmental Quality Act (CEQA) environmental analysis.

Water Code Sections 10910 through 10915 were amended by Senate Bill 610 (SB 610) in 2002. SB 610 requires that under specific circumstances, as detailed below, an assessment of available water supplies must be conducted. The purpose of the assessment is to determine if available water supplies are sufficient to serve the demand generated by the Project, as well as the reasonably foreseeable demand in the region over the next 20 years under average normal year, single dry year, and multiple dry year conditions. Water Code Section 10910 was further amended by SB 1262 on September 24, 2016 to require a Water Supply Assessment to include additional information regarding the groundwater basin designation and adjacent water systems. This report provides the information required for a Water Supply Assessment (WSA), as described in the October 2003 *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001 to Assist Water Suppliers, Cities, and Counties in Integrating Water and Land Use Planning*, published by the California Department of Water Resources (DWR Guidebook) along with the additional information required by SB 1262.

2.0 PROJECT DESCRIPTION

CEMEX Construction Materials Pacific, LLC. (“CEMEX”) owns and operates the Eliot Quarry, a ±920-acre sand and gravel mining facility, located between the cities of Livermore and Pleasanton, at 1544 Stanley Boulevard in unincorporated Alameda County. CEMEX and its predecessors-in-interest have been continuously mining for sand and gravel at the Eliot Quarry since at least 1906. In addition to mining and reclamation, existing permitted and accessory uses at the Eliot Quarry include aggregate, asphalt and ready-mix concrete processing, as well as ancillary uses such as aggregate stockpiling, load-out, sales, construction materials recycling, and equipment storage and maintenance. CEMEX's mining operations at the site are vested per pre-1957 mining activities and Alameda County Quarry Permits Q-1 (1957), Q-4 (1957), and Q-76 (1969). Surface mining reclamation activities at the site are currently conducted pursuant to Surface Mining Permit and Reclamation Plan No. SMP-23 ("SMP-23"), approved in 1987.



Data: United State Geological Survey, Altamont, Dublin, & Livermore Quadrangle California 7.5'. 2015. Data Downloadable Online. Accessed [09/18/2018].

Legend: Project/Plan Boundary (920 acres)

0 1 2 3 Miles

Site Vicinity Map
Eliot Quarry - SMP 23
CEMEX Construction Materials Pacific, LLC.
Alameda County, California

Figure 1 12/19/2018

Disclaimer: The data was mapped for planning purposes only. No liability is assumed for accuracy of the data shown.

COMPASS LAND GROUP

Under the Eliot Quarry SMP-23 Reclamation Plan Amendment Project ("Project"), CEMEX proposes a revised Reclamation Plan that serves to adjust reclamation boundaries and contours, enhance drainage and water conveyance facilities, incorporate a pedestrian and bike trail, and achieve current surface mining reclamation standards. The planned post-mining end uses are water management, open space, and agriculture (non-prime).

Consistent with prior approvals, the Project will develop Lake A and Lake B, which are the first two lakes in the Chain of Lakes pursuant to the *Alameda County Specific Plan for Livermore-Amador Valley Quarry Area Reclamation* adopted in 1981 ("Specific

Plan"). Upon reclamation, Lake A and Lake B, along with their appurtenant water conveyance facilities, will be dedicated to the Zone 7 Water Agency ("Zone 7") for purposes of water storage, conveyance and recharge management.

Lake A reclamation will include installation of a surface water diversion from the Arroyo del Valle ("ADV") to Lake A; conversion of a berm that is currently located in Lake A that blocks water to a small island to allow water to flow across the lake; installation of a water conveyance pipeline from Lake A to future Lake C (located off-site to the northwest); and an overflow outlet to allow water to flow back into ADV when Lake A water levels are high to prevent flooding in the localized area. The final surface area of Lake A will be 81 acres as compared to 208 acres in SMP-23. No further mining will occur in Lake A.

Lake B reclamation will include installation of a pipeline turn-out from Lake A, a water pipeline conduit to future Lake C, and an overflow outlet to allow water to flow back into ADV when Lake B water levels are high. The final bottom elevation of Lake B is proposed at 150 feet above mean sea level ("msl"), in order to maximize the available aggregate resource. The final surface area of Lake B will be 208 acres as compared to 243 acres in SMP-23.

To facilitate the southerly progression of Lake B, the Project includes realignment and restoration of a ±5,800 linear foot reach of the ADV. The proposed ADV realignment will result in an enhanced riparian corridor that flows around, rather than through (as currently anticipated in SMP-23), Lake B. The ADV realignment was contemplated in the Specific Plan and subject to environmental review in 1981.

Outside of Lake A and Lake B, reclamation treatment for other disturbed areas, including the Lake J excavation (not part of the Chain of Lakes), processing plant sites, and process water ponds will involve backfills and/or grading for a return to open space and/or agriculture.

The Project is a modification of an approved project. Except as outlined above, CEMEX proposes no change to any fundamental element of the existing operation (e.g., mining methods, processing operations, production levels, truck traffic, or hours of operation). A more complete description of the proposed Project is contained in CEMEX's Project Description, Revised Reclamation Plan, and other application materials provided to the County.

3.0 WATER SUPPLY PLANNING UNDER SB 610 and SB 1262

SB 610, effective January 1, 2002, amends Sections 10910 through 10915 of the Water Code by requiring preparation of a WSA for development projects subject to CEQA and other criteria, as discussed below. SB 610 also amends Section 10631 of the Water Code, which relates to Urban Water Management Plans (UWMPs). The WSA process under SB 610 is designed to rely on the information typically contained in UWMPs, where available.

On September 24, 2016, SB 1262 further amended Section 10910 of the Water Code to require additional information related to adjacent public water systems and the status of the groundwater basin. These amendments provide additional consistency with the Sustainable Groundwater Management Act of 2014, as discussed further in Section 4.3.

The first steps in the WSA process are to determine whether SB 610 applies to the proposed Project. If so, then documentation of available water supplies, anticipated Project demand, and the sufficiency of supplies must be conducted. These issues are summarized by the following questions, as outlined in the DWR Guidebook:

1. Is the proposed Project subject to CEQA?
2. Is the proposed Project a “Project” under SB 610?
3. Is there a public water system that will service the proposed Project?
4. Is there a current UWMP that accounts for the project demand?
5. Is groundwater a component of the supplies for the Project?
6. Are there sufficient supplies to serve the Project over the next twenty years?

Each of these issues are discussed in the following sections as they relate to the Project

3.1 Is the Proposed Project Subject to CEQA?

The first step in the SB 610 process is to determine whether the proposed project is subject to CEQA. Water Code Section 10910(a) states that any city or county that determines that an application meets the definition of “project”, per Water Code Section 10912 (see Section 3.2, below), and is subject to CEQA, shall prepare a water supply assessment for the project. CEQA applies to projects requiring issuance of a discretionary permit by a public agency, projects undertaken by a public agency, or projects funded by a public agency. The proposed amendments to the 1987 SMP-23 Reclamation Plan, as described in Section 2.0, require discretionary approval by Alameda County, a public agency. Therefore, the Project is subject to CEQA. This

WSA has been prepared to support the environmental review being conducted by Alameda County under CEQA.

3.2 Is the Proposed Project a “Project” Under SB 610?

The second step in the SB 610 process is to determine if the proposed Project meets the definition of “project” under Water Code Section 10912(a). Under Section 10912(a) a “project” is defined as meeting any of the following criteria:

1. a proposed residential development of more than 500 dwelling units;
2. a proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space;
3. a proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space;
4. a proposed hotel or motel, or both, having more than 500 rooms;
5. a proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area;
6. a mixed-use project that includes one or more of the projects defined above; or
7. a project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

The proposed amendments to the reclamation plan for the Eliot Quarry will occur on an industrial site that is larger than 40 acres and thus this WSA is being prepared in accordance with category 5, above.

3.3 Is There a Public Water System That Will Service the Proposed Project?

Section 10912(c) of the Water Code identifies a public water system as a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections. There are no public water systems that serve the project site. As described below, the project provides its own water needs through mine pit dewatering and a groundwater well. In addition, the project will not be connected to a water system, such that the project will not result in an existing water system becoming a public water system as a result of the project (per SB 1262 modifications to Water Code Section 10910(b)). While the project will carry out a portion of the Specific Plan’s objectives for the Chain of Lakes, the Chain of Lakes provides no potable water and has no customer connections.

The nearest public water systems to the Eliot Quarry include the City of Pleasanton Water Service, located to the west of the Project site, and California Water Service Company's service area in the southwestern part of the City of Livermore, located to the east and northeast of the Project site. The proposed amendments to SMP-23 are anticipated to enhance recharge of the groundwater aquifers in the region and reduce evaporative loss of groundwater, consistent with the objectives of the Specific Plan (EMKO, 2019). Therefore, the proposed project will not reduce the available water supply for nearby public water systems.

3.4 Is There a Current Urban Water Management Plan That Accounts for the Project Demand?

The Water Code requires that all public water systems providing water for municipal purposes to more than 3,000 customers, or supplying more than 3,000 acre feet per year, must prepare an UWMP. The DWR Guidebook (page iii) states that SB 610 repeatedly refers to the UWMP as a planning document that can be used to meet the standards set forth in the statute, and that UWMPs act as a foundation to fulfill the requirements of the statute. Zone 7 has prepared an UWMP (Zone 7, 2016). The Zone 7 UWMP addresses a broad range of water sources and water demands, not just groundwater. Evaporative loss of water from gravel quarries and subsequent recharge under the Specific Plan are not addressed in the UWMP. However, the entire Livermore-Amador Groundwater Basin is covered by the Zone 7 Groundwater Management Plan (GWMP) (Jones and Stokes, 2005). This WSA is based upon available and relevant information, including public documents, the technical studies and assessments submitted with the application for the proposed project, and other relevant documents, as cited in Section 8.0, such as the Zone 7 GWMP and relevant information in the UWMP. Since this WSA has been prepared for use by the CEQA lead agency, this document includes an evaluation of whether the total projected water supplies, determined to be available during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses, in accordance with Water Code § 10910(c)(4). While agricultural uses are planned after reclamation, no manufacturing uses are proposed for the Project site after it is reclaimed.

3.5 Is Groundwater a Component of the Supplies for the Project?

Water Code Section 10910(f), paragraphs 1 through 5, must be addressed if groundwater is a source of supply for the proposed project. The CEMEX Eliot Quarry and related processing facilities currently obtain all the water necessary for operations from groundwater, including a combination of water pumped from the Lake B and Lake

J pits to keep them dewatered and an onsite well to provide makeup water for concrete production and potable water for employee use. No other sources of water are anticipated to be affected by the proposed Project. Therefore, the project will affect only groundwater and an assessment of groundwater is included in this document.

Water Code Section 10910(f) paragraphs 1 through 5, as modified by SB 1262, state:

(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water supply assessment:

> (1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.
>
> (2) (A) A description of any groundwater basin or basins from which the proposed project will be supplied. (B) For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. (C) For a basin that has not been adjudicated that is a basin designated as high- or medium priority pursuant to Section 10722.4, information regarding the following: (i) Whether the department has identified the basin as being subject to critical conditions of overdraft pursuant to Section 12924; and (ii) If a groundwater sustainability agency has adopted a groundwater sustainability plan or has an approved alternative, a copy of that alternative or plan. (D) For a basin that has not been adjudicated that is a basin designated as low- or very-low priority pursuant to Section 10722.4, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft condition.
>
> (3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.
>
> (4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

> (5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated with the proposed project. A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

Pursuant to paragraph 1, there is not an UWMP that addresses the project demand, or the adjacent and surrounding properties, as discussed in Section 3.4. Therefore, the information and evaluations presented in this WSA are based primarily on other publicly-available reports and documents from the California Department of Water Resources and Zone 7, including the Specific Plan and the GWMP, along with the site-specific groundwater studies previously conducted at the CEMEX Eliot Quarry.

Paragraph 2 is addressed in Section 4.1, below, including a description of the groundwater basin and groundwater conditions.

As previously discussed, there is not an urban water management plan that covers the project area. To address the items described in Paragraph 3, Section 5.0 presents available information regarding current and future water consumption at the CEMEX Eliot Quarry.

To address paragraph 4, Section 4.2 includes a discussion of the amount and location of groundwater pumping and recharge that occurs throughout the groundwater basin. Section 5.0 presents available information regarding current and future water consumption at the CEMEX Eliot Quarry.

The Paragraph 5 requirement to provide an analysis of the sufficiency of the groundwater basin to meet the projected water demand associated with the proposed project is addressed in Section 6.0, below.

3.6 Are There Sufficient Supplies to Serve the Project Over the Next Twenty Years?

Water Code Section 10910(c)(4) requires the WSA to "*include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and future planned uses, including agricultural and manufacturing uses.*"

The sufficiency of water supply for the proposed Project is addressed in Section 7.0, below.

4.0 PROJECT WATER SUPPLY

Water for the CEMEX Eliot Quarry is sourced onsite and supplied by the Applicant. The current water supply comes from groundwater, including a combination of water pumped from the Lake B and Lake J pits to keep them dewatered, an onsite well to provide makeup water for concrete production and potable water for employee use, and a well along Vineyard Avenue that is used to irrigate the Lake A trail landscaping. Water demand for the proposed Project is discussed in Section 5.0 and will consist primarily of evaporation from the reclaimed mining pits. Since the evaporative loss will primarily come from groundwater, information regarding the groundwater basin is provided in this section, along with an estimate of the amount of groundwater that is available for Project use. In addition, the potential implications of the Sustainable Groundwater Management Act of 2014 and future regulatory requirements are discussed.

4.1 Groundwater Basin

DWR refers to the Livermore-Amador Groundwater Basin as the Livermore Valley Groundwater Basin (Basin Number 2-10) (DWR 2003). The information presented in this section has been summarized primarily from the *Hydrostratigraphic Investigations of the Aquifer Recharge Potential for Lakes C and D of the Chain of Lakes, Livermore, California* (Alameda County Flood Control and Water Conservation District Zone 7, 2011), the *Groundwater Management Plan for Livermore-Amador Valley Groundwater Basin* (Prepared for Zone 7 Water Agency by Jones and Stokes, 2005), *Groundwater Hydrology and Water Quality Analysis Report for the CEMEX Eliot Quarry SMP-23 Reclamation Plan Amendment Project, Alameda County, California* (EMKO Environmental, Inc., 2019), and Zone 7 groundwater and surface water data.

The CEMEX Eliot Quarry is located within the Livermore-Amador Valley, an east-west trending inland alluvial basin located in northeastern Alameda County (Figure 1). An alluvial basin is a valley that has been filled with sediments deposited predominantly by streams and rivers. The basin is surrounded primarily by north-south trending faults and hills of the Diablo Range. The Livermore-Amador Valley encompasses approximately 42,000 acres, is about 14 miles long (east to west), and varies from three miles to six miles wide (north to south). The Livermore Valley Groundwater Basin is located in the central part of the Livermore-Amador Valley. The Main Basin is a part of the Livermore Valley Groundwater Basin that contains the highest-yielding aquifers and the best groundwater quality. The CEMEX Eliot Quarry is located within the southeast corner of the Main Basin.

The Livermore-Amador Valley is partially filled with alluvial fan, stream, and lake deposits, collectively referred to as alluvium. The alluvium in the valley consists of unconsolidated gravel, sand, silt, and clay. Alluvial fans occur where streams and rivers from hilly or mountainous areas enter a valley and deposit very coarse sediment, primarily sand and gravel. The silt and clay were deposited in floodplain areas or lakes that developed at different times across the basin. The alluvium is relatively young from a geologic perspective, being deposited during the Pleistocene and Holocene geologic epochs (younger than 1.6 million years old). In the west-central area of the basin, the alluvium is up to 800 feet thick, but thins along the margins of the valley.

The southeastern and central parts of the Main Basin area contain the coarsest alluvial fan deposits. These alluvial fan deposits were formed by the ancestral and present Arroyo del Valle and Arroyo Mocho. The coarse alluvial fan deposits are economically important aggregate deposits, which has resulted in the widespread aggregate mining in the Main Basin area. The coarse alluvial fan deposits also comprise some of the most significant groundwater recharge areas in the Livermore-Amador Valley.

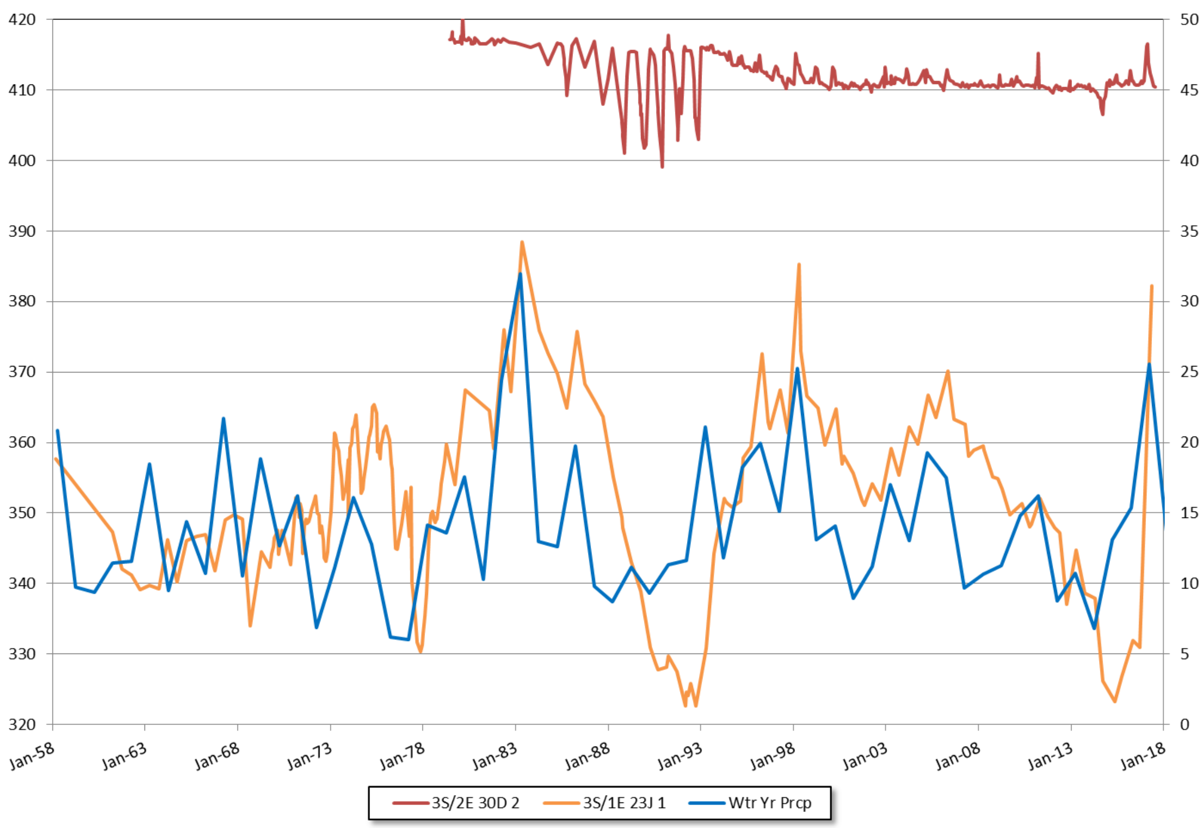
Two primary aquifer zones have been identified in the Main Basin. The Upper Aquifer Zone is present to depths of up to 150 feet below ground surface (ft bgs). The Lower Aquifer Zone is present to depths of more than 500 ft bgs. In the central part of the Main Basin, a thick clay layer, up to 50 feet thick, separates the two aquifer zones. This clay layer is referred to as an aquitard zone. In the CEMEX Eliot Quarry area, however, data from borehole and well logs indicates that the aquitard is much thinner and discontinuous, and is not present in some locations (Brown & Caldwell, 2004; Jeff Light Geologic Consulting, 2018; EMKO Environmental, Inc., 2019). Thus, in the area of the Project, the two aquifer zones are connected hydraulically.

Water levels have been measured in numerous wells by Zone 7 for many decades. Figure 2 presents a hydrograph showing the groundwater elevations in two wells adjacent to the CEMEX Eliot Quarry, along with the annual rainfall totals for each year shown (see Section 6.0 for more detailed discussion of the rainfall data). Well 30D2 is located to the south of Lake A and Well 23J1 is located to the south of Lake B. Lake A and Lake B will be the two main surface water bodies at the Eliot Quarry after mining is completed and the site is reclaimed. The two selected wells have the longest period of groundwater measurements of any of the wells monitored at or adjacent to the CEMEX Eliot Quarry property.

As shown on Figure 2, the water level data for Well 30D2 do not vary significantly over time. The lack of significant variation is most likely due to the proximity to Arroyo del Valle and the likelihood that this well is completed within a different geologic formation than that which comprises the main aquifer units in the groundwater basin (EMKO Environmental, Inc., 2019).

As exemplified by the hydrograph for Well 23J1 on Figure 2, most wells completed in the main aquifer units typically have a dual cyclical pattern (EMKO Environmental, Inc., 2019). Long-term cycles are related to climatic changes such as wet periods and drought periods. For example, significant dry periods in the late 1980s-early 1990s, in the early and late 2000s, and in the early-mid 2010s are reflected in lower water levels in many wells[1]. Shorter annual cycles are due to recharge during the wet season and extraction during the dry season each year. Peak water levels generally occur between March and May and minimum water levels generally occur in August or September within each annual cycle (EMKO Environmental, Inc., 2019). The average depth to groundwater in the Project area is approximately 40 ft bgs.

Figure 2. Groundwater Elevations Near Lake A and Lake B



The long term climatic cycles can result in water-level changes of up to 100 feet. The annual cycles typically range in magnitude from about 15 feet to 40 feet. As discussed

[1] A more detailed discussion of drought periods is presented in Section 6.0.

above, however, the aquifer units are generally more than 500 feet thick in the project area.

According to the Department of Water Resources, the Livermore-Amador Groundwater Basin is a medium priority basin according to the SGMA Basin Prioritization Dashboard (https://gis.water.ca.gov/app/bp2018-dashboard/p1/, accessed February 26, 2019) and is not subject to conditions of critical overdraft. See Section 4.3 for additional discussion of groundwater sustainability.

4.2 Available Groundwater Supply

According to the Zone 7 GWMP (Jones and Stokes, 2005), the Main Basin area of the Livermore-Amador Groundwater Basin has a storage capacity of more than 250,000 AF. The CEMEX Eliot Quarry is located in the southern part of the Main Basin. Historic low groundwater storage occurred in the early 1960s, estimated to be 128,000 AF. The basin reached full capacity in 1983. However, drought conditions in 1977 and from 1987 to 1992 caused groundwater levels to decrease to near historic-low values in some parts of the basin. As indicated on Figure 2, groundwater levels in some wells near the CEMEX Eliot Quarry decreased to near historic low levels as a result of the 2012-2015 drought but have since recovered (see additional discussion in Section 6.0).

Groundwater recharge occurs from natural sources, artificial recharge, and recharge related to gravel mining (Jones and Stokes, 2005). Natural groundwater recharge in the basin occurs primarily from rainfall runoff into local streams. The average natural recharge is estimated to be 13,400 AF/yr (Jones and Stokes, 2005). Artificial recharge occurs by release of surface water from the South Bay Aqueduct or Lake Del Valle to streams or recharge ponds. Artificial recharge may range from 12,300 AF/yr to 20,000 AF/yr under conditions that existed at the time the Zone 7 GWMP was prepared (Jones and Stokes, 2005). Gravel mining recharge may occur by discharge of water to former gravel mining pits or discharges from pit dewatering into streams, where the water subsequently percolates back to the subsurface. The Zone 7 GWMP does not provide an estimate of recharge related to gravel mining, but the Specific Plan estimates that up to 8,700 AF/yr of unregulated flow in Arroyo Mocho and flood releases from Lake Del Valle could be diverted into the Chain of Lakes for groundwater recharge. Zone 7 also jointly holds water rights to divert up to 60,000 AF/yr for “beneficial use”, which could be used to provide surface water for groundwater recharge in the Chain of Lakes under the Specific Plan, once mining is completed in all of the basins that are part of the Chain of Lakes and appropriate diversion structures are constructed.

Approximately 35 percent of the total water demand in the Livermore-Amador Valley is supplied by groundwater (Jones and Stokes, 2005). Groundwater extraction in 2005 was reported to be approximately 12,000 AF/yr of pumping by Zone 7, 3,000 AF/yr evaporative losses from gravel mining operations, 7,200 AF/yr municipal pumping by several water retailers, 1,200 AF/yr private pumping, and 500 AF/yr irrigation pumping (Jones and Stokes, 2005). Thus, total groundwater usage in the basin averages approximately 24,000 AF/yr. In normal meteorological and hydrologic conditions, the natural and artificial recharge of 25,700 AF/yr to 33,400 AF/yr is more than sufficient to balance the groundwater pumping in the basin and to help replenish groundwater supplies.

4.3 Groundwater Sustainability

A series of three bills passed by the California legislature were signed by Governor Brown on September 16, 2014. These three bills, Assembly Bill (AB) 1739, SB 1168, and SB 1319, together comprise the Sustainable Groundwater Management Act of 2014 (SGMA). SGMA provides a structure under which local agencies are to develop a sustainable groundwater management program. SGMA focuses on basins or subbasins designated by DWR as high- or medium priority basins. As discussed in Section 4.1, the Livermore-Amador Groundwater Basin is designated as having medium priority. However, the subbasin is not subject to critical conditions of overdraft.

SGMA requires the establishment of a Groundwater Sustainability Agency (GSA), development of a Groundwater Sustainability Plan (GSP), and achievement of groundwater sustainability within 20 years. The GSAs allow for locally-controlled groundwater management and provide tools and authorities for these local agencies to achieve sustainability goals. For medium and high priority basins, the GSAs must have been established by June 30, 2017. Any local water or land use agency or combination of local agencies overlying a groundwater basin may elect to be a GSA. Zone 7 applied to be the GSA for the Livermore-Amador Groundwater Basin in December 2016 and has proposed to use its existing Groundwater Management Plan (Jones and Stokes, 2005) as an Alternative GSP by submitting documentation to DWR that demonstrate that the basin has been operated within its sustainable yield over at least the last 10 years (https://sgma.water.ca.gov/portal/alternative/print/2).

DWR must make a determination if the existing Groundwater Management Plan and monitoring programs form an acceptable Alternative GSP by January 2022. However, completion of the proposed Project would not occur until approximately 30 to 35 years later. Lake A and Lake B will become part of the Chain of Lakes, operated by Zone 7 for use in water storage and groundwater recharge in accordance with the Specific Plan. In addition, Ponds C and D may become part of future Lakes C and D, which will also be part of the Chain of Lakes. Any other programs implemented by the GSP to comply with SGMA would be in addition to any current requirements under SB 610, SB 1262, and CEQA for this proposed Project.

5.0 BASELINE AND PROJECT WATER DEMAND

The proposed Project is a change to the reclaimed conditions at the Eliot Quarry. As a result, the Project water demand includes the water anticipated to reclaim the site and the subsequent consumptive water use of the proposed reclaimed conditions, which will not be fully implemented for several decades. This section provides a comparison between the water demand of the existing baseline conditions at the Eliot Quarry and the anticipated water demand from the proposed amendments to the SMP-23 Reclamation Plan.

Baseline Water Demand

There is not always a clear distinction between certain reclamation actions and mining-related activities. For example, realignment of Arroyo del Valle would be conducted before mining in Lake B can extend farther to the south. While realignment of the arroyo changes the reclaimed configuration of Lake B, it is not being conducted to reclaim the Lake B mining disturbance. Thus, water use for the realignment (primarily construction-related dust control and water added to fill material to reach compaction specs) will be a mining-related water use and is not included in this analysis.

In addition, current dewatering of the Lake B and Lake J mining pits are not consumptive uses of water. The water pumped from the active excavations offsets groundwater pumping for consumptive uses such as dust control and aggregate processing, or it is routed to onsite ponds where it may percolate back into the subsurface. Evaporation from these ponds, however, is a baseline consumptive use and is discussed below.

Two different baseline consumptive water use conditions have been considered (EMKO Environmental, Inc., 2019). The first is the consumptive water use under the current operating conditions (i.e. operating baseline conditions). The second is the consumptive water use that would occur under existing conditions if all operations ceased and water was allowed to fill the existing excavations (i.e. non-operating baseline conditions).

Current operating water uses at the Eliot Quarry include water that is used to process the aggregate and remains in the product that is shipped from the site, dust control, water provided to East Bay Regional Park District (EBRPD) to help maintain the water level in Shadow Cliffs Lake[2], water used to manufacture concrete, potable water use, and water used for landscape irrigation along the Lake A trail. Additional consumptive water demand occurs due to evaporation from existing water surfaces on the site. Water for aggregate processing, dust control, and Shadow Cliffs is supplied from ponds that hold water that is pumped from the active mining pits (Lake B and Lake J) to keep them dewatered. Based on aggregate production information provided by CEMEX (personal communication, 2013-2017 Mining Operation Annual Reports, Deborah Haldeman of CEMEX to Yasha Saber of Compass Land Group), an average of 1,182,325 tons of aggregate are produced per year at the Eliot Quarry. The produced aggregate is assumed to have a moisture content of 5 percent by weight, based on reported field capacities for such material (https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/field-capacity; https://nrcca.cals.cornell.edu/soil/CA2/CA0212.1-3.php; both accessed February 1, 2019). Therefore, approximately 44 AF/yr are shipped with the aggregate product. Dust control consumes approximately 100,000 gallons per day on average, with peak dry season dust control water use up to 128,000 gallons per day (personal communication, Grantt Franco of CEMEX to Yasha Saber of Compass Land Group, February 5, 2019). Assuming that dust control occurs for 200 days per year, the existing dust control water demand is approximately 61 AF/yr. Pumping to Shadow Cliffs is approximated at 10 AF/yr. A well located on the Project site is used to provide water for ready mix concrete and potable supply for employee restrooms. The annual use for concrete ranges from 6 AF to 9 AF based on an average annual concrete production of 90,338 cubic yards (personal communication, Michelle Bunch of CEMEX to Yasha Saber of Compass Land Group, December 4, 2018) and a water requirement of 20 gallons to 30 gallons per cubic yard (U.S. EPA, 2006; https://www.concretenetwork.com/concrete/slabs/ratio.htm; https://www.concretenetwork.com/concrete/slabs/ratio.htm; both accessed February 1, 2019). Approximately 240,000 tons of hot-mix asphalt were shipped from the site on average per year for the period 2013-2017 (personal communication, Donald Roland of Granite Construction Company to Yasha Saber of Compass Land Group, November 26, 2018). Water is not used to manufacture hot-mix asphalt, other than for dust control, which is included in the dust control estimate provided above in this paragraph.

According to the American Water Works Association (http://www.drinktap.org/consumerdnn/Home/WaterInformation/Conservation/WaterUseStatistics/tabid/85/Default.aspx, accessed 2016), water use in a commercial setting (i.e.

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[2] SMP-23 discharges to Shadow Cliffs occur pursuant to Waste Discharge Requirements Regionwide National Pollutant Discharge Elimination System ("NPDES") Permit No. CAG982001 under Order No. R2-2015-0035, as originally documented in a Notice of General Permit Coverage issued on March 25, 2003.

toilets and faucets using water-efficient fixtures) is approximately 20 gallons per worker per day. Approximately 55 persons are currently employed at the Project site (Compass Land Group 2019a, based on the production information sources cited in the paragraph above). Therefore, the anticipated potable water demand is anticipated to be 1,100 gallons per day for 200 days per year, which is approximately 0.75 AF/yr. According to CEMEX, based on irrigation parameters in the *CEMEX Lake A – Trail Corridor Revised Landscape Plan* (Teichert Materials, May 2016) and the as-built *CEMEX Lake A – Vineyard Trail Corridor Landscape Planting Summary* (Triangle Properties, 2017), approximately 0.25 AF per year are used to irrigate the recently installed landscaping along the Lake A trail. Thus, the current operational demand is approximately 125 AF/yr, based on information provided by CEMEX.

Existing water surfaces on the site include Lake A, the Main Silt Pond, the freshwater pond north of Lake B, an area in the western part of Lake B, a makeup water pond for the aggregate plant, Ponds C and D that are located east of the freshwater pond and west of Lakes C and D, respectively, and several former mining pits located along Arroyo del Valle. The existing water surface area for these features is approximately 231.5 acres (EMKO Environmental, Inc., 2019). Evaporative loss is estimated based on an average Class A Pan evaporation rate for the region of about 63 inches per year and a lake evaporation factor of 0.7 (DWR, 1975). Thus, for the existing water surface area at the Eliot Quarry, the baseline evaporative loss is approximately 850 AF/yr.

If all operations ceased and water was allowed to fill the existing excavations, the total water surface area would be 400 acres, which includes the acreages for Lake A, Lake B, Lake J, the Main Silt Pond, the freshwater pond north of Lake B, Ponds C and D, and former mining pits located along Arroyo del Valle (EMKO Environmental, Inc., 2019). Under the non-operating baseline conditions, the annual evaporative loss from the 400 acres of water surface would be approximately 1,470 AF/yr and the irrigation demand for the Lake A trail landscaping would be 0.25 AF/yr.

Thus, for baseline conditions, the total consumptive use of water ranges from 975 AF/yr for active operating conditions to 1,470 AF/yr if all mining and dewatering were to cease. The active operating baseline scenario includes 125 AF/yr for operational demand and 850 AF/yr of evaporation from existing water surfaces. The non-operating baseline scenario of 1,470 AF/yr consists of evaporation and landscaping irrigation only, since there would be no ongoing operations.

<u>Project Water Demand</u>

Water demand during reclamation will be variable. The water demand during construction will be primarily for dust control and to aid in compaction. In addition, reclamation will be conducted, at least in part, concurrently with mining (e.g. Lake A will likely be reclaimed while mining is occurring in Lake J). The overall annual construction water demand is anticipated to be comparable to the current dust control water use at the site, which is estimated to be approximately 61 AF/yr (EMKO Environmental, Inc., 2019).

Once reclamation is completed, the total area of water surface will be 355 acres, (EMKO Environmental, Inc., 2019). The annual average evaporation from this surface area will be 1,300 AF/yr, based on an average Class A Pan evaporation rate for the region of about 63 inches per year and a lake evaporation factor of 0.7 (DWR, 1975). Irrigation water demand will include 0.25 AF/yr for the Lake A trail and 0.45 AF/yr for the landscaping improvements that would be installed around the perimeter of Lake A (personal communication, Michael Engle of Cunningham Engineering to Yasha Saber of Compass Land Group, January 29, 2019). Thus, the total Project water demand would be up to 1,362 AF/yr, with 95 percent of that demand being evaporation from water surfaces that would be dedicated to Zone 7 (Lake A, Lake B, Pond C, Pond D, and the Fresh Water Pond that would become part of Lake B). The large proportion of Project water demand due to evaporation demonstrates that potential additional irrigation demand that may occur on other parts of the reclaimed Project Site (e.g., irrigation along the Vineyard Avenue Lake B trail and realigned Arroyo del Valle) would be de minimis and would not affect the overall evaluation of water use.

<u>Comparison of Baseline and Project Water Demand</u>

The overall reclamation demand of up to 1,362 AF/yr is more than the baseline operational water demand of 975 AF/yr but less than the baseline non-operational water demand of 1,470 AF/yr if all mining and dewatering were to cease at this time. As described in the Revised Reclamation Plan (Compass Land Group, 2019), reclamation construction at Lake A is anticipated to occur in 2022 and 2023. Therefore, for those two years, the water demand would consist of the operational baseline water demand of 975 AF/yr plus up to 61 AF/yr for reclamation dust control and other construction needs, or a total of 1,036 AF/yr (EMKO Environmental, Inc., 2019).

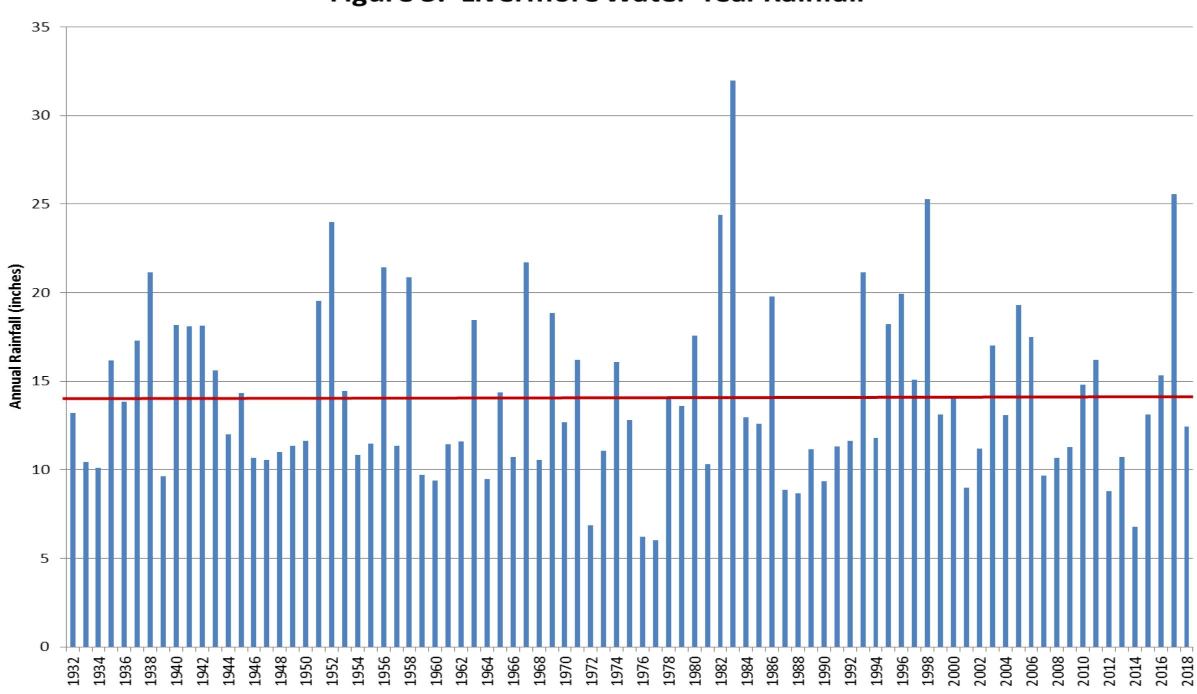
6.0 DRY YEAR SUPPLY

To evaluate the amount and sustainability of dry-year water supply for the project, historical rainfall data and groundwater levels were evaluated. Publicly-available rainfall data from the Western Regional Climate Center for the City of Livermore were used for this evaluation (WRCC, 2019). Rainfall data for the City of Livermore have been recorded monthly by the East Bay Municipal Utility District since 1931.

Rainfall data were evaluated for a water year, not a calendar year. A water year begins on October 1 and extends to September 30 of the next calendar year. This time period better-represents the seasonal rainfall patterns in California than does a calendar year. In this report, a water year is designated by the year in which it ends. For example, the period from October 1, 1976 through September 30, 1977 is designated as the 1977 water year. The annual water-year rainfall from 1932 to 2018 for Livermore is shown on Figure 3. The average water-year rainfall at Livermore for this period is 14.15 inches. The average annual rainfall amount is plotted as the red line on Figure 3.

Table 1 shows the driest single year and driest multiple-year periods since 1932. For each period, the rainfall totals for each year during the period are added together and then divided by the number of years in the period. For example, for the three-year period from 1975 to 1977, the annual rainfall amounts for each year were 12.82 inches, 6.23 inches, and 6.02 inches. Adding those values together yields 25.07 inches and dividing by three (i.e. the number of years) equals 8.36 inches. The multiple-year average of 8.36 inches can then be compared directly to the normal annual average rainfall of 14.15 inches to determine that during this three-year dry period, the total rainfall amount was 59 percent of normal, as indicated in Table 1.

Figure 3. Livermore Water-Year Rainfall



The single driest water year was 1977, with only 43 percent of normal rainfall. The driest two-year period recorded at Livermore was from 1976 to 1977, with 44 percent of normal rainfall. The driest three-year period occurred from 1975 to 1977, with 60 percent of normal rainfall. Table 3 also provides a summary of the driest four-year, five-year, and six-year periods since 1932. The recent four-year drought period from 2012 to 2015 is also shown in Table 3 for comparison with the driest four-year period, which was from 1987 to 1990 in Livermore. The recent four-year drought period was only the third driest four-year period on record for Livermore.

Table 3
Dry Year Comparisons

	Driest Single Year	Driest Two-Year Period	Driest Three-Year Period	Driest Four-Year Period	Driest Five-Year Period	Driest Six-Year Period	Recent Four-Year Drought Period
Water Years	1977	1976-1977	1975-1977	1987-1990	1987-1991	1972-1977	2012-2015
Annual Average	6.02	6.13	8.36	9.52	9.88	9.86	9.86
Percent of Normal	43%	43%	59%	67%	70%	70%	70%

Upon completion of mining, and implementation of the proposed Project, Lake A and Lake B will become part of the Chain of Lakes[3], to be operated by Zone 7. Zone 7 will divert water that it owns into the Chain of Lakes to provide groundwater recharge in accordance with the Specific Plan. Section IV of the Specific Plan states that one of the Specific Objectives of the Plan is “to mitigate exposure of groundwater to evaporative losses due to mining operations” (Specific Objective No. 2). Evaporative losses would be mitigated by diverting water from Arroyo del Valle into the Chain of Lakes at Lake A and conveying that water to locations within the Chain of Lakes where it would recharge groundwater.

As discussed in Section 4.2, groundwater demand in the Livermore-Amador Groundwater Basin is approximately 24,000 AF/yr (Jones and Stokes, 2005), whereas existing natural and artificial recharge may range from about 25,000 AF/yr to over 30,000 AF/yr. Under the Specific Plan, artificial recharge may be increased by as much as 60,000 AF/yr. The Zone 7 UWMP provides estimates of water demand under normal year, single dry year, and multiple dry year scenarios over a 20-year period (Zone 7, 2016, Tables 7-12, 7-13, and 7-14a through 7-14c). The estimates in the UWMP include both surface water supplies and pumping of groundwater, in addition to surface water demands for groundwater recharge. The UWMP concludes that under each

[3] Ponds C and D would become part of Lakes C and D, respectively, which are also components of the Chain of Lakes.

scenario (normal, single dry, and multiple dry years) the available water supply will exceed the water demand. The ability to maintain adequate supplies in dry year scenarios occurs primarily by increased use of groundwater supplies and the direct use of surface water that would have otherwise been used for groundwater recharge. The Specific Plan provides a mechanism by which the available storage capacity of the groundwater basin acts as a reservoir which may be recharged during wet periods while providing a source of supply during dry periods.

The UWMP (Zone 7, 2016) projects that during normal rainfall periods the annual available water (projected supplies in excess of demands) would range from 6,545 AF/yr to 11,345 AF/yr over a 20-year period. During single and multiple dry year scenarios, the annual available water would range from 12,320 AF/yr to 29,700 AF/yr, primarily due to a temporary increased reliance on groundwater. Due to the cyclical nature of normal and dry rainfall periods (see Figure 3), the temporary increased reliance is not anticipated to exceed the sustainable yield of the groundwater basin or to result in conditions of overdraft (Zone 7, 2016; Jones and Stokes, 2005). As described in Section 5.0, the annual water demand for the proposed Project would include up to one acre-foot for landscape irrigation, 61 AF for dust control during construction, and evaporative loss of 1,300 AF from water surfaces, or a maximum of 1,362 AF/yr. This volume of water is substantially less than the projected annual available water identified in the UWMP (Zone 7, 2016). In addition, the increased recharge that will occur in the Chain of Lakes once the proposed Project is implemented will more than offset the evaporative water demand during normal, single dry and multiple dry-year conditions, as intended in the Specific Objectives of the Specific Plan.

7.0 FINDINGS

This WSA has been prepared in accordance with SB 610 and SB 1262 to support the CEQA environmental review for the proposed Project and provides an assessment of water supply adequacy for the Project in accordance with Water Code Sections 10910 through 10915.

The water demand for the proposed project will consist of evaporation from the reclaimed mining excavations, water needed for construction, and a small amount of landscape irrigation. The total demand is estimated to be approximately 1,362 AF/yr.

The proposed Project would allow Zone 7 to implement parts of the Specific Plan that will substantially increase groundwater recharge using the Chain of Lakes, of which Lake A and Lake B will be a part. Review of groundwater elevations, rainfall data, and the Zone 7 GWMP indicates that there will be sufficient water available for the proposed Project during single and multiple dry years. However, the proposed Project will not be completed for approximately 30 to 35 years. Therefore, over the next 20 years, which is the timeframe of analysis for a WSA under SB 610, the water demand at the Eliot Quarry will be comparable to that which currently exists for existing (baseline) operational uses and evaporation from the small ponds at the site, which is estimated to be 975 AF/yr, plus nominal irrigation demands of less than one AF/yr, as described in Section 5.0 (EMKO Environmental, Inc., 2019). As discussed in Section 5.0, reclamation construction at Lake A is anticipated to occur in 2022 and 2023 (Compass Land Group, 2019). For those two years, the water demand would include up to 61 AF/yr for dust control and other construction needs, beyond the 975 AF/yr existing operational demand (EMKO Environmental, Inc., 2019). Thus, for a period of up to two years during the next 20 years, the water demand could increase to approximately 1,036 AF/yr to conduct the reclamation of Lake A. The operational and evaporative water demand over the next 20 years is less than that which will occur under the proposed Project. Therefore, there will also be sufficient water available for the on-going operations during single and multiple dry years over the next 20 years.

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