# 3.15 Master Response on Terminology

## 3.15.1 Introduction

### Overview

This master response addresses issues commenters raised regarding the meaning of "conservation" and "sustainability" as used in the EIR.

This master response is organized by the following subtopics:

3.15.2 Meaning of "conservation."

3.15.3 Meaning of "sustainability."

3.15.4 Abbreviated Glossary of Hydrology Terms

## 3.15.2 Meaning of "Conservation"

### Summary of Issues Raised by Commenters

Commenters expressed concern that the Project would not conserve groundwater as claimed in the Draft EIR and that it is misleading to apply the term "conservation" to the Project. Commenters asserted that the extraction of groundwater that otherwise would evaporate at the Dry Lakes would not result in the conservation of water.

### Responses

The term "conservation" has several uses in the environmental context. It is commonly used to refer to the protection and management of biodiversity and the protection of flora and fauna and their habitats. "Water conservation" is commonly used to refer to the process of reducing personal and public use of water in order to make what water we have available to us go farther and remain affordable. It is also California public policy that Californians, both public entities and private residents, conserve water by preventing the waste of water. The subsections below discuss these water conservation concepts and California's policy regarding water in order to avoid any doubt as to their meanings as accurately used in the Draft EIR. This master response addresses both CEQA and non-CEQA concerns in order to address comments as fully as possible even though some of the concerns about use of these terms pertain to legal and policy issues, not environmental issues governed by CEQA.

#### *How "Conservation" is Defined According to the California State Water Resources Control Board and the California Water Code*

Commenters have questioned whether the Project would, in fact, conserve water. The Draft EIR shows that the Project would conserve water by capturing groundwater that otherwise would mingle with brine and evaporate. The Draft EIR includes estimates from the hydrological modeling that the Project would reduce evaporation by 470,000 to 2,210,000 acre-feet (AF) (Draft EIR Vol. 1, Section 4.9.3 Hydrology and Water Quality, Table 4.9-11). This water is considered conserved since it would otherwise evaporate. Because this water would be supplied for domestic uses via the participating water providers, it would serve a beneficial use as defined in the California Constitution, Article X, Section 2.

### *California's Policy on Water Conservation as Beneficial Use*

It is the policy of the state of California to prevent the waste of water and encourage the conservation of water for the fullest beneficial uses that benefit the public. The California Constitution provides that "the waste … of water be prevented, and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and for the public welfare."[1] This policy has been bolstered by the California Supreme Court in cases like *Joslin v. Marin Municipal Water District* where the court held that, given the great and growing need for water, a paramount consideration is the conservation of water.[2] Furthermore, California Water Code regulations provide that beneficial uses include domestic, municipal, industrial, recreational, and environmental uses. See **Master Response 3.7** Water Rights for more on "beneficial use."

### *California's Interpretation of "Water Conservation"*

California considers the suppression of water evaporation a form of conservation, as is demonstrated through permitting decisions of the California State Water Resources Control Board (SWRCB). The SWRCB has repeatedly applied this meaning in its permitting of projects.[3] In addition, the California Water Code includes in its definition of "water conservation" the reduction of the amount of water irretrievably lost to evaporation or saline sinks.[4,5] Furthermore, the California-Nevada Interstate Compact (Compact) also supports this meaning of conservation. Article XI of the Compact states that increasing yield is permitted

1 Cal. Const. Article X, Section 2.

2 See *Joslin v. Marin Municipal Water Dist.* (1967) 67 Cal.2d 132, 140 (explaining that the constitutional provision cannot be applied *in vacuo* isolated from statewide considerations of transcendent importance, and that paramount among these considerations is the ever increasing need for the conservation of water in California).

3 For example, the California State Water Resources Control Board routinely includes the suppression of evaporation as a permit term to avoid waste. (See, e.g., *In the Matter of Application 31212*, State Water Resources Control Board, Order WR 2008-0013-DWR (2008); *In the Matter of License 7354, License 12624, and Permit 21809*, State Water Resources Control Board, Order WR 2008-0037-DWR (2008); *In the Matter of Permit 16762*, State Water Resources Control Board, Order WR 2006-0017 (2006).) Another example is the Agricultural Water Suppliers Efficient Water Management Practices Act, which defines "water conservation" to include the reduction of the amount of water irretrievably lost to evaporation. (Wat. Code, § 10902(c).) Yet another example, is the California-Nevada Interstate Compact, which apportions waters of the Lake Tahoe, Truckee River, Carson River, and Walker River Basins between California and Nevada. Article XI of the compact provides that either state may increase the yield to which it is entitled by undertaking projects that conserve water by suppressing evaporation.

4 Wat. Code § 10902(c).

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where the state (California or Nevada) undertakes projects for the conservation of water through evaporation suppression. Therefore, the State of California interprets conservation to include the suppression of water evaporation and the EIR's use the term to describe the Project is appropriate.

#### *Project Proposed to Take Water Currently Wasted through Evaporation and Conserve for Use*

Groundwater that is currently flowing down from the mountains through the Fenner Gap and to the Dry Lakes (annual recharge) enters the saline sink and then evaporates from the Dry Lakes. Groundwater does not supply the flora and fauna (in the mountains or at the Dry Lake edges) because it flows deep below the ground surface at depths out of the reach of animals and plant roots. Similarly, it does not supply plants at the Dry Lakes since it is highly saline and no plants exist on the Dry Lakes. Therefore, precipitation that has entered the aquifer system stays within the basin until it becomes brine and evaporates from the Dry Lakes. As explained above, this constitutes a waste of water, which the state of California encourages be prevented.

In order to prevent waste, the Project aims to capture this groundwater by altering the hydraulic gradient at the Fenner Gap, upgradient from the Dry Lakes. The flow of the water, underground, currently toward the Dry Lakes, would be reversed so that the groundwater is stopped at the Gap and forced to flow back toward the Gap and wellfield. At the wellfield, the water would be extracted and supplied to water providers for domestic and municipal beneficial uses in Southern California.

#### *Conclusion*

The Project would provide a process of evaporation suppression. This evaporation suppression and its application to beneficial uses constitutes the conservation of water. Accordingly, the use of the term in regards to the Project is not misleading.

## 3.15.3 Meaning of "Sustainability"

### Summary of Issues Raised by Commenters

Commenters expressed concern that the Project would not be sustainable as claimed in the Draft EIR and that it is misleading to apply the term "sustainability" to the Project. Commenters asserted that by extracting more water than is recharged into the aquifer system, the Project would diminish to harmful levels or even deplete the basin and, therefore, the Project is not sustainable.

### *Response*

#### *Sustainable Project*

A sustainable project may be defined as one that does not result in a depletion of resources, but rather relies on renewable resources. The proposed Project would capture groundwater flowing through the Fenner Gap on its way to the highly saline low point of the valley where it ultimately evaporates. This groundwater flow is a natural perennial condition that will continue with or without the Project. The Project would put this water that is otherwise destined to evaporate to beneficial uses without significantly impacting any existing beneficial uses.

Commenters have questioned the Project's extraction of groundwater beyond the amount of annual recharge, claiming that it makes the Project unsustainable. The Draft EIR acknowledges that the Project will extract more water than the amount naturally recharged into the aquifer temporarily in order to effectively control the groundwater flow and actually reduce evaporation. Without the control of the groundwater gradient, the groundwater evaporation would not be stopped. The Draft EIR also explains that doing this 1) will not result in harm to the environment and 2) is consistent with California state policy of conserving water and putting water to "beneficial use" to the "fullest extent" possible.[6] Following the cessation of pumping after 50 years, the groundwater basin would refill with annual recharge, while evaporation would again increase until pre-Project levels are reached. As a result and as further explained below, the Project is sustainable.

### *Safe Yield, Temporary Surplus, and Conservation*

In consideration of the protection of the environment, California policy is to limit extractions to what is called "safe yield." Safe yield is defined as the maximum amount of water that can be withdrawn without causing an "undesireable result."[7] An "undesireable result" was defined by the Court in *City of San Fernando* as the gradual lowering of groundwater levels to the point that the water supply is ultimately depleted. If an "undesireable result" occurs, the basin is considered to be overdrafted. However, overdraft is not achieved unless extractions exceed safe yield creating a temporary surplus of extracted water (see also June 4, 2012 Memorandum of Understanding Between County, SMWD and Cadiz, Definitions, Final EIR Vol. 7, Appendix N). The state of California holds as its policy the maximum beneficial use of water. The California Supreme Court has determined that a basin may extract more water than is recharged if it is being done to conserve water. [8] As discussed in the Draft EIR Vol. 1, Section 4.9.3 Hydrology and Water Quality, pp. 4.9-62 to 4.9-63, water can be extracted in excess of recharge if it is done for the purpose of temporarily lowering groundwater levels in an effort to prevent water from being wasted. The amount of water extracted beyond the amount of recharge is called "temporary surplus" because for a defined period of time, that water is treated like surplus water. This type of management of a groundwater basin is sustainable as it will not cause an undesireable result, namely the long-term depletion of the aquifer.

6 California Constitution, Article X, Section 2.
7 *City of Los Angeles v. City of San Fernando* (1975) 14 Cal.3d 199.
8 *City of Los Angeles v. City of San Fernando* (1975) 14 Cal.3d 199.

### *Protection of the Environment*

The temporary surplus for the Project is approximately 18,000 AFY, the difference between the extraction amount (50,000 AFY) and the estimated natural recharge (32,000 AFY). See Draft EIR Vol. 1, Section 4.9 Hydrology and Water Quality, p. 4.9-46. A conservative estimate is that the aquifer holds in storage over 20 MAF of groundwater. If, on average, a temporary surplus of 18,000 AFY is extracted for a period of 50 years (the term of the proposed Project), the aquifer will lose over one million acre-feet of water, or simply three to six percent of the water it holds in storage.[9] However, the Project's use of this water is offset by the reduction in evaporation amounts estimated between 470,000 and 2,100,000 AF (Draft EIR, Section 4.9.3 Hydrology and Water Quality, Table 4.9-11). Moreover, the further away from the center of the Project wellfield area, the less drawdown will occur such that the amount of drawdown will shrink considerably with distance from the center. Furthermore, the aquifer will begin to recover immediately after the cessation of pumping and would be fully recovered after 67 years. This result does not constitute depletion of the aquifer and does not constitute an undesirable result. Therefore, the Project is sustainable.

### *Conservation and Protection of the Environment Creates a Sustainable Project*

Since the aquifer system is currently wasting approximately 32,000 AF of water to evaporation each year, applying a groundwater management method that will prevent this water from being lost is sound California policy and condoned by the California courts. For the Project, groundwater levels will be lowered temporarily and only enough to alter the hydraulic gradient, thus reversing the underground flow of water to the Dry Lakes and allowing the conservation of that water via extraction and supply for the beneficial use of southern Californians. Because the aquifer would not be depleted or diminished to a harmful level, the Project would not result in an undesirable result and the Project is sustainable.

## 3.15.4 Abbreviated Glossary of Hydrology and Geology Terms[10]

| | |
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| acre-ft/yr or AFY | acre-feet per year. |
| Alluvial | A geologic term describing beds of sand, gravel, silt, and clay deposited by flowing water. |
| amsl | above mean sea level |

9 The loss of storage at the end of 50 years includes credit for reduced evaporation from the Dry Lakes. Geoscience's previous analysis demonstrated that pumping in excess of the natural recharge is necessary to reduce the evaporative losses to the Dry Lakes. However, evaporation from the Dry Lakes will continue at the beginning of the Project. Conservation of evaporative losses increases with increased Project pumping by retrieving water that was moving down-gradient towards the Dry Lakes. Over time, pumping the natural recharge plus temporary surplus reduces evaporation from the Dry Lakes through hydraulic control. Therefore the reduction in groundwater storage is not linear as the reduction in evaporation from the Dry Lakes is not linear (Draft EIR Vol. 1, Section 4.9 Hydrology and Water Quality, p. 4.9-5, 4.9-71).

10 This list of terms is taken from Appendix H1, Geoscience Support Services, Inc., *Cadiz Groundwater Modeling and Impact Analysis*, September 2011, p. 1.

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| Antiform | Arch-shaped rock structure which, by definition, closes (i.e. arches) upward. Antiforms are usually accompanied by synforms, which are oppositely shaped. |
| Aquifer | A geologic formation or group of formations which store, transmit, and yield significant quantities of water. |
| Archean | An eon of geologic time extending from about 3.9 billion years ago to 2.5 billion years ago. |
| bgs | below ground surface |
| Capillary rise | The height above a free water surface to which water will rise by capillary action |
| Carbonate | A rock consisting primarily of a carbonate mineral such as calcite or dolomite, the chief minerals in limestone and dolostone, respectively. |
| CDMG | California Division of Mines and Geology |
| Cone of depression | A depression of the potentiometric surface in the shape of an inverted cone that develops around a well which is being pumped. |
| CRA | Colorado River Aqueduct |
| DEM | Digital Elevation Model |
| Detachment Fault | A nearly horizontal fault at the base of a fault system associated with large-scale extensional tectonics. |
| Dispersivity | A geometric property of a porous medium which determines the dispersion characteristics of the medium by relating the components of pore velocity to the dispersion coefficient. |
| Drawdown | The change in hydraulic head or water level relative to a background condition. |
| DWR | California Department of Water Resources |
| Effective Porosity | A fraction of the void spaces which forms part of the interconnected flow paths through the medium, per unit volume of porous medium (excluding void space in isolated or dead-end pores). Also known as “specific yield.” |
| Evapotranspiration | The combined loss of water from a given area by evaporation from the land and transpiration from plants. |

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| Fanglomerate | A sedimentary rock of heterogeneous materials that were originally deposited in an alluvial fan and have since become cemented into rock. |
| Fault | A fracture in the earth's crust, with displacement of one side of the fracture with respect to the other. |
| Formation | A geologic term that designates a body of rock or rock/sediment strata of similar lithologic type or combination of types. |
| Ft | feet, foot |
| ft/day | feet per day |
| gpm | gallons per minute |
| Groundwater | Water contained in interconnected pores located below the water table in an unconfined aquifer or located in a confined aquifer. |
| Hanging wall | Of the two sides of a fault, the side above the fault plane. It is called the hanging wall because where inactive faults have been "filled in" with mineral deposits and then mined, this is the side on which miners can hang their lanterns. |
| Head | Energy, produced by elevation, pressure, or velocity, contained in a water mass. |
| Holocene | An epoch of the Quaternary period extending from the end of the Pleistocene, approximately 11,000 years ago, to the present time. |
| Hydraulic Conductivity | The measure of the ability of the soil to transmit water, dependent upon both the properties of the soil and those of the fluid. |
| ID | inside diameter |
| in. | inch |
| Inselberg | An isolated residual knob or hill rising abruptly from a lowland erosion surface. |
| Jurassic | The second period of the Mesozoic era extending from approximately 200 to 145 million years ago. |
| Land Subsidence | The lowering of the natural land surface due to extraction of fluids and/or gas from the subsurface. |
| Leakage | The vertical movement (either downward or upward) of ground water from one aquifer to another. |

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| Leakance | (1) The ratio K'/b', in which K' and b' are the vertical hydraulic conductivity and the thickness, respectively, of the confining beds.<br>(2) The rate of flow across a unit (horizontal) area of a semipervious layer into (or out of) an aquifer under one unit of head difference across this layer. Synonymous with coefficient of leakage. |
| Leakance, vertical | Vertical leakance is defined as the average vertical hydraulic conductivity of the confining unit sediment divided by its thickness. In a model, vertical leakance controls the rate of groundwater movement between two adjacent model layers for a given head difference between the layers (USGS, 1996). |
| Listric Fault | Listric faults can be defined as curved normal faults in which the fault surface in concave upwards; its dip decreases with depth. These faults also occur in extension zones where there is a main detachment fracture following a curved path rather than a planar path. Hanging wall blocks may either rotate and slide along the fault plane (e.g., slumps), or they may pull away from the main fault, slipping instead only along the low dipping part of the fault. Roll-over anticlines will often form between bedding planes and the main fault plane as a result of the flexing between the two. |
| Mesozoic | An era of geologic time extending from approximately 250 to 65 million years ago. |
| Metamorphic | A rock changed from its original form and/or composition by heat, pressure, or chemically active fluids. |
| mg/l | milligrams per liter |
| Miocene | An epoch of the early Tertiary period extending from approximately 23 to 5.3 million years ago. |
| MODFLOW-2000 | A modular finite-difference flow model developed by the United States Geologic Survey (USGS) to solve the groundwater flow equation. |
| MT3DMS | A modular three-dimensional solute transport model for simulation of advection, dispersion, and chemical reactions of contaminants in groundwater systems. |
| Normal Fault | A fault characterized by predominantly vertical displacement in which the hanging wall is moved downward with respect to the footwall of the fault. Generally, this kind of fault is a sign of tectonic extension. |
| OD | outside diameter |

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| Paleozoic | An era of geologic time extending from approximately 542 to 250 million years ago. |
| Permeability | The capability of soil or other geologic formations to transmit water. The term is used to separate the effects of the medium from those of the fluid on the hydraulic conductivity. |
| PEST | Parameter ESTimation software |
| Pleistocene | An epoch of the Tertiary period extending from approximately 2.6 million years ago to 11,000 years ago. |
| Porosity | The ratio, usually expressed as a percentage, of the total volume of voids of a given porous medium to the total volume of the porous medium. Also, the volume percentage of the total bulk not occupied by solid particles. |
| Porosity, effective | The ratio of the volume of the voids of a soil or rock mass that can be drained by gravity to the total volume of the mass, or the amount of interconnected pore space and fracture openings available for the transmission of fluids, expressed as the ratio of the volume of interconnected pores and openings to the volume of rock. |
| Preconsolidation Stress | The maximum stress to which a deposit has been subjected, and which it can withstand without undergoing additional permanent deformation. |
| Proterozoic | An eon of geologic time extending from approximately 2.5 billion years ago to 542 million years ago. |
| Quaternary | The second period of the Cenozoic era extending from approximately 2.6 million years ago to 5,000 years ago. |
| Saline Water | Water characterized by a total dissolved solids concentration in excess of 1,000 milligrams per liter. |
| SEAWAT-2000 | Developed by the USGS to simulate three-dimensional, variable density, groundwater flow and solute transport in porous media. The source code for SEAWAT Version 4 was developed by combining MODFLOW and MT3DMS into a single program that solves the coupled flow and solute transport equations |
| Specific Yield | See “Effective Porosity” |
| Storativity | The volume of water that an aquifer releases or takes into storage per unit change in hydraulic head. |

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| Synform | A structure formed by the downward bending of rock strata onto earlier and steeper folds of smaller size. Synforms are usually accompanied by antiforms, which are oppositely shaped. |
| TDS | Total dissolved solids. The total concentration of dissolved constituents in solution, usually expressed in milligrams per liter. |
| Tertiary | The second period of the Cenozoic era extending from approximately 65 to 2.6 million years ago. |
| USGS | United States Geological Survey |
| Volcanic | Pertaining to the activities, structures, or rock types of a volcano. |
| yr(s) | year or years |