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EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

State Water Resources Control Board

TO: Paul Clanon
Executive Director
Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102-3298

FROM: Michael Buckman
Senior Environmental Scientist
DIVISION OF WATER RIGHTS

DATE: DEC 21 2012

SUBJECT: DRAFT ANALYSIS OF MONTEREY PENINSULA WATER SUPPLY PROJECT PROPOSED IN APPLICATION 12-04-019 BY CALIFORNIA AMERICAN WATER COMPANY

Enclosed for your review is the State Water Resources Control Board's (State Water Board) draft analysis of California American Water Company's (Cal-Am) proposed Monterey Peninsula Water Supply Project (MPWSP). The California Public Utilities Commission (Commission) requested that the State Water Board assist the Commission in reviewing whether Cal-Am has the legal right to extract desalination feedwater for the proposed MPWSP.

State Water Board staff relied on information contained in the Commission's Notice of Preparation (NOP) for the proposed MPWSP and the 2009 Final Environmental Impact Report (FEIR) for the Coastal Water Project for our analysis. Since the NOP did not include specific details of the proposed MPWSP, staff relied heavily on the analysis in the FEIR, specifically the North Marina Project Alternative.

The key determination in whether Cal-Am may extract water from beneath the Salinas Basin (Basin) is whether injury will result to other users in the Basin. If the MPWSP is constructed as described in the FEIR for the North Marina Project, there will be a slight lowering of the groundwater levels within an approximate 2-mile radius from the MPWSP, which could affect some existing wells within the Basin. Because seawater has intruded into this area, developing a fresh water supply from this source through desalination could result in water that is "surplus" to the needs of other users in the Basin. This developed water would be available for export outside the Basin so long as any fresh water extracted from the Basin is returned to the Basin in a manner that avoids injury to other users.

Since project specific details and aquifer conditions for the MPWSP are unverified at this time, it is not possible to make definitive water rights statements. If conditions are found to be similar to the North Marina Project, however, it is unlikely injury to other users would occur by the slight lowering of the groundwater levels in this seawater intruded region. If Cal-Am's extractions are limited to water derived from brackish or saline sources in areas of the Basin, and it returns all incidental fresh water it extracts to the Basin in a method that avoids injury to other users, the MPWSP could likely proceed without violating other users' groundwater rights. State Water Board staff has included several recommendations for additional studies and determinations that would need to be completed in order to provide the Commission with a more definitive conclusion.

The Commission and State Water Board staff continue to work on executing a reimbursement contract for staff time spent developing the analysis. Although the contract is not yet finalized, State Water Board staff is transmitting the draft to the Commission for its review so it is timely for the Commission's process.

The State Water Board anticipates releasing the draft analysis for public review shortly. After a public review, the State Water Board will evaluate any comments received before issuing a final report. The State Water Board may also decide to hold a public workshop.

If you have any questions regarding this matter, you may contact me at (916) 341-5448 (mbuckman@waterboards.ca.gov) or Paul Murphey at (916) 341-5435 (pmurphey@waterboards.ca.gov).

STATE WATER RESOURCES CONTROL BOARD

DRAFT REVIEW OF CALIFORNIA AMERICAN WATER COMPANY'S MONTEREY PENINSULA WATER SUPPLY PROJECT

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1. Introduction

In a letter dated September 26, 2012, the California Public Utility Commission (Commission) asked the State Water Resources Control Board (State Water Board) whether the California American Water Company (Cal-Am) has the legal right to extract desalination feed water for the proposed Monterey Peninsula Water Supply Project (MPWSP). The Commission stated that it is not asking for a determination of water rights, but is instead requesting an opinion as to whether Cal-Am has a credible legal claim to extract feed water for the proposed MPWSP, in order to inform the Commission's determination regarding the legal feasibility of the MPWSP.

In a letter dated November 16, 2012, the State Water Board informed the Commission that State Water Board staff would prepare an initial report for the Commission and for public review.

Cal-Am proposes several approaches that it claims would legally allow it to extract water from the Salinas Basin (Basin) near or beneath Monterey Bay without violating groundwater rights or injuring other groundwater users in the Basin. The purpose of this report is to examine the available technical information and outline legal considerations which would apply to Cal-Am's proposed MPWSP.

This paper will: (1) examine the available technical information; (2) discuss the effect the proposed MPWSP could have on other users in the Basin; (3) discuss the legal constraints that will apply to any user who proposes to extract water from the Basin; and (4) outline information that will be necessary to further explore MPWSP's feasibility and impacts. Ultimately, whether a legal means exists for Cal-Am to extract water from the Basin, as described in its proposal outlined in the California Environmental Quality Act (CEQA) Notice of Preparation[1] (NOP) document, will depend on developing key hydrogeologic information to support established principles of groundwater law.

[1] California Public Utilities Commission, Notice of Preparation, Environmental Impact Report for the Cal-Am Monterey Peninsula Water Supply Project, October 2012, available at: http://www.cpuc.ca.gov/Environment/info/esa/mpwsp/pdf/NOP_100812_print-ready.pdf

2. Background

In 2004, Cal-Am filed Application A.04-09-019 with the Commission seeking a Certificate of Public Convenience and Necessity for the Coastal Water Project. The primary purpose of the Coastal Water Project was to replace existing water supplies that have been constrained by legal decisions affecting the Carmel River and Seaside Groundwater Basin water resources. The Coastal Water Project proposed to use existing intakes at the Moss Landing Power Plant to draw source water for a new desalinization plant at Moss Landing. In January 2009, the Commission issued a Draft Environmental Impact Report (EIR) for the Coastal Water Project and two project alternatives – the North Marina Project and the Monterey Regional Water Supply Project (Regional Project). In October 2009, the Commission issued the Final EIR[2] (FEIR) and in December 2009, it certified the FEIR. In December 2010, the Commission approved implementation of the Regional Project. In January 2012, Cal-Am withdrew its support for the Regional Project and subsequently submitted Application A.12-04-019 to the Commission for the proposed MPWSP as described in their September 26, 2012 letter. In October 2012, the Commission issued a NOP for an EIR for the proposed MPWSP.

3. Monterey Peninsula Water Supply Project Description

According to the MPWSP description in the NOP, the intake system of the MPWSP would consist of eight 750-foot–long subsurface slant wells which would extend offshore and terminate approximately 200 feet into the Monterey Bay. These wells would draw water from beneath the ocean floor for use as source water for the proposed desalination plant. The proposed location for the slant wells is a 376-acre coastal property located north of the city of Marina (Figure SWB 1). Approximately 22 million gallons of water per day (mgd) would be extracted from the wells in order to produce 9 mgd of desalinated product water.

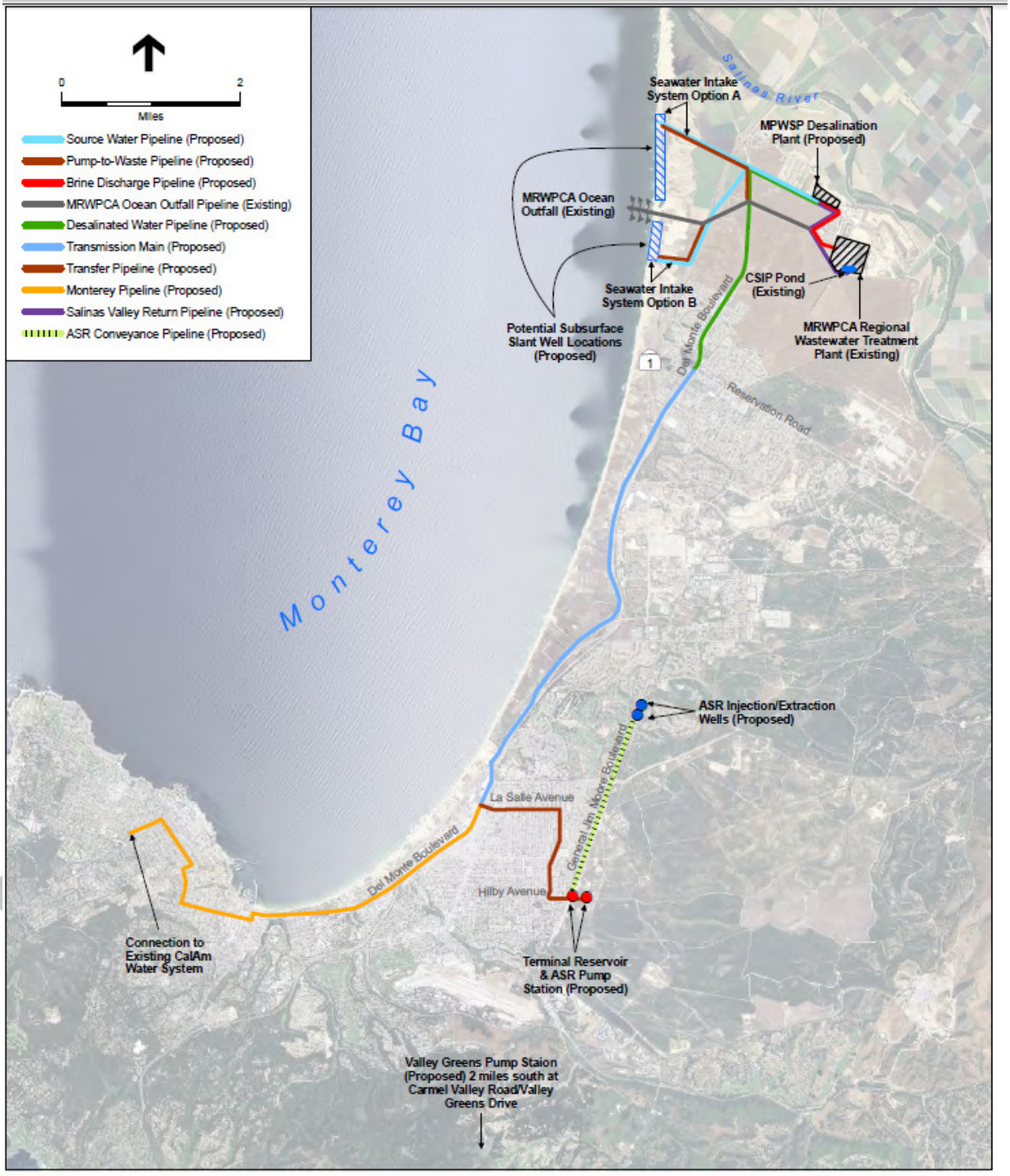
[2] Cal-Am, Coastal Water Project, FEIR, October 30, 2009.

The NOP does not provide all the information necessary for the State Water Board to address the issue of water rights. The NOP does not provide information on the proposed depth of the slant wells or provide information on which aquifer(s) the wells will extract water from. Further complicating the analysis, the relationship of the aquifers in the well area to surrounding low permeability aquitards is uncertain. Given these significant unknowns, this State Water Board report attempts to provide the Commission with a review of the MPWSP by assuming the MPWSP hydrogeologic characteristics and response would be similar to one of the project alternatives analyzed in the FEIR.

State Water Board staff relied heavily upon the analysis in the FEIR. Of the two project alternatives in the FEIR, the North Marina Project more closely resembles the proposed MPWSP described in the NOP. For this reason, State Water Board staff assumes that most of the information, including the slant wells construction and operation as described in the FEIR – North Marina Project Alternative[3], is applicable to the proposed MPWSP. However, in an effort to be inclusive, this draft report also provides a summary of the Regional Project's hydrogeologic impacts.

[3] FEIR, Section 3.3 – North Marina Project, October, 2009.

Figure SWB 1



SOURCE: ESA, 2012

Monterey Peninsula Water Supply Project . 205335.01

Figure 2

Preliminary Project Facilities Map

4. Physical Setting

4.1 Groundwater Aquifers

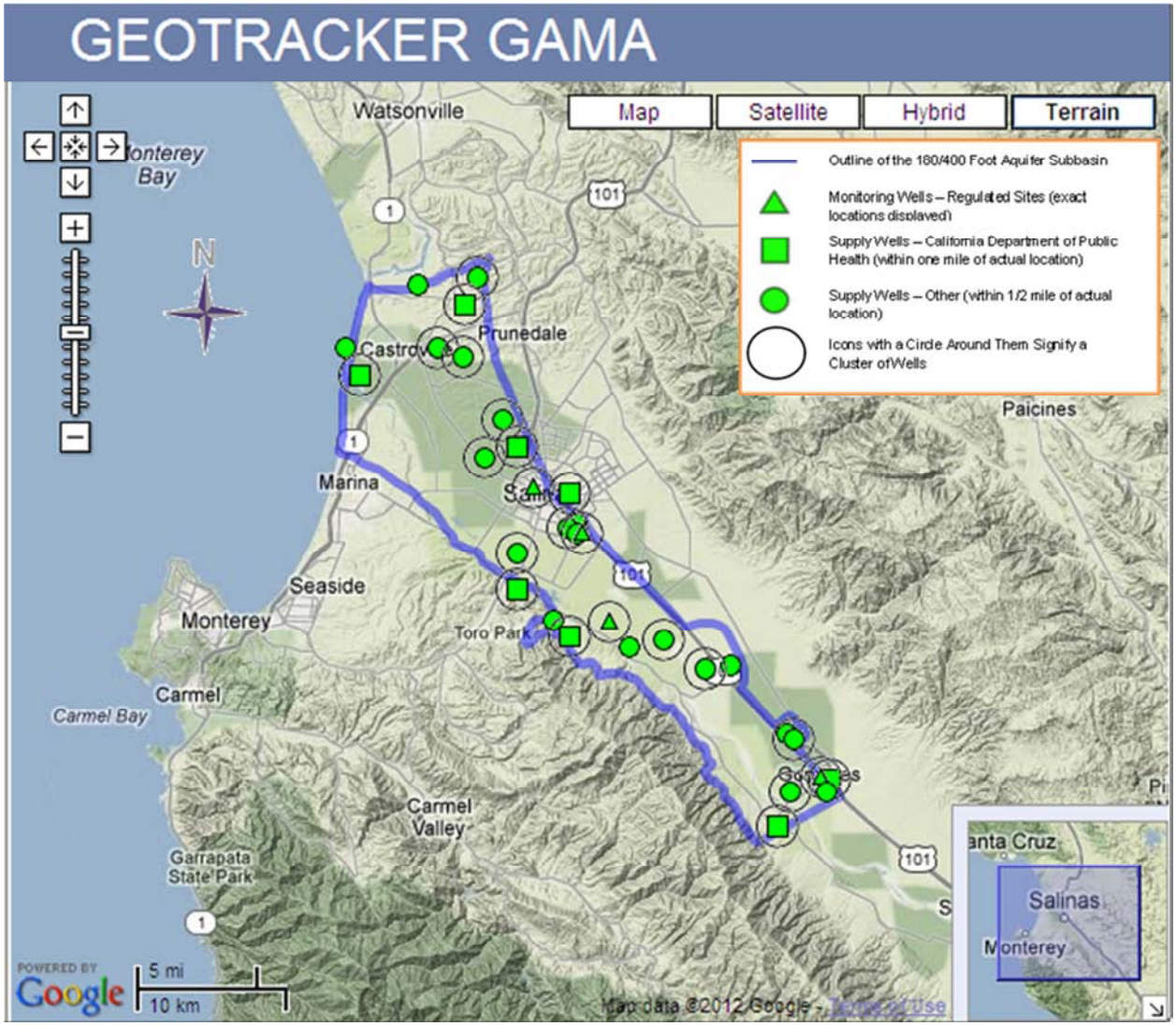
The location of the proposed slant wells is in the 180/400 Foot Aquifer subbasin of the Salinas Valley Groundwater Basin[4] (Basin, Salinas Basin, or SVGB). Figure SWB-2 shows the outline of the 180/400 Foot Aquifer subbasin. The SVGB extends approximately 100 miles from Monterey Bay in the northwest to the headwaters of the Salinas River in the southeast. Major aquifers in the SVGB have been named for the average depth at which they occur. The aquifers from top to bottom include the 180-Foot Aquifer, the 400-Foot Aquifer and the 900-Foot or Deep Aquifer. A near-surface water-bearing zone comprised of dune sands, commonly referred to as the dune sand aquifer, also exists but is considered a minor source of water due to its poor quality. The dune sand aquifer is not regionally extensive and is limited in its extent.[5] It is not a recognized sub-basin within the SVGB. The amount of groundwater in storage in the dune sand aquifer is unknown. Figure SWB 3 is a cross-section taken from the FEIR for the Coastal Water Project that shows the relationship of aquifers and aquitards.

The 180-Foot Aquifer is generally confined by the overlying Salinas Valley Aquitard (SVA). The SVA is a well-defined clay formation that extends vertically from the ground surface to approximately 100 to 150 feet below mean sea level (msl) and extends laterally from Monterey Bay to 10 miles south of Salinas. The SVA is a low permeability layer that retards the vertical movement of water to the underlying 180-Foot Aquifer. Studies have shown that in some areas the SVA thins enough to create unconfined conditions in the 180-Foot Aquifer.[6] It is unknown if these unconfined conditions exist in the MPWSP well area.

[4] California Department of Water Resources, California's Groundwater, Bulletin 118, Central Coast Hydrologic Region, SVGB, February 2004.
[5] FEIR, Section 4.2, Groundwater Resources, page 4.2-5, October 2009.
[6] Monterey County Water Resources Agency, Monterey County Groundwater Management Plan, Chapter 3 – Basin Description, pages 3.7 & 3.8, May 2006.

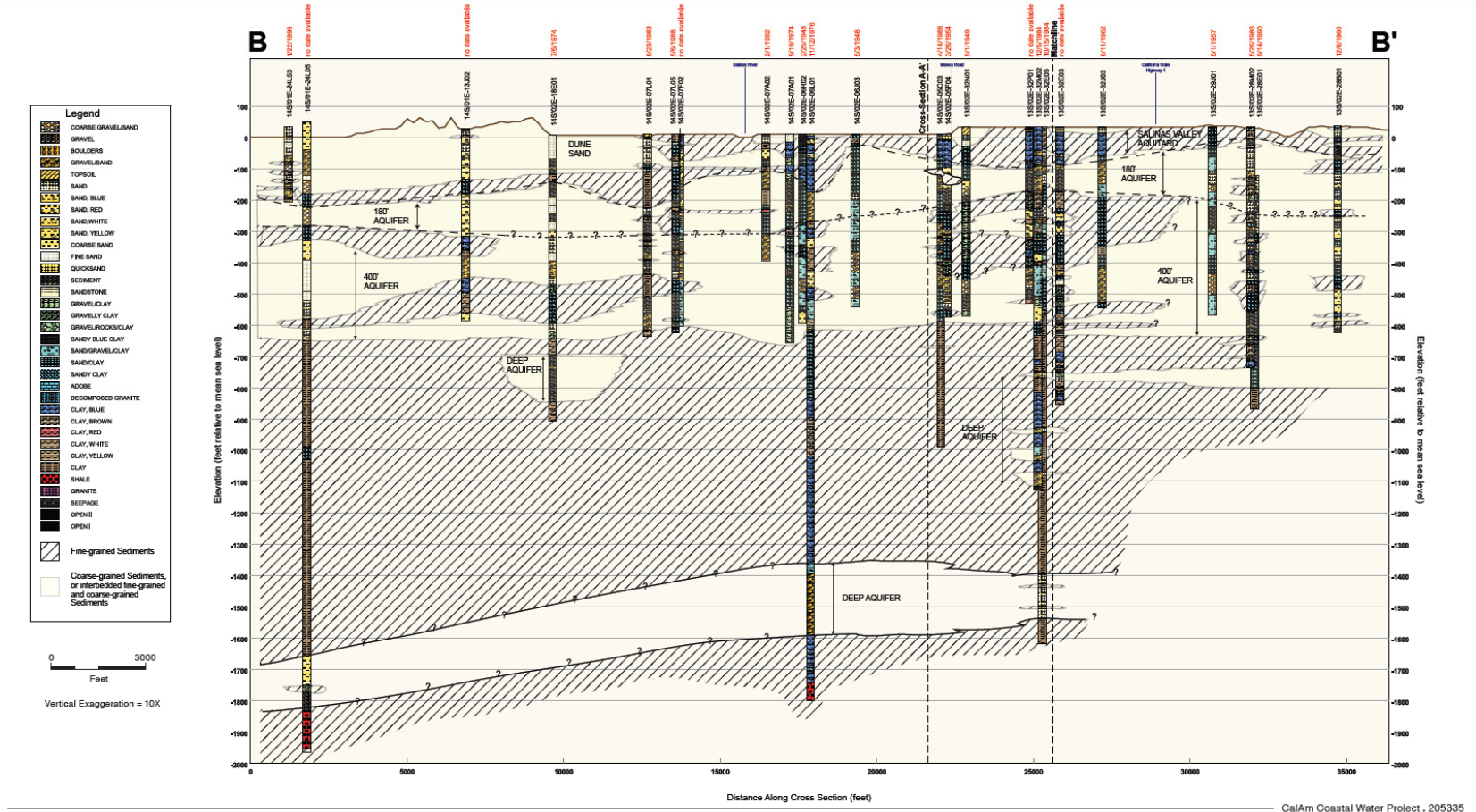
Based on information from logs of two wells located approximately ½ mile south and ½ mile northeast from the proposed MPWSP slant wells, the top of the SVA is between 150 to 180 feet below msl. The well logs show the top of the underlying 180-Foot Aquifer at approximately 190 to 220 feet below msl.[7]

Figure SWB 2



[7] FEIR, Section 4.2 – Groundwater Resources, Figure 4.2-3, October, 2009.

Figure SWB 3



SOURCE: Kennedy/Jenks, 2004

CalAm Coastal Water Project . 205335

Figure 4.2-3
Cross-Section B-B'

4.2 Groundwater Quality

Heavy pumping of the 180-Foot Aquifer has caused significant seawater intrusion, which was first documented in the 1930s.[8] The Monterey County Water Resources Agency (MCWRA) uses the Secondary Drinking Water Standard upper limit of 500 milligrams per liter (mg/L) concentration for chloride to determine the seawater intrusion front. MCWRA currently estimates that seawater has intruded into the 180-Foot Aquifer approximately 5 miles inland. This seawater intrusion has resulted in the degradation of groundwater supplies, requiring numerous urban and agricultural supply wells to be abandoned or destroyed. In MCWRA's latest groundwater management plan (2006), it is estimated that 25,000 acres of land overlie water that has degraded to 500 mg/L chloride. The amount of 500 mg/L chloride water that enters the Basin was reported to be as high as 14,000 acre-feet per year (afa) or 4.5 billion gallons.[9]

Efforts have been made to increase fresh water percolation through the Castroville Seawater Intrusion Project (CSIP).[10] The CSIP is a program that distributes recycled water to agricultural users within the SVGB. The program provides a form of groundwater recharge by effectively reducing groundwater extraction in those areas of the Basin that are part of the CSIP area.

4.3 Groundwater Recharge and Discharge

Groundwater recharge in the lower portion of the Salinas Valley is largely by infiltration along the channel of the Salinas River and its tributaries. This accounts for approximately 50% of the total recharge within the SVGB. Approximately 40% of the total recharge is from irrigation return water with the remaining 10% due to precipitation, subsurface inflow and seawater intrusion.

[8] California Department of Water Resources, California's Groundwater, Bulletin 118, Central Coast Hydrologic Region, SVGB, 180/400 Foot Aquifer subbasin, February 2004.
[9] MCWRA, Monterey County Groundwater Management Plan, Chapter 3 – Basin Description, pages 3.14 & 3.15, May 2006.
[10] FEIR 4.2-17.

Approximately 95% of outflow from the Basin is from pumping with the remaining 5% due to riparian vegetation evapotranspiration. Groundwater withdrawal outpaces groundwater recharge of fresh water, which results in overdraft conditions.[11]

Historically, groundwater flowed seaward to discharge zones in the walls of the submarine canyon in Monterey Bay.[12] This seaward flow of groundwater prevented seawater from intruding landward into the SVGB. With increased pumping, groundwater flow is now dominantly northeastward.[13] This northeastward flow has allowed seawater to intrude into the SVGB, thereby degrading groundwater quality in the 180 and 400-Foot Aquifers.

4.4 Groundwater Budget

The Department of Water Resources calculated that total fresh water inflow into the 180-Foot and 400-Foot Aquifers is approximately 117,000 afa. Urban and agriculture extractions were estimated at 130,000 afa and subsurface outflow was estimated at 8,000 afa.[14] Therefore, there is a net loss or overdraft of approximately 21,000 afa in the 180-and 400-Foot Aquifers.

4.5 Groundwater Modeling[15]

As part of the FEIR for the Coastal Water Project, a local groundwater flow and solute transport model (Model) was developed to determine the effects that project pumping would have on groundwater levels and seawater intrusion in the area. This Model was constructed using aquifer parameters, recharge and discharge terms, boundary conditions and predictive scenarios that were developed for a regional groundwater model called the Salinas Valley Integrated Groundwater and Surface Model (SVIGSM). Use of this information allows for consistency between the two models. The Model was developed to specifically focus on the North Marina area and has a much finer cell size than the SVIGSM.

[11] MCWRA, County Groundwater Management Plan, Chapter 3 – Basin Description, page 3-10, May 2006
[12] DWR, Bulletin 118.
[13] FEIR, Section 4.2, page 4.2-9.
[14] DWR, Bulletin 118.
[15] FEIR, Appendix E, Geoscience, North Marina Groundwater Model Evaluation of Projects, July 2008.

This allows for improved resolution in the vicinity of the proposed MPWSP. The Model can model seawater intrusion, a capability that the SVIGSM does not have.

The Model consists of six layers. The layers represented from top to bottom are: (1) a layer directly beneath the ocean that allows direct connection from the ocean to the aquifers; (2) the 180-Foot Aquifer; (3) an unnamed aquitard; (4) the 400-Foot Aquifer; (5) an unnamed aquitard; and (6) the Deep Aquifer. It should be noted that the Model does not include a layer that represents the SVA. Therefore, the Model assumes that the 180-Foot Aquifer is unconfined.

Aquifer parameters such as depth, hydraulic conductivity, specific storability, and effective porosity were obtained from the SVIGSM. In addition, monthly data for recharge and discharge values were obtained from the SVIGSM. The North Marina predictive scenario was run for a 56-year period from October 1948 through September 2004. This is the same period used in the SVIGSM predictive scenarios.

Two potential projects were evaluated with the Model: 1) The North Marina Project; and 2) The Regional Project. In both of these alternatives, the 180-Foot Aquifer was modeled as an unconfined aquifer. It is not known if the MPWSP wells would indeed be in unconfined conditions. Consequently, the alternative's results discussed below may or may not be predictive of the MPWSP.

5. North Marina Alternative Project

The North Marina Project's design consisted of six slant wells each constructed with a length of 600 linear feet. The wells would pump between 1,800 and 2,700 gallons per minute (gpm) for a total production of 22 mgd. The Model assumes the slant wells would pump from the 180-Foot Aquifer under unconfined conditions.

Modeling results of the North Marina Project show that there would be a decline in groundwater elevations at the slant wells of approximately 15 feet. There would be

about a 2-foot decline in groundwater levels approximately one mile from the slant wells decreasing to less than 0.5 feet about 1.5 miles away.[16] It is likely that the lowering of groundwater levels approximately 2 miles from the slant wells would be negligible. According to the State Water Board's Groundwater Ambient Monitoring and Assessment (GAMA) database, there are approximately 14 wells within a 2-mile radius of the North Marina Project. The modeling results show that inflow to the slant wells from the east (landward direction) would be approximately 3,250 afa of brackish water (13% of total water pumped) and inflow from the west (ocean direction) would be about 21,400 afa of saline water (87% of total water pumped).[17] The rate of seawater intrusion is predicted by the Model to be the same for the North Marina Project as it is for "No Project" conditions, with the exception of the area in the immediate vicinity of the slant wells.

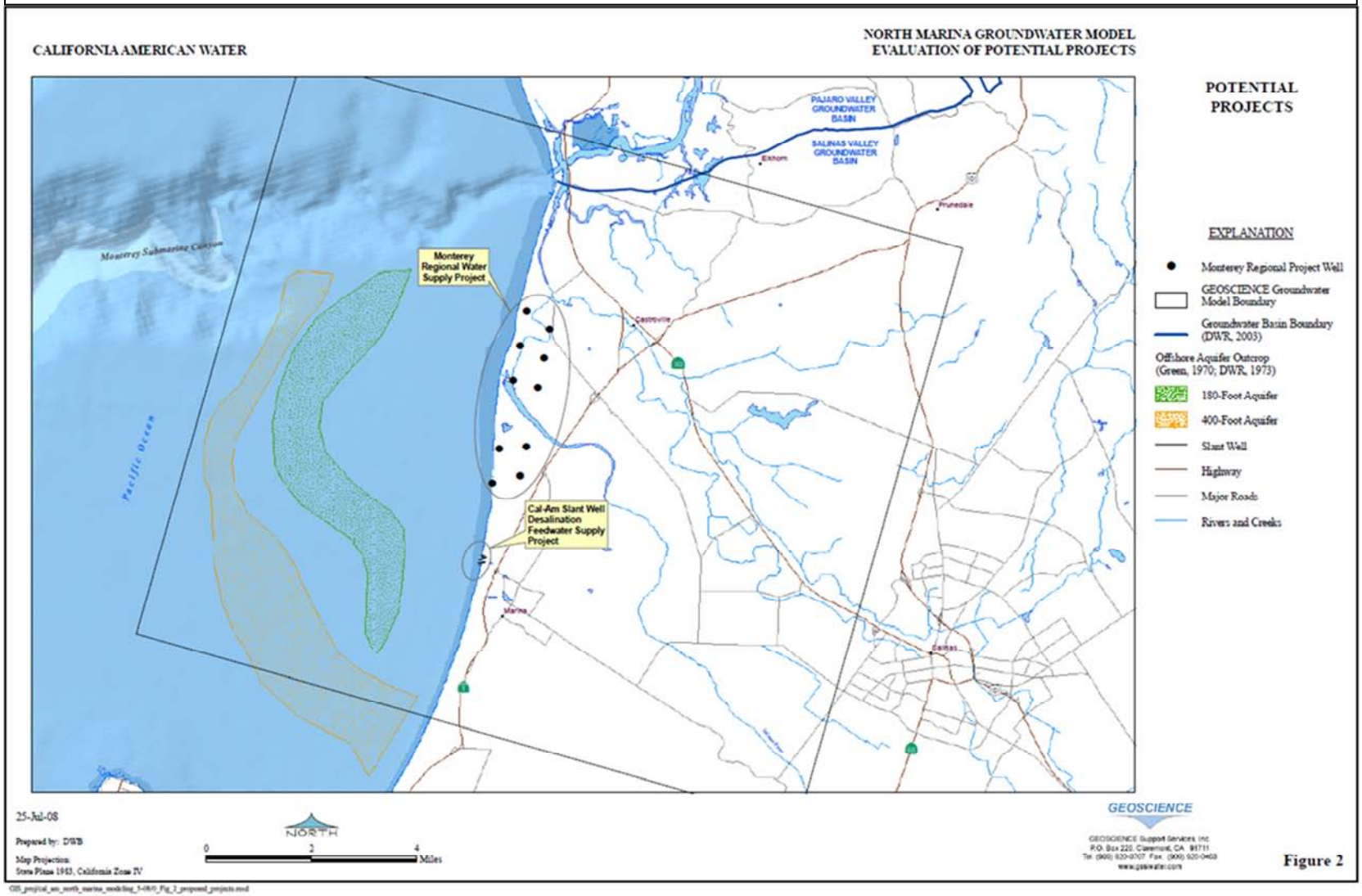
Because the Model shows that the seawater intrusion front remains basically the same with or without the North Marina Project, it is likely that the amount of water (3,250 afa) extracted from the eastern portion of the aquifer will be brackish (intruded) water.

6. Monterey Regional Water Supply Project

The Regional Project assumes that ten vertical wells would pump both saline and brackish water from the 180-Foot Aquifer (Figure SWB 4). Five seaward wells would each pump saline water at about 1,500 gpm, and five inland wells would pump brackish water at approximately 1,700 gpm, for a combined total of 23.4 mgd. The Model assumes that the 180-Foot Aquifer is unconfined.

[16] FEIR, Appendix E, page 21 (E-28).
[17] FEIR, Appendix E, page 22 (E-29).

Figure SWB 4


CALIFORNIA AMERICAN WATER
NORTH MARINA GROUNDWATER MODEL
EVALUATION OF POTENTIAL PROJECTS
POTENTIAL PROJECTS
Monterey Submarine Canyon
Pacific Ocean
Monterey Regional Water Supply Project
Cal-Am Slant Well Desalination Feedwater Supply Project
PAJARO VALLEY GROUNDWATER BASIN
SALINAS VALLEY GROUNDWATER BASIN
Elkhorn
Prunedale
Castroville
Marina
Salinas
EXPLANATION
Monterey Regional Project Well
GEOSCIENCE Groundwater Model Boundary
Groundwater Basin Boundary (DWR, 2003)
Offshore Aquifer Outcrop (Green, 1970; DWR, 1973)
180-Foot Aquifer
400-Foot Aquifer
Slant Well
Highway
Major Roads
Rivers and Creeks
25-Jul-08
Prepared by: DWB
Map Projection:
State Plane 1983, California Zone IV
NORTH
0
2
4
Miles
GEOSCIENCE
Figure 2

Results of the modeling show about a 10-foot decrease in groundwater levels near the extraction wells and about a 4-foot decrease approximately 4 miles inland from the extraction wells. According to information from the State Water Board's GAMA database, there are approximately 170 supply wells within 4 miles of the Regional Project. The seawater intrusion problem is improved by the Regional Project as compared to No Project conditions. The Model did not have data showing the relative rates of intrusion under both confined and unconfined conditions.

7. Proposed Monterey Peninsula Water Supply Project

There are two likely scenarios in which Cal-Am would extract groundwater for its MPWSP: 1) pumping from an unconfined aquifer; and 2) pumping from a confined aquifer.

Pumping effects differ from an unconfined aquifer compared to a confined aquifer. When water is pumped from an unconfined aquifer, water is removed from the aquifer and the water table in the aquifer is lowered. This lowering or drawdown of the water table is greatest close to the well and gets smaller in all directions as the distance from the well increases.[18] When a confined aquifer is pumped, the loss of hydraulic head occurs rapidly because the release of the water from storage is entirely due to the compressibility of the aquifer material and the water.[19] This means that the same drawdown will be measurable at greater distances from the pumping well. This zone of influence in a confined aquifer is commonly several thousand times larger than in an unconfined aquifer.[20] Therefore, in general, there would be a larger effect to the Basin and an increase in the possibility of injury to existing groundwater users if the MPWSP extracted water from a confined condition than from an unconfined condition.

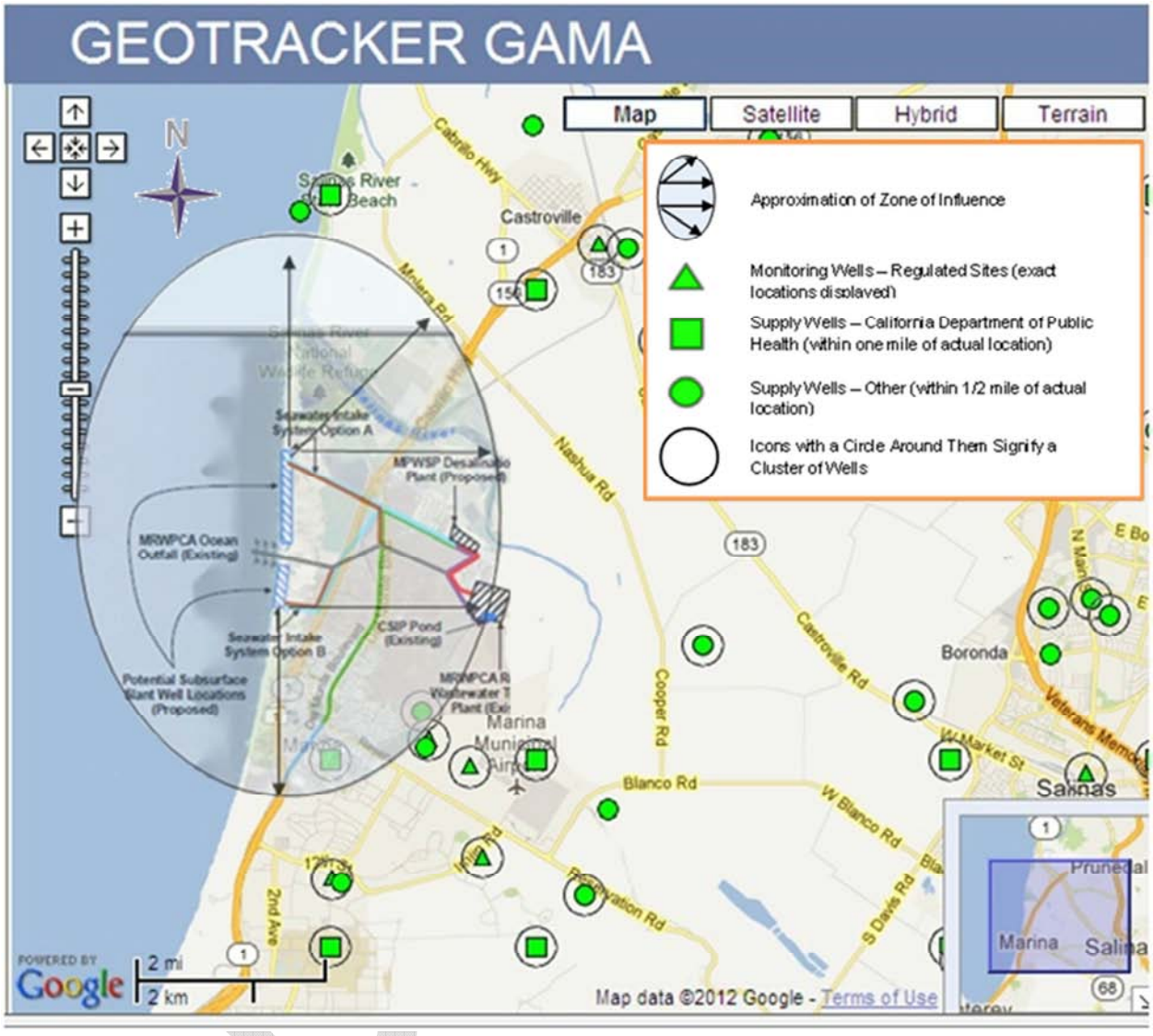
[18] Driscoll, 1986, Groundwater and Wells, pages 63-64.
[19] Driscoll, 1986, Groundwater and Wells, pages 64-65.
[20] United States Geologic Survey, Sustainability of Groundwater Resources, Circular 1186. Section A, page 2.

7.1 Pumping from Unconfined Conditions

If pumping were to occur under unconfined conditions, water would be extracted either from the dune sand aquifer or from the 180-Foot Aquifer (if the SVA is not present at the proposed well-site). If pumping were to occur in either of these unconfined aquifers, there would be a lowering or drawdown of the water table creating a cone of depression (or zone of influence) where drawdown would be greatest near the pumps and would get smaller further away from the pumps. Modeling of the North Marina Project predicts that the zone of influence would be approximately 2 miles. If the MPWSP is similar in design to the North Marina Project, then the zone of influence would be roughly the same. Any wells within the zone of influence would be affected by project pumping and possibly cause injury. According to information from the State Water Board's GAMA database, there are approximately 14 wells within 2 miles of the proposed MPWSP (Figure SWB 5). All of these wells are located within the seawater intruded portion of the Basin. The drawdown would change the groundwater gradient within the zone of influence causing a radial flow of groundwater toward the wells.[21] Currently, the predominant groundwater flow direction in the 180-Foot Aquifer is toward the northeast. Project pumping would likely change the flow direction to more of a southwest to westerly direction within the zone of influence. Outside the zone of influence there would be little if any change to groundwater flow direction; however, the rate of flow in the original direction (northeast) would be reduced. Therefore; the MPWSP would slow the rate of seawater intrusion in a landward direction from the wells. The MPWSP would increase the rate of seawater intrusion in a seaward direction from the pumps, but the seawater intrusion would not extend past the zone of influence of the wells.

[21] Driscoll, 1986, Groundwater and Wells, 63-64.

Figure SWB 5


GEOTRACKER GAMA
Map
Satellite
Hybrid
Terrain
Approximation of Zone of Influence
Monitoring Wells – Regulated Sites (exact locations displayed)
Supply Wells – California Department of Public Health (within one mile of actual location)
Supply Wells – Other (within 1/2 mile of actual location)
Icons with a Circle Around Them Signify a Cluster of Wells
Castroville
Boronda
Salinas
Marina
Blanco Rd
Castroville Rd
Cooper Rd
Nashua Rd
Reservation Rd
Potential Subsurface Plant Well Locations (Proposed)
MRWPCA Ocean Outfall (Existing)
CSIP Pond (Existing)
Marina Municipal Airport
Map data ©2012 Google - Terms of Use
2 mi
2 km

As mentioned above, groundwater flow to the wells would initially be from all directions in a radial pattern. However, once the water table is lowered enough to allow direct connection with the ocean, then the majority of pumped water would come from the ocean and a lesser portion would come from the landward side of the aquifer. If the North Marina Project model is applicable, then approximately 87% of the water pumped would come from the ocean side of the wells and approximately 13% of the water would come from the landward side of the wells.[22] It is unlikely that pumping from an unconfined aquifer would extract fresh groundwater since the majority of the water pumped would be ocean water and the seawater intrusion front is approximately 5 miles landward from the pumps.

7.2 Pumping from Confined Conditions

If pumping were to occur under confined conditions, water would be extracted from the confined 180-Foot Aquifer. Pumping from the confined 180-Foot Aquifer would lower the pressure head in the aquifer but the aquifer would remain fully saturated. Drawdown in the confined aquifer would occur over a much larger area compared to that in an unconfined aquifer. The total volume of the cone of depression in a confined aquifer could be several thousand times larger than the total volume of the cone of depression in an unconfined aquifer.[23] Therefore, effects from MPWSP pumping would occur over a much larger area that the effects seen in an unconfined aquifer. Modeling in the FEIR did not predict the effects of pumping from a confined condition, so there are no estimates on the extent of potential impacts. Generally speaking, water levels would be lowered in wells much further inland and the effects on groundwater flow direction would be greater. Since pumping from a confined condition would affect a much larger area, there would be a greater likelihood of the MPWSP pumping a certain

[22] FEIR, Appendix E, Geoscience, North Marina Groundwater Model Evaluation of Projects page 22 (E-29), July 2008.
[23] United States Geologic Survey, Sustainability of Groundwater Resources, Circular 1186. Section A page 2.

portion of fresh water from the aquifer. Since modeling has not been done simulating confined conditions, the extent of the impacts is unknown.

8. Legal Discussion of Proposed Extraction Wells in Salinas Basin

Although the Basin is in a condition of overdraft, the Basin has not been adjudicated and water withdrawals by the Basin's users are not quantified by court decree. Water users state the Basin's water is managed through cooperative agreements reached by the Basin's groundwater users.[24] Users claim that Cal-Am's proposed Project would disrupt the Basin's agreements, lead to a costly adjudication, and are barred by principles of groundwater law.[25]

Question: Does Cal-Am require an appropriative right to extract brackish water from slant wells that terminate near, or beneath, Monterey Bay? If so, can such a right be acquired and what are the legal constraints on the right?

Brief Answer: Cal-Am needs no groundwater right or other water right to extract seawater from Monterey Bay. Based on the information provided, however, the proposed MPWSP could extract some fresh water from within the Basin. An appropriative groundwater right is needed to extract water from the Basin for use outside the parcel where the wells are located.[26] To appropriate groundwater from the Basin, Cal-Am will have to demonstrate that the MPWSP will extract water that is surplus to the needs of groundwater users in the Basin and injury to those users will not result. Because the Basin is in a condition of overdraft, to appropriate water for non-overlying uses, any fresh water that Cal-Am pumps will have to be replaced.[27]

[24] *Salinas Valley Water Coalition*, Letter to State Water Board Chair, Charles Hoppin, (December 3, 2012).
[25] See generally, Application 12-04-019 before the California Public Utilities Commission, *Opening Brief of LandWatch Monterey County Regarding Groundwater Rights and Public Ownership*, July 10, 2012; *Opening Brief of Various Legal Issues of Monterey County Farm Bureau*, July 10, 2012, available at: www.cpuc.ca.gov.
[26] An appropriative groundwater right is not necessary to recover water injected or otherwise used to recharge the aquifer, where the water used for recharge would not recharge the aquifer naturally.
[27] Additionally, the Monterey County Water Resources Act, (Stats. 1990 ch.52 § 21. West's Ann. Cal. Water Code App.) prohibits water from being exported outside the Salinas Basin.

9. Discussion:

9.1 General Principles of Groundwater Law

Groundwater rights may generally be classified as overlying, appropriative or prescriptive.[28] Overlying users of groundwater have correlative rights which are rights similar to riparian users' rights, and an overlying user can pump as much water as the user can apply to reasonable and beneficial use on the overlying parcel so long as other overlying users are not injured. (*City of Barstow v. Mojave Water Agency* (2000) 23 Cal.4th 1224, 1240 (*Mojave*).) In times of shortage, pumping must be curtailed correlatively, to provide each overlying user a reasonable share of the available supply. (*Id.* at 1241.)

Prescriptive rights are acquired through the taking of water that is not surplus or excess to the needs of other groundwater users. Similar to other prescriptive property rights, if the elements of prescriptive use are met—the use is actual, open, notorious, hostile, adverse to the original owner, continuous and uninterrupted for the statutory period of five years—a user may acquire a prescriptive right. (*California Water Service Co. v. Edward Sidebotham & Son* (1964) 224 Cal.App.2d 715, 726.)

Appropriative groundwater rights apply to other users who extract groundwater. (*Mojave, supra,* 23 Cal.4th at p.1241.) Appropriative groundwater rights are not to be confused with appropriative rights that apply to surface waters or subterranean streams that are administered by the State Water Board. Unlike appropriative water rights that are permitted by the State Water Board, appropriative groundwater rights are any rights to pump groundwater that do not fall into either the overlying or prescriptive category.[29] No permit is required by the State Water Board to acquire or utilize appropriative groundwater rights.

[28] Groundwater rights referenced in this report apply to percolating groundwater only.
[29] This is generally true. There are other types of rights, including pueblo rights, federal reserved rights, and rights to recover water stored underground pursuant to surface water rights. These other types of rights are not discussed in detail in this report.

Because Cal-Am proposes to export water from the Basin to non-overlying parcels in the Monterey Region, an appropriative groundwater right is required. In order to appropriate groundwater, a user must show that the water is "surplus" to existing uses or does not exceed the "safe yield" of the affected basin. (*City of Los Angeles v. City of San Fernando* (1975) 14 Cal.3d 199, 214-215, 277-282.) The appropriator must show that the water is surplus to all existing uses in the Basin and the use will not harm or cause injury to any other legal user of water. The burden is on the appropriator to demonstrate a surplus exists. (*Allen v. California Water and Tel. Co.* (1946) 29 Cal.2d 466, 481.) But if, after excluding all present and potential reasonable beneficial uses,[30] there is water wasted or unused or not put to any beneficial uses, "the supply… may be said to be ample for all, a surplus or excess exists… and the appropriator may take the surplus or excess…" (*Peabody v. City of Vallejo* (1935) 2 Cal.2d 351, 368-369 (*Peabody*).)

As discussed previously, because groundwater in the Basin is in a condition of overdraft, to appropriate water for uses outside the Basin, the only way to show there is surplus water available for export to non-overlying parcels is for a user to develop a new water source.

Cal-Am's proposed MPWSP would pump brackish water. The exact composition is yet to be determined, but the water is substantially degraded by seawater intrusion and other natural factors. Estimates based on the North Marina Project description are that 13% of the total water pumped through the proposed wells could be attributed to the landward portion of the Basin, and 87% could come from the seaward direction relative to the pump locations. Based on data currently available, the State Water Board is unable to estimate what percentage or proportion of water extracted from the Basin landward of the proposed well location could be attributed to fresh water sources. It is known, however, that the Basin's waters are degraded some distance landward from the proposed wells. MCWRA currently estimates that seawater has intruded into the 180-Foot Aquifer

[30] Potential overlying uses are often inherently implicated in determining whether a surplus actually exists.

approximately 5 miles inland. It is unknown whether seawater has intruded the dune sand aquifer. It is unlikely that the dune sand aquifer is used extensively due to its reported low water quality.

9.2 Developed Water

Water an appropriator pumps that was not previously available to other legal users can be classified as developed or salvaged water.[31] "[I]f the driving of tunnels or making of cuts is the development of water, as it must be conceded it is, we perceive no good reason why the installation of a pump or pumping-plant is not equally such development." (*Garvey Water Co. v. Huntington Land & Imp. Co.* (1908) 154 Cal. 232, 241.) Further, it is generally accepted that whoever creates a new source of water should be rewarded by their efforts. (See generally *Hoffman v. Stone* (1857) 7 Cal. 46, 49-50.)

If Cal-Am shows it is extracting unusable water that no Basin user would put to beneficial use, then Cal-Am could show its proposed desalination MPWSP would develop new water in the Basin, water that could not have been used absent Cal-Am's efforts to make it potable. Of course, this does not apply to any source water that is considered fresh or non-brackish and would not be considered developed water.

Making use of water before it becomes unusable or is "wasted" is supported both by statute, case law and the California Constitution, which in part states: "the general welfare requires that the water resources of the State be put to beneficial use to the fullest extent of which they are capable…and that the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof." (Cal. Const., art. X, § 2; see also *City of Lodi v. East Bay Municipal Utility District*, (1936) 7 Cal.2d 316, 339-341 (*Lodi*); [salvaged water that would otherwise be wasted should be put to beneficial use].)

[31] The concepts of developed and salvaged waters are closely related and the legal concepts are the same. Technically, salvaged waters usually refers to waters that are part of a water supply and are saved from loss whereas developed waters are new waters that are brought to an area by means of artificial works. (See Hutchins, The California Law of Water Rights, (1956) p. 383.) For purposes of this report, the distinction is largely irrelevant and the term developed waters will be used throughout for consistency.

The key principle of developed waters is that if no lawful water user is injured, the effort of an individual to capture water that would otherwise be unusable and unused should be legally recognized. As the court determined in *Cohen v. La Canada Land and Water Co.* (1907) 151 Cal. 680 (*La Canada*), if water would never reach or be used by others there can be no injury. (*Id.* at p. 691.) In *La Canada*, waters which were secured by the construction of tunnels could be considered developed waters as the waters were determined to trend away from the direction of the natural watershed and would never have reached it and would be lost if left to percolate in their natural flow. (*Ibid.*)

> Under these circumstances, as the waters developed by the tunnels were not waters which would have trended towards or supported or affected any stream flowing by the land of appellant,…she was not injured as an adjoining proprietor or as an appropriator, and hence could not complain or insist upon the application of the rule announced in the cases cited to prevent the respondents from taking such developed waters to any lands to which they might see fit to conduct them.

(*La Canada, supra,* 151 Cal. at p. 692.)

"[F]ull recognition is accorded of the right to water of one who saves as well as of one who develops it." (*Pomona Land and Water Co. v. San Antonio Water Co.* (1908) 152 Cal. 618, 623-624 (*Pomona*) citing *Wiggins v. Muscupaibe Land & Water Co.* (1896) 113 Cal. 182, 195 (*Wiggins*).)

> [I]f plaintiffs get the one half of the natural flow to which they are entitled delivered, unimpaired in quantity and quality, through a pipe-line, they are not injured by the fact that other water, which otherwise would go to waste…was rescued. Nor can they lay claim to any of the water so saved.

(*Pomona*, *supra,* 152 Cal. at p. 631.)

In summary, if there is no injury, a user should be able to develop all water available:

> The plaintiff could under no circumstances be entitled to the use of more water than would reach his land by the natural flow of the stream, and, if he receives this flow upon his land, it is immaterial to him whether it is received by means of the natural course of the stream or by artificial means. On the other hand, if the defendant is enabled by artificial means to give to the plaintiff all of the water he is entitled to receive, no reason can be assigned why it should not be permitted to divert from the stream…and preserve and utilize the one hundred inches which would otherwise be lost by absorption and evaporation.

(*Wiggins*, *supra,* 113 Cal. at p. 196.)

As discussed above, in order to take advantage of developed water, Cal-Am must establish that no other legal user of water is injured. Thus, even if the water being pumped is unusable, it could not be treated as developed water unless those who pump from areas that could be affected by Cal-Am's MPWSP are protected from harm.

Cal-Am proposes a replacement program for the component of brackish water that it pumps that can be attributed to fresh water supplies or sources in the Basin. Accordingly, export of the desalinated brackish source water would be permissible, and qualify as developed water if Cal-Am can show that all users are made whole and are uninjured by the replacement water supply and method of replacement.

Cal-Am could use one or more of several possible methods to replace any fresh water it extracts from the Basin. Cal-Am could return the water to the aquifer through injection wells, percolation basins, or through the CSIP. Cal-Am would need to determine which of those methods would be the most feasible, and would in fact, ensure no harm to existing legal users. The feasibility analysis would depend on site-specific geologic conditions at reinjection well locations and at the percolation areas. These studies need to be described and supported in detail before Cal-Am can claim an appropriative right to export surplus developed water from the Basin.

Cal-Am has to ensure an adequate water supply exists for all legal users and its MPWSP will not injure other legal users in the Basin. This could require implementation of a "physical solution." The doctrine is further discussed in the following section.

9.3 Physical Solution Discussion

Another legal theory that would support a pathway for Cal-Am to extract groundwater for the proposed MPWSP without resulting in injury to the rights of others would be through implementation of a "physical solution."

Physical solutions are frequently used in groundwater basins to protect existing users' rights, groundwater quality, allow for future development, and to implement the constitutional mandate against waste and unreasonable use. (See *California American Water v. City of Seaside* (2010) 183 Cal.App.4th 471, 480-481.) A physical solution is one that assures all water right holders have their rights protected without unnecessarily reducing the diversions of others. A physical solution may not adversely impact a party's existing water right (*Mojave*, *supra,* 23 Cal.4th 1224, 1251-1252.) A physical solution may be imposed by a court in connection with an adjudication of a groundwater basin where rights of all parties are quantified, as part of a groundwater management program, or as part of a water development project.[32]

From the standpoint of applying the State's waters to maximum beneficial use, and to implement Article X, section 2 of the California Constitution, physical solutions can and should be imposed to reduce waste.[33] (See, e.g., *Lodi, supra,* 7 Cal.2d 316, 339-341, 344-345; *City of Santa Maria v. Adam* (November 21, 2012, No.HO32750) 2012 WL 5871028; *Hillside Memorial Park and Mortuary v. Golden State Water Co.* (2011) 205 Cal.App.4th 534, 549-550.) In *Lodi* a physical solution was imposed to limit the wasting of water to the sea. The

[32] Sawyer, *State Regulation of Groundwater Pollution Caused by Changes in Groundwater Quantity or Flow* (July 1998) 19 Pacific. L.J.1267, 1297.

[33] Additionally, Water Code section 12947 states the general policy of promoting saline water conversion to freshwater in the State.

defendant appropriator was required to keep water levels above danger levels for pumping by the senior user or to supply equivalent water to the plaintiff. (*Lodi, supra,* 7 Cal.2d 316, 339-341, 344-345.)

Agreement of all parties is not necessary for a physical solution to be imposed. (See *Lodi, supra,* at p.341, citing *Tulare Irrigation District v. Lindsay Strathmore Irrigation District* (1935) 3 Cal.2d 489, 574.) In addition, a basin need not be determined to be in a condition of overdraft for a physical solution to be instituted. "Although we may use physical solutions to alleviate an overdraft situation, there is no requirement that there be an overdraft before the court may impose a physical solution." (*City of Santa Maria v. Adam,* 2012 WL 5871028 at p.10.) Likewise, a physical solution can also be imposed in a basin that is determined to be in a condition of overdraft. (See generally *Pasadena v. Alhambra* (1949) 33 Cal.2d 908 [in a situation of continued overdraft, the court imposed limits on all users].)

Thus, even while the Basin continues to be in a condition of overdraft, to maximize beneficial use of the state's waters, Cal-Am may be allowed to pump a mixture of seawater and fresh water, export the desalinated water to non-overlying parcels, and be required to return its fresh water component to the Basin in such a way that existing users are not harmed and foreseeable uses of the Basin are protected.

Modeling of the North Marina Project, which may be similar to the MPWSP, indicates that approximately 3,250 afa could be extracted from the landward direction of the slant wells, or approximately 13% of the total water extracted will be water that is contained or sourced from the Basin rather than seawater derived from Monterey Bay. The percentage of this water that is fresh or potable water would have to be determined and the proportion of fresh water that is extracted for the desalination facility would have to be replaced. The exact method for replacing the fresh water extracted will be a key component of any legally supportable project. Replacement methods such as fresh water injection to recharge wells, fresh water delivery to recharge basins, or applying additional

fresh water through the CSIP program, would need to be further examined to implement a physical solution that ensures no injury to other legal users. Whether to avoid injury, the fresh water would be re-injected through recharge wells, delivered to recharge basins, or applied through the CSIP would need to be further examined to implement a physical solution.

Cal-Am would need to determine which of those methods would be the most feasible and result in returning the Basin to pre-project conditions. Injection wells would have to be designed to ensure the water is injected into an aquifer that is not degraded. Initial studies would be needed to determine the most suitable location for the percolation basins based on soil permeability. Percolation basins would need to be located where the underlying aquifer does not have degraded water.

Based on the information provided in the FEIR, North Marina Project modeling suggests a zone of influence of approximately 2 miles from the proposed extraction wells.[34] Within this zone, there are approximately 14 known water wells. These 14 wells are located within the seawater intruded portion of the Basin. As such, it is unlikely there would be injury to users of these wells from the MPWSP as the wells are within a zone where water quality is significantly impacted from seawater intrusion. Beyond this 2 mile radial zone, the two foreseeable injuries that overlying users could experience are: changes in the composition of the aquifer beneath their wells; and, changes in water elevation in wells thereby requiring additional pumping energy.

If unconfined conditions exist at the location of the MPWSP wells, it is unlikely that pumping would extract non-brackish groundwater as the majority of the source water pumped would be ocean water and the seawater intrusion front is approximately 5 miles landward from the proposed well locations. Because pumping from a confined condition aquifer would affect a much larger area in the Basin, there would be a greater likelihood of the MPWSP pumping a certain

[34] FEIR, Appendix E, Page 21 (E-28).

portion of fresh water from the aquifer if the aquifer is confined in the area of pumping. Without test wells and data operating under confined aquifer conditions it is not possible to determine at this point what percentage of fresh water would be pumped under confined aquifer conditions.

As stated earlier, the burden is on Cal-Am to show no injury to other users. Key factors will be: 1) how much fresh water Cal-Am is extracting as a proportion of its total pumped amount and how much sea water is thus available for export; 2) how it should return the fresh water to the Basin to prevent injury to others; and 3) how extractive rights might adjust in the future as the composition of fresh and sea water changes both in the larger Basin area and the immediate area around Cal-Am's wells.

A discussion of projected uses of the Basin's waters and potential future conditions in the Basin will not be explored in depth in this report, mainly due to the lack of reliable data to enable the State Water Board to make informed assumptions about future conditions. As discussed in this report, additional data will be necessary to ensure that continued operation of the MPWSP, under different source water extraction scenarios, will not injure other legal groundwater users.

If and when the proportion of fresh/seawater changes due to Cal-Am's MPWSP, the physical solution doctrine would allow for an adjustment of rights, so long as others legal rights are not infringed upon or injured. "[I]f a physical solution be ascertainable, the court has the power to make and should make reasonable regulations for the use of the water by the respective parties…and in this connection the court has the power to and should reserve unto itself the right to change and modify its orders…" (*Peabody, supra,* 2 Cal.2d at pp. 383-384.)

At some point Cal-Am may reach a limit where it will be infeasible for it to return a like amount of fresh water back to the Basin and still deliver the amount of desalinated water needed for off-site uses. Several scenarios could develop. One possible scenario is that Cal-Am could show that but-for the MPWSP, new fresh water would not be available in the Basin and as it continues to operate the

MPWSP, the increased amount of fresh water available is developed water that would have previously been unavailable both to it and to other users. If this increased freshwater available to Basin users alleviates seawater intrusion issues, as well as provides for a new supply in excess of what would otherwise be available in the Basin, a physical solution could be imposed that would apportion the new water supply and allow the continued pumping. North Marina Project modeling showed that if pumping occurred in an unconfined aquifer over a 56 year period, then pumping would have little to no effect on the movement of the seawater intrusion front. If it is similar, the MPWSP would not pump fresh water within a 56 year period if pumping occurred in an unconfined aquifer. Because pumping from a confined aquifer would affect a much larger area, there would be a greater likelihood of the MPWSP pumping a portion of fresh water from the aquifer. Since modeling has not been done simulating confined conditions, the extent of the impact on fresh water supply or wells is unknown in this situation.

Both near and long-term, a physical solution would be a useful tool to ensure an adequate water supply for all legal water users in the Basin and provide an assured supply of groundwater to the Basin's users.[35] Even if overdraft conditions continued in the Basin for some time following imposition of the solution, it is possible that Cal-Am could legally continue pumping brackish water so long as the quantity was not in excess of an amount that would be detrimental to the conditions in the Basin and other Basin users' rights. "When the supply is

[35] Some parties argue an adjudication of the Basin's rights would be needed for the MPWSP to proceed. While adjudication could provide some benefits to the Basin's users it is not necessary for a physical solution to be imposed. For reference, there are three general procedures by which an adjudication or rights to use groundwater in the Basin could be quantified and conditioned: 1) civil action with no state participation; 2) civil action where a reference is made to the State Water Board pursuant to Water Code section 2000; or 3) a State Water Board determination, pursuant to the outlined statutory procedure that groundwater must be adjudicated in order to restrict pumping or a physical solution is necessary to preserve the quality of the groundwater and to avoid injury to users. (Water Code section 2100 et seq.) Whether Cal-Am could force an adjudication of water rights is beyond the scope of this report but will be briefly discussed. As applied in *Corona Foothill Lemon Co. v. Lillibridge*, (1937) 8 Cal.2d 522, 531-32, an exporter cannot force an apportionment where it is conclusively shown that no surplus water exists and there is no controversy among overlying owners. But a conclusive showing that there is no water available for export does not appear to be the case here. Water that is currently unusable, both due to its location in the Basin and corresponding quality, could be rendered usable if desalinated and would thus be surplus to current water supplies in the Basin.

limited public interest requires that there be the greatest number of beneficial uses which the supply can yield." (*Peabody, supra*, 2 Cal.2d at p. 368.)

A physical solution could ensure an adequate supply of quantity and quality of groundwater for all users while protecting the rights of overlying users. So long as overlying users are protected from injury, appropriation of water consistent with the principles previously discussed in this report should be possible. As discussed in *Burr v. MacClay Rancho Water Co*. (1908) 154 Cal. 428, 430-31, 438-39, if an appropriator does not exceed average annual replenishment of groundwater supply, lower users' water levels in wells or restrict future pumping, the appropriator's use is not adverse to other users. Additional support is found in *City of San Bernardino v. City of Riverside* (1921) 186 Cal. 7, 20; "No injunction should issue against the taking of water while the supply is ample for all. But the respective priorities of each water right should be adjudged, so that if in the future the supply falls below the quantity necessary for all, he who has the prior right may have his preferred right protected."

Cal-Am should have the opportunity to show any desalinated water it produces is surplus to the current needs of the Basin, replacement water methods are effective and feasible, and the MPWSP can operate without injury to other users. As discussed earlier, if the MPWSP pumps source water from an unconfined aquifer, there may be no injury to other users outside of a 2-mile radius, with the exception of possibly slightly lower groundwater levels in the seawater intruded area. Based on current information we do not know the exact effects on other users if source water is pumped from a confined aquifer but the effects, in general, will be amplified.

10. Conclusion**:**

The key determination in whether Cal-Am may extract water from beneath the Salinas Basin is whether injury will result to other users or the Basin. If the MPWSP is constructed as described in the FEIR for the North Marina Project the slant wells would pump from the unconfined dune sand aquifer. If groundwater is pumped from an unconfined aquifer and the modeling assumptions in the FEIR for the North Marina

Project are accurate, then there will be lowering of groundwater levels within an approximate 2-mile radius. Since seawater intrusion occurs in this area, this water developed through desalination is likely "surplus" to the needs of other users in the Basin. Based on the information available, it is unlikely any injury would occur by the lowering of the groundwater levels in this region. Nevertheless, Cal-Am would be required to show there was no injury and that any fresh water it extracts is returned to the Basin.

Modeling for the North Marina Project does not predict that Basin users' fresh water supplies would be affected if its wells pump from an unconfined aquifer, which we assume to also be true for the MPWSP. If however, further exploratory testing shows water is removed from a confined aquifer, water levels would be lowered in a larger inland area and the effect on groundwater flow direction would be greater. Since the pumping from a confined condition would affect a much larger area, there would be a greater likelihood of the MPWSP extracting fresh water from the Basin thereby causing impacts to other users in the Basin that would require additional mitigation measures to avoid injury to affected users.

If no injury results–this would have to be shown through modeling, mitigation, project design or other means–Cal-Am could legally pump from the Basin by developing a new water supply through desalination that produces water that is surplus to the existing supply. If Cal-Am's extractions are limited to water derived from brackish or saline sources or areas of the Basin, and it returns all incidental fresh water to the Basin in a method that avoids injury to other users, the MPWSP could proceed without violating other users' groundwater rights.

A physical solution could be implemented to ensure that all rights are protected while maximizing the beneficial uses of the Basin's waters.[36] Such an approach is consistent with the general policy stated in the California Constitution article X section 2, and by a long history of case law that has provided guidance on the solutions that can be

[36] At some point, an adjudication of Basin rights could be initiated, this would in no way impact the imposition of a physical solution that could account for the MPWSP and all other users' needs in the Basin.

developed to address complex groundwater issues in regions where supply is constrained. The ongoing development of unique solutions tailored to the specific conditions that apply to a given groundwater basin, reflects the understanding that waters in California are too valuable not to be utilized to the maximum extent possible if beneficial uses and other legal users' rights are maintained.

11. Recommendations

Additional information is needed to accurately determine MPWSP impacts on current and future Basin conditions. First, specific information is needed on the depth of the wells and aquifer that water will be extracted from. Studies are needed to determine the extent of the dune sand aquifer, the water quality and quantity of the dune sand aquifer, the extent and thickness of the SVA and the extent of the 180-Foot Aquifer.

Second, the effects of the MPWSP on the Basin need to be evaluated. A series of test boring/wells would be needed to assess the hydrogeologic conditions at the site. Aquifer testing would be needed to determine the pumping effects on both the dune sand aquifer and the underlying 180-Foot Aquifer. Aquifer tests should mimic proposed pumping rates.

Third, a groundwater model will be needed to predict future impacts from the MPWSP. Modeling scenarios will need to be run to predict changes in groundwater levels, groundwater flow direction, and changes in the extent and boundary of the seawater intrusion front. Additional studies will be necessary to determine how any extracted fresh water is replaced, whether through re-injection wells, percolation basins, or through existing recharge programs. The studies will form the basis for a plan that avoids injury to other groundwater users and protects beneficial uses in the Basin.