PREPARING FOR SUSTAINABLE GROUNDWATER MANAGEMENT: A REVIEW OF GROUNDWATER RECHARGE

Recharging groundwater is a critical tool for achieving the sustainable management of groundwater basins in California. Indeed, in adopting the Sustainable Groundwater Management Act of 2014 (SGMA), the California Legislature found that:

> ….sustainable groundwater management in California depends upon creating more opportunities for robust conjunctive management of surface water and groundwater resources. The Legislature further explicitly expressed its intent "to increase groundwater storage and remove impediments to recharge. (Water Code §10720.1)(g).)

As SGMA implementation shifts from a focus on the formation of Groundwater Sustainability Agencies (GSA) to the development of Groundwater Sustainability Plans (GSP), public entities and private landowners alike will need to evaluate whether groundwater supplies in their basin are sufficient to achieve the mandates of SGMA. In those basins in conditions of critical overdraft, the prospect of pumping curtailments looms. Groundwater recharge can be an effective way to achieve sustainability without unnecessary or undesirable curtailments on pumping. This article will provide an overview of direct artificial groundwater recharge, its pros and cons, and its interaction with existing California water rights.

Groundwater Recharge: An Overview

Groundwater recharge is the process of increasing groundwater supply by natural or artificial means. Artificial means include utilizing dedicated recharge basins; developing injunction wells; installing inflatable dams; or alternatives such as flooding agricultural fields or unlined canals. Recharge also includes both direct and "in lieu" recharge. In-lieu recharge—not evaluated in this article—is the process of temporarily decreasing the amount of groundwater pumped from an aquifer, in combination with increasing surface water deliveries. Typically the decrease in groundwater pumping occurs as a result of increased surface water supplies that can be delivered "in-lieu" of groundwater pumping. Resulting decreased pumping allows natural recharge to occur without additional pumping pressures.

As GSAs begin to develop GSPs, groundwater recharge projects will increasingly be looked to assist in meeting the sustainability goal. GSPs are to be completed in critically overdrafted basins by January 31, 2020, and for all other high and medium priority basins by January 31, 2022. Substantively, GSPs will need to have a 50-year planning horizon and achieve sustainability by 20 years after the GSP is adopted (Either January 31, 2040 or January 31, 2042). Each GSP will also need to identify interim milestones every 5 years until then in effort to keep the sustainability plan on track.

Sustainability under SGMA includes, among other things, avoiding undesirable results such as the chronic lowering of groundwater levels; seawater intrusion; land subsidence that substantially interferes with surface uses; and surface water depletions that have significant and unreasonable adverse impacts on beneficial uses of the surface water. (Water Code §§ 10727.2; 10721(w).) Generally, a basin will be sustainable if its recharge (inputs) and pumping (outputs) are balanced, and its storage is stable. To aid the process of identifying such additional inputs, DWR produced a report entitled Water Available for Replenishment in early 2017. (*See, Water Available for Replenishment Draft Report*, Department of Water Resources, available at: http://www.water.ca.gov/groundwater/sgm/pdfs/Draft_Water_Available_For_Replenishment_Report.pdf.)

The report evaluated water supply and demand across ten regions of the state and confirmed that in many overdrafted regions such as the San Joaquin Valley, meaningful amounts of water are only available to augment supply in high precipitation years—thus highlighting the need to capture and store excess flows underground through groundwater recharge.

Groundwater recharge is also attractive because it is generally less costly than other forms of new water. Water developed through groundwater recharge costs approximately half of other sources of new water such as new reservoirs or desalination. Water developed through groundwater recharge costs approximately $90-1100 per acre-foot (AF), in comparison to $1700-2700 per AF for reservoir expansion and $1900-3000 per AF for desalination. (See *Recharge: Groundwater's Second Act* available at http://waterinthewest.stanford.edu/groundwater/ recharge/.) Further, grant funding is available for groundwater recharge projects through Proposition 1, which authorized $7.5 billion in water projects including groundwater storage. Lastly, groundwater recharge projects may be physically structured to provide significant benefits to basins while having minimal impact on overlying operations by creative land use including siting projects on previously mined gravel pits, existing streambeds and canals, or even in-production farmland.

Groundwater Recharge and Water Rights

From a water rights perspective, there are two key questions for any potential recharge project: 1) what is the legal classification of water to be recharged; and 2) will the project recapture the water it recharges? The answer to these questions will assist in determining whether a State Water Resources Control Board (SWRCB or Board) permit is required for the recharge project.

First, a SWRCB permit is *not* needed if the water to be recharged is imported water (water that is brought into the basin to augment supply); wastewater; flood water when there is no intent to recapture; or water under a pre-1914 right. (*City of Los Angeles v. City of Glendale*, 23 Cal.2d 68 (1943); *City of Los Angeles v. City of San Fernando*, 14 Cal.3d 199 (1975); Water Code § 1200 *et. seq.*) Many large, established recharge projects utilize imported water such as water delivered through the State Water Project. Many new recharge projects under consideration today, however, seek to develop water from local watercourses rather than rely on imported water.

A SWRCB permit is needed if the water to be recharged is surface water diverted from within the watershed and stored for later beneficial use. (Water Code § 1200 *et. seq.*) From a permitting perspective it is important to note that the Board does not consider groundwater recharge is a "beneficial use" of water on its own. Rather, the required permit is for underground storage of water and a "back end" beneficial use of subsequently extracted water must be specified such as irrigation, municipal, or industrial use. It is important to note that a riparian right generally does not include a right to storage other than short-term "regulatory" storage for less than 30 days. Thus, a riparian right is an ill-suited basis for groundwater recharge.

As an example, if a project takes flood water and the project operator does not recapture the water for later use, a Board permit is not needed. This type of project would be for the benefit of the basin as a whole. On the other hand, if the water is appropriated from a watercourse within the basin and the project operator intends to recapture the recharged water by subsequent pumping, a permit would be required. Failure to obtain a permit when required will result in the Board advising a project proponent that the project may be utilizing an unauthorized diversion of water and may institute an enforcement action.

If a permit is required for a project, there are two types of permits available: 1) a temporary permit, and 2) a standard permit. (Water Code §§ 1201, 1425) A temporary permit is cheaper and may be obtained fairly quickly (months for a temporary permit versus years for a standard permit). However, a temporary permit only lasts for 180 days, while a standard permit provides a vested right to divert subject only to forfeiture. For a project seeking long-term security and rapid implementation, a project proponent may secure a temporary permit while a standard permit is pending. Temporary permits have the additional benefit of—if obtained by or in partnership with a local agency—being exempt from the California Environmental CEQA pursuant to Governor Edmund G. Brown Jr.'s Executive Order B-36-15. A comparison of temporary and standard permits follows:

	Temporary Permit	**Standard**
Provides	No vested right.	Vested right.
Time frame	Months.	Years.
Duration	Expires after 180 days, but may be renewed.	Subject only to forfeiture.
CEQA requirements	Exempt if in partnership with local agency.	Compliance required.
Best application	Trial projects or while standard permit application pending.	Long-term projects.

Temporary permits received a further benefit through 2015-2016 Senate Bill 839 which defined the 180 day limitation as "a limitation on the authorization to divert and not a limitation on the authorization for beneficial use of water diverted to storage." Thus, diversions under a temporary permit must occur within the 180-day period, but the subsequent extraction and use of that recharged water may permissibly occur beyond the 180 day timeframe. (Water Code § 1430.)

Further, temporary permits have very affordable fees. The fee structure for temporary permits is $100 plus $1 per $100 AF in excess of 10,000 AF. (Cal. Code Regs., titl. 23 §1062.) The fee structure for standard permits, on the other hand, is $1,000 plus $15 per AF in excess of 10 AF, with cap of $506,145. (*Id.*) As an example, in 2016 Scott Valley Water District recharged 5,400 AF pursuant to a temporary permit. Under the standard fee structure, Scott Valley would incur a fee of $40,925. Under the temporary fee structure, however, the district's fee was *$100*. Similarly in 2016, Yolo County Flood Control and Water Conservation District recharged 40,000 AF pursuant to a temporary permit. With the standard fee structure, the district would have incurred a fee of $249,333. Instead, under the temporary permit the district incurred a fee of only *$400*.

Since 2016 there have been seven applications for temporary groundwater recharge permits statewide, with six permits issued to date. The impacts of SGMA—along with changing hydrology from exceptional drought to the potentially wettest year on record—will likely increase interest in capturing flows for underground storage through both temporary and standard permits.

Conclusion and Implications

In many areas of California the only way to augment basin-wide supply and minimize curtailments of groundwater pumping under SGMA is to recharge groundwater. The SWRCB has recognized this and has created a more streamlined, efficient, and less costly temporary permit structure for recharge projects. However, challenges to the widespread development of recharge projects remain, including the frequent absence of conveyance infrastructure necessary to bring excess flows to locations best suited for recharge. Further, project costs are highly variable based on specifics of the project including the legal classification of water to be recharged and whether the project intends on recaptured water. Costs generally include project planning, design, and engineering; potential easements for access and conveyance; potential environmental documentation; project construction and implementation, environmental compliance and mitigation; legal costs; and ongoing project monitoring and administrative costs. Early and thorough planning is also necessary to properly evaluate potential impacts to neighboring well owners and ensure the project truly augments the basin.

As the date for GSP implementation under SGMA nears, and as GSAs move to comply with their first interim milestones, there will be an increased interest in developing and implementing sound groundwater recharge projects. It remains to be seen, however, whether basins as a whole will be able to sufficiently augment their supplies and avoid future pumping restrictions.
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