6.0 Indirect Potable Reuse Opportunities

Water Reuse Study

Indirect potable reuse (IPR) is the practice of taking recycled water that meets all regulatory requirements for non-potable use, treating it further with several advanced treatment processes to meet potable water standards, and adding it to an untreated potable water supply, usually a water body such as a surface water reservoir or a groundwater aquifer. The term "indirect" refers to the distinction that highly-treated recycled water is not plumbed directly to the potable distribution system. During a long residence time, the highly-treated recycled water blends with the source water, which is usually imported water and local runoff. This process is illustrated in **Figure 6-1**.

Extensive permitting and regulatory interaction is required prior to starting an IPR project. Regulations require the recycled water receive extensive advanced treatment, plus additional natural treatment processes that occur in a groundwater basin, stream or lake. Prior to entering the City's potable water system, the blended source water is treated at a potable water treatment plant or at a wellhead treatment facility. Treatment methods for IPR projects are described in detail in Appendix G.

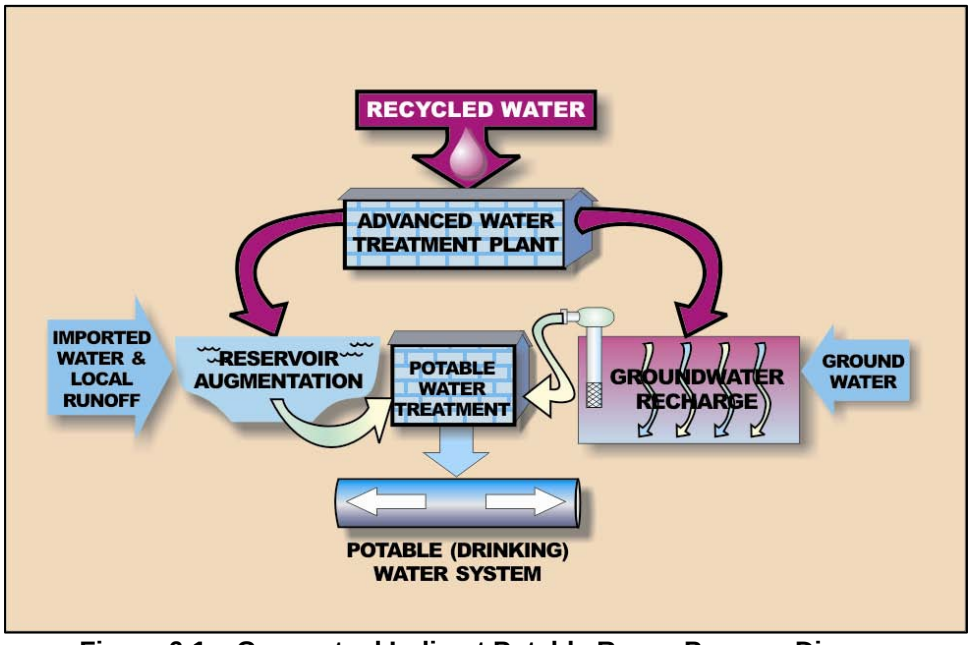

Figure 6-1 – Conceptual Indirect Potable Reuse Process Diagram

6.1 Reservoir Augmentation Opportunities

Reservoir augmentation is an IPR opportunity that involves adding advanced treated recycled water into a surface raw (untreated) water reservoir; the opportunities and constraints of this IPR method have been examined as part of the Study. Regulations require advanced treated water to be stored in the reservoir for a minimum of 12 months to blend with the untreated water within the reservoir and undergo a measure of natural treatment. Consideration was also given to the development of wetlands upstream from the surface water reservoir to provide additional natural treatment processes.

Any wetlands development upstream of a surface water reservoir would eventually result in advanced treated water entering into the City's raw water system and provide a new source of water beyond stormwater runoff and imported water. The option of creating wetlands as an aspect of each reservoir augmentation concept was considered, with certain factors examined, including the steepness of the basin surrounding each reservoir, the amount of time advanced treated water would be retained within a wetland, natural treatment provided, public access, City ownership of the land needed to construct the wetland and increased project cost of adding a wetland.

All nine City reservoirs – Sutherland Reservoir, Lake Hodges, Miramar Reservoir, Lake Murray, San Vicente Reservoir, El Capitan Reservoir, Morena Reservoir, Barrett Reservoir and Lower Otay Reservoir – were evaluated for reservoir augmentation concept projects. Sutherland, Morena and Barrett Reservoirs were determined to be unsuitable due to their distance from the City's existing recycled water facilities. Miramar and Murray Reservoirs were too small for further consideration, even for a small-scale reservoir augmentation project, since retention time requirements would not be met. Of the remaining reservoirs, Hodges and San Vicente Reservoirs underwent further consideration for North City reservoir augmentation opportunities, while Lower Otay Reservoir was considered further for South Bay. In each service area, both large-scale and small-scale reservoir augmentation projects were taken into account.

Northern Service Area – Reservoir Augmentation

The Study team's screening process of the City's nine raw water reservoirs determined that only Lake Hodges, San Vicente and Lower Otay were suitable candidate reservoirs for an IPR project. Lake Hodges is only suitable for a small-scale reservoir augmentation project because it is relatively small and has limited ability to provide the necessary retention time. San Vicente was most suitable for a large-scale reservoir augmentation project due to its large size and ability to provide the appropriate retention time. Drawbacks to San Vicente include its distance from the recycled water supply source. The San Vicente and Hodges proposed projects are shown in **Figure 6-2**.

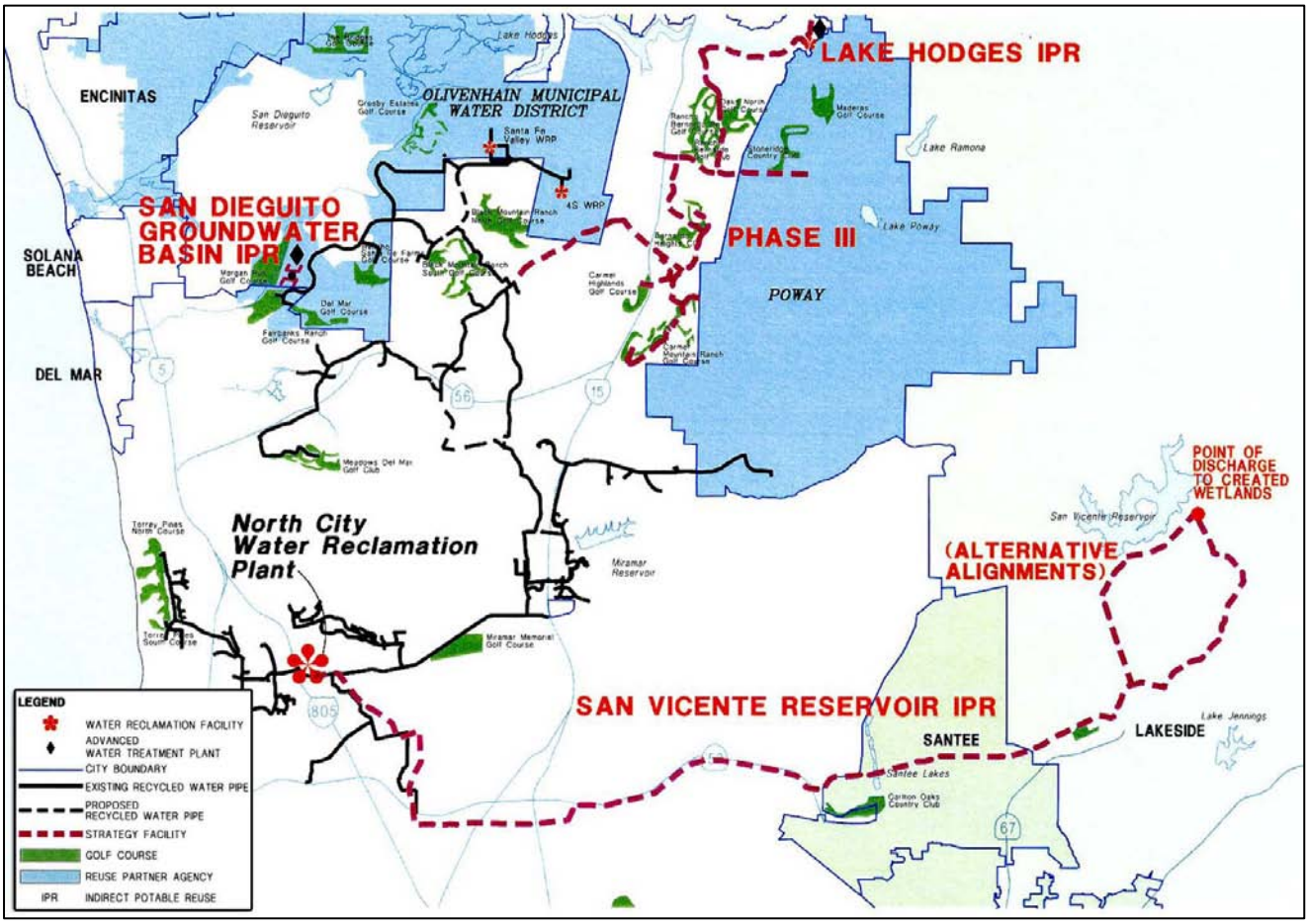

Figure 6-2 – Northern Service Area Indirect Potable Reuse Opportunities

Lake Hodges Reservoir Augmentation Project

A small-scale Lake Hodges reservoir augmentation project would require the implementation of the Phase III expansion of the Northern Service Area recycled water distribution system into Rancho Bernardo (see Section 5). At the northernmost end of the distribution system, an advanced water treatment plant would be sited in close proximity to the reservoir, and the treated water would be conveyed to Lake Hodges. This potential treatment facility would be capable of providing 2 MGD of water to supplement the local runoff and imported water stored in Lake Hodges. This blended water would subsequently be conveyed to drinking water treatment plants that serve both San Diego and North City areas. Upon completion of the Water Authority's Emergency Storage Project (ESP), water from Lake Hodges will also be available for distribution to areas further south, including the City's Alvarado and Miramar Water Treatment Plants. (See Figure 4.3 for the service areas of the City's three water treatment plants.)

The advanced water treatment facility would likely operate 8 to 10 months out of the year. The limited months of operation would be an effect of the seasonality of the Northern Service Area's existing and planned non-potable uses (i.e. a majority of the NCWRP capacity will be needed to serve non-potable uses during summer months for this option). Therefore, the advanced water treatment plant needed for this IPR project would be idle for these months. Brine disposal from

the advanced water treatment plant would require new facilities to convey the brine to the City's existing sewer collection system, or north to City of Escondido treatment facilities.

San Vicente Reservoir Augmentation Project

A large-scale San Vicente reservoir augmentation project would include a 16 MGD advanced water treatment facility, located adjacent to the NCWRP. A 23-mile pipeline would be needed to convey the water to San Vicente. An optional wetland could be constructed near the reservoir to add a natural treatment process prior to the water entering the reservoir. Brine disposal would be accomplished by tying into the NCWRP brine disposal facilities. This large-scale project would beneficially maximize the recycled water available from the NCWRP.

The ESP includes at least doubling the volume of water stored in the San Vicente Reservoir. Raising the dam and construction of related water transmission facilities will allow delivering San Vicente water to all City water treatment plants and areas served by those plants. Therefore, the San Vicente reservoir augmentation project provides the greatest potential service coverage. (Figure 4.3 details the service area of the City Water Treatment Plant.)

Southern Service Area Reservoir Augmentation Opportunities – Otay Lakes

Both the small-scale and large-scale reservoir augmentation projects in the Southern Service Area, shown in **Figure 6-3**, involve the Lower Otay Reservoir. Conceptually, these projects would take recycled water from the City's SBWRP, treat it to advanced levels at an advanced water treatment plant, and then convey the water to the Lower Otay Reservoir via the Upper Otay Reservoir. A created wetland above the Upper Otay Reservoir could be constructed to add a natural treatment process prior to the water entering the Lower Otay Reservoir.

From Lower Otay Reservoir, the water would be withdrawn for treatment at the City's Otay Water Treatment Plant and distributed through the City's potable water distribution system to a majority of the South Bay area. Interconnecting pipelines between the City's Otay and Alvarado systems also allow water to be delivered north to the Alvarado Service Area. (Again, Figure 4.3 provides the service areas for the City's water treatment plants.)

The small-scale project would take advantage of the City's 1 MGD of capacity rights in OWD's recycled water distribution system expansion that is currently underway. A 2 MGD advanced water treatment plant would be located near Otay Lakes. Brine flows would be discharged into a trunk sewer belonging to the City of Chula Vista and eventually treated at the City's Point Loma Wastewater Treatment Plant.

The large-scale 5.5 MGD advanced water treatment plant would be located adjacent to the SBWRP. A 16-mile pipeline would be constructed to convey water to the reservoir, and brine would be discharged to the South Bay Outfall. This large-scale project beneficially maximizes the recycled water available from the SBWRP.

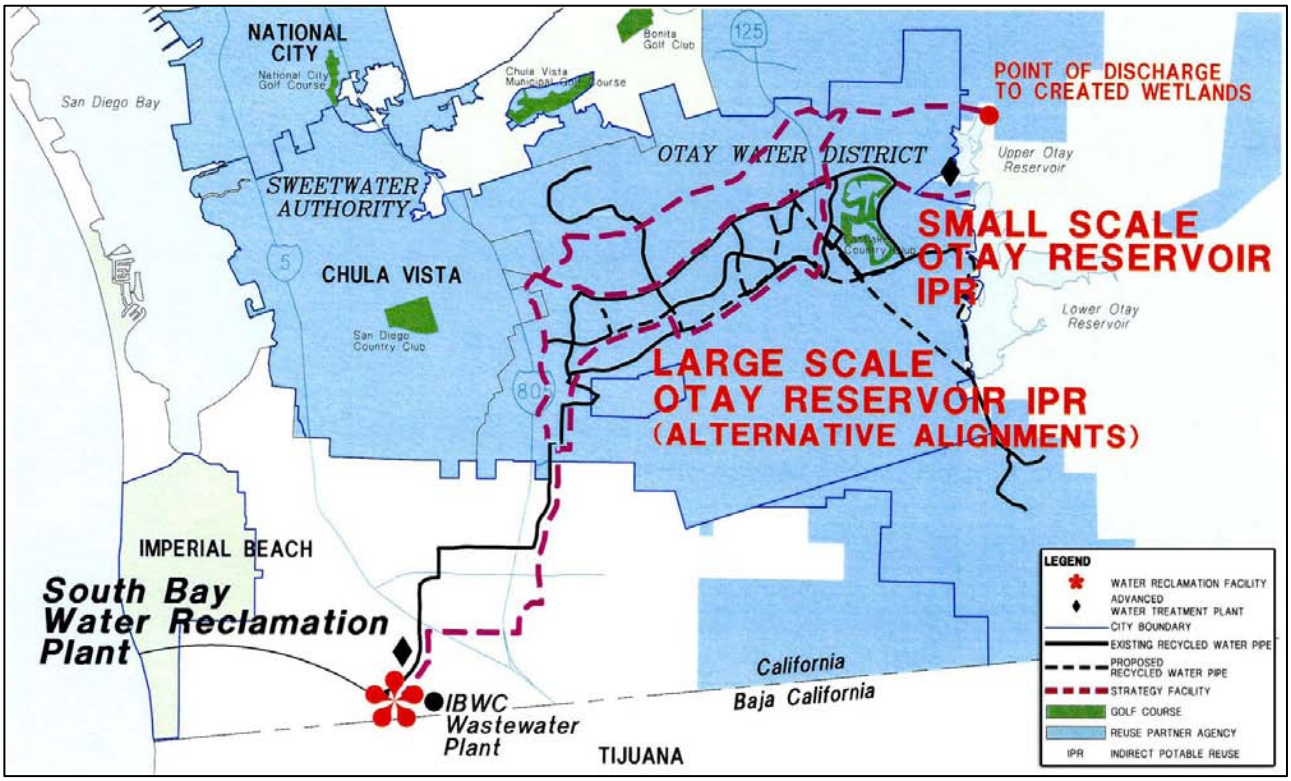

Figure 6-3 – Southern Service Area Indirect Potable Reuse Opportunities

6.2 Groundwater Recharge Opportunities

Advanced treated water may also be added to groundwater. Through direct injection into the aquifer via wells, or placed in spreading basins and allowed to percolate into the aquifer. The advanced treated water could blend with the groundwater and undergo natural treatment processes within the basin. The blended water would eventually be extracted, treated, and added to the potable water system (drinking water supply). This practice, referred to in the Study as groundwater recharge, must also meet minimum retention time and stringent water quality criteria as determined by RWQCB and DHS. Once extracted, a significant level of additional treatment may be necessary to achieve the required drinking water quality depending on the existing groundwater quality conditions.

The Study evaluated the feasibility of an IPR project using the City's existing groundwater basins. The San Pasqual, San Dieguito, Santee/El Monte, Mission Valley, San Diego Formation and Tijuana Groundwater basins were considered. Of these basins, San Dieguito was the only basin suitable for considering a groundwater recharge project at this time. The main factors taken into account for evaluating suitability were basin size, jurisdictional and economic issues, and overall water quality.

Domestic water use and insufficient retention time rendered the San Pasqual basin infeasible at this time. The Mission Valley basin displays certain benefits, such as simpler institutional issues and an improved ability to get water into and out of the basin, however, it is generally too narrow and shallow, and there are no planned recycled water conveyance facilities from either

the Northern or Southern Service Areas to support it. Similarly, the Santee/El Monte basin is remote from existing City facilities. Sufficient hydrogeological information is not currently available on the San Diego Formation, making a determination regarding its suitability for an IPR project difficult. Finally, the Tijuana basin water quality is compromised by sewage and untreated industrial discharges at the international border, so extracted water from the Tijuana basin is of extremely poor quality. In addition, the basin has extensive riparian vegetation and extraction of groundwater could have a significant environmental impact on this habitat. These conditions severely limit the ability of the Tijuana basin to be used for an indirect potable groundwater recharge project.

The San Dieguito Basin was selected for further evaluation due to its size, proximity to a larger recycled water source and its current degraded quality and limited use. The San Dieguito Basin groundwater recharge concept, shown in **Figure 6-2**, entails conveying NCWRP recycled water to an advanced water treatment plant located adjacent to the basin. The water produced at the 2.2 MGD plant, based on draft DHS requirements, would be blended with 1.6 MGD of potable water and then piped to spreading basins over the San Dieguito groundwater basin. The water would percolate into the ground and mix with groundwater to recharge the basin. After regulatory requirements are met, the water would be extracted, treated, and distributed into the City's potable water system at the Del Mar Heights Pipeline. The project would also have the ancillary benefit of significantly improving the water quality of upstream portions of the basin.

Additional considerations of the San Dieguito groundwater recharge concept include the need to blend the advanced treated recycled water with imported water, the need for brine disposal and the number and complexity of agreements that would be required with neighboring and overlying local agencies and municipalities, as well as affected property owners. Several golf courses and horse ranches are located in this low-lying valley and use the groundwater through on-site wells. The permitting of a groundwater recharge project in a basin designated for potable uses is anticipated to require an amendment to the RWQCB's Basin Plan, a lengthy and tedious process. Given the challenges associated with implementation, this opportunity is not considered viable at this time.

6.3 Summary of Indirect Potable Reuse Opportunities Brought Forward for Evaluation

All of the potential opportunities, including the quantity of recycled water used, and the facilities required for proposed reservoir augmentation and groundwater recharge projects in each of the service areas, were outlined in the previous section. Although many were investigated, not all were brought forward, for evaluation as components of larger implementation strategies.

A summary by service area of the viable opportunities and the facilities required to deliver the recycled water for indirect potable uses is provided in **Table 6-1**.

Table 6-1
Summary of Indirect Potable Reuse Opportunities

Service Area	Opportunity	Estimated Average Day Demand (MGD)	Estimated Annual Use (AFY)	Customers Served	Facilities Required
Northern	Reservoir Augmentation – Lake Hodges	1.6	1,800	Potable water customers – North City and San Diego	Phase III recycled water extension 2 MGD advanced water treatment plant Brine disposal pipeline and connection to Escondido Hale Avenue Resource Recovery Plant
Northern	Reservoir Augmentation – San Vicente	9.4	10,500	Potable water customers – throughout City	16 MGD advanced water treatment plant 23 mile pipeline
Southern	Reservoir Augmentation – Otay Lakes	4.9	5,500	Potable water customers – throughout central and southern portions of the City	5.5 MGD advanced water treatment plant 16 mile pipeline

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