6.0 Indirect Potable Reuse Opportunities

Water Reuse Study 2005

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. The water body is typically 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**.

Prior to starting an IPR project, extensive permitting and regulatory interaction is required. Regulations require that 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 (drinking) 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 D.

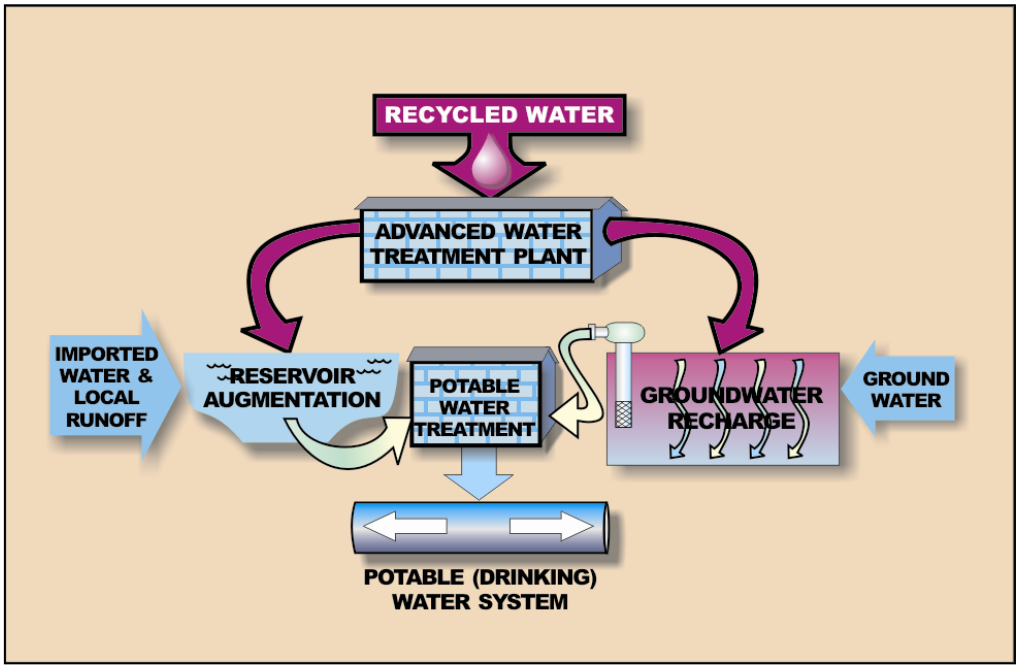

Figure 6-1 – Conceptual Indirect Potable Reuse Process Diagram

6.1 Reservoir Augmentation Opportunities

Reservoir augmentation is an IPR opportunity that involves adding advanced treated recycled water into a surface water reservoir. Opportunities and constraints of conveying advanced treated water to City-owned, surface water reservoirs have been examined as part of this 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 prior to entering the reservoir.

Nine City reservoirs were selected as candidate Reservoir Augmentation concept projects and evaluated in this study. The Sutherland Reservoir, Lake Hodges, Miramar Reservoir, Lake Murray, San Vicente Reservoir, El Capitan Reservoir, Morena Reservoir, Barrett Reservoir and Lower Otay Lake were considered. Sutherland, Morena and Barrett Reservoirs were determined to be unsuitable due to their distance from the City's existing recycled water facilities. Lake Miramar and Lake Murray 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, Lake Hodges and San Vicente underwent further consideration for North City reservoir augmentation opportunities. Lower Otay was considered further for South Bay reservoir augmentation opportunities. In each service area, a full-scale and a small-scale reservoir augmentation project were considered and these opportunities are described below.

Northern Service Area – Reservoir Augmentation Opportunities

The study team developed a screening process of the City's nine raw water reservoirs and determined that only Lake Hodges, San Vicente and Lower Otay were suitable candidates 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 times. San Vicente was most suitable for a full-scale reservoir augmentation project due to its large size and ability to provide appropriate retention times. Drawbacks to San Vicente include its distance from the recycled water supply source. Each of these proposed projects is shown in **Figure 6-2**, and described below.

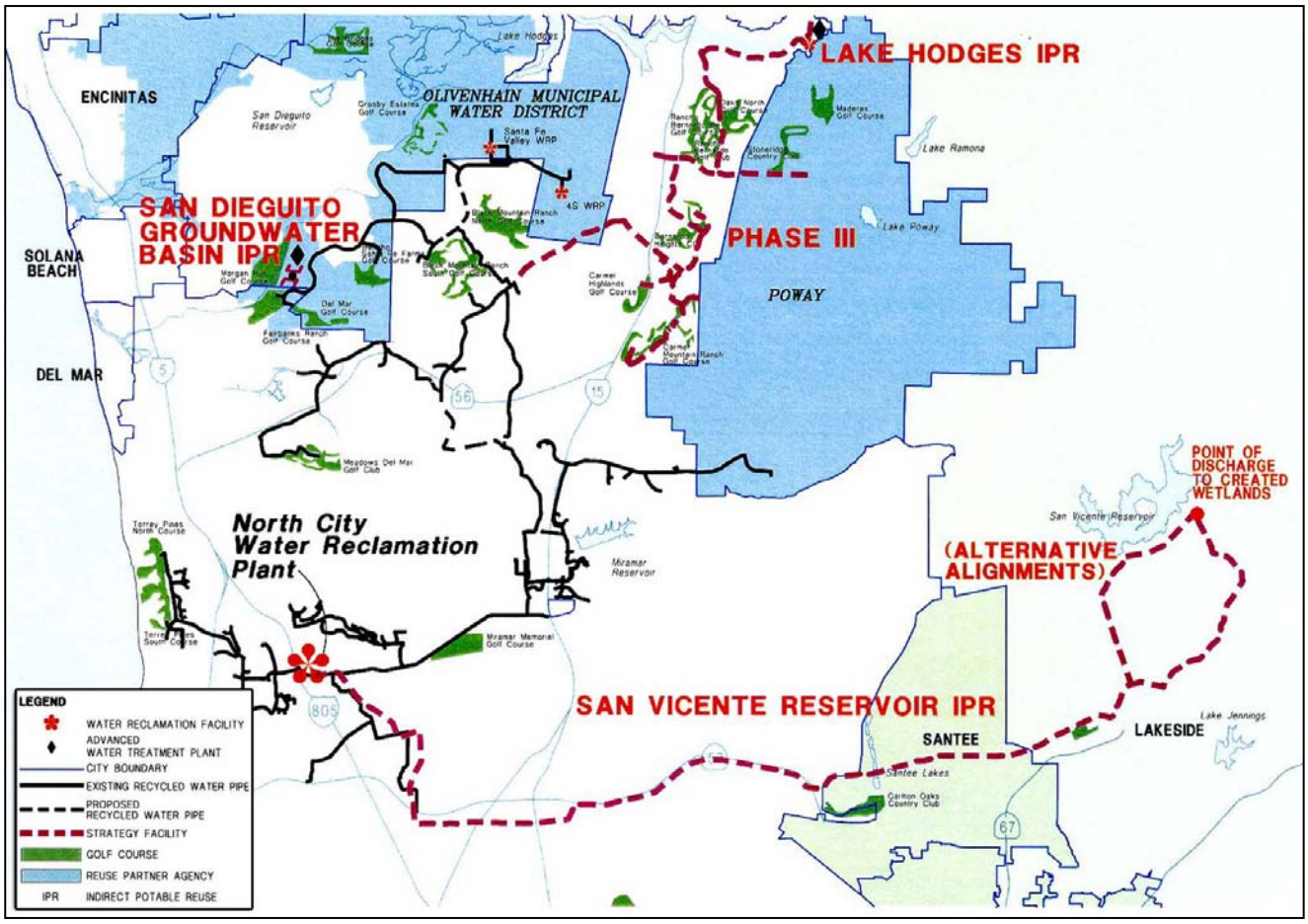

Figure 6-2 – Northern Service Area Indirect Potable Reuse Opportunities

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 non-potable opportunity section). 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. The treatment facility would be capable of providing 2 MGD of water to supplement local runoff and imported water that is stored in Lake Hodges. This water would subsequently be conveyed to drinking water treatment plants that serve both San Diego North County and North City areas. Upon completion of the San Diego County Water Authority Emergency Storage Project, using new infrastructure, water from Lake Hodges will also be able to be distributed to areas further south.

The advanced water treatment facility would operate 8 to 10 months out of the year. The limited months of operation is an effect of the seasonal peaking 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. The new advanced water treatment plant would be located adjacent to the North City Water Reclamation Plant. A 23-mile pipeline would be needed to convey the water to San Vicente. An optional, created 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 beneficially maximizes the recycled water available from the NCWRP.

The San Diego County Water Authority Emergency Storage Project includes increasing the volume stored in the San Vicente Reservoir. The dam raise, and related transmission facilities, will allow delivering San Vicente water to all City treatment plants and areas served by those plants. Therefore, the San Vicente reservoir augmentation project provides the most service coverage.

Southern Service Area Reservoir Augmentation Opportunities – Otay Lakes

Both the small-scale and large-scale reservoir augmentation projects, shown in **Figure 6-3**, in the Southern Service Area 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. An optional, created wetland could be constructed near the reservoir to add a natural treatment process prior to the water entering the reservoir.

From Lower Otay, 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.

The small-scale project would take advantage of the City's 1 MGD of capacity rights in Otay Water District's recycled water distribution system expansion 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.

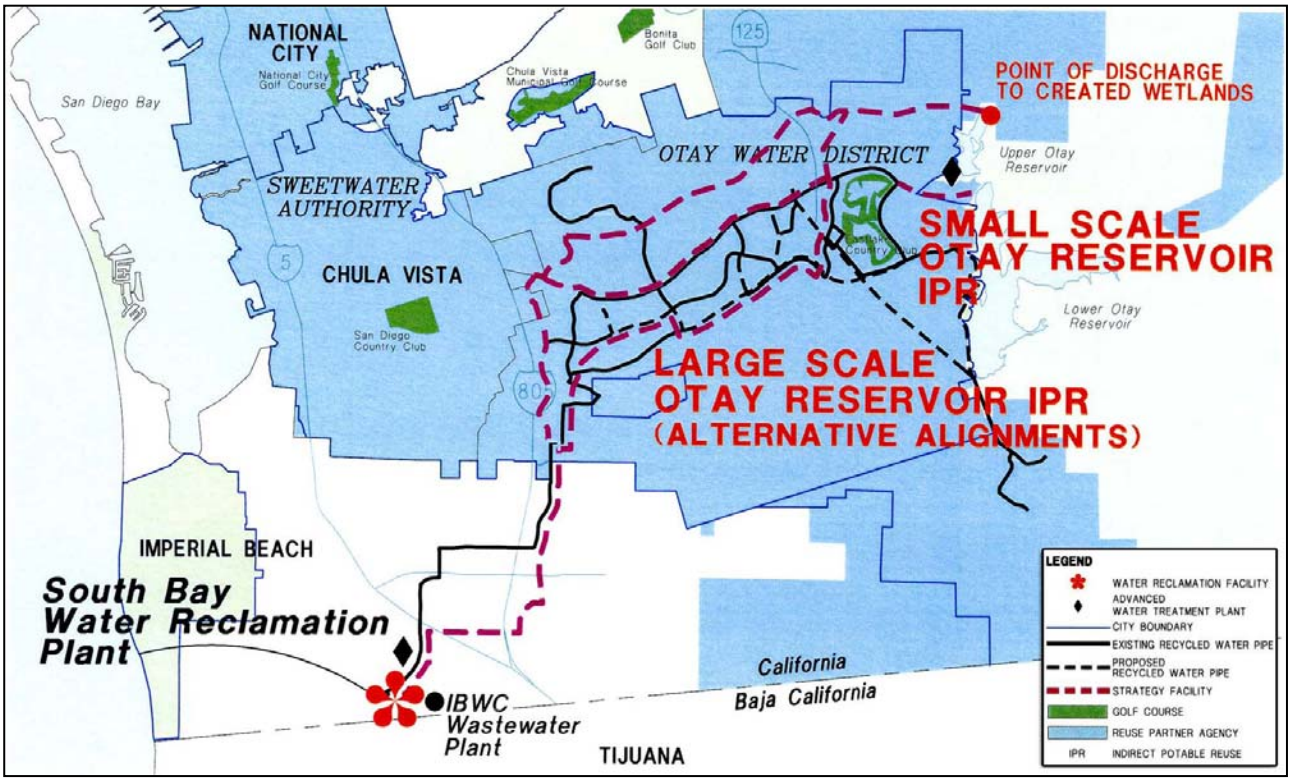

Figure 6-3 – Southern Service Area Indirect Potable Reuse Opportunities

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. Brine would be discharged to the South Bay Outfall. This large-scale project beneficially maximizes the recycled water available from the SBWRP.

6.2 Groundwater Recharge Opportunities

Advanced treated water may also be added to groundwater. The advanced treated water is injected directly into the aquifer via wells, or percolates into the aquifer via spreading basins. The advanced treated water blends with the groundwater and undergoes natural treatment processes within the basin. The blended water is eventually extracted, treated and added to the potable water system (drinking water supply). This practice, referred to in this study as groundwater recharge, must also meet minimum retention times and stringent quality criteria. 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 Water Reuse Study evaluated the feasibility of an indirect potable reuse 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 to appear to be suitable for considering a groundwater recharge project at this time.

Domestic water use and insufficient retention times made the San Pasqual basin infeasible at this time. The Mission Valley basin has benefits, such as simpler institutional issues and an improved ability to get water into and out of the basin. However, the basin is generally 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. Insufficient hydro-geological information is currently available on the San Diego Formation making a determination regarding its suitability for an IPR project difficult. Lastly, the Tijuana basin water quality is influenced by sewage and untreated industrial discharges at the international border. Therefore, extracted water from the Tijuana basin is of extremely questionable 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 advanced water treatment plant, based on draft California 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 (drinking) 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 property owners, in this area. Many high profile golf courses and horse ranches are located in this low-lying valley and continue to access and use the groundwater through on-site wells. The permitting of a groundwater recharge project in a basin that is designated for potable uses is anticipated to require an amendment to the Regional Water Quality Control Board's Basin Plan, a lengthy and difficult process. Given the difficulty associated with implementation, this opportunity is not considered viable at this time.

6.3 Summary of Indirect Potable Reuse Opportunities that are Brought Forward for Evaluation

All of the opportunities, 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 opportunities were investigated, not all were brought forward, as previously discussed, 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 North County 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