1.0 Introduction

Water Reuse Study

This report presents the findings of the City of San Diego (City) Water Reuse Study (Study). The purpose of the Study is to evaluate opportunities available to the City to increase the city-wide beneficial use of recycled water. Together with the results of a broad public outreach and involvement process, the City will use the findings of this report to determine a future course for the implementation of water reuse projects.

1.1 Study Background

Currently, the 1.3 million people living in San Diego use an average of 210 million gallons per day (MGD) of potable water. The City's population is projected to increase 50 percent in the next 25 years. Even with additional water conservation measures, the City projects this population growth will increase demand for potable water by approximately 25 percent, or an additional 50 MGD.

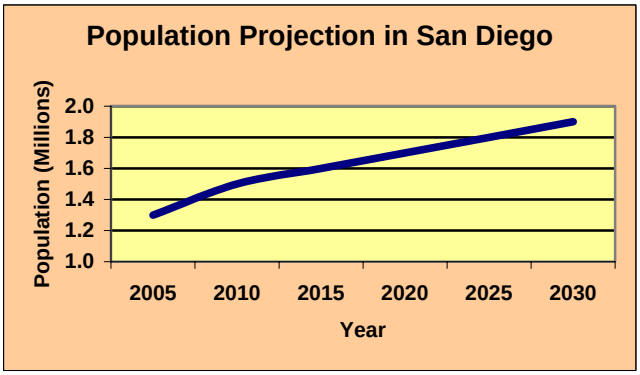

Figure 1-1
San Diego's population is anticipated to increase 50 percent by 2030.

Up to 90 percent of the City's existing water supply is imported from the Colorado River and the California State Water Project. The City has long recognized the need to develop local water supplies to balance and reduce this dependence on imported water.

Many factors outside the City also contribute to our future water needs and the reliability of existing supplies. California's access to surplus water from the Colorado River has been reduced, and recurring droughts in both the western United States and the Colorado River watershed have affected imported water supplies. Competing interests statewide between urban users, agricultural uses and environmental interests are being resolved, but water allocations to each will continue to be adjusted in the future.

In 1997, the City prepared the *Strategic Plan for Water Supply*, and in 2002 updated it with a more detailed *Long-Range Water Resources Plan* (Long-Range Plan). Both documents identified the need for the City to develop additional local water supply sources as a means of providing reliability and protection from water supply shortages. These recommendations were consistent with the sentiment expressed by the San Diego County Grand Jury in a 1999 report on San Diego's water supply. Having noted San Diego's dependence on imported water, the grand jury recommended the development of additional local supplies, including water reuse, quoted as follows:

Water is a scarce commodity in the rapidly growing San Diego region. In the face of increased demand for water from other geographical areas, imported water and water from transfers are not reliable sources of water for the future. Many decisions about water supply for San Diego are made by the state and federal governments and thus out of local control. In order to increase the reliability of its overall water supply, the City of San Diego must expand its supply of local water.

– San Diego County Grand Jury, 1999

The need for local water supply development is echoed by the San Diego County Water Authority (Water Authority) in their *2004 Annual Water Supply Report*, subtitled *Supply Reliability through Diversification*. This report states, "A critical component of future reliability is development and management of local supplies and conservation programs by the Water Authority's member agencies." The report also addresses water reuse by saying, "implementation of water recycling is essential to using the region's water supplies efficiently," and specifically references this Study as an example of what is needed.

The City must diversify its sources of water and increase the use of locally produced water to assure an adequate and reliable supply for the future. One local source of water is already being produced – recycled water.

1.2 Purpose of the Water Reuse Study

On January 13, 2004, the San Diego City Council (Council) directed the City Manager to conduct a study to evaluate options for increasing the beneficial use of the City's recycled water. In Resolution R-298781, included in Appendix A, the Council directed that the study:

- Include a participatory process to discuss/develop reuse opportunities;
- Account for diverse stakeholder viewpoints;
- Be based on sound technical analysis;
- Build upon past City efforts; and,
- Utilize recent knowledge and information gained through growth in the recycled water industry.

The envisioned study would become a planning tool for guiding future recycled water efforts throughout the City. With this charge, the City's Water Department promptly engaged staff and consultants to develop an approach and process. In May 2004, the project kick-off meeting was held, and public participation tasks began.

As part of the planning process, the Study team developed an objective and a mission statement for the project:

Objective
To conduct an impartial, balanced, comprehensive and science-based study of all recycled water opportunities so the City of San Diego can meet current and future water needs.

Mission Statement
To pursue opportunities to increase local water supply and reliability, and optimize local water assets, through a comprehensive study of recycled water.

1.3 Study Approach

The Study began with a small team of City staff and consultants. The first task was to expand the team into a diverse, participatory group that included stakeholders and noted specialists in the fields of science, technology, health and safety, and economics. Two key groups convened shortly after the project began – an American Assembly-style stakeholder workshop, called the City of San Diego Assembly on Water Reuse (Assembly), and an Independent Advisory Panel (IAP).

City of San Diego Assembly on Water Reuse
Over fifty years ago, President Dwight D. Eisenhower developed the American Assembly process as a means to examine key aspects of public policy questions. Because it brings together academicians, business people, government officials, the media, policy makers, community leaders and other interested individuals, the American Assembly process formed the basis of the participatory stakeholder component of the Study. This format thrives with the sharing of diverse perspectives, experiences and interests, and moves towards consensus in making recommendations for action. At the end of the American Assembly workshop, participants deliberate and develop a statement of majority and minority viewpoints with the goal of composing a finalized, professional and comprehensive report at the process' end.

The City selected its 67 Assembly participants through a city-wide search for key stakeholders such as community leaders, policy makers, water consumers, business leaders, and professionals in various fields of expertise. The Mayor and each Council member suggested names of constituents to participate in the Assembly, and each potential candidate was contacted, provided an overview of the Study and participatory process, and asked if they would commit to their essential role. Thus, a total of 67 participants attended the two workshops held in October 2004 and July 2005. During the October 2004 Assembly, the Study process was reviewed and evaluation criteria established to guide the Study team on how the various reuse opportunities were to be assessed and prioritized. The July 2005 Assembly reviewed the Draft Study Report and thoroughly evaluated each proposed reuse strategy contained therein. With the conclusion of each workshop, Assembly participants issued a written statement, which are included in this document as Appendices B and C.

The Assembly process brought together diverse stakeholders throughout the City to discuss recycled water opportunities.

Independent Advisory Panel

The Independent Advisory Panel (IAP) was established to provide independent oversight and guidance to the Study team. IAP panel members were contracted through the National Water Research Institute (NWRI), which was selected to ensure an unbiased and thorough examination of all possible water reuse opportunities. NWRI's mission is to promote the protection, maintenance and restoration of water supplies and aquatic environments through the development of cooperative research work.

The eleven panelists selected for the Study were renowned experts in the fields of water and wastewater technology, public health, epidemiology, toxicology, microbiology, water quality, economics, environmental engineering and science, public utilities administration and industry regulations from across the United States. The IAP also included a local citizen representative.

IAP workshops were held in July 2004, May 2005 and November 2005. The July 2004 workshop focused on the strengths and weaknesses of the reuse opportunities under consideration, proposed evaluation criteria and the parameters of the research studies on advanced water treatment being conducted. The May 2005 workshop reviewed the Interim Study Report providing significant suggestions regarding the reorganization and enhancement of the Study contents as well as the comprehensive science-based projects. The final IAP meeting in November 2005 gave the Study Team a detailed critique of the Final Draft Water Reuse Report and the Panel issued their findings which are included in Appendix E. The following is an excerpt from the IAP's findings:

> *"It is the unanimous conclusion of the Panel [IAP] that appropriate alternative water reuse strategies for the City of San Diego have been identified, and that these alternatives have been presented clearly so that the citizens of the City of San Diego can make informed choices with respect to water reuse."*

The members of the IAP and their areas of expertise are listed below. Dr. Tchobanoglous chaired the IAP and Dr. Gersberg served as vice-chair.

Richard Bull, Ph.D., Toxicologist, MoBull Consulting (Richland, WA), *Toxicology*

Joseph A. Cotruvo, Ph.D., Risk Assessment, Joseph Cotruvo Associates (Washington, D.C.), *Environmental and Public Health*

James Crook, Ph.D., P.E., Water Reuse Consultant (Boston, Massachusetts), *Environmental Engineering and Regulatory Issues*

Richard Gersberg, Ph.D., Professor and Division Head of Occupational and Environmental Health; Director, Coastal and Marine Institute, San Diego State University, (San Diego, CA), *Ecological Research and Environmental Health*

Christine L. Moe, Ph.D., Associate Professor, Department of International Health, Emory University (Atlanta, GA), *Epidemiology and Microbiology*

James E.T. Moncur, Ph.D., Director Water Resources Research Center and Professor of Economics, University of Hawaii (Honolulu, HI), *Economics*

Derek Patel, M.D., Assistant Clinical Professor of Medicine, University of California San Diego (San Diego, CA), *Clinical Physician specializing in Gastroenterology*

Joan B. Rose, Ph.D., Homer Nowlin Endowed Chair for Water Research, Michigan State University (East Lansing, MI), *Microbiology and Water Quality*

George Tchobanoglous, Ph.D., P.E., Professor Emeritus, University of California, Davis (Davis, CA), *Environmental Engineering*

Michael P. Wehner, Director of Water Quality and Technology, Orange County Water District (Fountain Valley, CA), *Water Quality and Public Utilities Administration*

Fred Zuckerman, Mechanical Engineer, Member of the Tierrasanta Community Council (San Diego, CA), *Local Perspective*

1.4 Methodology

An overview of the four major phases of the Study from inception to completion is displayed in **Figure 1-2**. Stakeholders and the City's public involvement efforts played a significant role in crafting the Study's approach and process.

Stage I – Project Definition

Provided the basis of the Study, the information from which water reuse opportunities could be analyzed was split into two concurrent efforts.

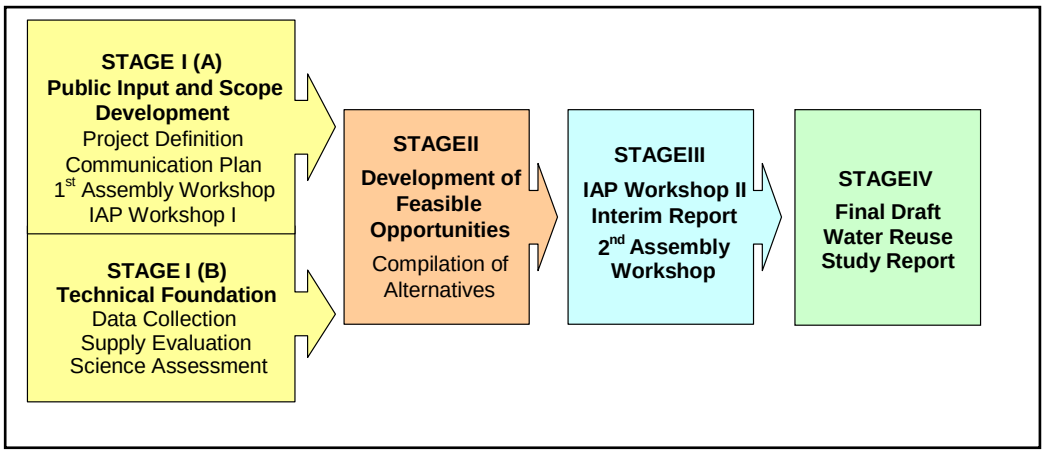

Figure 1.2 – Water Reuse Study Methodology Diagram

Stage I (A) – Public Input and Scope Development

In Stage I (A), stakeholder efforts and public involvement took center stage. A broad range of stakeholders were solicited for participation in the first Assembly workshop, which convened in October 2004. July 2004 saw the first meeting of the IAP. Public viewpoints were solicited through community meetings, San Diego Speakers Bureau (Speakers Bureau) presentations, focus groups and surveys. A website (http://www.sandiego.gov/water/waterreusestudy) was developed and debuted on August 5, 2004. The website included Study information, facts and terminology related to recycled water, and a survey where the public could provide their input on recycled water.

Stage I (B) – Technical Foundation

Stage I (B) included tasks designed to form the technical foundation for the Study. Science, health issues, technological advances in water treatment, case studies, distribution system assessment, market studies, and regulatory issues were researched. The resulting information was consolidated into a technical issue paper and provided to both the IAP and the Assembly for review and comment.

Stage II – Development of Feasible Opportunities

Stage II tasks were aimed at consolidating stakeholder contributions, IAP input, and technical information into viable water reuse opportunities. The first Assembly delivered a recommendation to categorize reuse opportunities into non-potable opportunities (such as using recycled water for landscaping and manufacturing) and indirect potable reuse (IPR) opportunities, such as augmenting groundwater or reservoirs that store water used for drinking. These were integrated into reuse strategies to optimize the beneficial use of recycled water.

Stage III – Interim Report and 2nd Assembly

Stage III was predominantly aimed at engaging the Assembly and IAP on the technical analysis and the opportunities and strategies developed in Stage II. An interim report was completed through coordination with the IAP and provided to the Assembly participants for review and comment. The Assembly was charged with crafting a statement, which summarized majority and minority viewpoints on reuse opportunities and proposed strategies that would be included in the Study report.

Stage IV – Final Water Reuse Study Report

Stage IV consolidates the Study process, tasks, and conclusions into one document. The IAP's review and comments on the Final Draft Water Reuse Report is included as Appendix E. Closing of this process will occur when Council accepts the Study Report and determines the best ways to proceed with the proposed alternative water reuse strategies.