

1.0 Introduction

Water Reuse Study 2005

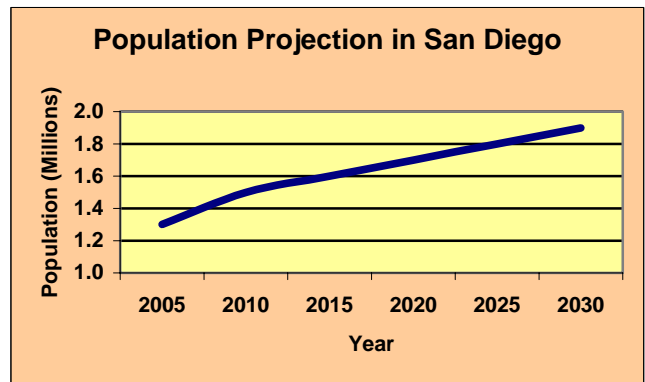
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This report presents the findings of the City of San Diego Water Reuse Study. The purpose of the Study is to evaluate opportunities available to the City to increase the city-wide beneficial reuse of recycled water. Together with the results of a broad 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 of 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 that this population increase will increase demands for potable water by approximately 25 percent, or an additional 50 MGD.

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. The recommendations were consistent with the sentiment expressed by the San Diego County Grand Jury in a 1999 report on San Diego's water supply. The Grand Jury noted San Diego's dependence on imported water, and recommended the development of additional local supplies, including water reuse, as quoted below:



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 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 the City’s Water Reuse Study 2005 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 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.
- 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 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.

The mission statement is intended to guide the study team to achieve the objective of conducting an impartial, balanced, comprehensive, science-based study.

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 Water Reuse Study began with a small team of City staff and consultants. The first essential task was to expand the small team into a diverse, participatory team 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 stakeholder group, and an Independent Advisory Panel (IAP).

American Assembly

The American Assembly (Assembly) formed the basis of the participatory stakeholder process for the Water Reuse Study. Dwight Eisenhower originally developed the Assembly process over fifty years ago as a means of bringing together diverse stakeholders to examine key aspects of public policy questions. The Assembly allows participants of varying views, experiences, and interests to come together for intense discussions, debate and dialogue. At the end of each session, the assembly deliberates the issues and develops a statement of majority and minority viewpoints.

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

Assembly participants were selected based on a citywide search for key stakeholders, such as community leaders, council district representatives, policy makers, water consumers, business leaders, and professionals in various fields of expertise. The Mayor and each City Council member suggested names of constituents to participate in the Assembly. Potential candidates were contacted, provided an overview to the Water Reuse Study and the

participatory process, and asked if they would commit to participating. Two assembly workshops were planned. Approximately 60 participants attended the first American Assembly Workshop held in October 2004. The second workshop is planned for July 2005.



Independent Advisory Panel

The IAP was established to provide independent oversight and guidance to the Water Reuse Study team. IAP panel members were contracted through the National Water Research Institute (NWRI). NWRI 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 11 panelists selected for the Water Reuse Study are renowned experts in the fields of water and wastewater technology, public health, epidemiology, toxicology, microbiology, water quality, economics, biostatisticians, environmental engineering and science, public utilities administration and industry regulations from across the United States. The panel also includes a local citizen representative.

IAP workshops were held in July 2004 and May 2005. The members of the IAP panel and their areas of expertise are listed below. Dr. Tchobanoglous was chosen to chair the panel.

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

Joseph A. Cotruvo, Ph.D., Principal, 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 Head, Division 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., Chairman, 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 Water Reuse Study from inception to completion is displayed in **Figure 1-1**. Stakeholders and the City's public involvement efforts played a significant role in crafting the study's approach and process.

Phase I provided the basis of the study – the information from which reuse opportunities could be analyzed. Phase I was split between two concurrent efforts.

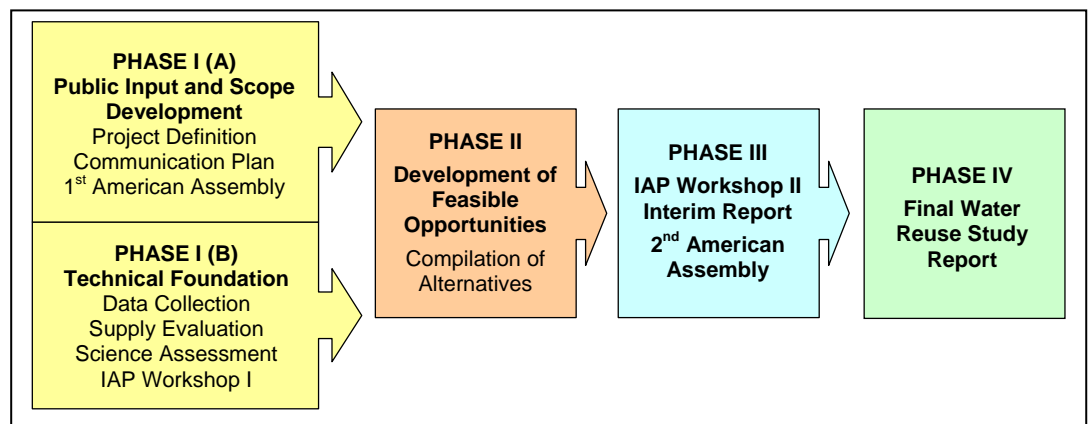


Figure 1-1 – Water Reuse Study Methodology Diagram

Phase I (A) – Public Input and Scope Development

In Phase I (A), stakeholder efforts and public involvement took center stage. A broad range of stakeholder groups were solicited for participation in the first American Assembly Workshop, which convened in October 2004. The IAP was formed and met for the first time. Public viewpoints were solicited through community meetings, speaker bureau presentations, focus groups and surveys. A website was developed and debuted on August 5, 2004. The web page included study information, facts and terminology related to recycled water, and a survey where the public could provide their input on recycled water.

Phase I (B) – Technical Foundation

Phase 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 the IAP and American Assembly for review and comment.



Phase II – Development of Feasible Opportunities

Phase II tasks were aimed at consolidating stakeholder and IAP input and technical information into viable 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 opportunities (such as augmenting groundwater or reservoirs that store water used for drinking). The opportunities were integrated into reuse strategies to optimize the beneficial use of recycled water.

Phase III – Interim Report and 2nd American Assembly

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

Phase IV – Final Water Reuse Study Report

Phase IV consolidates the study process, tasks and conclusions into one document. The closing of this process is acceptance of this study and City Council consideration to determine how best to proceed with the proposed alternative reuse strategies.

1.5 Understanding Water Reuse Terminology

Throughout this study there are several key terms that are used repeatedly. For the convenience of the reader, those terms are defined below. Additional terms and definitions are also provided in the Glossary of Terminology and Abbreviations section at the end of this report.

Recycled Water: Water that originates as municipal wastewater and is treated at a reclamation facility to a level where it can safely be reused for a variety of beneficial uses - Also known as reclaimed water.

Water Reuse: The planned use of recycled water for a specific beneficial purpose.

Advanced Treated Water: Recycled water that undergoes additional treatment for indirect potable reuse applications.

Non-Potable Reuse: The use of recycled water for purposes other than drinking water, such as landscape irrigation and industrial process water. Allowable uses are defined by the California Department of Health Services in Title 22 of the California Code of Regulations.



Indirect Potable Reuse: The blending of advanced treated water into a natural water source (groundwater basin or reservoir) that could be used for drinking (potable) water after further treatment.

Acre-Foot: An acre-foot (AF) is a measurement unit for large volumes of water. One acre-foot is the amount of water that would cover one acre of land to a depth of one foot, and is equal to approximately 326,000 gallons. One acre-foot of water would typically supply two residential households for one year.



