THE CITY OF SAN DIEGO

MANAGER'S REPORT

DATE ISSUED: October 18, 2002 REPORT NO. 02-240

ATTENTION: Natural Resources and Culture Committee
Agenda of October 23, 2002

SUBJECT: City of San Diego Long-Range Water Resources Plan (2002-2030)

REFERENCES: Strategic Plan for Water Supply, adopted August 12, 1997
City Manager's Report No. 99-32, dated February 11, 1999
City Manager's Report No. 99-59, dated March 24, 1999
City Manager's Report No. 99-219, dated October 29, 1999
City Manager's Report No. 00-95, dated May 3, 2000
City Manager's Report No. 00-147, dated July 17, 2000

SUMMARY

Issue: What action should the City Council take regarding the City of San Diego Long-Range Water Resources Plan (2002-2030)?

Manager's Recommendation: Accept the Long-Range Water Resources Plan (2002-2030).

Other Recommendations: The Long-Range Water Resources Plan was unanimously approved by the Water Department Citizen's Advisory Board on November 28, 2001.

Fiscal Impact: None. The Long-Range Water Resources Plan (2002-2030) is a guide for developing a city-wide water resources plan and strategy. Implementation of specific alternative water supply options will require separate City Council approval.

BACKGROUND

On August 12, 1997, the City Council adopted the *Strategic Plan for Water Supply* (*Strategic Plan*) that included a water resources strategy to meet future water demands through 2015, identified a nine-year Capital Improvements Program (CIP) to upgrade, replace and expand key water system facilities, and approved a rate increase to fund the initial years of the CIP. The *Strategic Plan* was the result of a year-long effort by a 30 member Public Advisory Group that focused on the City's needs for water supply options, increased levels of conservation, and infrastructure improvements. A mix of water supply options was identified to meet the City's

water demands through 2015. This mix included increasing water conservation savings by five percent over 1997 levels, water reclamation, repurification, and local runoff with an underlying assumption that no individual resource alone could meet future water demands. Programs to increase water conservation savings were implemented following adoption of the Strategic Plan. One of the PAG's recommendations was that the Water Department "consider desalination, groundwater storage, transfers and exchanges on an on-going basis, as well as each time this plan is updated."

In 1999, the Water Department received several unsolicited water supply proposals involving water transfers, desalination, and purchasing firm water rights in California and Arizona. In March 1999, the Water Department made a presentation to the Natural Resources and Culture Committee (NR&C) on alternative sources of water being explored, and that the department was proceeding to hire a firm to assist in evaluating the water supply proposals and update the City's water resources plan. In November 1999, the City Council approved an agreement with Camp Dresser and McKee, Inc. (CDM) to provide water resource planning services.

The Water Department and its consultant worked closely with the thirteen member Citizen's Advisory Board (CAB) on updating the City's water resources strategy though 2030. The objective of the Long-Range Water Resources Plan (Water Resources Plan) was to define a flexible strategy for the next 30 years and develop evaluation tools for continued water resources planning. A systems dynamic model was developed to measure the performance of water resource alternatives (i.e. different combinations of water supply options) using a set of objectives. The objectives were established by the CAB through individual interviews and workshops. The CAB also defined and weighted the objectives. Performance measures were developed to determine whether objectives were being achieved. The CAB held meetings every two months and, over a two-year period, identified a strategy for flexible, long-term water supply planning. The CAB approved the Long-Term Water Resources Plan on November 21, 2001.

DISCUSSION

By the year 2030, San Diego's population and economic growth is projected to increase water demands by almost 50 percent over 2002 levels. To accommodate such growth the challenge is to continue to provide its existing and new customers with a reliable and safe drinking water supply in a cost-effective and environmentally sound manner. One underlying premise of the Long-Range Water Resources Plan is to meet the requirements of projected growth.

The City of San Diego presently imports the majority of its water to satisfy existing demands. This imported water comes from northern California and the Colorado River. Competing demands for imported water increases the uncertainty of the availability of this supply. This supply method also gives the City no direct control over the majority of its water supply. Local reservoirs owned and operated by the City supply about 10 to 15 percent of total supply. The amount of water runoff into local reservoirs varies greatly from year-to-year due to weather and hydrology. During wet periods, abundant rainfall and runoff lead to greater local water supply. During dry periods, when rainfall and runoff is minimal, local water supply is severely reduced.

In response to future projected water demands and water supply uncertainties, a water strategic planning process was undertaken in order for the City to be more engaged in the planning and

development of its own water supply and less reliant on imported water. The following sections of this report outline the major sections of the Long Range Water Resources Plan.

San Diego's Water Situation

The City's population is currently more than 1.2 million. In 2001, the City consumed 234,000 acre-feet per year (AFY) of water. Projections developed by the San Diego County Association of Governments (SANDAG) indicate that the City's population will increase to over 1.9 million residents by 2030. With the City's water conservation program actively trying to increase conservation levels to approximately 32,000 AFY in 2010 and 46,000 AFY in 2030 the projected population growth will translate into estimated water demands as follows:

Table 1
Water Demand

With conservation (Normal Day vs. Critically Dry Day)	**Without conservation** (Normal Day vs. Critically Dry Day)
252,000 – 255,000 AFY in 2010	284,000 – 287,000 AFY in 2010
297,000 – 304,000 AFY in 2030	343,000 - 350,000 AFY in 2030

Note: one acre-foot of water is equal to 325,851 gallons, and can supply two average families for one year

The two columns display water demands with and without conservation illustrating the large impact conservation has on overall water demands. "With conservation" reflects water savings from active and passive measures. Active measures are programs developed by the Water Department to permanently reduce water demands. These programs include rebates for low-flow toilets and horizontal-axis clothes washers; landscape irrigation incentives (clock timers, rain sensors); public information and education; turf management; and, conservation demonstration gardens. Passive conservation measures are programs that reduce water demands without the active involvement of the utility, such as plumbing codes and landscape ordinances. The "without conservation" column displays what total water demands would have been had the City never implemented any conservation measures. Thus, conservation reduces demands by approximately 32,000 AFY in 2010 (11%) and 46,000 AFY in 2030 (13%).

The City currently purchases up to 90 percent of its water from the San Diego County Water Authority (CWA). CWA is a wholesale water agency that sold approximately 600,000 acre-feet (AF) of imported water to its 23 member agencies in San Diego County in calendar 2001. The City of San Diego represents approximately 40% of the total water delivered by CWA. CWA, in turn, purchases its imported water from the Metropolitan Water District (MWD) of Southern California, which is comprised of 26 public water agencies. MWD obtains its water from the Colorado River and from Northern California. In calendar 2001, MWD delivered approximately 2.3 million AF of imported water to its wholesale customers.

Future Water Supply Options

CAB members reviewed and refined a mix of water resource options, some of which were included in the 1997 Strategic Plan. The resource options are outlined below:

- Imported water from CWA;*
- Conservation;*
- Reclaimed water*;
- Groundwater storage;
- Groundwater treatment;
- Desalination of seawater;
- Runoff;
- Water transfers;
- Marine transport

*included in Strategic Plan

The Water Resources Plan explored further development of existing supplies (i.e., conservation, reclamation, water transfers, and imported supplies) and the feasibility of new water supply options that included ocean and groundwater desalination, groundwater storage and recovery and marine transport. For each water supply option the following information was collected or estimated:

- water supply yield
- affect on supply yield from hydrology and weather
- cost of supply development (including related infrastructure cost for delivery and treatment)
- water quality
- risk factors (institutional, environmental, consumer acceptance)

The following table summarizes the potential water supply options analyzed by the City. A detailed investigation, including field investigations and pilot studies, must be undertaken prior to implementation of any listed option to further refine assumptions and determine feasibility and economic viability.

Table 2
Summary of Supply Options Examined

Supply Option	**Existing Supply (AFY)**	**Range in Potential Supply (AFY)**
Water Conservation	21,000	42,000 (by 2030)
Water Reclamation	8,000	33,000
Groundwater Desalination (Safe Yield Supply)	0	6,000 – 20,000
Groundwater Storage (Dry Year Supply)	0	10,000 – 48,000
Ocean Desalination	0	10,000
Marine Transport	0	20,000
Central Valley Water Transfers (Dry Year Supply)	0	10,000 – 60,000
Imported Supply from CWA/MWD (Firm Dry Year Supply)	175,000 [1]	200,000

[1] The City can get as much as 260,000 AFY from imported water during normal and wet years. However, in a repeat of a critically dry year, such as 1977, the estimated firm imported supply is 175,000 AFY.

Planning Objectives and Development of Alternatives

A crucial step in the development of the Water Resources Plan was to define the planning objectives. Once the objectives were defined and weighted, predictive indicators or performance measures were developed to determine if the objectives were being achieved. Objectives and performance measures serve as evaluation criteria by which alternative water supply options can be compared. Figure 1 illustrates the objectives and performance measures.

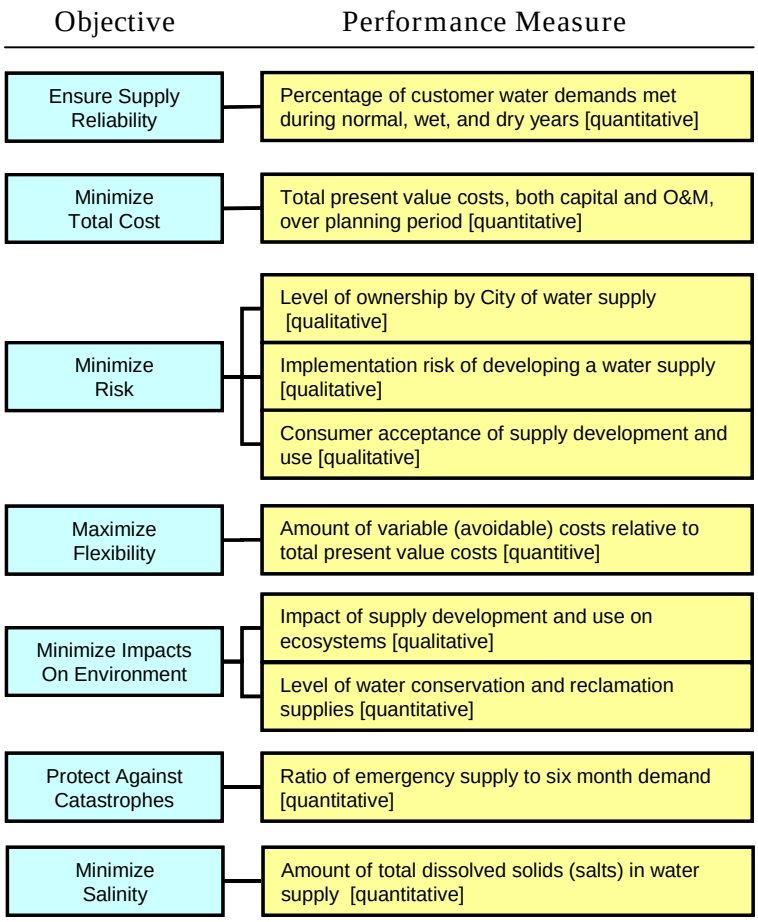

Figure 1. Planning Objectives and Performance Measures

Developing Water Resource Alternatives

Understanding that no single water supply option could meet all of the City's objectives, water resource "portfolios" were created combining various water supply options at different quantities. These portfolios were tested against the performance measures. Eight alternative portfolios were developed:

Minimum Risk	Minimize Catastrophe
Minimum Cost	Mixed Balance 1
Minimum Environmental Impact	Mixed Balance 2
Minimum Salinity	Status Quo

Some of the portfolios were designed to maximize a single objective (such as minimize cost or protect against catastrophes). This allowed the City to evaluate trade-offs amongst the alternatives. Other portfolios represented a balanced mix (i.e., not maximizing or minimizing any one objective). A Status Quo alternative, or no action alternative, was developed as a base case. All alternatives were designed to meet demands under all hydrological conditions. In addition, two balanced alternatives were constructed to test the hypothesis that the overall best performing alternative would be one that did not seek to maximize any one objective.

A computer systems model was developed to evaluate the alternative water resource portfolios. The systems model represents the City's physical water delivery system, simulates the operations of existing and future water supplies under different hydrologic cycles (based on historic data) in order to meet current and future (2030) demands, and was used to determine if alternative portfolios met the planning objectives.

Some of the evaluation criteria were easily quantifiable, such as: supply reliability (percent of time supply meets demands); cost (present value total costs); and water quality (salinity of all sources of water). Other criteria were qualitative, such as: environmental impacts and risk. A scorecard approach was used to combine both quantitative and qualitative measures into a comparable index (score from 0 to 100). A score for each objective was developed for each portfolio. An overall score was derived using the relative importance of each objective, as determined by the CAB. Only the Status Quo, which did not assume any additional future supply development, was unable to reliably meet future water demands.

Generally, portfolios designed to minimize risk or environmental impacts had the greatest amount of local supply development. In terms of reliance on imported water, the alternatives ranged from 51 to 85 percent dependent on imported supply. The Minimum Catastrophe Impact had the lowest reliance on imported water, while the Status Quo had the highest. The three top-scoring portfolios are the Balance Mix #2 (emphasis on storage), Minimum Salinity, and Minimum Cost.

Recommended Water Resource Strategy

During the planning process, the importance of having a flexible and adaptive water resources strategy was recognized. Given the uncertainty of technology, price of imported water, and availability of funding for local projects, it would be unwise to select the current highest scoring alternative as the final basis for a 30 year water resources plan. Therefore, the recommended approach for the Water Resources Plan is to implement it in three phases. The initial phase consists of implementing the resource elements common to the three high-scoring portfolios by 2010 – conservation, reclamation, groundwater storage, groundwater desalination, and water transfers. As time advances and factors such as changing technology, water markets, water management in California, and other factors become clearer, the other water resource elements can be examined to determine their feasibility for implementation in 2020 and 2030. This strategy ensures that the City can move forward with the most promising resource elements

while allowing for a "wait-and-see approach" for those options that have higher risks. The following figure presents this flexible and adaptive water management strategy.

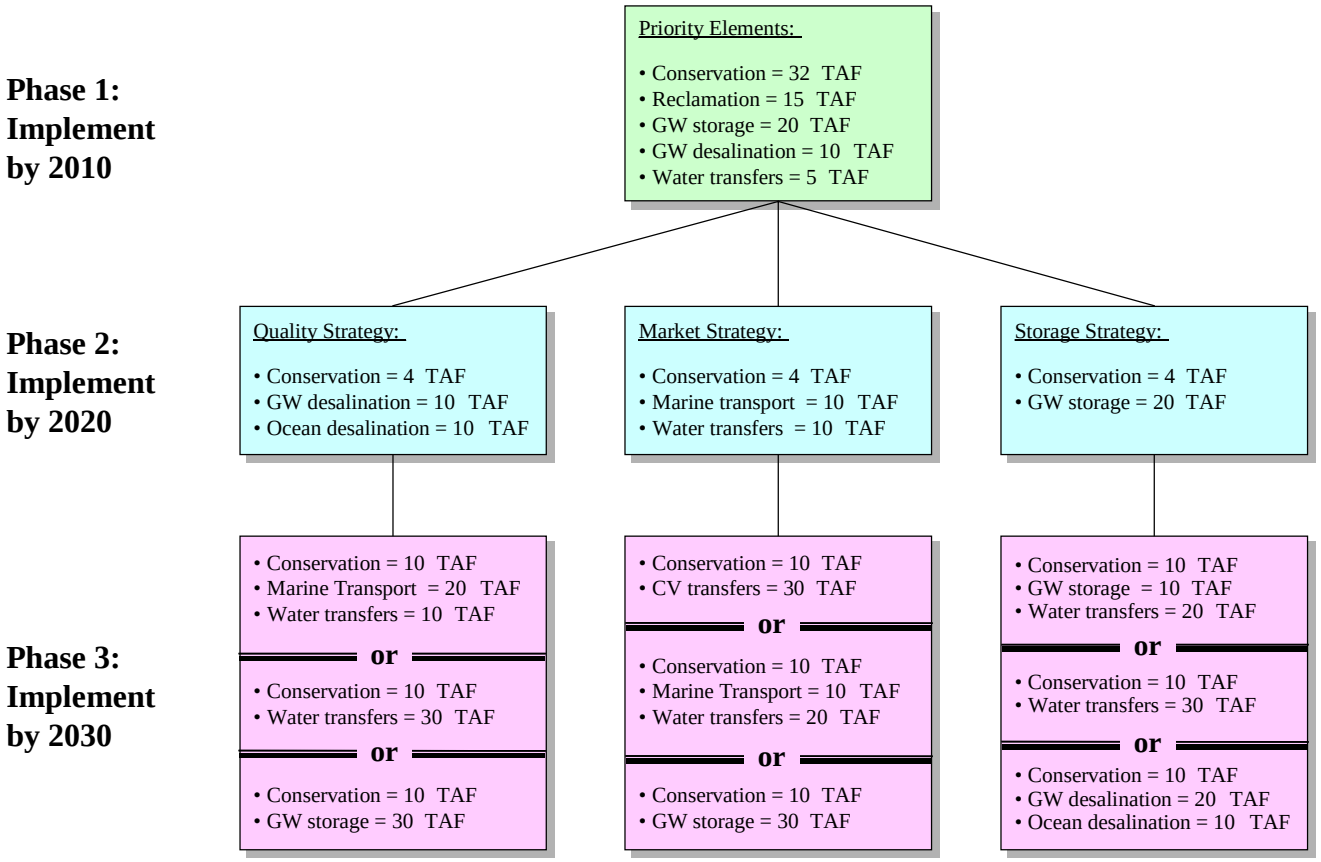

Figure 2. Adaptive Water Resources Strategy [TAF = thousand acre-feet**]**

With implementation of the common resource elements by 2010, the City's reliance on imported water during a critically dry period would be approximately 74 percent. By 2030, the City's reliance on imported water will stay at the same level (not increasing proportionately to demands) but at a lower percentage 57% (because of the increase in demands) if most of the alternative resources options available to the City were implemented. Again, the actual implementation of resource options will be dependant on many factors such as the success of CALFED, desalination technologies, feasibility of using local groundwater basins for storage and enhanced safe yield, and others.

It is important to note that the City will continue to rely heavily upon imported water. With adoption of this water resources strategy, the City can develop new local supplies to meet future demands. By adopting this strategy it may be possible for the City to import roughly the same amount of water in 2030 as it does in 2001.

Figure 3 summarizes how the City would meet 2010 and 2030 demands under normal and critically dry scenarios.

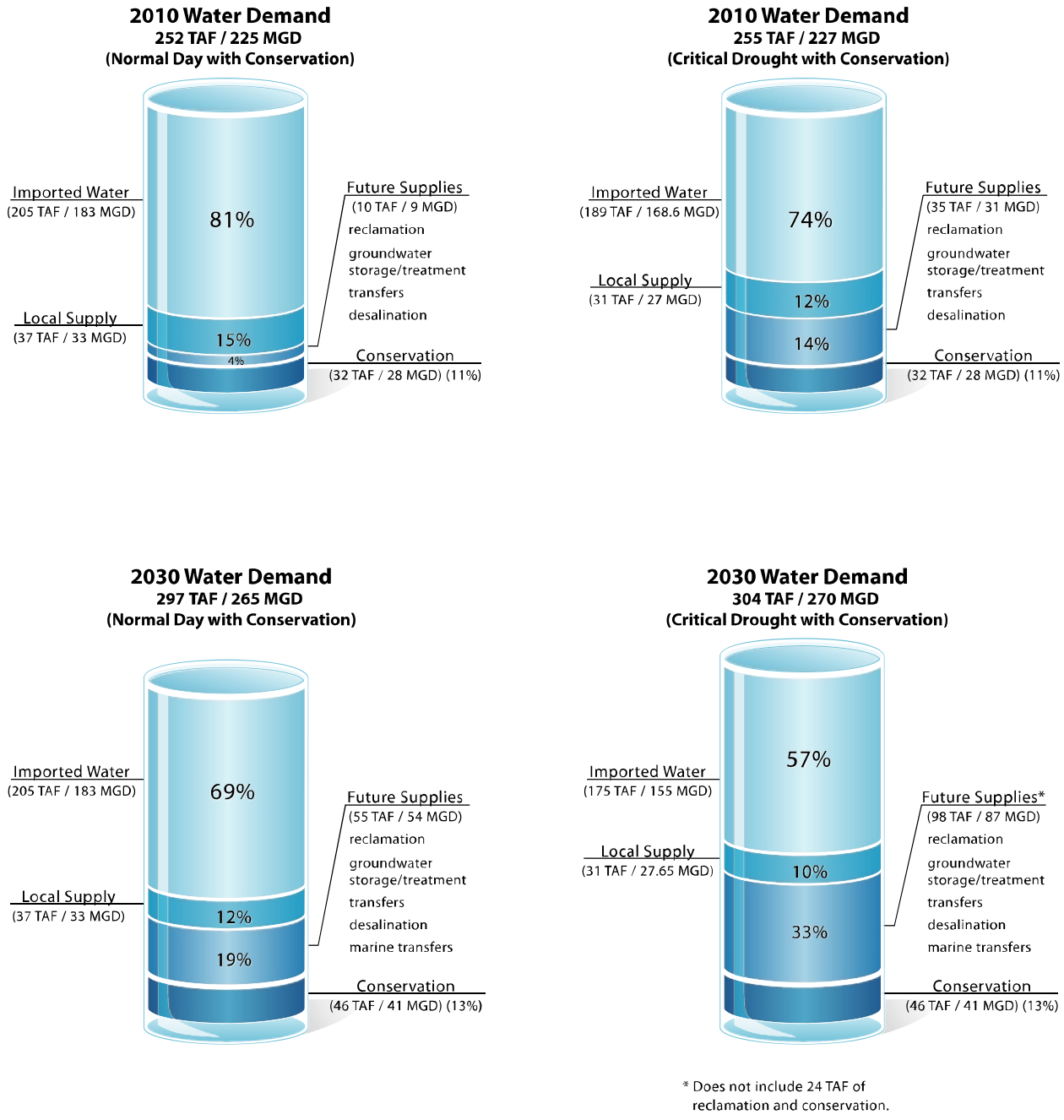

Figure 3. City's supply mix for 2010 and 2030 for Normal day and Critical Drought (TAF = thousand acre-feet, MGD - Million gallons per day)

Next Steps

The next step to implementing the specific 2010 water resource strategies detailed in this report involve the following: 1) developing an implementation plan for the 2010 portfolio/resource mix to include project costs, schedule, and feasibility studies and/or pilot plants; 2) updating the model for seasonal, rather than only annual analysis; 3) updating the model to include the most recent demand data; and, 4) updating the capital improvements program to include projects to develop water supply as identified in the Water Resources Plan. Taking these steps will enhance and increase the reliability of the City's water supply.

CONCLUSION

Since the adoption of the Strategic Plan for Water Supply in 1997, the City has continued to prepare for the future by investigating water supply options and developing a long-term water supply strategy designed to meet San Diego's water needs for the next 30 years. The proposed Water Resources Plan is flexible and adaptive to a changing environment. Adopting the Water Resources Plan will provide the City with a "roadmap" for developing water supply alternatives, thereby reducing the City's dependence upon imported water, diversifying its water supply options and increasing control over local water supply development. During the next 10 years, the City can move forward and implement the first phase of the Water Resources Plan focusing on conservation, reclamation, groundwater storage and treatment, and water transfers. By pursuing this water resources strategy, the City can expand the number of water supply options available in order to develop a supply sufficient to meet projected water needs in 2030, thereby limiting City's exposure in a drought condition.

ALTERNATIVE

Do not adopt City of San Diego Long-Range Water Resources Plan (2002-2030). This is not recommended as the City's overall dependence upon imported water will increase over time, and it will become more challenging to provide residents with a reliable water supply.

Respectfully submitted,

Approved:	Larry Gardner Water Department Director	Richard Mendes Utilities General Manager

GARDNER/MAS/GJA

Attachments: 1. Draft - City of San Diego Long-Range Water Resources Plan (2002-2030)
2. List of Citizens Advisory Board Members

Note: A limited distribution of the report and its attachments has been made due to the size of Attachment 1. Interested parties may review the Attachment at Water Department offices located at 600 B Street, Suite 700.