

Pure Water
San Diego

2021 Annual Report: A Year in Review



The City of San Diego's Pure Water Program kicked off Phase 1 construction and achieved important milestones to mark the first year as the largest-ever infrastructure project in the City's history.



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Program Overview

What is Pure Water San Diego?

Pure Water San Diego is a phased, multi-year program. Based on water use projections developed in 2020, the Pure Water Program will provide nearly one-half of San Diego's water supply locally by 2035.

The Pure Water Program:

- Uses proven technology to clean recycled water to produce safe, *high-quality* drinking water
- Provides a *reliable, sustainable*, water supply
- Offers a *cost-effective* investment for San Diego's water needs

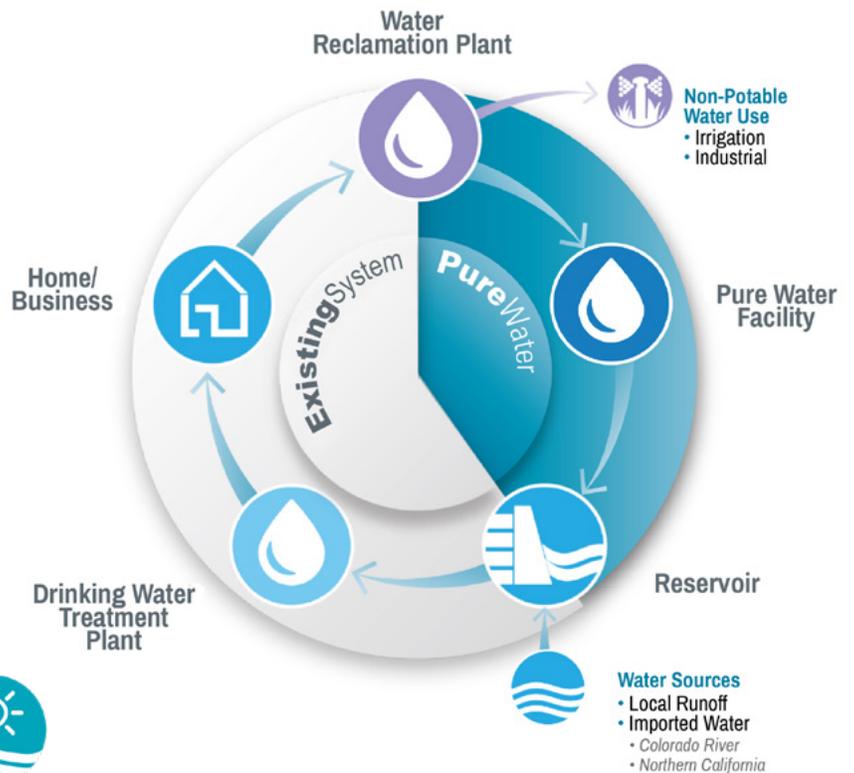


Why is Pure Water San Diego being implemented?

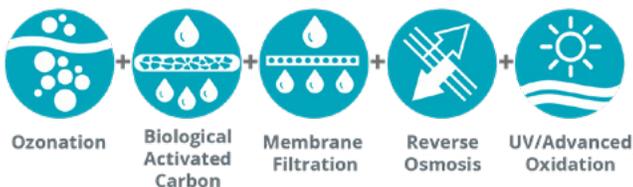
San Diego relies on importing 85% of its water supply from the Colorado River and Northern California Bay Delta. The cost of this imported water has tripled in the last 15 years and continues to rise. With limited local control over its water supply, the City of San Diego is more vulnerable to droughts, climate change and natural disasters.

How Does the Pure Water Program Work?

With San Diego's existing water system, only 8% of the wastewater leaving homes and businesses is recycled; the rest is treated and discharged into the ocean. The Pure Water Program transforms the City's water system into a complete water cycle that maximizes our use of the world's most precious resource—water.



What are the Steps of the Water Purification Process?



Since June 2011, the City has produced 1 million gallons of purified water every day at its Pure Water Demonstration Facility.

More than 50,000 water quality tests have confirmed the water is safe and meets all federal and state drinking water standards.

Did you Know?



The Pure Water Program is the largest integrated infrastructure program the City of San Diego has undertaken and will be the first reservoir augmentation project in California.

2021 Milestones

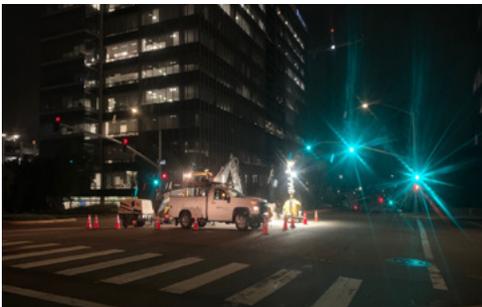
APRIL

Construction on the [North City Pure Water Facility & Pump Station](#) begins



JUNE

Construction on the [Morena Pump Station](#), [Morena Northern Pipelines and Tunnels](#) and [North City Pure Water Pipeline](#) begins



AUGUST

Phase 1 [Media Event](#) & Water Infrastructure Finance and Innovation Act (WIFIA) loan; North City Water Reclamation Plant Expansion begins

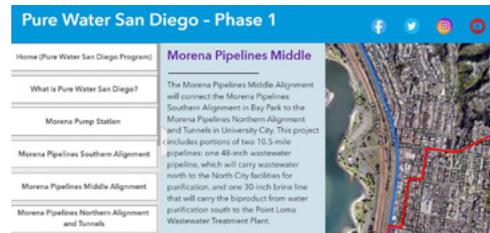


DECEMBER

[North City Water Reclamation Plant Flow Equalization Basin](#) construction begins

MAY

New Phase 1 North City construction [website launches](#)



JULY

Meetings held for the [Phase 1 North City Community Working Groups](#)



SEPTEMBER

[Metropolitan Biosolids Center Improvements](#) project construction begins





Phase 1 North City Construction

Phase 1 North City includes the facilities shown below.



A total of **11 construction contracts** comprise Phase 1 North City construction. The sum of the awards for these contracts represents over \$1 billion in Phase 1 North City construction.

Phase 1 North City Pure Water Project (listed by start date)	Start Date	Expected Completion Date
Early Works at the North City Water Reclamation Plant	2019	Completed
North City Pure Water Facility and Pump Station	April 2021	2025
North City Pure Water Pipeline	June 2021	2025
Morena Pipelines Northern Alignment and Tunnels	June 2021	2024
Morena Pump Station	June 2021	2025
North City Water Reclamation Plant Expansion	August 2021	2025
Metropolitan Biosolids Center Improvements	September 2021	2025
North City Water Reclamation Plant Flow Equalization Basin	December 2021	2023
Miramar Reservoir Pump Station Improvements*	2022	2024
Morena Pipelines Middle Alignment*	2022	2024
Morena Pipelines Southern Alignment*	2022	2024

* There are three construction packages remaining to be advertised for bid by the end of the year.



Phase 1 North City Construction

Here's a round-up of the seven active construction contracts that began construction in 2021 (by start date):

North City Pure Water Facility and Pump Station

(Construction began in April 2021)

This project is the cornerstone project of Phase 1 of Pure Water. Upon completion, the facility will produce 30 million gallons per day (mgd) of purified water, which will be conveyed by the Pump Station to Miramar Reservoir for storage. A significant amount of activity is underway with major excavation completed, concrete slabs and walls being poured, major pipelines and trench boxes installed and backfilled and the pipeline construction to connect to the North City Water Reclamation Plant beginning.



The North City Pure Water Facility project is making progress. This southwest aerial photo shows the foundation for the ozone building. (Sept. 2021)

North City Pure Water Pipeline

(Construction began in June 2021)

This project will convey 30 mgd of purified water to Miramar Reservoir for storage. The dechlorination facility will remove chlorine necessary for disinfection in the pipe from the purified water before it is delivered into the reservoir. In 2021, initial underground utility investigation work was performed.

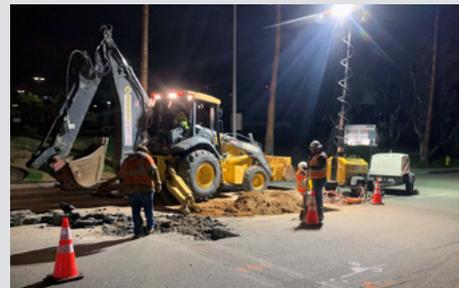


Map of the North City Pure Water Pipeline alignment.

Morena Pipelines Northern Alignment and Tunnels

(Construction began in June 2021)

This project will connect to the Morena Pipelines Middle Alignment to the south and the North City Water Reclamation Plant to the north. In 2021, initial field work including underground utility investigations was performed.



Workers began underground utility investigations in University City.

Morena Pump Station

(Construction began in June 2021)

This project will divert an average of 32 mgd of wastewater through the Morena Pipeline to the North City Water Reclamation Plant for treatment and the Pure Water Facility for purification. Since the project kicked off this year, the existing structures were demolished at the project site on Custer Street and work on the foundation has started. Work is also ongoing on Friars Road between Napa Street and Sea World Drive.



Rendering of the Morena Pump Station project.



Phase 1 North City Construction

North City Water Reclamation Plant Expansion

(Construction began in August 2021)

While crews are performing initial activities such as earth moving and site preparation, material and concrete deliveries are expected in the coming months. When completed, the plant's recycled water production will increase from 30 mgd to 52 mgd.



The North City Water Reclamation Plant is under construction with earth moving and site preparation. Seen here is an aerial shot looking north onto the site. (Nov. 2021)

Metropolitan Biosolids Center Improvements

(Construction began in September 2021)

To accommodate increased biosolids flows and loadings to the Metropolitan Biosolids Center due to the expansion at the North City Water Reclamation Plant, upgrades at Metropolitan Biosolids Center will be necessary. Most of the construction activity will take place on City-owned property, and initial work to rehabilitate and install new equipment has begun.



The Metropolitan Biosolids Center.

North City Water Reclamation Plant Flow Equalization Basin

(Construction began in December 2021)

The Flow Equalization Basin, which is in its initial construction stage, is being built on the North City Water Reclamation Plant project site and will regulate the peak wastewater flow rates so that water can be delivered at more manageable flow rates to the Metropolitan Biosolids Center for further treatment.



Rendering of the new Flow Equalization Basin.



2021 Working Group Meetings

A series of virtual meetings was held throughout July and early August 2021 for the four Phase 1 North City Community Working Groups. At the meetings, working group members were provided updates on the projects in their communities and introduced to the contractor teams, WA Rasic (North City Pure Water Pipeline), Shimmick Construction Company (North City Pure Water Facility), OHL USA (Morena Northern Pipelines and Tunnels), and Flatiron West (Morena Pump Station).

The working groups will be kept informed throughout construction, with additional meetings taking place as needed. Meeting summaries and PDFs of the meeting presentations are available for download on the [Phase 1 North City Working Group page](#).

Operations and Maintenance Readiness

The City of San Diego is continuing to implement its Operations and Maintenance Readiness Plan and prepare for the commissioning and operation of the Pure Water Program's North City facilities. One area of focus in 2021 has been to hire, onboard and train staff for the North City Pure Water Facility in alignment with the Hiring Plan Schedule.



Rendering of the North City Pure Water Facility

The Hiring Plan Schedule was developed in 2017 and updated in 2020. It identifies the year in which new operations and maintenance staff should be hired to support construction and commissioning and, subsequently, operate and maintain the facilities. The basic logic of the Hiring Plan Schedule is for senior maintenance staff to be brought on near the beginning of construction to observe how all the facility components (e.g., equipment, electrical systems, instrumentation and controls systems) are installed, so they can train subordinates and direct the more complex maintenance and repair efforts when the plant is operational. Senior operations staff are also brought on early in construction to complete their required training, obtain their Advanced Water Treatment certifications prior to plant start-up, help respond to contractor Requests for Information and observe the plant start-up activities.

Based on the Hiring Plan Schedule, the City recruited, hired and initiated onboarding and training for all the operations and maintenance positions approved for 2021, including:

- Pure Water Treatment Superintendent
- Senior Pure Water Operations Supervisor
- Plant Technician Supervisor
- Instrumentation & Controls Supervisor
- Plant Process Control Electrician Supervisor
- Plant Maintenance Coordinator

Operations and maintenance staff hiring will continue as planned over the next couple of years, with a goal to have North City Pure Water Facility operations and maintenance staff hired and onboarded in time for a 120-day start-up and testing period in late 2024.

Certification and Training

Advanced Water Treatment (AWT) certifications will be required for Pure Water Operations personnel prior to plant startup, with the required certification level based on their position. For instance, the Pure Water Treatment Superintendent is required to achieve AWT 5 certification before plant startup, while a Senior Pure Water Plant Operator is required to achieve AWT 3 certification.

The selected Pure Water Treatment Superintendent, John Carroll, has already achieved the required certification and is the first person in the nation to receive this certification. In November 2021, John was a panelist for an “Ask An AWT Certified Operator” webinar organized by the American Water Works Association (AWWA) and the California Water Environment Association (CWEA).



*John Carroll (R) pictured with
CWEA Past President Kevin Calderwood*

Based on feedback provided by the Superintendent and other City employees who have taken the AWT certification exam, the City identified gaps in its North City Pure Water Facility Operator classroom training. Therefore, the City collaborated with a

specialized consultant to augment the North City Pure Water Facility training to include the full AWT certification exam training content. The updated training materials will help enable and support the City’s operations staff to achieve AWT certification in the future.

Newly hired North City Pure Water Facility operations and maintenance staff are being onboarded and trained through the North City Pure Water Facility classroom and at the Pure Water North City Demonstration Facility. The Demonstration Facility has been an invaluable tool to help train staff on the treatment processes and maintenance needs that will be required for the full-scale North City Pure Water Facility.

Program Funding

The City has received, and continues to apply for, grants and loans from both the federal and state governments. Grants do not have to be repaid and loans must be repaid over time. There are grant funds allocated for both water and wastewater project components.

On the federal level in August 2021, the City secured a second low-interest Water Infrastructure Finance and Innovation Act (WIFIA) loan from the U.S. Environmental Protection Agency for \$119.5 million with an interest rate of 1.82%, bringing the amount of federal funding to a total of \$733.5 million for the Pure Water Program Phase 1 North City. Additionally in 2021, the U.S. Bureau of Reclamation awarded \$3.5 million in grant funding to the Pure Water Program, bringing the total award from the agency to date to \$28 million.

On the state level the California State Budget Act of 2021 allocated \$50 million for the construction of the Pure Water Program. Additionally, the City applied for the Drinking Water and Clean Water State Revolving Fund (SRF) low-interest loans from the State Water Resources Control Board for a total of almost \$667 million. The City is in active negotiations with the State and expects to finalize the Drinking Water and Clean Water SRF loans in calendar year 2022.



Regulatory and Environmental Progress

POINT LOMA WASTEWATER TREATMENT PLANT PERMIT

The Point Loma Wastewater Treatment Plant continues to operate under a modified permit to provide enhanced primary treatment. On June 15, 2021, the U.S. House of Representatives passed the Ocean Pollution Reduction Act II (H.R. 587), which proposes modifying the permitting requirements for discharge of pollutants from the Point Loma Wastewater Treatment Plant. The bill contains required milestones in line with projected reductions in both the treated discharges from the Point Loma Wastewater Treatment Plant and the production of potable water expected with Phase 1 and Phase 2 of the Pure Water Program. The legislation is now before the U.S. Senate Committee on Environment and Public Works for further consideration.



The Point Loma Wastewater Treatment Plant

MIRAMAR RESERVOIR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT AND WATER SUPPLY PERMIT

The Miramar Reservoir National Pollutant Discharge Elimination System (NPDES) permit, which allows purified water to be released to Miramar Reservoir, was formally adopted by the Regional Water Quality Control Board in May 2020. That master permit established a schedule for several conditions that must be satisfied before water can be released to Miramar Reservoir. In 2021, work continued on the Pure Water Facility Operations Plan and a program to establish any additional limits on discharges to the collection system to protect the Pure Water facilities and reservoir water quality. The plan outline for the operational start up and release to Miramar Reservoir was reviewed with the regulators and preparation of the plan is underway.

The City continues to work with the State Division of Drinking Water on updating and reissuing the City's Water Supply Permit, which encompasses all the City's water sources, its three drinking water treatment plants and the entire drinking water distribution system. For purified water to be used as a water source, it must be approved in the Water Supply Permit. In 2021, several inspections of drinking water facilities were conducted by the Division of Drinking Water and the City continues to support its efforts to prepare the new permit prior to purified water being released to Miramar Reservoir.



Miramar Reservoir, photo by MrGALL



Regulatory and Environmental Progress

CALIFORNIA POTABLE REUSE REGULATIONS UPDATE

In 2021, the State Water Board released an addendum to its proposed framework for regulating Direct Potable Reuse in California that contained additional specific requirements. These Direct Potable Reuse criteria must be adopted by December 31, 2023. Unlike Indirect Potable Reuse regulations that govern Phase 1 efforts by providing credit for the surface water reservoir that serves as an environmental buffer, Direct Potable Reuse governs projects that do not have an approved buffer.

The City is considering discharging purified water to Murray Reservoir in the Phase 2 Central Area. Although this represents a discharge to a surface water reservoir prior to additional treatment (similar to Phase 1), the volume in Murray Reservoir is too small to meet the Indirect Potable Reuse buffer requirements. Therefore, it would likely be subject to the forthcoming Direct Potable Reuse regulations.

The Pure Water team continues to hold meetings with the State Division of Drinking Water and the Regional Water Resources Control Board staff every two months to review deliverables that satisfy permit conditions for Pure Water and to review concepts prepared by the Pure Water team for Phase 2 Central Area. As with North City, the City is working closely with the regulators to provide a practical example of the implications of the potential Direct Potable Reuse regulations on project implementation.

PHASE 1 NORTH CITY PROJECTS ENVIRONMENTAL COMPLIANCE

In accordance with the Mitigation, Monitoring and Reporting Program adopted as part of the Final Environmental Impact Report/Environmental Impact Statement for Phase 1 North City, biological, archaeological and paleontological monitoring were conducted for all active North City construction packages.

The SANDER Vernal Pool and Upland Mitigation Site, which offsets impacts to sensitive biological resources at the North City Pure Water Facility, is in year one of a seven-year maintenance and monitoring program. In 2021, ongoing maintenance included fence repair, weed and debris removal, irrigation and supplemental planting and seeding. Newly enhanced and restored vernal pools are ponding as designed and have been documented to support listed vernal pool species. The Pueblo South Native Grassland Mitigation Creation Site is in the second year of a grow-kill program to eliminate weeds. In 2021, the site had significant seedling growth of native tar plant (*Dianandra* syn. *Hemizonia fasciculata*), doveweed (*Eremocarpus segiterus*) as well as scattered native needle grasses (*Stipa pulchra* and *Stipa lepida*). The site was hydroseeded using a native grassland seed mix in November 2021.

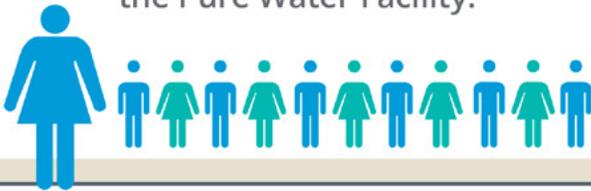


Cumulative Outreach Program Metrics

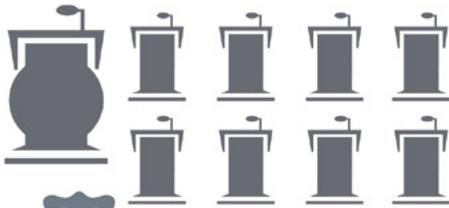


Public Outreach Program Highlights

More than **18,700** people have toured the Pure Water Facility.



906
Community Presentations



284
Community Events

435
Stakeholder Interviews



4,921
Support Pledges from San Diegans



189,737 website visits





2021 Virtual Outreach Metrics



2021 Virtual Outreach & Engagement

more than **6,200**
views of the Virtual Tour of the
Pure Water Demonstration Facility.



Virtual Presentations to more than
1,500 **Community members**



32,487
website visits

18
Stakeholder
Interviews



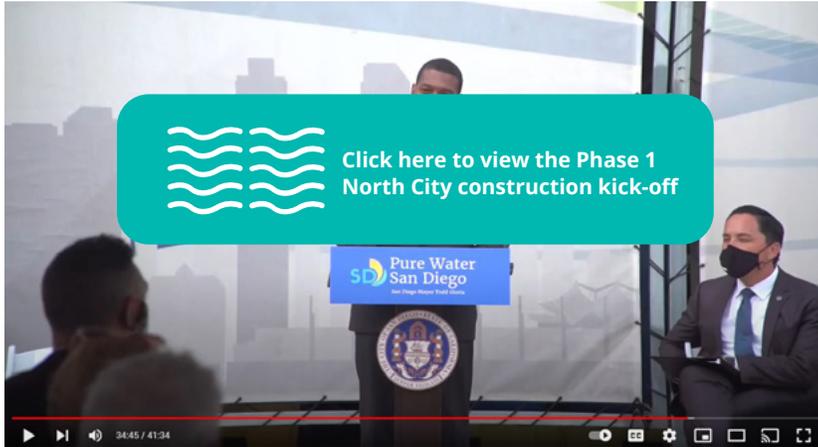
More than **30**
support pledges
from San Diegans



6 
youth lesson plans/toolkits
distributed to local educators

PHASE 1 NORTH CITY CONSTRUCTION KICK-OFF

On August 20, 2021, San Diego Mayor Todd Gloria and other city, state and federal leaders officially kicked off Phase 1 North City construction at the Pure Water Demonstration Facility. The event commemorated the start of the largest-ever infrastructure project in the City’s history, with 11 different pipeline and facility construction contracts. **Watch the full kick-off video:**



CONSTRUCTION OUTREACH

Community outreach remains an important part of the Pure Water Program. In 2021, with the start of Phase 1 North City construction, the Pure Water outreach team focused heavily on construction outreach. Through online channels, the team sent email construction notices. Residents and businesses near construction areas also received information on upcoming construction straight to their mailbox via direct mail campaigns.

To help ensure that residents and businesses who are impacted by construction are aware of the nearby work and have the necessary information about what to expect, the Pure Water outreach team also went door-to-door to drop off doorhangers and perform in-person field visits. Additionally, the outreach team incorporated new ways to inquire and learn more about the Pure Water projects with the addition of dedicated phone lines.

Pure Water Project Contact Information	
Community	Phone
Morena, Bay Park and Clairemont	833-MOR-PWSD (833-667-7973)
University City and Eastgate Mall	833-UTC-PWSD (833-882-7973)
Scripps Ranch and Miramar	833-MIR-PWSD (833-647-7973)

Community Outreach

PRESENTATIONS

In 2021, Pure Water team members gave presentations to a variety of organizations, community groups and planning groups like the University City Community Association, San Diego Chamber of Commerce Sustainability and Industry Committee, City Planning Commission, Scripps Ranch Planning Group and more. During these presentations, a wide range of topics were covered, including program regulations, project maps, wastewater treatment process, history of recycling drinking water, project updates and engineering.

VIRTUAL TOUR

The Pure Water Virtual Tour remained an important way to showcase the Demonstration Facility in 2021. Public tours were not offered in 2021 due to the COVID-19 pandemic and Phase 1 construction activities. The virtual tour provides an up-close look at the water purification technology.



WEBSITE AND MATERIALS

Pure Water materials were refreshed in 2021. As part of program outreach, educational materials include presentations, activity pages, teacher toolkits and more.

As part of the updates, a new [Phase 1 North City interactive map](#) was developed. On the map, you can see a list of Phase 1 North City projects, track where they are located, read the latest project and road closure information and more. Future additions to the map will include the incorporation of a live road closure page, where users can quickly find information on road closures, detours and impact-related information by project.

SCHOOL PARTNERSHIPS

In 2021, the Pure Water team continued partnerships with UC San Diego, Hoover High School's Sustainable Academy of Building and Engineering (SABE) program and Marston Middle School.

CONFERENCE PARTICIPATION

The Pure Water team regularly identifies water industry conferences and trade shows where the program can be profiled. Participating in conferences raises public awareness of the program and shares lessons learned with other water agencies and industry groups. In 2021, members of the Pure Water team presented at conferences including WateReuse California, American Water Works Association Virtual Summit, Nevada Water Resources Conference, California Water Environment Association AC21 and others.

Engineering and Process Optimization Support Studies

NORTH CITY PURE WATER FACILITY RESEARCH

The City continues to operate and maintain the Pure Water Demonstration Facility, a one million gallon per day plant that comprises the advanced treatment processes that will be used in the North City Pure Water Facility. Three studies that had been suspended during the Early Works construction were resumed in 2021.

The Pure Water team is managing a U.S. Bureau of Reclamation grant-funded research project that is evaluating the impact of bromide on reverse osmosis membrane oxidation and compliance with water quality regulations. Testing began in July 2021 to evaluate effectiveness of selected control measures to minimize disinfection by-products and bromate formation, as well as determine reverse osmosis membrane performance under different operating conditions. This study is anticipated to be completed in December 2022.



Demonstration Facility: A City team member and Pure Water consultant working together at the Demonstration Plant taking a sample of Pure Water for testing purposes.

Additional pathogen monitoring was performed to expand the data that can be evaluated to achieve additional treatment credit above what regulators have currently approved for the Phase 1 North City facilities. Additional credit would recognize the added levels of protection provided during treatment and would provide flexibility for treatment operations for the Phase 1 North City facilities. The City is currently evaluating the results with an Independent Advisory Panel before submitting the results to the State Division of Drinking Water.

Finally, a North City Water Reclamation Plant Optimization study that began in the fall of 2019 was completed in spring 2021. The study analyzed treatment performance data associated with potential process upsets in secondary treatment at the North City Water Reclamation Plant, recommended monitoring protocols and developed a prototype tool for process optimization using data.



Phase 2 Planning

PURE WATER PHASE 2 CENTRAL AREA PLANNING

The Pure Water team is underway on high-level Phase 2 Central Area planning activities, including working with the Independent Advisory Panel and continuing planning for the Phase 2 Central Area Alternatives Refinement effort as well as regulatory preparation. Upon completion of the planning phase, the project will be defined for the preliminary design and environmental review processes, which are scheduled to begin in 2023.

INDEPENDENT ADVISORY PANEL

In 2004, the National Water Research Institute formed the Independent Advisory Panel, comprised of nine independent, world-renowned experts from academia and professional scientific and engineering fields. As part of the development of the Phase 1 North City, the Independent Advisory Panel was convened to provide specialized evaluation of the technical, scientific and regulatory aspects. The current panel continues to work with the City team to evaluate how to best implement the Pure Water Program in a way that is both protective of public health and the natural environment and is cost-efficient. During Phase 2 Central Area planning and design, the Independent Advisory Panel will continue to provide similar guidance.

CENTRAL AREA SMALL-SCALE FACILITY

As with Phase 1 North City, a new small-scale facility is a regulatory requirement for Phase 2 Central Area, since it will treat water from a different area and use slightly different treatment processes due to more constrained facility sites. The Pure Water team developed a treatment process concept for the facility, which will demonstrate the performance of water reclamation and purified water treatment processes. In 2021, the Pure Water team decided to construct the small-scale facility at the Point Loma Wastewater Treatment Plant. The design for the facility has begun.

ALTERNATIVES REFINEMENT AND RESERVOIR SELECTION

As part of Phase 2 Central Area planning, the Pure Water team has been collaborating with the Metro Wastewater Joint Powers Authority (JPA), which is a coalition of the 12 municipalities and special districts that share the use of the City of San Diego's wastewater system. As the program proceeds, key decisions will be presented to the JPA for their input.

The major remaining decision related to Phase 2 Central Area is whether to use Lake Murray or San Vicente Reservoir as the discharge location for Phase 2 Central Area purified water.



Looking into 2022, over \$1 billion in construction will be fully underway for the Phase 1 North City Projects and more technical information will be gathered to enable Phase 2 Central Area implementation.



Pure Water
San Diego

Pure Water San Diego Program

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The City of San Diego continues to provide safe, high quality drinking water for its customers each and every day.



@PureWaterSD

Visit purewatersd.org
to learn more about the
Pure Water Program.