The City of SAN DIEGO

Completing our Water Cycle, Securing our Future

Pure Water San Diego Program

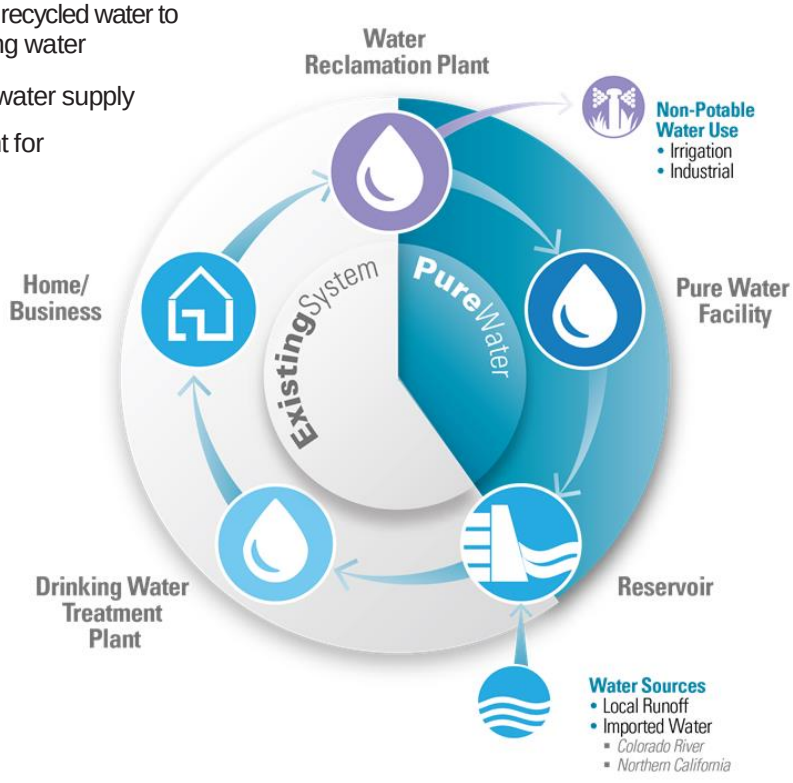
Why is **Pure Water San Diego** Being Implemented?

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.

What is **Pure Water San Diego?**

Pure Water San Diego is a phased, multi-year program that will provide 1/3 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



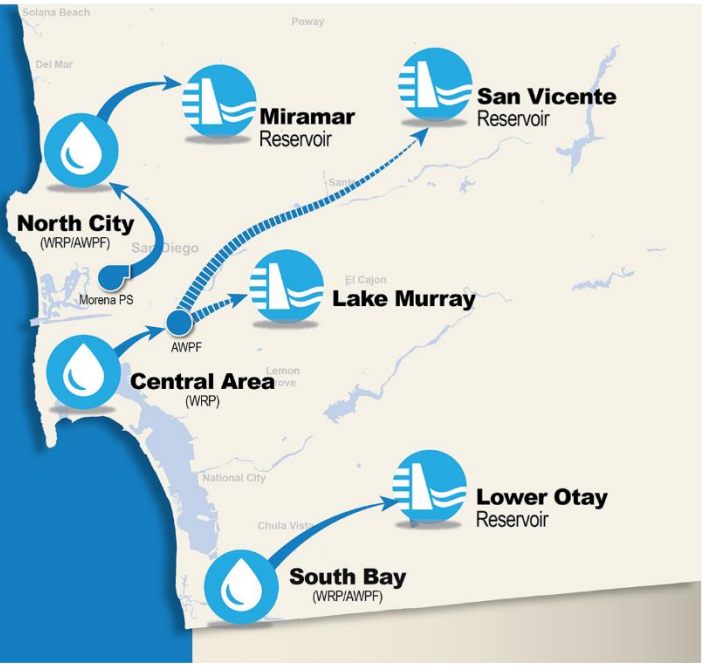
How Does the **Pure Water Program Work?**

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.

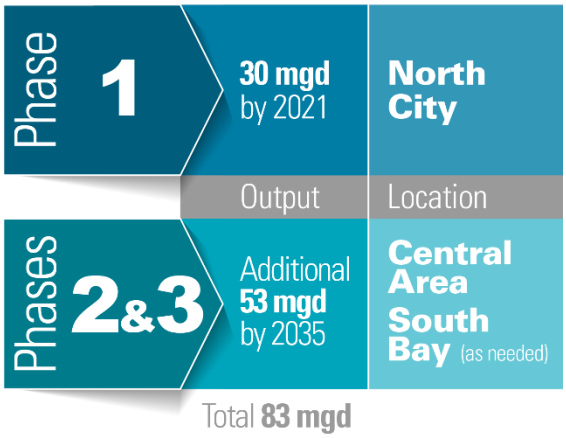
Where is the **Pure Water** Program?

The Pure Water facilities will be located throughout the City of San Diego and are grouped into three geographical areas to facilitate implementation: North City, Central Area and South Bay (shown on map).

Construction on the Phase 1 North City projects will start in 2019.

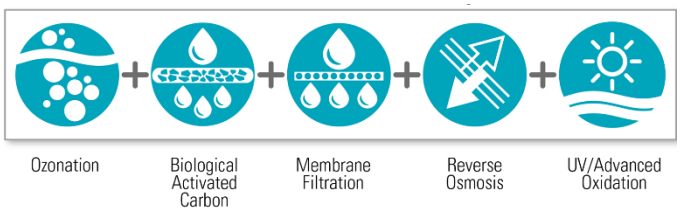


When will the **New Facilities** be Built?



**mgd = million gallons per day*

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 demonstration Pure Water Facility.

More than 30,000 water quality tests have confirmed the water is safe and meets all federal and state drinking water standards.

Local **residents**, community **groups**, environmental **organizations** and local **businesses** support the **Pure Water Program.**

Do you **support Pure Water?** Like us, follow us:

@PureWaterSD

Want to Know **More?**

Visit www.PureWaterSD.org to sign up for a free tour of the Pure Water Facility or request a presentation for your organization.

Pure Water San Diego

The City of SAN DIEGO

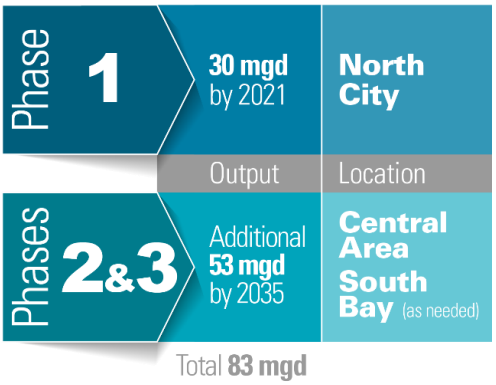
Completing our Water Cycle, Securing our Future

Pure Water San Diego Phase 1 Projects

What is Pure Water San Diego?

Pure Water San Diego is the City of San Diego's (City) program that will provide one-third of San Diego's water supply locally by 2035. The Pure Water Program will include a system of treatment facilities, pump stations and pipelines that will be constructed in multiple phases and will:

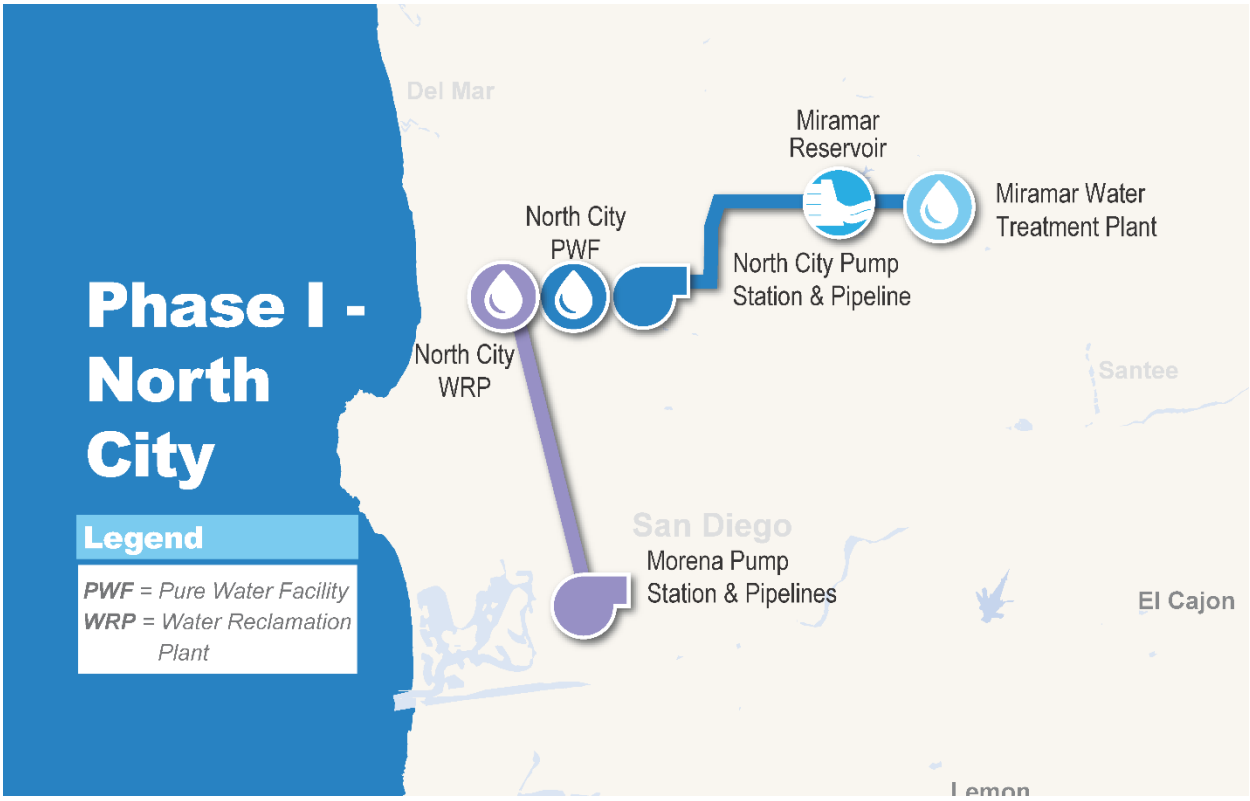
- Use proven technology to clean recycled water to produce safe, high-quality water
- Provide a reliable, sustainable, water supply; and
- Offer a cost-effective investment for San Diego's water needs.



**mgd = million gallons per day*

What does Phase 1 Include?

Phase 1 - North City is comprised of several projects that will deliver 30 million gallons per day (mgd) of purified water to Miramar Reservoir. The purified water will blend with the City's imported and local water sources and be treated again at the Miramar Drinking Water Treatment Plant and distributed to the public. The projects include the Morena Pump Station and Pipelines, the North City Water Reclamation Plant Expansion, the North City Pure Water Facility, and the North City Pure Water Pump Station and Pipeline. A detailed map of the project locations can be viewed online at www.purewatersd.org/phase1.



Morena Pump Station and Pipelines

This project will transport approximately 32 mgd of wastewater to the North City Water Reclamation Plant (NCWRP), where it will be treated before being sent to the new North City Pure Water Facility (NCPWF) for further purification. Construction will include a new pump station on Sherman Street and two parallel 10.7-mile-long wastewater pipelines. One wastewater pipeline will transport wastewater to the NCWRP, while the other will transport salt and contaminants removed during the water purification process at the NCPWF to the Point Loma Wastewater Treatment Plant. The wastewater pipelines will start at Sherman Street, follow West Morena Boulevard to Clairemont Drive, continue to Genesee Avenue and go through University City to the NCWRP on Eastgate Mall. This project will also include the construction of two approximately 3.5-mile water pipelines, a 16-inch water distribution pipeline and a 36-inch water transmission pipeline, which will run parallel to the wastewater pipelines along West Morena Boulevard and Morena Boulevard.

Current Status: In Design
Construction: 2019 – 2021

North City Water Reclamation Plant Expansion

This project will increase the amount of recycled water the NCWRP produces to meet the needs of both the recycled water system and the new NCPWF. The NCWRP is located on Eastgate Mall and treats wastewater to recycled water standards for irrigation and industrial uses. The plant capacity would increase from 30 mgd to 52 mgd. A new pump station located at the NCWRP will convey up to 42 mgd of recycled water to the new NCPWF across the street for further purification.

Current Status: In Design
Construction: 2019 – 2021

North City Pure Water Facility

A new Pure Water Facility will be built on Eastgate Mall across the street from the existing NCWRP to clean the recycled water further to produce 30 mgd of safe, high-quality water that meets all state and federal drinking water standards. The facility will use the proven five-step water purification process of ozonation, biological activated carbon filters, membrane filtration, reverse osmosis and ultraviolet disinfection with advanced oxidation.

Current Status: In Design
Construction: 2019 – 2021

North City Pure Water Pump Station and Pipeline

This project will transport purified water produced at the NCPWF to Miramar Reservoir. A new pump station will be constructed next to the NCPWF on Eastgate Mall along with an 8.4-mile pipeline that will convey approximately 30 mgd of purified water to Miramar Reservoir. The pipeline will start on Eastgate Mall, follow Miramar Road, and continue through Scripps Ranch and end in the Miramar Reservoir.

Current Status: In Design
Construction: 2019 – 2021

Local **residents**, community **groups**, environmental **organizations** and local **businesses** support the **Pure Water Program.**

Do you **support Pure Water?** Like us, follow us:

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Want to Know **More?**

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Pure Water San Diego

The City of SAN DIEGO



Completing our Water Cycle, Securing our Future

Pure Water San Diego FAQ

What is Pure Water San Diego?

Pure Water San Diego is the City's phased, multi-year program that will provide one-third 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.

What are the steps to purify recycled water?

The water purification process includes five steps: ozonation, biological activated carbon filters, membrane filtration, reverse osmosis, and ultraviolet disinfection with advanced oxidation.

How was it determined that purifying recycled water is safe?

The City conducted a demonstration project (2009-2013) that confirmed the purified water meets all federal and state drinking water standards.

During a one-year testing period, more than 9,000 laboratory tests were conducted at the City's 1-million-gallon-per-day test facility on 342 chemical and microbial constituents and water quality parameters. To date, more than 30,000 tests have been conducted, and the Division of Drinking Water and the San Diego Water Board support the City's plan to blend the purified water with imported water supplies in a local reservoir.

Are pharmaceuticals and personal care products removed in the water purification process?

Yes. The presence of pharmaceuticals and personal care products are monitored at every step.

Results show the reverse osmosis and advanced oxidation processes are particularly effective at removing pharmaceuticals and personal care products. All test results showed the levels were well below EPA Health Reference levels or at non-detection levels.

When will water purification facilities be built? When will the water be part of the drinking water supply?

An initial 30-million-gallon-per-day water purification facility is scheduled to come online in 2021. This facility will be located across the street from the North City Water Reclamation Plant, and the purified water produced will be piped to the Miramar Reservoir to blend with San Diego's imported water sources. From there, the blended water will be cleaned again at a drinking water plant before being sent to our taps.

By 2035, the City will produce 83 million gallons of purified water every day, which is equal to one-third of San Diego's future water supply needs. At full build out, the purified water will be distributed to all communities in the City of San Diego.

Why has the City moved forward with the Pure Water Program instead of other options like desalination?

From 2004 to 2006, the City conducted a Water Reuse Study that included a public participation process. The study determined that water purification with reservoir augmentation was the preferred option for the City of San Diego. The City also conducted a Recycled Water Study and a Water Purification Demonstration Project to determine that the project was feasible and cost effective for San Diego. The reports for each of these studies can be found at purewatersd.org/reports.

What is the cost of purified water?

The cost is estimated to be $1,700 to $1,900 per acre-foot. This equates to less than one penny per gallon. With the current cost of imported water ($1,200 to $1,400) expected to double in the next ten years, water purification will ultimately be a more cost-effective option.

How will purified water affect the quality of water in the Miramar Reservoir?

The addition of the purified water to the Miramar Reservoir will meet all regulatory requirements for dilution in the reservoir. It will not negatively affect the reservoir's water quality.

Is the Pure Water Program "toilet to tap"?

"Toilet to tap" does not accurately describe the water purification process. Water goes through numerous treatment steps and is subject to strict testing requirements before it would ever return to drinking water taps. In California, all forms of water are highly regulated and monitored to ensure safety. Since there is no new water on Earth, all water goes through a natural cycle and is essentially recycled water before it is treated and tested and then returned to homes and businesses as drinking water.

How does water purification compare with desalination?

Desalination is an important part of San Diego's water portfolio. The San Diego County Water Authority (SDCWA) operates a 50-million-gallon-per-day desalination plant in Carlsbad that accounts for seven percent of the region's water supply.

In comparison to the Pure Water Program, it takes almost 50 percent more energy to desalinate ocean water due to its high salt content. Similarly, desalination produces 46 percent more greenhouse gas emissions than the Pure Water Program. According to SDCWA's website, the cost for desalinated water is $2,131 to $2,367 per acre-foot.

How much water do San Diegans use per day?

San Diegans use approximately 180 million gallons of water per day. Individually, San Diegans use an average of 65 gallons per day (most of which is for outdoor/irrigation purposes).

What other places have implemented water purification projects?

The multi-barrier water purification process has already been proven to protect public health. The Orange County Groundwater Replenishment System has successfully used a similar water purification process to San Diego since 2008. Other places in various stages of implementing projects include Singapore, Australia, Virginia, Texas and numerous other California cities.

How does the Point Loma Wastewater Treatment Plant fit in with the Pure Water Program?

Point Loma is capable of treating 240 million gallons of wastewater per day. The Federal Clean Water Act requires wastewater treatment plants treat to secondary treatment level; however, San Diego has a permit that allows the City to treat to advanced primary level. Upgrading the plant to secondary standards would cost $1.8 billion. Investing in the Pure Water Program and seeking federal legislation to allow San Diego to meet modified secondary standards would eliminate the necessity for costly upgrades to Point Loma and would decrease the amount of water that is discharged to the ocean.

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Want to Know **More?**

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Pure Water San Diego

Pure Water San Diego

INSIDE:

THE PROGRAM

Pure Water San Diego (Pure Water) is a phased, multi-year program that uses proven technology to produce a safe, reliable and sustainable water supply for the City of San Diego (City). At full implementation in 2035, Pure Water will provide 1/3 of San Diego's water supply locally and reduce the City's ocean wastewater discharges by more than 50%.

Why

The City faces two considerable water challenges:

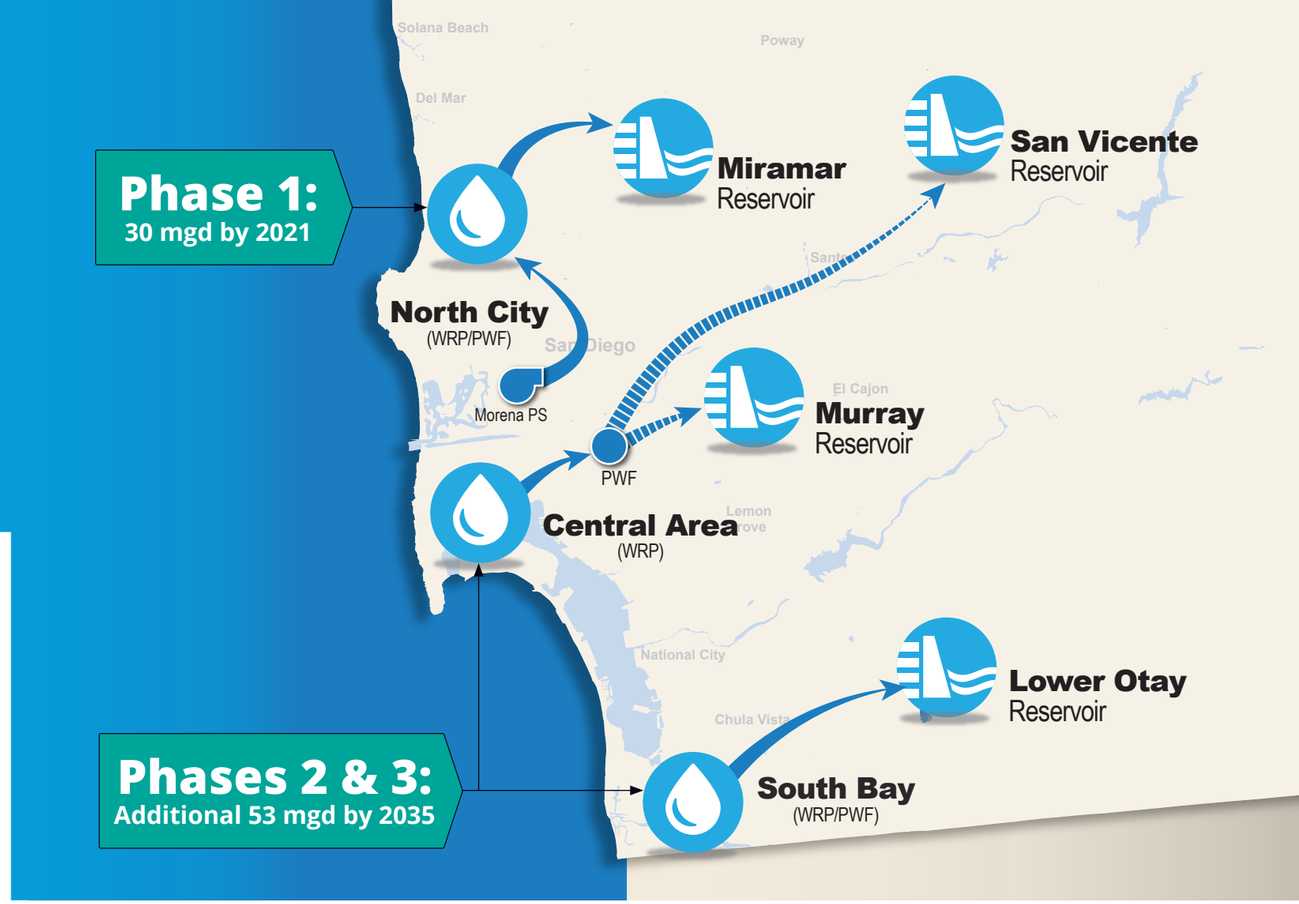
1. **Lack of Control Over its Water Supply:** 85% of the City's water must be imported due to limited local water sources. The cost of imported water has tripled in the last 15 years and the lack of local control leaves the City vulnerable to further cost increases, drought, climate change and natural disasters.

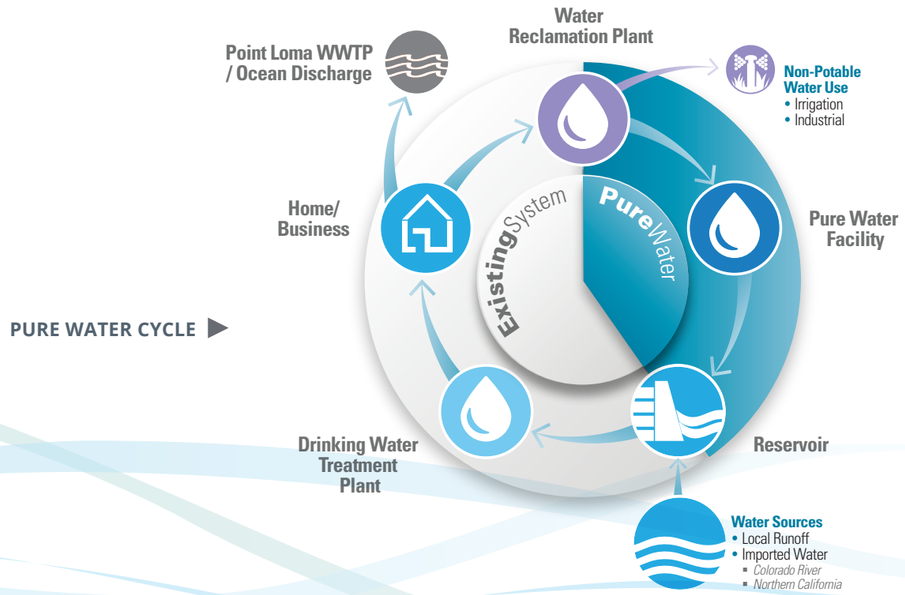
2. **Unique Regulatory Arrangement for Point Loma Wastewater Treatment Plant (Point Loma):** A demonstrated reduction in wastewater discharges is a vital part of securing the City's next permit to continue operating Point Loma. Without the permit, the City would need to spend $1.8 billion to convert Point Loma to secondary treatment, would produce no new water, and would not provide measurable improvement to the ocean environment.

How

With San Diego's existing water system, most of the wastewater leaving homes and businesses is treated at Point Loma and discharged into the ocean. The Pure Water Program will direct wastewater flows away from Point Loma and use cutting-edge treatment processes to produce safe, high-quality purified water. Here's how it will work:

1. **Wastewater** is treated to recycled water standards at an existing water reclamation plant (WRP)
2. **Recycled water** is treated at a Pure Water facility, resulting in purified water
3. **Purified water** is sent to an existing reservoir and blended with imported and local water supplies
4. **Water** is treated further at an existing drinking water treatment plant
5. **Potable water** is distributed to consumers via the City's existing water supply system





THE BENEFITS

The City is implementing Pure Water in order to maximize benefits to its residents and the environment. There are three primary types of benefits that Pure Water offers: **environmental, financial and reliability.**

Environmental

From decreasing ocean discharges to maximizing water reuse and renewable energy, Pure Water focuses on sustainability and environmental protection.

- **More than 50% reduction in ocean discharges will be realized by maximizing the amount of water that is reused**
- **One-third of the City's water supply will be produced, reducing reliance on imported water**
- **Renewable energy production will be leveraged to power the majority of Phase 1 facilities, supporting the City's Climate Action Plan targets**

For these reasons, San Diego's environmental community supports Pure Water, including San Diego Coastkeeper and Surfrider Foundation.

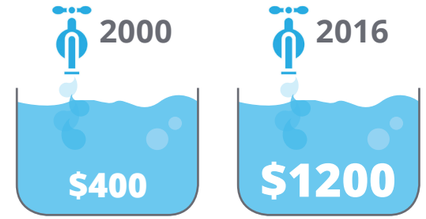
Financial

Pure Water will lessen the impacts of rising imported water costs and solves multiple challenges with one investment.

- **Imported water costs will be offset by lessening our reliance on imported water, which has tripled in cost over the last 15 years**
- **$1.8 billion in Point Loma upgrades will be avoided while creating a reliable water source**

Pure Water is supported by San Diego's business community, including the San Diego County Taxpayers Association and the San Diego Regional Chamber of Commerce.

IMPORTED WATER COST PER ACRE-FOOT ▶



Reliability

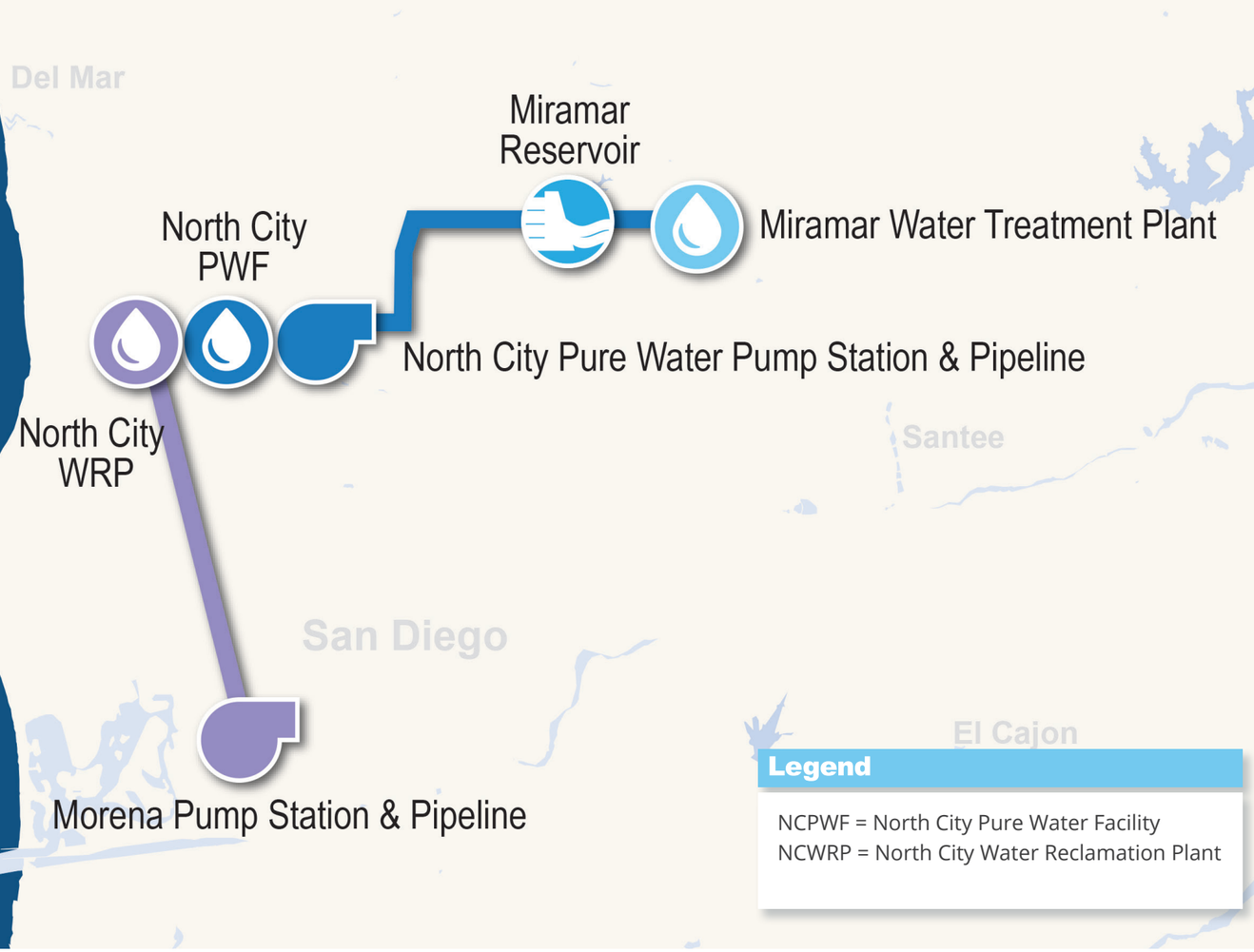
Pure Water is locally produced and controlled, which increases the City's water supply reliability.

- **Potential limitations of supplies due to natural disasters, such as earthquakes, will be lessened by local water production**
- **Availability of Pure Water, regardless of drought or rain, will make it a consistent water source for San Diego**
- **Locally produced and controlled, Pure Water will not be subject to heightened competition for limited water resources**

Nearly 75% of San Diegans support adding purified water to the drinking water supply.

PHASE 1 - North City Projects

will deliver 30 million gallons per day (mgd) of purified water to Miramar Reservoir. The purified water will blend with the City's imported and local water sources before it is treated again at the Miramar Drinking Water Treatment Plant and distributed to the public.



Morena Pump Station and Pipelines

The Morena Pump Station and Pipelines will divert approximately 32 mgd of wastewater from Point Loma to the existing North City Water Reclamation Plant (NCWRP), where it will be treated to recycled water standards. It will also transport salt and contaminants removed from the water at the North City Pure Water Facility (NCPWF) to Point Loma.

PROJECT COMPONENTS
- ▸ Pump station
- ▸ Two 11-mile-long pipelines

TIMELINE
Detailed Design: 2016 - 2018
Construction: 2019 - 2021

North City Water Reclamation Plant Expansion

To meet the needs of both the recycled water system and the NCPWF, the NCWRP plant capacity will be expanded from 30 mgd to 52 mgd. The NCWRP treats wastewater to recycled water standards for irrigation and industrial uses. A new pump station will convey up to 42 mgd of recycled water to the NCPWF across the street on Eastgate Mall for further purification.

PROJECT COMPONENTS
- ▸ Upgrades and expansion of NCWRP to increase plant capacity
- ▸ Pump station
- ▸ Conveyance pipeline

TIMELINE
Detailed Design: 2016 - 2018
Construction: 2019 - 2021

NORTH CITY Pure Water Facility

30% design rendering of the North City Pure Water Facility and Pump Station.

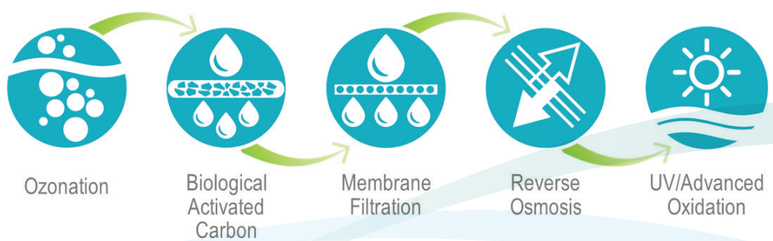
North City Pure Water Facility

The new NCPWF will be built on Eastgate Mall across the street from the existing NCWRP to clean the recycled water further to produce 30 mgd of safe, high-quality purified water. The NCPWF will use the proven five-step water purification process of ozonation, biological activated carbon filters, membrane filtration, reverse osmosis and ultraviolet disinfection with advanced oxidation.

PROJECT COMPONENTS
- ▸ 30-mgd NCPWF

TIMELINE
Detailed Design: 2016 - 2018
Construction: 2019 - 2021

FIVE-STEP WATER PURIFICATION PROCESS



North City Pure Water Pump Station and Pipeline

The North City Pure Water Pump Station and Pipeline will transport approximately 30 mgd of purified water produced at the NCPWF to Miramar Reservoir. The pipeline will start on Eastgate Mall, follow Miramar Road, and continue through Scripps Ranch and end in the Miramar Reservoir.

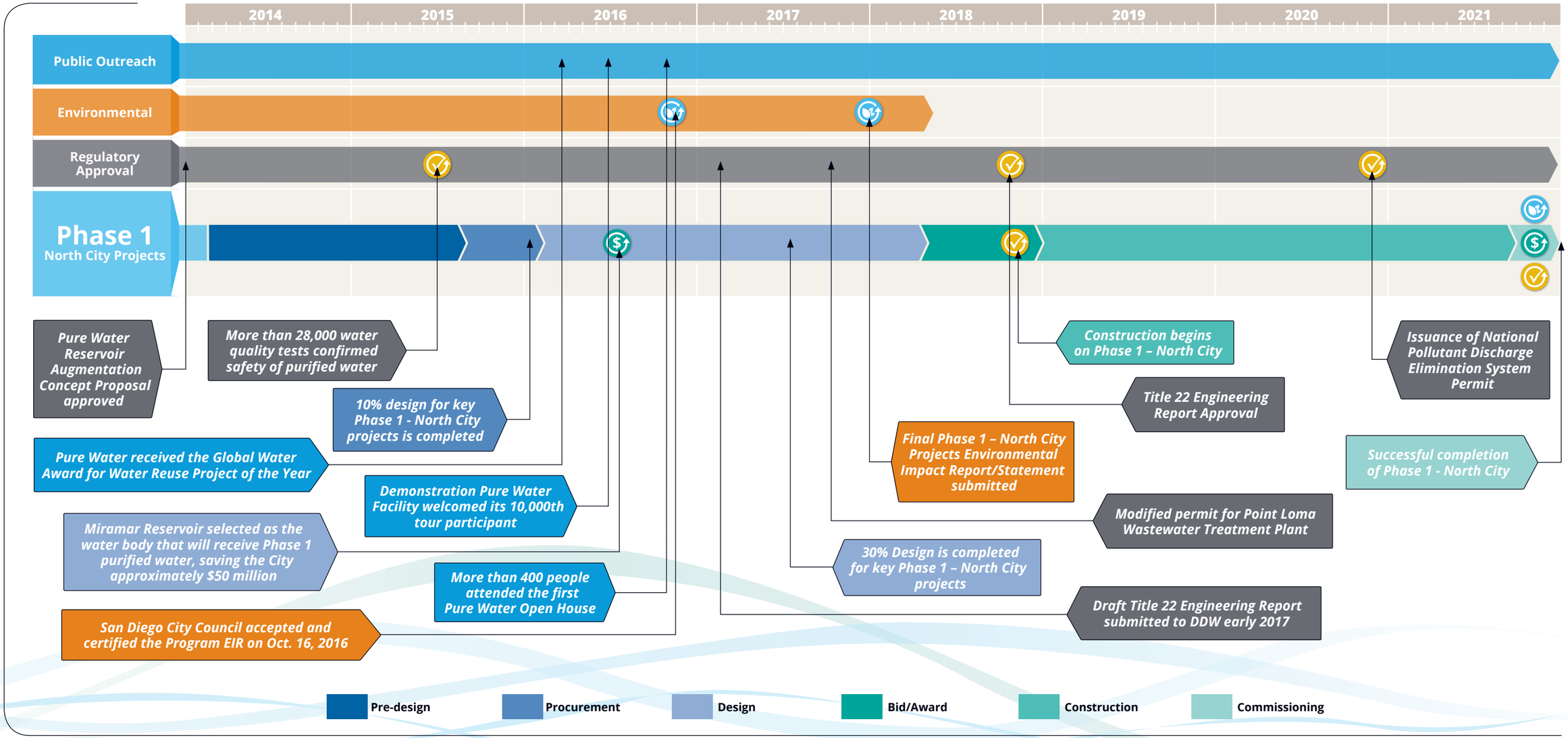
PROJECT COMPONENTS
- ▸ Pump station
- ▸ 8-mile pipeline

TIMELINE
Detailed Design: 2016 - 2018
Construction: 2018 - 2021

Photo by MrGall

THE PATH

The path to successful Phase 1 – North City completion is complex and relies on many different program elements, including effective public outreach, environmental and regulatory approvals and on-time completion of project delivery milestones. Nearly all delivery tasks are interconnected and the start date of one task often times depends on the completion of another task. **These interconnected tasks drive the Phase 1 schedule.**



The City of San Diego is committed to the Pure Water Program to ensure a reliable water future for San Diego residents.

Want to know more?

Visit **www.purewatersd.org** and sign up for a free tour of the demonstration Pure Water Facility.

Pure Water SD | PureWaterSD | @PureWaterSD | purewatersd

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Pure Water San Diego

02/2017
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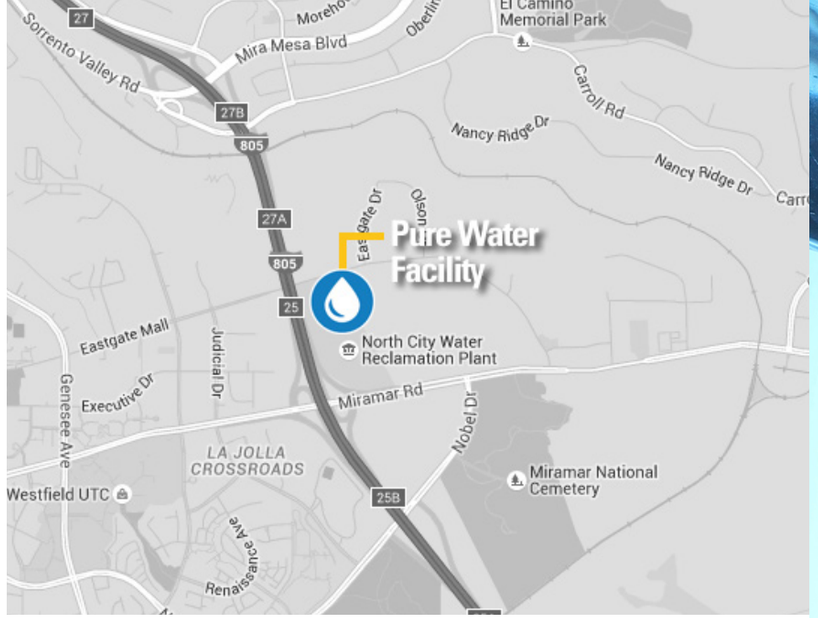
The North City Pure Water Facility is scheduled to produce 30 million gallons of purified water per day beginning in 2021. By 2035, San Diego will produce 83 million gallons of purified water per day, which is 1/3 of San Diego's future water supply needs. Learn more about the Pure Water San Diego Program at www.purewatersd.org.

Request a presentation about Pure Water San Diego for your group or organization at www.purewatersd.org/presentations or call (619) 533-7572.



Tasting is **Believing**

You are invited to tour the demonstration Pure Water Facility. During the free walking tour, you will see and learn about each step of the water purification process up close and have the opportunity to compare samples of purified water produced at the facility to tap, recycled and bottled water.

The demonstration Pure Water Facility is located at the North City Water Reclamation Plant at 4949 Eastgate Mall, San Diego, CA 92121. Register for a public tour at www.purewatersd.org/tours or call (619) 533-7572.

Want to **know more?**

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Pure Water San Diego ***PureWaterSD*** ***@PureWaterSD*** ***purewatersd***

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Pure Water San Diego

The City of SAN DIEGO

A look at the technology behind

Pure Water San Diego

A safe, reliable and sustainable drinking water supply for San Diego

Innovation for **San Diego's Water Future**

Pure Water San Diego is the City's phased, multi-year program that uses proven water purification technology to clean recycled water to produce safe, reliable, high-quality water. Pure Water will provide 1/3 of San Diego's water supply locally by 2035.

The Purification **Process**

The demonstration Pure Water Facility began operating in June 2011 and purifies one million gallons of recycled water every day. More than 28,000 water quality tests have confirmed the purified water produced meets all federal and state drinking water standards. The facility's water purification process uses a multi-barrier approach of consecutive treatment steps which work together to remove or destroy contaminants. Each barrier includes frequent and continuous water quality monitoring, and safeguards are built into the process to ensure public health protection. Here is a look at the process, which starts with recycled water that is clean enough to be used for irrigation and industrial purposes:

The **Process**

Barrier 1 **Ozonation**

Ozone is a gas produced by subjecting oxygen molecules to high electrical voltage. The ozone gas is infused into the water and the water travels through a long series of pipes, called the ozone contactor. The ozone destroys microorganisms and reacts with and breaks down contaminants in the water. Prior to the next step, the ozone is consumed and breaks down into oxygen.

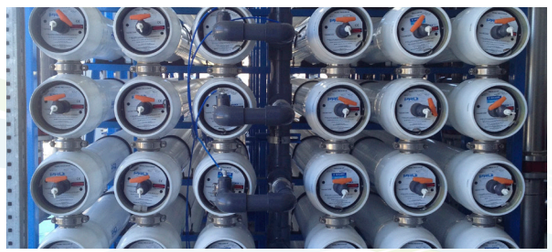
Barrier 2 **Biological Activated Carbon Filters**

Biological activated carbon (BAC) filters are filled with carbon granules covered in "aerobic" bacteria, which thrive in the presence of oxygen. The bacteria on the granules consume 30-50% of the organic matter (anything that is or was living). The "helpful" bacteria, along with any other bacteria still in the water, are removed in the next treatment step.

Barrier 3 **Membrane Filtration**

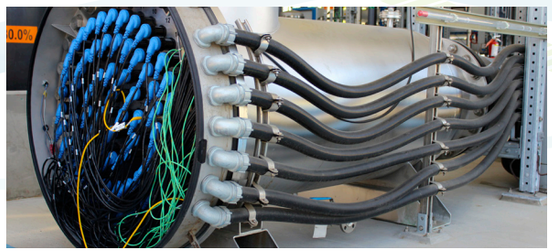
Membrane filtration uses canisters filled with straw-shaped hollow fibers that provide 99.99% removal of microscopic particles including suspended solids, bacteria and protozoa. The filters are tested daily to confirm their consistent removal of contaminants. The pores in the fibers are smaller than 1/300 the diameter of a human hair.

Barrier 4 **Reverse Osmosis**



Reverse osmosis uses high pressure to force water through spirally wound membranes that remove most salts and minerals, and 99% of dissolved organics, including pharmaceuticals and personal care products. This process is used by the bottled water industry.

Barrier 5 **Ultraviolet Disinfection/ Advanced Oxidation**



Inside a reactor are 72 ultraviolet lights that break down the DNA of any microbes or viruses. At the same time, advanced oxidation generates powerful reactive molecules that oxidize and destroy any trace contaminants that may remain in the water.

San Diego is among many innovative cities implementing water purification technology to provide a safe, reliable and sustainable drinking water supply.