



Los Angeles
Department of
Water & Power

An aerial photograph of the San Fernando Valley in Los Angeles, California. The image shows a dense residential and commercial area with a grid of streets and highways. The valley floor is partially obscured by thick, white clouds that appear to be rising from the ground. In the foreground, a rocky, green hillside slopes down towards the valley. The sky is a clear, bright blue with some light clouds on the horizon.

San Fernando Groundwater Basin Remediation Program

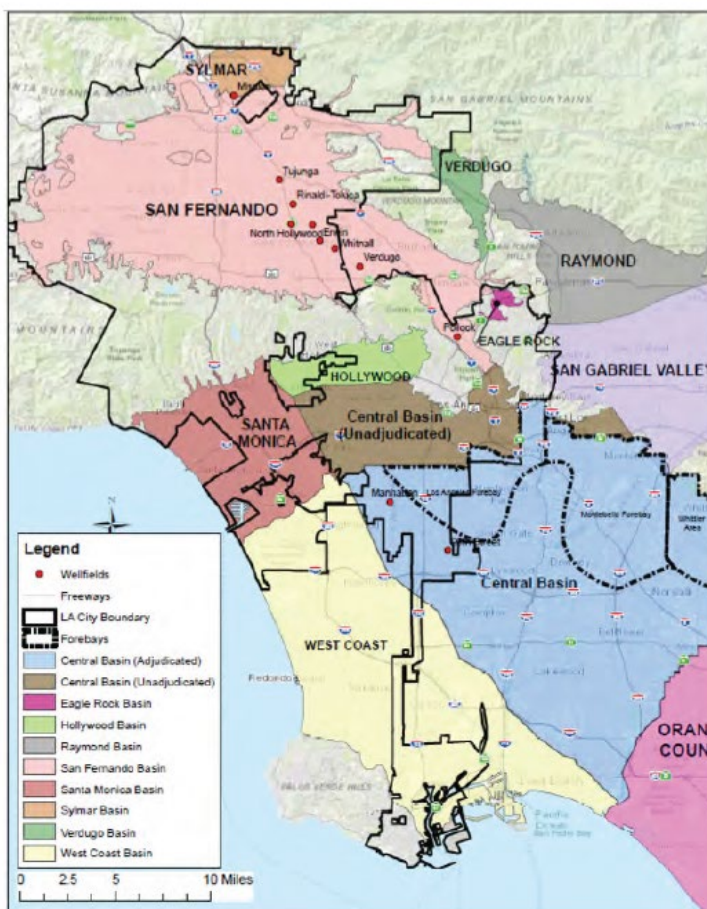
November 2021

The San Fernando Basin

Beneath the San Fernando Valley is the San Fernando Basin (SFB), a collection of aquifers made of gravel, sand and silt that store water underground. The SFB is one of the basins in the Upper Los Angeles River Area watershed and is naturally recharged with rain water from the valley and surrounding mountains. The SFB is a local water resource for the City of Los Angeles (City) and has provided about 10% of LADWP's total water supply (5-year average), but has the potential to provide up to 21% in average year conditions.

The City encompasses an area of 465 square miles with a population of nearly four million residents and an annual average water consumption of approximately 161 billion gallons. The daily average per capita water use is 106 gallons.

The City currently has a total of 115 groundwater wells configured into nine well fields in the SFB. The City, however, is only able to reliably operate 41 of its wells because of contamination caused by commercial, agricultural, and industrial operations. This has caused a 50% reduction in historical groundwater supply.



What is LADWP doing and why is it important?

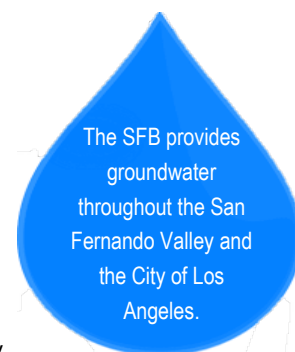
The separate response actions LADWP is planning and implementing in the SFB (collectively, in this document these discrete and distinct response actions are referred to as the Program) will help restore the beneficial uses of the SFB. The restoration of these beneficial uses will, in turn, enable LADWP to fully utilize its groundwater rights and the storage capacity of the SFB. The specific remediation objectives of the Program are to:

- ◆ Protect the public health and environment by reducing exposure to contaminants.
- ◆ Limit the migration of contaminants that prevent the beneficial use of groundwater.
- ◆ Remove contaminants from groundwater in the vicinity of the impacted well fields.
- ◆ Restore the beneficial use of the SFB and the capacity for its planned use.

The actions implemented through the Program will be transformative for the City as they would have the benefits of:

- ◆ Enhancing sustainability by reducing reliance on imported water.
- ◆ Strengthening water supply resiliency in case of a major earthquake.

In the event of a drought or an emergency, and as the City becomes less dependent on imported water, the availability of local groundwater becomes more important. The City is committed to developing programs to obtain 70% of water locally. (UWMP, 2020). Appropriately responding to the contamination and thereby restoring the historical capacity and full beneficial use of groundwater in the SFB will help the City meet its goals by supporting the ability to recharge and store recycled water and



stormwater in the aquifers of the SFB. LADWP's mission and purpose is to provide a safe supply of drinking water to the City.

What is CERCLA and the National Contingency Plan?

The Comprehensive Environmental Response, Compensation, and Liability Act, also known as CERCLA or Superfund, is an environmental law that the federal government enacted in 1980 that establishes processes for response actions, enforces accountability for potentially responsible parties, and promotes community involvement and long-term protectiveness, among other things.

LADWP is implementing its CERCLA response actions in the SFB in a manner that is consistent with the National Contingency Plan (NCP), which is a federal regulation that provides the organizational structure and procedures for responding to releases and threatened releases of hazardous substances, pollutants, and contaminants. Complying with the NCP is important, as it ensures that the public is informed and engaged in the process, and can lead to holding potentially responsible parties accountable for the contamination. More details on the Superfund Cleanup Process and the NCP can be found at <https://www.epa.gov/superfund>.

All detailed studies and Program updates are available at www.ladwp.com/remediation.

Useful Definitions	
Potentially Responsible Parties (PRPs)	An owner/operator at the time of disposal, a current owner/operator, a transporter, or an arranger for the disposal, treatment or transportation of a hazardous substance.
Response Action	A corrective action or project for remediation; can be classified as <i>remedial</i> (generally longer-term response actions) or <i>removal</i> (generally shorter-term response actions, immediate actions).
Remedial Investigation/ Feasibility Study (RI-FS)	A study intended to determine the nature/extent of the problem, establish remediation criteria, identify alternatives, and support the technical/cost analyses of alternatives; and evaluate alternatives from a technical, environmental and cost effectiveness perspective, make recommendations, prepare conceptual design and cost estimate.
Interim Action	An action which may be long in duration, but which addresses a limited area or media to reduce the threat to the public health, until a final response action is chosen.
Operable Unit	One of a number of distinct areas that may address a geographic area, specific problem or require a specific action.
Beneficial Uses	Include, but are not limited to, using water for drinking water supply and the availability for natural or artificial recharge of ground water for purposes of future extraction, and maintenance of water quality.

What is the extent of contamination?

The map illustrates the extent of contamination and the area of impacted groundwater in the SFB, based on current data. This area is described as a "contaminant plume." A contaminant plume generally begins at the source(s) of contamination and can spread, depending on the properties of contaminants and aquifer characteristics. The colored dots are LADWP wells, which are within or near the contaminant plume. The contaminant plume shows two of the main SFB contaminants and is roughly 12 miles in length.



What contaminants are present in the SFB?

Contaminants of Concern (COCs)

Volatile organic compounds (VOCs), such as TCE, PCE, and 1,4 Dioxane account for the majority of the groundwater contamination. Additional contaminants and their potential sources are described in the table below.

Sources of Contamination

Groundwater contamination in the SFB was likely caused by improper storage, handling, and disposal of hazardous chemicals used in commercial and heavy industrial activities dating back to the 1940s. PRPs are still being identified.

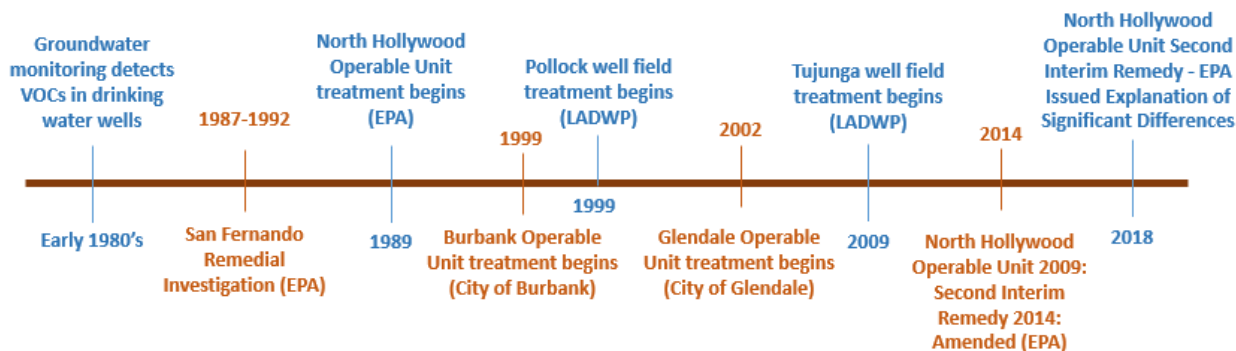
Contaminant of Concern	Uses and Occurrence	Human Health Risks
TCE (Trichloroethylene)	Starting chemical for refrigerant HFC-134a; adhesives, lubricants, paints, and pesticide; Helps to remove greases, oils, fats, waxes and tars.	Carcinogen; Can cause cancer upon inhalation or ingestion; Targets the cardiovascular and immune systems.
PCE (Perchloroethylene)	Dry cleaning agent, some consumer products (e.g. shoe polish), starting material for making other chemicals.	Likely to be a carcinogen; Exposure may result in nervous and reproductive system effects.
1,1-DCE (1,1-dichloroethylene)	Packaging materials, flexible films and flame-retardant coatings for fiber and carpet backing.	Possible human carcinogen; impacts the liver by exposure via either ingestion or inhalation.
Perchlorate salts	Mainly used in propellants, bleach and some fertilizers.	Not considered to be a carcinogen; Impacts the endocrine system, particularly the thyroid.
1,4 Dioxane	Paint strippers, dyes, greases, varnishes, and waxes; Impurity in antifreeze, deicing fluids and some consumer products.	Likely to be a carcinogen; Potential tumor sites are gastrointestinal, reproductive, respiratory and urinary.
Hexavalent Chromium	Exists naturally in the environment and in stainless steels for anti-corrosion properties; Industrially used in electroplating, textile dyes, and leather tanning.	Known human carcinogen; Can cause cancer upon inhalation and oral exposure.
Carbon tetrachloride	Dry cleaning agent, degreaser, refrigerant, fire extinguisher; Chlorofluorocarbon feedstock.	Likely to be a carcinogen; Long term exposure results in liver and kidney damage.

What previous remediation efforts have been made to restore the SFB?

The U.S. Environmental Protection Agency (EPA) conducted a comprehensive remedial investigation that characterized and revealed the VOC contamination of the groundwater in the San Fernando Valley, starting in the 1980s. Efforts to clean up the contaminated groundwater were then initiated through the EPA's Superfund program. Local, state, and federal agencies, along with the cities of Los Angeles, Glendale and Burbank, have been making efforts to identify and remediate the contamination, shown in the timeline below.

Changing groundwater conditions and additional VOC contamination in the SFB hampered the remediation and containment of the VOC plume near North Hollywood. The contamination continued to spread to other areas of the SFB and forced LADWP to shut down groundwater wells previously used to serve drinking water to Los Angeles residents. In response to this, EPA has undertaken new containment and remediation efforts that are anticipated to contain concentrated areas of the contaminant plumes, as well as other areas of contamination in the vicinity of other

LADWP wells. Although progress has been made in identifying, containing, and removing contaminants, full containment has not been achieved and some contaminant plumes continue to expand.



US EPA North Hollywood Operable Unit (1989)



LADWP Granular Activated Carbon Treatment at Tujunga Well Field (2009)



LADWP Granular Activated Carbon Treatment at Pollock Well Field (1999)



State and Federal Agencies Involved	
Agency	Responsibility
United States EPA	To protect human health and the environment by writing and enforcing regulations based on laws passed by Congress www.epa.gov
State Water Board - Division of Drinking Water	To regulate public drinking water systems, oversee water recycling projects, support and promote water system security https://www.waterboards.ca.gov
State Water Board - Division of Financial Assistance	To administer the implementation of the State Water Board's financial assistance programs that includes funding for construction of facilities, remediation, watershed protection, and pollution control projects
State Water Board - Los Angeles Regional Water Quality Control Board	To preserve, enhance, and restore the quality of California's water resources for the protection of environment, public, and all beneficial use
California Department of Toxic Substances Control	To protect the public and environment from harmful effects of toxic substances by restoring contaminated resources, enforcing hazardous waste laws, and reducing hazardous waste generation www.dtsc.ca.gov

Current and Future Remediation Efforts by LADWP

Characterization of Groundwater Contamination

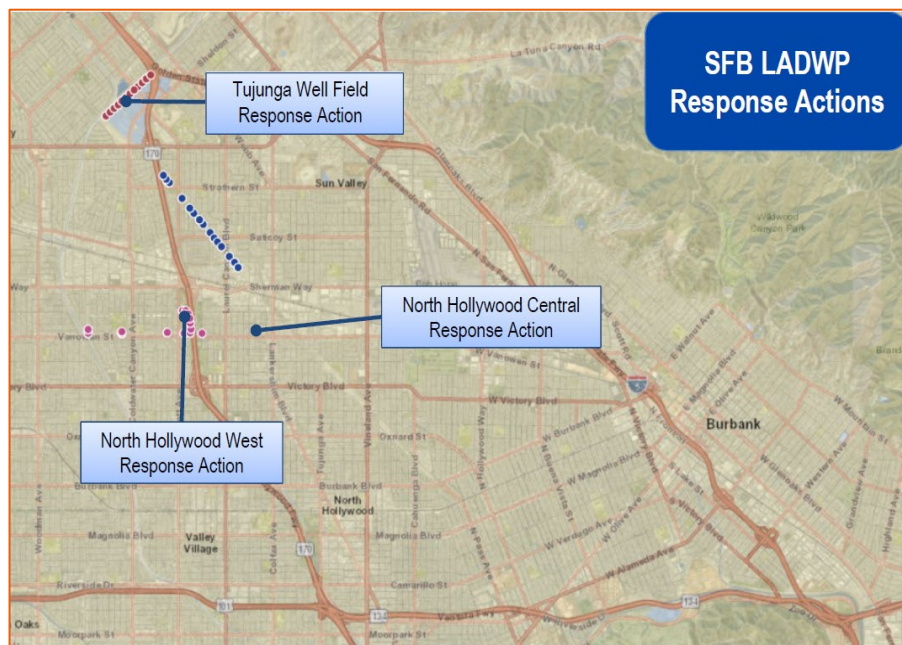
LADWP undertook an extensive well field characterization and treatment evaluation from 2009 through 2015. The six-year, \$11.5 million Groundwater System Improvement Study (GSIS) characterized the SFB contamination. LADWP installed and sampled 26 new monitoring wells in support of the groundwater characterization at an additional cost of approximately \$22 million. LADWP used these new monitoring wells, along with a network of more than 70 existing wells, to characterize the SFB's groundwater quality and develop a series of response actions that will address plumes of contamination in the vicinity of the City's major well fields in the SFB:

North Hollywood West

Tujunga

Rinaldi-Toluca

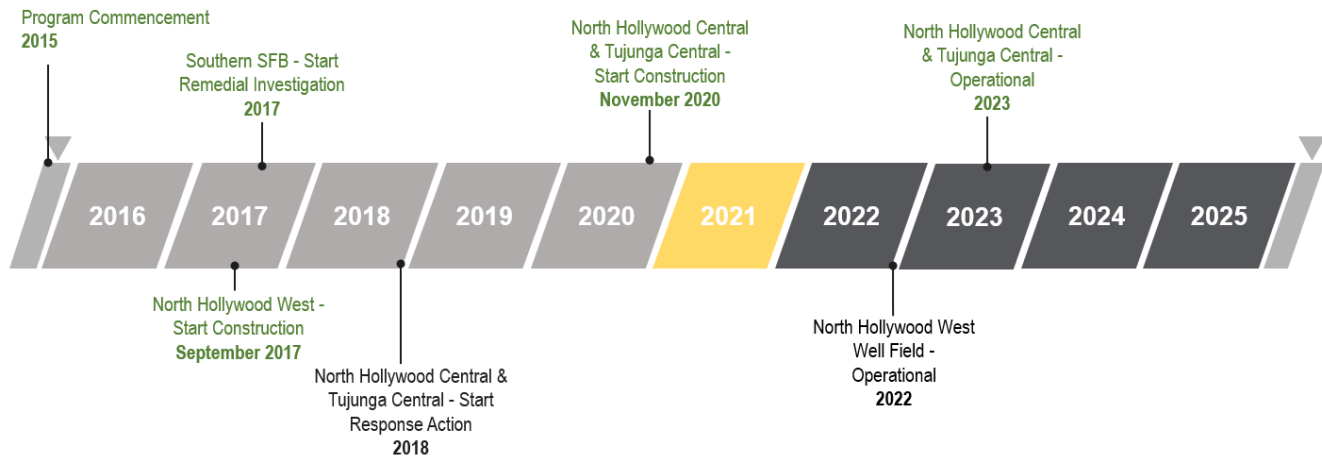
Water quality data analysis and well field characterizations serve as an integral part of the response actions that LADWP is implementing. LADWP used the information to develop remedial action objectives, prepare remedial investigations, screen and evaluate remedial alternatives and select appropriate response actions to address the releases and threatened releases in the vicinity of the North Hollywood West, Tujunga and Rinaldi-Toluca well field areas. LADWP is now implementing the response actions, which were selected by Board of Water and Power Commissioners in substantial compliance with the NCP.



Current Projects in the SFB

Inside Look at the Program's Progress and Path Forward

LADWP is taking an accelerated approach to address contamination in the SFB. The program's progress and path forward are depicted in the project timeline below.



LADWP has completed individual Remedial Investigation and Feasibility Studies and Remedial Design for each of the three interim response actions described below, along with other documents as required by the NCP. LADWP is now in the process of completing permitting, construction, and startup of these interim response actions.

North Hollywood West Response Action:

On August 1, 2017, the Board of Water and Power Commissioners selected the Interim Remedial Action (IRA) for North Hollywood West (NHW). The IRA for NHW is a groundwater pump-and-treat system intended to protect human health by extracting and removing 1-4 dioxane contaminated groundwater from the NHW well field and concentrating and removing the plume from the groundwater through the operation of remediation wells. LADWP completed the Remedial Design for NHW in April 2018. The project has entered the Remedial Action phase – the construction of the Response Action treatment facility – which is estimated to be complete by Fall of 2022. The facility is expected to be operated year-round and is expected to treat nearly 16,000 acre-feet per year (FY) or 21.7 cubic-feet per second (CFS) during the first several years of operation. As part of the response action, LADWP will monitor conditions in the vicinity of the well field and optimize remedial system operations as appropriate over time.



NHW Well Field Facilities Construction

North Hollywood Central Response Action:

On December 11, 2018, the Board of Water and Power Commissioners selected the IRA for North Hollywood Central (NHC). The IRA for NHC will address the releases of hazardous substances in the vicinity of the Rinaldi-Toluca well field. This project involves constructing and operating treatment equipment capable of removing the groundwater contamination. LADWP completed the Remedial Design for NHC in March 2021. The project has entered the Remedial Action phase – the construction of the Response Action treatment facility – which is estimated to be complete by Summer of 2023. This treatment facility, with a capacity of nearly 28,000 AFY (38 CFS), will be located within the North Hollywood Pump Station Complex. As part of the response action, LADWP will operate the remedial wells connected to the treatment plant to concentrate and remove the plume from the groundwater. LADWP will monitor conditions in the vicinity of the well field and optimize operations as appropriate over time.



NHC Well Field Facilities Construction

Tujunga Well Field Response Action:

On January 22, 2019, the Board of Water and Power Commissioners selected the IRA for Tujunga. The IRA for Tujunga will address the releases of hazardous substances in the vicinity of the Tujunga well field. Similar to the NHW and NHC response actions, this project involves constructing and operating treatment equipment capable of removing the groundwater contamination. LADWP completed Remedial Design for Tujunga in March 2021. The project has entered the Remedial Action phase – the construction of the Response Action treatment facility – which is estimated to be complete by Summer of 2023. This treatment facility, with a capacity of nearly 43,000 AFY (59 CFS), will be located within the Tujunga Spreading Grounds. As part of the response action, LADWP will operate the remedial wells connected to the treatment plant to concentrate and remove the plume from the groundwater. LADWP will monitor conditions in the vicinity of the well field and optimize operations as appropriate over time.



Tujunga Well Field Facilities Construction

A Treatment System to Provide Safe Drinking Water

Pump and treat are a common and versatile method for remediating groundwater impacted with contaminants, such as those identified at NHW, NHC, and Tujunga. Groundwater is pumped from wells to an above-ground treatment system designed to break down or remove the contaminants. The above-ground treatment systems selected for NHW, NHC, and Tujunga contain Ultraviolet Advanced Oxidation Process (UV AOP) treatment with hydrogen peroxide. Other parts of the treatment systems include sand separators, cartridge filters, and granular activated carbon vessels.

Expanded San Fernando Basin Investigation

Pursuant to recommendations in the GSIS, LADWP is undertaking a continuation of the GSIS study to better characterize groundwater in the southern portion of the SFB in the area surrounding the Headworks, Pollock, Erwin, Whitnall, and Verdugo Well Fields; collectively the “Southern SFB Well Fields.”

Historically, the Southern SFB has provided a source of municipal and domestic water supply and local water storage. However, hazardous substances detected within the SFB have impaired the beneficial use of groundwater in the vicinity of the Southern SFB Well Fields for municipal use. The presence of hazardous substances in groundwater also impairs the beneficial uses of the SFB for storage. Results of the Southern SFB Well Fields study will provide the basis for evaluating whether additional response actions should be implemented in the southern portion of the basin to address the release and threatened release of hazardous substances, and aid in the analysis of those potential actions, if needed.

Program Funding

Proposition 1, also known as “the Water Bond,” was approved by California voters in 2014. It is essential in providing up to 50% funding for significant capital investments to improve water reliability and help meet the long-term water needs of California. To date, LADWP has secured approximately \$287 million in grant funding under Proposition 1, as follows: LADWP received a Proposition 1 grant award for \$46 million dollars for planning and implementation to remediate the 1,4-dioxane at the NHW well field. Proposition 1 planning grants were approved for \$6 million related to the North Hollywood Central and Tujunga Remediation projects. Implementation grants in the amount of \$94.8M and \$137.8 million were awarded towards the construction of the North Hollywood Central and Tujunga Well Field Response Action Treatment Facility Projects, respectively. Proposition 1 planning grants for \$2 million were approved for the Southern SFB investigation. LADWP will continue to proactively seek local, state, and federal funding to offset potential impacts to rate payers.

Community Involvement

LADWP has engaged members of the community throughout the process, including in conceptual discussions, milestones, and planning stages of the Program, in substantial compliance with the NCP. The Community Involvement Plans are available at www.ladwp.com/remediation. Outreach includes communications to individuals, organizations, and Neighborhood Councils throughout the City, public meetings at the Valley Plaza Library, the maintenance of a mailing list, and posting to the LADWP website (www.ladwp.com). For each of the IRAs, LADWP published the NCP documentation, solicited public comment, held public meetings and considered public and stakeholder comments received. On an ongoing basis, LADWP encourages community members and stakeholders to submit their comments and feedback or to request a meeting or presentation for their community group with the LADWP Community Involvement Coordinator at remediation@ladwp.com.

LADWP also formed a technical advisory committee (TAC) for these response actions, consisting of key regulatory agencies. LADWP engages with the TAC through regular meetings and other coordination efforts.

Proposition 1 Disclosure

Funding for the three projects discussed above (NHW, North Hollywood Central and Tujunga) has been provided in full or in part by Proposition 1 — the Water Quality, Supply, and Infrastructure Improvement Act of 2014 through an agreement with the State Water Resources Control Board. The contents of this document do not necessarily reflect the views and policies of the foregoing, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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