San Francisco’s
Non-Potable Water Program

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Director of Water Resources
San Francisco Public Utilities Commission
May 2, 2016
San Francisco Public Utilities Commission

Water: delivering high quality water every day to 2.6 million people

Power: generating clean energy

Sewer: protecting public health and the environment
Hetch Hetchy Regional Water System
Provide Water to 2.6 Million People
Respond to Aging & Vulnerable Water Infrastructure

Water System Improvement Program

- Repair, replace, and seismically upgrade infrastructure
- $4.8 billion
- Over 90% Complete
- Diversify water supplies
San Francisco’s Local Water Program

- **Conservation**: average residential 40 gpcd

- **Groundwater**: blend groundwater with surface water for potable purposes during normal and drought years

- **Recycled Water**: provide recycled water for irrigation of parks and golf courses

- **Non-potable Water**: collect and treat alternate water sources for non-potable applications within buildings
Approach to Water Reuse: Multiple Scales

- Centralized
- Decentralized
  - Building scale
  - District-scale
Drivers for Water Reuse: Ordinances and Demand Management

Ordinances:
- Recycled Water Ordinance
- Non-potable Water Ordinance
- Stormwater Ordinance

Demand Management:
- Reduce use of potable water for non-potable uses such as toilet flushing, irrigation, etc.
Recycled Water Ordinance 1991

- New developments & major alterations over 40,000 SF
- Irrigated landscapes over 10,000 sf
- Requires recycled water systems for toilet/urinal flushing, irrigation, & cooling
Non-Potable Water Ordinance
2015

• Mandatory in 2015 (Voluntary 2012-2015)

• Requires onsite water systems in new buildings over 250,000 square feet

• Assessment of water sources and non-potable end uses in buildings over 40,000 square feet
• Applies to any project that disturbs over 5,000 sf of ground surface

• Requires Stormwater Control Plan and retention or reuse of stormwater on-site

• Fulfills obligations of City’s NPDES Permit
Opportunity to Reuse Water Onsite

Precipitation collected from roofs and above-grade surfaces

Precipitation collected at or below grade

Nuisance groundwater from dewatering operations

Wastewater from toilets, dishwashers, kitchen sinks, and utility sinks

Wastewater from clothes washers, bathtubs, showers, and bathroom sinks
Residential Programs

• Rainwater Harvesting Program
• Residential Graywater Program
Rainwater Harvesting Program

Subsidy Program
- Cisterns and rain barrels for SF Residents

Public Outreach
- Web page
- Technical Workshop
- Fact Sheet
Laundry-to-Landscape (L2L) Graywater Program

1 and 2-unit homes
- $112 subsidy toward L2L kits
- Free training, manual, tech support
- Free tool lending

Requirements
- San Francisco resident
- Working laundry machine
- Flat or down sloping yard
- Install within 60 days
- Access for inspection
- Participation in survey
Water Reuse in Large Commercial, Multi-family and Mixed Use Buildings
Up to 50% of Demands are Non-potable in Multifamily Residential Buildings

Source: adapted from Alliance for Water Efficiency
Up to 95% of Demands are Non-potable in Commercial Buildings

Source: USEPA

Office Water Use

- Sanitary
- Cooling Tower Make-up
- Irrigation
- Single-Pass Cooling
- Kitchen
- Miscellaneous

Source: USEPA
SFPUC Headquarters Incorporates Non-potable Water Systems
Interest from Developers to Collect & Treat Water Onsite
Barriers to Implementation

• Who should set water quality standards?
• Who should issue permits and provide operational oversight?
• What type of on-going monitoring and reporting should be implemented?
Need for a Program on the Local Level

- Provide for Oversight and Management
- Establish Roles and Responsibilities
- Focus on Implementation
- Stakeholder Outreach
Limited Water Quality Guidance

2013 California Plumbing Code Updates

• Incorporated graywater and rainwater end uses & water quality standards

• Provided construction requirements

• Included purple and signage requirements
<table>
<thead>
<tr>
<th>SFPUC</th>
<th>SFDPH</th>
<th>SFDBI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Administration</td>
<td>Public Health</td>
<td>Construction</td>
</tr>
<tr>
<td>Reviews Water Budget: non-potable water supplies &amp; demands</td>
<td>Issue water quality &amp; monitoring requirements</td>
<td>Conduct Plumbing Plan check and issue Plumbing Permit</td>
</tr>
<tr>
<td>Provide technical support &amp; outreach to developers</td>
<td>Review and approve non-potable engineering report</td>
<td>Inspect and approve system installations</td>
</tr>
<tr>
<td>Provide financial incentives to developers</td>
<td>Issue permit to operate onsite systems</td>
<td></td>
</tr>
<tr>
<td>Cross connection test</td>
<td>Review water quality reporting</td>
<td></td>
</tr>
<tr>
<td>Administer citywide project tracking &amp; annual potable offset achieved</td>
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</table>
Ordinance Amends SF Health Code

- Article 12C: establishes a regulatory structure that provides administrative and project approval process
- Sets application fees & annual fees for SFDPH
- Provides ability to impose penalties by SFDPH (Chapter 100 of Admin Code)
Amendments to 2012 Ordinance
Include District Scale Systems

- District: 2 or more parcels that share water
- Must include permanent legal agreement between property owners
- Encroachment permit, if applicable
<table>
<thead>
<tr>
<th>SFPUC</th>
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<th>SFDPW</th>
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<tbody>
<tr>
<td><strong>Program Administration</strong></td>
<td><strong>Public Health</strong></td>
<td><strong>Construction</strong></td>
<td><strong>Right of Way and Mapping</strong></td>
</tr>
<tr>
<td>Review onsite non-potable water supplies &amp; demands</td>
<td>Issue water quality &amp; monitoring requirements</td>
<td>Conduct Plumbing Plan check and issue Plumbing Permit</td>
<td>Issue Encroachment Permits as needed for infrastructure in the Right-of-Way (if needed)</td>
</tr>
<tr>
<td>Administer citywide project tracking &amp; annual potable offset achieved</td>
<td>Review and approve non-potable engineering report</td>
<td>Inspect and approve system installations</td>
<td>Includes condition on a subdivision map or a parcel map requiring compliance with the Non-potable Ordinance prior to approval and issuance of said map (if applicable)</td>
</tr>
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<td>Review water quality reporting</td>
<td></td>
<td></td>
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**Administrative Agencies Involved:***
- SFPUC: San Francisco Public Utilities
- SFDPH: San Francisco Department of Public Health
- SFDBI: San Francisco Department of Building Inspection
- SFDPW: San Francisco Department of Public Works

**Program Contacts:**
Please contact [SFPUC] for questions regarding utility service and utility connections to the public water system.

**Citywide Programs:**
- **Building Projects:** The citywide program tracks building projects to ensure compliance with the Non-potable Ordinance.
- **Right-of-Way:** Right-of-Way permits may be required for infrastructure projects in the Right-of-Way area.

**Technical Support:**
- The program provides technical support for developers to ensure compliance with the Non-potable Ordinance.

**Financial Incentives:**
- Financial incentives may be available to developers to encourage compliance with the Non-potable Ordinance.

**Issue Water Quality & Monitoring Requirements:**
- Water quality & monitoring requirements must be met for non-potable systems.

**Review and Approve**:
- Engineering reports are reviewed and approved to ensure compliance with the Non-potable Ordinance.

**Issue Permit to Operate Onsite Systems:**
- Permits are issued to operate onsite non-potable systems.

**Conduct Plumbing Plan Check & Issue Plumbing Permit**:}
- Plumbing plans are checked and permits are issued to ensure compliance with the Non-potable Ordinance.

**Inspect and Approve System Installations**:}
- System installations are inspected and approved to ensure compliance with the Non-potable Ordinance.

**Issue Encroachment Permits**:}
- Encroachment permits may be required for infrastructure projects in the Right-of-Way area.

**Includes Condition on a Subdivision Map or Parcel Map**:}
- A condition on a subdivision map or parcel map may require compliance with the Non-potable Ordinance prior to approval and issuance of said map.
## Water Quality Criteria
Consistent with Existing State Codes

<table>
<thead>
<tr>
<th>Alternate Water Source</th>
<th>Regulation Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blackwater</td>
<td>Title 22</td>
</tr>
<tr>
<td>Graywater</td>
<td>California Plumbing Code</td>
</tr>
<tr>
<td>Rainwater</td>
<td>California Plumbing Code</td>
</tr>
<tr>
<td>Stormwater</td>
<td>No state codes - SFDPH established</td>
</tr>
<tr>
<td>Foundation Drainage</td>
<td></td>
</tr>
</tbody>
</table>

SFDPH issues permits to operate onsite water systems and requires ongoing monitoring and reporting.
## Water Quality Monitoring & Reporting

<table>
<thead>
<tr>
<th>Water Source</th>
<th>Conditional Start-Up</th>
<th>Final Use</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Monitoring</td>
<td>Reporting</td>
<td>Monitoring</td>
</tr>
<tr>
<td>Rainwater</td>
<td>W/M*</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Stormwater</td>
<td>W</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Graywater</td>
<td>W</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Foundation Drainage</td>
<td>W</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Blackwater</td>
<td>D</td>
<td>M</td>
<td>D</td>
</tr>
</tbody>
</table>

D = daily  
W = weekly  
M = monthly  
Y = yearly  

* Rainwater systems with a chlorine residual = monthly; Rainwater systems without a chlorine residual = weekly
## Estimated Monitoring Costs

<table>
<thead>
<tr>
<th></th>
<th>Rainwater</th>
<th>Graywater</th>
<th>Blackwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start Up</td>
<td>$1,100</td>
<td>$1,100</td>
<td>$13,950</td>
</tr>
<tr>
<td>Ongoing</td>
<td>$420</td>
<td>$420</td>
<td>$13,500</td>
</tr>
</tbody>
</table>
Key Requirements for Onsite Systems

- Water and Sewer Connections
- Operations and Maintenance
- Backflow Protection Requirements
- Cross Connection Test Prior to Operation
- Operator Capacity
6 Steps for Successful Implementation of Onsite Water Systems

1. Submit a Water Budget Application and Non-potable Calculator to the SFPUC
   Assess water supplies and non-potable water demands

2. Submit an Engineering Report to the SFDPH
   Provide detailed design and technical aspects of the onsite water system

3. Obtain Permits from the DBI and Complete Construction
   Adhere to construction and plumbing code requirements to ensure proper installation

4. Schedule a Cross Connection Test with the SFPUC
   Ensure separation of potable and non-potable water systems

5. Obtain a Permit to Operate from the SFDPH
   Provide required documents to the SFDPH, pay first annual license fee to the Tax Collector, and begin operating the onsite water system with SFDPH oversight

6. Conduct Ongoing Monitoring, Reporting, and Inspections
   Keep your system in compliance with water sample collection, ongoing maintenance, routine reporting to the SFDPH, and timely payment of the annual license fee

Market Street Place, a six-level retail center scheduled to open in 2016, plans to treat rainwater for cooling tower make-up and for toilet and urinal flushing.

PG&E is treating foundation drainage to flush toilets and urinals at their San Francisco Service Center to reduce potable water consumption by approximately 80%.
SFPUC Track Projects

- Overview of onsite water system
- Water sources collected and treated
- End use applications
- Costs
St. Anthony’s Building

- Source: Rainwater
- End Use: Toilet & Urinal Flushing
- Status: System Constructed
PG&E Office Building Retrofit

• Source: Foundation Drainage

• End Uses: Toilet & Urinal Flushing

• Status: System Constructed
San Francisco Public Safety Building

- Sources: Rainwater, Stormwater, & Graywater
- End Uses: Toilet & Urinal Flushing and Irrigation
- Status: System Constructed
181 Fremont Mixed Use Development

- Source: Graywater & Rainwater
- End Use: Toilets & Irrigation
- Status: Under Construction
Transbay Transit Center

- **Sources**: Rainwater & Graywater
- **End Uses**: Toilet & Urinal Flushing and Irrigation
- **Status**: Final Design
Downtown Steam Loop

- Sources: Foundation Drainage
- End Uses: Steam Loop
- Status: Final Design
Graywater Treatment Systems
• $250,000 - $500,000 (1,200 gpd-5,000 gpd)

Blackwater Treatment Systems
• $400,000 - $2.3 M (5,000 gpd- 50,000 gpd)

ROI: 6-15 years
Grant Assistance for Large Alternate Water Source Projects

Grant Guidelines and Terms

Grant Assistance Overview

The SFPUC’s Grant Assistance for Alternate Water Source Projects (Grant Assistance) is a program designed to encourage retail water users to implement on-site treatment and use of non-potable water, including but not limited to rainwater, stormwater, graywater, foundation drainage, and blackwater. The goal is to minimize the use of non-potable water for toilet flushing, irrigation, and other non-potable uses. The SFPUC has approximately $1,000,000 in funding available for two types of non-potable water projects:

1) District-scale projects that consist of two or more parcels that share treated alternate water sources or
2) building-scale projects that include any residential or non-residential buildings of at least 100,000 square feet or more. Grants will be awarded to those applicants who demonstrate they will significantly and permanently reduce or offset the use of existing drinking water supplies for non-potable applications.

Types of activities considered for funding include the installation of harvesting or collection systems for on-site sources, treatment systems to improve the water quality of on-site sources for beneficial reuse, and/or storage of the treated water. The SFPUC anticipates funding multiple projects. The deadline for applications for Calendar Year 2014 is December 31, 2014. Provision of grant funding is based on the eligibility of the proposed activity and availability of funds. Each application will be reviewed and evaluated on a case-by-case basis. Grant funding is available on a first-come, first-served basis and is limited to $250,000 per on-site project and $500,000 per district-scale project. Projects that meet the Grant eligibility criteria for District-scale Grant Assistance may not apply for Building-scale Grant Assistance.

Grant assistance will support customer efforts to implement sustainable water use practices in San Francisco. In addition to advancing water supply reliability, this grant assistance will support the SFPUC’s Phased Water System Improvement Program Variant (WSIP) goals adopted by Resolution No. 08-200 on October 30, 2008. The WSIP included a goal of developing an additional 10 million gallons per day (mgd) of locally available water resources.

Definitions

Terms used in this grant application package have the meanings described below:

Alternate Water Source—Non-potable source of water that includes graywater, rainwater, stormwater, foundation drainage, and blackwater. The level of treatment and quality of the alternate water source shall be approved by the City’s Department of Public Health and comply with all applicable federal, state, and local regulations.

Applicant—Property owner that is a retail water customer of the SFPUC, proposing the installation of a building-scale or district-scale treatment system on their property, and is seeking grant funds from the SFPUC for an alternate water source project pursuant to the instructions and guidelines set forth in this application package.

Award—The decision by the SFPUC to provide grant funds, following the review and evaluation of a completed application. An award is made through a Grant agreement.

Blackwater—wastewater containing bodily or other biological wastes, as from toilets, dishwashers, kitchen sinks and utility sinks. Because of plumbing configurations, Blackwater leaving a building generally includes greywater.
Non-Potable Water Program Timeline

- 2010-2012: Develop Program
- 2012: Single Building
- 2013: District Scale Systems
- 2015: Mandatory for projects over 250,000 square feet
New Water Paradigm

• Decentralized systems integrated with centralized infrastructure

• Need for new utility business models

• Future innovative technologies
Pilot New Innovations

• Rainwater for potable purposes

• Conduct R&D for potable reuse

• Urine diverter to produce fertilizer

• Resource recovery, such as thermal energy
Key Outcomes from Summit

• Management and oversight programs are needed

• Lack of consistent water quality criteria and monitoring to protect public health
BLUEPRINT for Onsite Water Systems

A Step-by-Step Guide for Developing a Local Program to Manage Onsite Water Systems
Public Health Collaborative
Health risk based approach to develop recommendations for:

- Performance criteria for treated alternate water sources
- End use applications (toilet/urinal flushing, irrigation and clothes washers)
- Monitoring and reporting
- Operational requirements and permitting
Project Structure and Timeline

• 5 Member Independent Expert Panel

• Stakeholder Advisory Committee (comprised of local, state and federal public health officials)

• Interactive workshops

• Final report available September 2016
National Blue Ribbon Commission

- Collaborate with state public health + water utilities
- Develop consistent state policies
- Engage EPA
- Two year effort starting Fall 2016
THANK YOU

sfwater.org/np

sfwater.org/np/iuws
<table>
<thead>
<tr>
<th>Measure</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>10 NTU</td>
</tr>
<tr>
<td>E. Coli</td>
<td>≤ 100 MPN/100 mL</td>
</tr>
<tr>
<td>Chlorine Residual(^1)</td>
<td>0.5 – 2.5 mg/L</td>
</tr>
<tr>
<td>Odor</td>
<td>Non-Offensive</td>
</tr>
</tbody>
</table>

1. A Chlorine Residual is not required for rainwater systems- use of uv or ozone can meet requirement.
# SFDPH Stormwater Water Quality Requirements

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</tr>
<tr>
<td>Volatile Organic Compounds (VOC)</td>
<td>Depends on specific VOC(^1)</td>
</tr>
<tr>
<td>Odor</td>
<td>Non-Offensive</td>
</tr>
</tbody>
</table>

1. Stormwater systems require quarterly testing for VOCs to meet acceptable maximum concentration levels (MCLs).
<table>
<thead>
<tr>
<th>Measure</th>
<th>Average</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
<td>6.0 – 9.0</td>
</tr>
<tr>
<td>Turbidity</td>
<td>2 NTU</td>
<td>10 NTU</td>
</tr>
<tr>
<td>Chlorine Residual</td>
<td></td>
<td>0.5 – 2.5 mg/L</td>
</tr>
<tr>
<td>Total Coliform</td>
<td>≤ 2.2 MPN/100 mL</td>
<td>≤ 200 MPN/100 mL</td>
</tr>
<tr>
<td>Odor</td>
<td></td>
<td>Non-Offensive</td>
</tr>
<tr>
<td>Measure</td>
<td>Average</td>
<td>Maximum</td>
</tr>
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<td>----------------------------------------------</td>
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</tr>
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<td>Turbidity</td>
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<td>10 NTU</td>
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<tr>
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</tr>
<tr>
<td>E. Coli</td>
<td>≤ 2.2 MPN/100 mL</td>
<td>≤ 200 MPN/100 mL</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOC)</td>
<td>N/A</td>
<td>Depends on specific VOC¹</td>
</tr>
<tr>
<td>Odor</td>
<td>Non-Offensive</td>
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1. Foundation drainage systems require quarterly testing for VOCs to meet acceptable maximum concentration levels (MCLs).
<table>
<thead>
<tr>
<th>Measure</th>
<th>Minimum</th>
<th>Average</th>
<th>Maximum</th>
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</thead>
<tbody>
<tr>
<td>BOD$_5$</td>
<td>≥ 85% removal</td>
<td>≤ 10 mg/L</td>
<td>≤ 25 mg/L</td>
</tr>
<tr>
<td>Suspended Solids</td>
<td>≥ 85% removal</td>
<td>≤ 10 mg/L</td>
<td>≤ 30 mg/L</td>
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<tr>
<td>pH</td>
<td></td>
<td>6.0 – 9.0</td>
<td></td>
</tr>
<tr>
<td>Turbidity</td>
<td>n/a</td>
<td>2 NTU</td>
<td>10 NTU</td>
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<tr>
<td>Chlorine Residual</td>
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<td>0.5 – 2.5 mg/L</td>
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<td>Total Coliform</td>
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<td>≤ 2.2 MPN/100 mL</td>
<td>≤ 23 MPN/100 mL</td>
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<tr>
<td>Odor</td>
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<td>Non-Offensive</td>
<td></td>
</tr>
</tbody>
</table>
Watershed Stewardship Grant Program

- Funds sidewalk landscaping, rainwater harvesting and green infrastructure projects in the public realm
- Engages community and provides opportunities for education & outreach
PROJECT PROFILES
Lafayette Elementary
Rainwater Harvesting System
(large cistern)
Cesar Chavez Elementary
Rainwater Harvesting System &
Educational Garden
PROJECT PROFILES

Miraloma Elementary
Rainwater Harvesting System & Outdoor Classroom