April 25, 2021

AGREEMENT NO. RMC 17011 - COUNTY OF LOS ANGELES – PARKWAY BASIN WATER QUALITY IMPROVEMENT PROJECT
TASK 6 - MONITORING AND ASSESSMENT PLAN AND COMPLETION REPORT

<u>Summary</u>

Infiltration monitoring demonstrated that installations meet or exceed expectations for water percolation, strongly cohering with the latest US Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil data which partially informed site selection. Monitoring was carried out by third-party contract with pre-testing of three sites. Post-testing was expanded to include one additional site for a total of 4 sites tested at 3-, 9- and 18-months for each location. Post-installation rates ranged from 1.1 to 11 inches an hour at testing 18 months after installations in August 2020, with a high at one location of 14.4 inches an hour at 9-month testing in December 2019. Post-project installation rates have been significantly higher than pre-testing, which ranged from 0.4–3 inches an hour. Even the lowest rates have exceeded those generally assumed in conventional models.

In addition to measuring infiltration rates as standard at the point of saturation, testing methods included measuring volume of water applied up to the point of saturation. Data collected suggests percolation up to the point of saturation may in instances exceed percolation at a saturated average rate, especially for small events. If accurate and representative of general conditions, calculations and models applying only an average percolation rate may underestimate the amount of water that can be percolated, even rates that accurately represent conditions. Additionally, significant variation has been observed in rates across sites and over the period of testing post-installation, including a significant increase from the 3-month testing to 9-month testing, and drops in infiltration rates between the 9-month and 18-month testing across 3 of 4 sites. Causes may include biological activity, levels of soil saturation, buildup of vegetative debris, and other factors that would benefit from further evaluation to structure most efficient installation and management of these and similar projects. Additional monitoring across different site conditions would be instrumental to confirm and build on results.

Community engagement through this project continues to demonstrate the significance of ongoing active dialogue and information exchange in adoption of these and similar projects. However, normalizing the proliferation of interventions such as the Parkway Basin Water Quality Improvement Project can present challenges. Enlisting and working directly with early-adopter communities is time-intensive in the near term, events such as COVID which cannot be controlled may significantly impact outcomes, and interest may vary across communities and demographics. Collectively, however, individuals continue to demonstrate a clear willingness to participate meaningfully in land and water management strategies that provide direct benefits to their communities. Thus, investments that incentivize such collaborative processes represent a value proposition for continued work and may yield significant support for such civic projects at all scales.

Context

The Parkway Basin Water Quality Improvement Project has included the first monitoring of distributed, low-impact development (LID) and specifically Nature-Based Solution (NBS) infrastructure by Los Angeles County Public Works, and one of the only instances on record in LA County. This is significant in light of the Southern California Water Coalition (SCWC) 2018 Whitepaper Update *Stormwater Capture: Enhancing Recharge & Direct Use Through Data Collection*. The study found only 32 projects in all of Southern California that presented monitoring data, only three of which were classified “distributed”, though they meet definitions for neighborhood-scale infrastructure, including major infrastructure such as on-site water recycling infrastructure, underground chambers, paving, and utilities. There are fewer examples of retrofit projects, which may include the Hall House Sustainability Demonstration Site and the City of Santa Monica garden\garden study. Across all available examples, limited and inconsistent methods make projects difficult to compare and evaluate for performance and cost-impact.

In the development of the original Water LA pilot, infiltration was anecdotally observed to be consistently higher than anticipated by conventional models and the Los Angeles County Hydrology Manual Section B. Since the first pilots completed in 2014, the USDA NRCS completed comprehensive soil testing and mapping across the Los Angeles Basin, indicating infiltration rates significantly higher than projected in modeling. Limited studies also indicate regularly saturated conditions, healthy soils and vegetation can impact and possibly increase infiltration. Monitoring of projects in New York, NY and Portand, OR have significantly exceeded modeled expectations. However, there are many complex factors, including soil structure, morphology, weather, and biology that can impact results. Use of conventional infiltrometers, for instance, take a single core per sample which may not be representative of the whole of an installation configuration, and may compact soil, disrupt root system structures, and impact results in the process of measuring.

This project proposed and applied controlled saturation via gutter with a water truck to measure discrete volumes in a condition similar to what occurs through rain events or urban runoff for this eddy-basin parkway basin water capture strategy. The measurements not only included infiltration rates, which are the rate at which water moves through soil at the point of saturation, but also volumes of water and time to reach a point of saturation. This approach tests the entire configuration as a whole, including increased surface area of not only vertical but also horizontal percolation of unmortared side-slopes, variation in undisturbed soils, and vegetation across installations. The additional measurements also provide a point of reference for potential water volumes absorbed, which is significant as intensity of rainfall varies over the course of and between any given rain event(s).

The intent of the project is to observe the functionality and effectiveness of installations, and to provide a point of reference for adaptations that may be made to future projects.

Monitoring and Assessment Plan (from Section 2.f. of Project Grant Application)

1. **Goals prior to construction:**
    a. Develop relations with residents interested in participating in the program.
        i. Success will be measured by identifying 30 project locations with residents who are engaged in the project.
        ii. During community build event, achieve participation from at least 50% of the residents whose Parkway's are being improved.

2. **Post Construction goals:**
    a. Determine impact of vegetation growth on infiltration within the Parkway Basin
        i. The ability to infiltrate water at Parkway Basins may improve or decline over time. It is believed that the level of vegetation growth will impact the infiltration rate.
        ii. Accordingly, field tests will be conducted on one Parkway Basin at three different stages post construction to assess the impact of vegetation on infiltration/capture. The tests will be done three months after construction, nine months after construction and finally one and a half years after construction.
        iii. Testing methods will be determined based on site constraints.

Resident Participation with Project

An assumption of the pilot and programs for distributed NBS is the promotion of a "new normal". Essentially, that early investments in communication of best-practices and stewardship can support popular self-perpetuation. The River Project (TRP) team observes that the concept of manicured lawns was once only common for wealthy land owners, and has since become a ubiquitous practice and cultural norm supported by entire industries. Similarly, as lawn removal and stormwater capture become more popular and commonplace, investing in communications, public engagement and education to support stewardship skills will be instrumental to yield best outcomes.

Engagement is the foundation of participatory design and stewardship. The road right-of-way represents an outstanding opportunity to better manage land and water to meet a range of challenges across the region, and at the same time has overlap with private property, use, and maintenance. Project success is dependent on the interest of the underlying property owners and residents. Working with people that are already interested and giving them opportunities to meaningfully impact the project through participatory design is key.

Initial engagement included reaching out to local community groups and associated community leaders to identify interested residents in the project areas. Calls were made directly to primary contacts, and postings were made at community locations including libraries and parks. Staff attended community events, manned information tables at events and local parks, and presentations were made to local groups including

Florence-Firestone Community Leaders, and neighborhood watch groups in Florence-Firestone and West Whittier/Los Nietos. Community in Florence-Firestone was particularly active and the project team benefitted from partnership with the Florence-Firestone Community Leaders group that on multiple occasions actively shared information, made introductions, and hosted. The new County Library in West Whittier/Los Nietos served as a vibrant community hub for information sharing. West La Puente Valley/Basset presented particular challenges, with no local groups active, not even community watch, and little active interest at table staffing at the local Bassett Park and community center. Park staff and first District deputies confirmed relative inactivity in the area. As with other areas this may be due to a history of being underserved which was a project area selection criteria, and fragmented community identity in the area. TRP consistently observed residents of unincorporated communities to be disengaged with civic processes, and rarely even knew what jurisdiction they were a resident of (e.g. people in Florence-Firestone thought they lived in the City of Los Angeles, and people in West La Puente Valley/Bassett identified as living in Bassett "the city" or La Puente). Due to low participation in West La Puente Valley/Basset, and limited time for recruitment, additional sites were located in Florence-Firestone where there was consistently more trust observed through working with local groups, and a high level of interest in the project.

Through this initial process, we engaged nearly 1,100 community members, (766 in Florence-Firestone, 245 in West Whittier-Los Nietos, and 59 in Basset) and enrolled 22 property owners in the project for a total of 30 parkway basin installations.

Beyond informational presentations, the project included a workshop series with an introduction, site preparation and grading, stone work/masonry, planting days, and stewardship. A total of 8 such workshops were delivered across the 3 communities, with additional one-on-one walkthroughs on stewardship with participants as part of ongoing stewardship. In the words of Baba Dioum, "*In the end we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught*." These workshops are not only important for the stewardship components, but to convey understanding and appreciation of the investments to build interest and support for stewardship, related work, and land management more generally.

Participants from 20 of the 22 project sites actively participated in community build events, representing a 90% participation rate. Of the remaining 2, one was confined to bed following a health emergency after enrolling in the project, and another was our second Basset participant who enrolled after community build events had completed.

Unfortunately, COVID-19 statistically impacted these historically underserved and recognized disadvantaged communities harder than many other parts of Los Angeles, and accordingly in observing COVID-19 protocols the TRP Team was not engaged directly with participants over a prolonged and critical time, impacting project outcomes and follow-up. As a result, outcomes are not considered to be as optimal as they may have been. Most participants, however, continue to engage in stewardship and all participants have been in communication with the project team throughout the project period.

Summary of Results of Pre-Construction Soil Testing

See Attachment A - Parkway Basin Water Quality Improvement Project Infiltration Feasibility Report.

Earth auger borings were excavated to a maximum depth of 4 feet below ground surface (bgs) to determine subsurface conditions.

		Depth	Native Soil Type (from top of curb to 4 ft depth)
Parkway Basins Locations	81st Street	2.5 ft	Sandy Silt (moist, brown, soft; fine to coarse grained sand; traces of coarse gravel)
	Whitsett Avenue	4 ft	Sandy Silt (fine sand, brown, moist)
	Flallon Avenue	2.5 ft	Clay (dense, brown, moist; low plasticity)
	Le Borgne Avenue	4 ft	Sandy Lean Clay (fine sand, reddish brown, soft; fine to medium grained sand)

Post Construction Infiltration Testing Results

Infiltration tests were conducted at the Parkway Basins post construction at the 3-, 9-, and 18-month anniversary of the construction completion date within the four following locations:

- 1405 East 81st Street, Los Angeles, CA 90001
- 7319 Whitsett Avenue, Los Angeles 90001
- 8609 Flallon Avenue, Whittier, CA 90606
- 1143 Le Borgne Avenue, Bassett, CA 91746

The purposes of this study are to evaluate the infiltration of the previously constructed parkway basin LID features as they would perform during a storm event, review the project plans and GMED report, evaluate the surrounding environment and existing site conditions, and to provide infiltration test results. See Attachment B for detailed testing methods and results as well as photos capturing the level of vegetation within the basin at the time of testing.

From Attachment B - Final Summary Report (18-Month Anniversary of Construction)

TABLE 1

LID Feature Average Percolation Rate Summary

Testing Series		Average Percolation Rate (in./hr.)		
		3-Month	9-Month	18-Month
LID Feature Location	81st Street	4.3	5.0	2.5
	Whitset Avenue	9.1	10.7	11.0
	Flallon Avenue	1.2	1.9	1.1
	Le Borne Avenue	13.2	14.4	8.9

As shown in photo documentation of each infiltration test event, vegetation levels and other conditions within the parkway basins were found to vary seasonally and from site to site. Vegetation levels within the basins were observed and categorized into minimal, medium, and full, as follows:

		Vegetation Levels		
		3-Month	**9-Month**	**18-Month**
Parkway Basins Locations	81st Street	Minimal, a few young plants	Minimal, a few weeds	Minimal, a few weeds
	Whitsett Avenue	Minimal, a few young plants	Minimal, a few small plants	Minimal, a few small plants
	Flallon Avenue	Minimal, a few young plants	Minimal, a few small plants	Full, significant weeds, and a few of the original plants
	Le Borgne Avenue	Minimal, a few young plants	Medium, a few flourishing medium sized plants	Medium, a few flourishing medium sized plants

As stated in Attachment B, “all features accumulated an abundant number of decomposing organics (leaves, sticks, etc.) from 1 to 3 inches thick. Depending on the thickness and freshness, the organics may have created an impermeable boundary that would slow the infiltration of water. A small amount of plastic and paper debris also found their way into the features but impacted the infiltration capacity of the features much less due to the relatively small quantity of them.”

Analysis of factors that impacted infiltration rates:

- Applicable to all sites—baseline infiltration rates at the 3-month mark were likely due to native soil characteristic infiltration rates.
- 81st Street - Build-up of decomposing organics may have led to decrease in infiltration rate from 9-month mark to 18-month mark.
- Whitsett Avenue—Good native soil infiltration rate. Nominal increase of infiltration rate not due to any change in vegetation growth.
- Flallon Avenue—Poor native soil infiltration rate. Nominal variation of infiltration rate may have been due to increase in weeds.
- Le Borgne Avenue—Good native soil infiltration rate. Maturing of vegetation root system may have increased pore space in soil causing increase in infiltration rate from the 3-month mark to the 9-month mark. Build-up of decomposing organics may have led to decrease in infiltration rate from 9-month mark to 18-month mark.

Long Term Maintenance

During this Project, participants were trained to steward their parkway basins through hands-on educational workshops and the distribution of stewardship guides, as well as one-on-one follow up support at each site. Participants have learned how to water, weed, and mulch landscaped areas, manually trim native plantings, and manually clear debris from the parkway basin inlets.

- Frequency—Site checks and debris clearing were regular prior to the COVID-restricted period beginning March 2020, and after County reopening and reduction in infection rates in Spring 2021. Homeowners were on-site at project locations daily to address outstanding tasks on at least a monthly basis. Participants are encouraged to check for debris before and after storm events. Watering was confirmed to be appropriate before the COVID-restricted period, and will be regular biweekly during any new plant establishment, to monthly or even seasonally depending on local rainfall and length of plant establishment. Trimming, weeding, and mulching occurred seasonally with the exceptions of Spring and Fall 2020. Weeding resumed late Winter 2021, and a re-planting with fresh mulch has been completed Spring 2021 prior to project closeout.
- In Case Participant Unable to Maintain Intended Use of Parkway Basins
    - After 2-year Stewardship Follow-Up period, participants are ultimately responsible for their own parkway basins. TRP contact information has been provided for homeowners, and homeowners have received seasonal information postcards with a continued open invitation to reach out with questions or concerns. Guidance information, material sources, and stewardship documents have been previously provided.
    - County to implement a long-term maintenance plan that prioritizes continuing encouragement and support of participants to fulfill RMC requirement of 20 years maintenance of intended use of parkway basins. County may work with TRP and may also utilize its Road Maintenance Division staff to assist with periodic maintenance of Parkway Basins which are within the County Road Right-of-Way.

ATTACHMENT A

Parkway Basin Water Quality Improvement Project Infiltration Feasibility Report

WATER LA FEASIBILITY ASSESSMENT REPORT

Water LA Phase II Upper LA River Watershed

The River Project (TRP) uses the term Feasibility Assessment to describe analysis conducted to determine where Water LA residential retrofit projects are possible. However, in practice these analyses are refined to suitability assessments: identifying project locations most ideal for project benefits. The extent of the Upper LA River Watershed necessitates the use of available tools to narrow down target communities where projects may return the greatest benefits for investments:

- Water conservation and reuse offsetting imported water
- Water capture for water supply through direct infiltration to groundwater aquifers
- Water capture to reduce polluted surface water runoff
- Habitat, biodiversity, and carbon sequestration through soils and native plant cover
- Tree canopy increase for urban cooling, habitat, and carbon sequestration
- Social awareness and guidance, addressing prevailing and diverse conditions to improve efficiency and adoption of best practices

Project area is limited to the Upper LA River Watershed subregion of the Greater Los Angeles Integrated Regional Water Management Plan, and according to partner and funding provisions prioritizing water supply and associated factors over the Raymond and San Fernando Valley groundwater basins.

Geoprocessing, remote sensing technology, social data, and local and technical experience are applied through four steps at increasingly higher levels of resolution include the following:

- **Geoprocessing**
- **Aerial Map Evaluation**
- **Social Evaluation**
- **Ground-Truthing**

In this process Geoprocessing was applied with the use of ESRI ArcGIS to identify overlap between relevant datasets. The prioritized areas were then compared against additional datasets, and further evaluated with Google Maps and Google Street View to confirm sufficient parkway widths and appropriate geophysical characteristics including existing amenities (sidewalks, parking accommodations, etc.), visible utilities, and flood risk indicators. Narrowed down to a neighborhood-scale the final locations were then evaluated on the ground with physical measurements and photo inventories, confirming the feasibility and suitability of project adoption by physical space available, prevalence of obstacles, and supporting infrastructure and programs such as neighborhood watch groups, nearby schools, businesses, etc.

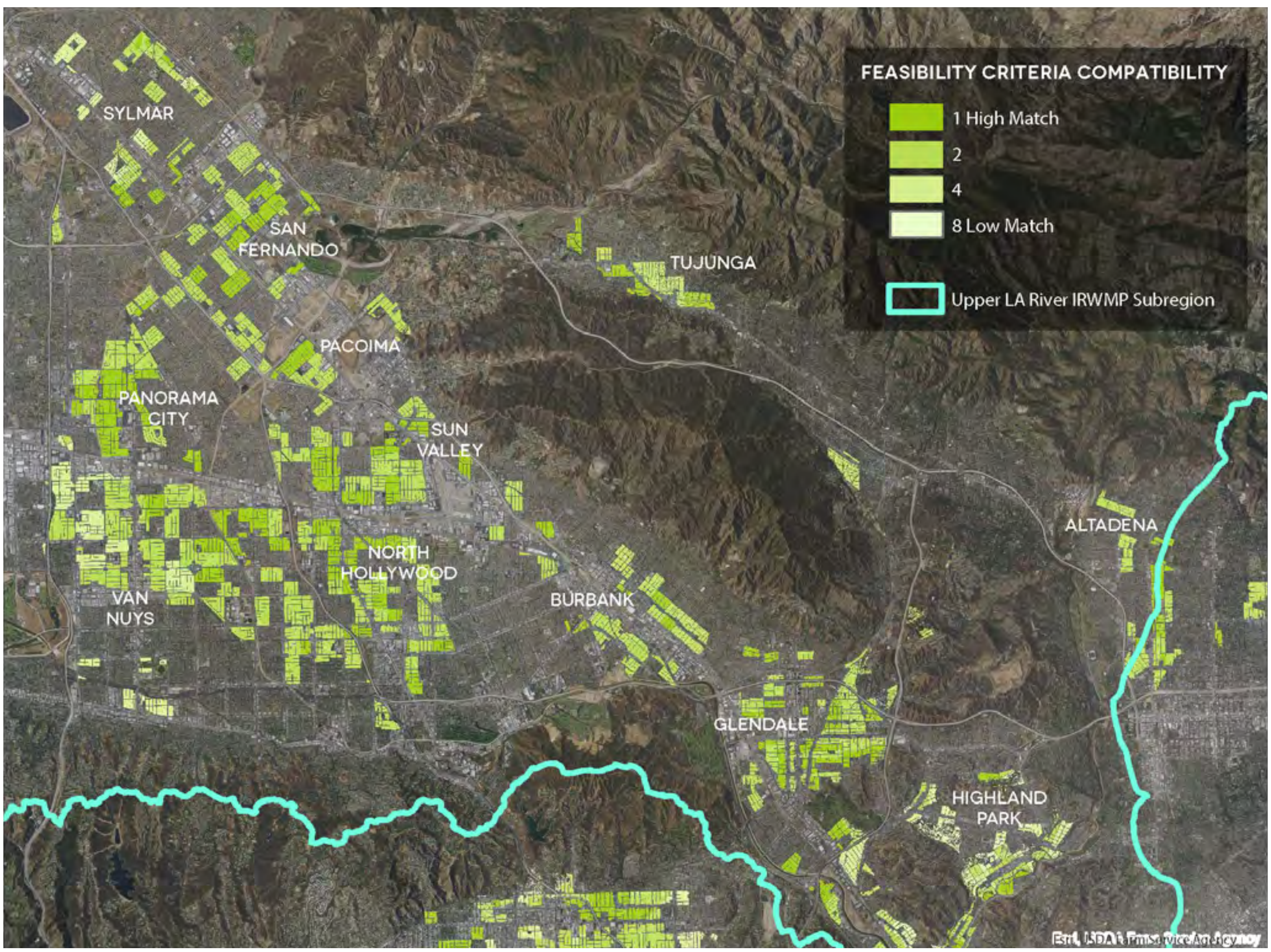
Soil testing will be conducted as participant agreements are confirmed.

Geoprocessing

Geoprocessing is the interpretation and synthesis of geospatial data, typically applied through Geographic Information Systems (GIS). Relevant data is increasingly sophisticated, and provides a means by which large geographic areas may be assessed through calculations and methodical scanning to develop an understanding of features and conditions accurately correlated with actual space. Representations are made by associating coordinates with aerial and satellite imagery, measurements, and compilations of site and regional assessments and evaluations.

An inventory of public and proprietary data has been compiled to evaluate the range of information available to identify gaps and optimize applications. This data includes geophysical and social factors ranging from geology, hydrology, and ecology to socioeconomic status through the US Census, academic and professional models, as well as land use and infrastructure. Using ESRI ArcGIS this data is layered with overlays and selected to identity priority areas. Appropriate data has been selected to reflect key factors to determine target communities, converted to raster datasets, and assigned numeric values to highlight primary and secondary priority factors. The numeric values of these priority factors are multiplied through raster calculation to identify areas where there is greatest overlap with primary categories.

A value of one (1) is assigned to primary factors to establish a baseline, anticipating that some priority factors would have only one value. One (1) always represents overlap with primary priority factors considered most significant for project benefits. A value of two (2) is assigned to secondary factors, which are significant but lower priority. A value of zero (0) is assigned to low-priorities or disqualifying factors. The result is that the highest matching overlap between primary factors are the lowest scores.



Evaluated datasets and associated values for priority factors include the following:

- **Land Use**
- **Disadvantaged Communities (DAC)**
- **Slope**
- **Soil Infiltration Rates**

- **Groundwater Aquifers**
- **Water Quality**
- **Tree Canopy**
- **Habitat**
- **Local Flood Risk**
- **Infrastructure**

Land Use

Data: Single-Family Residential categories as determined by the 2008 Southern California Association of Governments (SCAG) landuse dataset.

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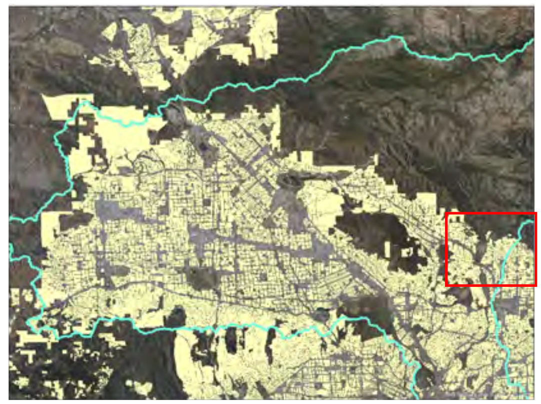


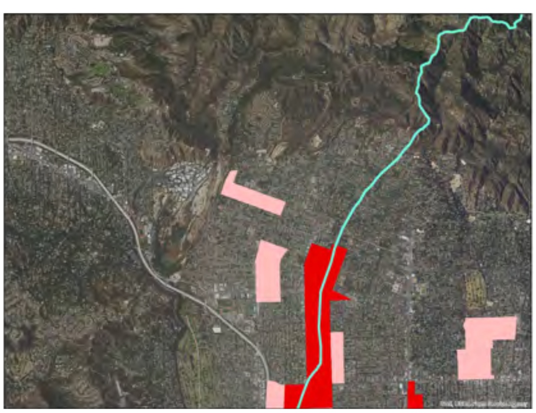
Upper LA River IRWMP Subregion

This is the most recent comprehensive dataset available at the time of this report, and comparisons were made against Google aerial photography and street view to parse individual categories to capture maximum extent of detached properties that were primarily single-family residential neighborhoods, which included the categories Single-Family, Mixed-Use, and Multi-Family. Note that there are some known discrepancies and clear changes over time.

(1) Single-Family Residential Categories
(0) All other land uses

Disadvantaged Communities (DAC)

Data: DWR DAC Mapping Tool—US Census American Community Survey (ACS) 5-Year Data: 2010 - 2014 (with an MHI of $61,489 and hence calculated DAC and SDAC thresholds of $49,191 and $36,893, respectively).



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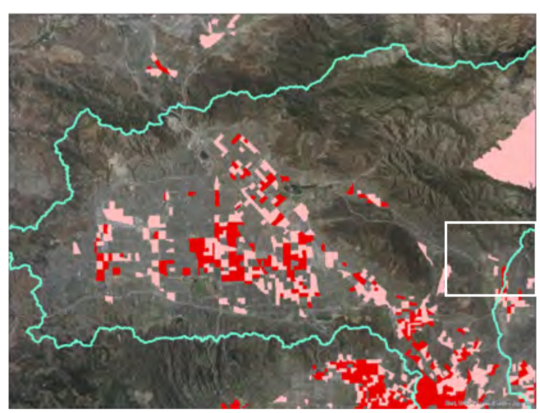
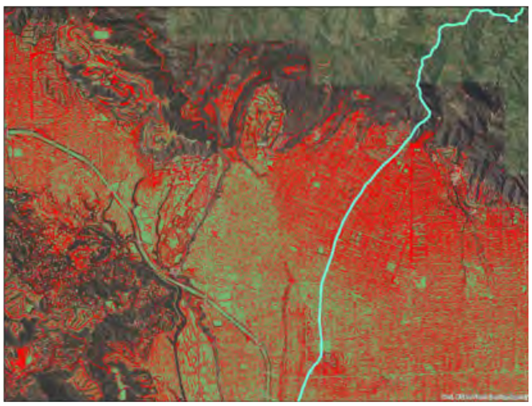


Upper LA River LA IRWMP Subregion

The Proposition 84 IRWM Guidelines (2015) define DACs as 80 percent of the Statewide annual median household income. The US has inventoried this status as of the 2014 update to the 2010 census. DWR provides spatial data extrapolating both the 80th percentile and 60th percentile (termed Severely Disadvantaged Communities [SDAC]) of annual median household income.

(1) Less than 60%
(2) Less than 80%
(0) 0-80 percentile

Slope
Data: Flattest slope, as determined through the Los Angeles Region Imagery Acquisition Consortium (LARIAC) 5-foot Digital Elevation Model (DEM)



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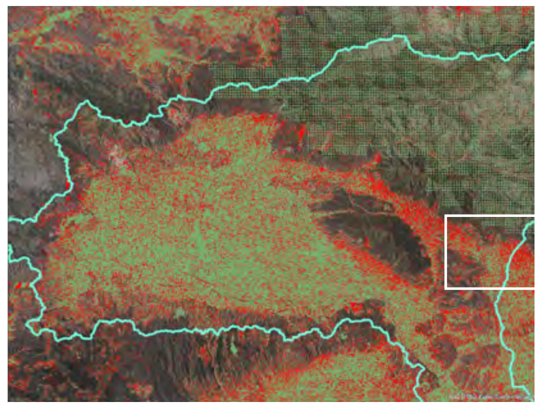


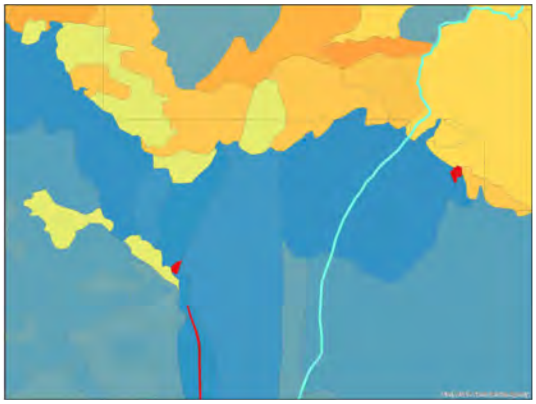
Upper LA River LA IRWMP Subregion

Slope is an important factor in considering feasible project locations for water infiltration projects. Steep slopes are less stable and erode more quickly from water runoff, in extreme instances destabilizing not only installations but surrounding landscapes and infrastructure. The slope ranges are rough approximations to identify locations where an apropriate longitudinal slope of 1-6% (1-2% target) may be likely to be established for completed water infiltration projects.

The following ranges are used to estimate project feasibility and suitability:

(1) 0-6% (up to 6% is considered stable in a natural stream system)
(2) 6-17% (approximate point at which slopes are stable without retention, where conditions are likely to be adaptable to establish appropriate longitudinal slope)
(0) 17%+ (likely to be too steep)

Soil Infiltration Rates
Data: highest infiltrating soil types as identified through the 2017 National Resources Conservation Service (NRCS) soil data.



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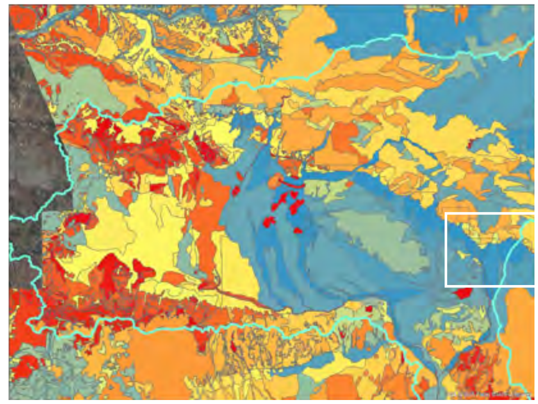


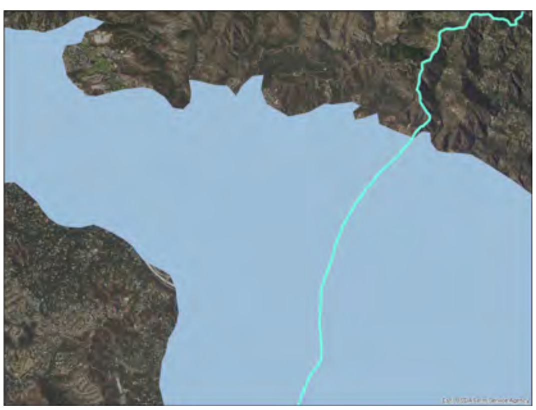
Upper LA River LA IRWMP Subregion

Soil infiltration is the rate at which water moves through soil. In this assessment soil type is the only determination, however, actual infiltration is the sum of many factors including not only the structure and configuration of soil types, but also other elements such as vegetation, organic matter, macro and micro invertebrates, gravity, and sorptivity rates. While these factors may significantly increase infiltration rates, rates are not assumed to be lower than associated with soil types on average, which are reliable indicators. Rates up to 1 inches/hour are considered well-draining by the Los Angeles County Hydrology Manual B. The NRCS update includes infiltration rates much higher than historically recognized, ranging from 0-42 inches/hour.

(1) 5+ inches/hour
(2) 1-5 inches/hour
(0) 0-1 inches/hour

Groundwater Aquifers

Data: Producing areas of groundwater aquifers identified through the USGS, including the Central Basin forebay as provided by the Council for Watershed Health, and excluding non-producing aquifer areas.



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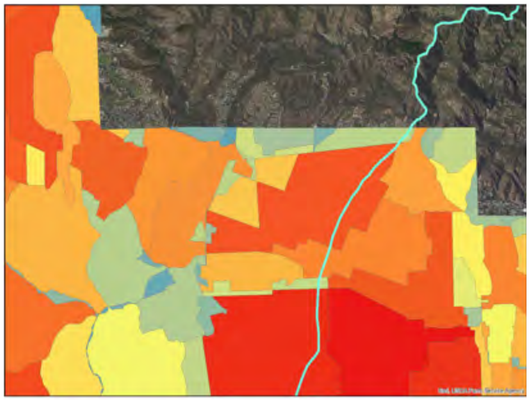
Upper LA River LA IRWMP Subregion

Underlying geology has a significant impact on potential for water captured to infiltrate into groundwater basins. Areas over geologic configurations that can drain directly to groundwater aquifers are essential for project selection, to capitalize on opportunity to optimize infiltration that can result in water supply. While specific localized conditions are not yet well-understood, data is available for approximate extent of producing groundwater aquifers, with consideration for contemporary monitoring and reports.

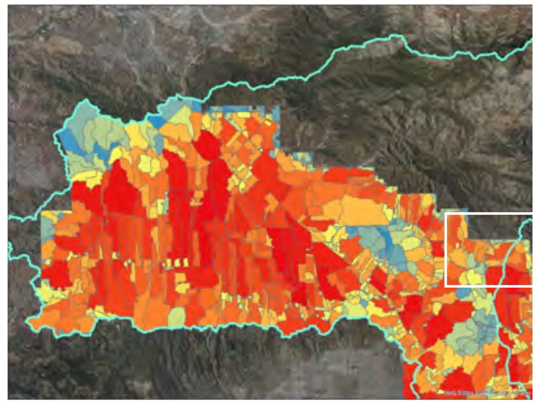
(1) Producing aquifer areas
(0) Non-producing aquifer areas

Water Quality

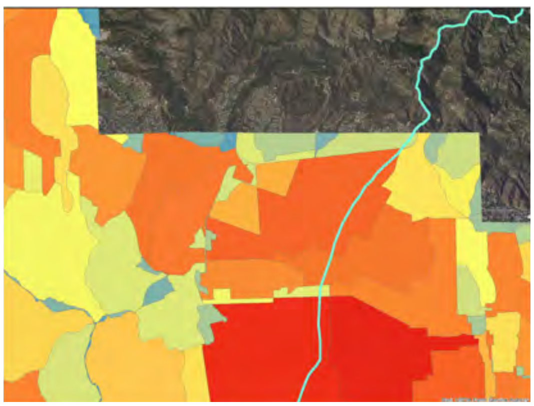
Data: TMDL estimates for bacteria and zinc loads based on land use for LA River Enhanced Watershed Management Program (EWMP).



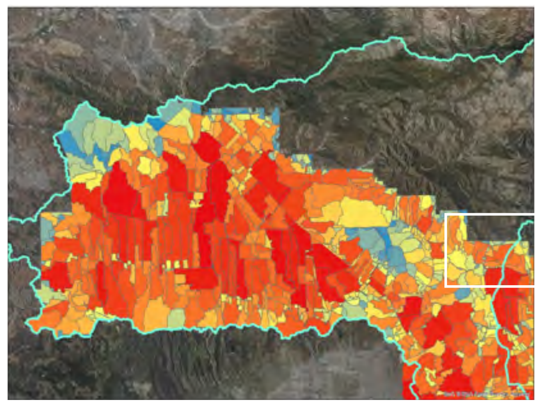
Altadena: Estimated Bacteria Loads



Upper LA River LA IRWMP Subregion: Estimated Bacteria Loads



Altadena: Estimated Zinc Loads



Upper LA River LA IRWMP Subregion: Estimated Zinc Loads

Evaluations of water quality primarily by land use are rough estimates and are not comprehensive across the County. However, these estimates included in the local Upper LA River EWMP have been considered against the high match overlay results, and consistently cover high overlay matches. The Hahamongna Wash of the Arroyo Seco adjacent the Altadena area has a long history of operations, spills, and dumping which have significantly impaired water quality in the area, which can be positively impacted by parkway basin grading to maximize stormwater interface and infiltration through soil and vegetated area.

Tree Canopy

Data: tree canopy as determined through the LA Region Imagery Acquisition Consortium (LARIAC) solar modeling based on 5-foot Digital Elevation Model (DEM) and Color Infrared (CIR) imagery at 4-inch resolution.

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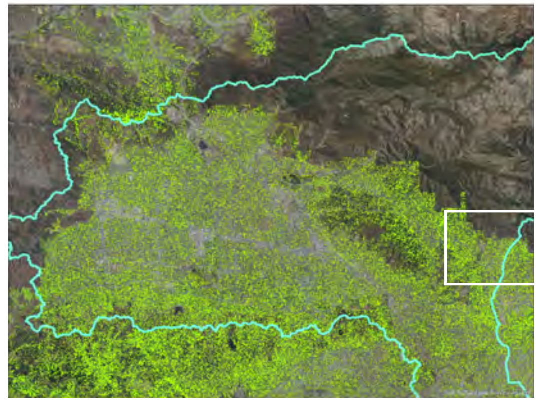


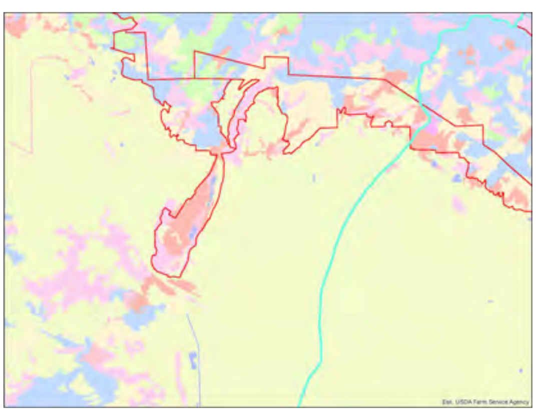
Upper LA River LA IRWMP Subregion

Tree cover has demonstrated benefits for reducing urban heat island effect, sequestering carbon together with soil and other layers of vegetation, and depending on tree selection potential for habitat and local biodiversity. However, trees require greater concentrations of water than rainfall alone provides in most parts of Los Angeles, and roots may negatively impact sidewalks and infrastructure. Water LA projects, particularly parkway basins, provide opportunities to capture water to supplement irrigation, and planting in appropriate areas and below sidewalk level as specified for projects can mitigate upheaval from roots. Additionally, a lack of urban tree canopy has a positive correlation with disadvantaged communities, and to maintain the health of existing trees projects are not to be implemented within established root zones. For these reasons areas with a lack of existing tree canopy are prioritized for feasible and most beneficial locations.

Inconsistent canopy data is a challenge in consistently and meaningfully incorporating into numeric raster calculation. Results of the above layers were compared against recent data, and also considered in the following steps.

Habitat

Data: Significant Ecological Areas (SEAs) established in the LA County General Plan, and landscape cover data through the US Forest Service Gap Analysis Program (GAP) vegetation classification also referencing the California State-recognized *A Manual of California Vegetation* 2nd Edition by Sawyer, Keeler-Wolf, and Evans and by the California Native Plant Society online *Calscape*.



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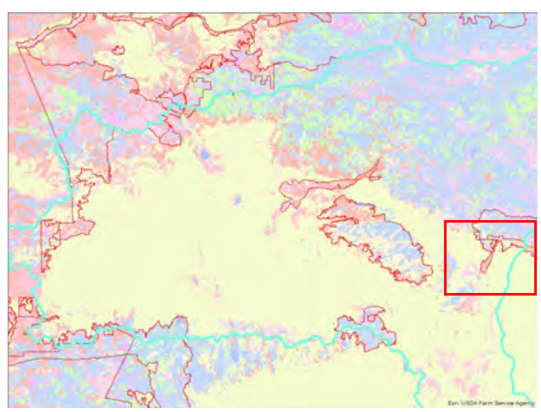


Upper LA River LA IRWMP Subregion

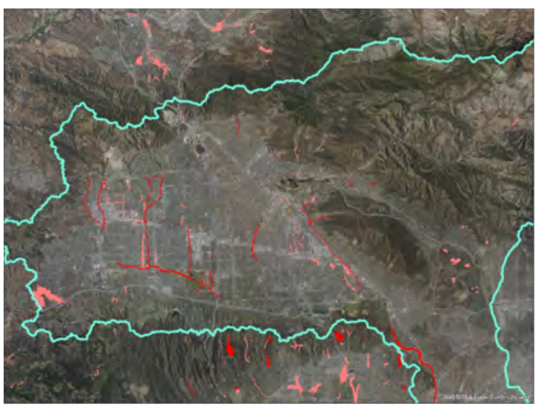
Habitat and biodiversity are priorities as Los Angeles is in an ecological hotspot internationally recognized for both the rich diversity of species and challenges they face for continued existence. However, natural landscapes and wildlife movement cannot be contiguous across the urban area. A patch model of supporting habitat is most appropriate for residential retrofits—which are by definition small, parcel-based distributed projects—and through this iteration of Water LA across urban Los Angeles. A patch model is an approach to provide pockets of features that support habitat for species that have the ability to move between them—in a fragmented urban environment primarily species mobile and either already nearby or that have capacity to be reintroduced.

SEAs are County-recognized priority areas for ecological resources, which surround the San Fernando Valley study area in the San Gabriel Mountains, Santa Monica Mountains, Santa Susana Mountains, Verdugo Hills, Simi Hills, and additional habitat patches. The US Forest Service Gap Analysis Program for this region is dated and low resolution, primarily based on imagery from 2002 and in the San Gabriels from 2009, but still the most current comprehensive data source on landscape cover types to identify appropriate vegetation within and adjacent SEAs supporting local species. Contemporary resources and historic accounts have also been referenced on current and potential species status and coverage. Different measures are appropriate depending upon targets, including target species and plant communities.

Generally proximity to existing resources are ideal for habitat provisions, with localized project installations maximizing locally native plant material for mobile species such as birds and pollinators. However, even where distances from existing ecological resources are significant there are species that can be supported, responding to known inventories. For example, *Asclepias fascicularis* (narrow leaf milkweed) supported by project installations in key areas for monarch butterflies. These datasets will be most relevant for identifying appropriate plant material for individual project designs and installations.

Local Flood Risk

Local flood risk zones are not updated, evidenced by regular observed flooding in local areas well outside the Federal Emergency Management Agency (FEMA) 100-year floodplain.



Differences between estimated flood risk areas and current FEMA flood maps are observed in “Estimates of present and future flood risk in the conterminous United States” published in *Environmental Research Letters* 13 (2018). Without comprehensive data recognition, prioritization of areas with local flooding is addressed primarily in the following steps of Social Evaluation through available interactions, and through *Ground-Truthing* to observe height of curb, depth and presence of low-flow measures in gutters, size of drains, and other indicators of flood potential. Additionally, all areas upstream of flooding areas have opportunity to reduce peak flow and time to peak flow, contributing to management of flood impacts downstream.

Infrastructure

Project locations—as retrofits of existing infrastructure—are limited by existing infrastructure such as width of parkways and extent of utilities. Data on utilities and infrastructure parameters for the study area are limited, and these are the leading factors requiring the need for the steps of *Aerial Mapping* and *Gound-Truthing*. Data is in development for comprehensive parkway widths for the City of Los Angeles, and also for land use at the County level. These and other improvements may greatly streamline assessment processes.

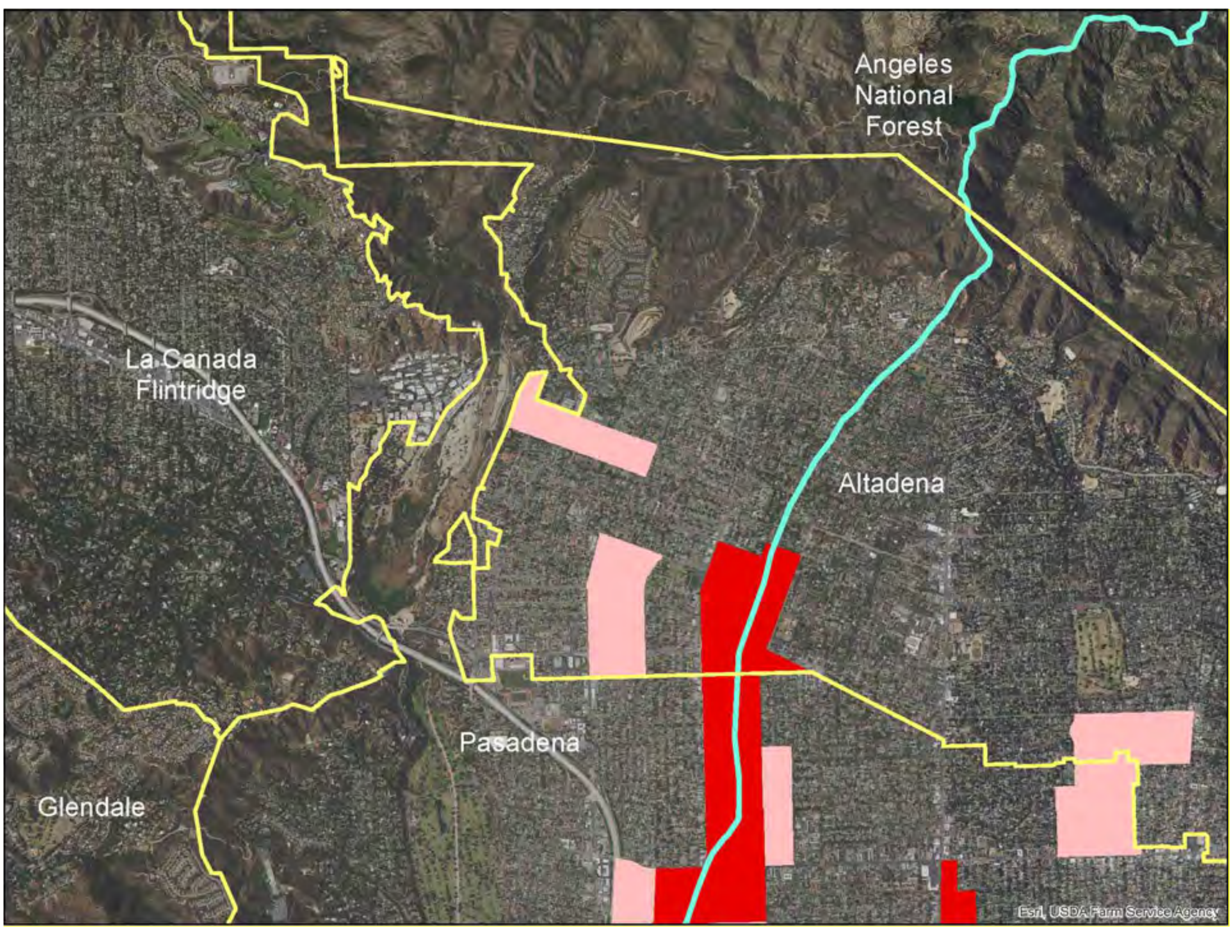
Aerial Mapping

Inventory of infrastructure and utilities are limited, and what inconsistent data exists is largely proprietary. To address this, results from *Geoprocessing* ESRI ArcGIS overlays are evaluated through Google Maps and Google Street View. A systematic manual scan was conducted to trace each street of prioritized areas to identify parkways that appear significant enough (>6') for parkway installations. Additionally, in tandem with GIS evaluation of canopy the canopy layer, and any obvious barriers with existing utilities, parking configurations, or other barriers.

This process was completed in tandem with Social Evaluation, limiting the full extent of areas visually scanned to confirm final target communities.

Social Evaluation

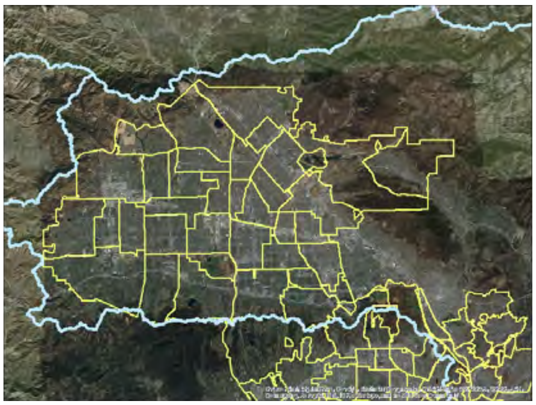
County projects are considered by unincorporated community. Many areas have appropriate physiographic conditions, however, the community of Altadena is the only unincorporated area in the Upper LA River Watershed with significant communities recognized as disadvantaged per the definition provided by Proposition 84 IRWM Guidelines (2015). Three Census Block Groups are included, with the severely disadvantaged block group in the southwest corner of the project area split by the dividing line between the Arroyo Seco subwatershed of the LA River and the Rio Hondo subwatershed outside the IRWMP subregion.



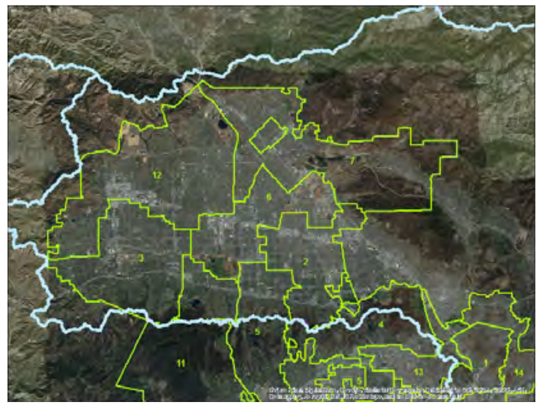
Water LA Feasibility Assessment Report

As part of initial planning communities in the City of Los Angeles have been considered by neighborhood council district. Neighborhood Council Districts initially considered through *Geoprocessing* ESRI ArcGIS overlay priority factors include:

- Pacoima
- Panorama City
- Sun Valley
- Lake Balboa
- Arleta
- Van Nuys
- Mid-Town North Hollywood
- NoHo West
- Reseda



City of Los Angeles Neighborhood Council Districts



City of Los Angeles City Council Districts

Community interest and support are significant to streamline implementation and maximize impact. Indicators of existing interest and support are determined through agency partnerships, local organizing, and TRP experience, including local groups active (e.g. community-based organizations, neighborhood watch groups, and parent-teacher associations), neighborhood council districts, support letters for Water LA submitted by neighborhood Council Districts, relevant planned civic projects for capitalizing on awareness of related goals, and distribution of neighborhoods across priority areas.

Through review of the above factors locations for *Ground-Truthing* are identified. Determinations made include the following as summarized:

- *Altadena*—high overlay match, local community groups active, significant water quality improvement opportunities with a long history of spilling and dumping in and adjacent the Hahamongna Wash of the Arroyo Seco, adjacency to the Arroyo Seco and San Gabriel Mountains high potential for supporting species movement

Future projects funded in the City of Los Angeles may include the following communities:

- *Pacoima*—high overlay match, local community groups active, City of LA Great Street on Van Nuys Boulevard and Green Alleys program are adjacent likely project areas with are likely to compound community awareness of project priorities
- *Panorama City*—high overlay match, Water LA has been in community already compounding awareness, local community groups, and Woodman Median is a high-profile project on which TRP partnered that already has community approval
- *Mid-Town North Hollywood*—high overlay match, local community groups, neighborhood council submitted a support letter for Water LA to be in their community

Ground-Truthing

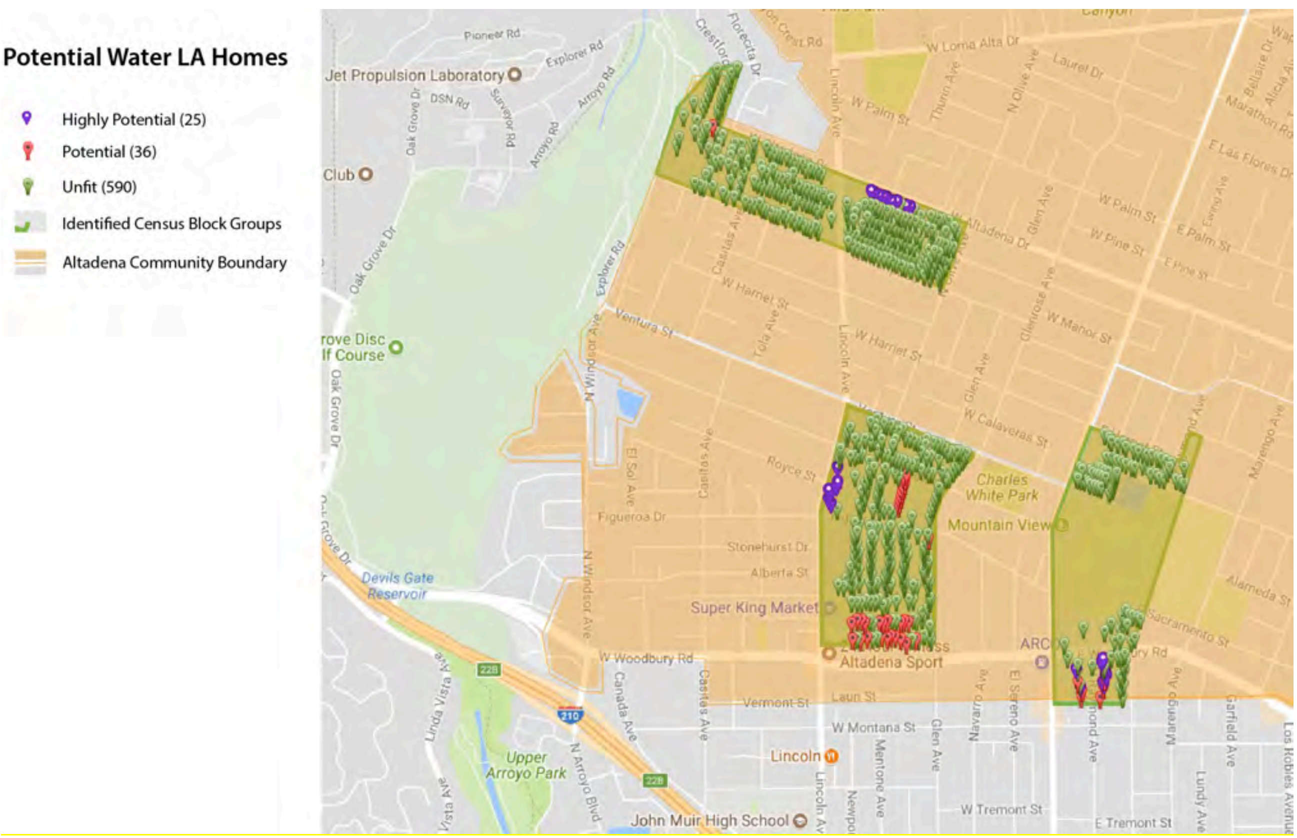
Data and tools to process data are increasingly sophisticated and powerful. However, there are still gaps in available data and low resolution for actual conditions. Additionally, many points of information that may not be easy to access remotely are evident on the ground. Examples of primary physical factors include available space, and other indicators such as infrastructure for flood management and dryweather flow. Examples of social considerations include presence of people, neighborhood action, watch groups, and current practices.

Initial Ground-Truthing: (Site / Neighborhood) Visits
To check the truth of the data with the truth on the ground, initial site visits are made to verify the data as shown above, along with other factors such as specific parkway measurements, utilities locations, tree canopy, and stormwater flows.

Initial site visits determined the following neighborhoods as optimal project areas for outreach:

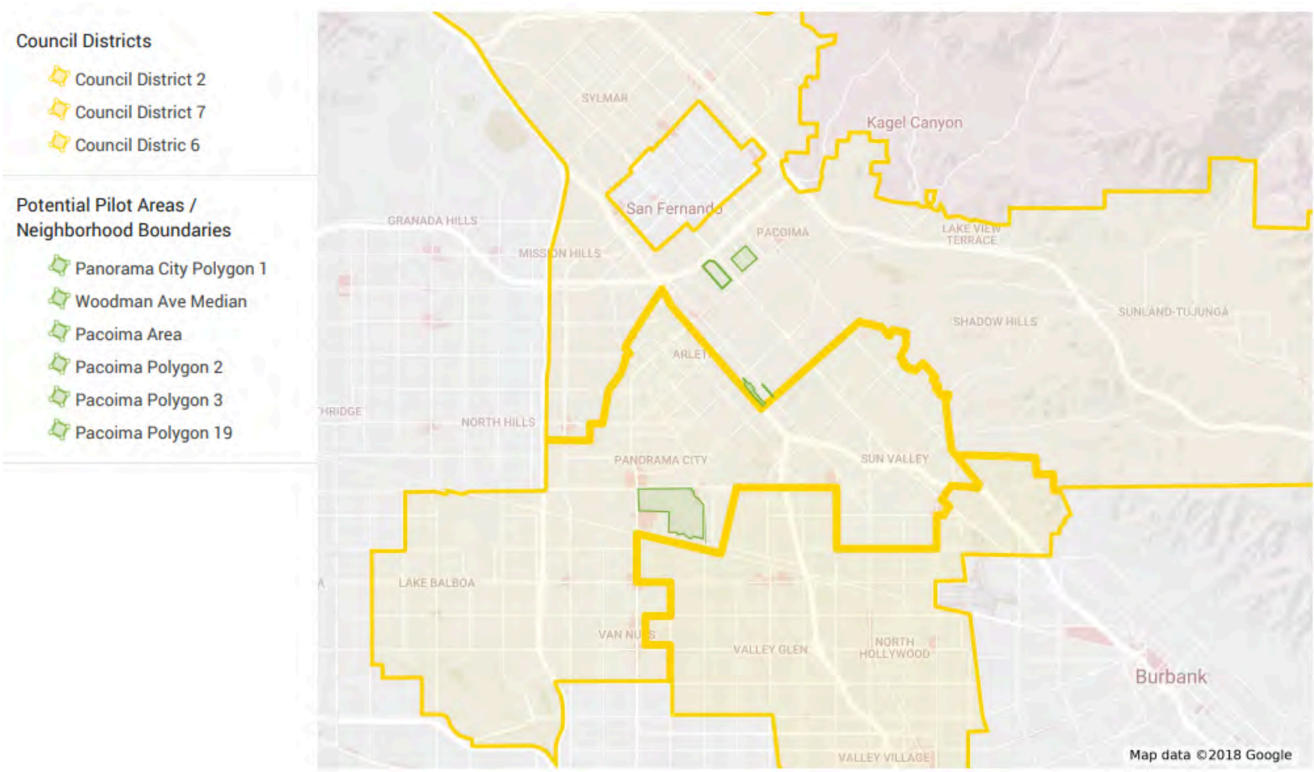
Altadena
Potential homes are defined by width of parkway—minimum 5' width clear of utilities and tree canopy. High Potential Locations are additionally clear of any landscape improvements, with yards demonstrating homeowner dedication to quality landscape care. Each address was evaluated on the ground to confirm a total of 61 homes that qualify for project implementations—36 Potential and 25 Highly Potential.

These streets of these homes will be targeted for community engagement to reach interested participants.



San Fernando Valley

The City of Los Angeles had committed funding for projects in the East San Fernando Valley. The City has failed to meet commitments, however, inventory conducted has identified communities where significant impact could be realized by project implementations. These neighborhoods were walked and confirmed to have both Potential and Highly Potential homes. The following are locations where significant impact could be realized by future funding:



Soils Testing

The average rate at which water infiltrates through soil is the primary factor for soils. This is typically expressed as an hourly rate, with soils across Los Angeles County ranging from 0-42 inches/hour based on 2017 data from the National Resources Conservation Service (NRCS). The County of Los Angeles Department of Public Works requires that sites drain within 48 hours to manage vectors of diseases and pests. Additionally, higher rates of infiltration result in greater benefits for water capture, supply through infiltration to groundwater aquifers where feasible, and conservation through passive irrigation.

As noted above, target communities are chosen for several factors including location over geologic configurations determined to drain directly to groundwater aquifers, and at a high level chosen for being part of soil groups determined to have a high infiltration rate of at least several inches an hour. These locations have a high level of confidence for passing the 48-hour requisite. Further testing will confirm efficacy at a higher resolution at each project location as part of mandatory site assessments. This will include both percolation and soil composition assessments. Permissions are required for this sampling, and accordingly will be conducted following completion of participant agreements as part of the installation phase.

ATTACHMENT B

Infiltration Studies of Existing Low Impact Development Features, Parkway Basin Water Quality Improvement Project, Unincorporated Communities, Florence, West Whittier and Bassett, County of Los Angeles, California

September 30, 2020
J.N. 19-278

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
Geotechnical and Materials Engineering Division
Soils Investigation Section
900 South Fremont Avenue, 4th Floor
Alhambra, California 91803-1331

Attention: Mr. Jose Urquizo

Subject: **Final Summary Report (18-Month Anniversary of Construction) for Infiltration Studies of Existing Low Impact Development Features, *Parkway Basin Water Quality Improvement Project*, Unincorporated Communities, Florence, West Whittier and Bassett, County of Los Angeles, California**

Reference: Revised Proposal for Infiltration Study for Existing Low Impact Development Features, Parkway Basin Water Quality Improvement Project, Unincorporated Communities, Florence, West Whittier, and Bassett, County of Los Angeles, California, dated June 24, 2019

Dear Mr. Urquizo:

Petra Geosciences, Inc. (Petra) is submitting this letter presenting the results of our 18-month anniversary of construction infiltration study for the existing Low Impact Development (LID) features at the following locations:

- 1405 East 81st Street, Los Angeles, CA 90001
- 7319 Whitsett Avenue, Los Angeles, CA 90001
- 8609 Flallon Avenue, Whittier, CA 90606
- 1143 Le Borgne Avenue, Bassett, CA 91746

Petra's scope of services included performing an initial site reconnaissance and an infiltration test at each of the four predetermined, preexisting LID locations. This work was performed in general accordance with the scope of services outlined in our proposal dated June 24, 2019.

FINDINGS

Site Reconnaissance

An initial site reconnaissance was performed at each of the 4 predetermined LID locations (Figures 1 through 4) to evaluate the surrounding environment, photo document, record LID feature dimensions, and to document existing site conditions. Measurements of the LID feature dimensions are presented on

Figures 1 through 4 – Site Map. Current site conditions were also documented during the site reconnaissance and during testing. Descriptions of the observations are presented within Appendix A – Percolation Test Summaries and photos of the pre-testing conditions and as-tested conditions are presented in Appendix B – Site Photographs.

Conditions within the LID features were found to vary seasonally and from site to site. All features accumulated an abundant number of decomposing organics (leaves, sticks, etc.) from 1 to 3 inches thick. Depending on the thickness and freshness, the organics may have created an impermeable boundary that would slow the infiltration of water. A small amount of plastic and paper debris also found their way into the features but impacted the infiltration capacity of the features much less due to the relatively small quantity of them. Increased maintenance would be recommended to remove unwanted debris and increase infiltration potential of each LID feature.

Infiltration Testing

One infiltration test was performed at each of the 4 LID locations (Figures 1 through 4) at the approximate 18-month anniversary of the completion of construction. Tests were performed by flooding the LID features with a clean water source to simulate a storm event. Infiltration testing incorporated approximately 4 hours of continuous test data readings. The first series of readings were taken at the maximum capacity of the LID features, where the LID feature was refilled to capacity before each new reading and stopped after a stabilized percolation rate was achieved within at least 3 readings. Once a stabilized percolation rate was achieved, the LID feature was left to drain until empty while a second series of readings were collected. The results of the percolation tests are presented as “inch per hour” (in./hr.) units and are presented within Appendix A – Percolation Test Summaries. The average percolation rates of each LID feature at the 3-month, 9-month, and 18-month anniversaries is summarized in Table 1 – LID Feature Average Percolation Rate Summary, below.

TABLE 1

LID Feature Average Percolation Rate Summary

Testing Series		**Average Percolation Rate (in./hr.)**		
		3-Month	**9-Month**	**18-Month**
LID Feature Location	81st Street	4.3	5.0	2.5
	Whitset Avenue	9.1	10.7	11.0
	Flallon Avenue	1.2	1.9	1.1
	Le Borne Avenue	13.2	14.4	8.9

This opportunity to be of service is sincerely appreciated. If you have any additional questions or concerns, please feel free contact this office.

Respectfully submitted,

PETRA GEOSCIENCES, INC.

PROFESSIONAL GEOLOGIST
EVAN B. PRICE
No. 2589
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

9/30/2020

REGISTERED PROFESSIONAL ENGINEER
JOHN MONTGOMERY SCHULTZ
G2941
GEOTECHNICAL
STATE OF CALIFORNIA

Evan Price
Associate Geologist
CEG 2589

J. Montgomery Schultz
Associate Engineer
RGE 2941

EBP/JMS/lv

Attachments: Figures 1 through 4 – Site Maps
Appendix A – Percolation Test Summaries
Appendix B – Site Photographs

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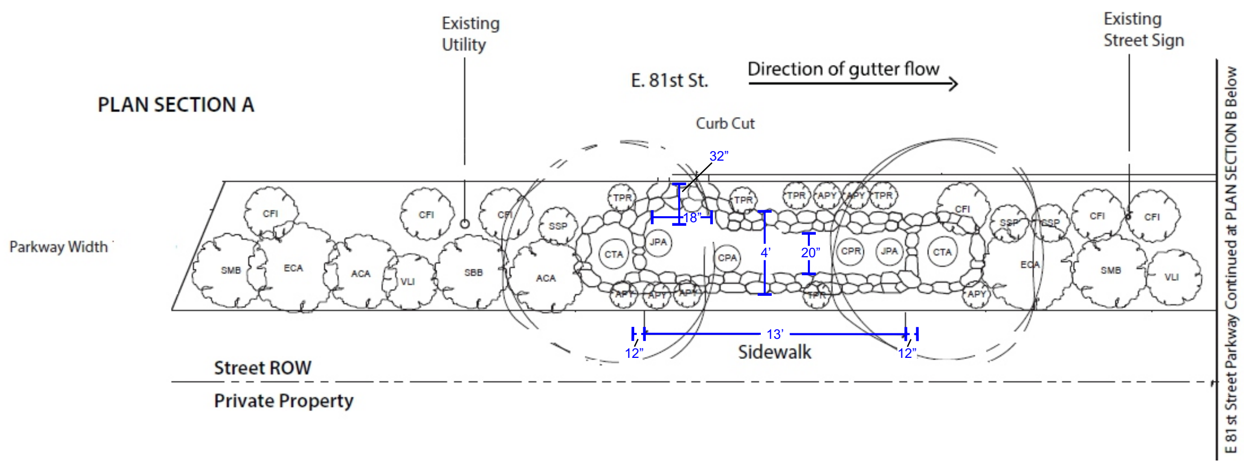
FIGURES



Scale: NTS

Base Map: 1405 East 81st Street, LA, Conceptual Plan

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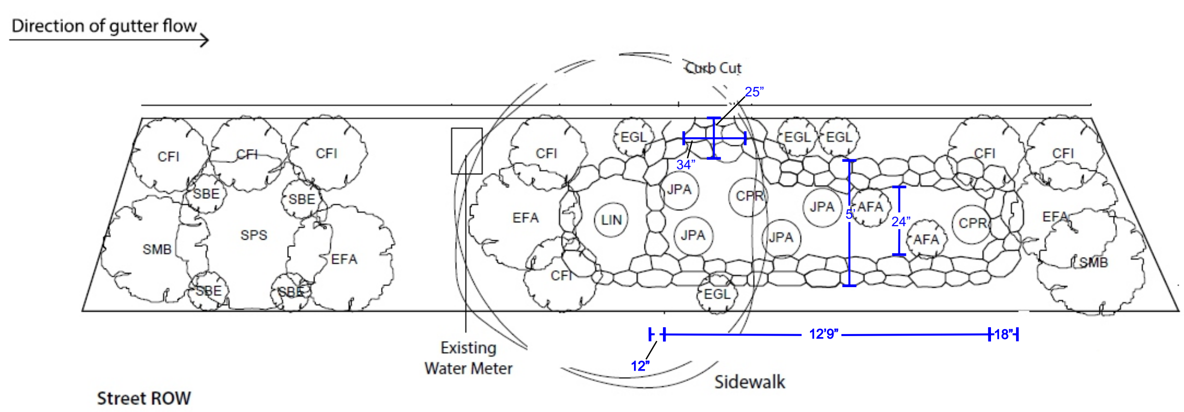
3186 Airway Avenue, Suite K
Costa Mesa, California 92626
PHONE: (714) 549-8921
COSTA MESA TEMECULA VALENCIA PALM DESERT CORONA

SITE MAP

1405 East 81st Street
Los Angeles, California

PETRA GEOSCIENCES	DATE: September, 2020	Figure 1
	J.N.: 19-278	



Base Map: 7319 Whitsett Ave., LA, Conceptual Plan

Scale: NTS

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SITE MAP

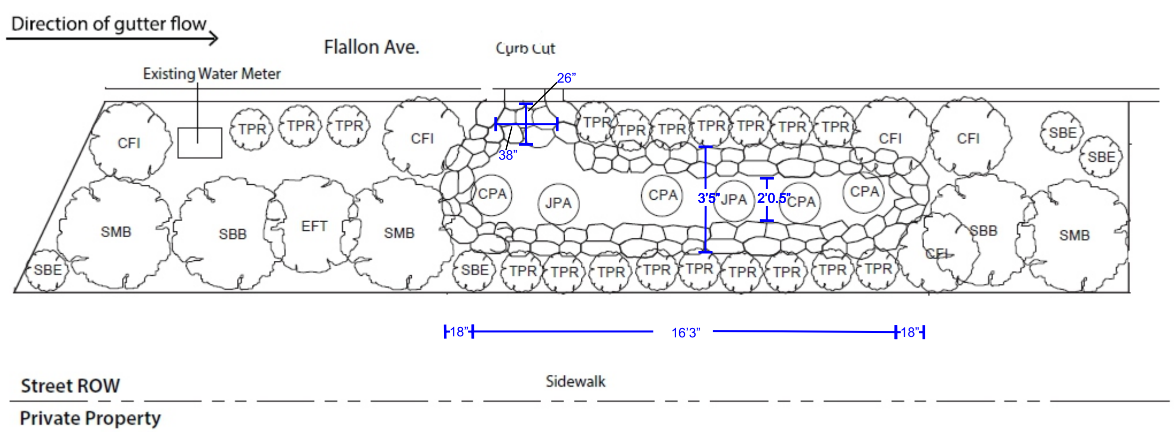
7319 Whitsett Ave.
Los Angeles, California

PETRA GEOSCIENCES

DATE: September, 2020

J.N.: 19-278

Figure 2



Base Map: 8609 Flallon Ave., Whittier, Conceptual Plan

Scale: NTS

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SITE MAP

8609 Flallon Ave.
Whittier, California

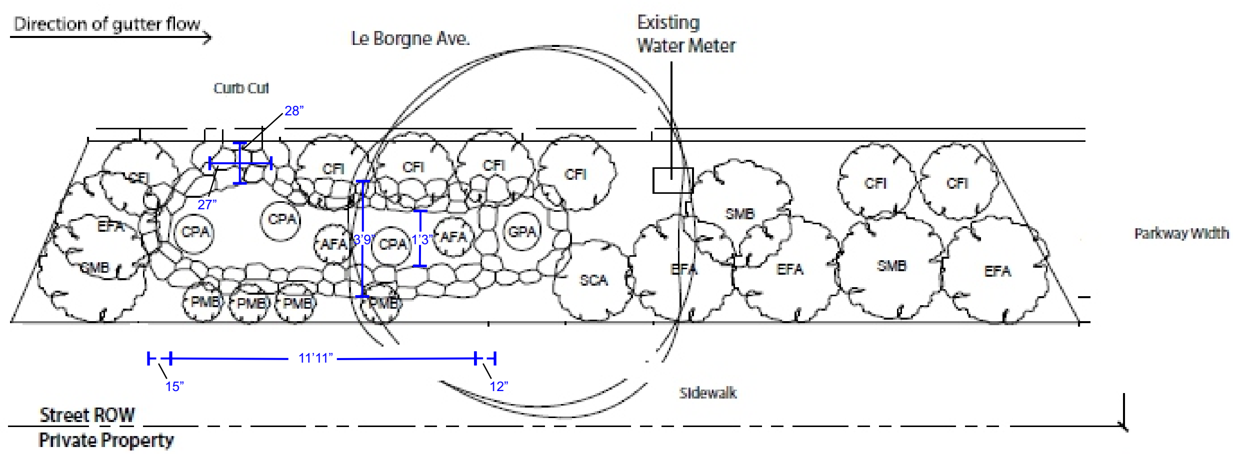
PETRA GEOSCIENCES INC

DATE: September, 2020

J.N.: 19-278

Figure 3

Base Map: Google Earth, 2019



Scale: NTS

Base Map: 1143 Le Borgne, Bassett, Conceptual Plan

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SITE MAP

1143 Le Borgne
Bassett, California

PETRA GEOSCIENCES INC

DATE: September, 2020

J.N.: 19-278

Figure 4

APPENDIX A

PERCOLATION TEST SUMMARIES

Test Location: 1405 E. 81st Street, Los Angeles

Date of Test: 9/1/2020
Weather: Cloudy, 68˚F
Water source: 500 gal water tank w/ clean water

Initial Flooding of LID to Capacity				
Time started	Time Capacity Reached	Estimated Amount of Water Used (gal)	Depth of Water to Capacity (in)*	Estimated Volume of LID (gal)
10:25 AM	10:33 AM	118**	6.00	175

Reading Number	Standing Water Level (in)		Time Started	Time Finsihed	Time Interval (min)	Water Drop (in) Δd	Percolation Rate (in/hr)	Est. Flow Rate (gpm)	Total Vol. of Water (gal)
	Initial	Final							
1	6.00	4.85	10:33	11:30	30	1.2	2.3	14.6	48
2	6.00	4.85	11:07	11:37	30	1.2	2.3	17.0	49
3	6.00	4.75	11:41	12:11	30	1.3	2.5	17.8	54
4	6.00	4.60	12:15	12:45	30	1.4	2.8	17.1	56
Begin Measurements from LID Capacity to Empty									
5	6.00	4.65	12:50	13:20	30	1.4	2.7		
6	4.65	2.80	13:20	13:50	30	1.9	3.7		
7	2.80	1.10	13:50	14:20	30	1.7	3.4		
8	1.10	0.00	14:20	14:36	16	1.1	4.1		

* at constant point of measurement. Depth of water varies through the LID feature

Average Percolation Rate: 2.5 In./Hr.

Condition of LID Feature:

Organic debris (generally leaves) with a few pieces of garbage was noted within the LID basin. Debris generally consisted of small plastic and cigarettes.

Notes:
**Upon arrival to site, urban runoff from previous residential runoff was flowing into the LID basin. Testing was delayed until the runoff stopped, although approximately 2 inches of standing water was present in the LID basin at the start of the initial test.

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Costa Mesa, California 92626
PHONE: (714) 549-8921
COSTA MESA TEMECULA VALENCIA PALM DESERT CORONA

PERCOLATION TEST SUMMARY

Parkway Basin WQIP
County of Los Angeles, California

PETRA GEOSCIENCES INC.

DATE: Sept, 2020
J.N. 19-278

Appendix A

Test Location: 7319 Whittset Ave., Los Angeles

Date of Test: 9/2/2020
Weather: Sunny
Water source: 500 gal water tank w/ clean water

Initial Flooding of LID to Capacity				
Time started	Time Capacity Reached	Estimated Amount of Water Used (gal)	Depth of Water to Capacity (in)*	Estimated Volume of LID (gal)
9:15 AM	9:37 AM	265	7.95	210

Reading Number	Standing Water Level (in)		Time Started	Time Finsihed	Time Interval (min)	Water Drop (in) Δd	Percolation Rate (in/hr)	Average Flow Rate (gpm)	Total Vol. of Water (gal)
	Initial	Final							
1	7.95	3.05	9:37	9:57	20	4.9	14.7	19.1	158
2	7.95	2.80	10:06	10:26	20	5.2	15.5	15.2	157
3	7.95	4.30	10:37	10:57	20	3.7	11.0	15.8	143
4	7.95	4.25	11:08	11:28	20	3.7	11.1	17.2	132
5	7.95	4.25	11:36	11:56	20	3.7	11.1	16.5	134
6	7.95	4.40	12:05	12:25	20	3.6	10.7	15.7	139
Begin Measurements from LID Capacity to Empty									
7	7.95	4.60	12:36	12:56	20	3.4	10.1		
8	4.60	0.80	12:56	13:16	20	3.8	11.4		
9	0.80	0.00	13:16	13:17	1	0.8	48.0		

* at constant point of measurement. Depth of water varies through the LID feature

Average Percolation Rate: 11.0 In./Hr.

Condition of LID Feature:

Light cover of organic debris, genereally trace with a few areas up to 1" thick. No trash debris observed.

Notes:

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PERCOLATION TEST SUMMARY

Parkway Basin WQIP
County of Los Angeles, California

PETRA GEOSCIENCES INC.

DATE: Sept, 2020
J.N. 19-278

Appendix A

Test Location: 8609 Flallon Avenue, Whittier

Date of Test: 9/3/2019
Weather: Sunny
Water source: 500 gal water tank w/ clean water

Initial Flooding of LID to Capacity				
Time started	Time Capacity Reached	Estimated Amount of Water Used (gal)	Depth of Water to Capacity (in)*	Estimated Volume of LID (gal)
8:58 AM	9:09 AM	207	9.90	200

Reading Number	Standing Water Level (in)		Time Started	Time Finsihed	Time Interval (min)	Water Drop (in) Δd	Percolation Rate (in/hr)	Average Flow Rate (gpm)	Total Vol. of Water (gal)
	Initial	Final							
1	9.90	8.95	9:09	9:24	15	1.0	3.8	19.0	33
2	10.00	9.55	9:28	9:43	15	0.4	1.8	19.3	24
3	10.00	9.70	9:45	10:00	15	0.3	1.2	17.9	13
4	10.00	9.90	10:02	10:17	15	0.1	0.4	18.7	12
5	10.00	9.55	10:18	10:33	15	0.4	1.8	21.8	16
Begin Measurements from LID Capacity to Empty									
6	10.00	9.40	10:35	11:05	30	0.6	1.2		
7	9.40	8.60	11:05	11:35	30	0.8	1.6		
8	8.60	8.00	11:35	12:05	30	0.6	1.2		
9	8.00	7.40	12:05	12:35	30	0.6	1.2		
10	7.40	6.75	12:35	13:05	30	0.7	1.3		

* at constant point of measurement. Depth of water varies through the LID feature

Average Percolation Rate: 1.1 In./Hr.

Condition of LID Feature:

Light cover of organic debris and weeds, with minor trash debris observed.

Notes:

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PERCOLATION TEST SUMMARY

Parkway Basin WQIP
County of Los Angeles, California

PETRA GEOSCIENCES INC.

DATE: Sept, 2020

J.N. 19-278

Appendix A

Test Location: 1143 Le Borgne Ave., Bassett

Date of Test: 9/4/2020
Weather: Sunny
Water source: 500 gal water tank w/ clean water

Initial Flooding of LID to Capacity				
Time started	Time Capacity Reached	Estimated Amount of Water Used (gal)	Depth of Water to Capacity (in)*	Estimated Volume of LID (gal)
9:12 AM	9:16 AM	89	6.10	95

Reading Number	Standing Water Level (in)		Time Started	Time Finsihed	Time Interval (min)	Water Drop (in) Δd	Percolation Rate (in/hr)	Average Flow Rate (gpm)	Total Vol. of Water (gal)
	Initial	Final							
1	6.10	2.65	9:16	9:31	15	3.5	13.8	20.6	72
2	6.10	3.25	9:35	9:50	15	2.9	11.4	18.4	54
3	6.10	3.50	9:53	10:08	15	2.6	10.4	18.4	55
4	6.10	3.60	10:11	10:26	15	2.5	10.0	18.6	74
5	6.10	3.80	10:50	11:05	15	2.3	9.2	17.0	52
6	6.10	3.85	11:10	11:25	15	2.3	9.0	17.8	48
7	6.10	3.85	11:29	11:44	15	2.3	9.0	17.2	43
8	6.10	3.85	11:48	12:03	15	2.3	9.0	19.0	44
9	6.10	3.90	12:08	12:23	15	2.2	8.8	18.6	42
Begin Measurements from LID Capacity to Empty									
10	6.50	4.05	12:30	12:45	15	2.5	9.8		
11	4.05	2.50	12:45	13:10	15	1.6	6.2		
12	2.50	1.00	13:10	13:15	15	1.5	6.0		
13	1.00	0.00	13:15	13:23	8	1.0	7.5		

* at constant point of measurement. Depth of water varies through the LID feature

Average Percolation Rate: 8.9 In./Hr.

Condition of LID Feature:

Local resident was observed trimming and clearing LID basin. Basin was observed with trace debris and approximately 1-inch thick layer of organic material.

Notes:

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PERCOLATION TEST SUMMARY

Parkway Basin WQIP
County of Los Angeles, California

PETRA GEOSCIENCES INC.

DATE: Sept, 2020
J.N. 19-278

Appendix A

APPENDIX B

SITE PHOTOGRAPHS

1405 East 81st Street, Los Angeles

LID Feature condition prior to testing

LID Feature during testing

7319 Whitsett Avenue, Los Angeles

LID Feature condition prior to testing

LID Feature during testing

8609 Fallon Avenue, Whittier

LID Feature condition prior to testing

LID Feature during testing

1143 Le Borgne Avenue, Bassett

LID Feature condition prior to testing

LID Feature during testing