

APPENDIX **E**

SMALL SCALE RESIDENTIAL
PRESCRIPTIVE MEASURES
(4 UNITS OR LESS)

Appendix E: Small Scale Residential Prescriptive Measures

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SMALL SCALE RESIDENTIAL (4 UNITS OR LESS)



Fee (QC 711): \$21 _____

Fee (QC 712): \$204 _____

Includes 2% surcharge

Bureau of Sanitation

Your WPD Project Plan Checker:

Counter: **213-482-7066**

Office: **213-485-**

PCIS# _____

The following is a list of outstanding items that are required in order for the project to be approved by the WPD for compliance with the stormwater runoff requirements:

- Complete the Project Summary Clearance Form
 - Provide treatment train BMP to pre-treat and infiltrate/retain/reuse the first 0.75-inch rain event as required by the City of Los Angeles' LID Ordinance and the Regional Board NPDES permit.
 - Obtain infiltration system approval letter from Building & Safety, Grading Division (include soil report and percolation test). Include copy of Approval Letter **on plans**.
 - Show **on plans** detail drawings (w/size & model) of the BMP device(s) including inlet and outlet elevations.
 - Show **on plans** roof drainage layout and connection(s) to treatment system(s). Include riser diagram.
 - Submit completed Covenant & Agreement (C&A) Form with Operation and Maintenance (O&M) Plan for approval and signature prior to County recordation. Terminate old C&A.
 - Submit letter of authority for the individual(s) signing the Covenant and Agreement (original copy).
 - Stencil at all drainage inlets (i.e. catch basins, trench drains). Stencil requirements shall be noted **on plans**.
 - Identify Vegetated areas **on plans**. Add a note "All slopes must be vegetated" **on plans**.
 - Provide Hydrology Calculation to determine the volume (**Vm**) and/or flow rate (**Qpm**) of mitigated stormwater runoff for each treatment system of a sub-drainage area. Show selected BMP type and size.
 - Provide four (4) sets of full size plans with Engineer's wet stamp and signature at the **FINAL** SIGN OFF.
 - Obtain infiltration approval from the Upper Los Angeles Watermaster.
 - Obtain stormwater use approval from County of Los Angeles, Department of Public Health.
 - Return marked up plans with resubmittal.
 - Others:** _____
- _____
- _____
- _____

Project Summary Clearance Form

Permit Application #	_____ - _____ - _____	BMP3 - Type	
Development Type	Redevelopment ? (Y N)	BMP3 - Quantity	
Fee		BMP3 - Size	
Fee Status		BMP4 - Type	
Fee Payment Date		BMP4 - Quantity	
City Facility		BMP4 - Size	
Regulations (circle one)	LID - SUSMP - Site Specific	Contact Person	
APN #		Phone #	
Development Address		Owner	
Zip Code		Owner Phone #	
Watershed (Circle one)	Ballona - LA River - Dominguez Channel - Harbor - Santa Monica Bay	Date Submitted	/ /
Development Impervious Area (Acre)		WPD Staff	
Development Pervious Area (Acre)		Office (circle one)	Figueroa - Van Nuys - West LA - Harbor
Q _{pm} (CFS)		Status	
V _m	_____FT ³ Or _____Gal.	Clearance Date	/ /
BMP1 - Type		Other Permit Applications	_____ - _____ - _____
BMP1 - Quantity			_____ - _____ - _____
BMP1 - Size			_____ - _____ - _____
BMP2 - Type			_____ - _____ - _____
BMP2 - Quantity			_____ - _____ - _____
BMP2 - Size			_____ - _____ - _____

Appendix E: Small Scale Residential Prescriptive Measures

Small Scale Residential BMP Fact Sheets

The following pages provide fact sheets with recommended criteria for the design and implementation of various residential BMPs. These fact sheets have been designed in a simplified, user-friendly way with the intent of achieving optimal performance of the measures. The siting, design, and maintenance requirements in the fact sheets are not exhaustive. Alternative designs may be approved by the City of Los Angeles based on site specific conditions if equivalent pollutant removal performance is provided. New BMPs that are equivalent to those included in the 2011 LID Manual are acceptable if approved by the City of Los Angeles. All BMPs must be designed and implemented to be in full compliance with all applicable sections of the most recent municipal code, including site drainage requirements per the Los Angeles Building code.

The following BMPs for small scale residential projects are included in this Appendix:

- Rain Barrels and Small Cisterns
- Permeable Pavements (or Porous Pavement Systems)
- Planter Boxes
- Rain Gardens
- Dry Wells

Following the BMP Fact Sheets, a reference section with resources for additional information is provided. Applicable vendor information has also been provided.

Also Attached in this Appendix are five maps for guidance purposes in identifying areas that are not suitable for infiltration:

- Figure E-1: Slope Map
- Figure E-2: Landslide Map
- Figure E-3: Groundwater Map
- Figure E-4: Liquefaction Map
- Figure E-5: Hydraulic Conductivity Map

SMALL SCALE RESIDENTIAL RAIN BARREL FACT SHEET



Rain barrels capture runoff from roof downspouts during storms and temporarily store that runoff for later use. They are low-cost, effective, and easily maintained devices that can be sized for a specific volume of water. Retained water may be used for garden watering, and other outdoor non-potable uses. Rain barrel storage can reduce the amount of stormwater pollutants that are picked up and conveyed to local streams and the ocean. In addition, harvested water conserves precious City-supplied potable water and, if directed to unpaved surfaces, can recharge groundwater. Rain barrels are typically made of heavy duty plastic and can range in size from the standard 55 gallons to more than 80 gallons.

How many rain barrels do I need?

The number of rain barrels required to capture runoff from a given roof or impervious area is shown in the following table.

Are Rain Barrels Feasible at My Residence?

Rain barrels are appropriate where the following site characteristics are present:

- Roof areas with downspouts are required.
- A level, firm surface for support of the rain barrel(s) is required. Rain barrels should only be elevated with solid construction materials and kept away from retaining walls as a full 55-gallon rain barrel will weigh over 400 lbs.
- An area where the captured water can be used is required to be present within a reasonable distance from the rain barrel(s).
- Design of an appropriate area for overflow from the barrel is necessary. For sites within, immediately adjacent to, or discharging to an environmentally sensitive area, see the LID Manual for applicable criteria

Roof or Impervious Area (sq.ft.)	Number of 55 Gallon Rain Barrels*
500 – 1,000	4**
1,001 – 1,500	8**

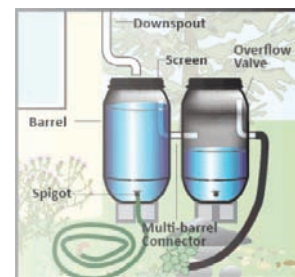
* Or equivalent capture using larger rain barrels.

** Minimum landscape area for 4 rain barrels shall be 200 square feet and the minimum landscape area for 8 rain barrels shall be 400 square feet.

Design Criteria and Considerations

(check all that apply)

- Screens are present on all rain barrel inlets to remove debris and larger particles as the water enters the barrel. Removable child-resistant covers and mosquito screening are in place.
- Barrel is child safe: access is child-proof and the barrel is properly sited and anchored on a stable surface to prevent barrel from tipping over. Remember – each rain barrel weighs approximately 400 lbs when full!
- Above-ground barrels are not located on uneven or sloped surfaces; if installed on a sloped surface, the base where the barrel is installed has been leveled using appropriate construction materials prior to installation.
- Installed rain barrels have not been placed on elevated platforms, decks or porches without consulting local building code officials.
- Overflow outlet is provided and designed to disperse overflow onsite and through stable vegetated areas where erosion or suspension of sediment is minimized.
- Dispersion is directed so as not to knowingly cause geotechnical hazards related to slope stability or triggering expansive (clayey) soil movement. Overflow dispersion will take place at least 3 feet away from public sidewalks, at least 5 feet away from property lines and foundations, and at least 10 feet from building foundations.
- Rain barrels are opaque and dark in color to prevent UV light penetration and discourage algae growth.
- Barrel placement allows easy access for regular maintenance.



Rain Barrel Setup

Operations and Maintenance (check all that apply)

- Rain barrel components will be inspected 4 times annually and following major storm events. Screens, spigots, downspouts, and leaders will be repaired or replaced as needed.
- Rain barrels will be cleaned as necessary to prevent algae growth and the breeding of vectors. Cleaning should always take place on a permeable surface. If vectors are breeding in a rain barrel, the barrel will be drained immediately.
- During dry periods, spigot drains will be left open when barrel is not in use.
- Dispersion areas will be maintained to remove trash and debris, loose vegetation. Areas of bare soil should be rehabilitated to minimize erosion.
- Where possible, effective energy dissipation and uniform flow spreading methods will be used to prevent erosion and aid dispersion.
- If adequate mosquito control is not in place and well-maintained, rain barrels will be emptied as necessary to prevent standing water from remaining in a barrel for more than 3 days, thereby preventing vectors from breeding. If vector breeding occurs as a result of contained storm water or inadequately maintained BMPs, I understand that the Greater Los Angeles County Vector Control District has the ability to fine site owners for violating the California Health and Safety Code (Section 2060 – 2067).
- Rain gutters will be inspected and cleaned at least twice annually.

Owner Certification

“As the owner of the project property, I hereby certify that the above information is true, accurate, and complete, to the best of my knowledge.”

Owner Signature

Date

SMALL SCALE RESIDENTIAL PERMEABLE PAVEMENT FACT SHEET



Permeable Paver Driveway
Photo Credit: City of Los Angeles

Permeable pavement contains pores or separation joints that permits non-concentrated water to flow through and seep directly into a base material. Permeable pavement systems include porous asphalt and concrete, permeable pavers (i.e. permeable interlocking concrete pavers), and restrained systems (plastic or concrete grid systems with gravel-filled voids). These systems reduce runoff and encourage infiltration of stormwater into surrounding soils.

Installing permeable pavement reduces stormwater quantity and filters out contaminants that would otherwise run off into storm drains, creeks, and the ocean. This improves water quality, reduces runoff velocity and volume, and can encourage groundwater recharge. Permeable pavement is available in many different types that offer environmentally friendly and aesthetically pleasing options for driveways, walkways, parking areas, and patios.

Is Permeable Pavement Feasible at My Residence?

Permeable pavement is appropriate where the following site characteristics are present

- Permeable pavements should work well on most residential sites where paved surfaces such as patios and driveways exist. Areas with slopes greater than 3 percent may not be appropriate.
- If the permeable pavement is designed to receive runoff other than incidental rainfall (e.g. roof) it should be installed at least 3 feet from public sidewalks and 10 feet from building foundations.
- Promoting infiltration should be avoided under permeable pavements at sites with expansive, clay-rich soils, or soils susceptible to tunnel erosion.
- At sites with certain characteristics that do not permit infiltration, an underdrain system can be installed to route the water to a storm drain or other BMP (i.e. rain garden). This type of system provides temporary storage, slows runoff, and filters some pollutants.
- There are many types of permeable pavements, including pour-in-place concrete or asphalt, unit paver blocks, and granular materials. Modular types, such as stone or brick pavers and open cell pavers, tend to be good options for residential projects. The use of the surface (i.e. vehicles, foot traffic, recreation), site conditions, aesthetic qualities, price, and maintenance requirements should be considered during the design process.

For sites within, immediately adjacent to, or discharging to an environmentally sensitive area, see the LID Manual for applicable criteria.

How Much Permeable Pavement Do I Need?

Permeable pavement should be sized to capture the runoff produced from the design storm within the gravel subbase of the pavement. This will ensure the capture and infiltration of the design storm volume. The following table should be used as minimum sizing guidance for permeable pavement.

Contributing Area (ft ²)	Permeable Pavement Area 1ft Gravel Subbase (ft ²)	Permeable Pavement Area 2ft Gravel Subbase (ft ²)
500 – 1000	90	50
1001 – 1500	150	80
1501 – 2000	210	110
2001 – 2500*	280	140

* Projects adding roof or impervious areas in excess of 2,500 sq. ft. shall add 60 sq. ft. of permeable pavement (with 1' of gravel subbase) or 30 sq. ft. of permeable pavement (with 2' of gravel subbase) per every 500 sq. ft. of addition.

Design Criteria and Considerations

When installing permeable pavement, the following criteria should be adhered to unless otherwise permitted by the City of Los Angeles. The owner should check all boxes that will be complied with.

- Installed subsurface is an open-graded base of crushed stone, which has 35 to 45 percent pore space, to allow for adequate drainage and storage.
- Site soils have adequate drainage (at least 0.5 inches per hour) and depth to groundwater (5 feet) if water will infiltrate from the open-graded base into site soils.
- Infiltration will not cause geotechnical hazards related to expansive soil movement, tunnel erosion, or slope stability.
- If infiltration hazards are a concern, an underdrain has been installed to drain water into a storm drain inlet or onsite BMP.
- Slope is not greater than 3 percent.
- Flow directed to permeable pavement is dispersed so as not to be concentrated at a small area of pavement.
- Pavers have a minimum thickness of 80 mm (3.14 inches).
- If required by LAFD, the project has been approved by LAFD.
- Pre-fabricated products have been installed per all appropriate manufacturer's specifications. If required, sub-grade soil has been compacted in accordance with product installation specifications.
- Project is in full compliance with all applicable sections of the current municipal code, including disabled access requirements and site drainage requirements per the Los Angeles Building Code.

Operations and Maintenance

Once permeable pavement is installed, the following criteria should be adhered to. The owner should check all boxes that will be complied with.

- Pavement will be inspected after rains for pooling or other visible problems. Surface clogging or movement of modular pavers can cause problems with both drainage and pavement function. Missing sand or gravel between pavers will be replaced as necessary.
- Pavement will be inspected for vegetation. Depending on the type of pavement and growth, vegetation may need to be removed.
- Home owners have talked with the contractor or manufacturer for additional maintenance requirements for their specific installation. Permeable pavement can involve significant maintenance, depending on the type of pavement installed.



Grass Paver Block Walkway
Photo Credit: City of Los Angeles

Owner Certification "As the owner of the project property, I hereby certify that the above information is true, accurate, and complete, to the best of my knowledge."

Owner Signature

Date

SMALL SCALE RESIDENTIAL PLANTER BOX FACT SHEET



Planter boxes function as soil and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. The components normally consist of a ponding area, mulch layer, planting soils, plantings, drainage layer, and an outlet drain. As stormwater passes down through the planting soil, pollutants are filtered by the soil and plants.



Photo Credit: Deco Alfresco

Planter boxes at residential locations should be placed beneath rain gutter downspouts, or they may be placed directly beneath roof drip lines where rain gutters are not present so as to directly capture runoff from the roof. The overflow outlet should discharge away from the building to ensure water does not percolate into footings or foundations. Planter boxes can be designed as a single linear trough or a series of "pots" of various shapes and sizes.

Are Planter Boxes Feasible at My Residence?

Planter boxes are appropriate where the following site characteristics are present:

- Roof areas with downspouts, or roof areas without downspouts that drain runoff to impervious surfaces.
- A level, firm surface away from retaining wall structures for support of the planter(s). Planters should only be elevated with solid construction materials.

For sites within, immediately adjacent to, or discharging to an environmentally sensitive area, see the LID Manual for applicable criteria.

How Large Does My Planter Box Need to Be?

The total size of planter(s) necessary to capture run-off from a given roof area is shown in the table to the right. The table assumes a minimum planter depth of 2.5 feet, with 2 feet of soil and 0.5 feet of storage space, or "free-board", above the soil surface.

Roof Area Tributary to Planter Boxes(sq.ft.)	Total Surface Area of Planter(s) (sq.ft.)
500 – 1,000	32
1,001 – 1,500	52
1,501 – 2,000	108
2,001 – 2,500*	168

* Projects adding roof or impervious areas in excess of 2,500 sq. ft. shall add 20 sq. ft. of planter box surface area per every 500 sq. ft. of additional area.

The table assumes that all runoff generated from the roof area will be directed to the planter(s). If a planter only extends across a fraction of a roof drip line for which it was designed to capture all runoff, one of the following methods shall be implemented:

- Additional planters shall be installed to extend across the entire roof drip line.
- Gutters or other devices shall be installed on the tributary roof to direct all runoff to the planter(s).
- Additional LID BMPs shall be implemented to capture the runoff unaccounted for by the planter(s).

Design Criteria and Considerations

When installing a planter box, the following criteria should be adhered to unless otherwise permitted by the City of Los Angeles. The owner should check all boxes that will be complied with.

- At locations without rain gutters, planters are placed directly below roof drip lines to capture runoff as efficiently as possible.
- At least 6 inches of storage is present between the planting surface and the crest of each planter.
- At locations implementing multiple planters, planters are placed directly adjacent to one another so as to minimize the impervious space between planters.
- Planters are not located on uneven or sloped surfaces.
- Planting soil is at least 2 feet deep.
- Planting soil contains no more than 30% compost.

- Planters have not been installed on elevated platforms, decks or porches without consulting local building code officials.
- The project is in full compliance with all applicable sections of the current municipal code, including drainage requirements per the Los Angeles Building and Safety Code.

Photo Credit: City of Los Angeles



Operations and Maintenance

Once a planter box is installed, the following criteria should be adhered to. The owner should check all boxes that will be complied with.

- Planters will undergo annual plant and soil maintenance typical of landscape care procedures to ensure optimum filtration, storage, and drainage capabilities.
- Following rain events, planters will be inspected to ensure that standing water is

not present in the planter for more than 72 hours (3 days). Ponded water that is not completely drained after 72 hours can cause vector breeding. If vector breeding occurs as a result of contained stormwater or inadequately maintained BMPs, I understand that the Greater Los Angeles County Vector Control District has the ability to fine site owners for violating the California Health and Safety Code (Section 2060 – 2067).

- Pesticide additives will not be used in the planters.

Owner Certification

“As the owner of the project property, I hereby certify that the above information is true, accurate, and complete, to the best of my knowledge.”

Owner Signature

Date

SMALL SCALE RESIDENTIAL RAIN GARDEN FACT SHEET



Rain gardens are simply gardens designed to capture and treat runoff. Stormwater runoff from impervious surfaces is directed toward a depression in the ground, which is planted with flood and drought-resistant plants. As the water nourishes the plants, the garden stores, evaporates, and infiltrates rainwater, reducing runoff and pollutant loads.

Rain gardens are a low-cost, effective, and aesthetically pleasing way to reduce the amount of stormwater that runs off your property and washes pollutants into storm drains, local streams, and the ocean. They are most often planted with native species. While mitigating the environmental impacts of land development, rain gardens also provide attractive landscaping and habitat for birds, butterflies, and other animals.



Photo Credit: City of Los Angeles

Are Rain Gardens Feasible at My Residence?

Rain gardens are appropriate where the following site characteristics are present:

- Edge of rain gardens should be installed at least 25 feet from building foundations, 3 feet from public sidewalks, 10 feet from property lines, and in an area where potential overflow will not run onto neighboring properties. Rain gardens may be located closer than the above mentioned criteria provided
 - 1) A geotechnical report is submitted and approved by LADBS or;
 - 2) A impermeable liner is installed to prevent infiltration under these facilities, and an over flow drain pipe to the street is installed
- Ground adjacent to the building should slope away at a 2% minimum. The rain garden area should receive full sunlight throughout most of the day. A downspout extension or bioswale can be used to convey rain from a roof directly into a rain garden. They are also appropriately sited downstream from a rain barrel overflow line.
- Do not site rain gardens above septic systems.
- The site should have well-drained soil and be relatively flat. Soil amendments can improve infiltration in areas with poor drainage.
- A front or back yard can work well for a rain garden, but look for areas where the slope naturally takes the stormwater. Areas where water naturally flows or ponds are ideal locations for a rain garden. Work with the site drainage and hydrology.
- Areas highlighted in Figures E-1 through E-4 are not ideal for rain gardens and must be approved by the City prior to installation. Areas highlighted in Figures E-5 require soils amendments to increase the natural soils infiltration abilities.

For sites within, immediately adjacent to, or discharging to an environmentally sensitive area, see the LID Manual for applicable criteria.

How Large Does My Rain Garden Need to Be?

Rain gardens should not exceed 300 square feet, and the contributing impervious area should not be more than 4,000 square feet. A general recommendation for a garden with a 6-inch ponding depth is to size the rain garden to approximately 6% of the contributing area. The infiltration rate of water into the soil will affect how the rain garden should be sized; rain gardens will need to be larger in areas with slower infiltration. The following table can be used as general guidance.

Contributing Area (sq.ft.)	Rain Garden Area (sq.ft.)
500 – 700	36
701 – 900	48
901 – 1100	60
1101 – 1300	72
1301 – 1500	84
1501 – 2000*	105

* Projects adding roof or impervious areas in excess of 2,000 sq. ft. shall add 30 sq. ft. of rain garden surface area per every 500 sq. ft. of additional area.

Design Criteria and Considerations

When installing a rain garden, the following criteria should be adhered to unless otherwise permitted by the City of Los Angeles. The owner should check all boxes that will be complied with.

- Location is at least 25 feet from home foundations, 3 feet from public sidewalks, 10 feet from property lines and in an area where potential overflow will not run onto neighboring properties. Rain gardens may be located closer than the above mentioned criteria provided.
 - 1) A geotechnical report is submitted and approved by LADBS or;
 - 2) A impermeable liner is installed to prevent infiltration under these facilities, and an overflow drain pipe to the street is installed.
- Rain Garden has been located to intercept and collect runoff via a downspout or adjacent impervious area. The rain garden is not located underneath the canopy of existing trees.
- Rain garden is appropriately sized to the soil type and drainage area.
- Rain garden is not located over septic systems or shallow utilities. Utilities have been located before digging by

calling Dig Alert at (888) 376-3314. Rain garden is not located within 50 feet of steep slopes (>25%). The rain garden has been built on a relatively flat area. Visit the Navigate LA website for a hillside area map or the Zone Information and Map Access System (Z1 MAS) websites for area maps. Permits are not required for typical residential landscaping projects. If you plan on making major landscaping modifications such as moving more than 50 cubic yards of soil or altering 1 acre or more, contact the Los Angeles Building and Safety Department at (866) 452-2489 for further assistance.

- An overflow has been incorporated in the rain garden such that excess water will flow into another pervious area and away from the home's foundation or neighboring property.
- Detention and infiltration do not (knowingly) cause geotechnical hazards related to slope stability or triggering expansive (clayey) soil movement.
- Drought and flood resistant native plant species are used whenever possible. Invasive or pest species have been avoided. A listing of resources where information on native plant species can be found is in the reference section. A list of invasive species may be found at the California Invasive Plant Council, Southern California Region website (www.cal-ipc.org).

Operations and Maintenance

Once a rain garden is installed, the following criteria should be adhered to. The owner should check all boxes that will be complied with.

- Rain gardens will be irrigated deeply once a week during dry months to encourage root growth and keep plants strong, especially while plants are being established. Plants will be inspected for health and weeds will be removed as often as necessary.
- Rain gardens will be monitored after storm events for signs of overflow. If overflow occurs significantly or often, the size and/or depth of the garden may need to be increased, or other actions to increase infiltration (e.g., soil amendments, underdrain installation) may be necessary.
- Signs of erosion will be repaired immediately. Further erosion can be prevented by reinforcing the

surrounding area with groundcover or using energy dispersion techniques on downspouts.

- Infiltration effectiveness and excess sediment deposition will be monitored annually, preferably prior to the start of the rainy season.
- Standing water will not remain in a rain garden for more than 3 days. Extended periods of flooding will not only kill vegetation, but may result in the breeding of mosquitos or other vecotrs. If vector breeding occurs at a site as a result of contained stormwater or inadequately maintained BMPs, I understand that the Greater Los Angeles County Vector Control District has the ability to fine site owners for violating the California Health and Safety Code (Section 2060 – 2067).
- Rain gutters and downspouts will be inspected and cleaned at least twice annually.

Owner Certification

"As the owner of the project property, I hereby certify that the above information is true, accurate, and complete, to the best of my knowledge."

Owner Signature

Date

SMALL SCALE RESIDENTIAL DRY WELL FACT SHEET



Prefabricated Dry Well
Photo Credit: Canale Landscaping

A dry well is a bored, drilled, or driven shaft or hole designed specifically for the infiltration of stormwater. Simple dry wells may consist of a small excavated pit filled with gravel media, while more advanced dry wells typically consist of a prefabricated storage chamber or perforated pipe segment placed in the ground. These latter types of dry wells offer more storage capacity per unit area since they are not typically filled with media and also conserve land area since they may be buried completely in the ground.

Dry wells are situated to capture runoff from roofs or other impervious areas. They can easily be designed to be directly connected to rain gutter systems to capture runoff from rooftops. Once filled with stormwater, dry wells can accept water at the same rate at which they can dissipate water.

Is a Dry Well Feasible at My Residence?

Dry wells are appropriate where the following site characteristics are present:

- Roof areas with downspouts or other impervious areas are required.
- Sites must have soils suitable for infiltration, with a minimum saturated hydraulic conductivity of 0.3 in/hr.
- Edge of dry wells should be installed at least 25 feet from building foundations, 3 feet from public sidewalks, 10 feet from property lines and an overflow drain pipe to the street is required. Dry wells may be located closer than the above mentioned criteria provided a geotechnical report is submitted and approved by LADBS.
- Do not site rain gardens above septic systems.
- An overflow area that drains to the street is required.

For sites within, immediately adjacent to, or discharging to an environmentally sensitive area, see the LID Manual for applicable criteria.

How Large Does My Dry Well Need To Be?

A dry well should be sized to capture the runoff produced from the design storm over the connected impervious area, with account taken for any gravel or fill material that is used. This will ensure the capture and infiltration of the design storm volume. The following table should be used as minimum sizing guidance for dry wells.

Contributing Area (ft ²)	Dry Well Volume - Without Fill (gallons)	Dry Well Volume - Including Gravel Fill (gallons)
500 – 1000	250	600
1001 – 1500	400	1,000
1501 – 2000	550	1,400
2001 – 2500*	700	1,800

* Projects adding roof or impervious areas in excess of 2,500 sq. ft. shall add 150 gallons of dry well volume (without fill) or 400 gallons of dry well volume (with gravel fill) per every 500 sq. ft. of additional area.

Design Criteria and Considerations



Installed Dry Well Schematic

Image Credit: ABHL Landscape Architects

When installing a dry well, the following criteria should be adhered to unless otherwise permitted by the City of Los Angeles. The owner should check all boxes that will be complied with.

- Edge of dry wells should be installed at least 25 feet from building foundations, 3 feet from public sidewalks, 10 feet from property lines and an overflow drain pipe to the street is required. Dry wells may be located closer than the above mentioned criteria provided a geotechnical report is submitted and approved by LADBS.
- Dry well has been properly located and installed to intercept and collect runoff via a downspout from a roof or adjacent impervious area.
- Dry well is appropriately sized in accordance with the sizing table above.
- For dry wells with gravel fill, gravel used is 2" or greater diameter stone.
- The soil under the dry well has been over-excavated to at least one foot in depth. The soil has been replaced uniformly without compaction, or amended with 15-30% of coarse sand and replaced without compaction.
- A fine mesh screen has been installed on the inlet to prevent sediment and debris from entering the dry well.
- An observation well has been incorporated into the dry well design. The observation well consists of a slotted or perforated pipe (typically PVC), 4-6 inches in diameter, capped with an above-ground, sealable lid.
- An overflow has been incorporated in the dry well such that excess water will flow into the storm drain system or another pervious area and away from any nearby foundations or neighboring properties.
- Detention and filtration do not (knowingly) cause geotechnical hazards related to slope stability or triggering expansive (clayey) soil movement.

Operations and Maintenance

Once a dry well is installed, the following criteria should be adhered to. The owner should check all boxes that will be complied with.

- Water level, drawdown time, and evidence of clogging will be monitored monthly during the rainy season.
- Standing water will not remain in an exposed dry well for more than 3 days. Extended periods of flooding may result in the breeding of mosquitoes or other vectors. If vector breeding occurs at a site as a result of contained stormwater or inadequately maintained BMPs, I understand that the Greater Los Angeles County Vector Control District has the ability to fine site owners for violating the California Health and Safety Code (Section 2060 – 2067).
- Rain gutters and downspouts will be inspected and cleaned at least twice annually.
- If the dry well ever becomes plugged and overflows on a continual basis, the dry well will be excavated and removed. The dry well will be repaired or replaced as necessary, and gravel media fill will be cleaned or replaced to enhance the infiltration capacity.

Owner Certification

"As the owner of the project property, I hereby certify that the above information is true, accurate, and complete, to the best of my knowledge."

Owner Signature

Date

**Only to be used for Single Family Residences
(Less than 1 acre and not in an ESA)**

**STORMWATER OBSERVATION REPORT FORM
LOW IMPACT DEVELOPMENT (LID)**

***STORMWATER OBSERVATION** means the visual observation of the stormwater related Best Management Practices (BMPs) for conformance with the approved LID Plan at significant construction stages and at completion of the project. Stormwater observation does not include or waive the responsibility for the inspections required by Section 108 or other sections of the City of Los Angeles Building Code.*

***STORMWATER OBSERVATION** must be performed by the contractor responsible for the approved LID Plan or designated staff in their employment. Homeowner can also perform the Stormwater Observation if no licensed contractor was involved.*

***STORMWATER OBSERVATION REPORT** must be signed by the contractor responsible for the approved LID Plan and submitted to the City prior to the issuance to the certificate of occupancy. Homeowner can sign the Stormwater Observation Report if no licensed contractor was involved.*

Project Address:	Building Permit No.:
Name Contractor or Owner responsible for the approved LID Plan:	Phone Number:
Name of LID Plan Observer:	Phone Number:

I declare that the following statements are true to the best of my knowledge:

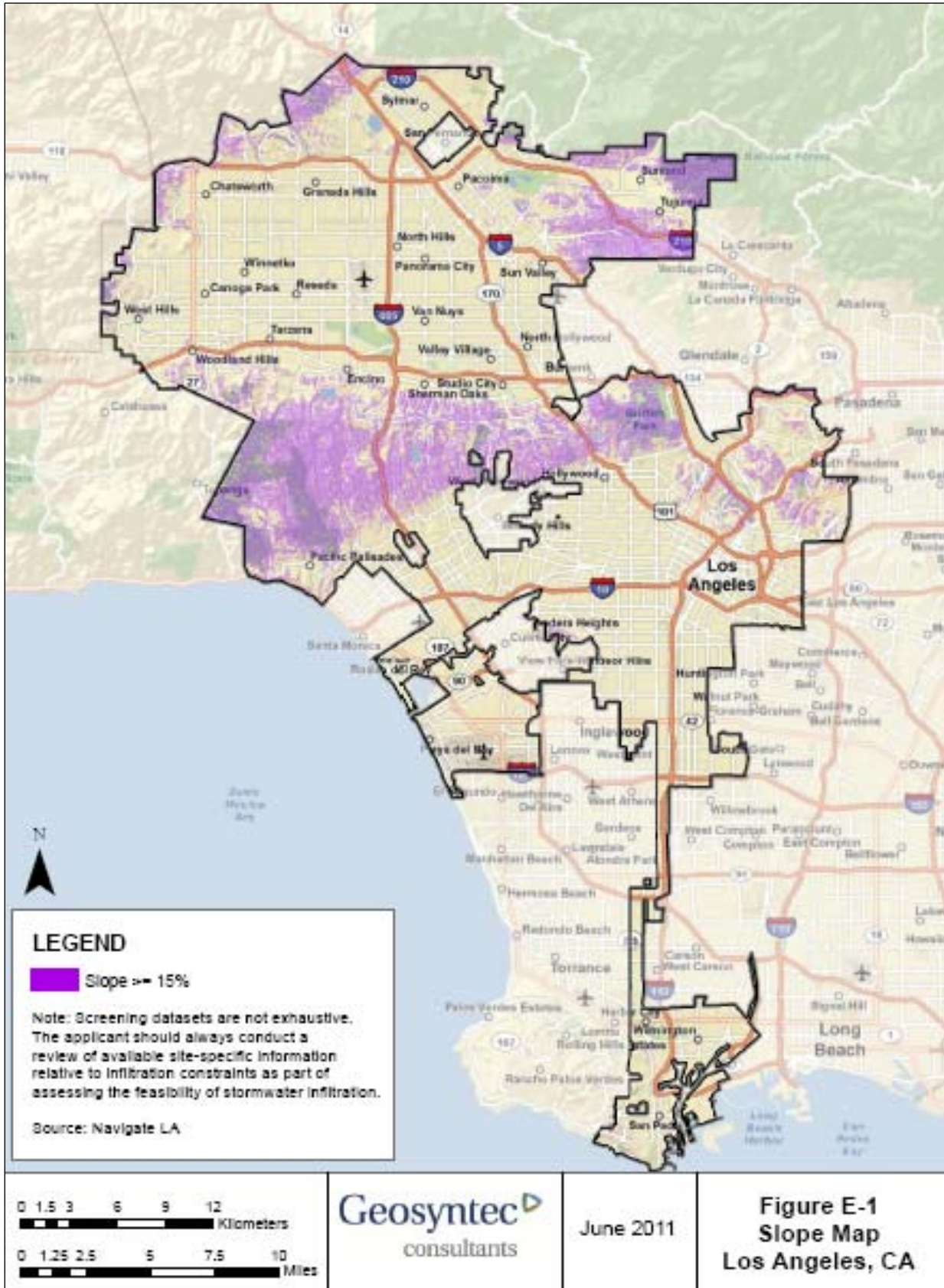
1. I am responsible for the approved LID Plan, and
2. I, or designated staff under my responsible charge, has performed the required site visits at each significant construction stage and at completion to verify that the best management practices as shown on the approved plan have been constructed and installed in accordance with the approved LID Plan.

Signature

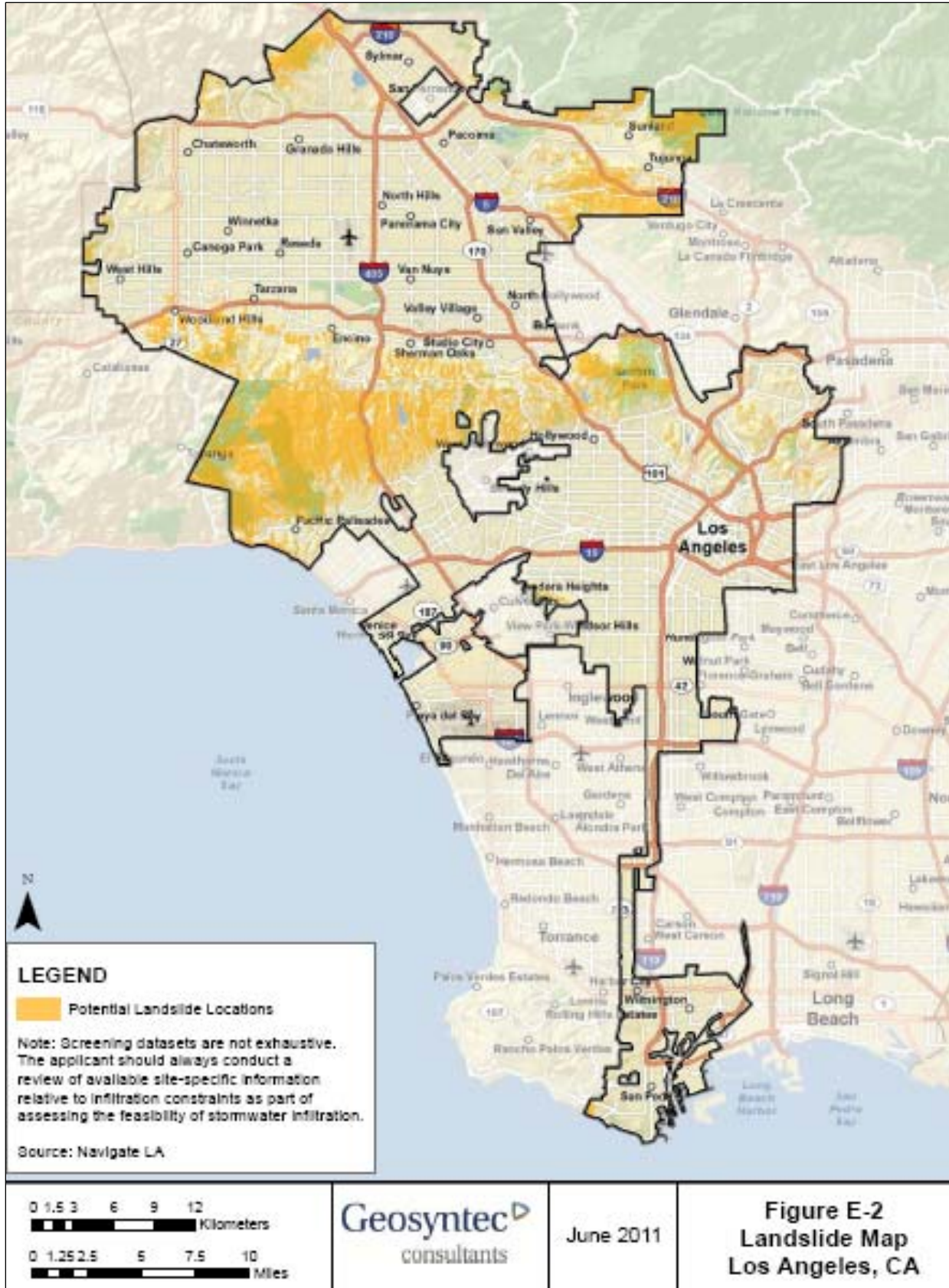
Date

Contractor/Architect/Engineer License

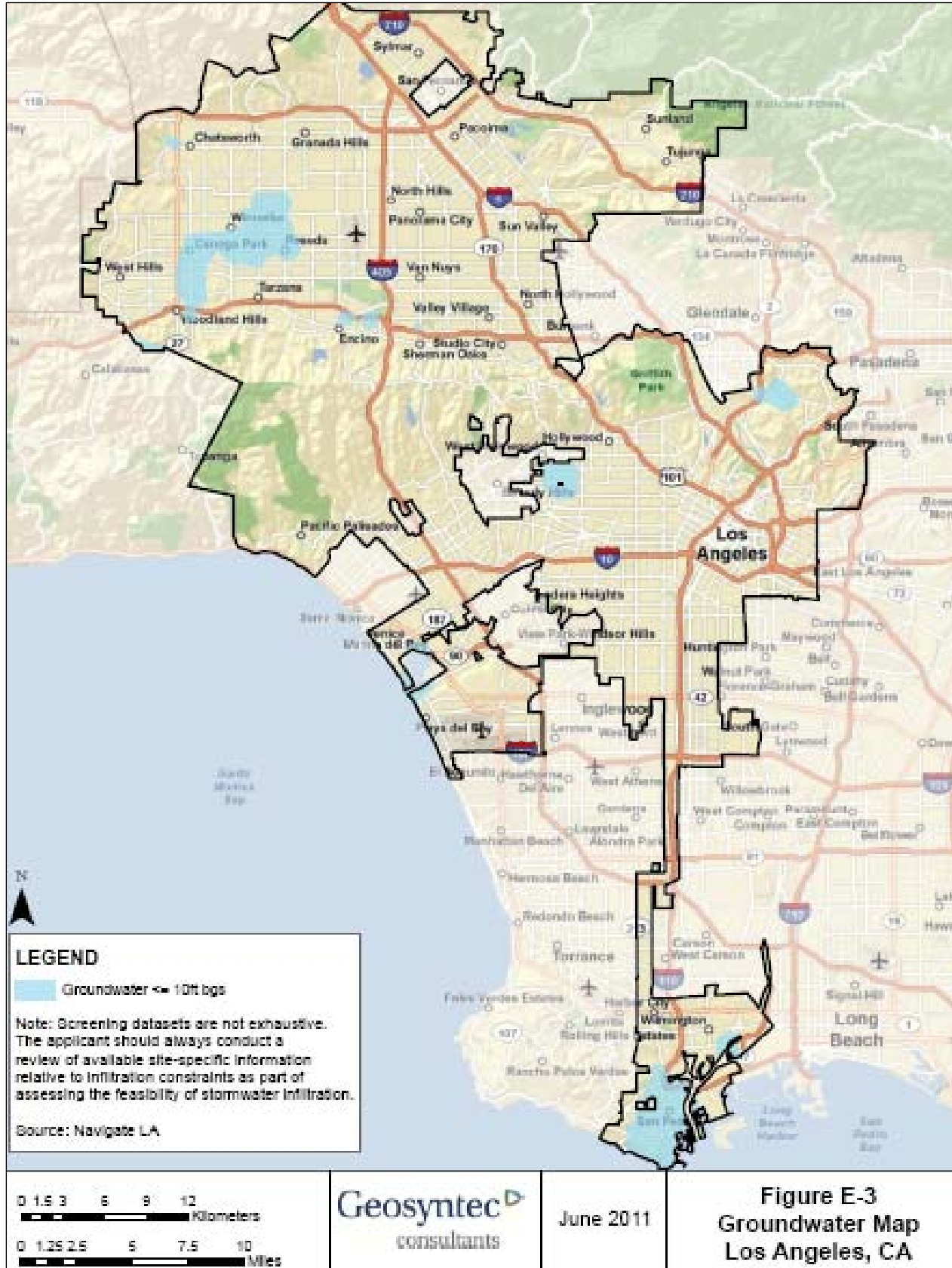
Appendix E: Small Scale Residential Prescriptive Measures



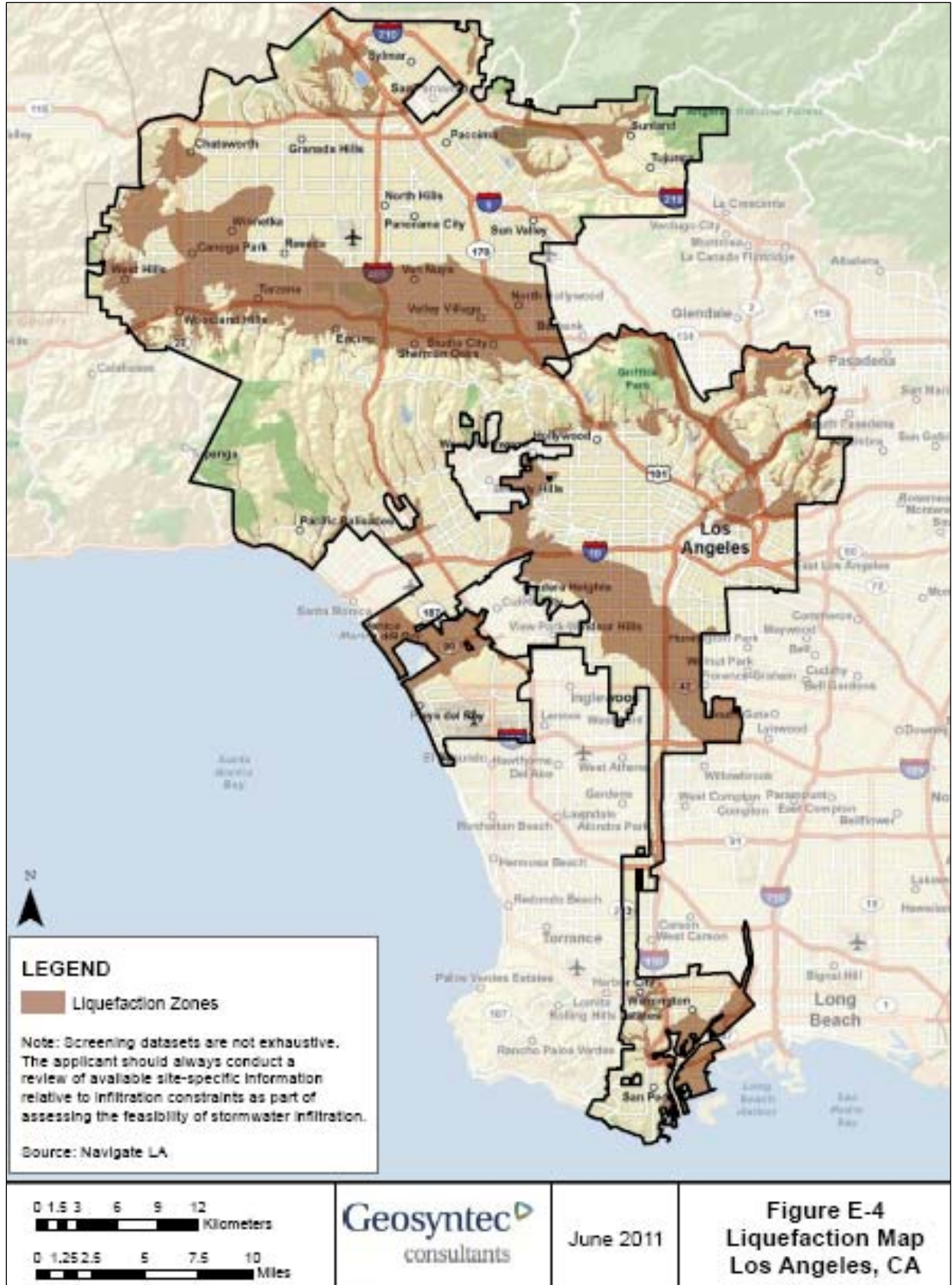
Appendix E: Small Scale Residential Prescriptive Measures



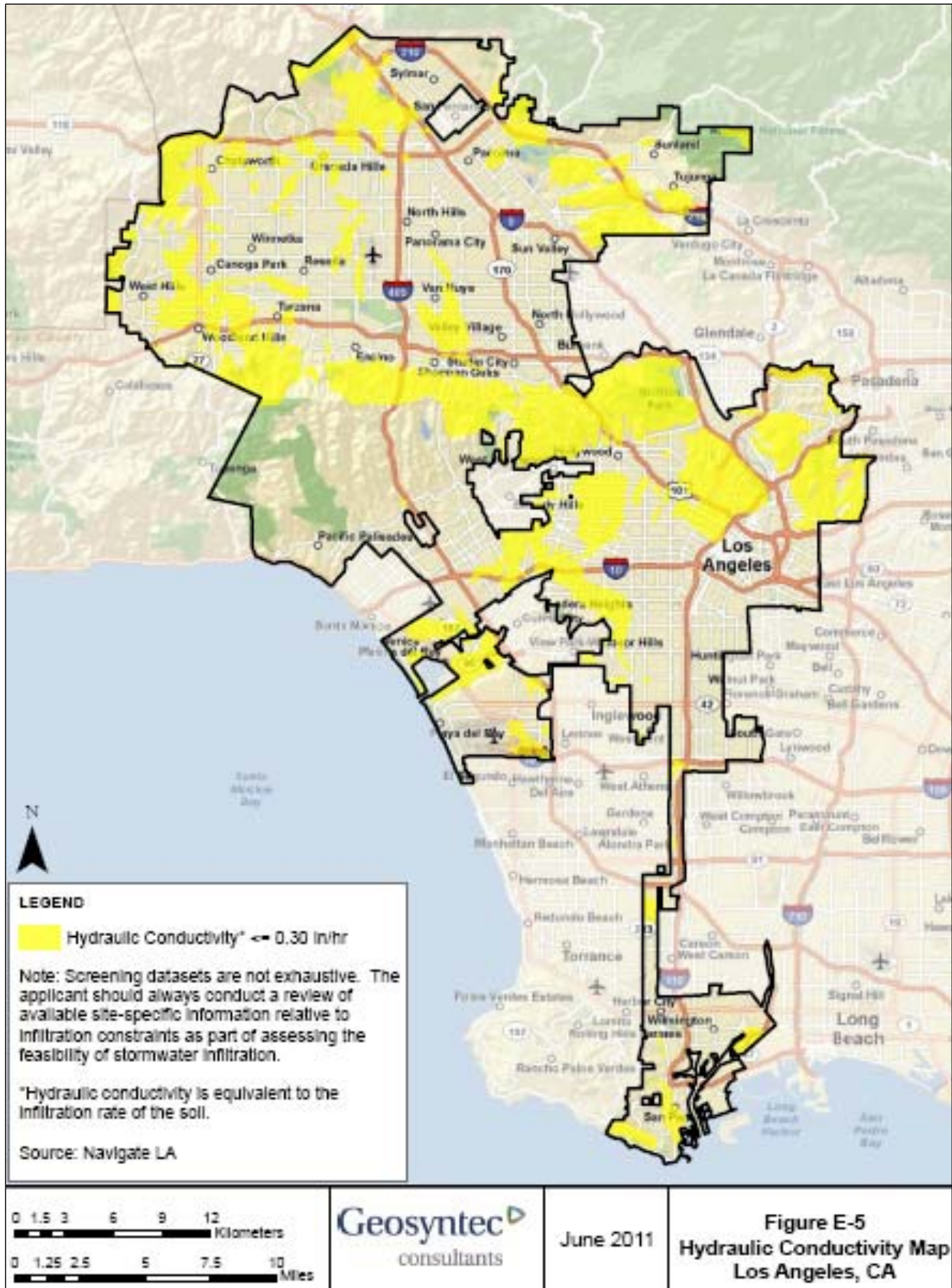
Appendix E: Small Scale Residential Prescriptive Measures



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References

The City of Los Angeles maintains a rainwater harvesting website that provides information on LA's Rainwater Harvesting Program and instructional content for the implementation of various BMPs. The website can be accessed at www.lastormwater.org. A Homeowner's "How-to" Guide, which gives helpful information on rain barrel and rain garden installation, can be found on this website as well.

Additional Manuals

Many LID manuals exist that offer additional insight and information with regards to residential BMP implementation. The following manuals may be consulted to obtain more information on LID practices in Southern California:

- City of Santa Barbara, 2008. Storm Water BMP Guidance Manual. June 2008
- County of Los Angeles, 2009. Low Impact Development Standards Manual. January 2009
- County of San Diego, 2007. Low Impact Development Handbook – Stormwater Management Strategies. December 31, 2007.
- County of Ventura, 2010. Ventura County Technical Guidance Manual for Stormwater Quality Control Measures, Manual Update 2010. November 2010
- Los Angeles Unified School District (LAUSD), 2009. Stormwater Technical Manual. October 2009

Web Resources

A host of information is available on the world wide web to help homeowners design and implement LID BMPs. The following is a brief list of agencies and websites devoted to the protection and conservation of our water resources:

- The City of Los Angeles Stormwater Program (www.lastormwater.org)
- Los Angeles County Department of Public Works, Low Impact Development (http://ladpw.org/wmd/dsp_LowImpactDevelopment.cfm)
- Council for Watershed Health (www.watershedhealth.org)
- The Low Impact Development Center (www.lowimpactdevelopment.org)
- Metro Blooms (Rain garden installation video and information) (<http://metroblooms.org>)
- Metropolitan Water District of Southern California and The Family of Southern California Water Agencies (<http://bewaterwise.com>)
- Rainwater Harvesting for Drylands and Beyond by Brad Lancaster (www.harvestingrainwater.com)
- Rancho Santa Ana Botanic Gardens: California's Native Garden (native plant list and gardening workshops) (www.rsabg.org)
- TreePeople (www.treepeople.org)
- The U.S. Environmental Protection Agency (www.epa.gov/owow/NPS/lid)

Appendix E: Small Scale Residential Prescriptive Measures

Vendor Information

A short list of potential product vendors is provided below. The City of Los Angeles does not endorse any specific product or vendor.

Rain Barrels and Planter Boxes:

- Gutter Guy (www.gutterguyonline.com)
- Hey!Tanks LA (www.heytanksla.com)
- H&H Nursery (www.hhnursery.com/current)
- The Home Depot (www.homedepot.com)
- Rain Barrels International (www.rainbarrelsintl.com)
- Bourjet Brothers Building Materials (www.bourjetbros.com)
- Lowes (www.lowes.com)
- Simply Rain Barrels (www.simplyrainbarrels.com)
- Ultra Greens Nursery (www.ultragreens.com/index.html)
- Water Tanks (www.watertanks.com)

Dry Wells and Underground Storage Solutions:

- Advanced Drainage Systems, Inc. (www.ads-pipe.com)
- Contech Stormwater Solutions (www.contech-cpi.com)
- Cultec, Inc. (www.cultec.com)
- HydroLogic Solutions (www.hydrologicsolutions.com)
- Invisible Structures, Inc. (www.invisiblestructures.com)
- NDS (www.ndspro.com)
- StormTech, Inc. (www.stormtech.com)
- Tensar Technologies, Inc. (www.tensarcorp.com)
- Triton Stormwater Solutions (www.tritonsws.com)

Permeable Pavement:

- Invisible Structures, Inc. (www.invisiblestructures.com)
- Geofill Cellular Concrete (www.geofill.com)
- The Home Depot (www.homedepot.com)
- Lowes (www.lowes.com)
- PermaPave (www.permapave.com)
- Terrafirm Enterprises (www.terrafirmenterprises.com)
- Uni-Group U.S.A. (www.uni-groupusa.org)