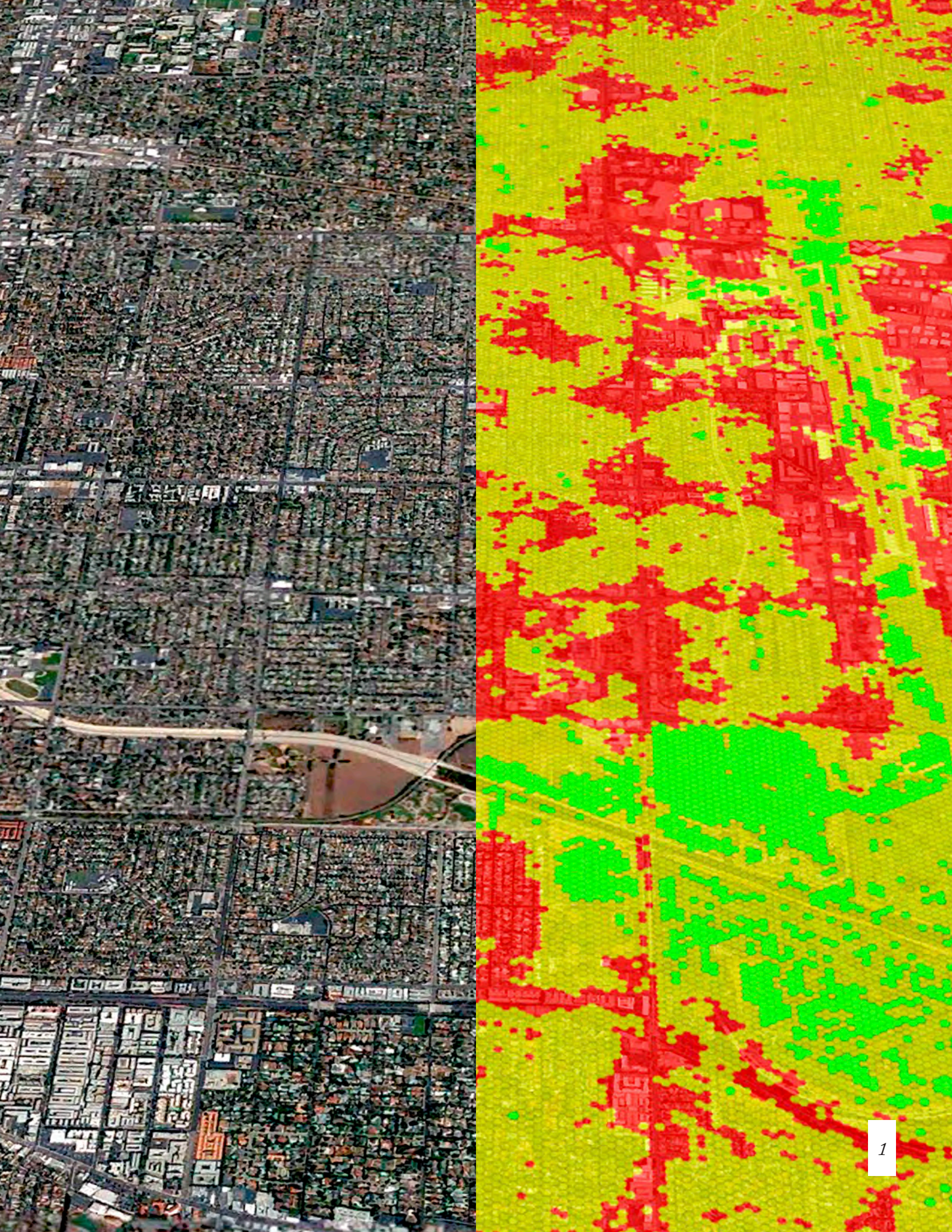


Hazel**DRY** analyzing cities to
create urban **water**
supply solutions that
work, **worldwide**.



We build the world's highest
resolution groundwater
recharge models

for accelerating high-precision
water-resilience decision-
making in water-stressed cities,
worldwide.

[1] Emerging Hydrologic Zones

Hazel's visual analysis of a basin or a city or a site, provides performative zoning insights. Every site is characterized within a spectrum of zones:

Hazel zone 1 (green areas): Infiltrate Here;

Hazel zone 2 (yellow areas): Combination of Capture and Distribute;

Hazel zone 3 (red areas): Capture and Store on Site (infiltration not supported).

For each zone, HazelIDRY automatically suggests a small catalog of green stormwater infrastructures specifically suited to a sites' surface and subsurface conditions. The inventory of green stormwater infrastructures is derived from USEPA legacy data and protocols. Each zone is ranked or prioritized for suitability, gradated along a spectrum of risk/reward, and tied to a catalog of appropriate stormwater management measures.

Our models rapidly analyze urban watersheds identifying thousands of strategic, targeted opportunities for decentralized low-carbon green infrastructure, giving decision-makers early-stage cost-benefit feedback.

Using our geospatial tool, HazelDRY, communities can visualize water-sensitive urban design scenarios and assess specific infrastructural options early in the planning and design phases.

[2] Subsurface Data and Analysis:

Looking beneath the density and complexity of the existing urban surface, HazeDRY provides insight into subsurface conditions necessary to safely and efficiently infiltrate stormwater.

HazelDRY's subsurface infiltration model processes and analyzes multiple soil and geotechnical layers.

The results show the suitability levels of draining water through a given soil layer—(determined by hydraulic conductivity and adjacency to known subsurface risks). By including subsurface risks—soil liquefaction zones, chemical contamination sites HazelDRY constrains the infiltration opportunities, and values them.

This allows the user to locate infiltration opportunities and weigh them against potential risks to water quality, given the user's objectives and risk-tolerance levels.

Figure 2
subsurface

HAZEL
[INFILTRATION MODEL]

INFILTRATION SUITABILITY



HazelDRY puts high-resolution local data, a menu of recognized best management green infrastructure practices, and a proprietary analytic and computational framework into the hands of communities, empowering decision-makers to evaluate and prioritize potential green infrastructure investments from a range of metrics.

HazelDRY evaluates large scale urban watersheds to identify all of most suitable groundwater recharge opportunities.

[3] Surface Data and Analysis

Impervious surfaces (pavements, compacted earth, tile roofs, etc.) largely control the volume of stormwater runoff generated and effect the quality and quantity of stormwater generated (Arnold et al, 1996).

Understanding their make-up is critical for fine-tuning green infrastructure response at both large and small scales.

HazelDRY computes the percentage impervious surface at a very high resolution (0.609 m² or 6.5 ft²) providing an unprecedented level of access to precise surface conditions effecting stormwater run-off.



STORMWATER RUNOFF

(at 10: 212701990)

STORM TYPE
3/4"
(inches / 24 hr)

465,596 gal
1,762.4 m³
1.43 acre-ft

STORM TYPE
85th %
(inches / 24 hr)

580,014 gal
2,195.6 m³
1.78 acre-ft

surface

% IMPERVIOUS AREA



LOT Average

% IMPERVIOUS SURFACE



HazelDRY suggests recognized best practices for each site condition, and evaluates their potential application quantitatively.

Using locally specific data sets and a proprietary computational and analytic method, HazelDRY quantifies:

estimated costs of construction, operation, and maintenance;

jobs created;

energy and carbon density savings;

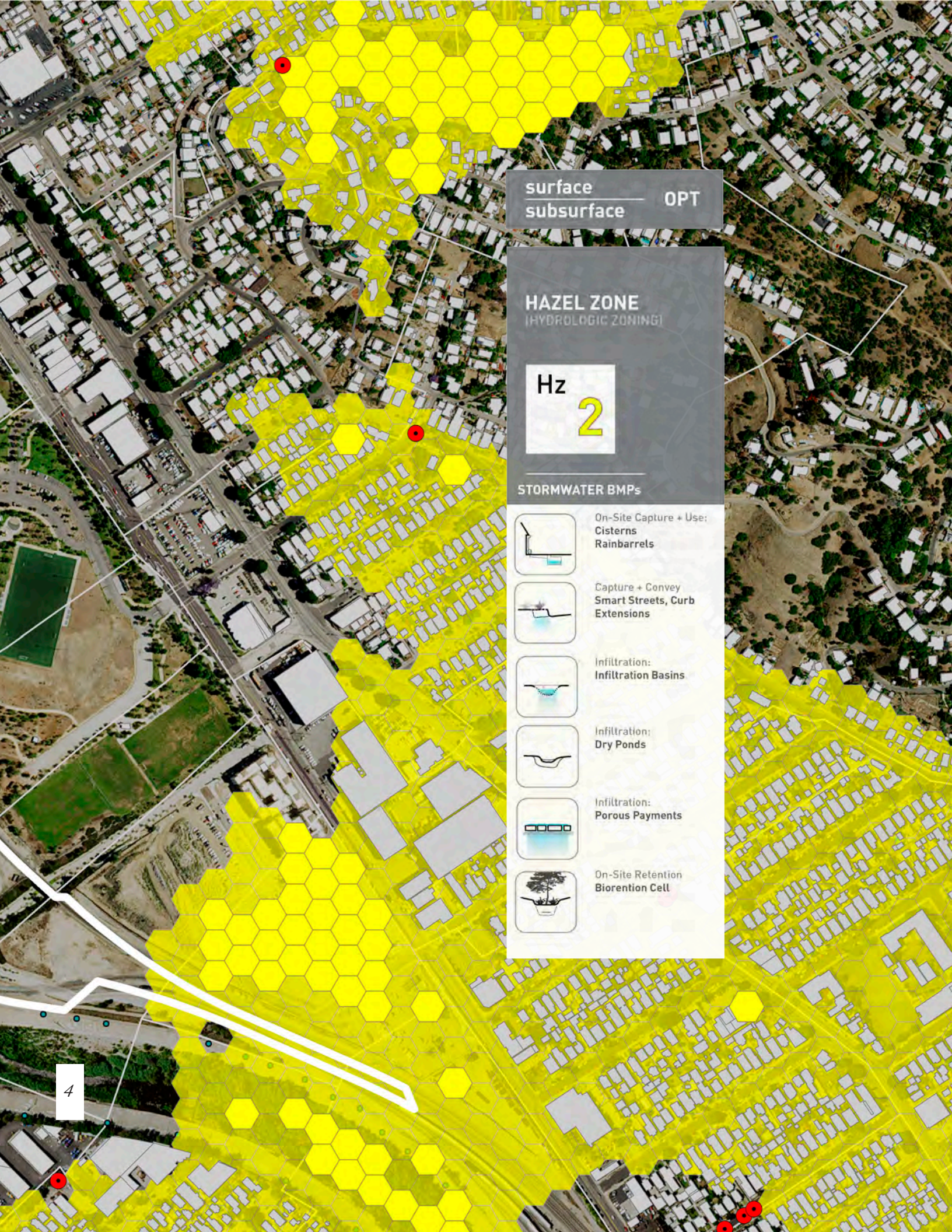
and water quality and risk levels to known contaminants.

[4] Hybrid Infiltration Strategies.

Hazel Zone 2 is moderately appropriate for infiltration. A hybrid approach is appropriate here: some on-site capture and re-use strategies in combination with capture and conveyance to more appropriate Hazel Zone 1 infiltration sites. Green stormwater infrastructure best management practices within this zone include:

- On-site capture and reuse from cisterns and rain barrels;
- Stormwater-smart streets: curb extensions and porous pavements;
- Dry ponds;
- Infiltration basins;
- On-site retention using bio-retention cells.

Additionally HazelDRY provides value prioritization: darker yellow hexagonal markers (930 m² or 10,000ft²) indicate areas of higher priority for action due to less expensive capital costs due from improved surface and subsurface conditions as compared with areas of lighter yellow markers.



surface
subsurface

OPT

HAZEL ZONE (HYDROLOGIC ZONING)

Hz
2

STORMWATER BMPs



On-Site Capture + Use:
Cisterns
Rainbarrels



Capture + Convey
Smart Streets, Curb
Extensions



Infiltration:
Infiltration Basins



Infiltration:
Dry Ponds



Infiltration:
Porous Pavements



On-Site Retention
Bioretention Cell

Where groundwater recharge is not an option, HazelDRY identifies a multi-tiered strategy for above-grade capture, containment, and distribution, along with cost / benefit analysis.

surface
subsurface OPT

HAZEL ZONE
[HYDROLOGIC ZONING]

Hz
3

STORMWATER BMPs

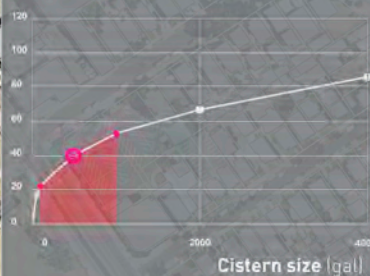


On-Site Capture + Use:
Cisterns
Rainbarrels

PREDICTED DELIVERY
40gal/day

OPTIMAL CISTERN SIZE (gal)
750gal

Ave Daily Harvest
(gal/day)



Our models take the guesswork out of a massively decentralized, low-carbon approach to groundwater recharge, integrating water supply goals with water quality, climate adaptation, economic development, and social equity goals for a renewed and adaptive public realm.

HazelDRY is designed to support and complement the pursuit of other strategic urban objectives, revealing potential alignments between water resilience objectives and transit, housing, and economic development objectives.

[5] Capture and On-site Reuse

On the opposite end of suitability is Hazel Zone 3.

Infiltration is not advisable in Hazel Zone 3 – either because of soil type, geology, chemical contamination, or other risk factors and constraints. Hazel Zone 3 suggests that stormwater be captured, contained, and reused on-site.

Stormwater best management practices within this zone include:

- On-site capture and reuse from cisterns and rain barrels;
- On-site retention;
- Urban forests (as an effective remediation strategy and carbon sink).

