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GEOTECHNICAL CONSIDERATIONS FOR STORM WATER

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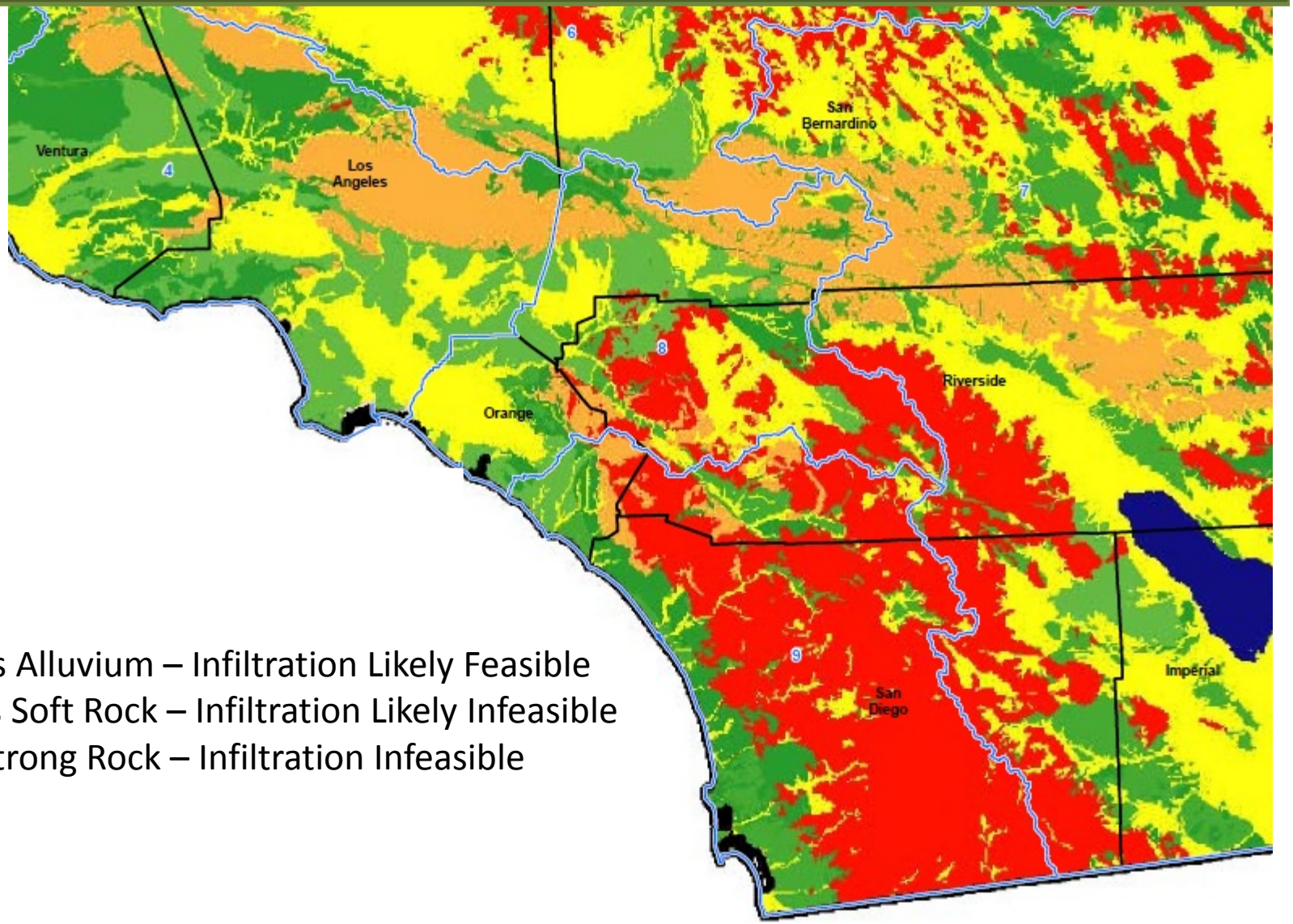
Technical Infeasibility



Yellow Indicates Alluvium – Infiltration Likely Feasible
Green Indicates Soft Rock – Infiltration Likely Infeasible
Red Indicates Strong Rock – Infiltration Infeasible

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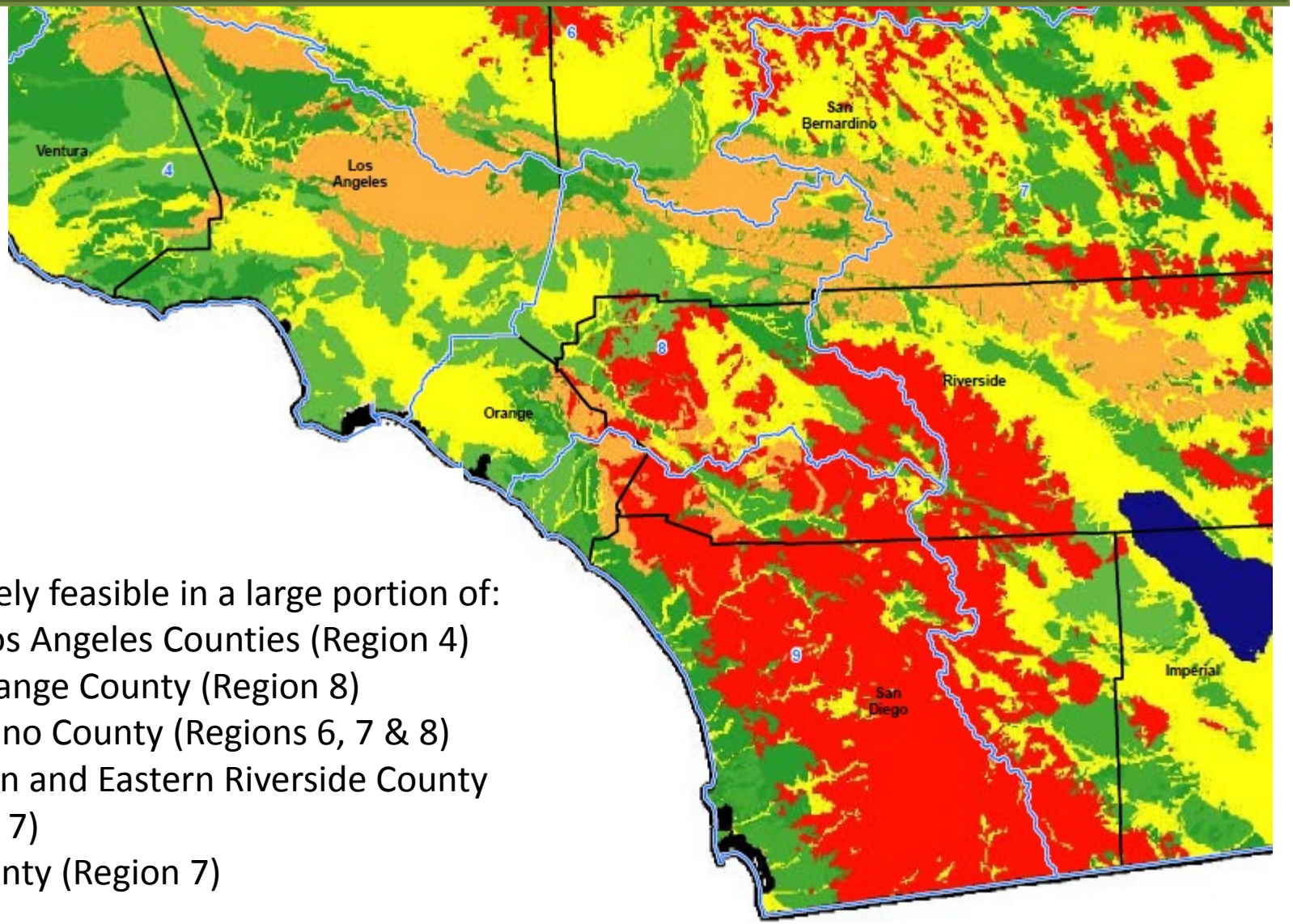
Technical Infeasibility



Infiltration is likely feasible in a large portion of:

- Ventura & Los Angeles Counties (Region 4)
- Northern Orange County (Region 8)
- San Bernardino County (Regions 6, 7 & 8)
- Northwestern and Eastern Riverside County (Regions 8 & 7)
- Imperial County (Region 7)

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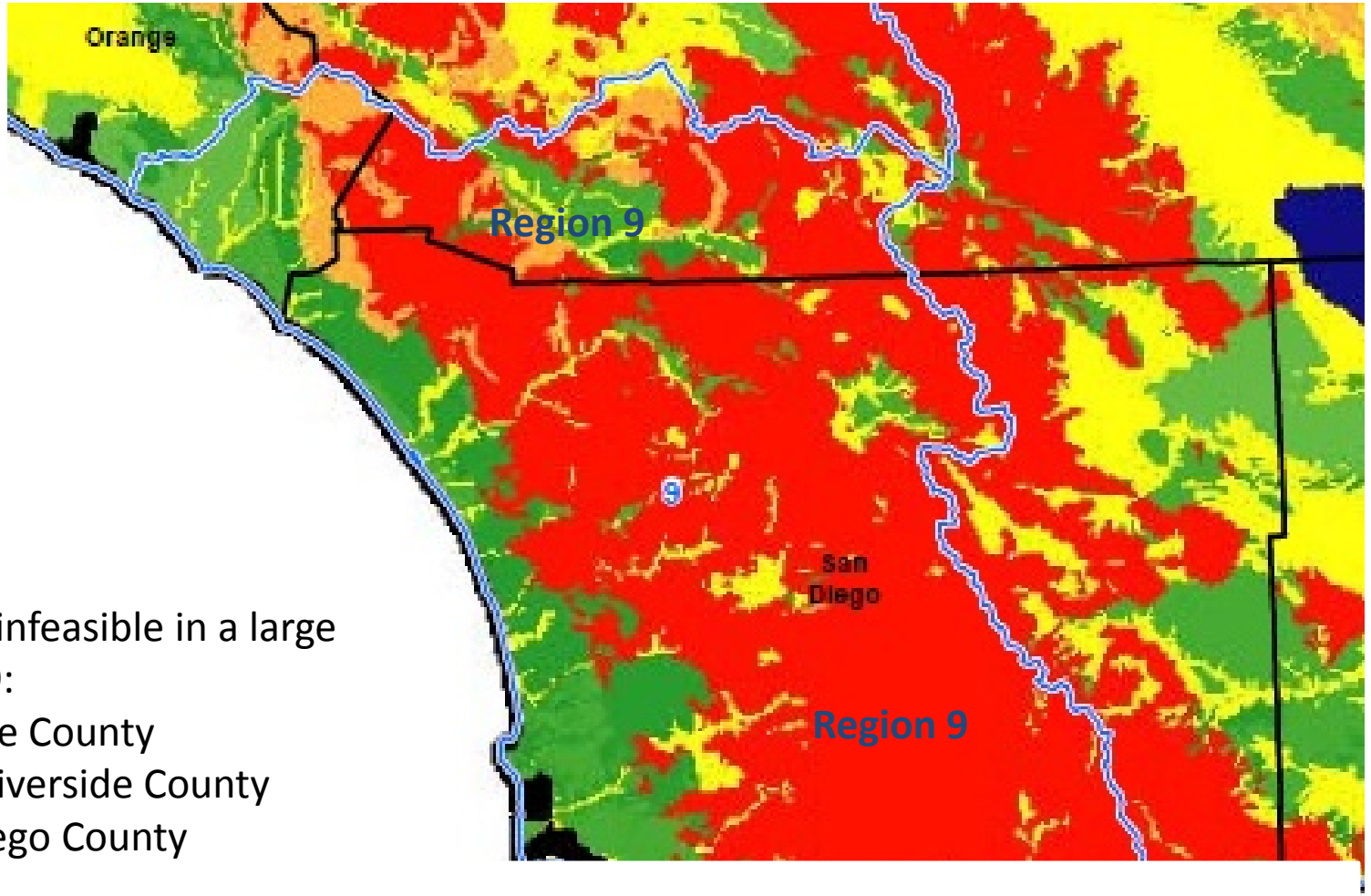
Technical Infeasibility



Infiltration is likely infeasible in a large portion of Region 9:

- Southern Orange County
- Southwestern Riverside County
- Western San Diego County

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Technical Infeasibility

Geotechnical conditions that could be affected from required infiltration are:

- Slope stability
- Expansive soil
- Compressible soil
- Seepage
- Loss of pavement and foundation subgrade support

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Slope Stability

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Technical Infeasibility

Slope Stability

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Technical Infeasibility

Expansive Soil

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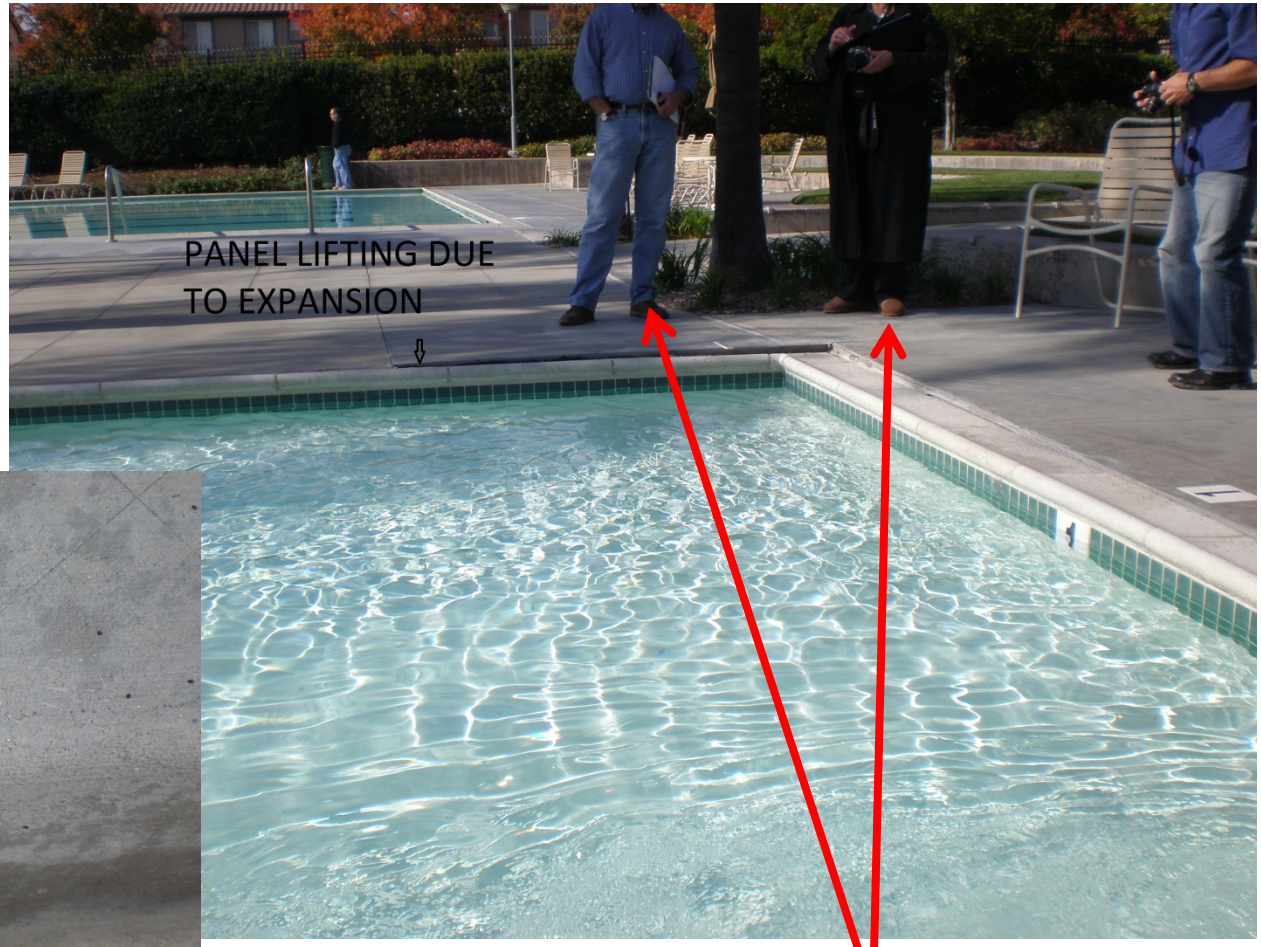
Technical Infeasibility

Expansive Soil



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Technical Infeasibility

Seepage

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Technical Infeasibility

Seepage

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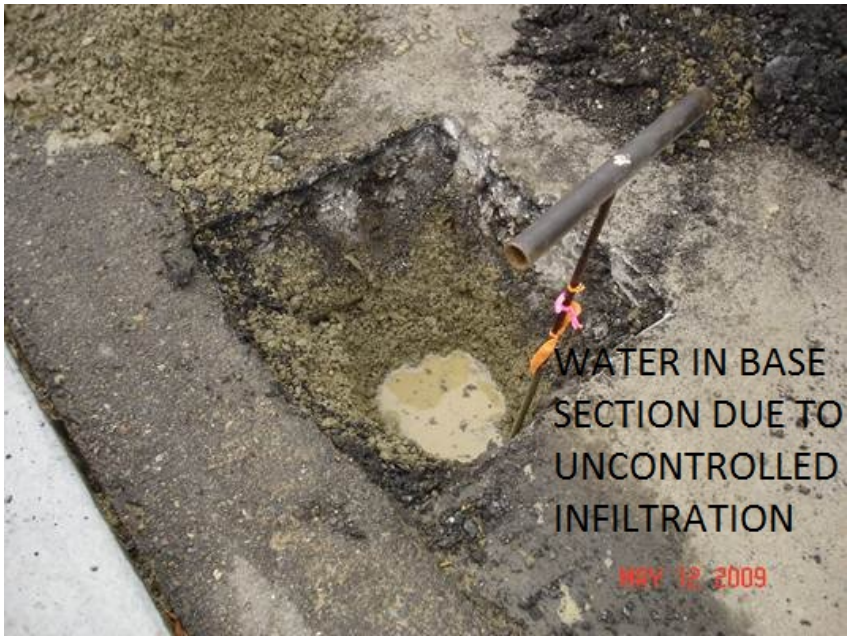
Technical Infeasibility

Loss of Support



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Increased Liability

About 95 percent of lawsuits that are geotechnically based involve water. The issues include:

- Expansion due to water infiltration that lift flatwork and lightweight structures (i.e. homes) that can cause racking of doors and windows and cracking,
- Retaining wall issues including efflorescence (mineral deposits and staining) on the face of the wall, settlement of backfill soil, and rotational failure,
- Settlement,
- Mold growth,
- Slope stability failure,
- Seepage, and
- Pavement subgrade failure

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Illicit Connections

Illicit discharges are non-storm water discharges without an MS4 or NPDES permit.

We recommend non-storm water discharges be allowed provided the discharges are essential for emergency response purposes, structural stability, slope stability, or naturally occurring and include:

- Foundation and footing drains,
- Water from crawl spaces or basement pumps,
- Hillside/canyon dewatering, and
- Naturally occurring seepage.

Groundwater should also be defined as water that occurs beneath the water table in soil and in geologic formations that are fully saturated as evaluated by the geotechnical consultant/geologist.

The 85th Percentile Event and Runoff Generation in Natural Conditions

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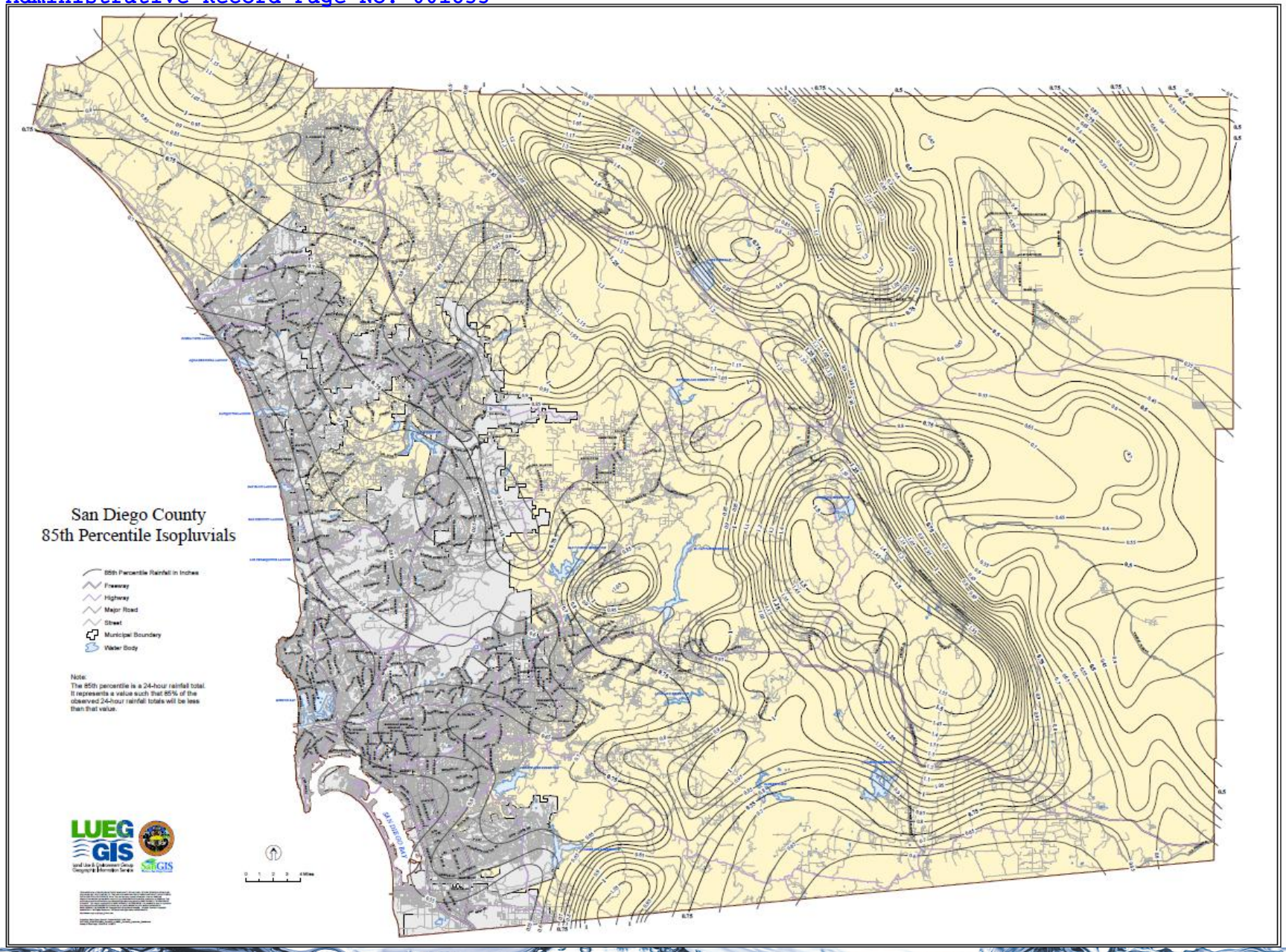
Purpose

- Discuss runoff generation from a relatively large (85th Percentile) storm event
  - Improve the Draft Permit language to incorporate natural runoff scenarios
  - Maintain naturally occurring runoff, which provides beneficial uses to receiving waters

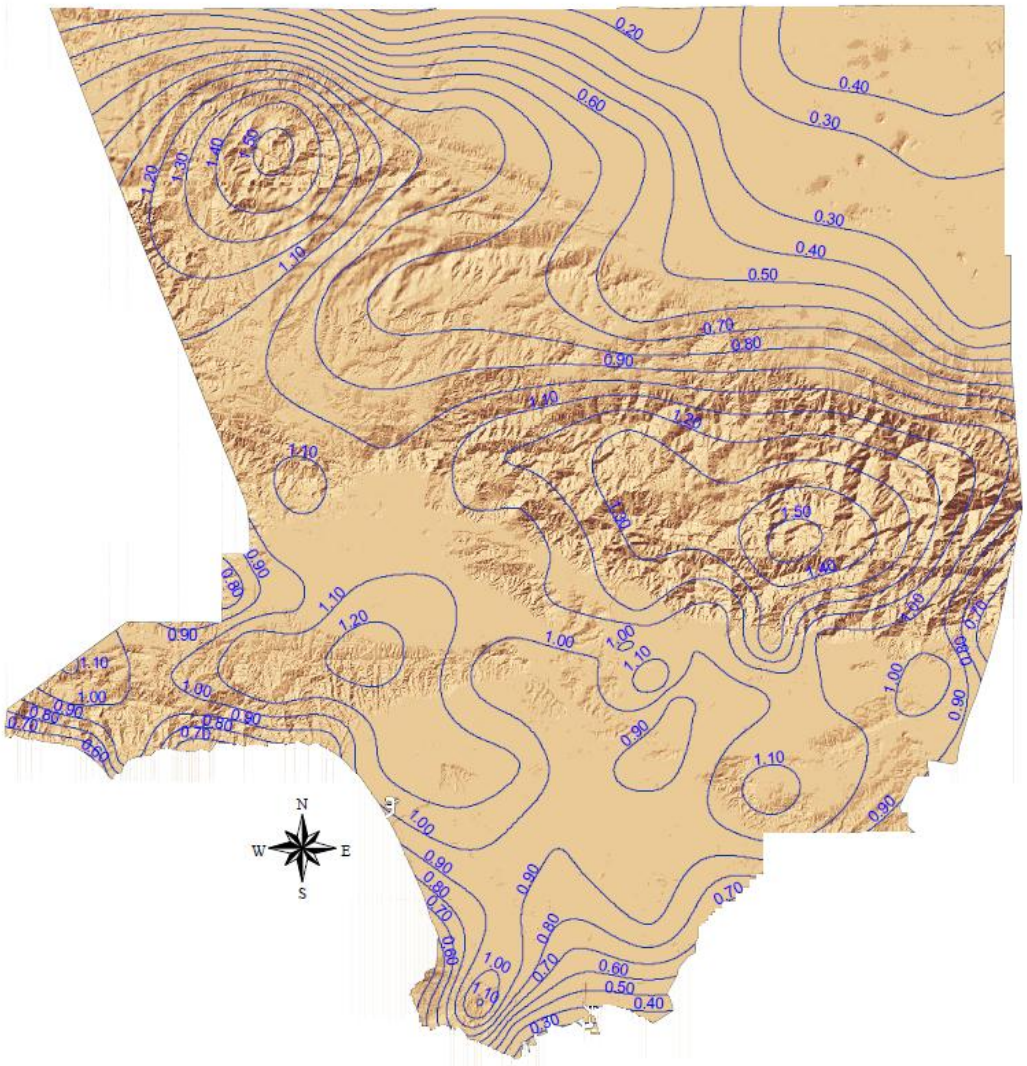
85th Percentile Runoff

- The 85th Percentile, 24-hour duration event represents the daily record of precipitation exceeded only 15% of the time.
- In San Diego Lindbergh Airport, (1948 –2005, or 57 years) there have been 2,334 rainy days (average* of 40.9 per year).
- An 85th percentile daily event occurs six times a year, on average*.
- A County-wide map has already been prepared (in the SDCHM) to show the 85th Percentile, 24-hr depth in different locations in San Diego County. Other Southern California Counties have prepared similar maps.

* Wide variability (skew)


San Diego County
85th Percentile Isopluvials
85th Percentile Rainfall in Inches
Freeway
Highway
Major Road
Street
Municipal Boundary
Water Body
Note:
The 85th percentile is a 24-hour rainfall total. It represents a value such that 85% of the observed 24-hour rainfall totals will be less than that value.
LUEG GIS
SanGIS

85th Percentile 24-hr Rainfall Isohyetal Map



Los Angeles County

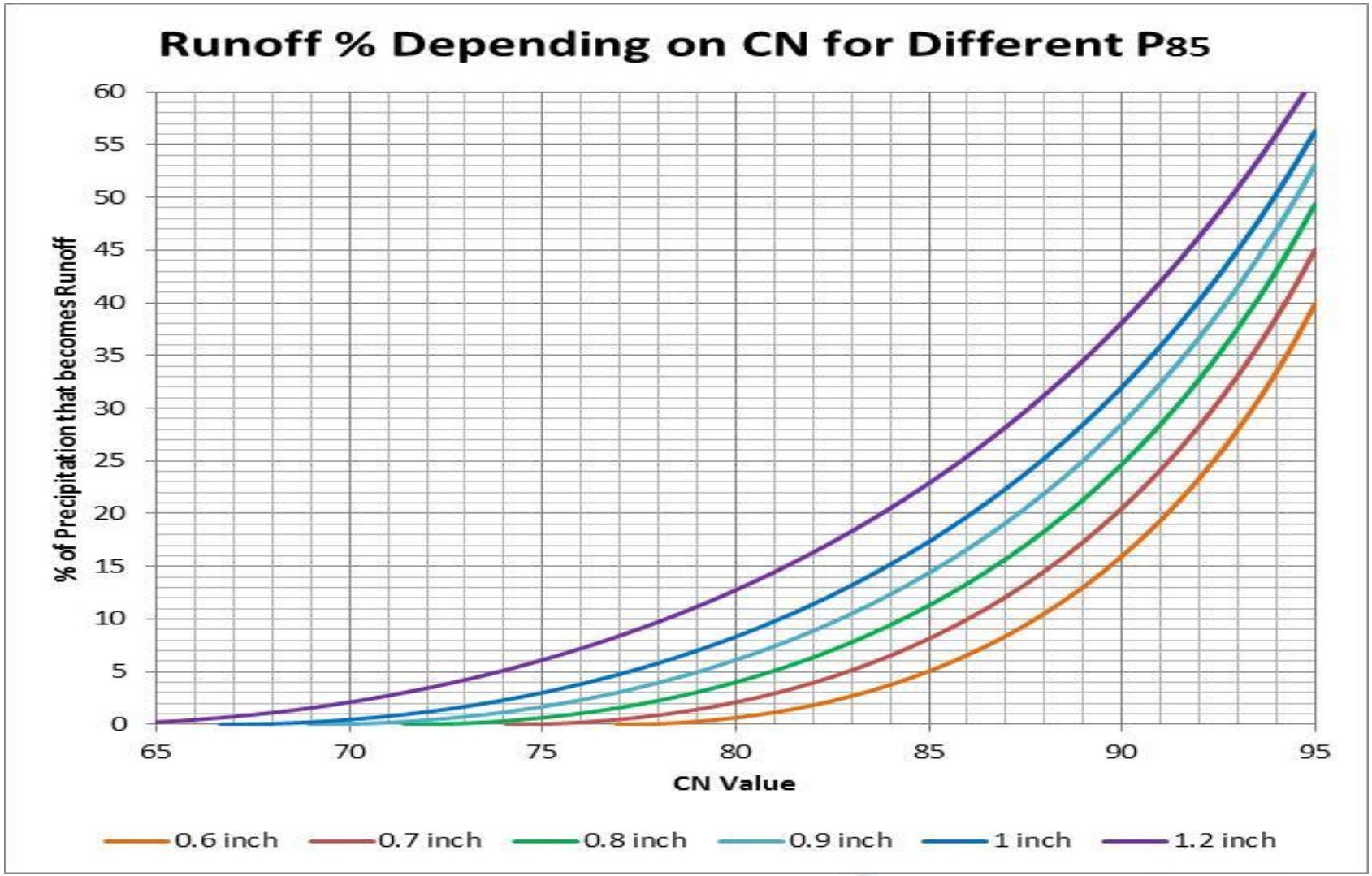
Runoff from the 85th Percentile Event

- As the depth of precipitation for the 85th percentile event varies , so does the capacity of the soils to absorb it.
- Runoff depends on many factors: precipitation depth and patterns; soil type; vegetation type and amount; and Antecedent Moisture Conditions (degree of saturation of the soil prior to the rain event).
- In the San Diego Region, the 85th percentile event generates some runoff most of the time:
  - -Impervious Soils (Type D) are most common in the region
  - -Natural vegetation is poor or fair in many areas
- Curve Number values (CN) can be used to estimate natural and post-development runoff volumes

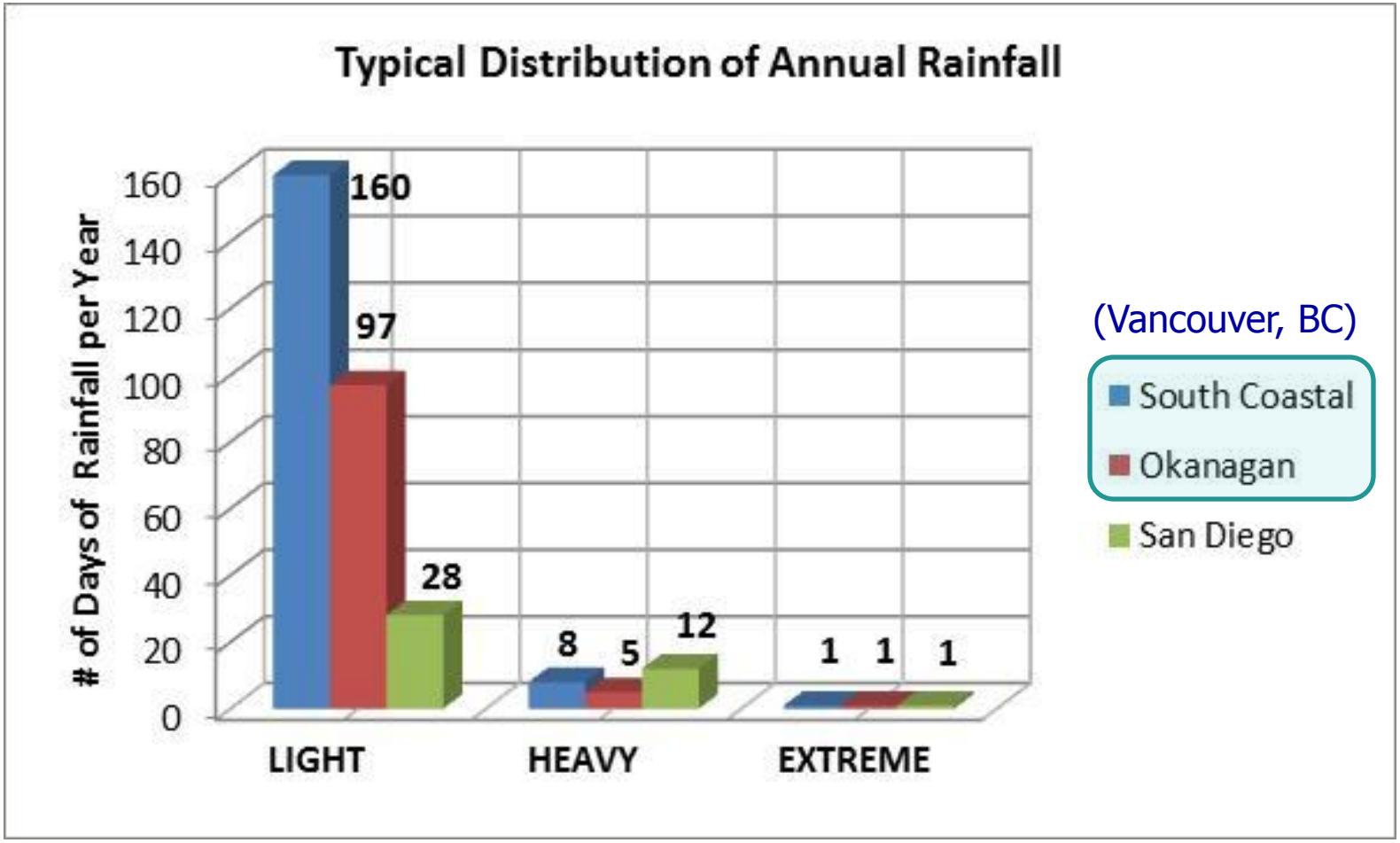
Runoff from the 85th Percentile Event

- Removal of naturally occurring flows generated by storms similar to the 85th percentile for those environments where such flow does occur may have negative impacts to existing habitats:
  - ❖ Excessive retention can alter the natural water balance.
- Retention of ALL storms equal to or smaller than the 85th percentile will remove naturally occurring runoff that provides several beneficial uses within the receiving waters
- *The intent of the permit is to retain the seasonal first flush only (and not all flows). Such intent should therefore be evident in the language.*

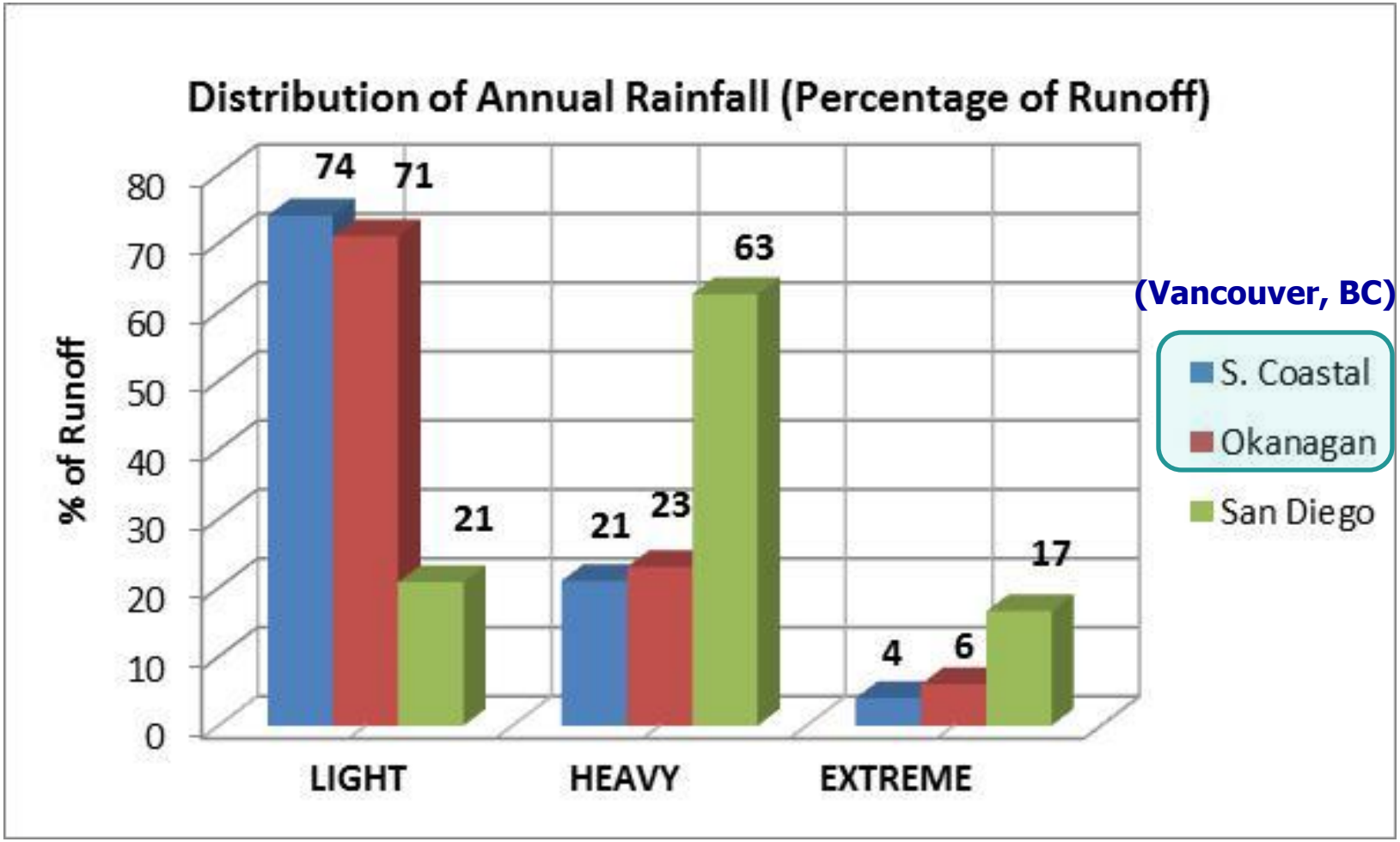
Runoff for Different P_{85} Values



Rainfall Distribution



Rainfall Distribution



A Better Way to Manage 85th Percentile Runoff

- The Draft Permit says:

  Priority Development Projects must retain the volume equivalent to runoff produced from a 24-hour 85th percentile storm event ("design capture volume");

- To preserve natural condition runoff, we propose:

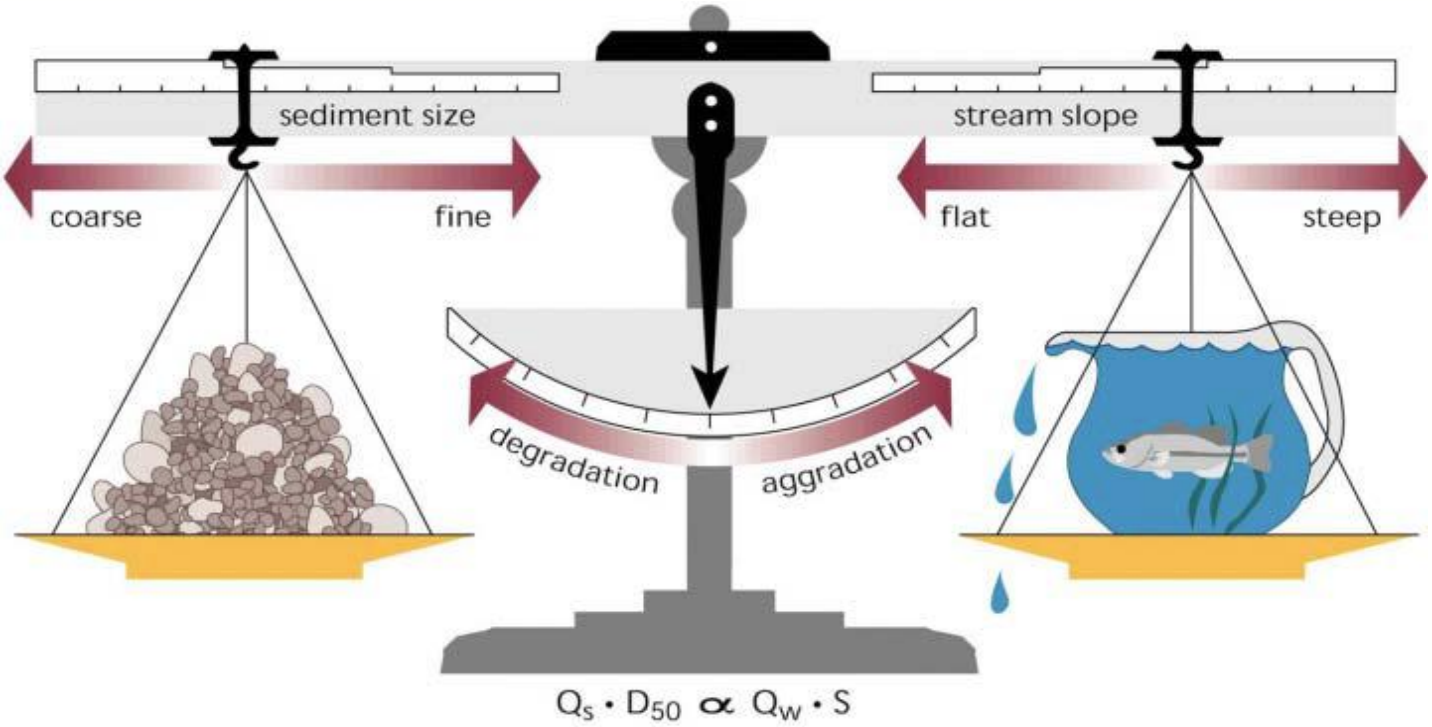
  Priority Development Projects must retain the volume equivalent to the runoff volume produced from a 24-hour 85th percentile storm event[15] in post-development conditions less the runoff volume produced from the same 24-hour 85th percentile storm event in natural conditions ("design capture volume");

Lane's Stream Balance Relationship

Lane's classic description of channel stability states that dynamic equilibrium exists between stream power and the discharge of bed-material sediment (Lane, 1955 as cited in Chang, 1998):

$$Q_s d \alpha Q_w S$$

where Q_s is the sediment discharge, d is the median sediment size, Q is the discharge and S is the bed slope.



ILLICIT DISCHARGE DETECTION & ELIMINATION – NON-STORM WATER DISCHARGES

Foundation Drains, Footing Drains, and Other Subsurface Drainage Systems

- **Source of the Proposed Regulation**

  The direction and language of the Administrative Draft proceeds from 40 CFR 122.26(d)(2)(iv)(B & B1), but with ***a difference for the following subcategory of non-storm water discharges***:

  a. Uncontaminated pumped ground water;
  b. Discharges from foundation drains;
  c. Water from crawl space pumps; and
  d. Water from footing drains.

ILLICIT DISCHARGE DETECTION & ELIMINATION – NON-STORM WATER DISCHARGES

Foundation Drains, Footing Drains, and Other Subsurface Drainage Systems

- 40 CFR says:

  "the following category of non-storm water discharges or flows shall be addressed where such discharges are ***identified by the municipality as sources of pollutants to waters of the United States***:"

  the Administrative Draft (E.2.a(1)) would require that:

  "Discharges of non-storm water to the MS4 from the following categories ***must be addressed as illicit discharges unless the discharge has coverage under NPDES Permit No. (CAG919001 or CAG919002)***."

ILLICIT DISCHARGE DETECTION & ELIMINATION – NON-STORM WATER DISCHARGES

Foundation Drains, Footing Drains, and Other Subsurface Drainage Systems

- **Concern #1: the Term "Groundwater"**
  - "Groundwater" here is an undefined term and seems to describe any underground water that could enter the MS4 through this subcategory of drains.
  - "Groundwater" should be properly defined as water that occurs beneath the water table in soil and geologic formations that are fully saturated, as defined by the geotechnical engineer or engineering geologist.

ILLICIT DISCHARGE DETECTION & ELIMINATION – NON-STORM WATER DISCHARGES

Foundation Drains, Footing Drains, and Other Subsurface Drainage Systems

- **Concern #2: Misconception about the Drains**
  - This broad use of "Groundwater" may have led to a misconception of the purpose and function of this subcategory of drains:
  - The designer doesn't include these drains because a fully saturated soil condition exists or is expected to exist on the site. Instead, the designer uses these drains to avoid overdesigning for saturated conditions. Many such drains never yield any water to the MS4.
  - These drains are provided for in state and local building codes and ordinances to protect public health, safety & welfare in case a fully saturated soil condition should develop.
  - If a fully saturated soil condition exists or is expected to exist, the foundations, footings, and other subsurface drainage systems would likely be designed differently.

ILLICIT DISCHARGE DETECTION & ELIMINATION – NON-STORM WATER DISCHARGES

Foundation Drains, Footing Drains, and Other Subsurface Drainage Systems

- **Concern #3: Coverage under NPDES Permits**
  - The NPDES Permits process is not structured to address "theoretical" discharges.
  - At the time of drain design & approval, metrics such as flow rates, pollutant loads, and types of pollutants cannot be known.
  - At the time of drain design such discharges cannot be "***identified by the municipality as sources of pollutants to waters of the United States***".
  - With the Administrative Draft, the Copermittees and the Building Community are in a difficult position – the Copermittees can't approve categorical illicit discharges and the Builders can't get coverage under an NPDES Permit for discharges that don't exist.

ILLICIT DISCHARGE DETECTION & ELIMINATION – NON-STORM WATER DISCHARGES

Foundation Drains, Footing Drains, and Other Subsurface Drainage Systems

- **Concept Revision**
  - Address these potential non-storm water discharges per 40 CFR and as in Administrative Draft E.2.a(3):

  "Discharges of non-storm water to the MS4 from the following categories (*include foundation drains, footing drains, and other Subsurface Drainage Systems*) must be addressed by the Copermittees as illicit discharges only if the Copermittees or the San Diego Water Board identifies the discharge as a source of pollutants to receiving waters based on test results:"

Restoration projects for alternative compliance

Restoration projects (onsite and offsite) can provide more benefit to the receiving waters than conventional LID and HMP BMP's

The Administrative Draft permit requires a technical infeasibility analysis for any alternative compliance.

Restoration projects for alternative compliance should be encouraged by the permit. If they enhance the beneficial uses within the watershed, and provide the same or better level of water quality protection, they should not require proof of infeasibility.

The permit should include an “off ramp” that would eliminate the need for a technical infeasibility analysis for restoration projects.