water smart LANDSCAPE

A Better Way to Beautiful

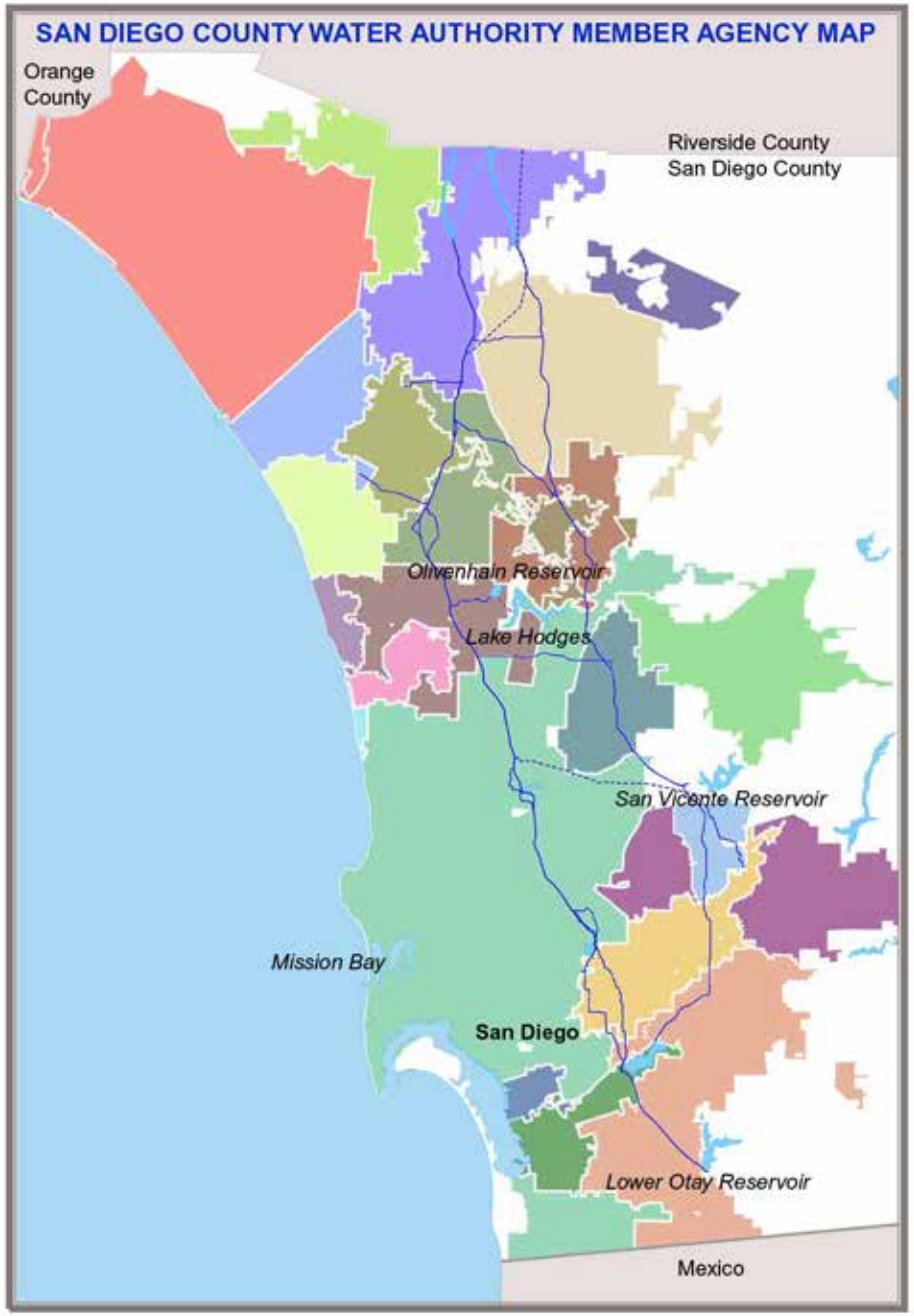
WaterSmart Landscape MAKEOVER SERIES

WELCOME!

San Diego County Water Authority

San Diego County Water Authority

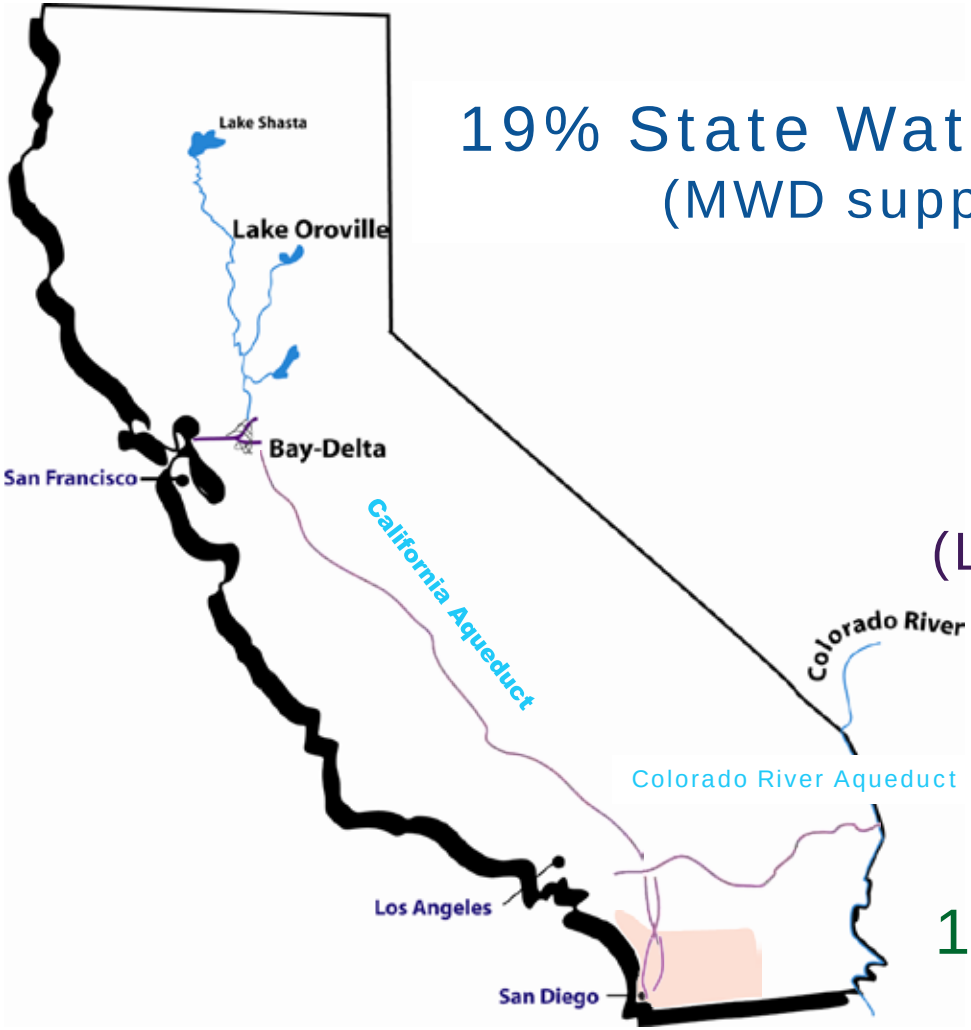
- Wholesale water agency created by the State Legislature in 1944
- 24 member agencies
- 3.2 million people
- 920,000 acre service area
- 97% of county's population
- Builds, owns, operates and maintains regional water infrastructure



San Diego County Water Authority

We're at the End of a Very Long "Pipeline"

Sources of San Diego County's Water Supply (2010-2014 five-year average)



19% State Water Project
(MWD supplies)

64% Colorado River
(Long-term Transfers and
MWD supplies)

17% Local Supplies

Where is residential water used?

Cut outdoor use for the biggest water savings!

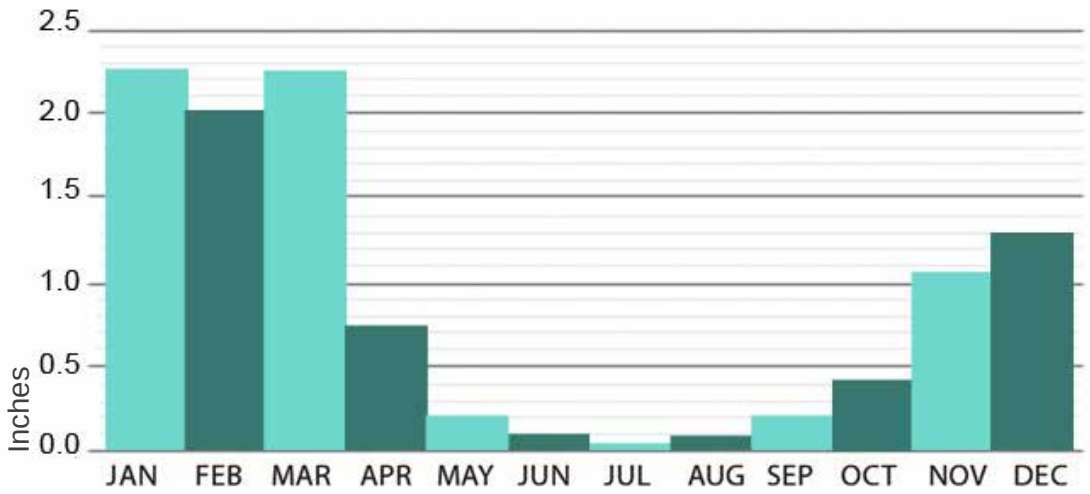
San Diego County Water Authority

WaterSmartSD.org

Q: What is the Annual Rainfall in San Diego?

Avg. Annual Precipitation-San Diego
(data from 1914-2011)

10 inches per year



Average Monthly Precipitation
San Diego, California

*Data taken Rssweather.com
**Data ranges from 1914-2000


SERIOUS DROUGHT
HELP SAVE WATER

San Diego Has Plenty of Sunshine…and Heat

Departure from normal monthly temperature at Lindbergh Field:
22 of last 23 months hotter than normal

Departure from Normal Temperature (° F)

10.0
8.0
6.0
4.0
2.0
0.0
-2.0

Nov 2013 | Dec | Jan 2014 | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec 2014 | Jan 2015 | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep-15

Hotter

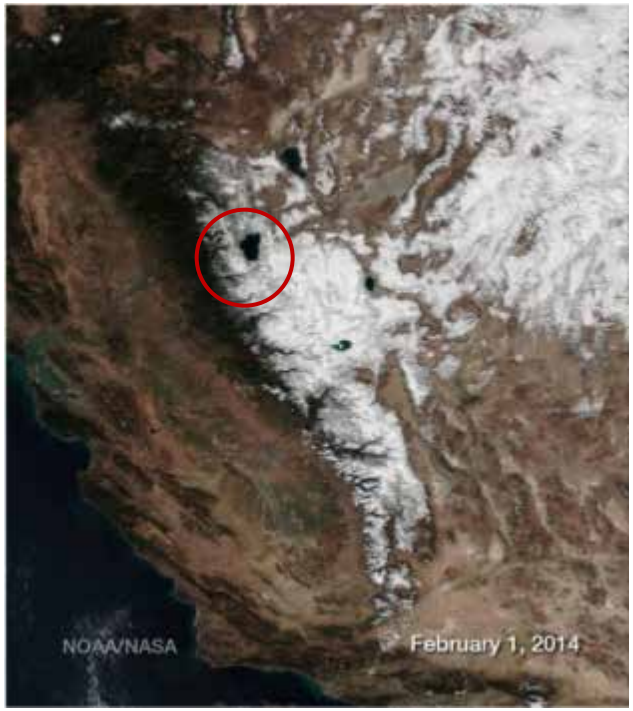
Cooler

All Dry on the Western Front

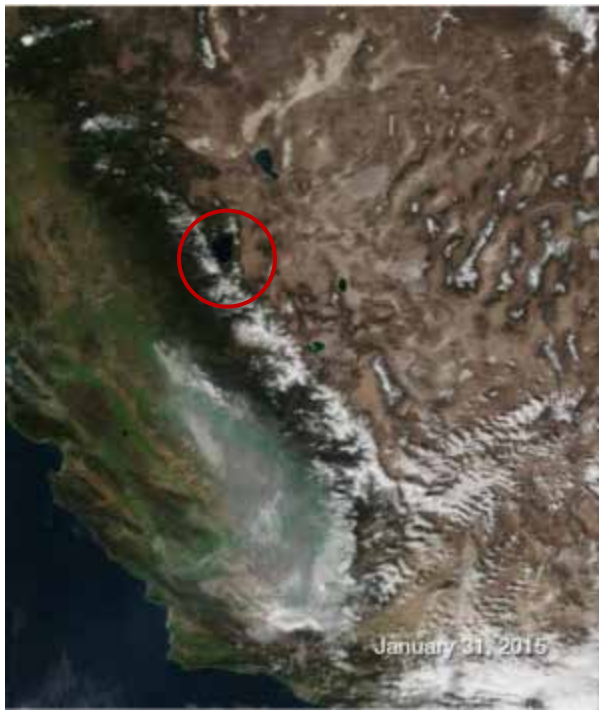
Comparison of Snowpack in the Sierra Nevada

} January 2013

} February 2014



} January 2015



Lake Tahoe

NASA Satellite Images

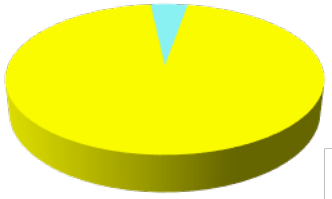
Lake Oroville – State Water Project Reservoir
July 2011 - 100% Capacity

Lake Oroville – State Water Project Reservoir
Jan. 2014 - 36% Capacity

Lake Oroville – State Water Project Reservoir
Oct. 2015 - 29% Capacity

Increasing San Diego County's Water Supply Reliability through Supply Diversification

1991



Total = 578 TAF

S.D. Faces 31% Cut in Imported Water Supply

By JENIFER WARREN
TIMES STAFF WRITER

Faced with record-low rainfall and no prospects for relief, the

State to Shut Off Water Delivery to Southland

By VIRGINIA ELLIS and TED ROHRLICH

Limits on tap water use urged by staff

San Diego Civic Leaders
"Never Again!"
"No More Water Shortages!"

SACRAMENTO – Southern Californians are likely to be ordered to cut back their water consumption by an unprecedented 30 percent this spring unless more snow falls on the Sierra Nevada, the area's chief water official said yesterday.

Will Be Blow to San Diego

■ **Drought:** Metropolitan Water District directors also vote a 90% cut in allocation for agricultural users.

035

AF

- Metropolitan Water District
- Imperial Irrigation District Transfer
- All American & Coachella Canal Lining
- Recycled Water
- Seawater Desalination
- Groundwater
- Local Surface Water
- Potable Reuse

TAF=Thousand Acre-Feet

San Diego County 1990 vs 2015

Population

33%

Potable Water Use

21%

Jobs

34%

Gallons per Capita

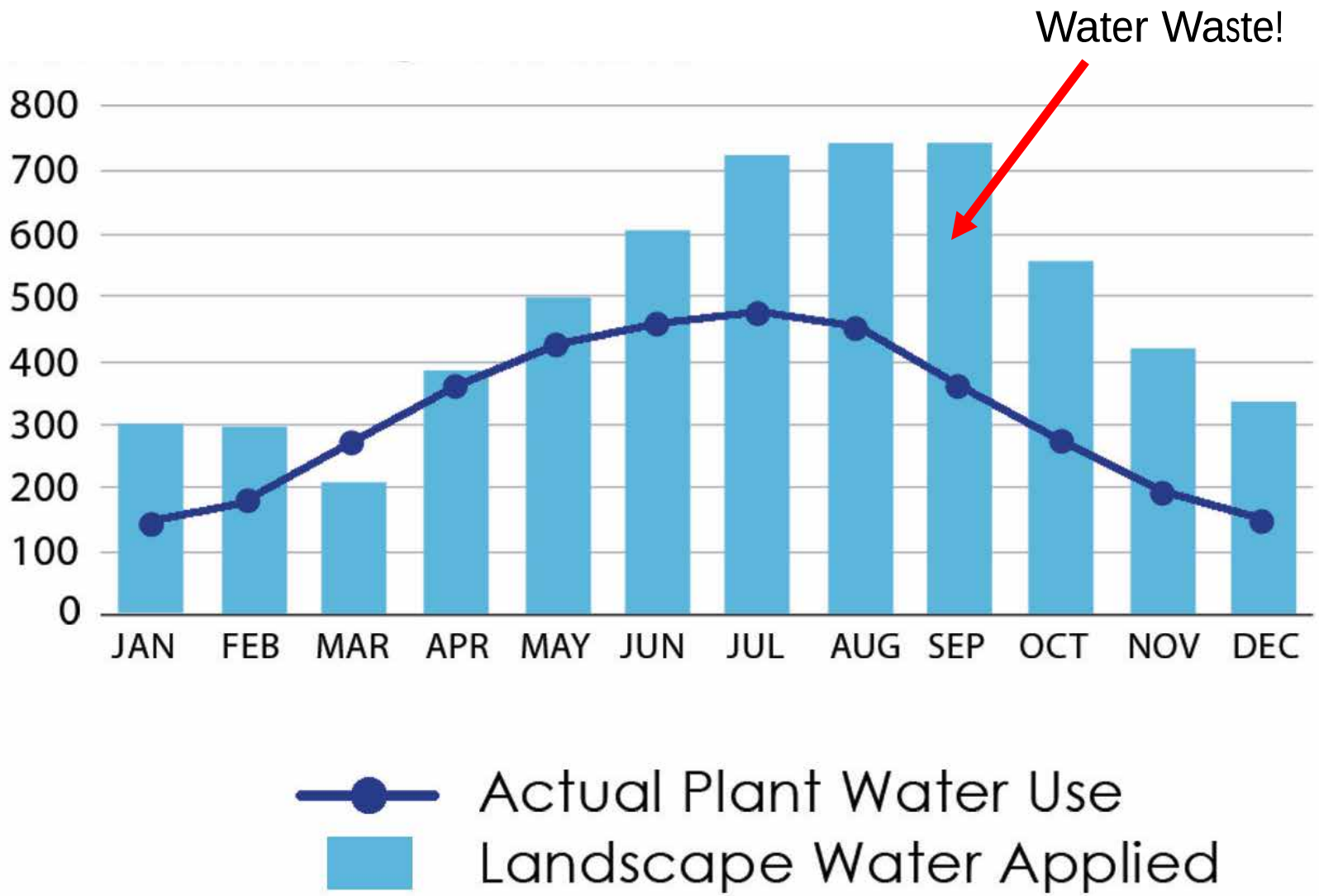
39%

Gross Domestic Product

91%

Water Applied vs. Plant Water Use

What you're putting on your plants vs. what they really need



Before

After

Joni German
Assistant Water Resources Specialist
San Diego County Water Authority
(858)522-6705
jgerman@sdcwa.org

WaterSmart Landscape
MAKEOVER SERIES

Class 1

water smart™
LANDSCAPE

A Better Way to Beautiful

Let's Get Started!

Housekeeping

Housekeeping:

Breaks: Mid class, after lab

Restrooms

Please silence your cell phones

If you can't attend, contact us!

WaterSmart Series Contacts:

Sharon Lowe	Project Manager	619-295-5115 x 233
Lucretia Sarmiento	Project Coordinator	619-295-5115 x 221

DeLorenzo International Landscape Architecture + Planning

Email: **landscapemakeover@sdcwa.org**

water smart LANDSCAPE

Introductions

Instructor …

Please introduce yourself…

- **Name**
- **Geographic area**
- **Personal Goals**

Thank you!

Personal Goals

How many of you are here to …

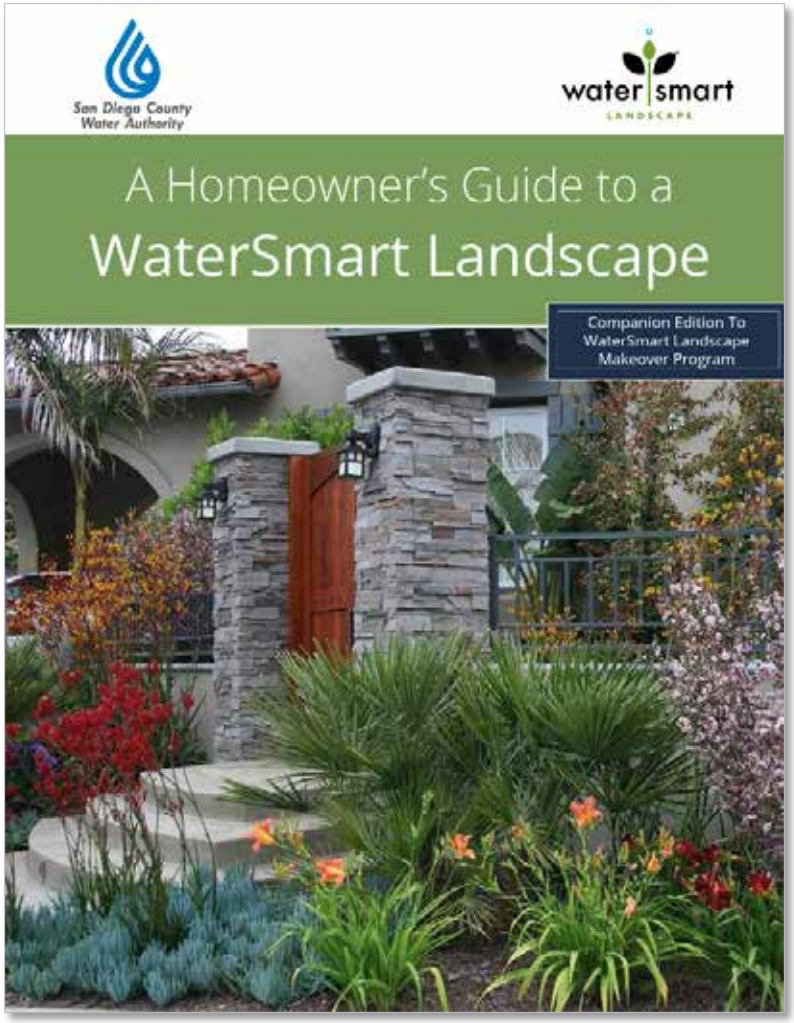
- Reduce your water use?
- Learn which plants to use?
- Get curb appeal?
- Get a planting plan?
- Learn how to retrofit irrigation?
- Reduce maintenance?

water smart LANDSCAPE

Course Goals

Teach Homeowners to:

1. Identify Your Landscape Target
2. Create a Basic Plot Plan
3. Evaluate Your Site
4. Design Your WaterSmart Landscape
5. Implement Your Plan
6. Care for Your WaterSmart Landscape



WaterSmart Landscape
MAKEOVER SERIES

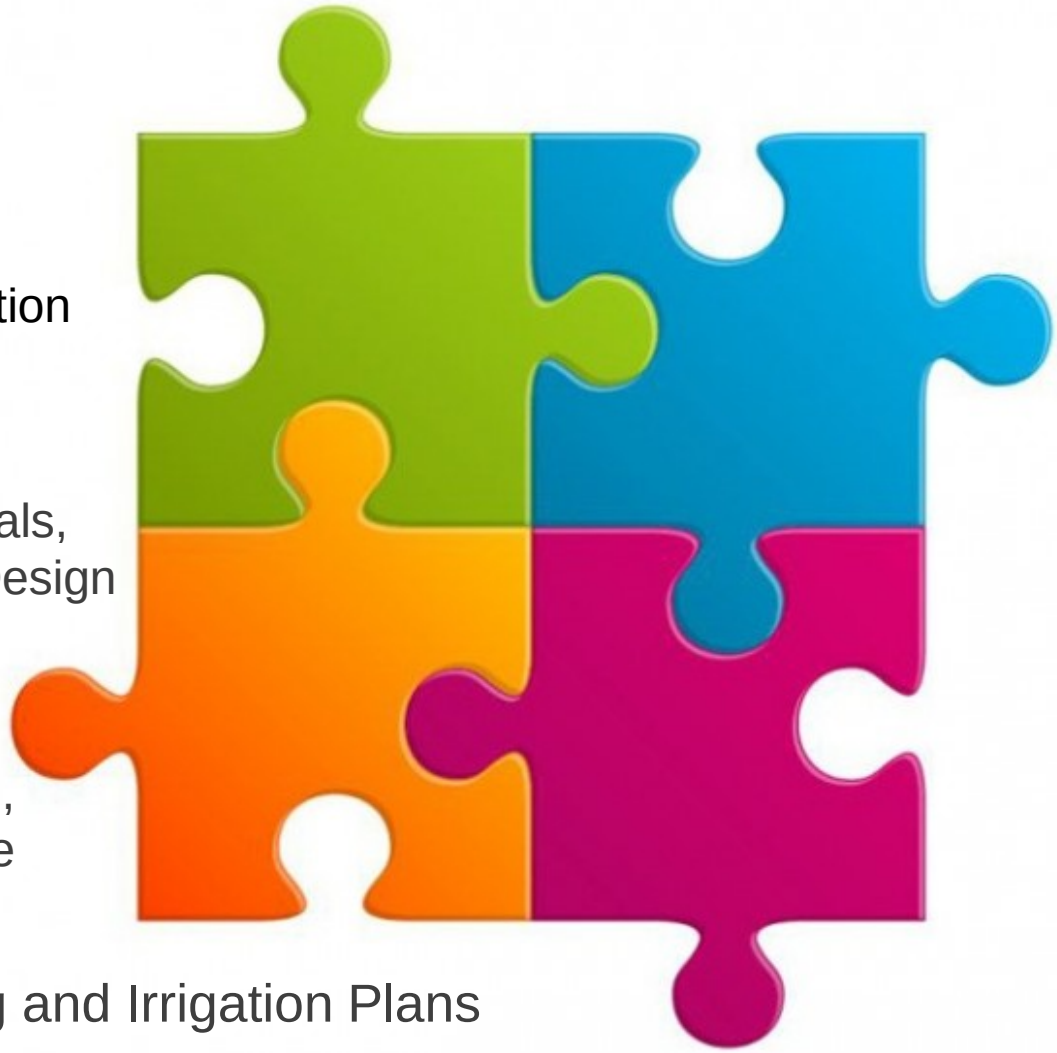
Series Topics:

Class 1
Let's Get Started:
Watersheds, Base Plan, Scale,
Soil, Stormwater & Site Evaluation

Class 2
Shaping Spaces:
Landscape Design Fundamentals,
Plant Selection, & Functional Design

Class 3
Make it Happen:
Irrigation Design, Turf Removal,
Implementation, & Maintenance

Class 4
Design Coach: LID, Planting and Irrigation Plans



water smart LANDSCAPE

Class 1

Class 1 Let's Get Started Objectives

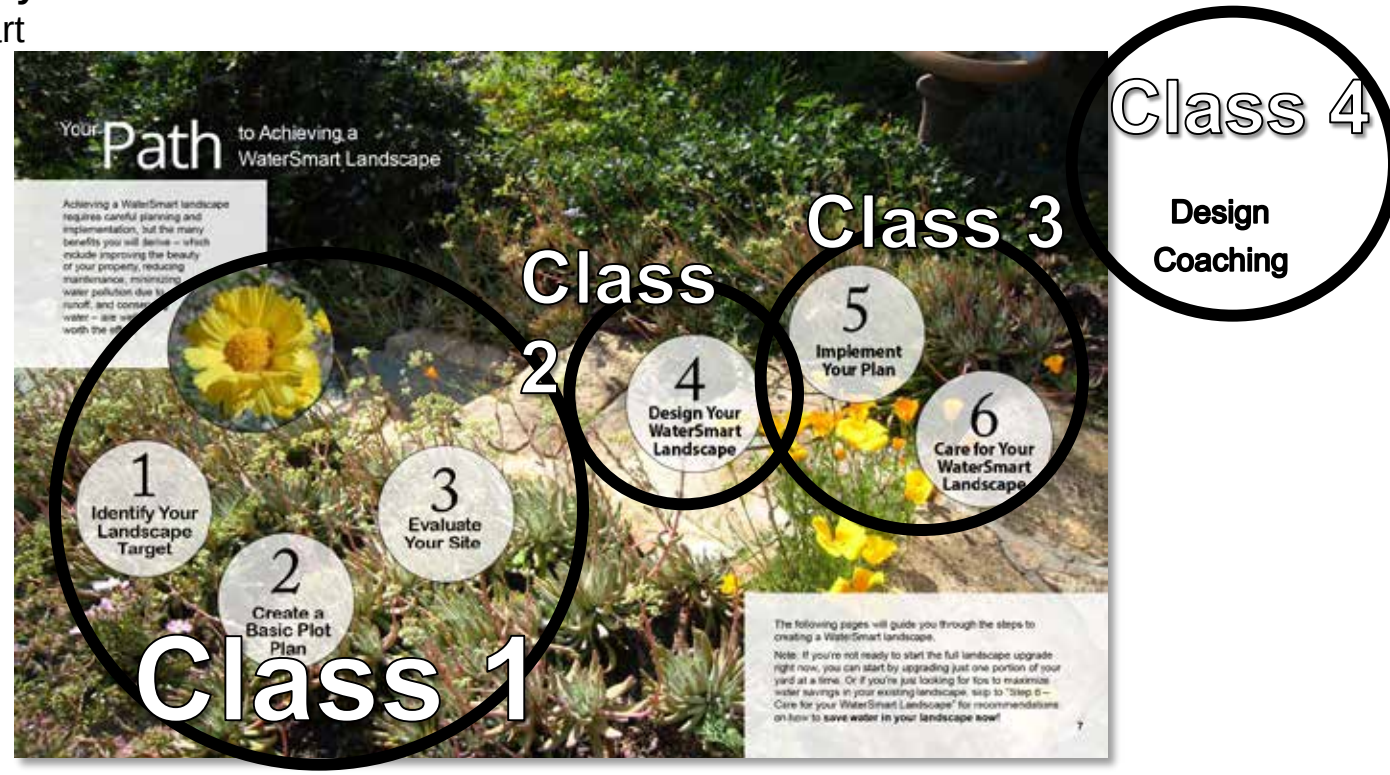
Water and San Diego County
- Reasons to be WaterSmart

Course Orientation
- Goals
- Materials

Why Remove Turf?
- Water Requirements
- Rainfall in SD
- Sample Projects

Steps to WaterSmart

1. Identify Your Target
2. Create a Plot Plan
3. Evaluate Your Site
   - Watersheds
   - First Flush
   - Soil
   - Managing On-Site Water Techniques



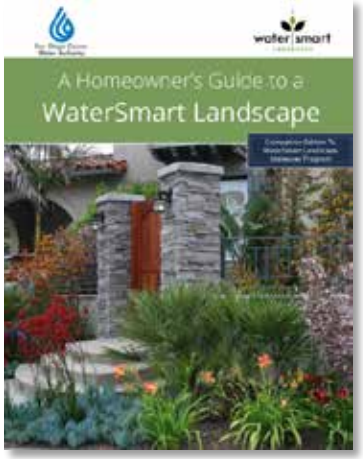
Class 1

Course Materials

- Notebook
  - Presentations
  - Homework and work sheets at end of each Class section
  - Support Materials: Reference material and some larger slides
  - WaterSmart Shade Plant Palette
  - Final Survey
  - Class schedule on back
- WaterSmart Guide for Homeowners
  - Details of entire process
  - Reinforces class material
  - WaterSmart Plant Palettes
- Sustainable Landscape Guidelines
  - A Watershed Approach to Landscaping
- Base Plans
  - Class 1: L-1 Property with Details
    L-2 for Low Impact Development
  - Class 2: L-3 Planting Plan with fewer details
  - Class 3: L-4 Irrigation Plan
  - Class 4: Bring them ALL
- E-Learning Videos: http://landscapemakeover.watersmartsd.org

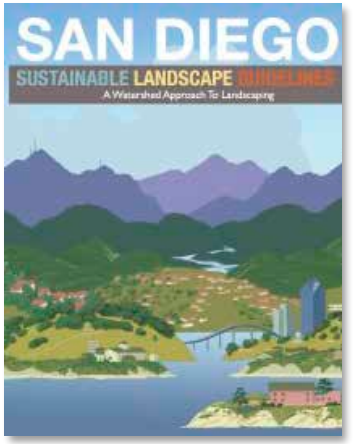
Homework

Read Pages 1-17



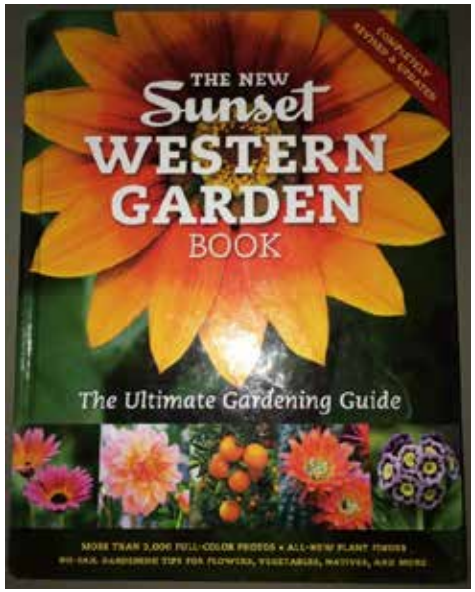
Homework

Read Pages 1-45

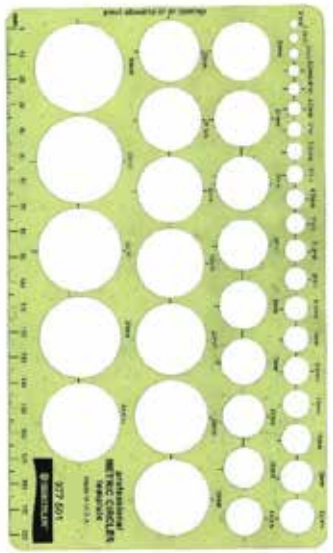


Recommended Materials

Scale



Reference:
Sunset Western Garden Book



Circle Template

Why Remove Turf?

Average Rainfall in San Diego

Integrated Zone Map

Map zones determined by analysis of United States Department of Agriculture (USDA) 2012 'Plant Hardiness Zone Map', California Irrigation Management Information System (CIMIS) 'Reference Evapotransporation Zone Map' (2012) and Sunset Western Garden Book 'The West's Climate Zones' data (2012). Geographic Information Systems (GIS) data layers of terrain and roadways were also used in creation of this zone map illustration

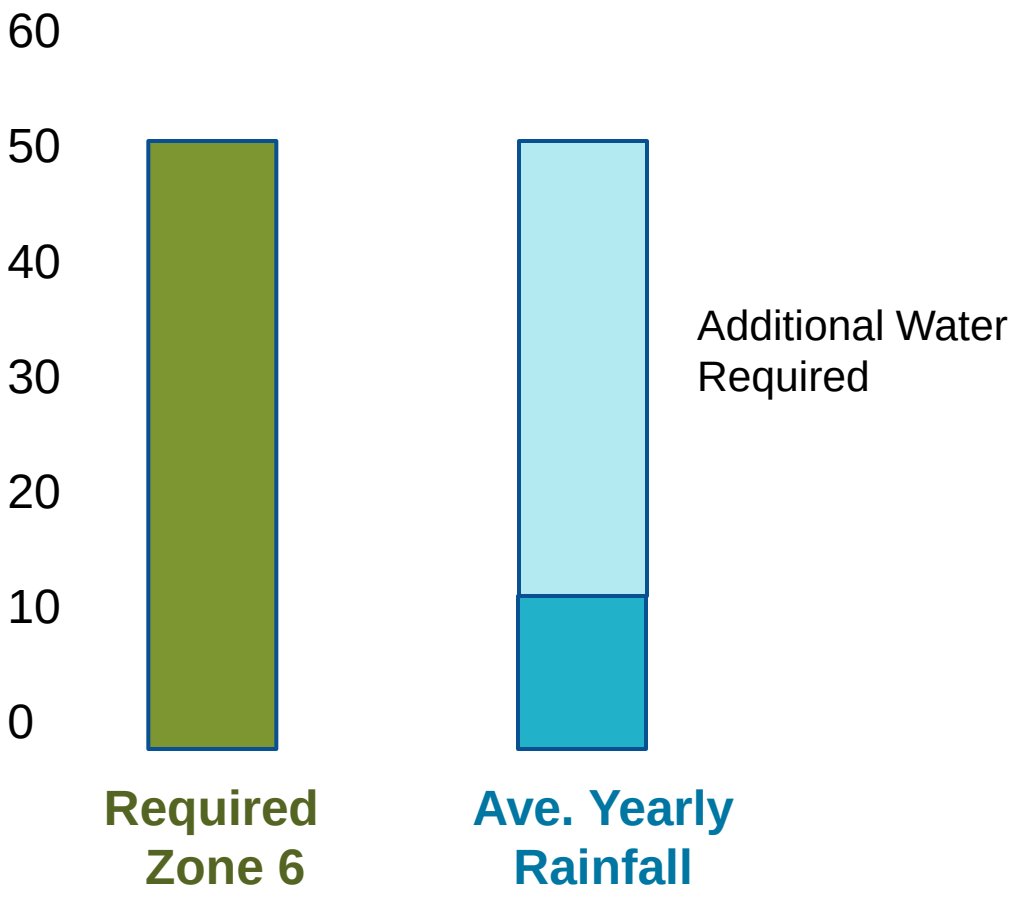
Monthly Average Reference Evapotranspiration by ETo Zone (inches/month)

Zone	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1	0.93	1.40	2.48	3.30	4.03	4.50	4.65	4.03	3.30	2.48	1.20	0.62	32.9
4	1.86	2.24	3.41	4.50	5.27	5.70	5.89	5.58	4.50	3.41	2.40	1.86	46.6
6	1.86	2.24	3.41	4.80	5.58	6.30	6.51	6.20	4.60	3.72	2.40	1.86	49.7
9	2.17	2.60	4.03	5.10	5.89	6.60	7.44	6.82	5.70	4.03	2.70	1.86	55.1
16	1.55	2.52	4.03	5.70	7.75	8.70	9.30	8.37	6.30	4.34	2.40	1.55	62.5
18	2.48	3.36	5.27	6.90	8.68	9.60	9.61	8.68	6.90	4.96	3.00	2.17	71.6

Why Remove Turf?

Regional Perspective

Turf's Water Needs vs. Annual Rainfall



Why Remove Turf?

Regional Perspective

Turf's Water Needs vs. Annual Rainfall

Why Remove Turf?

Regional Perspective

- Easy water savings!
- Landscapes can easily be retrofitted for water efficiency
- Some skills and technical knowledge are necessary
- Our goal: to educate you to succeed!

Case Study 1

Case Study 1

After Installation

Case Study 1

After: Approximately 6 months after installation

Case Study 1

After: Approximately 1 year after installation

Case Study 1

After: Approximately 2 years after installation

Case Study 1

Close Up Details

WaterSmart Landscapes

Before

After

WaterSmart Landscapes

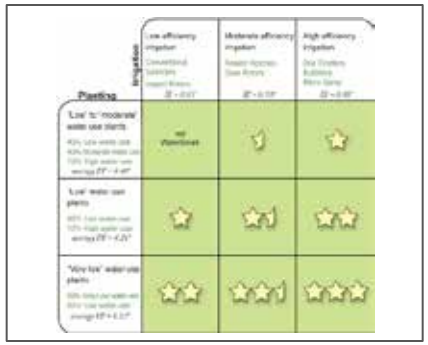
Before

After

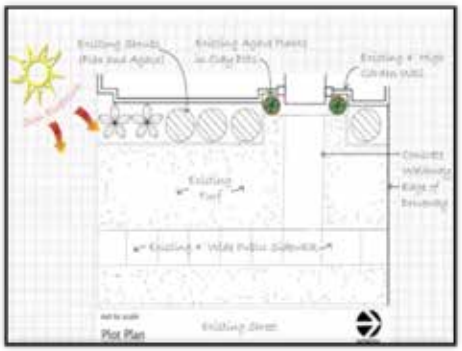
WaterSmart Landscapes

Steps to WaterSmart Landscape
Design Process Overview

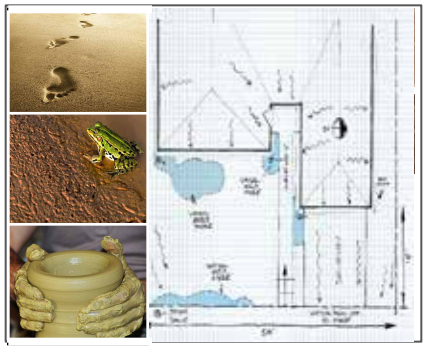
Identify Your Target



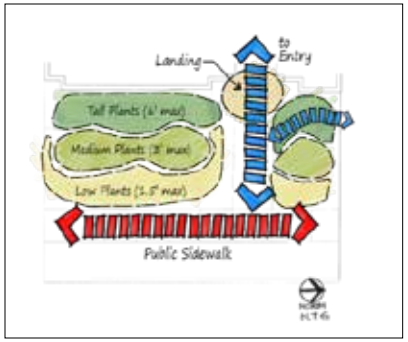
Base Plan



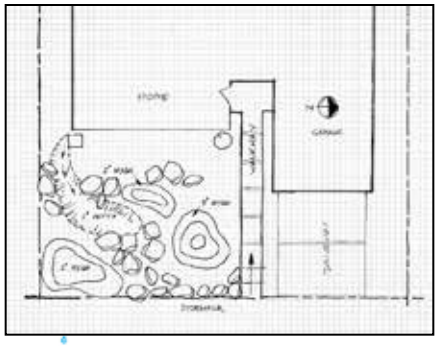
Soil & Site Analysis



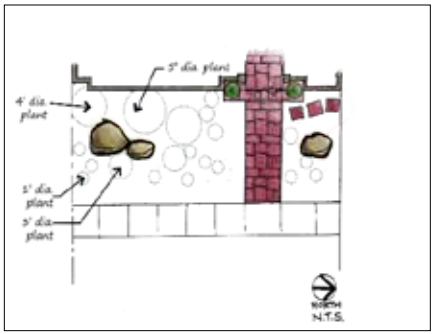
Bubble Diagram Functional



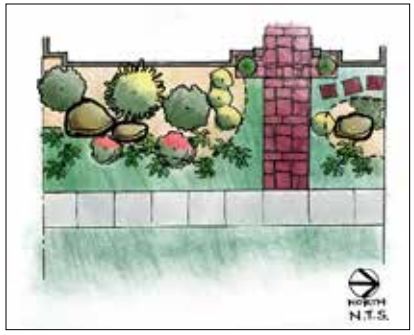
LID Plan



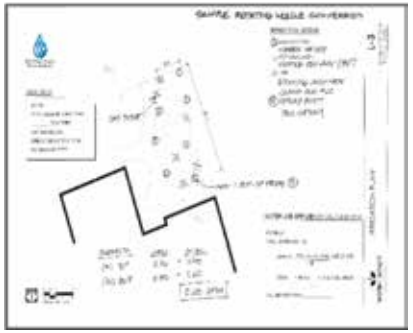
Hardscape & Preliminary Planting Plan



Finished Planting Plan

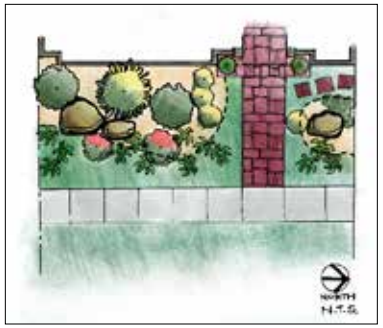


Irrigation Plan



Steps to WaterSmart Landscape
Implementation Overview

Planting Plan



Demolition

Contouring

Soil Prep

Irrigation

Plant Placement

Installed

Two Years Later

Step 1:
Identify Your Landscape Target

If you don't know where you're going, anywhere will do.

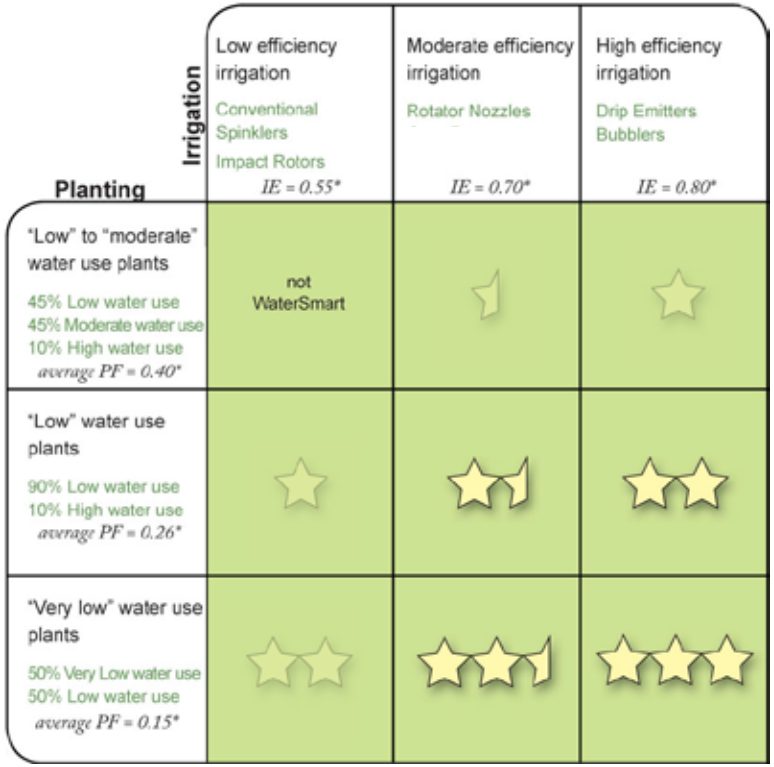
Landscape Target Factors:

- Turf Area
- Plant Selection
- Irrigation Efficiency

Step 1:
Identify Your Landscape Target

Two Factors:

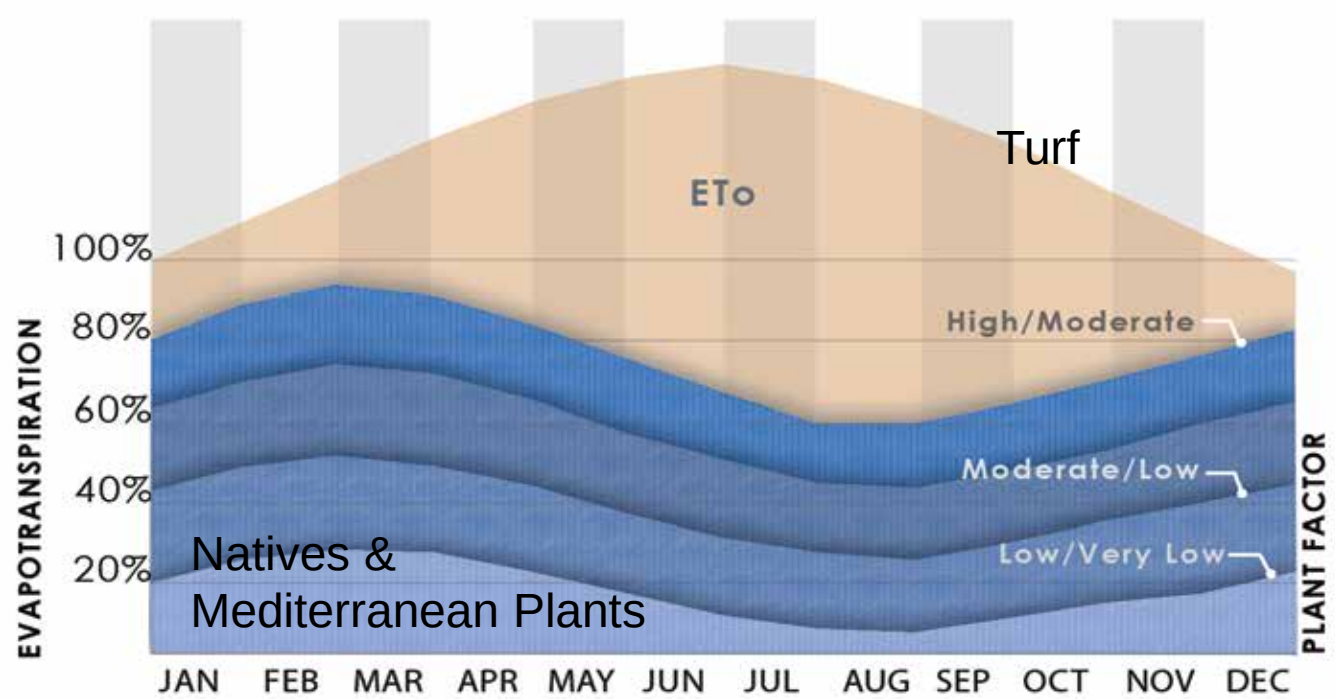
- Irrigation Efficiency
- Plant Selection



Use Pages 8 and 9 in your Homeowner's Guide

Step 1:
Identify Your Landscape Target

Plant Selection:



Source: *Landscape Plants* for California Gardens by Bob Perry

PLANT FACTOR- represents the estimated percent or portion of supplemental water needed relative to the **Eto** value of particular location

Step 1:
Identify Your Landscape Target

Irrigation Efficiency

Obsolete
Conventional
Overhead Spray Heads

Medium
Rotator Nozzles

High
In-Line Drip emitters
Bubblers

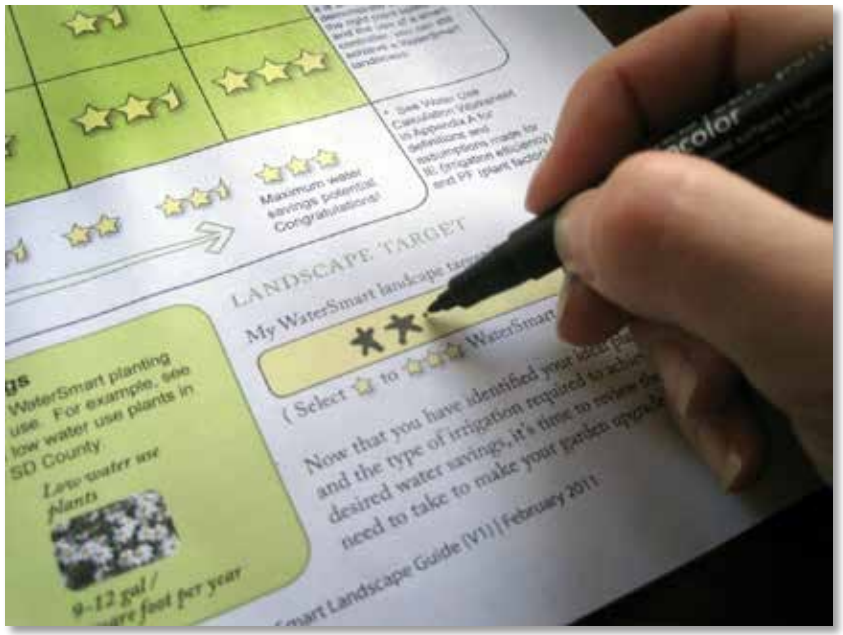
Homework

Step 1:
Identify Your Landscape Target

WaterSmart Star Rating

Compliant with the water conservation ordinance.

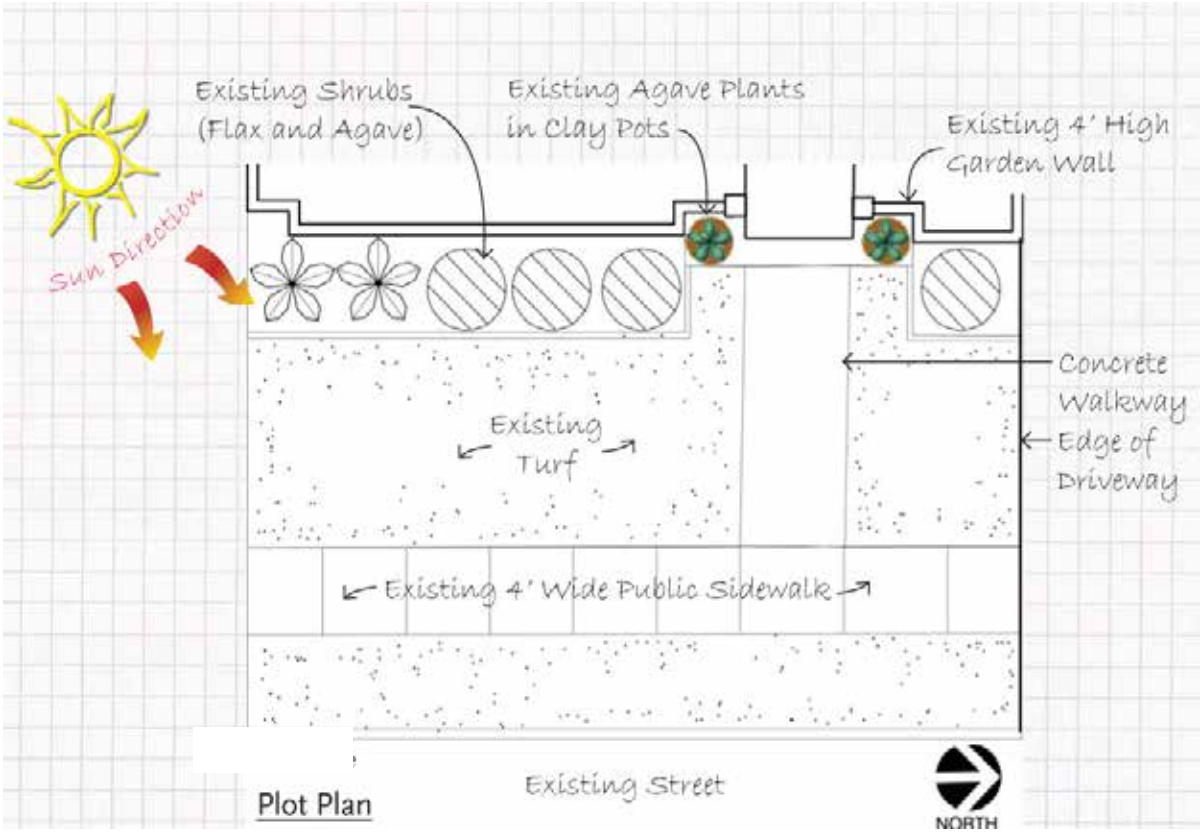
Maximum water savings potential. Congratulations!



New regulations eliminate anything less than one star

Step 2:
Create a Basic Plot Plan

Basic Plot Plan:
A scale drawing of the property, drawn in accurate proportion using a standard measurement to represent one foot

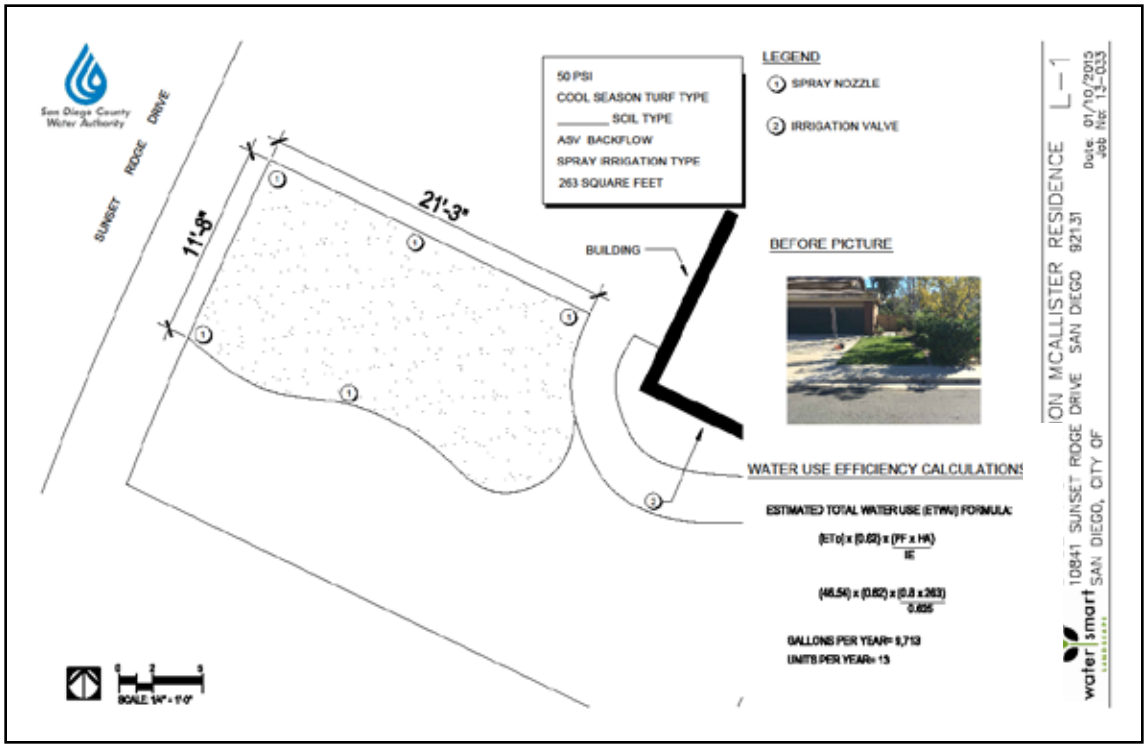


Legend
N Arrow
Scale:
1/8" = 1", 1/4" = 1', 1/10"= 1'

Step 2:
Create a Basic Plot Plan

Basic Plot Plan L-1
provided for you

- Bird's Eye View
- Drawn to scale
- Locates house and permanent features
- North Arrow
- Irrigation system info
- Dynamic PSI
- Turf:
  Cool / Warm Season
- Estimated water use for turf



Step 2:
Create a Basic Plot Plan

Scales: Architectural and Engineering

Standard Size Properties:

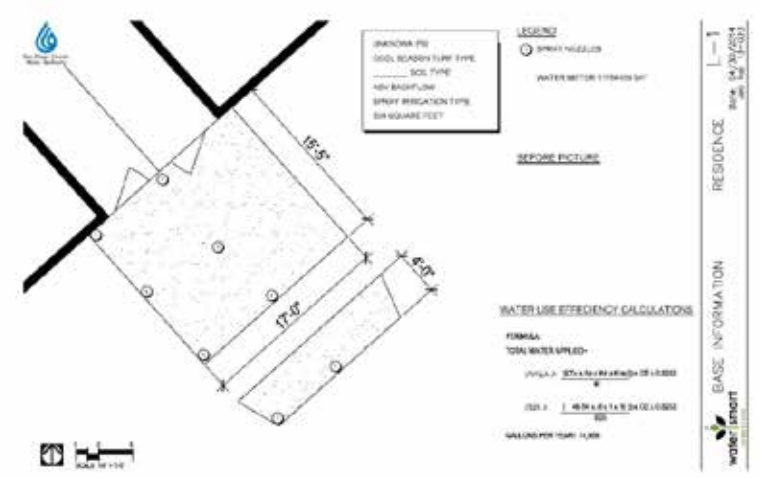
1/4 Scale: 1/4” = 1’ or 1” = 4’

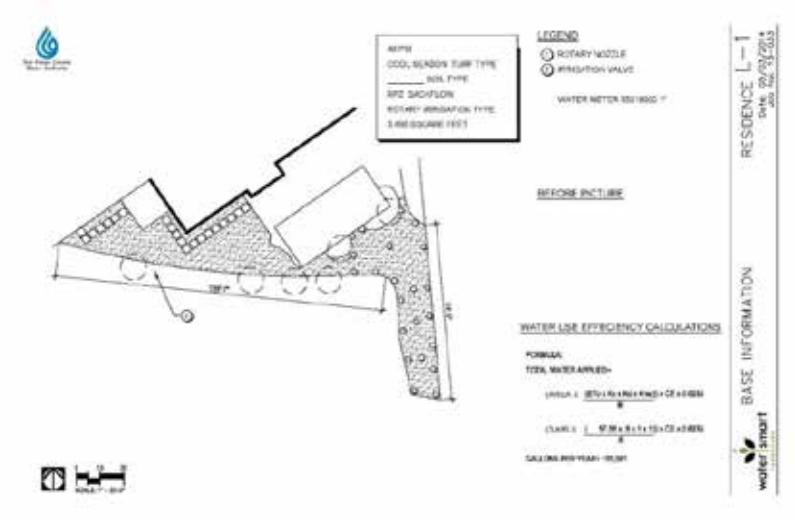
1/8 Scale: 1/8” = 1’ or 1” = 8’

Large Size Properties:

1/10 Scale: 1” = 10’

1/20 Scale: 1” = 20



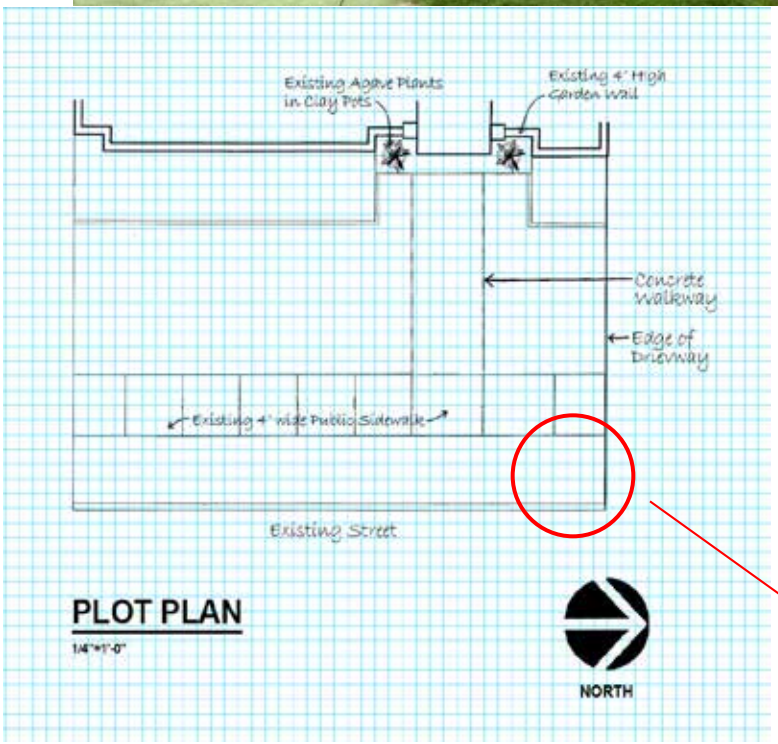


Step 2:
Create a Basic Plot Plan

Measure your property

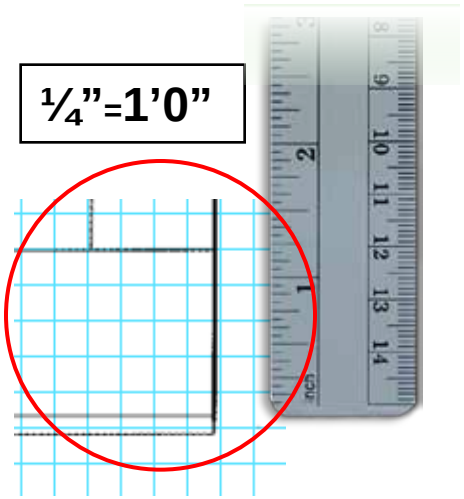
- Start with one dominant point to measure from (i.e. a wall corner)
- Locate features that stay (walls, hardscape, trees, fences, etc.)
- Alternate: use outside source (Property Description, Google Earth)

Step 2:
Create a Basic Plot Plan



Using Graph Paper

- Select grid paper to match scale
- Draw in scale on grid paper
- Align “0” and measure
- Add Legend:
  - Scale
  - N arrow



Step 2:
Create a Plot Plan

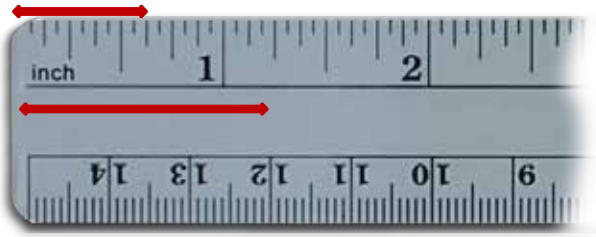
Measuring in Scale

Architectural Scale: 1/8” or 1/4” Scale

Ex: Measuring 5’ in scale

Standard Inch Ruler of 1/8” = 1’0” Scale

Standard Inch Ruler of 1/4” = 1’0” Scale



Architectural Scale of 1/8” = 1’0” Scale

Architectural Scale of 1/4” = 1’0” Scale

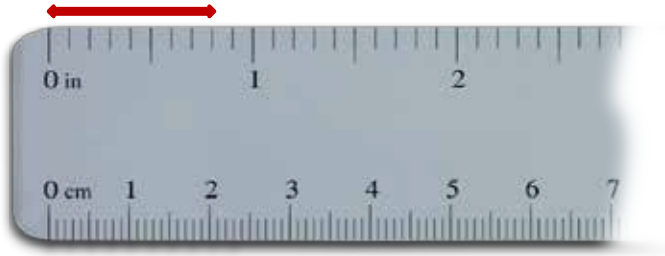
Step 2:
Create a Plot Plan

Measuring in Scale

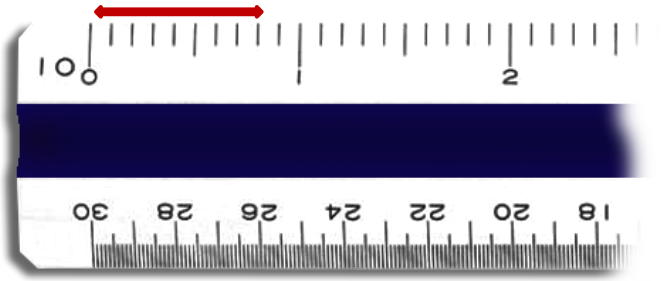
Engineering Scale: 1/10” or 1/20” Scale

Ex: Measuring 8’ in scale

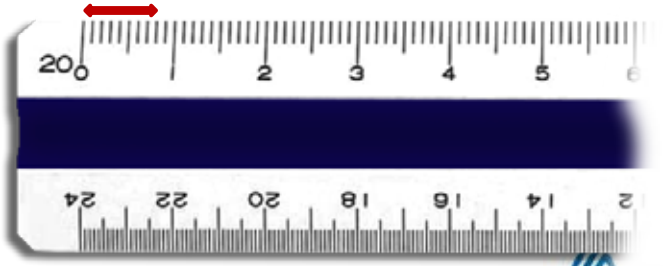
Decimal Ruler 1/10” = 1’0”



Engineering Scale 1/10” = 1’0”



Engineering Scale 1/20” = 1’0”



Step 2:
Plot Plan: Alternative

Without putting it on paper

Flag Method

- Mark flags with selected plants and size
- Place flags for each plant

Step 2:
Plot Plan: Alternative

Without putting it on paper

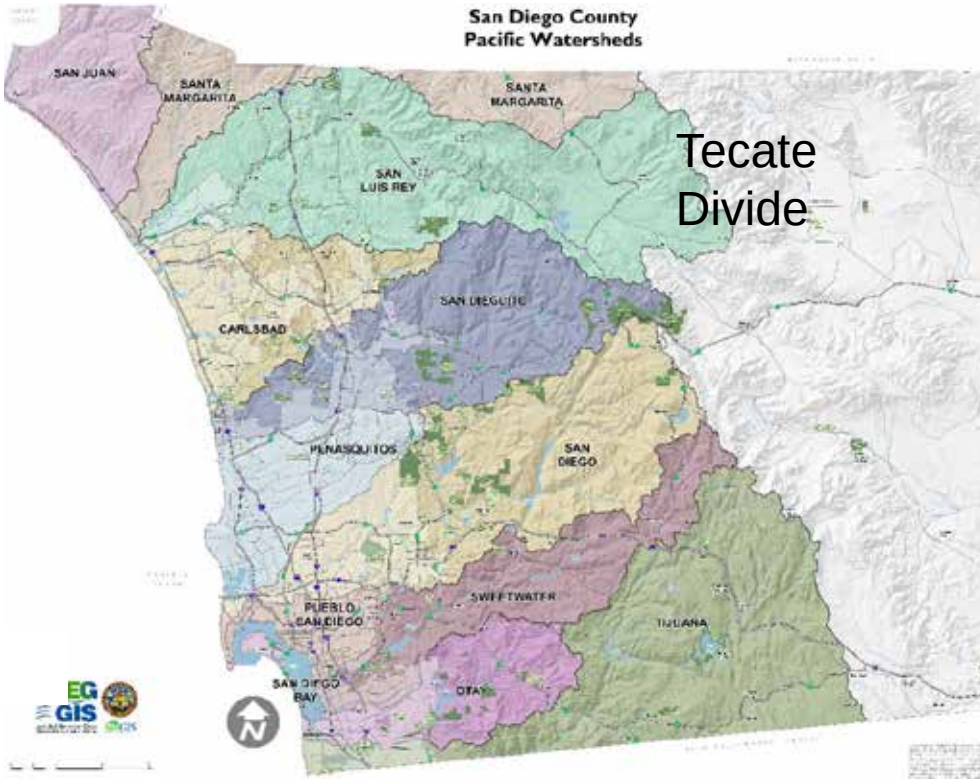
Flag Method

- Plan & measure for mature plants
- Rearrange as needed
- Count to create plant list
- Plant according to flags

Step 3:
Evaluate Your Site: Watershed

What is a Watershed?

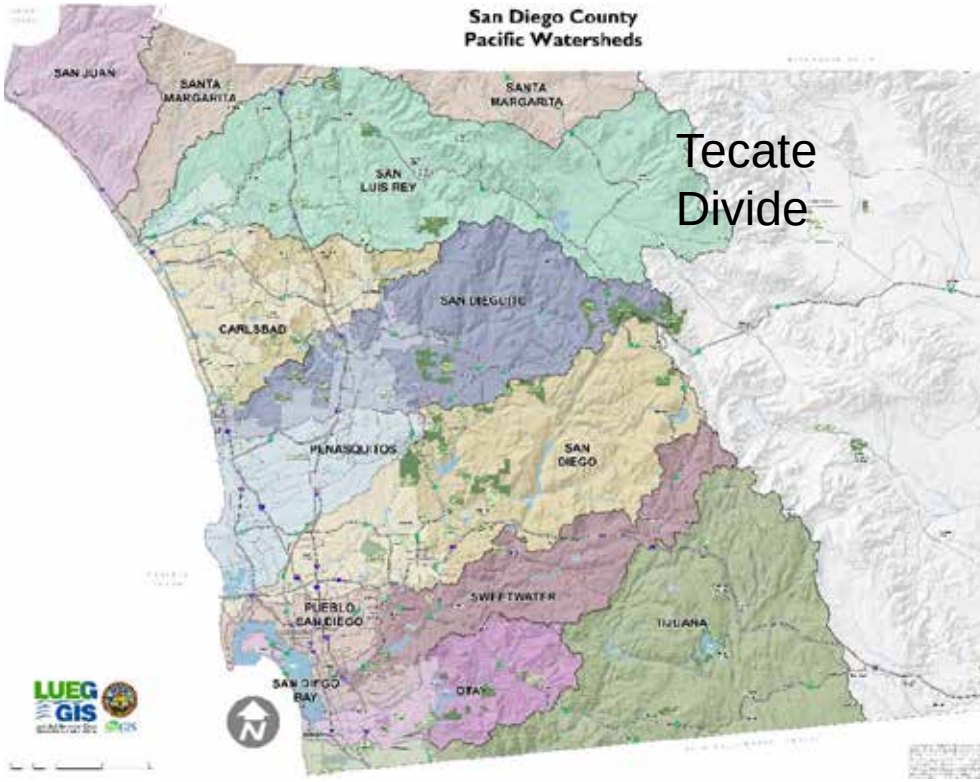
- A **watershed** is the area of land where all of the water that falls in it and drains off of it goes to a common outlet.



Step 3:
Evaluate Your Site: Watershed

You live in a Watershed

- San Diego has 11 westward draining Watersheds
- Where does it flow from?
  - Tecate Divide
- Where does it flow to?
  - Eastern side:
    desert aquifers & Salton Sea
  - Western side:
    canyons, streams,
    western aquafers & Ocean



Step 3:
Evaluate Your Site: Watershed

You live in a Watershed

Benefits to Using a Watershed Approach to Landscaping

- Improves environment
- Protects our waters
- Preserves our coast
- Reduces Beach Closures from pollution
- Saves water in landscape
- Saves energy used in water transport

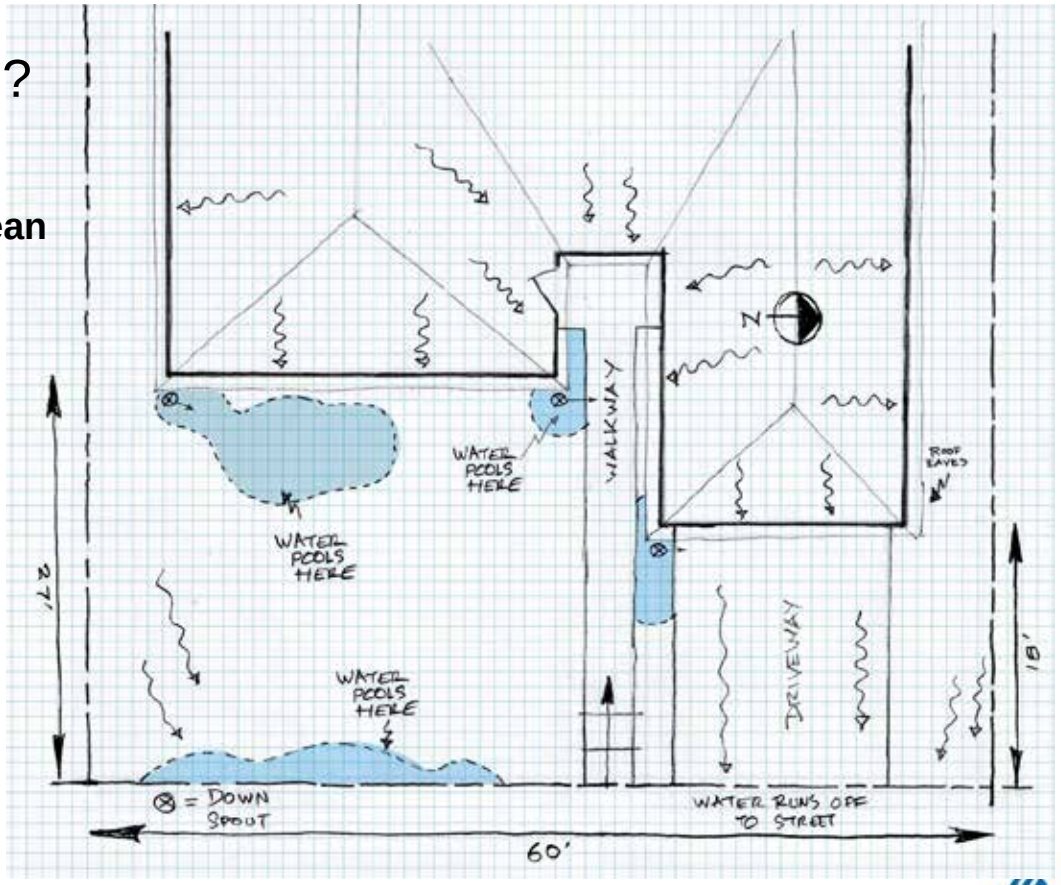
Step 3:
Evaluate Your Site: Watershed

Your yard is a Mini-Watershed

Homework

Map your drainage

- Where does it flow from?
- Where does it flow to?
- **Gutter ➡ Storm Drains ➡ Ocean**



Step 3:
Evaluate Your Site: Soil and Watershed

Evaluate Your Drainage

Record notes on your LID L-2 plan

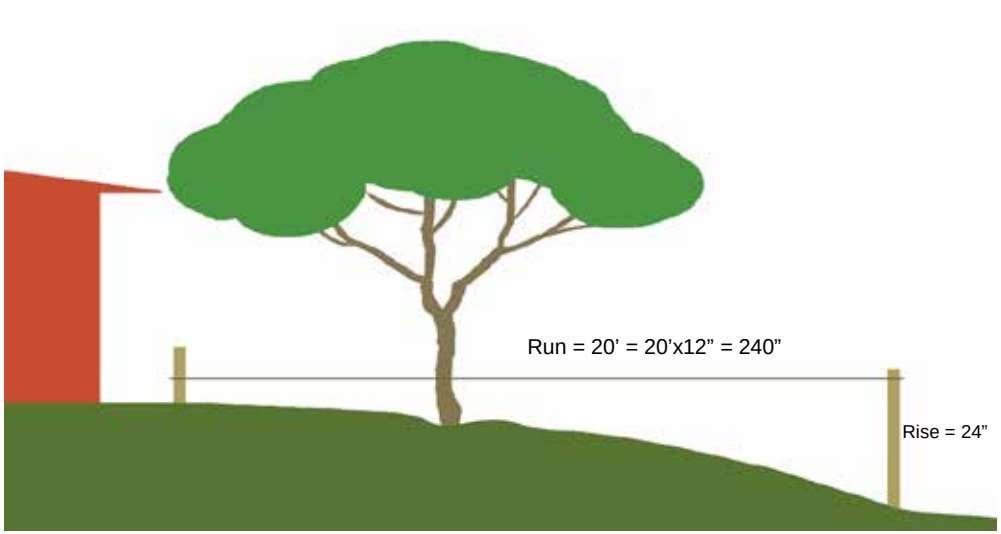
- Where does it flow from?
  - Downspouts
  - Drains: French, planters, Concrete
  - Swales
  - Slopes

Step 3:
Evaluate Your Site: Soil and Watershed

Slopes & Hillsides

- How steep is your slope?
  - Run = Horizontal distance
  - Rise = Vertical distance
  - Slope = (Rise /Run)* 100

Ex:
Rise = 24”
Run = 20’ = 20’x12” = 240”
Slope = (24”/240”)*100 = 10%



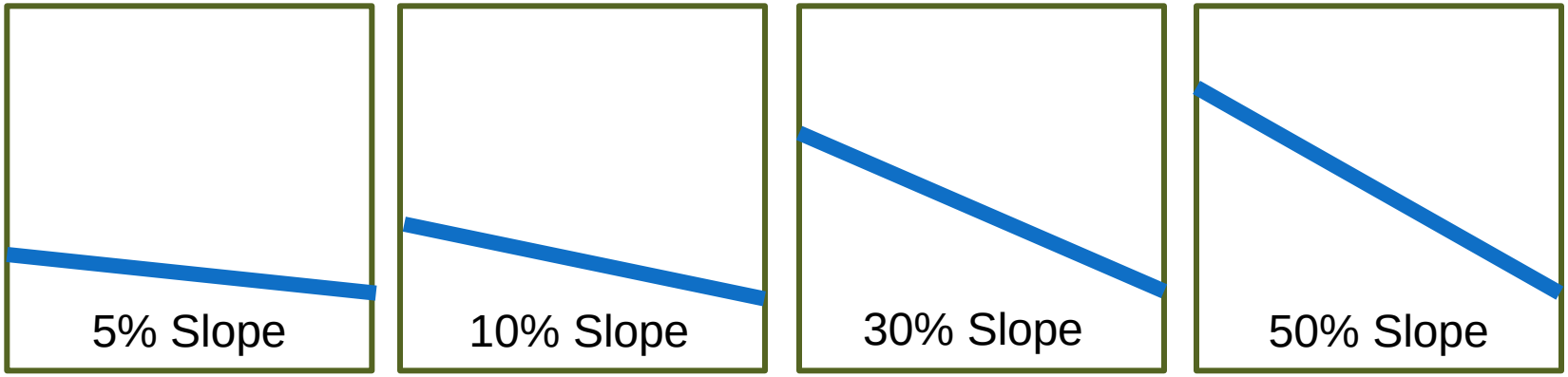
Step 3:

Homework

Evaluate Your Site: Soil and Watershed

Slopes & Hillsides: Estimating

- Slope formula: (Rise/Run) *100
- Slope examples:



- Estimate your slope on your L-2 plan for your site evaluation
- Use Soil Building Mulch type (brush Mulch, Chipped Mulch with specified texture) on all slopes
- Decomposed Granite (DG) used only on slopes less than 5%

Step 3:
Evaluate Your Site: Soil and Watershed

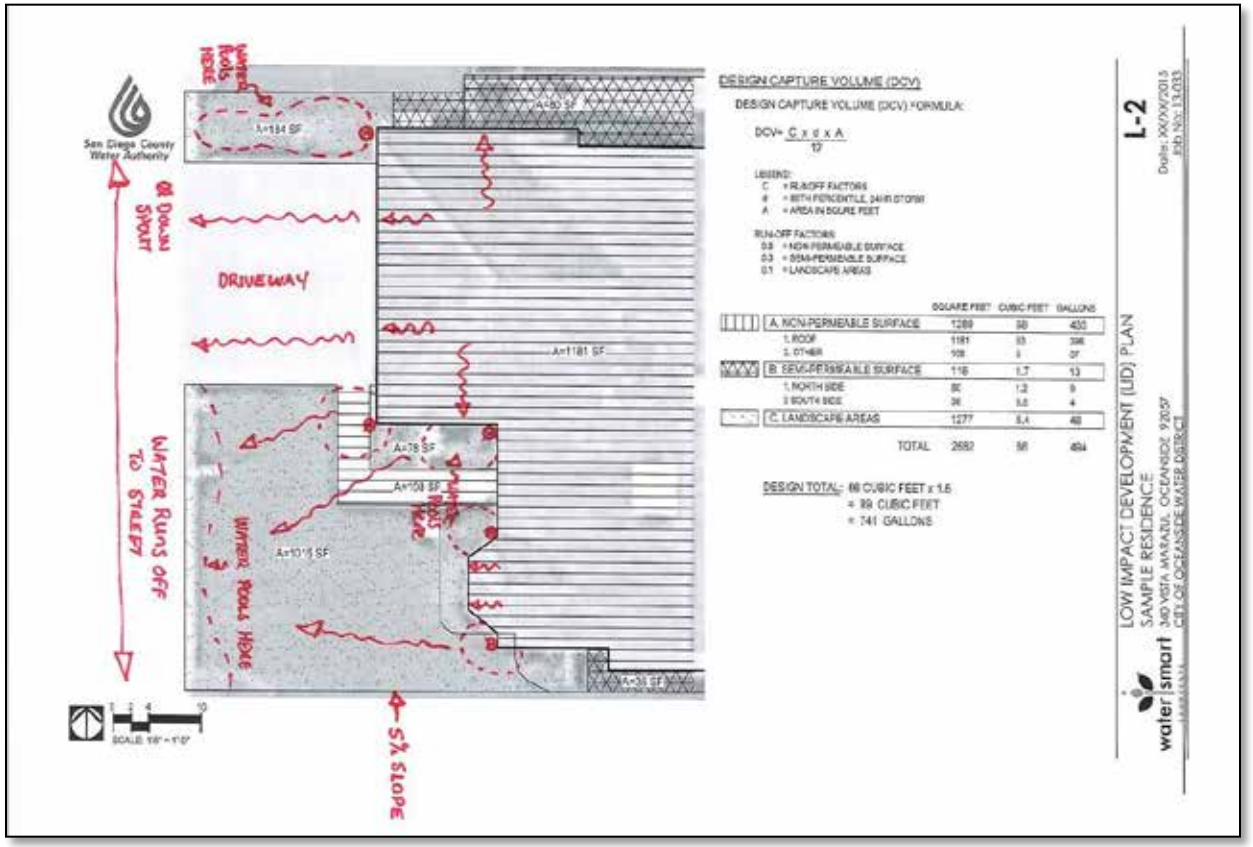
Evaluate Your Drainage

Record notes on your LID L-2 plan

- Where does it flow to?
  - Drainage system to gutter?
  - Direction of flow from slopes?
  - Where does it pool?
  - Permeability of areas?
  - Soil infiltration rate?
  - Rain barrel?
  - Gutter to Storm Drains to Ocean

Step 3:
Evaluate Your Site: Soil and Watershed

LID Base Plan (L-2):

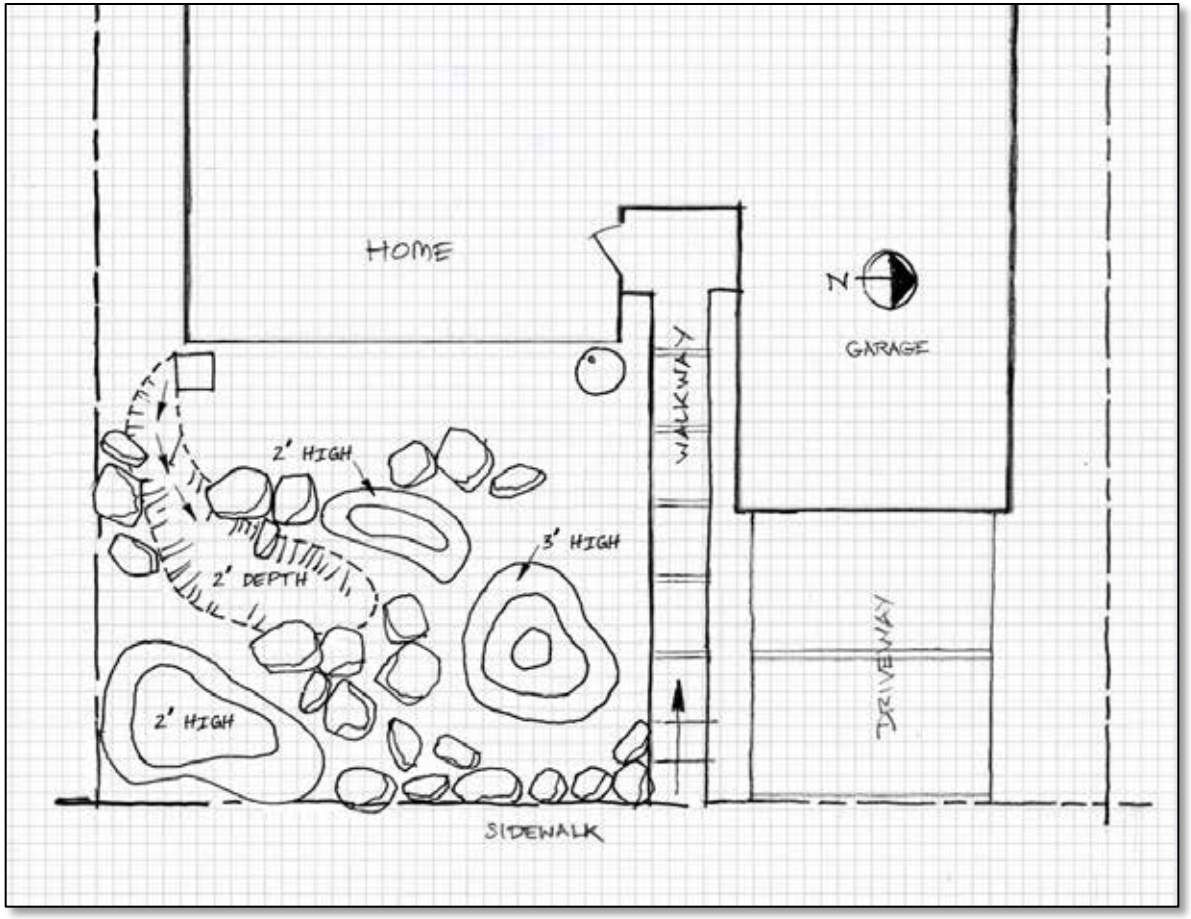


Evaluate Your Drainage for Your LID

Record notes on your L-2 plan

Step 3:
Evaluate Your Site: Soil and Watershed

Finished LID Plan (L-2) Example:



Step 3:
Evaluate Your Site: Soil

Soil: Why Do We Care?

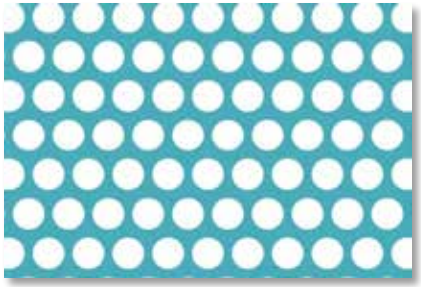
- Soil can cleanse water
- Soil can store water
- Soil influences everything related to water
  - Infiltration
  - Holding capacity
  - Movement
  - Irrigation scheduling

Step 3:
Evaluate Your Site: Soil

- **Mineral**

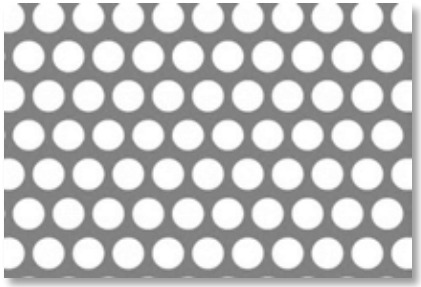
- **Organic**

- **Pore Space**



Step 3:
Evaluate Your Site: Soil

- **Mineral**
- Organic
- Pore Space



Step 3:
Evaluate Your Site: Soil

Soil Texture

Particle Type		Water Movement (Drainage)	Water Holding	Nutrient Holding
Sand 		Fast	No	No
Silt 		Medium	Medium	Medium
Clay		Slow	Yes, once wet	Rich!
Loam Mixture of all particle types		Medium	Yes	Yes

Step 3:
Evaluate Your Site: Soil

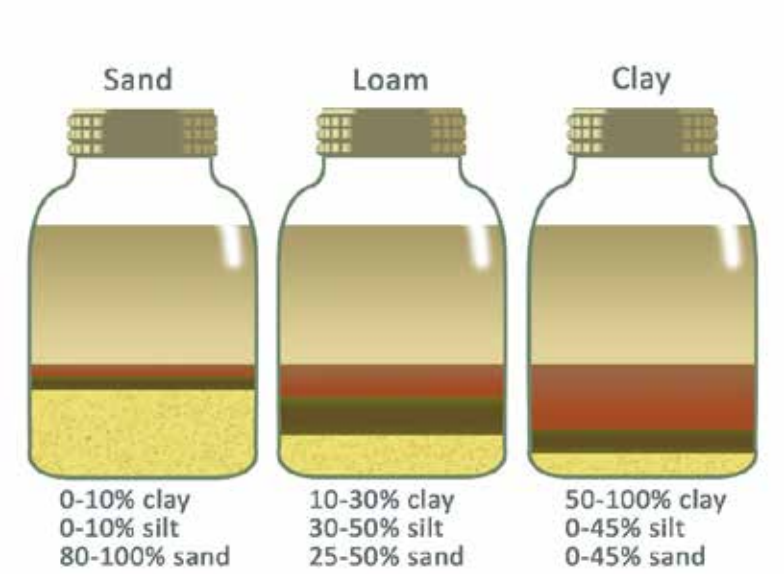
Determining Soil Texture

- Soil Sampling: Dig a hole
  - Remove mulch or surface matter
  - Dig down approx. 6”
  - Take sample from side of hole

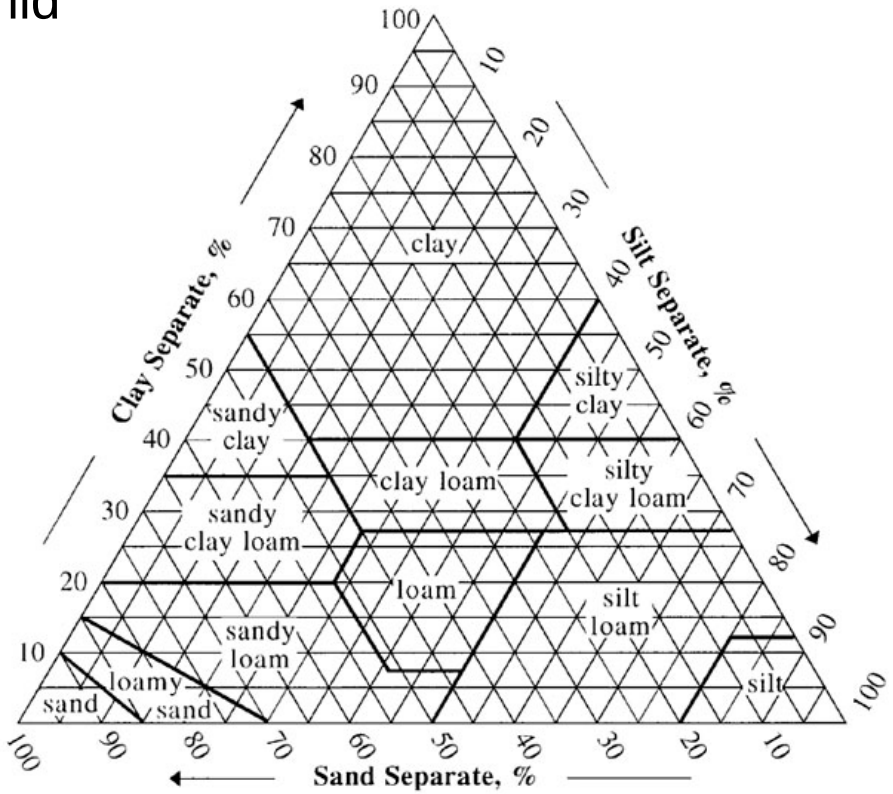
Step 3:
Evaluate Your Site: Soil

Determining Soil Texture

- USDA Soil Texture Pyramid



Jar Testing for Soil Texture

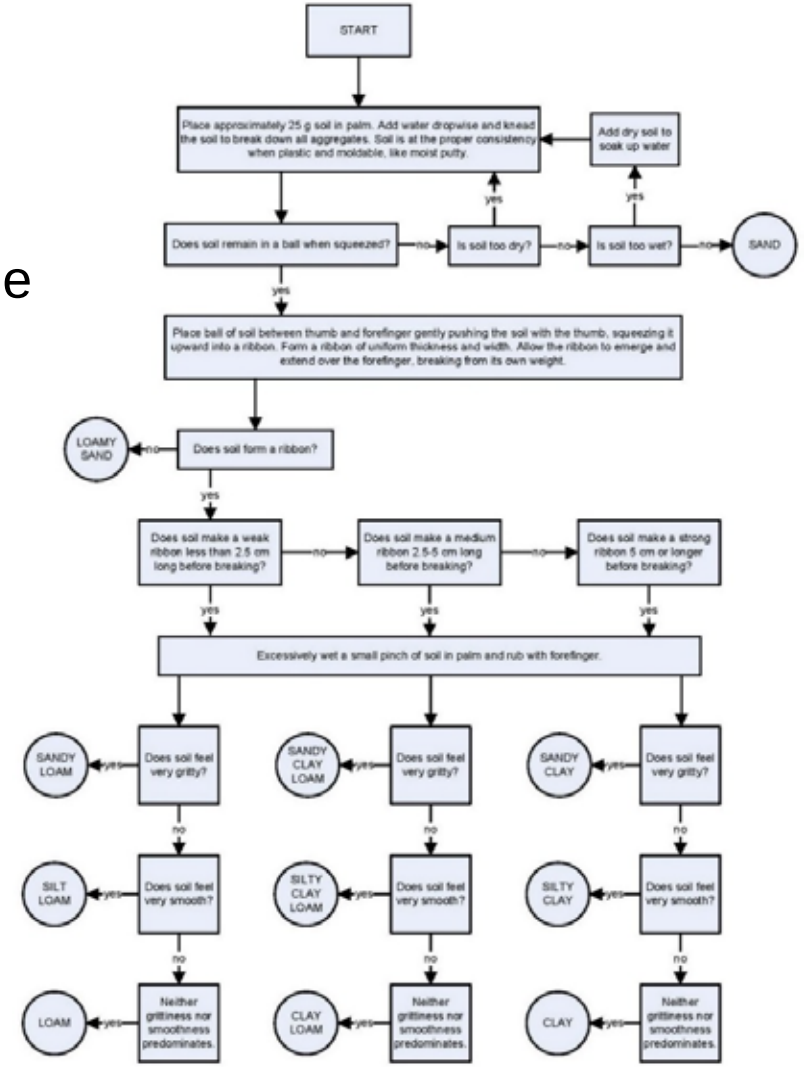


USDA Soil Texture Pyramid

Step 3:
Evaluate Your Site: Soil

Determining Soil Texture

- Want more?
- Find the “Thien Feel Test” on line



Taken from USDA-NCRS (Modified from S.J. Thien. 1979. *A flow diagram for teaching texture by feel analysis.* Journal of Agronomic Education. 8:54-55.)

Step 3:
Evaluate Your Site: Soil

Determining Soil Texture

- "Thein Feel Test"
  - Wet the soil sample to playdough consistency
  - Make a ball and poke it:
    - Does it fall apart?
    - Does it hold together?
  - Squeeze a ribbon:
    - Less than 1 inch?
    - Between 1 inch and 2 inches?
    - More than 2 inches?
  - Wet it excessively and feel it:
    - Is it slippery?
    - Is it gritty?

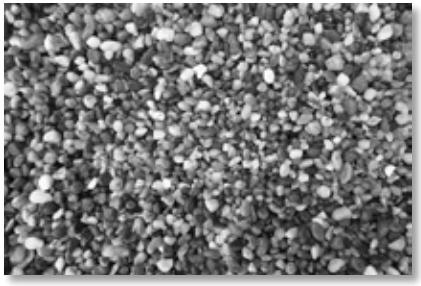
Step 3:
Evaluate Your Site: Soil

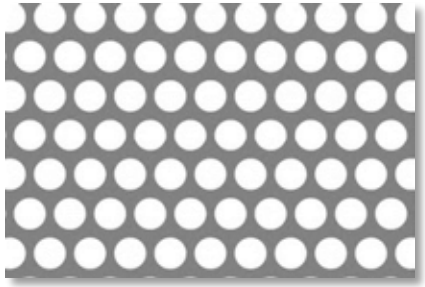
Back in 20 minutes!

- Lab Time
- Break

Step 3:
Evaluate Your Site: Soil

- Mineral
- **Organic**
- Pore Space

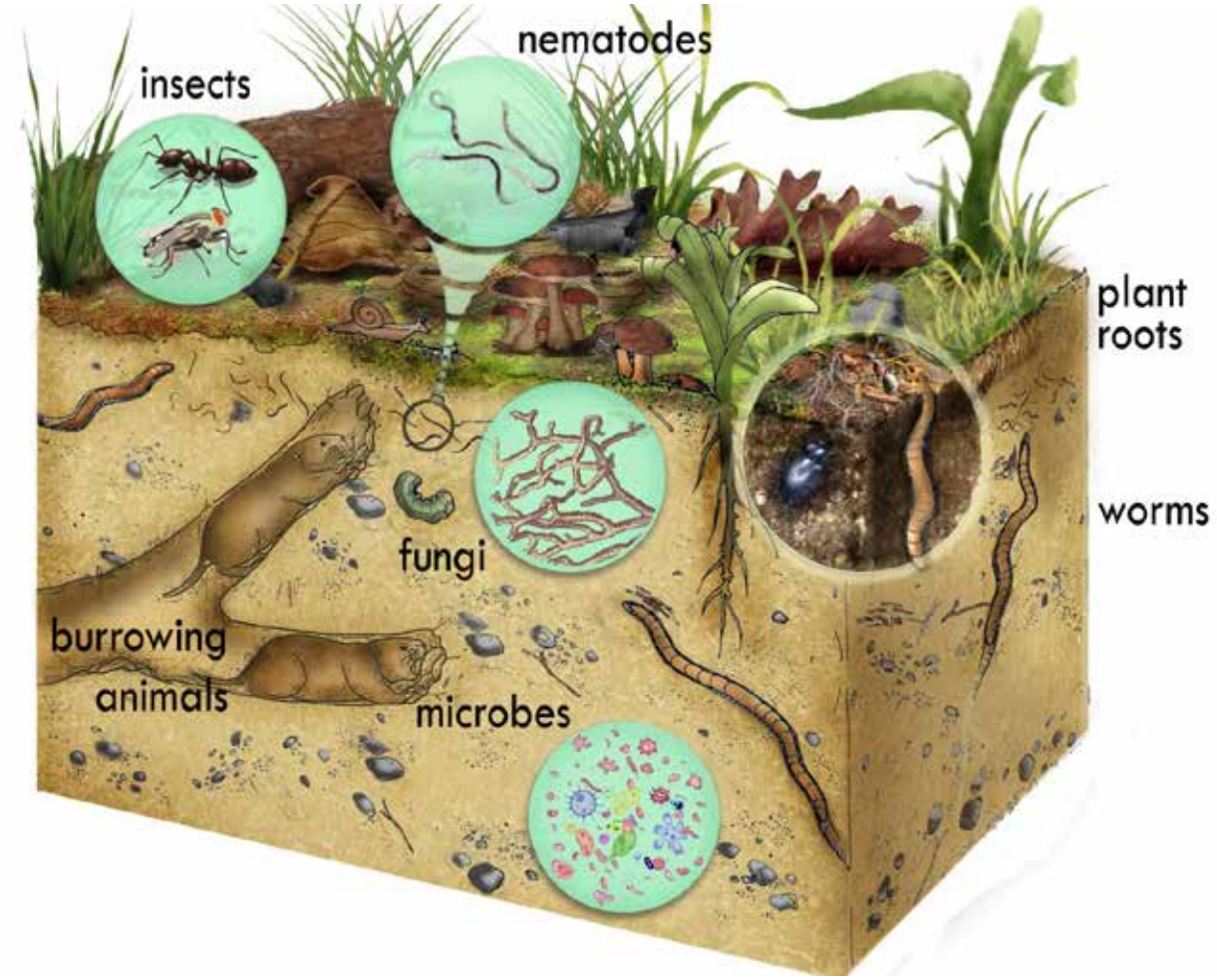




Step 3:
Evaluate Your Site: Soil

Sustainable Soil

- Soil Food Web
- Organisms build soil
- Encourage them with proper organic matter, moisture, oxygen, etc.



Step 3:
Evaluate Your Site: Soil

Soil Food Web

Bacteria

Nematodes

Weeds

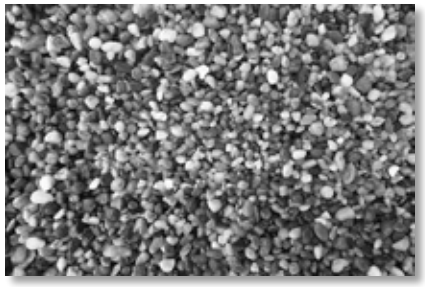
Fungi

Worms

Plants

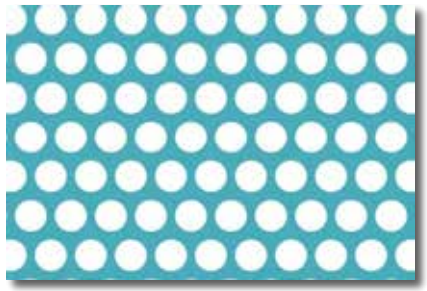
Step 3:
Evaluate Your Site: Soil

- Mineral



- Organic

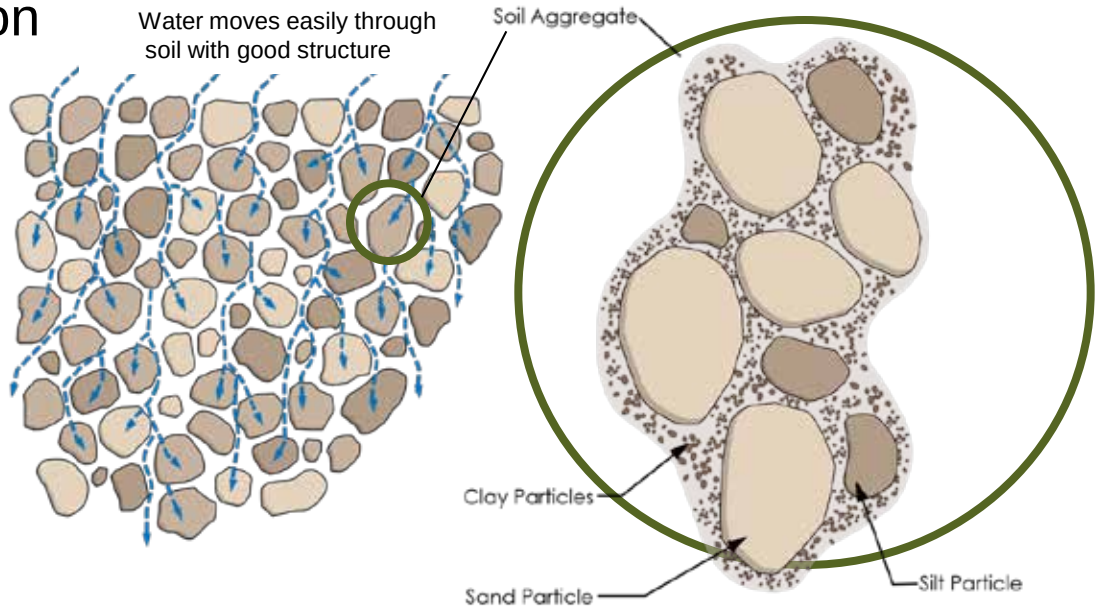
- **Pore Space**



Step 3:
Evaluate Your Site: Soil

Soil Aggregation

- Created by bacteria, fungi and humic acid from organic matter
- Allows water
  - Infiltration / percolation
  - storage



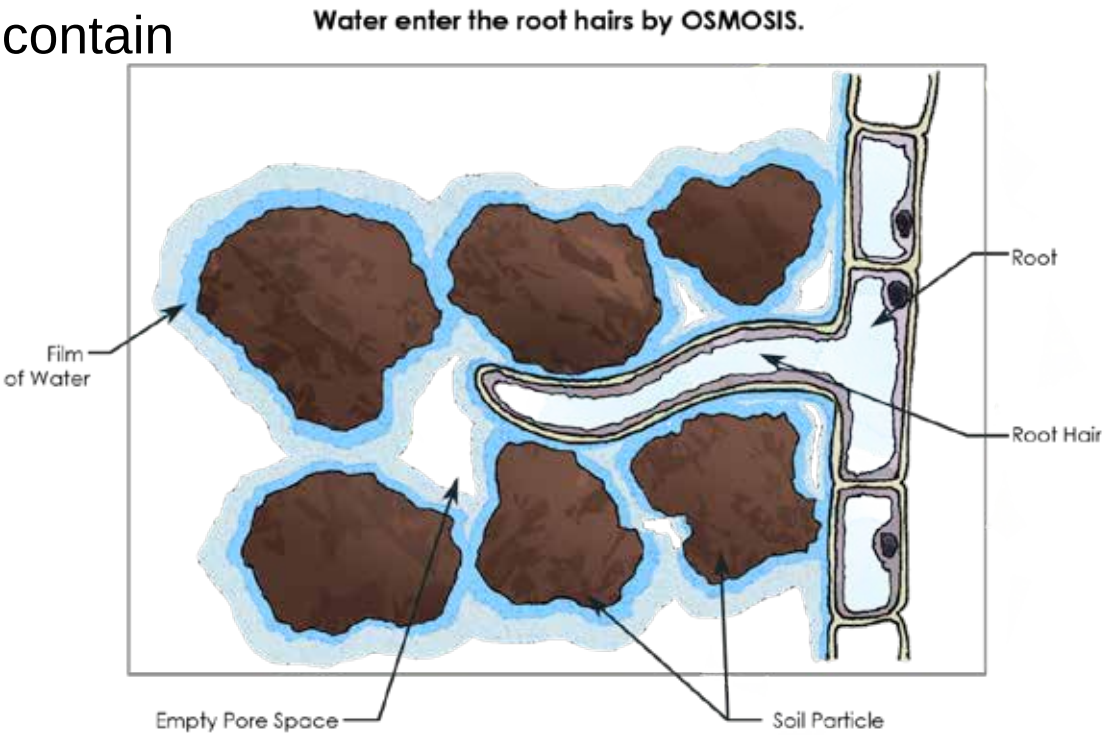
Step 3:
Evaluate Your Site: Soil

Soil Aggregation

- Creates soil pores which contain

OWL:
- **O**xyen
- **W**ater
- **L**ife

- Purifies runoff water
- Creates water holding capacity



Water Uptake by Plant Roots

Step 3:
Evaluate Your Site: Soil

Soil Compaction

Urban Compaction

Compaction Remediated

Step 3:
Evaluate Your Site: Soil

Organic Matter

- Reverses compaction
- Improves root penetration
- Improves plant success

Step 3:
Evaluate Your Site: Soil

Remediating Compaction

- Add organic matter
- Build the health of the soil food web
- By the way … ADD ORGANIC MATTER!
  - **IN** the ground: Compost for Soil Amendment when planting
  - **ON** the ground: Mulch after planting

Compost Soil Amendment
IN ground

Mulch
ON ground

Step 3:
Evaluate Your Site: Soil

Soil Amendment

- Use compost when planting
- Small particles, usually less than ¼”
- Mix compost with backfill soil
  - 30% most plants
  - 15% natives in disturbed soil
- Available in bags or bulk

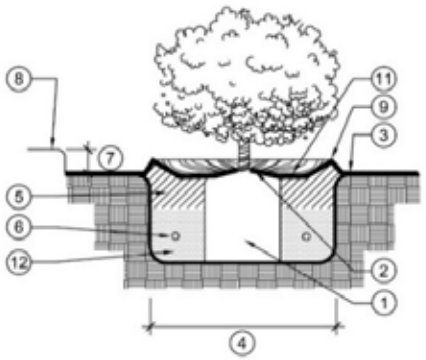
Compost for Soil Amendment

Step 3:
Evaluate Your Site: Soil

Soil Amendment

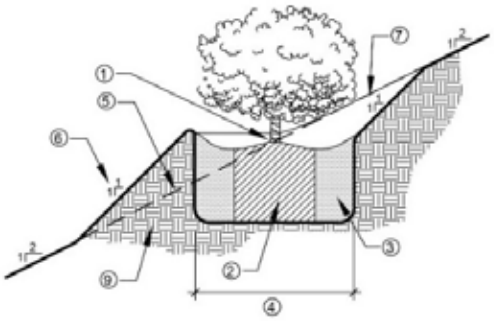
- Planting
  - Dig hole 2 x wide
  - Fill hole with water before planting
  - Loosen or slice roots
  - Plant crown above soil level

- Use amended soil mixture backfill planting hole



1. ROOTBALL.
2. CROWN-1" ABOVE FINISH GRADE.
3. FINISH GRADE.
4. 2 X ROOTBALL DIA.
5. BACKFILL MIX (SEE SPECS.).
6. PLANT TABLETS (SEE SPECS.).
7. 2" MAX. DEPTH.
8. TOP OF PAVING.
9. 4" HIGH WATERING BASIN.
10. UNDISTURBED NATIVE SOIL.
11. PROVIDE 2" MULCH LAYER. IN ALL SHRUB AREAS.
12. NATIVE SOIL BACKFILL

D SHRUB PLANTING DETAIL
NO SCALE



1. SET CROWN OF ROOTBALL. EQUAL TO ORIGINAL GRADE.
2. ROOT BALL.
3. PLANT SHRUBS PER DETAIL C2, SHEET L-423.
4. PLANT PIT 2X ROOTBALL WIDTH.
5. LINE OF ORIGINAL 2:1 SLOPE.
6. 1:1 DOWNHILL FILL
7. 1:1 UPHILL CUT

NOTE:
ALL SHRUB BEDS LESS THAN 3:1 SLOPE SHALL RECEIVE A 3" LAYER PREMIUM MEDIUM GRIND SHREDDED REDWOOD BARK MULCH.

G SLOPE SHRUB PLANTING DETAIL
NO SCALE

Step 3:
Evaluate Your Site: Soil

Mulch

- Blanket over soil surface
- Continues to feed the soil as it breaks down
- Adds organic matter in areas already planted
- Prevents
  - Erosion
  - Evaporation
  - Weeds
  - Compaction

Step 3:
Evaluate Your Site: Soil

Mulch Types

- Longevity: Wood Chips or Bark

Wood Chip Mulch
Pathways not beds or slopes

NOT for soil health or slopes

Step 3:
Evaluate Your Site: Soil

Mulch Types

- **Soil Building**: chipped tree trimmings or coarse compost
  - Varied particle sized
  - Texture
    - Water passes through
    - Holds in place on slopes and in wind

Brush or Chipped Mulch

Chipped Mulch

Blended Mulch

Step 3:
Evaluate Your Site: Soil

Mulch Application:

- After planting, lay 4” layer on top of soil
- Leave open space around plant stem or crown
- Add additional mulch when areas are thin
- Rule of thumb:
  - 1 1/4 CY covers about 100 sq. ft. at 4” depth

Brush Mulch / Chipped Mulch

Step 3:
Evaluate Your Site: Soil

Products at Miramar Greenery: Soil Building

Material Type	Description	Price/Cubic Yard (incl. tax & loading)
City Resident Self-Loading Composted 4" Mulch	**Up to 2 cubic yard**	**FREE**
1/2" Compost	**10 week processing of yard waste and food waste, screened to 1/2"**	**$12**
4" Mulch	**2 week processing of yard waste only**	**$ 5**
2" Mulch - *Preferred Mulch*	**2 week processing of brush and branches (no curbside material)**	**$12**
Coarse Chips (2" Compost Overs) (some plastic contamination)	**10 week processing of yard waste & food waste, screen to 1/2" - 2"**	**$ 5**
~~Natural Wood Chips~~ ***Fine for Paths***	~~Logs ground to 2" - 4" and screened to remove fines~~	~~$24~~
~~Natural 1/2" Fines~~	~~Logs ground and screened to 1/2"~~	~~$24~~
~~Plain Wood Chips~~ ***Fine for Paths***	~~Dimensional lumber ground to 2" - 4"~~	~~$24~~
~~Colored Wood Chips: red & brown~~	~~Dimensional lumber ground to 2" - 4" and colored with non-toxic dye~~	~~$34~~

~~Abcdefg~~ Do not use for sheet mulching

Recommended

Step 3:
Evaluate Your Site: Soil and Watershed

How does your soil handle water?

- Organic matter remediates compaction
- Percolation and infiltration effected by
  - Soil texture
  - Soil aggregation
  - Layers of compaction or rock

Homework

Step 3:
Evaluate Your Site: Soil and Watershed

Soil Drainage and Percolation Test (Homeowner's Guide)

Day 1

1. Dig one cubic foot hole (12"x12"x12")
2. Fill the hole with water to saturate the soil
3. Let drain overnight

Day 2

1. Lay a stick over the hole
2. Refill the hole with water to the level of the stick
3. Wait one hour
4. Measure how far the water level has dropped to determine the infiltration rate per hour

Note: Use the soil from the hole to do a worm count & test the texture of your soil

Drainage Test

Here's a simple way to evaluate your soil drainage.

Dig a hole 12 inches wide x 12 inches deep, putting the soil to the side to be used for the Squeeze Test and the Worm Test.

Fill the hole with water and let it drain overnight.

Use a stick to span the hole from the top of the stick to the bottom of the pit. Measure the distance again in one hour.

Step 3:
Evaluate Your Site: Soil and Watershed

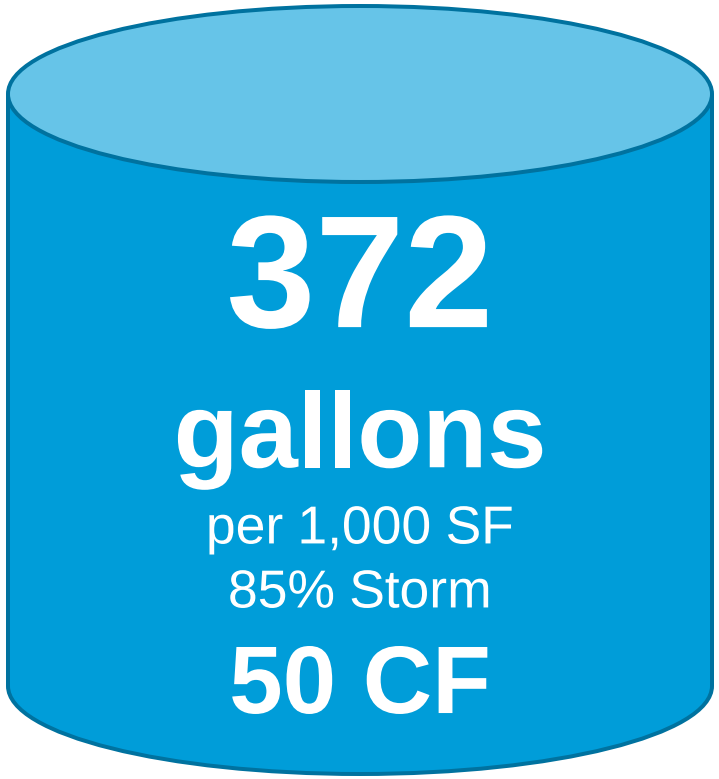
Soil Drainage Field Percolation Test

Inches per Hr.	Drainage	Solutions
Less than 1”	Slow	Add organics Create mounds Select tolerant plants
1”- 3”	OK	
More than 4”	Fast	Add organics Create mounds Select tolerant plants

Step 3:
Evaluate Your Site: Watershed and Soil

First Flush

- First rain after dry period
- Washes off pollutants deposited during dry period
- Discharge of higher concentrations of pollutants in early part of a storm (relative to the later part of the storm)
- 1,000 SF roof has
  - 372 gallons for 85%, 24 Hr. Storm at .6 inches of rainfall
- Soil is important tool for management of First Flush



Step 3:
Evaluate Your Site: Soil and Watershed

First Flush

Old Town, San Diego

First Seasonal Flush

Can the polluted water be cleaned?

YES! Healthy soil breaks down pollutants.

Can the water be utilized?

YES! It can be stored in

- Soil
- Rain Barrels
- Cisterns

Subsequent Storm Event

Step 3:
Evaluate Your Site: Soil and Watershed

Storm Water Requirements for Water Quality Treatment

Permanent new Storm Water requirements are now mandatory if Renovation project has 5,000 SF of impermeable surface replaced or added

If applicable:

- Retain and reuse 100% of Design Capture Volume (DCV)
- If 100% is not feasible: Biofiltration (Bioretention and Rain Gardens)

Typically this will include hiring design professionals to prepare a grading plan, an irrigation plan and a planting plan.

Most residential projects are not subject to these requirements.

Note: for complete information, see Model BMP Manual, San Diego Region, Table 1-2, page 1-6.

Step 3:
Evaluate Your Site: Soil and Watershed

Storm Water Requirements for Water Quality Treatment

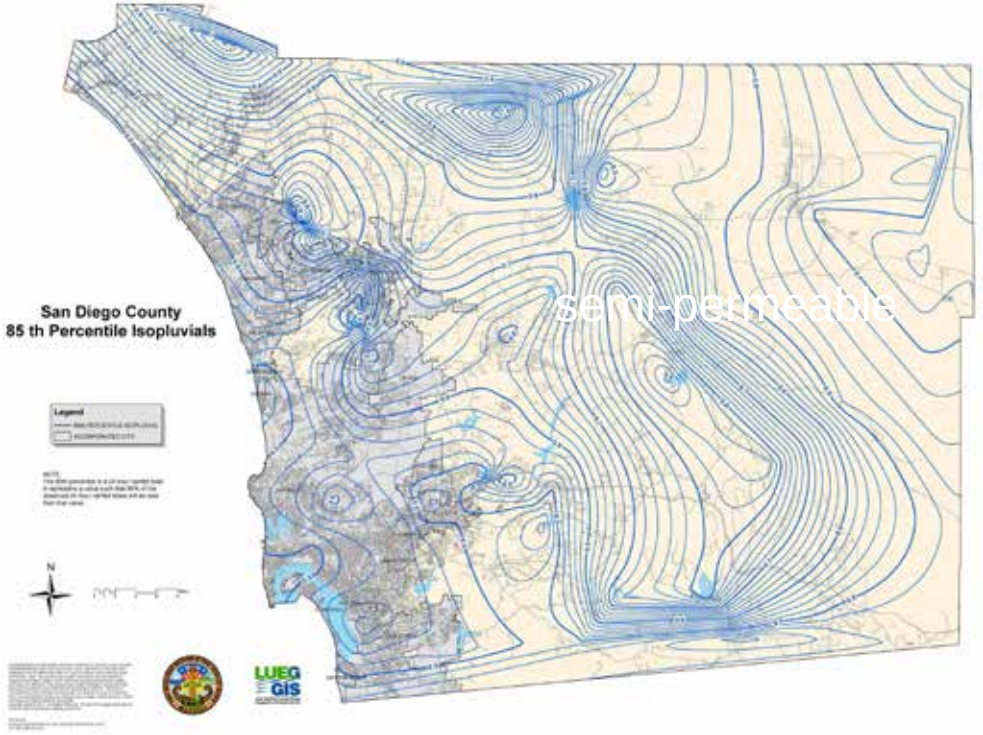
If Permanent Storm Water BMP's are **not** required:

- You can still be sustainable by incorporating features in your landscape plan such as:
  - Rain barrels
  - Bioinfiltration such as dry creek beds with basins

Step 3:
Evaluate Your Site: Soil and Watershed

How do we know how much water to plan for?

- Plan for the 85%, 24 hour rain event
  - San Diego Coastal Typical .6 inches
  - Mountains 1.0
  - Check Isopluvial map for area specifics



semi-permeable

Step 3:
Evaluate Your Site: Soil and Watershed

Design Capture Volume (DCV)

Impermeable

- Roofs, Concrete, Asphalt, Grouted Pavers

Semi-permeable

- DG, Cobble, Gravel, Compacted Soil

Permeable

- Landscape areas, Amended or Mulched Soils

Step 3:
Evaluate Your Site: Soil and Watershed

Design Capture Volume (LID):

- Formula for **on-site** Design Capture Volume (DCV) for Runoff Factors 85th percentile 24 Hr. Storm:

- **DCV = C x d x A x (43,560 SF/acre x 1/12 in/ft.)***
  DCV = C x d x A x 3,630*
  * conversion from acres to SF and to CF

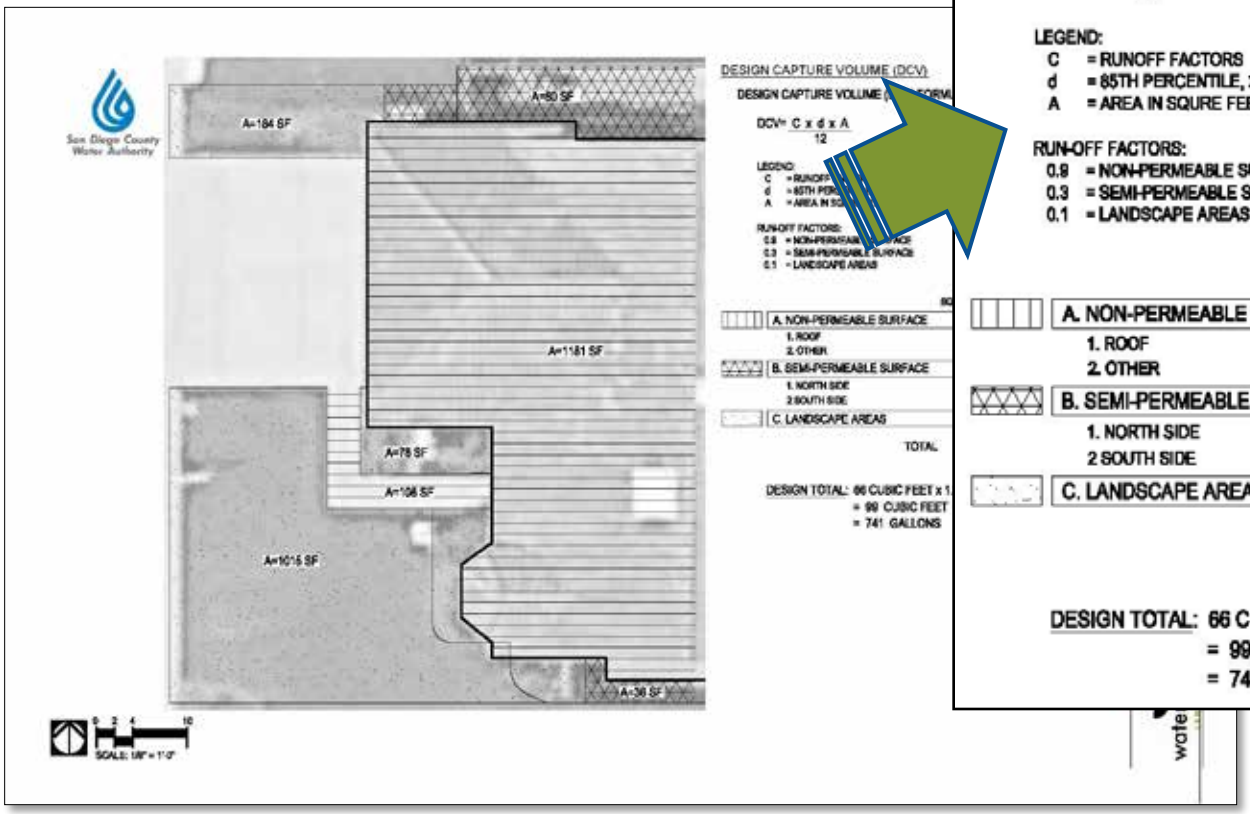
- DCV = Design Capture Volume in cubic feet
- C = Runoff Factors

Impermeable	0.9
Semi- permeable	0.3
Landscape areas	0.1

- d = 85th Percentile Storm, average regional 0.6
- A = Tributary area in acres
- 43,560 SF X 1/12 is conversion to CF

Step 3:
Evaluate Your Site: Soil and Watershed

LID Base Plan (L-2):



DESIGN CAPTURE VOLUME (DCV)

DESIGN CAPTURE VOLUME (DCV) FORMULA:

$$DCV = \frac{C \times d \times A}{12}$$

LEGEND:
- C = RUNOFF FACTORS
- d = 85TH PERCENTILE, 24HR STORM
- A = AREA IN SQUIRE FEET

RUN-OFF FACTORS:
- 0.9 = NON-PERMEABLE SURFACE
- 0.3 = SEMI-PERMEABLE SURFACE
- 0.1 = LANDSCAPE AREAS

	SQUARE FEET	CUBIC FEET	GALLONS
A. NON-PERMEABLE SURFACE	1289	58	433
1. ROOF	1181	53	396
2. OTHER	106	5	37
B. SEMI-PERMEABLE SURFACE	116	1.7	13
1. NORTH SIDE	80	1.2	9
2 SOUTH SIDE	36	0.5	4
C. LANDSCAPE AREAS	1277	6.4	48
TOTAL	2682	66	494

DESIGN TOTAL: 66 CUBIC FEET x 1.5
= 99 CUBIC FEET
= 741 GALLONS

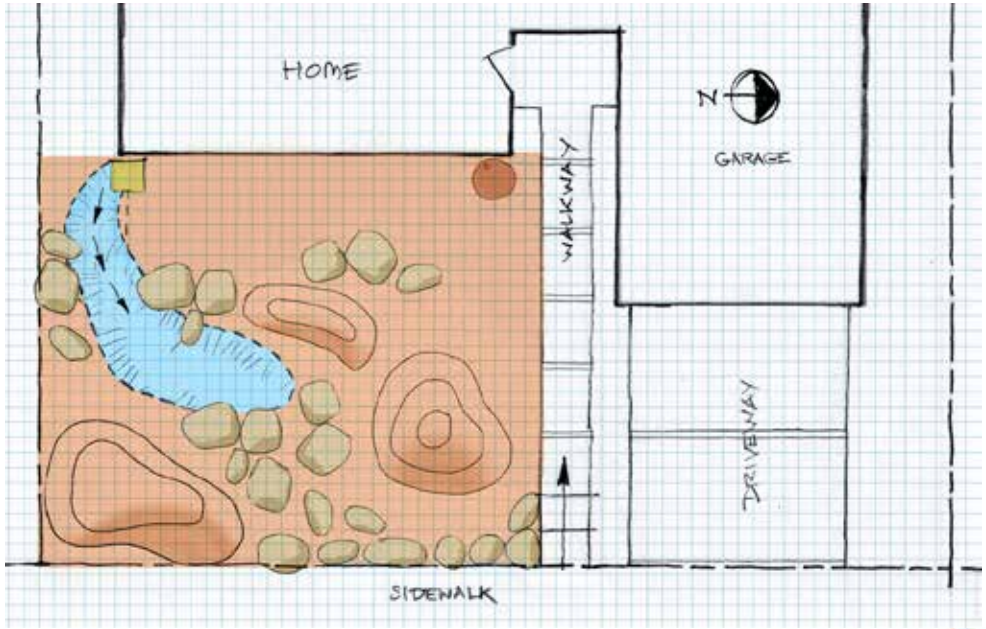
Evaluate Your Drainage for Your LID

Record notes on your L-2 plan

Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques:

- Keep water on site
- Slow-Store-Spread-Sink
  - Slow down the speed of the flow
  - Store in basins
  - Spread over wider area
  - Sink into healthy soil



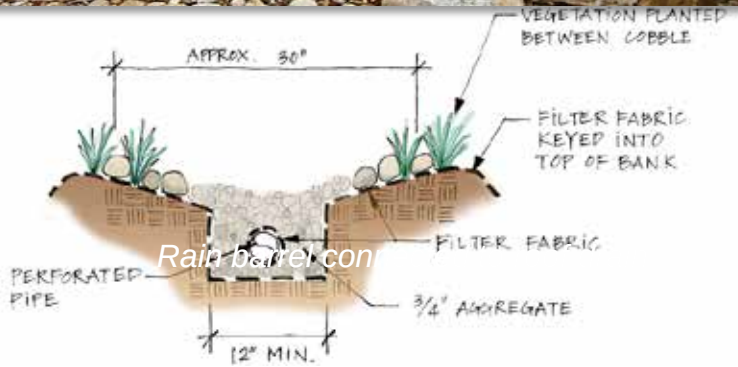
Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques: Pitfalls & Problems

- Drainage must be at least 10’ from buildings and hardscape
- Expansive clay soil
- Poor percolation

Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques: Dry Stream



10’ from hardscape

Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques: Dry Stream

- Dry Stream



- 10’ minimum from hardscape
- Optional permeable landscape fabric beneath rock

Step 3:
Evaluate Your Site: Soil and Watershed

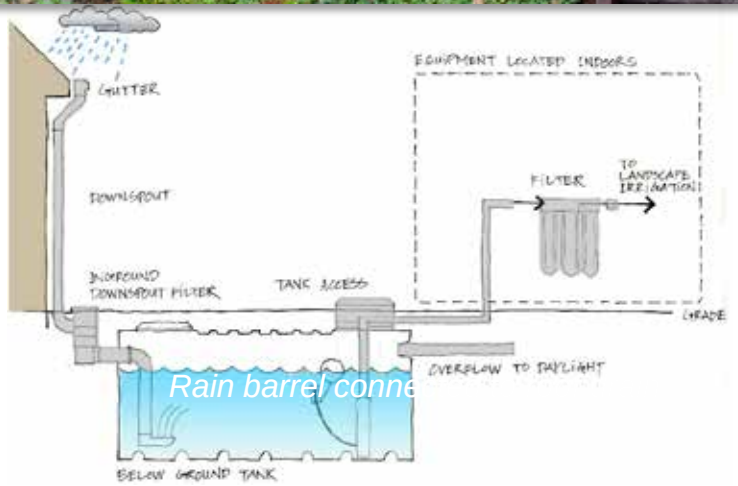
First Flush Techniques: Rain Barrel

- Install with Diverter to control overflow
- Be sure to plan for overflow if not tied to drainage system
- Check WaterSmartSD.Org for current incentives




Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques: Cisterns

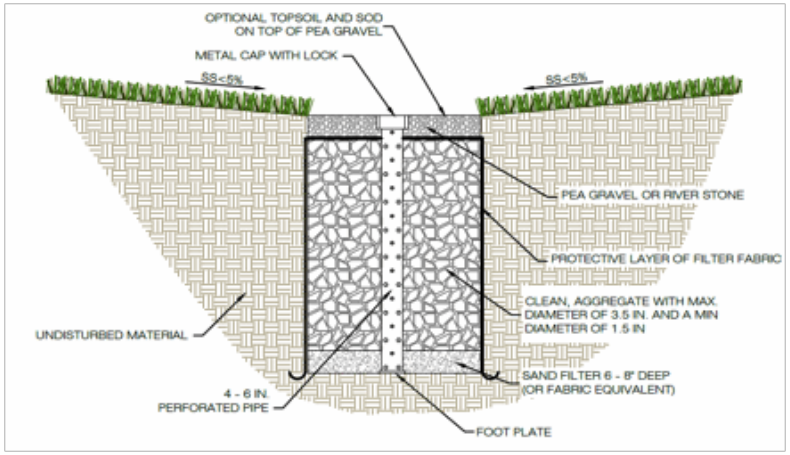


10’ from hardscape

Step 3:
Evaluate Your Site: Soil and Watershed

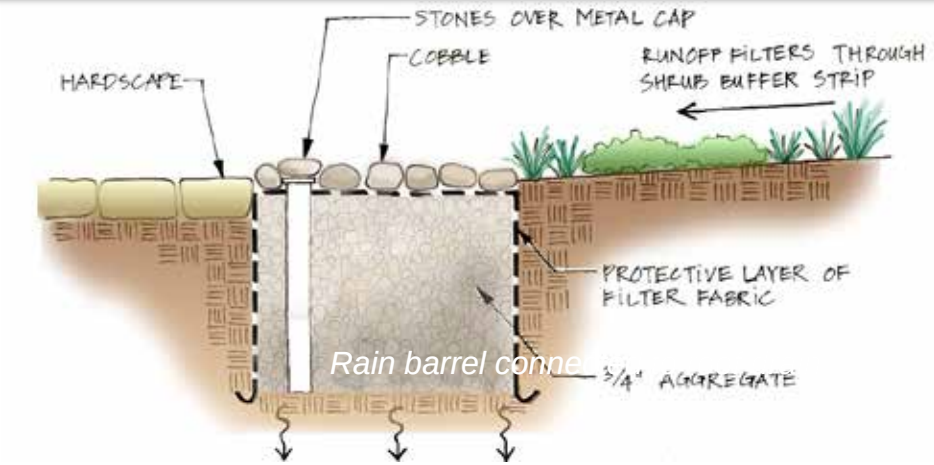
First Flush Techniques: Infiltration Trench

10’ from hardscape



Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques: Dry Well

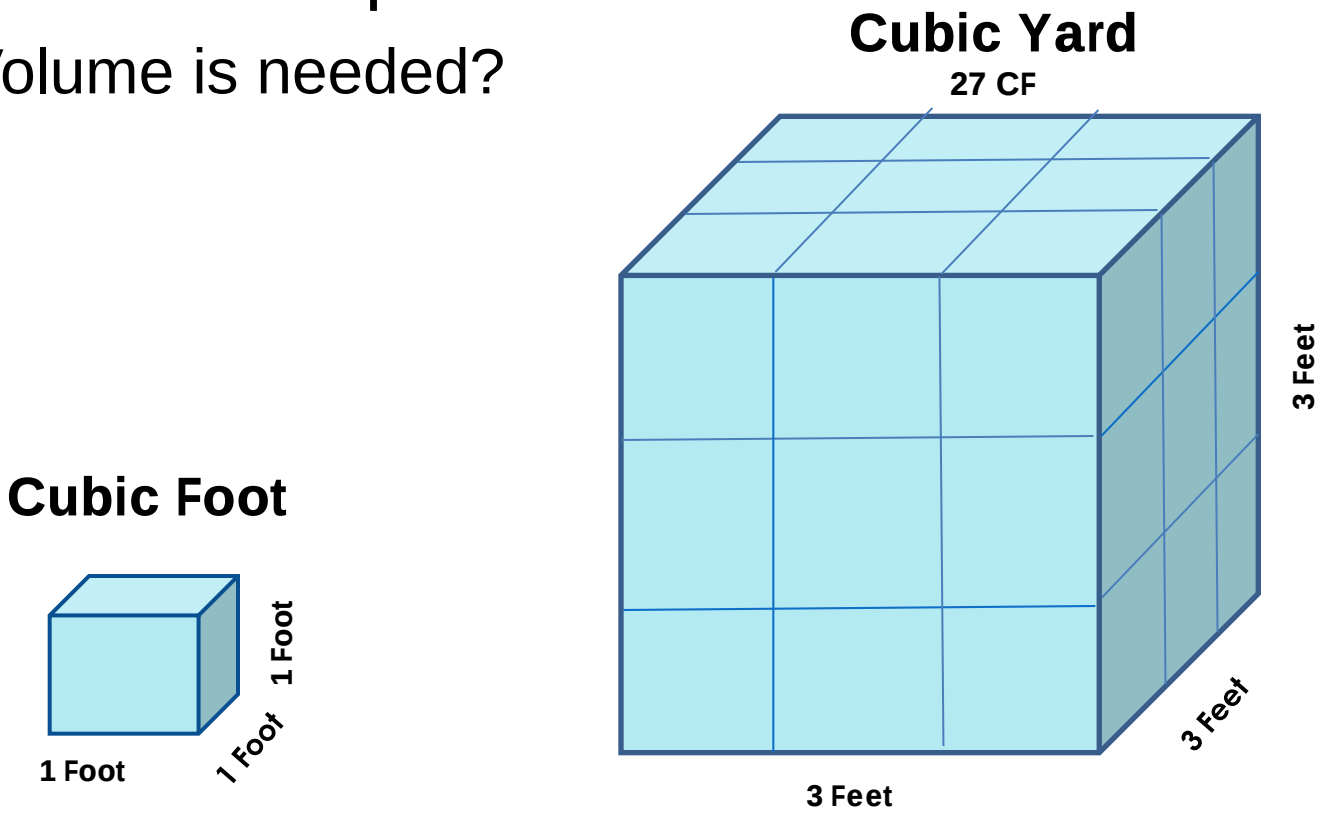


10’ from hardscape

Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques:

- What Volume is needed?



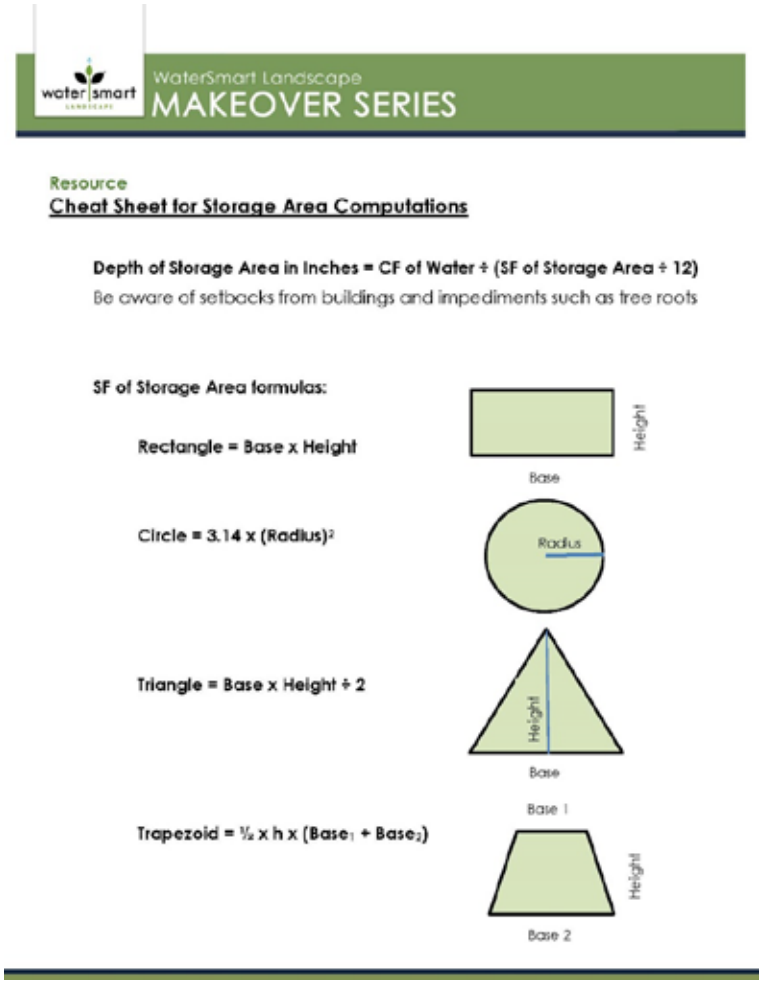
Step 3:
Evaluate Your Site: Soil and Watershed

First Flush Techniques:

- What Volume is needed?

Depth of Storage Area in Inches =
CF of Water ÷ (SF of Storage Area ÷ 12)

Be aware of setbacks from buildings and impediments such as tree roots



Homework

Step 3:
Evaluate Your Site: Observations

Site Observations

- Starting point of a successful design
- Take photos
- Assess existing situation
  1. LID Conditions
  2. Structural Conditions
  3. Design Considerations
  4. Growing Conditions

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MAKEOVER SERIES

Homework for Class 2
SITE INVENTORY AND ANALYSIS CHECKLIST
Highlight most important information for your Design Coach

Take photos and bring them to the next class

Low Impact Development Conditions and Opportunities (L-2)

Make notes of the following on your LID L-2 base plan:

Where does the water flow from?
- Downspout locations
- Drains: French, planters, Concrete
- Swales
- Slopes (location and estimated %)

Where does it flow to?
- Drainage system to gutter?
- Direction of flow from slopes?
- Where does it pool?
- Permeability of areas?
- Soil infiltration rate?
- Rain barrel?
- Gutter to Storm Drains to Ocean

What opportunities exist?

What volume of water can you slow, spread, store and sink?

What size and how deep will the space need to be?

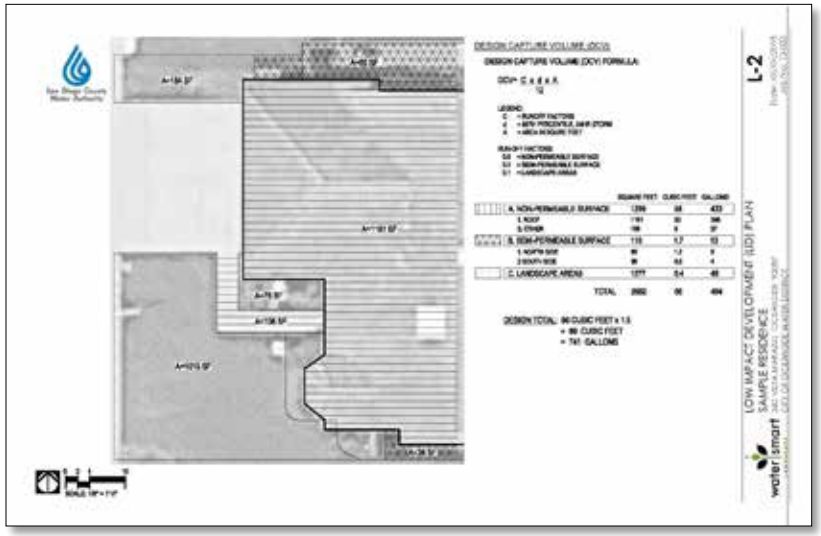
Homework

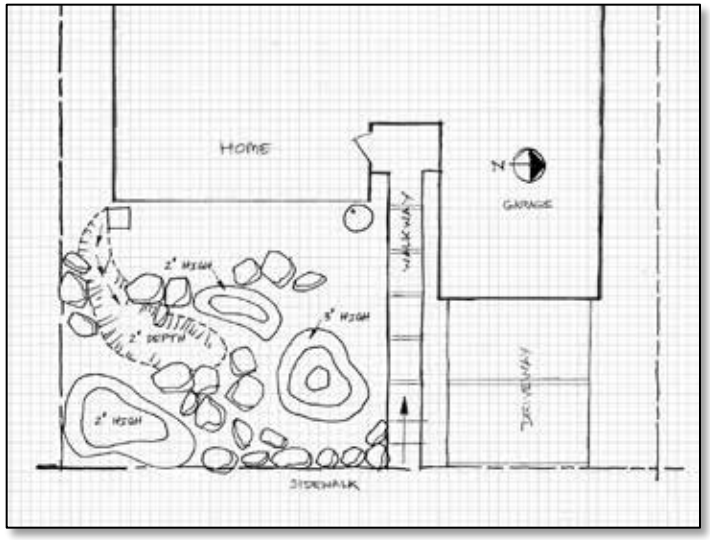
Step 3:
Evaluate Your Site: Observations

Site Observations

LID Conditions

- Where does it flow from?
- Where does it flow to?
- record on your LID L-2 plan





Homework

Step 3:
Evaluate Your Site: Observations

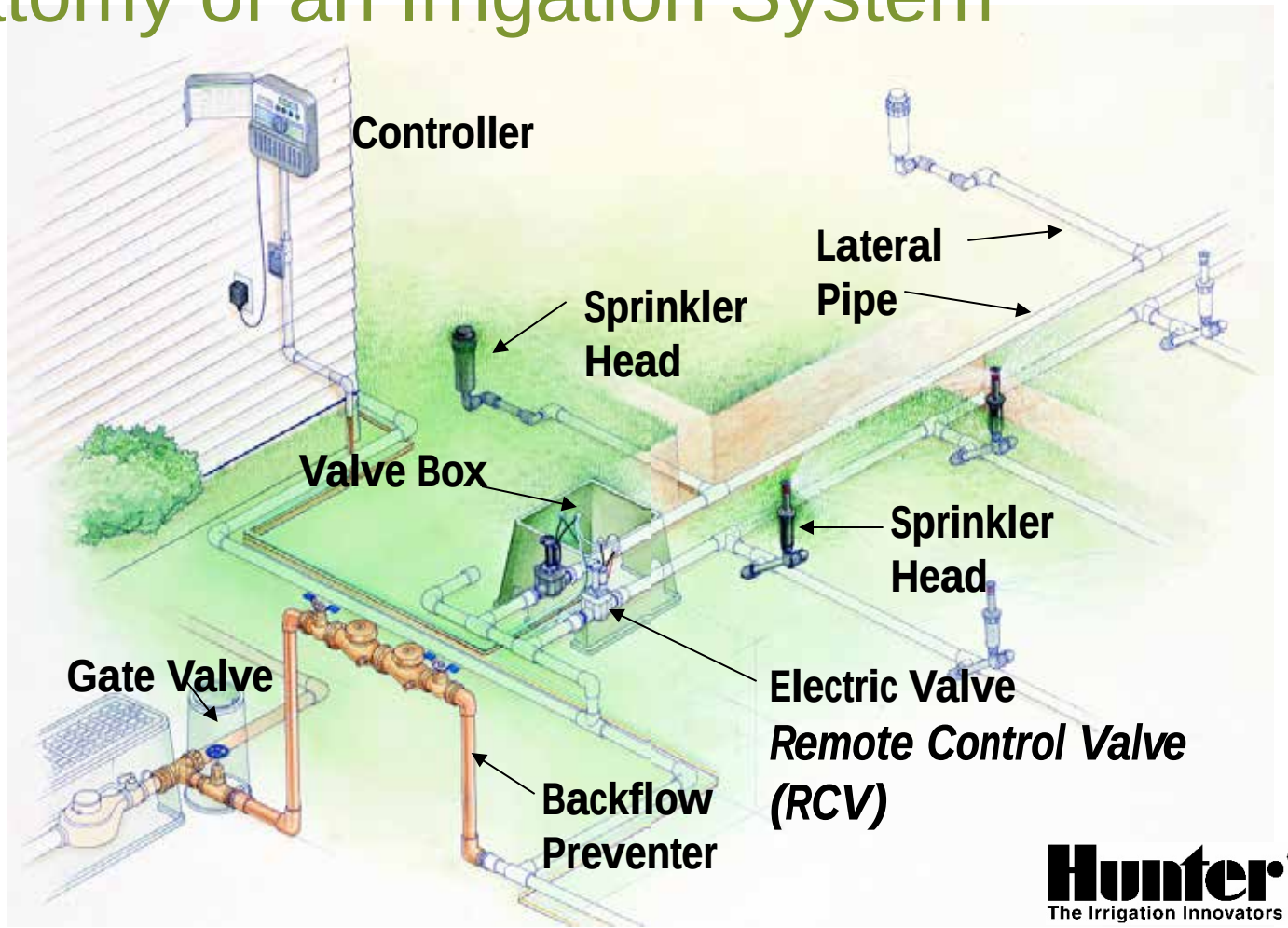
Site Observations

Structural Conditions

- Drainage: record on your LID L-2 plan
- Utilities / Easements / Sewer Clean outs
- Irrigation types and locations

Step 3:
Evaluate Your Site: Irrigation

Anatomy of an Irrigation System



Homework

Step 3:
Evaluate Your Site: Observations

Site Observations

Design Considerations

- House style
- Views
- Functional
  - Use patterns
  - Prevailing wind
  - Necessary shade
  - Screening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Workshop 1 Homework
SITE INVENTORY AND ANALYSIS CHECKLIST

Take photos and bring them to class next week

Existing Structural Considerations

Easements

Locate downspouts

Drainage

Sewer Clean outs

Irrigation lines and components

Landform:

Access Design Considerations

Door & Window locations: locate on plan and identify rooms

Views: Record existing views to preserve, views to frame/exploit/create, views to mitigate.

Homework

Step 3:
Evaluate Your Site: Observations

Site Observations

Growing Conditions

- Plants to keep
- Soil Type
- Exposure: sun/shade/wind
- Wet / Dry patterns
- Microclimate:
  - Low areas
  - Sunset Western Garden Climate Zone


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MAKEOVER SERIES

Workshop 1 Homework
SITE INVENTORY AND ANALYSIS CHECKLIST

Take photos and bring them to class next week

Existing Structural Considerations

Easements

Locate downspouts

Drainage

Sewer Clean outs

Irrigation lines and components

Landform:

Access Design Considerations
House: Record color of house and materials

Door & Window locations: locate on plan and identify rooms

Views: Record existing views to preserve, views to frame/exploit/create, views to mitigate.

Homework for Class 2:

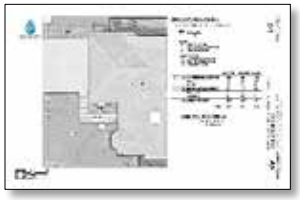
Homework

Homework sheets are located in the Notebook at the end of the Class 1 Section

1. Read: A Homeowner's Guide to a WaterSmart Landscape Pages 1- 17
   Sustainable Landscape Guidelines Pages 1 – 45

2. Do: Soil Drainage Test

3. Do: Evaluate Drainage Features on LID L-2 Base Plan
   Conduct Site Analysis



4. Identify: Your star rating

5. Collect: Turf sample- one for each type of lawn (bring to next class)

6. Watch: E-Learning Videos Episodes 1 through 8
   http://landscapemakeover.watersmart.org

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Next Session:

- Landscape Design
  - Shape your Space
  - Design Factors
- Plant Selection
- Functional Planning
- Putting It Together

QUESTIONS?