

Lesson 5

LID Design Objectives and Strategies

Design Objectives

Ideally, what should be the objective of stormwater management practices?

Design Objectives

- Water quantity control under all conditions (peak, volume)
- Water quality control under all conditions (pollution prevention)
- Aesthetics
- Costs of design and construction, operation and maintenance
- Safety

Design Objectives (cont'd)

- Reduce right-of-way impacts
 - Disruption of existing use
 - Land acquisition costs
- Swimmable, Fishable, Drinkable Waters (Clean Water Act)

General Strategies

What practical strategies in design and implementation lead to attainment of the objectives?

LID Design Strategies

- Minimize land disturbance
- Maximize roughness along flow paths (maintain natural velocities)
- Maximize infiltration rates
- Maximize retention
- Filter water above and below ground
- Minimize slope angles

1. Minimize disturbance

- Minimize soil exposure
 - Temporally
 - Spatially
- Avoid compaction of soil

2. Maximize roughness

- Use vegetated swales rather than pipes for small flow conveyance
- Spread runoff and direct it through naturally vegetated areas
- Disconnect unavoidably impervious areas



3. Maximize infiltration

- Avoid construction on pervious soils
- Direct runoff across pervious areas
- Utilize infiltration enhancement features:
 - Bioretention
 - Infiltration trenches
 - Permeable pavers

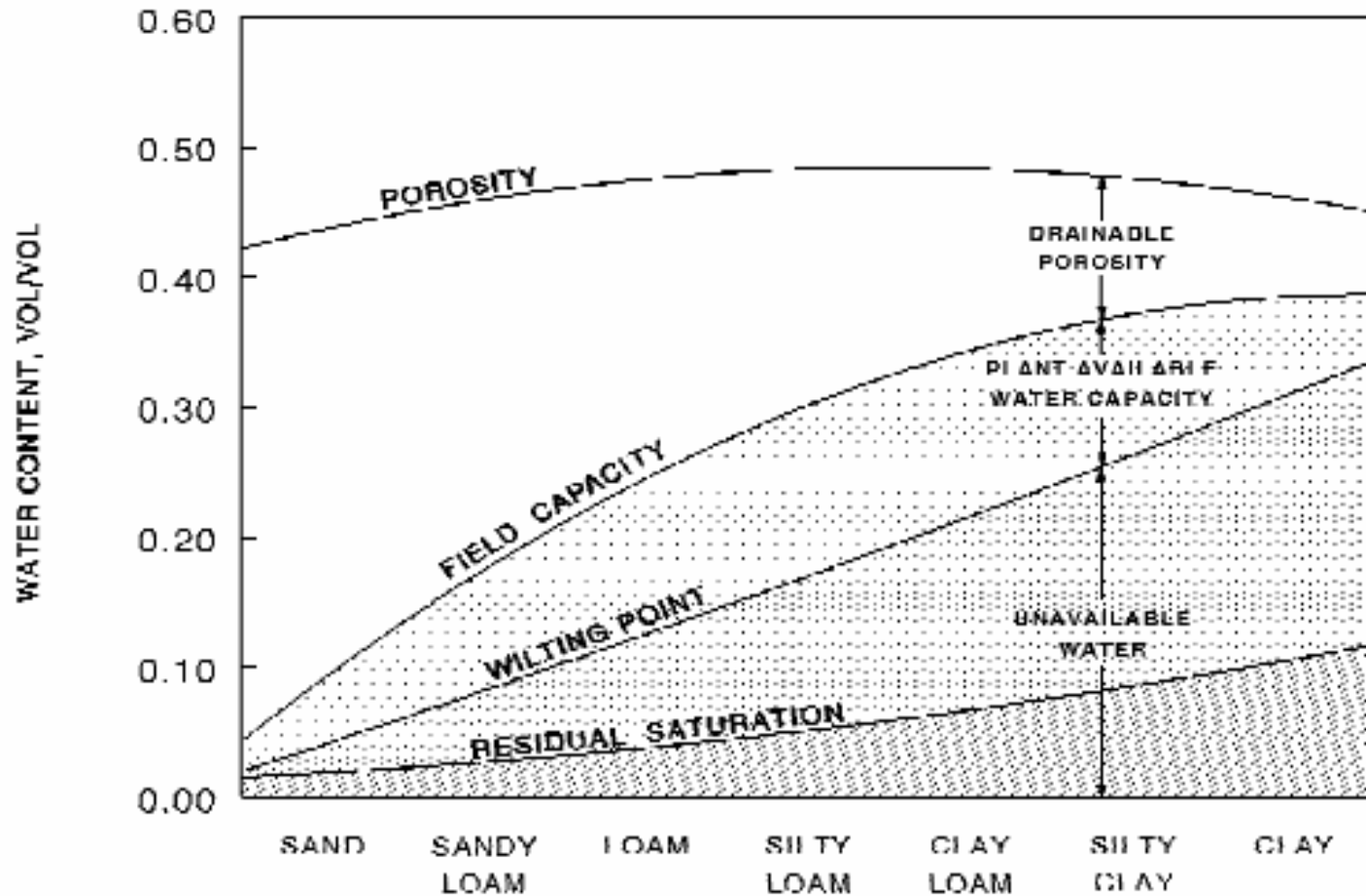


4. Maximize retention

- Use and preserve soils with high field capacity
- Utilize rain barrels and cisterns
- Use bioretention cells

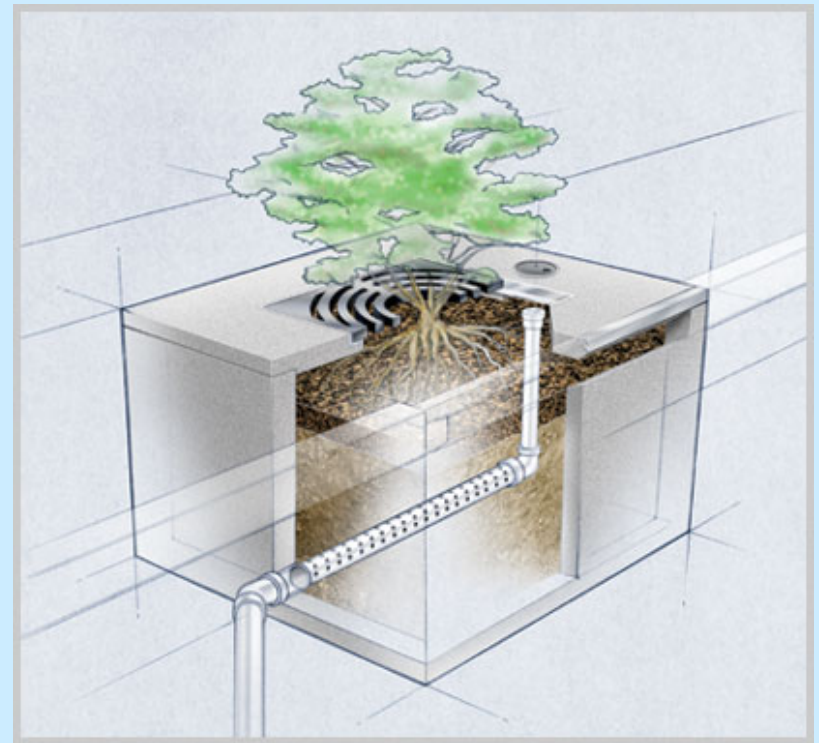


Soil Moisture Capacity



5. Filter runoff

- Horizontal filters
 - Vegetated swale
 - Vegetated filter strip
- Vertical filters
 - Bioretention cell
 - Infiltration trench
 - Filter boxes



Source: filterterra.com

6. Minimize slopes

- Keeps water velocities low
 - Sediment drops
 - Peak flow rates decrease (T_C effect)
- Increases flow depths and therefore rates of infiltration over pervious areas

7. Disperse Flow Paths

- Avoid use of channel and pipe conveyances for small flows
- Minimize erosive potential
- Maintain natural drainage patterns

Summary

Strategies

H&H Site Characteristics	Minimize Disturbance	Maximize Roughness	Maximize Infiltration	Maximize Retention	Filter Runoff	Minimize Slopes
Runoff Peak Flow						
Runoff Volume						
Time of Concentration						
Infiltration Rate						
Pollutant Loading						

Summary

Strategies

H&H Site Characteristics	Minimize Disturbance	Maximize Roughness	Maximize Infiltration	Maximize Retention	Filter Runoff	Minimize Slopes
Runoff Peak Flow	↓	↓	↓	↓		↓
Runoff Volume	↓	↓	↓	↓	↓	↓
Time of Concentration	↑	↑	↑	↑		↑
Infiltration Rate	↑	↑	↑	↑	↑	
Pollutant Loading	↓	↓	↓	↓	↓	

Questions? Answers!

Q & A