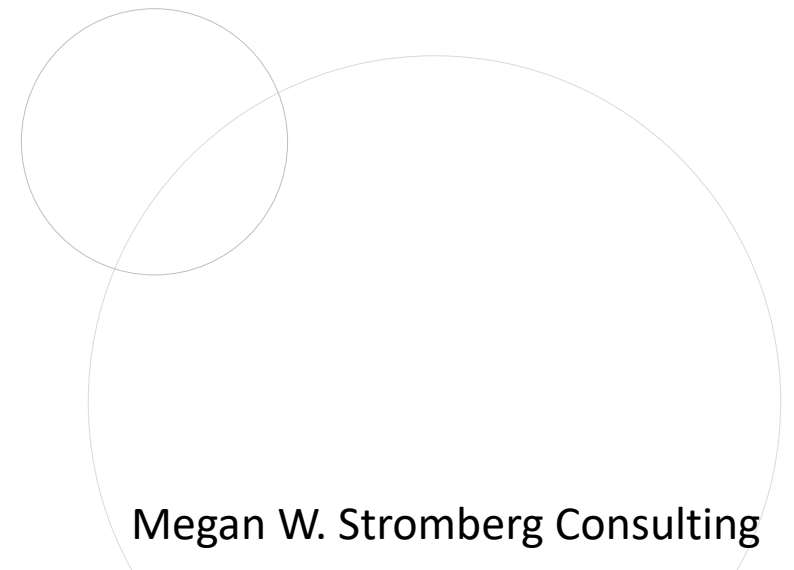




# BIOTREATMENT SOIL MIX & MULCH



# WHY IS BIOTREATMENT SOIL IMPORTANT?

Stormwater volume absorption

Filtration

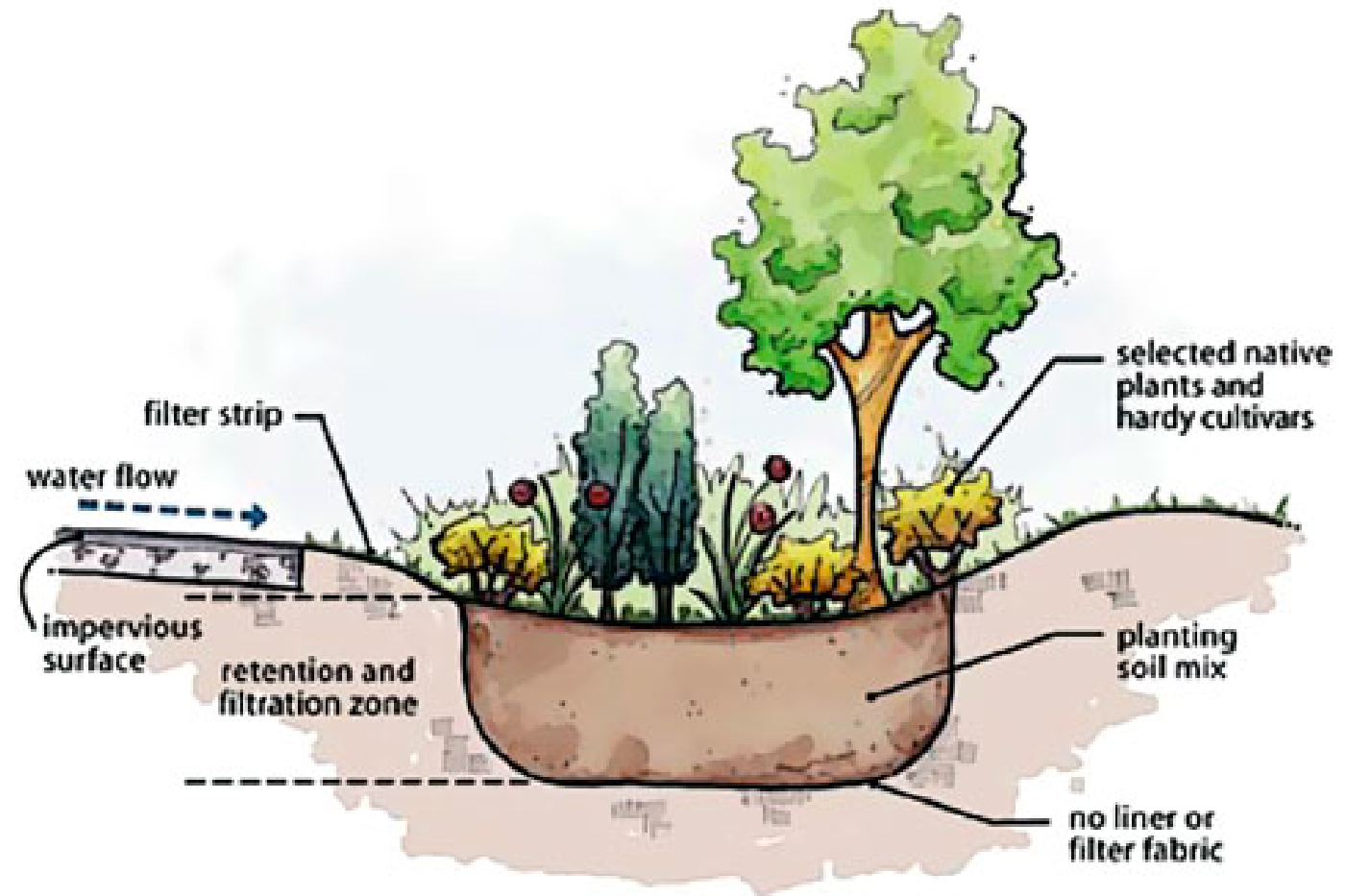
Phytoremediation

Temperature

Volatilization

Cation Exchange

Water Holding Capacity

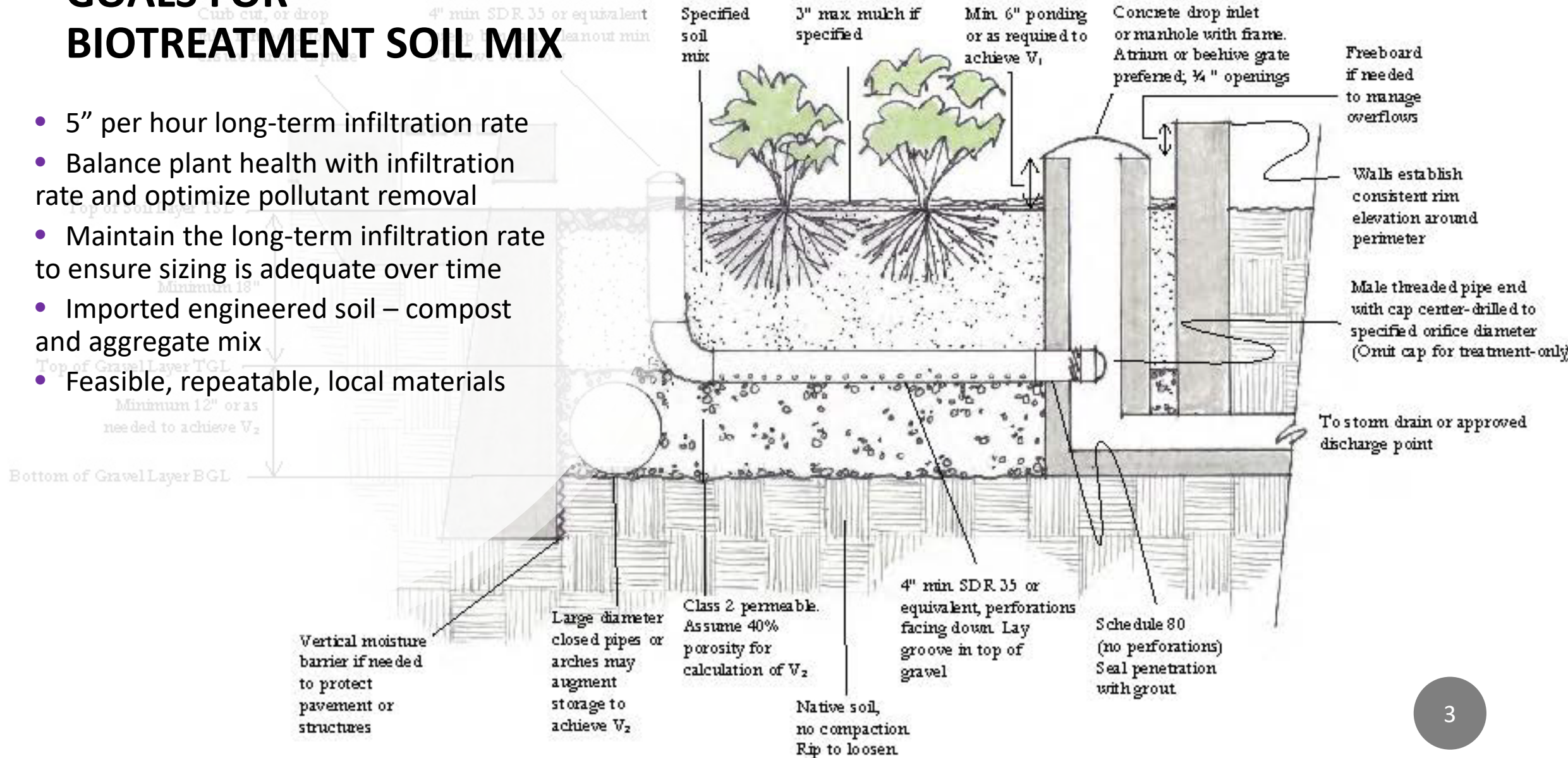


# Bioretention Facility

Cross-section  
Not to Scale

## GOALS FOR BIOTREATMENT SOIL MIX

- 5" per hour long-term infiltration rate
- Balance plant health with infiltration rate and optimize pollutant removal
- Maintain the long-term infiltration rate to ensure sizing is adequate over time
- Imported engineered soil – compost and aggregate mix
- Feasible, repeatable, local materials





## WHAT IS BIOTREATMENT SOIL?

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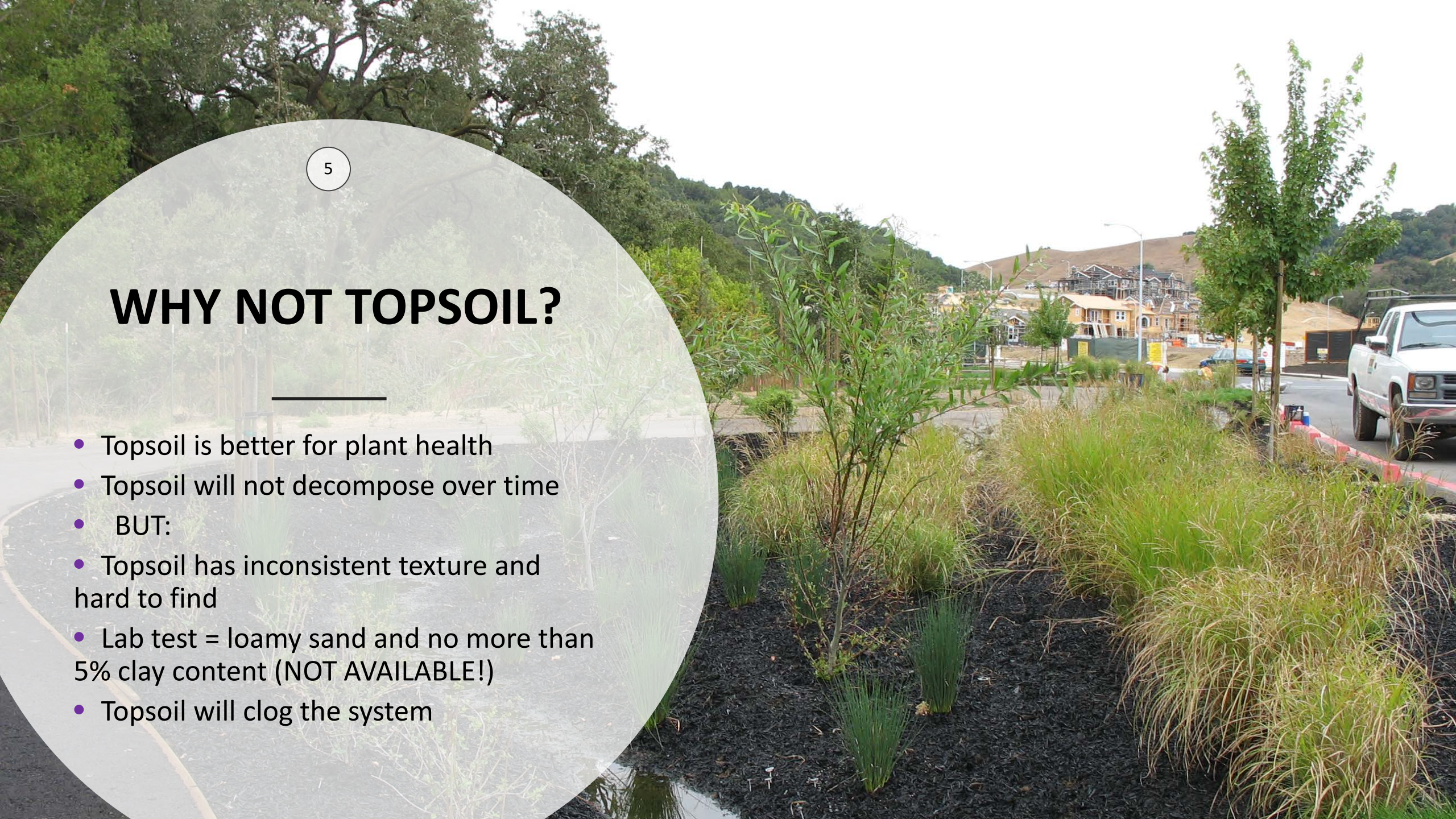
- ASTM C33 aggregate (concrete sand)
- Compost
- Commonly available from local soil suppliers, some variation
- No topsoil or other “soil”



## WHY NOT TOPSOIL?

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- Topsoil is better for plant health
- Topsoil will not decompose over time
- BUT:
- Topsoil has inconsistent texture and hard to find
- Lab test = loamy sand and no more than 5% clay content (NOT AVAILABLE!)
- Topsoil will clog the system





# SOIL MIX

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## **60-70% ASTM C33 Sand + 30-40% Compost**

- Mixed Sample (verify visually matches specification)
- Acquire certification from soil supplier or lab that mix meets specification
- Sand & Compost separately: Grain size analysis
- Organic content test of mixed soil



# DEFINING COMPOST

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- Compost: meet specifications by US Composting Council
- Stable
- Weed free
- Derived from waste materials including yard debris, wood wastes or other organic materials not including manure or biosolids
- Organic content, C:N, Boron, toxicity, nutrient content, salinity, pH





## ALTERNATIVE MIX

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**“Soils for bioretention facilities shall be sufficiently permeable to infiltrate runoff at a minimum rate of 5 inches per hour during the life of the facility, and provide sufficient retention of moisture and nutrients to support healthy vegetation.”**

- Evaluated on a case by case basis
- Acquire certification from soil supplier or lab that mix meets specification
- Grain size analysis of mixed soil
- Permeability testing



## TRUE OR FALSE?

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It is ok to walk around in a bioretention basin to perform maintenance.

# FINES

- Relationship to infiltration rate:
  - 2 - 4% passing the 200 sieve, correlates to percolation rate of 1-12" per hour (Hinman 2009)
- Improve treatment of metals – Cationic Exchange Capacity
- Slow drainage and improve water-holding capacity

ANOTHER ONE

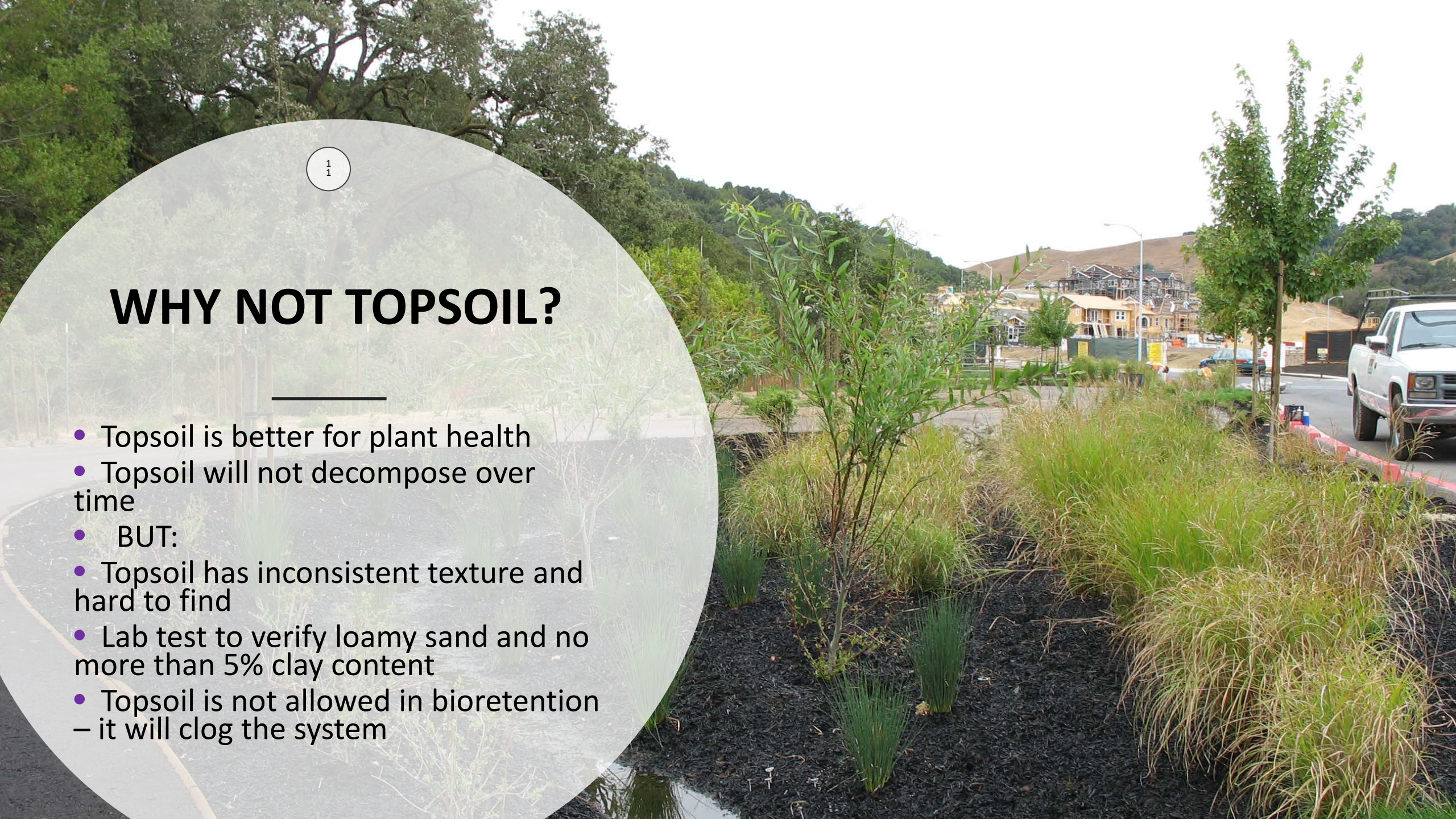
BITES THE DUST



# WHY NOT TOPSOIL?

---

- Topsoil is better for plant health
- Topsoil will not decompose over time
- BUT:
- Topsoil has inconsistent texture and hard to find
- Lab test to verify loamy sand and no more than 5% clay content
- Topsoil is not allowed in bioretention – it will clog the system



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# SOIL REPLACEMENT

How often does soil need to be replaced?

- A) 5 years
- B) 15 years
- C) 25 years

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# SOIL REPLACEMENT

How often does soil need to be replaced?

- Spills?
- Is it clogged?
- Heavy metals accumulate in top 3 inches, design provides 18” min.
- Soil should last decades or longer
- Plants maintain infiltration rate over the long-term
- Worst case is, scrape off clogged areas to 3” and replace with current mix specification

# REPLACING SOIL



Scrape 1-3" manually from the clogged area



Put in a bucket/wheel barrow and dispose in regular trash (not yard waste)



Loosen soil surface with a rake. Replace with biotreatment soil mix.



Soil replacement should occur during the dry season. If soil is wet it needs to be dewatered before disposal. Do not drain wet soil outside the facility (pollutants will enter the SD!). Use bucket with holes or other screen inside the facility.

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# SOIL REPLACEMENT

Check with your public works department before removing/replacing large area of soil.

Soil Suppliers selling “Biotreatment Soil Mix” that meets specifications.

- Contra Costa Topsoil
- American Soil Products
- Redi-Gro
- Marshall Brothers Enterprises
- L.H.Voss



# MULCH

- Within the basin:
- Mulch with rock
- Or, during dry season, compost with aged mulch (aka compost)
- Compost: use coarse blend that meets soil specifications
- Outside basin – Mulch with wood chips outside flow paths/ponded areas