Seeds of Health: Safer Soils for Growing Food

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CHE- Boston University Superfund Research Program Partnership

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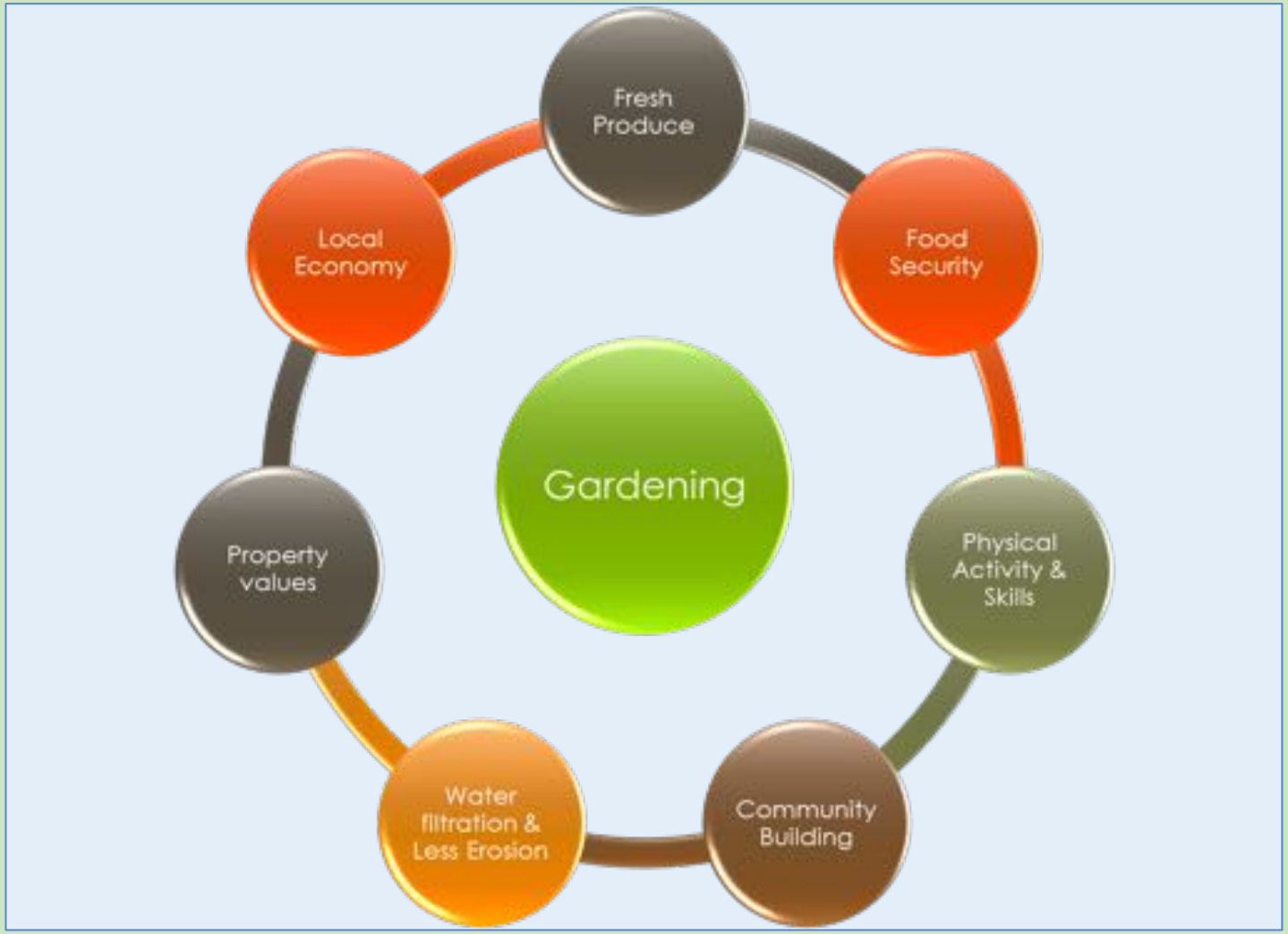
Growing and Eating Food: Benefits and Risks

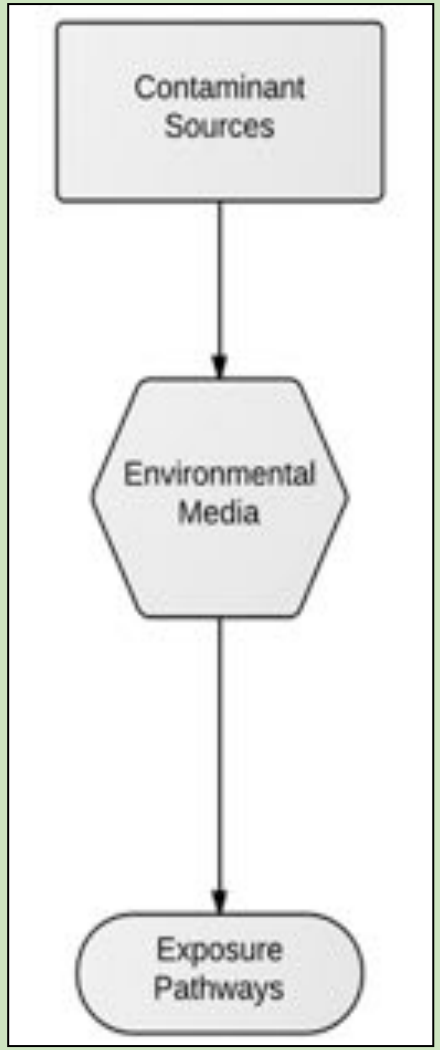
Historical Contamination

New Contamination



Human Soil Exposures

Direct and Indirect



Ingestion of Soil While Gardening

Inhalation of Dust While Gardening

Ingestion of Soil on Plants

Uptake into Plants

What's New is Old……Growing Food

Community Gardens

"Backyard" Gardens

Urban Environmental Transition

- **Stage 1:** "brown" environmental issues – clean water supply and waste management.
  - Wealth builds…
- **Stage 2:** "grey" issues of air and water pollution become increasingly important.
- **Stage 3:** "green" environmental agenda of sustainable ecosystems and life-support.
  - Sorensen and Okata (2010)

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What soils can I find in urban areas?

Former natural soil

- Disturbed by people

New soil

- Manufactured

USDA-Soil Survey (2008)

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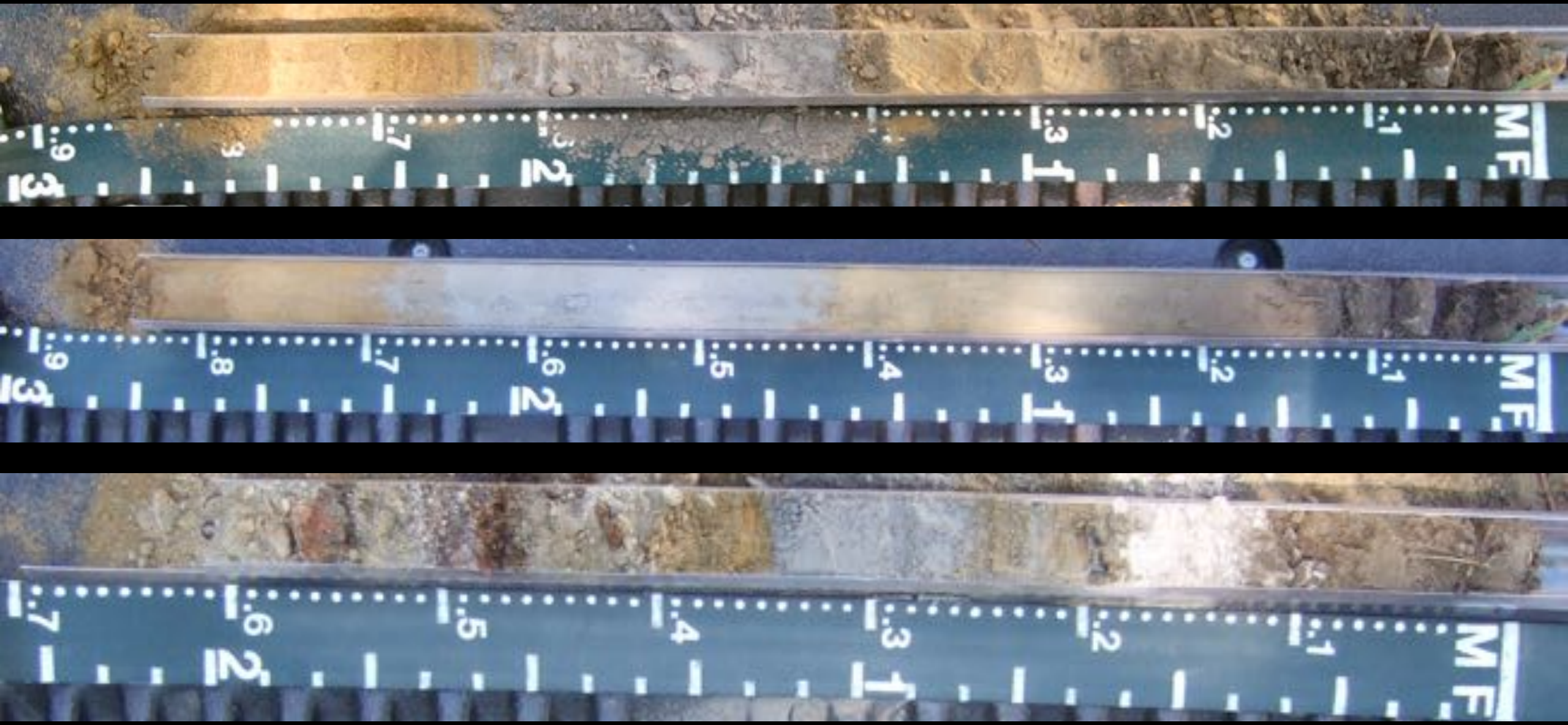
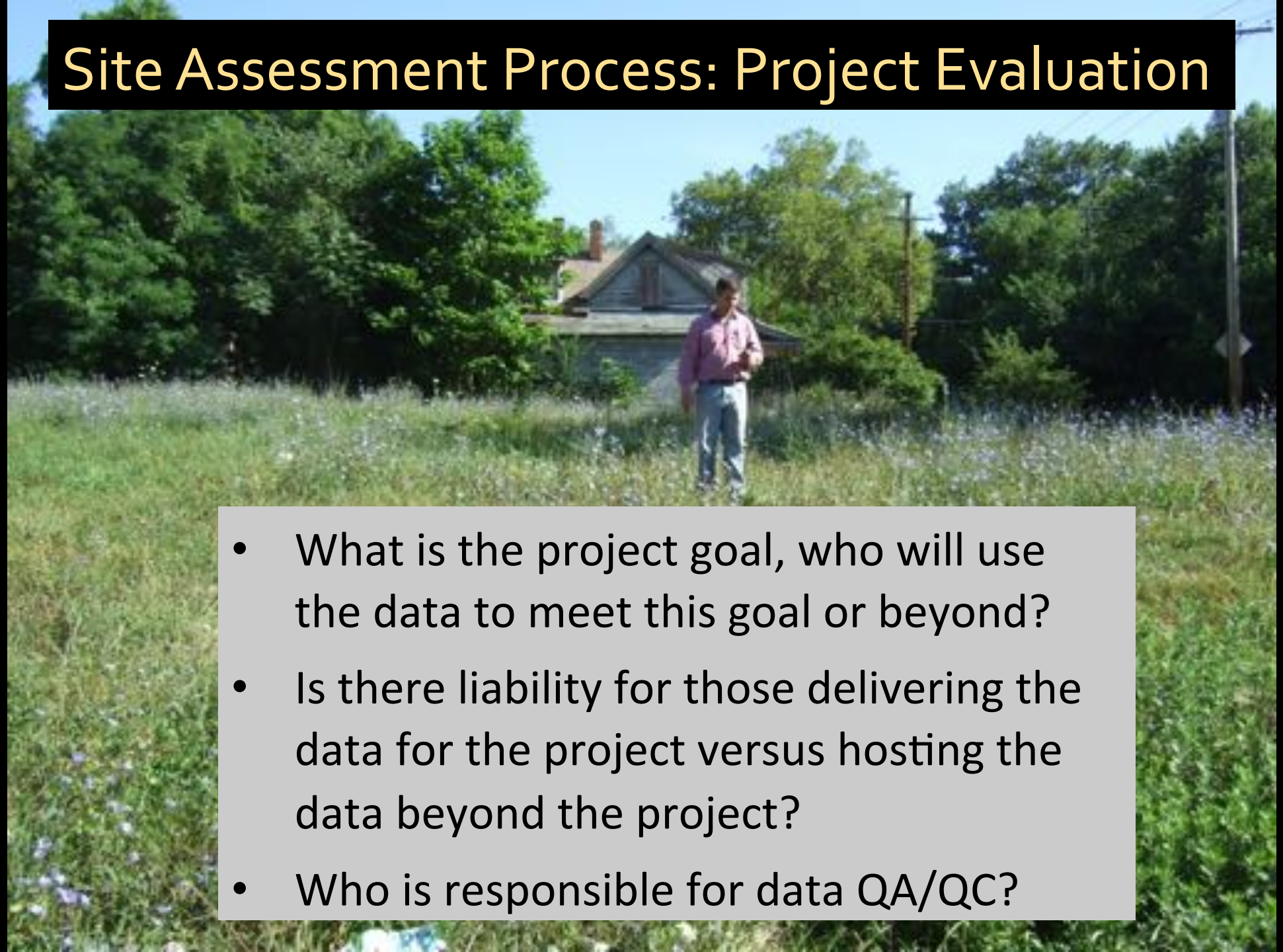
Bottom

Top



Site Assessment Process: Project Evaluation



- What is the project goal, who will use the data to meet this goal or beyond?
- Is there liability for those delivering the data for the project versus hosting the data beyond the project?
- Who is responsible for data QA/QC?

Site Assessment Process: Develop Base Data

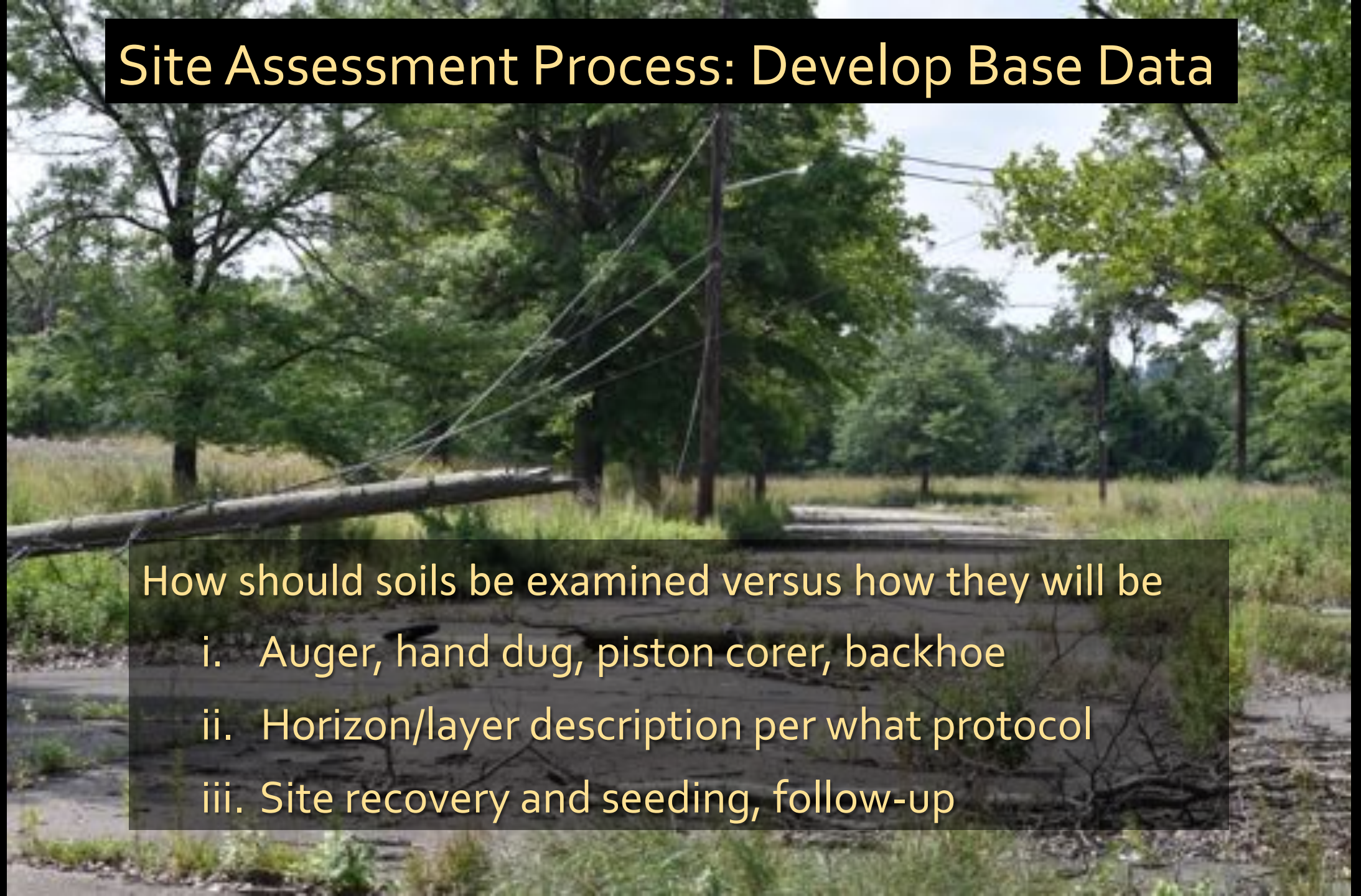
a) The big 3: topography (DEM, old USGS surveys), parent material and lithology type
b) Map the evolution of the city with time
c) Identify cultural community development with time
d) Identify hot spots through time (tanneries, railroad facilities, factories, warehouses, hospitals, slaughterhouses, shipping areas and loading docks, utility development, etc.)
e) Historic soil distribution and parameters (depth, particle size, pH minimum)
f) Historic drainage and its conveyance over time
g) Historic wind patterns (remember wind patterns change as the city and its surroundings are built up)

Sample Sanborn Fire Insurance Map

Site Assessment Process: Develop Base Data

1. Who acquires permissions for site access, utility calls, risk/liability insurance?
2. Are police services needed for protection/security?
3. Target testing to the question
4. How should soils be examined versus how they will be

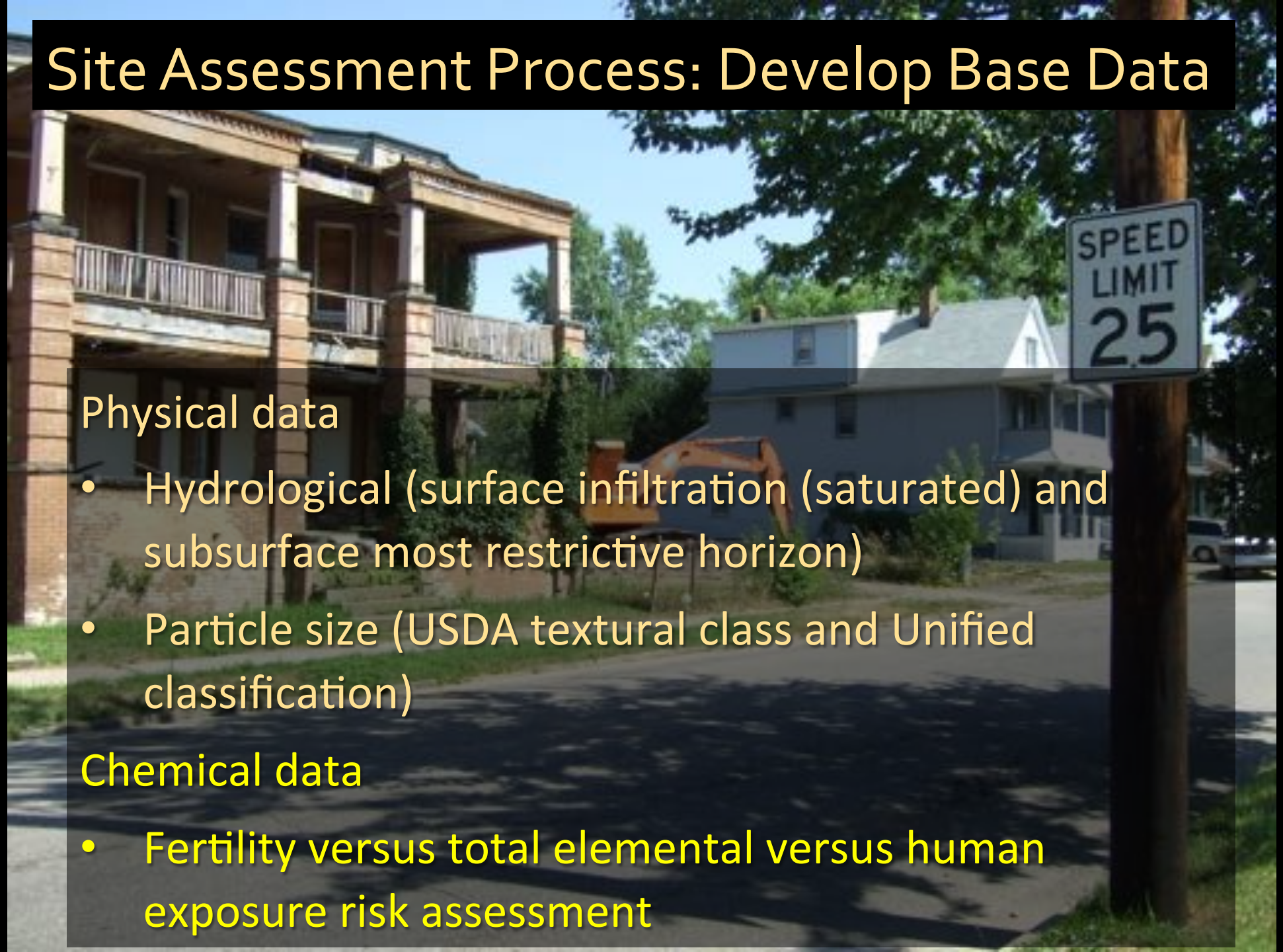
Site Assessment Process: Develop Base Data



How should soils be examined versus how they will be

i. Auger, hand dug, piston corer, backhoe
ii. Horizon/layer description per what protocol
iii. Site recovery and seeding, follow-up

Site Assessment Process: Develop Base Data



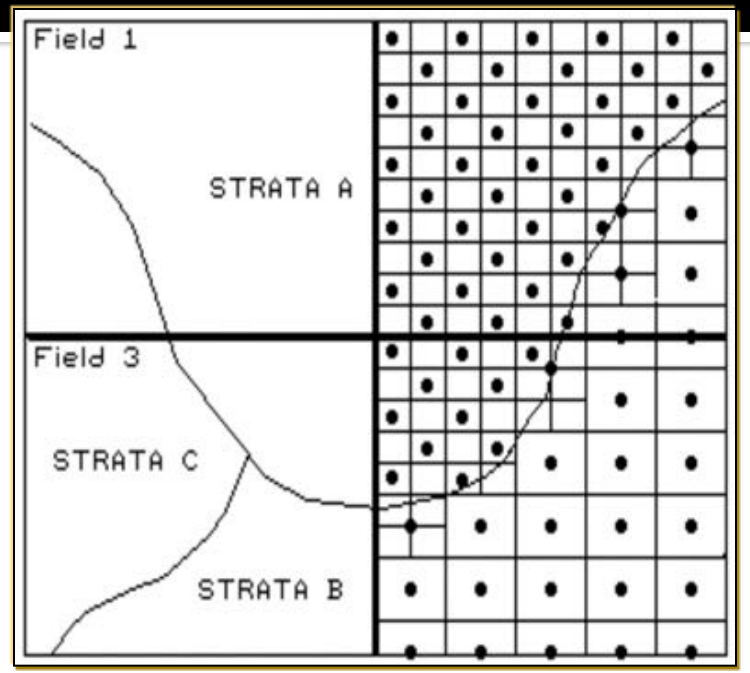
Physical data

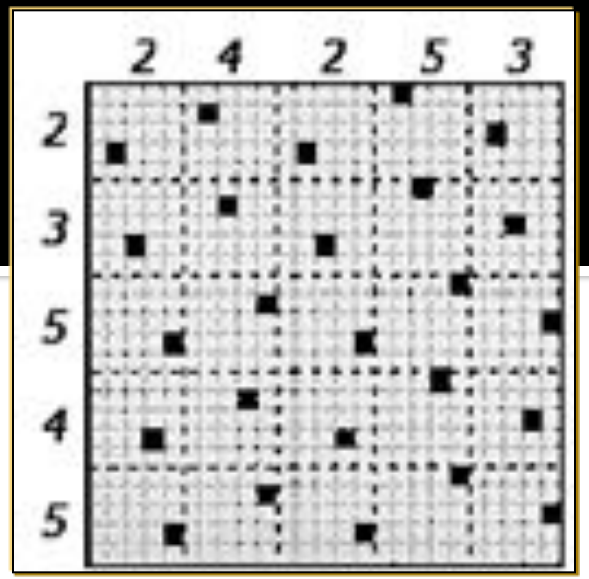
- Hydrological (surface infiltration (saturated) and subsurface most restrictive horizon)
- Particle size (USDA textural class and Unified classification)

Chemical data

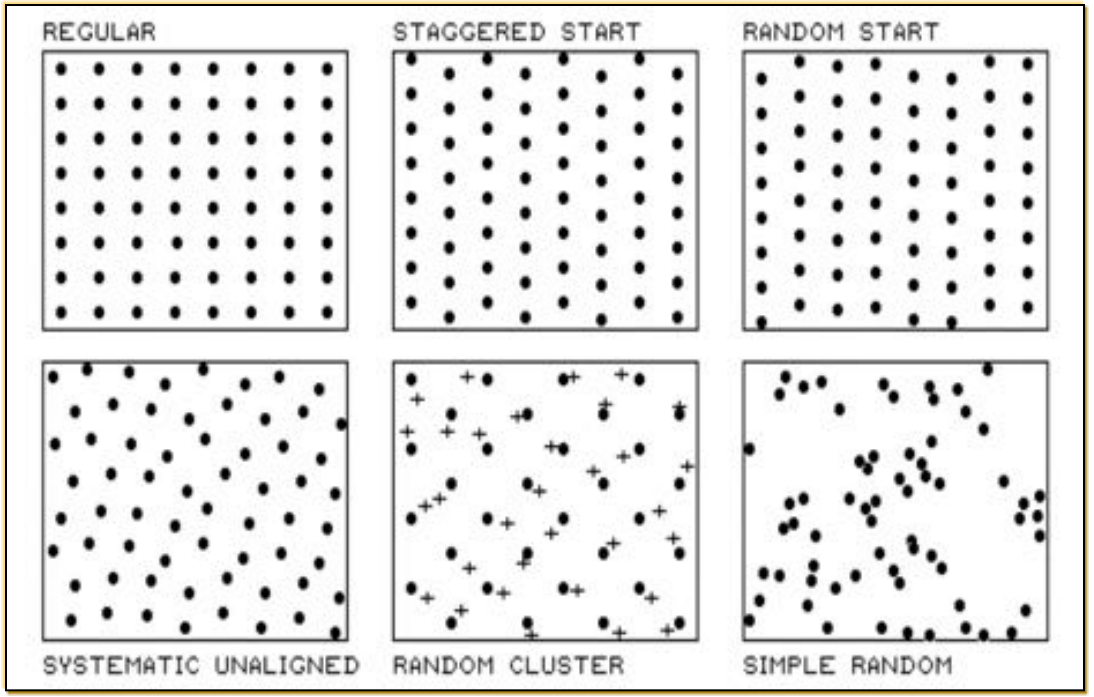
- Fertility versus total elemental versus human exposure risk assessment

Sampling





- Intensity = $$
- Random = risk?
- Stratified = natural feature tendency
- Flexibility, adjust sample size



Precision Farming Primer, 1999

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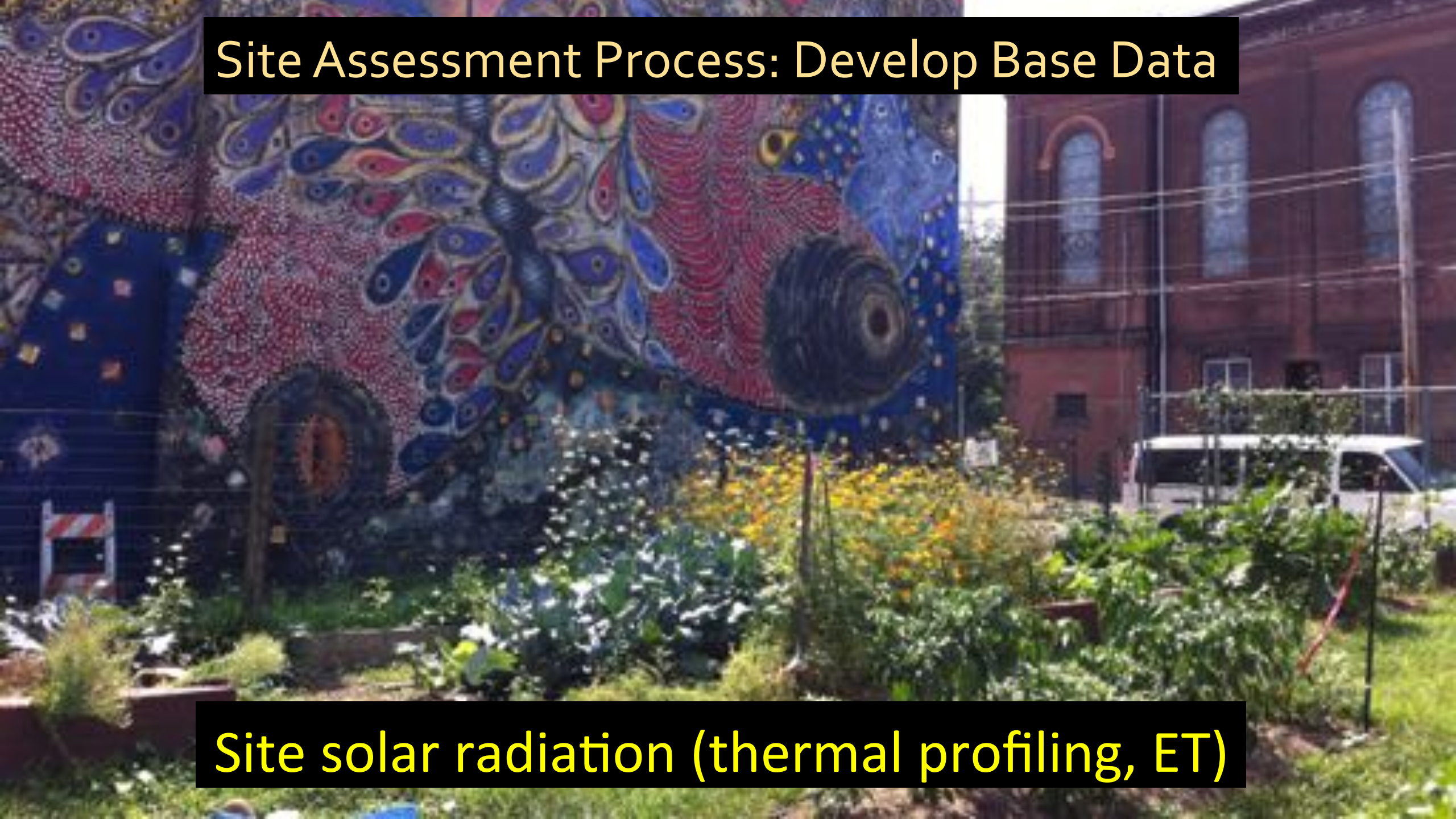
Site Assessment Process: Develop Base Data
Site solar radiation (thermal profiling, ET)

Other tests to keep in mind

i. Mineralogical and chemical (XRF versus Mehlich III, versus EPA 3050B; XRD)

ii. Soil mechanics (Atterberg limits, Proctor values, nuclear density gauge Bd, restrictive layer presence and characterization)

iii. Geophysics (EM, GPR, resistivity)


Boston Community Gardens
MIT
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Boston Community Gardens

- Why Community Gardens?
  - Boston's 2nd Park System, vital neighborhood open spaces
  - Provide healthy, fresh local food that supplements food budgets
  - Promote active living and recreational opportunities
  - Build civic engagement & stronger communities
  - Provides lifelong educational and learning experiences

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Minton Stables CG, Before


Minton Stables CG, After
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CAT


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CAN'T KEEP ME DOWN


Add to
the compost
pulled weeds
old garden plants
leaves
organic mulch
kitchen scraps,
coffee grounds
Don't add
woody branches
meat
cooked food, oil
pet poop
paper, plastic, glass
and metal
anything w/chemical
fertilizer or pesticide


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Good Gardening Practices

- Try to wear gloves while gardening
- Remember to wash hands before eating
- Wash or peel vegetables before cooking and or eating
- Try to leave shoes outdoors or at the door so as not to track soils inside

- Only use soil or compost from known, trusted sources.

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