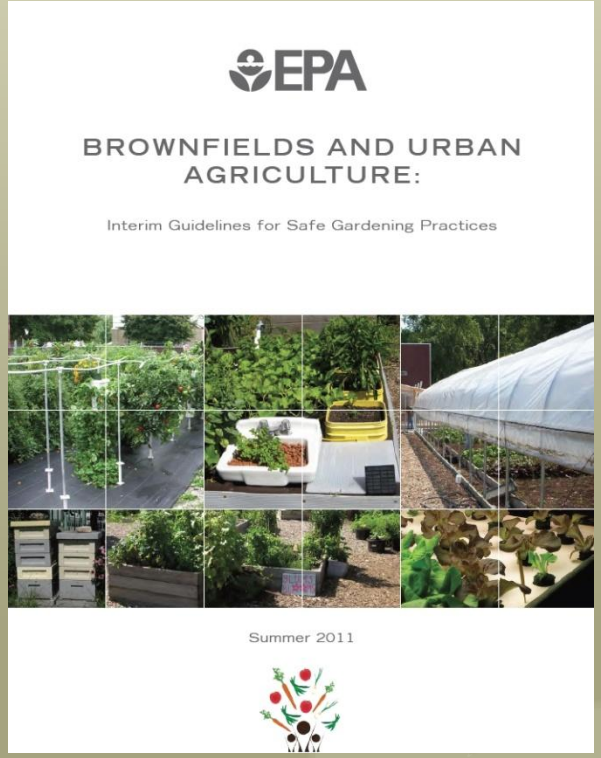
Ohio's Community Gardening on Brownfields Toolbox

Martin Smith, Sue Netzly-Watkins, Amy Yersavich

Ohio EPA, DERR

History of the Toolbox

- **Initial Guidance on Brownfields and Urban Gardening was Developed by U.S. EPA, Region V. - *Brownfields and Urban Agriculture – Interim Guidelines for Safe Gardening Practices (Summer 2011)* http://www.epa.gov/brownfields/urbanag/pdf/bf_urban_ag.pdf**



History of the Toolbox

- The Brownfields Focus Group of ASTSWMO (Association of State and Territorial Waste Management Officers) was approached by a few U.S. EPA staff about creating a more detailed guidance that would also cover what states can provide in terms of technical assistance, grants, etc.
- In October of 2012 ASTSWMO's Brownfields Focus Group published *Community Gardening on Brownfields Toolbox*
- In March of 2013, Ohio EPA/DERR staff added Ohio-specific information to the Toolbox.

Toolbox Organization

- **Introduction and Purpose of the Toolbox –** designed for use by State and Local Community officials who have some level of experience with brownfield redevelopment as well as environmental consultants
- **Getting Started -** commonly asked questions with links to answers within the Toolbox document
- **Utilizing an Urban Property for Gardening –** discusses the importance of an AAI or Phase I Assessment if purchasing the property is part of the plan
- **Know your Property-** how to conduct some of the Phase I type historical reviews easily and inexpensively. This section also talks about U.S. EPA Assessment Grants and State TBA services

Toolbox Organization

- **Sampling and other Considerations –** what potential contaminants urban gardeners should be concerned about. What areas to sample or remediate prior to gardening. What areas to avoid gardening in if sampling/remediation is too costly of an option. Also contains information on direct contact with contaminated soils and uptake of contaminants into common vegetable plants.
- **Risk Management Practices –** provides examples of different zoning and ordinances some cities have employed to ensure that urban gardening is done safely. Also provides information on alternative gardening approaches, such as soil augmentation and raised beds, which help ensure contaminants do not cause harm to gardeners or those who eat the fruits and vegetables.
- **Common Sense Practices –** inexpensive and easy to implement practices, or items, such as properly washing vegetables/fruits and wearing dust masks, that will help ensure the safety of the gardeners and those who eat the fruits and vegetables.
- **Case Studies**

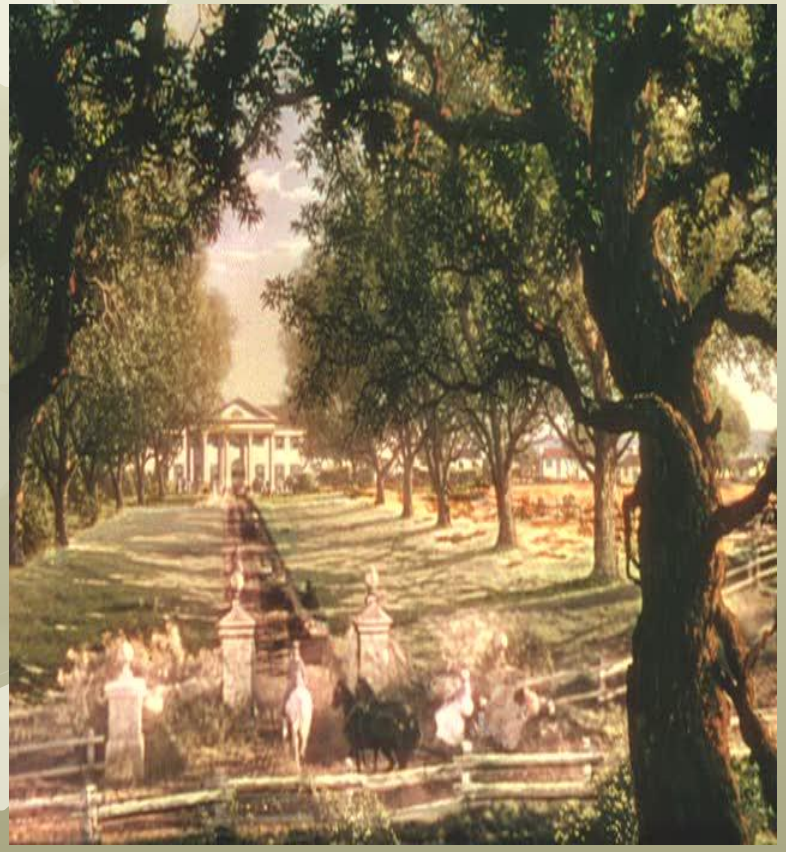
COURTESY: JOHN BRADBURN

Victory Garden

- During Word War I and World War II, Victory Gardens were planted on private residences and on public to reduce the pressure on the public food supply.

Farming Fell From Fashion

Feast–Famine & Romance-Ruin



Urban Garden

- Today's Urban Gardening revival provides urban dwellers increased access to fresher foods, promotes a stronger sense of community, and puts underused land into productive use.

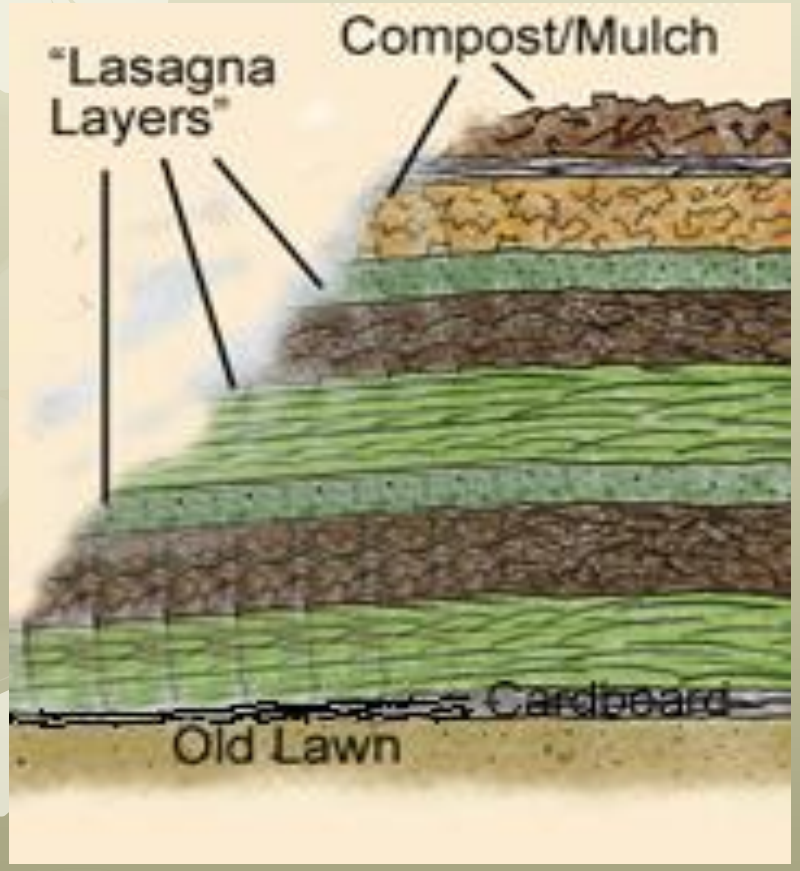
Know Your Property and Your Limits

- Qualitative
  - ASTM AAI – VAP Phase 1
  - Ask the neighbors
  - Check out Sanborn Maps
  - Aerial photos
  - Local libraries
- Quantitative
  - Test soil for proper nutrients and for potential contamination
  - Sampling strategy will need to be developed and gardeners may need help interpreting the results
  - Regional Screening Levels provide a bar to measure soil chemical risks

Weather Unpredictable. Manage Risk.

- Concerned with possible uptake of contaminants into plants
  - Use Raised Beds
  - Lasagna Gardening
  - Vertical Gardening
  - Bio-cellar Gardening
  - Plant non-food crops
  - Augment soils
  - Rain garden
- Concerned about exposing gardeners and visitors to impacted soil
  - Place thick layer of woodchips or other barrier over exposed soil
  - Remove affected soil or steer clear of the affected soil
  - Implement safe handling/hygiene practices

Lasagna and Vertical Gardens



Composting and Zoning

- Composting means the process of biological decomposition of solid wastes under controlled conditions.
- Compost means a humus-like organic material resulting from biological decomposition of solid waste.

Hoop House

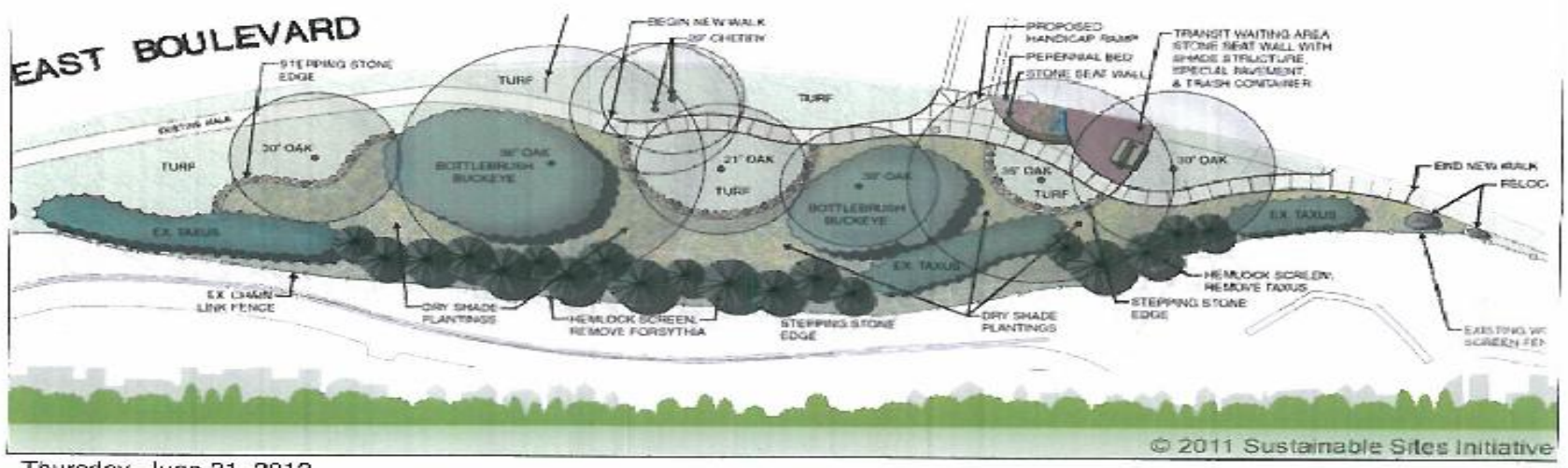
Mansfield Frazier's Chateau Hough

Bio Swales

Cleveland Botanical Garden

Project Size: 10 acres on greyfield
Construction Budget: $500,000
Project Goals:

- Establish BMPs
- Demonstrate examples of sustainable landscapes
- Teach importance of ecosystem services



Thursday, June 21, 2012

Urban Agriculture

Urban Agriculture

Balancing the Economics Balancing the Risks

- Samples were collected now what?
  - Compare data to the US EPA regional screening levels
  - Compare to the Ohio Background Data Set (in progress)
- Sample results are below these values
  - Happy Gardening!
- Sample results are above these values
  - Develop a clean up plan, risk management plan.

4th Street Farms

4th Street Farms

4th Street Farms

4th Street Farms

4th Street Farms

Soil Testing at 4th Street Farms

- #1 Goal - Determine average concentrations across site to evaluate safety of soil for gardening
- Chemicals of concern: TAL metals and 8270C PAHs
- Used incremental sampling as the best approach to determine average concentrations in soil
- Two decision units (DU1 and DU2)
  - Imported soil used for growing plants in rows and raised beds (DU1)
  - Original top soil on site prior to gardening (DU2)

Incremental Sampling Approach

- Keys to good incremental sampling/analysis
  - Number of increments per sample (30 increments)
  - Random sample locations (e.g., random grid)
  - Grinding and sieving of soil (sizes of 2 mm and 0.25 mm)
  - Milling of soil (only metal samples milled)
  - Subsample size for analysis (30 g for PAH, 3 g for mercury, 10 g for all other metals)

Grinding and Sieving of Samples

Sample ID	Total weight of sample (in grams)	Weight percent of soil fraction (>2 mm diameter)	Weight percent of soil fraction (2 mm to 0.25 mm diameter)	Weight percent of soil fraction (<0.25 mm diameter)
1379NFS-DU1	1,441	8%	57%	35%
1379NFS-DU2	614	18%	51%	30%
1379NFS-DU3	1,301	6%	55%	39%
1379NFS-DU4	1,272	6%	55%	39%

Analytical Cost Savings

- 24 Discrete Samples: 12 samples per area ($4,440)
- 4 Incremental Samples: 1 for DU1 and 3 for DU2 ($740 + $900 = $1,640)
  - Sample preparation (drying, grinding and sieving)
  - Milling with ball mill (Metals only)
  - 10 g sample prep for metals (3 g for mercury)
- $2,800 in analytical cost savings on a total budget of $12,376 (23% savings), plus better data

Results of Testing

- Imported soil blend
  - Metals met standards, except arsenic
  - Arsenic was 13 mg/kg – Likely background
  - PAHs all met standards

- Original top soil
  - Metals met standards, except arsenic
  - Arsenic was 25 mg/kg – Could still be background but may have some anthropogenic arsenic as well
  - PAHs all met standards, except benzo[a]pyrene
  - Benzo[a]pyrene slightly exceeded 1.1 mg/kg: 1.3 or 1.5 mg/kg

- RMS error – Measure of sampling precision (goal is < 35%)
  - Metals – most between 2.5% and 11% RMS error
  - Mercury 25% and Thallium 45%
  - PAHs – first analysis (31% to 65% or average of 45%); second analysis (28% to 59% or average of 40%)

Cover Material Over Original Top Soil

4th Street Farms – Present Day

4th Street Farms – Present Day

Questions?