



GROWING ECONOMIC OPPORTUNITY ON BROWNFIELDS

REINVIGORATING CONTAMINATED, VACANT PROPERTIES

The Great Lakes region is home to legacy cities with thousands of low-value properties with contaminated air, soil, and/or water, otherwise referred to as brownfields. Many of these properties, if cleaned and redeveloped, could contribute significantly to a community's economic development and environmental sustainability.

Your community can maximize the economic and environmental value of these properties by applying phytoremediation, the process of using plants and trees to uptake harmful contaminants in soil and water, such as petroleum hydrocarbons, chlorinated solvents, and heavy metals.

ECONOMIC, COMMUNITY & ENVIRONMENTAL BENEFITS OF PHYTOREMEDIATION

A number of ground-level contaminants run the risk of percolating into a community's drinking water and causing public health concerns. In addition to absorbing these harmful contaminants, phytoremediation can further reduce percolation risk by reducing stormwater run-off that carries sediment, oil, and toxins into waterways. Phytoremediation can also significantly contribute to economic development, as vegetation can be harvested for paper, bio-energy fibers, and construction materials.

WORK WITH DELTA TO TURN YOUR BROWNFIELD INTO AN ECONOMIC AND ENVIRONMENTAL ASSET

In 2013, Delta planted 3,000 hybrid poplar trees on brownfield sites in Muskegon, Michigan. Once mature, these trees can be harvested and sold locally, creating economic opportunity within the local community. Delta provides the following services:

- Program design
- Feasibility studies
- Brownfield site evaluation
- Equitable community agreements
- Landscape planning
- Site monitoring
- Management strategies
- Drafting ordinances
- Contractor selection
- Plant end-use support



About Delta Institute

Delta Institute is a nonprofit organization that builds a more resilient Great Lakes environment and economy through sustainable solutions.

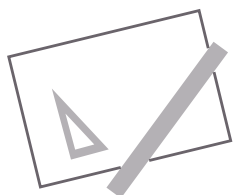
For more information on how you can work with us, visit us online at www.delta-institute.org or contact Todd Parker, tparker@delta-institute.org, 517-402-7922.

USING POPLAR TREES FOR PHYTOREMEDIATION



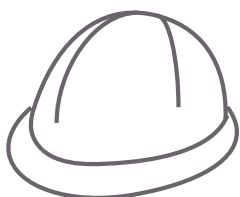
IDENTIFY & EVALUATE POTENTIAL BROWNFIELD SITES

A brownfield's phytoremediation capability depends on its size, ownership, development potential, past industrial uses, contaminant history, and surrounding community.



CREATE LANDSCAPE PLAN & ORDER TREES

The landscape plan provides technical information on how many and what type of plants to grow and projects the costs and contingencies for maintenance of the site. Rooted poplar cuttings should be ordered from a nursery as early as possible to ensure sufficient quantities for planting.



HIRE A CONTRACTOR

Three months prior to planting, the project manager should release a bid package to landscape and plant contractors that details the project's goals, site characteristics, planting specifications, contract length, billing process, and other bidder requirements.



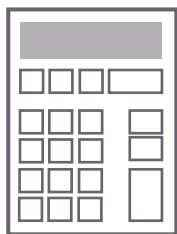
PLANT THE TREES

Rooted poplar tree cuttings, usually 10-12 inches in length, will arrive at the site usually a day before planting. If the trees must be stored for a few days, do so in a cool, dark location. The cuttings should be planted as soon as frost is no longer a threat.



MONITOR AND MAINTAIN

Regular mowing, mulching, and monitoring will ensure cutting growth. Delta considers an 80% poplar tree survival rate to be successful.



QUANTIFY THE UPTAKE OF CONTAMINANTS

To measure a project's true impact, one needs to sample, analyze, and quantify the soil contaminant uptake and removal. Standard contaminants measured include heavy metals like arsenic, cadmium, chromium, copper, lead, mercury, hydrocarbons, and volatile organic compounds of PCBs, PCEs, and TCEs.



PLAN FOR END USE OF POPLAR TREES

Depending on how long the trees are grown, the trees could be harvested as wood fiber for biochar, landscape mulch, wood pellets for residential wood stoves, biomass for electricity, pulpwood for paper products, or low-grade lumber.



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