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Land Reuse Site Screening Tool Cohorts: Creating Land Reuse Site Inventories

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Editor's Note:

As part of our continued effort to highlight innovative approaches to improve the health and environment of communities, the *Journal* is pleased to publish a bimonthly column from the Agency for Toxic Substances and Disease Registry (ATSDR) at the Centers for Disease Control and Prevention (CDC). ATSDR serves the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. The purpose of this column is to inform readers of ATSDR's activities and initiatives to better understand the relationship between exposure to hazardous substances in the environment, its impact on human health, and how to protect public health.

The conclusions of this column are those of the author(s) and do not necessarily represent the official position of ATSDR or CDC.

Introduction

The Agency for Toxic Substances and Disease Registry (ATSDR) first highlighted the Brownfields/Land Reuse Site Tool (Site Tool) in 2012 (Perlman, Berman, & Lemly Bing, 2012). The Site Tool helps environmental health professionals rapidly inventory and characterize land reuse sites with a public health lens. Inventorying of land reuse sites like brownfields is a common practice. For example, the U.S. Environmental Protection Agency

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(U.S. EPA) requires a reporting inventory that will sync with its Assessment, Cleanup, and Redevelopment Exchange System (U.S. EPA, 2018). This inventory database, however, was developed based on environmental regulation for redevelopment partners and might focus less on public health and chemical and physical exposure risks. This column demonstrates the utility of the Site Tool in addressing public health needs around redevelopment.

Updates to the Site Tool

ATSDR updated the Site Tool to include a comparison value viewer. The comparison value viewer allows environmental health professionals to screen available environmental data to determine if there are cancer or noncancer exposures that need further assessment. Comparison values (CVs) are concentrations of a substance in air, water, or soil that are unlikely to cause harmful health effects at levels at or below the CV in exposed people. If we find substances in amounts greater than their CVs, we can select them for further evaluation in the public health assessment process. Other federal and state agencies have developed similar types of health-based guidelines for concentrations of substances in water, soil, air, and food, such as U.S. EPA's residual contaminant levels (RCLs) for soil (U.S. EPA Region 4, 2014). In the absence of a CV, we can use these health-based guidelines for a particular environmental media.

The Site Tool can be used on any type of potentially contaminated site including brownfields, landfills, or Superfund sites, and as such, we changed its name to the ATSDR Land Reuse Site Screening Tool (Site Tool). Currently, the Site Tool has been downloaded approximately 2,500 times and is used throughout the U.S. and in four other countries.

Site Tool Cohorts: Example Uses

In 2018, we created four examples from Site Tool users to offer guidance to others who could benefit from using the Site Tool to create land reuse site inventories. Our Site Tool cohorts featured in this column are using the Site Tool in creative ways. Each cohort has provided a brief overview of their use of the Site Tool. For reader interest, we have also created more detailed fact sheets about their Site Tool projects at www.atsdr.cdc.gov/sites/brownfields/site_inventory.html.

Baker City, Oregon: High School Students Create a Brownfields Inventory and Engage in Brownfields Assessment and Cleanup

In a small, rural town in eastern Oregon, high school students are using the Site Tool to collect data on brownfields in their community. The data quality was part of an overall learning objective for the students. Initiated by the school's receipt of a donated property that was actually a brownfields, Baker School District's Baker Technical Institute (BTI) hosts the only high school-run brownfields program in the country. Students raised brownfields awareness and used the Site Tool to help the city write a U.S. EPA community-wide assessment grant.

Using the Site Tool, students mapped dozens of potential brownfields in their community, collated data on contaminants of concern, and presented their findings to the city council. Their presentation was key in convincing the city to support and submit a U.S. EPA community-wide assessment grant—with the help of the BTI brownfields class—focused on assessing 25 brownfields sites in 30 blocks (Figure 1). These assessments will help the city understand the depth and breadth of the contamination in their business corridors and will provide property owners with a valuable step in making their properties business ready.

Chicago, Illinois: Master of Science Project to Inventory Land Reuse Sites for Energy Innovation Potential

Erica Arias, Master of Science in Sustainable Management candidate, identified land reuse sites throughout Chicago's south side, including south and west Cook County. Arias researched dozens of sites and used the Site Tool to create an inventory to meet the request of a local Chicago community leader, Bruce Montgomery, executive director of Urban Energy Innovation, to identify land reuse sites greater than 10 acres that could be reused for energy innovation projects (i.e., solar farms) as economic drivers in distressed communities. Arias provided an inventory of 10 sites, including an old hospital, landfill, and several industrial sites to Montgomery, who investigated reusing these sites for energy innovation projects. This project was presented to the community. As a result, local development organizations are focusing on the landfill as a redevelopment opportunity.

Jacksonville, Florida: Florida Department of Health in Duval County Inventory of Land Reuse Sites in Health Zone 1

Grazyna Pawlowicz inventoried 138 known land reuse sites in Duval County, of which 101 (76%) are located within Health Zone 1, an area with elevated adverse health outcome rates and more distressed properties and vacant lots than the county's other five health zones (Florida Department of Health in Duval County, 2016). Pawlowicz inventoried 33 Superfund sites, 2 hazardous waste sites, 58 waste cleanup sites, 2 dump sites, and 10 dry cleaner sites and detailed the chemical contaminants of concern. Pawlowicz also mapped the sites using GIS and overlaid the sites with other local environmental and community data to provide stakeholders and potential developers with a clearer understanding of environmental conditions, as well as help to identify potential priority issues to address (Figure 2). While this project is still in progress, planning for a community citizen science project to engage the public in remediation plans at one Superfund site is underway.

West Bend, Wisconsin: Graduate Student Creates a Site Inventory to Characterize Brownfields Sites in Terms of Contaminant Exposures and Site Risks

For her Master of Public Health requirements, Dr. Elizabeth Yogerst is connecting brownfields sites and potential health outcomes by applying the Site Tool to existing data and following Washington County's future activity. Yogerst researched 24 sites and profiled

5 representative sites for this column to emphasize which contaminant levels exceed RCL soil standards in Wisconsin for metals, volatile organic compounds, and polycyclic aromatic hydrocarbons (Table 1). Yogerst obtained contaminant data from reports from the licensed environmental professional who completed the sampling following U.S. EPA and/or state methods (U.S. EPA Region 4, 2014).

Conclusion

The Site Tool's dual capacity of a searchable, customizable inventory and the ability to quickly review sampling data enhanced the capabilities of the cohort communities to ensure public health has a seat at the redevelopment decision table. In addition, the cohorts were able to avoid or reduce consultant costs typically levied for site inventory creations.

We are grateful to our coauthors for sharing their hands-on experiences using the Site Tool. If you would like assistance in creating your own inventory, please contact Gary Perlman at gap6@cdc.gov. In addition, if you use the Site Tool and want to let us know how you used it, we would be happy to add you to our list of Site Tool users so that we can continue to provide guidance to other communities.

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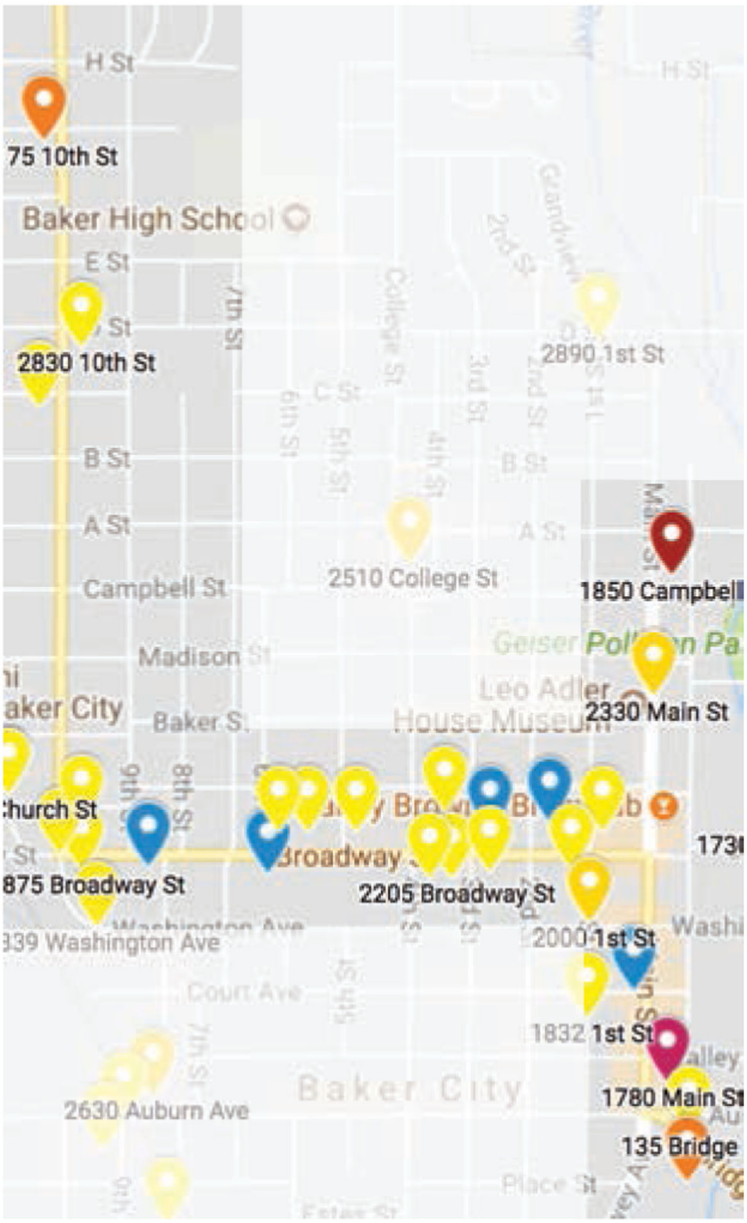

FIGURE 1.
Examples of Brownfields Mapped in Baker City, Oregon

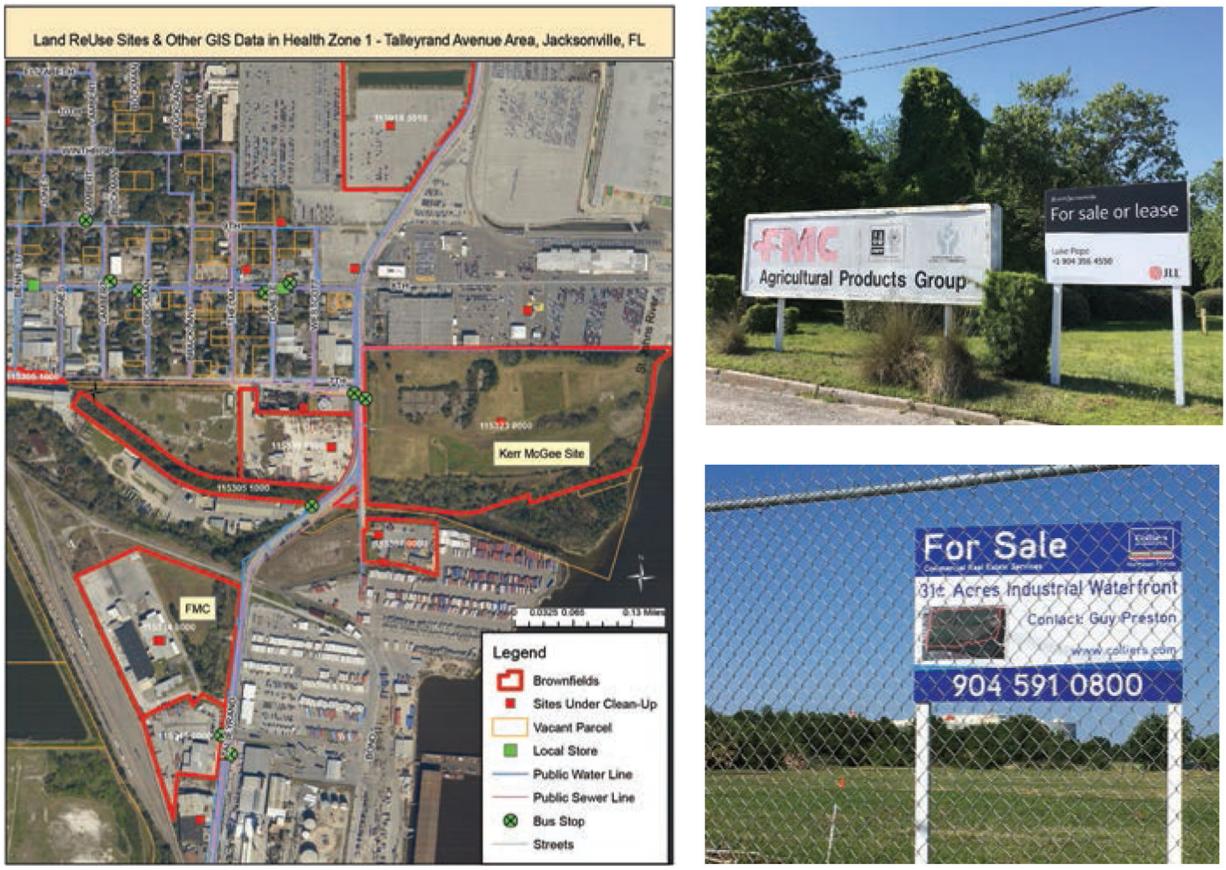

FIGURE 2.

Land Reuse Sites in Health Zone 1

Source: Florida Department of Health in Duval County, 2016.

TABLE 1

Maximum Soil Concentrations and Residual Contaminant Levels (RCLs) of Select Compounds From Five Brownfields/Land Reuse Sites, Washington County, Wisconsin

Contaminant	Unit	Soil Direct Contact RCL		Brownfields/Land Reuse Site (Slated Reuse Category)				
		Non-Industrial	Industrial	Petroleum Distributor (Commercial, Industrial)	Downtown Multi-Use (Residential, Commercial)	Machine Shop (Industrial)	Metal Plating (Unknown)	Rail Yard (Residential)
Metals								
Arsenic	mg/kg	0.613	2.390	**9.3**	**15.0**	n/v	**10.8**	n/v
Barium	mg/kg	15,300	100,000	190	110	114	191	114
Cadmium	mg/kg	70	798	n/v	0.96	n/v	0.72	n/v
Chromium	mg/kg	n/v	n/v	100.0	9.1	31.6	33.8	31.6
Lead	mg/kg	400	800	470	**580**	11	234	11
Mercury	mg/kg	3.13	3.13	0.081	0.110	0.024	0.075	0.017
Selenium	mg/kg	391	5,110	1.70	0.76	n/v	0.96	n/v
Silver	mg/kg	391	5,110	1.50	0.18	n/v	0.96	n/v
Volatile organic compounds (chlorinated)								
1,1,1-trichloroethane	μg/kg	n/r	640	n/v	n/v	0.129	n/v	n/v
Trichloroethylene	μg/kg	n/r	8.41	n/v	n/v	**19.70**	n/v	**7,600**
cis-1,1-dichloroethene	μg/kg	n/r	2,340	n/v	n/v	3.54	n/v	**17,000**
trans-1,1-dichloroethene	μg/kg	n/r	1,850	n/v	n/v	0.0131	n/v	4.1000
Volatile organic compounds (nonchlorinated)								
Benzene	μg/kg	1,490	7,410	170	n/v	n/v	n/v	**12,000**
Ethylbenzene	μg/kg	7,470	3,700	980	n/v	n/v	0.0149	**23,000**
Toluene	μg/kg	818,000	818,000	1,500	n/v	n/v	0.0599	670
Xylene (total)	μg/kg	260,000	260,000	3,100	n/v	n/v	0.1024	24,000
Polycyclic aromatic hydrocarbons								
Benzo[a]anthracene	μg/kg	147	2,100	1,300	**1,600**	n/v	**1,660**	n/v
Benzo[a]pyrene	μg/kg	14.8	211.0	**1,200**	**2,500**	n/v	**1,500**	n/v
Benzo[b]fluoranthene	μg/kg	148	2,110	**2,700**	**3,700**	n/v	**3,750**	n/v

Contaminant	Unit	Soil Direct Contact RCL		Brownfields/Land Reuse Site (Slated Reuse Category)				
		Non-Industrial	Industrial	Petroleum Distributor (Commercial, Industrial)	Downtown Multi-Use (Residential, Commercial)	Machine Shop (Industrial)	Metal Plating (Unknown)	Rail Yard (Residential)
Chrysene	µg/kg	1,480	21,100	2,200	**3,000**	n/v	**2,630**	n/v
Dibenz(a,h)anthracene	µg/kg	14.8	211.0	**340**	**290**	n/v	**264**	n/v
Indeno[1,2,3-cd]pyrene	µg/kg	148	2,110	710	**910**	n/v	**1,040**	n/v

Note. Numbers in bold indicate concentrations above the RCL. RCLs are considered by the U.S. Environmental Protection Agency to be protective for humans (including sensitive groups) over a lifetime. Contaminant values are most often obtained from licensed environmental site professionals.

n/r = not reported; n/v = no value.