Incorporating Public Health into Brownfield Redevelopment Frameworks

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Summary

The current regulatory landscape in Michigan defines brownfields as land that is contaminated, abandoned and functionally obsolete, or both. This is a broader scope than most brownfield definitions, which conventionally focus on chemical contaminants. The City of Detroit, with a high prevalence of blighted property, benefits from this expanded definition. However, current remediation and redevelopment strategies focus on economic growth, with secondary consideration for improved individual- and community-level health outcomes. Overlooking the interactions between brownfields and social determinants of health suggests that negative health consequences are not being minimized and positive health impacts are not being maximized.

To correct this, brownfield redevelopment policies in Detroit should be updated to motivate the inclusion of Health Impact Assessments (HIAs). Doing so may promote redevelopment activities that achieve health-related goals such as social justice, environmental sustainability and economic viability. This paper suggests a model for HIAs in Detroit, and discusses the need for engagement of public and private stakeholders to restructure incentives and financing.

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I. Introduction: Health in All Policies

The “social determinants” of health—social, physical, and economic factors that influence wellness—are often neglected in developing policies that extend beyond boundaries of the medical sector. A recent interdisciplinary trend has taken hold in the policy-making world: “Health in All Policies” is an effort to embed considerations of health, equity, and sustainability into decisions, expanding the conception of health policy beyond its traditional “clinical” silo.¹ This paradigm recognizes the impact that housing, environment, and social policies can have on individual- and community-level health outcomes.²

Brownfield redevelopment is a policy domain ripe for the incorporation of such health considerations. Current practice pays little heed to the health implications of contaminated and blighted land, instead placing priority on economic factors. Mitigation of disparities rooted in the social determinants of health might be aided by incorporating assessment of health impacts into the brownfield redevelopment process; this potential is especially salient Detroit, which suffers from disproportionate blight and contamination relative to the rest of Michigan.³

Health impact assessment (HIA) is one tool for understanding how policy decisions outside the traditional health sector can be used to promote population health. HIA is a decision support tool that aims to systematically describe all potential health impact of a proposed activity and monitor health impacts after implementation.

²Bostic, R. Health in all policies: the role of the US Department of Housing and Urban Development and present and future challenges. *Health Affairs.* 2012 Sep;31(9):2130-7
II. Legal Context of Brownfield Redevelopment in Michigan

Two provisions govern the redevelopment of contaminated and blighted land in Detroit: Section 201 of the Natural Resources and Environmental Protection Act (NREPA) and Act 381, the Brownfield Redevelopment Financing Act (BRFA). While its title refers to “brownfields,” BRFA’s scope extends beyond contaminated or potentially contaminated properties to include, for example, tax-condemned lands and “functionally obsolete” buildings. This has resulted in a brownfield redevelopment scheme focused on economic redevelopment, with secondary consideration for public health and the environment, rather than one focused on health and environmental protection with economic considerations.

Natural Resources and Environmental Protection Act

Prior to the adoption of Section 201, owners of contaminated properties faced liability under both statute and common law for impacts on health and environment caused by contamination of their property. Under Section 201, owners of contaminated properties who purchased the land after March 1, 1996 are not personally responsible for any contamination. This means they can not only avoid liability, but also avoid many of the costs formerly associated with brownfield cleanups. To do so, however, several steps must be taken.

Any owner suspecting contamination must perform an “All Appropriate Inquiry” or Phase I environmental assessment to determine whether their property is in fact contaminated. If the Phase I assessment uncovers indicators of contamination, a baseline environmental assessment (BEA) must be performed. This assessment is not intended to determine actual or potential environmental or health impacts of a property’s contamination. Instead, it determines

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5 This entails, among other requirements, “the review of past activity on the property -- including land and chemical use, review of regulatory agency files on the property, and a visual survey of the property to look for signs of soil staining or other indicators of possible contamination.” Ibid.
whether contamination of groundwater or soil exceeds state thresholds. This in turn determines whether and to what extent further cleanup action is needed.⁶

If the BEA uncovers “a hazardous substance in excess of the concentrations that satisfy the cleanup criteria for unrestricted residential [use],” the property is deemed a “facility” for purposes of both NREPA and BRFA.⁷ To avoid liability under NREPA, the owner of a “facility” is obligated to “prevent exacerbation” and perform “due care” activities, defined as “response activit[ies] necessary to mitigate unacceptable exposure to hazardous substances, mitigate fire and explosion hazards due to hazardous substances, and allow for the intended use of the facility in a manner that protects the public health and safety.”⁸

The extent to which “due care” activities must “mitigate” the hazards depends on the intended use of the facility (i.e. residential, commercial or industrial).⁹ “Residential” use requires the greatest remediation, while the criteria for non-residential uses are more relaxed.¹⁰ The legislature requires the Michigan Department of Environmental Quality (MDEQ) to determine cleanup levels based on “generic human health risk assessment assumptions determined by the department to appropriately characterize patterns of human exposure associated with certain land uses.”¹¹ Several risk assessment criteria are set by statute, and have recently been amended to “simplify the requirements for redevelopment.”¹² Specifically, in the late 1990s the legislature reduced the acceptable risk threshold for carcinogenic pollutants from 1 in 1,000,000 to 1 in

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⁶ MDEQ 2013.
⁸ Ibid.
¹⁰ See, for example, Mich. Admin. Code R. 299.5744.
100,000.\textsuperscript{13} It also relaxed requirements for groundwater remediation, and allowed for institutional controls rather than full cleanup of sites.\textsuperscript{14} While an owner or developer may remediate to contamination levels below those required by the MDEQ, they need not do so.

**Brownfield Redevelopment Financing Act**

The Brownfield Redevelopment Financing Act provides financing for a wide variety of properties—contaminated, blighted or otherwise—for a wide variety of activities, including those not associated with cleanups. All properties that are a “facility, historic resource, functionally obsolete, or blighted”\textsuperscript{15} are eligible for the cost of baseline environmental assessment activities, due care activities and “additional response activities to satisfy due care obligations (e.g. soil remediation or installation of a barrier to prevent unacceptable exposure).”\textsuperscript{16} “Blighted properties” include those that have “been declared a public nuisance”; are fire hazards or attractive nuisances “because of physical condition, use or occupancy”; those that have “had utilities, plumbing, heating, or sewerage permanently disconnected, destroyed, removed, or rendered ineffective so that the property is unfit for its intended use”; and tax reverted properties.\textsuperscript{17} Depending on their location and former uses, properties may also be eligible for the cost of lead or asbestos abatement, site preparation that is not required for response activities, infrastructure improvement, and other activities not related to environmental quality.

The Act allows Brownfield Redevelopment Authorities (BRAs) to adopt Brownfield plans for various project areas and properties and to authorize financing of those projects through

\textsuperscript{13} Mich. Comp. Laws Ann. § 324.20120a(2). Hula, 12.
\textsuperscript{14} Hula, 12.
\textsuperscript{15} Mich. Comp. Laws Ann. § 125.2652(n).
\textsuperscript{17} Mich. Comp. Laws Ann. § 125.2652(e).
tax-increment financing.\textsuperscript{18} It also gives them authority to accept and allocate grant and other funding to fund those “things necessary or convenient to achieve the objectives and purposes of the authority, this act, or other laws that relate to the purposes and responsibilities of the authority.”\textsuperscript{19} Tax-increment financing (TIF) is based on the idea that redevelopment will increase the property value of the property. The difference between the tax value of the undeveloped and developed value is the tax increment. The increase in revenues is known as the “tax increment revenues” or “captured taxes.”\textsuperscript{20} TIF financing uses these “captured taxes” to finance both cleanup and non-cleanup activities.\textsuperscript{21}

For a work plan to be considered for approval and financing, the submission must include a number of items, including proposed eligible activities and their associated costs, and other economic and financial information.\textsuperscript{22} Notably absent is any requirement of information about possible health benefits or detriments of the proposed project.\textsuperscript{23} Before accepting a work plan, the BRA must, among other things, determine whether the plan “constitutes a public purpose.”\textsuperscript{24} If such a purpose is found, the BRA can approve the plan by resolution.\textsuperscript{25} Otherwise, the BRA can either reject or modify the plan based on considerations of cost, feasibility of financing, and the requirements of the work plan described above. “Public purpose” is not defined, nor is there any indication that the analysis needs focus on health or environmental benefits. Indeed, the structure of the law, particularly in light of recent amendment\textsuperscript{26} strongly suggests that the

\textsuperscript{18} If the plan seeks to use school taxes for environmental response activities, the DEQ must approve the work plan. Likewise, if school taxes are to be used for non-environmental activities, the Michigan Strategic Fund (MSF) must approve the plan. Mich. Comp. Laws Ann. § 125.2663(13).
\textsuperscript{19} Mich. Comp. Laws Ann. § 125.2657(1)(g), (n).
\textsuperscript{21} Ibid.
\textsuperscript{22} Ibid., 2.
\textsuperscript{24} Mich. Comp. Laws Ann. § 125.2664(1).
legislature, and with it the DBRA, has turned the focus of Michigan’s brownfield laws primarily towards economic redevelopment, with protection of human health and the environment taking a back seat.

### III. Health Impact Assessment in Brownfield Redevelopment

#### Brownfields and Determinants of Health

Social and environmental variables interact in complex ways to influence the health of individuals within a community. Dahlgren and Whitehead have proposed how the main determinants of health can be considered as layers of influence\(^{27}\) (Fig. 1).

**Figure 1: Determinant Layers of Health**

Broader determinants, including biological and socio-political environments, can influence the living and working conditions of people in a community. These conditions may then govern how individuals interact with other community members, which may shape a person’s behavior and lifestyle choices. The overall interaction between each determinant layer ultimately influences the occurrence of individual health outcomes. Characteristics of brownfield and blighted properties can shape the broader determinants of health by altering environmental,

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working, and living conditions, and ultimately affecting the health of people who work or reside in brownfield or blighted sites (Fig. 2).

Health Concerns in Detroit

As of 2010, the leading causes of death in Detroit included heart disease, cancer, stroke, chronic lower respiratory diseases, and unintentional injury. Mortality rates for almost all the leading causes of death in Michigan are higher in Detroit when compared to the entire state (Table 1). Other important causes of mortality in Detroit include malignant neoplasms, accidents, intentional injury, liver diseases, kidney diseases, influenza and pneumonia (Table 2). Brownfield and blighted properties may contribute to these health outcomes for Detroit residents by influencing at least one determinant of health. Exposures that brownfields, whether they’re contaminated or blighted properties, may impose upon residents can be categorized into one of three types: chemical, physical, and social.

Table 1: Mortality rates per 100,000 persons in Detroit and the State of Michigan, age-adjusted to the 2000 US population

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Detroit</th>
<th>Michigan</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIDS</td>
<td>9.7±1.3</td>
<td>1.6±0.1</td>
</tr>
<tr>
<td>Alcohol - Induced</td>
<td>8.2±1.2</td>
<td>7.7±0.3</td>
</tr>
<tr>
<td>Alzheimer's Disease</td>
<td>10.9±1.4</td>
<td>23.5±0.5</td>
</tr>
<tr>
<td>Cancer</td>
<td>226.2±6.4</td>
<td>181.7±1.5</td>
</tr>
<tr>
<td>Chronic Liver Disease</td>
<td>12.0±1.4</td>
<td>9.7±0.3</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Disease</td>
<td>35.2±2.6</td>
<td>45.7±0.7</td>
</tr>
<tr>
<td>Diabetes - Related</td>
<td>100.8±4.3</td>
<td>77.5±0.9</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>335.6±7.8</td>
<td>208.1±1.5</td>
</tr>
<tr>
<td>Assault (Homicide)</td>
<td>41.0±2.7</td>
<td>6.6±0.3</td>
</tr>
<tr>
<td>Infant mortality</td>
<td>14.4±1.3</td>
<td>7.3±0.3</td>
</tr>
<tr>
<td>Kidney Disease</td>
<td>24.5±2.1</td>
<td>15.1±0.4</td>
</tr>
<tr>
<td>Pneumonia &amp; Influenza</td>
<td>19.9±1.9</td>
<td>14.7±0.4</td>
</tr>
<tr>
<td>Septicemia</td>
<td>25.0±2.1</td>
<td>9.0±0.3</td>
</tr>
<tr>
<td>Stroke</td>
<td>52.2±3.1</td>
<td>40.1±0.7</td>
</tr>
<tr>
<td>Intentional Self - harm (Suicide)</td>
<td>8.9±1.3</td>
<td>11.8±0.4</td>
</tr>
<tr>
<td>Unintentional Injury</td>
<td>46.3±2.9</td>
<td>35.6±0.7</td>
</tr>
</tbody>
</table>

aData collected from the 2010 Michigan Death Certificate Registry Division for Vital Records & Health Statistics, Michigan Department of Community Health.

Table 2: Leading causes of Years of Potential Life Lost (YPLL) in Detroit by sex

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cause of Death</th>
<th>Sex</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Males b</td>
<td>Females b</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Malignant neoplasm</td>
<td></td>
<td>2472.3</td>
<td>2159.0</td>
<td>2309.3</td>
</tr>
<tr>
<td>2</td>
<td>Heart Diseases</td>
<td></td>
<td>3659.2</td>
<td>2094.1</td>
<td>2845.1</td>
</tr>
<tr>
<td>3</td>
<td>Accidents</td>
<td></td>
<td>1645.1</td>
<td>1029.7</td>
<td>1325.1</td>
</tr>
<tr>
<td>4</td>
<td>Intentional self-harm (suicide)</td>
<td></td>
<td>482.9</td>
<td>--</td>
<td>295.6</td>
</tr>
<tr>
<td>5</td>
<td>Conditions originating in the perinatal period</td>
<td></td>
<td>1173.3</td>
<td>805.9</td>
<td>982.0</td>
</tr>
<tr>
<td>6</td>
<td>Assault (homicide)</td>
<td></td>
<td>3134.6</td>
<td>358.4</td>
<td>1690.2</td>
</tr>
<tr>
<td>7</td>
<td>Chronic lower respiratory diseases</td>
<td></td>
<td>274.5</td>
<td>259.6</td>
<td>266.8</td>
</tr>
<tr>
<td>8</td>
<td>Chronic liver diseases and cirrhosis</td>
<td></td>
<td>356.6</td>
<td>202.1</td>
<td>276.2</td>
</tr>
<tr>
<td>9</td>
<td>Congenital malformations, deformations &amp; chromosomal abnormalities</td>
<td></td>
<td>--</td>
<td>--</td>
<td>322.6</td>
</tr>
<tr>
<td>10</td>
<td>Cerebrovascular diseases</td>
<td></td>
<td>426.1</td>
<td>386.9</td>
<td>405.7</td>
</tr>
<tr>
<td>11</td>
<td>Diabetes mellitus</td>
<td></td>
<td>226.9</td>
<td>276.1</td>
<td>252.5</td>
</tr>
<tr>
<td>12</td>
<td>Influenza &amp; pneumonia</td>
<td></td>
<td>263.4</td>
<td>142.3</td>
<td>200.4</td>
</tr>
<tr>
<td>13</td>
<td>Nephritis, nephrotic syndrome, &amp; nephrosis</td>
<td></td>
<td>262.5</td>
<td>109.6</td>
<td>182.9</td>
</tr>
<tr>
<td>14</td>
<td>Septicemia</td>
<td></td>
<td>194.5</td>
<td>183.3</td>
<td>188.7</td>
</tr>
<tr>
<td>15</td>
<td>Other respiratory diseases</td>
<td></td>
<td>77.2</td>
<td>58.4</td>
<td>67.4</td>
</tr>
<tr>
<td>16</td>
<td>All other causes</td>
<td></td>
<td>2388.9</td>
<td>1998.2</td>
<td>2388.9</td>
</tr>
</tbody>
</table>


b Rates of YPLL given per year 100,000 persons under 75 years of age.
Chemical Exposures

Of all US counties in 2012, Wayne County released the third-highest quantity of pollutants into the environment\(^\text{29}\). The most hazardous carcinogens that have been released at very high levels include polychlorinated biphenyls (PCBs), asbestos, chromium, lead, and nickel compounds\(^\text{30}\). High quantities of several other highly toxic compounds, such as hydrochloric acid, sulfuric acid, xylene, and glycol ethers, have also been released in Wayne County (Table 3). All these substances are either known or recognized toxicants to several organ systems, including the respiratory, immune, and cardiovascular systems, and may also influence development of children\(^\text{31}\).

Table 3: Top 15 most released CERCLA hazardous substances in Wayne County during 2012 \(^a\) and the organ systems that each substance is recognized (R) or suspected (S) to affect \(^b\).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Chemical</th>
<th>Total Release (pounds)</th>
<th>Carcinogen</th>
<th>Cardiovascular or Blood</th>
<th>Development</th>
<th>Endocrine</th>
<th>Gut or Liver</th>
<th>Immune</th>
<th>Kidney</th>
<th>Musculo-skeletal</th>
<th>Nervous</th>
<th>Reproductive</th>
<th>Respiratory</th>
<th>Skin or Glands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Zinc Compounds</td>
<td>115,439,900</td>
<td>S</td>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chromium Compounds</td>
<td>38,126,24</td>
<td></td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Manganese Compounds</td>
<td>30,668,53</td>
<td></td>
<td></td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>Hydrochloric Acid</td>
<td>20,476,55</td>
<td></td>
<td></td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Barium Compounds</td>
<td>14,961,73</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Glycol Ethers</td>
<td>9,152,13</td>
<td>S</td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
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<tr>
<td>7</td>
<td>Asbestos</td>
<td>7,098,82</td>
<td>R</td>
<td></td>
<td>S</td>
<td></td>
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<tr>
<td>8</td>
<td>Polychlorinated Biphenyls</td>
<td>7,023,19</td>
<td>R</td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>Disopropylamine</td>
<td>5,624,86</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>S</td>
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</tr>
<tr>
<td>10</td>
<td>Xylene</td>
<td>5,102,01</td>
<td></td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
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</tr>
<tr>
<td>11</td>
<td>Nitrate Compounds</td>
<td>3,675,14</td>
<td></td>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>12</td>
<td>Lead Compounds</td>
<td>3,496,87</td>
<td>R</td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
<td></td>
<td>R</td>
<td></td>
<td></td>
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<tr>
<td>13</td>
<td>Nickel Compounds</td>
<td>2,667,34</td>
<td>R</td>
<td></td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>14</td>
<td>N-butyl Alcohol</td>
<td>2,558,55</td>
<td>S</td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Sulfuric Acid</td>
<td>2,386,44</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

\(^a\) Total pounds released data obtained from TRI On-site and Off-site Reported Disposed of or Otherwise Released (in pounds), for All industries, for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Hazardous Substances, Wayne County, Michigan, 2012.


Like other Rust Belt cities, Detroit’s industrial past has left its soil and water contaminated with a number of pollutants. While the precise number of contaminated properties in Detroit is unknown, and data regarding the types of contaminants found on those properties is


\(^{30}\) TRI On-site and Off-site Reported Disposed of or Otherwise Released (in pounds), for All industries, for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Hazardous Substances, Wayne County, Michigan, 2012.

incomplete, several of these chemical compounds have been found on Detroit brownfield sites and blighted properties in the past\textsuperscript{32,33} and may consequently present a health risk to the community. Prior studies have found increased exposure to hazardous materials and toxicants on brownfield sites, especially in the soil, were associated with worse health outcomes\textsuperscript{34} (e.g. cancer, respiratory disease, diabetes, stroke COPD, heart disease, injury) and higher mortality rates among infants and adults\textsuperscript{35}.

Detroit officials have expressed particular concern about lead and asbestos contamination in brownfield and blighted properties\textsuperscript{36}. In the 20\textsuperscript{th} century, asbestos was commonly used as insulation in homes\textsuperscript{37}, and leaded paint and fuels were also used in the process of building homes\textsuperscript{38}. But now, many abandoned buildings are inundated with lead contamination and asbestos and residents who are frequently exposed to these contaminants on brownfield or blighted sites may be at risk for severe health outcomes. Asbestos\textsuperscript{39} and lead\textsuperscript{40} contamination have been found on old industrial properties that have been proposed for redevelopment in Detroit. Lead exposure in adults may cause nerve damage, increased blood pressure, and reproductive problems, and exposure in children may cause severe brain damage and developmental delays\textsuperscript{41}. Exposure to asbestos may cause lung complications such as lung fibrosis, lung cancer, and pleural mesothelioma\textsuperscript{42}.

\begin{thebibliography}{9}
\bibitem{33} Sierra Club, The State of Detroit’s Environment: An Initial Assessment Using the Framework of Environmental Justice
\bibitem{34} Litt et al. 2002.
\bibitem{37} National Cancer Institute FactSheet – Asbestos Exposure and Cancer Risk. \url{http://www.cancer.gov/cancertopics/factsheet/Risk/asbestos}
\bibitem{38} U.S. Environmental Protection Agency Superfund. Human Health and Lead. \url{http://www.epa.gov/superfund/lead/health.htm}
\bibitem{41} U.S. Environmental Protection Agency Superfund. Human Health and Lead. \url{http://www.epa.gov/superfund/lead/health.htm}
\end{thebibliography}
Physical and Social Exposures

The abandoned buildings on blighted and brownfield properties may expose residents to physical hazards. Buildings that are not maintained or secured pose fire hazards.\textsuperscript{43} Chemically contaminated and abandoned buildings in Detroit have caught fire before, thus increasing risk for unintentional injury due to fire. Additionally, the urban sprawl caused by the rising numbers of abandoned buildings and long stretches of abandoned lots may expose residents to traffic-related injury risks. Urban sprawl, as characterized by low population density and physically disconnected communities, has been found to be associated with an increased risk for traffic-related injury and fatality, possible because sprawling areas have wider and longer streets that may encourage faster driving.\textsuperscript{44}

Urban sprawl and disconnected communities also affect several important social determinants of health.\textsuperscript{45} Increased numbers of abandoned and foreclosed properties may provide more spaces and opportunity for crime to occur, thereby increasing crime rates as well as risk of injury and death due to crime. Increased crime may discourage residents in these communities from engaging in health-promoting activities, such as walking, due to serious safety concerns.\textsuperscript{46} Feeling threatened by a lack of community safety may also discourage residents from becoming engaged with their community, thereby reducing social cohesion and social capital. Social capital refers to the collective value of a community or network and reflects the amount of trust and

\textsuperscript{43} Greenberg, M. Should Housing Be Built on Former Brownfield Sites? \textit{Am. J. Public Health}. 2002; 92(5): 703-5.
support residents have for their community\textsuperscript{48}. Individuals with low social capital may be at a higher risk for adverse physical and mental health outcomes.\textsuperscript{49}

Unsafe environments\textsuperscript{50} combined with disconnected street networks\textsuperscript{51} may also affect an individual’s ability to access facilities and engage in activities that promote healthy living. Specifically, these factors may influence an individual’s ability to utilize public transportation and to access healthy food markets, parks and trails\textsuperscript{52}. Because better access to grocery stores promotes healthier diets\textsuperscript{53} and increased physical activity in parks and trails positively affects physical fitness, inability to access these resources may negatively affect an individual’s health.

**Steps for Health Impact Assessments in Detroit**

Brownfield and blighted properties can affect the health of residents in and around these properties considerably. Therefore, brownfield redevelopment projects also have serious potential to impact human health of Detroit communities. In order to track how a redevelopment project influences the environment, community, and health of residents near the proposed redevelopment site, it is vital to conduct Health Impact Assessments (HIAs). We suggest using the following steps for conducting an HIA in Detroit.

1. **Community Assessment**

   a. **Identify Affected Populations:** A brownfield redevelopment project will likely most greatly affect those who reside or work around the site. Gathering demographic information, such as age, sex, race/ethnicity, etc., about this population will help

define the population of interest and identify the innate determinants of health (Figure 2). Additionally, certain demographic groups may be disproportionately affected by brownfields\textsuperscript{54}.

b. Health Concerns in Affected Populations: different communities have different primary health concerns depending on the demographics of the population and environmental factors. Obtaining information on the health of residents around brownfield redevelopment sites may help to identify the most important health concerns, as well as establish a baseline level of health in the community. There are two different types of health information that are important to collect:

i. Health Outcomes: disease incidence and major causes of morbidity and mortality may differ in a particular community compared to other communities in Detroit and the state of Michigan. County and state level health statistic databases may serve as useful resources in obtaining this information.

ii. Community Concerns: social issues in the community, such as social cohesion, crime and perceived safety, may influence health-related activities\textsuperscript{55}. The built environment may also influence these social issues\textsuperscript{56}, thus brownfield redevelopment projects can alter social capital. Conducting interviews and holding focus groups with community residents can be used to obtain this information.

\textsuperscript{54} CDC. Healthy Effects of Gentrification. (2009). \url{http://www.cdc.gov/healthyplaces/healthtopics/gentrification.htm}

\textsuperscript{55} CDC. Neighborhood safety and the prevalence of physical inactivity – selected states 1996. \textit{MMWR Morb Mortal Wkly Rep} 1999;48(7): 143-6

2. Exposure Assessment

   a. Exposures that Cause Health Concerns: as discussed previously, specific chemical, physical, and social exposures present at the redevelopment site may cause detrimental health outcomes in the affected community. Findings from peer-reviewed literature and governmental resources (e.g. CDC, NIH) may help to inform what exposures are important health determinants in a particular community.

      i. Contaminant Exposures: data collected during the Environmental Impact Assessment (EIA) can be used. Contaminant exposure criterion should match the five elements in the human exposure pathway identified by the Michigan Department of Community Health (MDCH) and the Michigan Department of Environmental Quality (MDEQ) 57: (1) a source of contamination, (2) contaminant transport through an environmental medium, (3) a point of exposure, (4) a route of human exposure, and (5) a receptor population.

   b. Exposures Affected by the Redevelopment Project: of the exposures that affect health outcomes identified in the previous step, brownfield redevelopment projects will likely affect at least one. It is important to identify the specific exposures in order to understand how redevelopment projects may impact health outcomes of the community.

3. Predict Mechanisms

   a. Combining Exposures, Health Determinants, and Health Outcomes: explain all possible mechanisms by which the brownfield redevelopment project may influence the occurrence of major health outcomes in the affected populations due to the ways

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the redevelopment project manipulates the determinants of health and exposures identified in 2.a.

4. Project Quantitative Health Impacts
   a. Change in Number Exposed: estimate the change in number of people exposed to health determinants that may cause adverse health outcomes (identified in 2.a).
   b. Change in Health Outcomes: health determinants may cause the occurrence of health outcomes, and brownfield redevelopment projects may change those determinants. Using the estimated number of people with a certain health outcome (e.g. obesity, diabetes, HIV infection) attributable to a specific health determinant, predict the change in number of cases due the brownfield redevelopment project. For example, if a redevelopment project plans to reduce asbestos contamination, then the redevelopment project would be expected to reduce the number of lung cancer cases due to asbestos exposure.

Using Information from HIAs

Inform Recommendations

The findings of the HIA may be used to inform recommendations that would be most beneficial for the health of the community affected by the brownfield redevelopment project and may reduce harmful outcomes. Decision makers for brownfield redevelopment projects may not have the information or tools to understand how a project may influence human health. HIA reports may encourage more knowledgeable decision-making by improving awareness and comprehension of community health.
Disseminate Findings

Major findings should be distributed to community members because their livelihoods are greatly affected by their surroundings. Understanding what environmental factors and health determinants affect their health the most may promote community involvement and possibly increase social capital.

Monitor and Evaluate

The data gathered in the HIA can provide baseline information regarding the health of the community. Monitoring of health determinants and outcomes should continue during the implementation of the redevelopment project and after the project has been completed. Specifically, monitoring can identify the actual change in the number of people exposed to health determinants as well as changes in health outcomes in the community. These actual numbers can then be compared to the projected numbers specified in step 4.b of the HIA. By doing this, this health evaluation may be used as a metric to assess the actual impact of the proposed brownfield redevelopment project. These evaluation metrics may also be useful when applying for additional funding opportunities for the project. For instance, the findings from HIA conducted from 2005-2007 for the Atlanta Beltline redevelopment project were cited when the project was awarded an additional $7 million for further cleaning and development of brownfield sites58. Conducting HIAs could be a way to not only provide a metric that can be used for project evaluation, but it also allows us to view brownfield properties as an opportunity to improve the health of citizens on Detroit.

IV. Implications for Sustainability

Integrating health impact assessment (HIA) criteria into the traditional framework for assessing brownfields may aid redevelopment to achieve more sustainable results. For instance, health outcomes for communities may be improved through the consideration of many factors related to the built environment, such as transportation and business investments; air and water quality, as well as land contamination; and sociocultural, psychosocial, and socioeconomic factors. These factors may be broken down into broader, yet interconnected, areas of social, environmental, and economic sustainability.

<table>
<thead>
<tr>
<th>Health Determinants Potentially Impacted by Public Policy Decisions</th>
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<td>Health Behaviors</td>
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<td>Diet</td>
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<td>Other addictions</td>
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<td>Coping</td>
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Social Justice

Social justice issues are intertwined with urban planning and health concerns, as inequitable disparities in health between and within populations can be exacerbated by planning decisions that fail to address preexisting concerns. Through the completion of a HIA, the social

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determinants of health can be identified and prioritized.\textsuperscript{62} The social aspect of an HIA may bring an additional benefit to a project in its ability to garner support from a local community by considering concerns that are most important to them. Such concerns may include community safety, convenience of resources that encourage physical activity, and social cohesion in a neighborhood.

Abandoned properties can become magnets for crime, vandalism, and arson. When more properties in an area are foreclosed upon or otherwise abandoned, there may be an increase in total crimes, including violent and public order offenses.\textsuperscript{63} This impact is more pronounced in areas that already have moderate or high crime levels. When there is an improvement in the housing of a community, there is a resulting reduction in fear of crime that is accompanied by improved social participation.\textsuperscript{64} Occupants benefit from feeling a sense of social connectedness and cohesion.\textsuperscript{65} Projects can build social capital for occupants through designing projects that make occupants feel included and developing community infrastructure that facilitates the creation of social networks. By performing an HIA, those health benefits from improving social outcomes can be factored into the equation.

Community safety can be enhanced through project planning to improve pedestrian access and mitigate crime. For instance, many disadvantaged communities and individuals with special needs may be underserved by a project that is developed for car-drivers, rather than users of mass-transit. By using health assessment information, designers can prioritize the needs of a site’s specific users. Pedestrian walkways can be made more visible and accessible to reduce the


risk of walkers being struck by vehicles. In addition, the project could also provide facilities that encourage the utilization of alternative transit resources.

Improvement of pedestrian resources can also aid in increasing the physical activity levels of future occupants. Obesity and low levels of physical activity have risen in recent years, causing a decline in health for many urban and low-income communities. To address concerns about physical activity of future occupants, a redevelopment project can choose to create areas that allow occupants the opportunity to participate in physical recreation. By providing an outlet for exercise, the long-term health of occupants will be improved by simply considering health needs at the start of redevelopment.

**Environmental Sustainability**

The link between environmental quality and public health is a crucial consideration when redeveloping a brownfield site. Common concerns typically deal with contamination of the land and what level of treatment should be provided in order for the redeveloped site to ensure the safety of future users or occupants. However, there is a broader array of environmental issues that an HIA may bring to light, enabling developers to plan improvements in areas that may have long-term health benefits for the entire community.

Consideration of the air quality at the brownfield site may indicate a risk of significant pollution, which would endanger future users with respiratory or cardiovascular health problems. Accordingly, a new plan for the site could choose to implement measures to reduce those risks, including improved air filtration systems for indoor air quality and continuous monitoring of air quality on site. Additionally, considering environmental health factors during a redevelopment plan may indicate whether a potential use is appropriate or whether changes need to be made to reduce the health risks to vulnerable populations.
Water issues also play a role in impacting the health of a community near a proposed redevelopment site. Detroit’s combined sewer and stormwater system can endanger human health due to the presence of pathogens from animal and human sources following wet weather.\textsuperscript{66} Taking the current water systems into account during project planning can address risks of contamination in the water and the project can choose to implement alternative stormwater management techniques, such as low-impact development, in constructing a new use for the site.

An additional environmental health concern deals with the possible exposure to lead or asbestos that occupants of a redevelopment may face.\textsuperscript{67} This issue is especially concerning for projects that may include children, as lead exposure can lead to developmental delays. While many projects may already address this concern under current frameworks, viewing it through the lens of a HIA may provide a more detailed and critical perspective, and monitoring should capture actual health gains accrued from the intervention. Future occupants may not be the only ones whose health can be compromised by the presence of harmful substances at the site; construction workers, who engage in the removal of the present facilities, have an interest in protecting their health. Removal of asbestos can also entail additional costs and removal requirements, pursuant to state and federal law.\textsuperscript{68} Assessing the environmental state of a brownfield and how the presence of contaminants can impact health at the individual and community levels provides lasting environmental health benefits.

### Economic Viability

Economic considerations during brownfield redevelopment can expand beyond considerations of how much site cleanup and new construction cost, instead considering how

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urban and economic development of a site may improve health in the community. Current measures that gauge economic gain from redevelopment fail to consider the full range of benefits that accrue from improving health. Brownfield redevelopment can help to invigorate local economies, reduce firefighting costs, and build property values by creating vibrant spaces with occupants may live, work, and play. While the long-term economic benefits of integrating health assessments into brownfield redevelopment may be too attenuated to capture at the initial stage of project planning, “there is a sound theoretical and empirical basis to the argument that human capital contributes to economic growth.” As health contributes to human capital, improving public health through HIAs can aid a community’s economic redevelopment.

Brownfield redevelopment can lead to economic benefits to the adjacent community. If a business develops on a site and hires local residents, job creation and the increase in tax revenue can improve socioeconomic conditions and lead to improved health outcomes. Overall, the social, environmental, and economic benefits of performing HIAs in brownfield redevelopment illustrate how valuable a tool the assessments can be. While the cost of performing the assessment may serve as a hindrance to widespread implementation, the broad array of health outcome improvements that can be realized by the information a health assessment brings to light provide adequate reasoning for policymakers to encourage developers to complete them.

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V. Policy Recommendations

Building on existing infrastructure—current stakeholders and available revenue streams—is the most sensible way to facilitate the implementation of HIAs in Detroit’s brownfield redevelopment process. It is also pertinent to understand the political landscape within which the City is operating; 2014 may present an unprecedented opportunity to promote health in all policies through a new administration.

The major challenge that this effort faces is the poor incentives for private actors to implement health impact assessments (HIAs) voluntarily. Gains in health and equity will require a long time horizon, and benefits are likely to accrue to the community, not developers or investors. This suggests that the effort to introduce HIAs into brownfield redevelopment should be a lead by the municipality, with the engagement of private stakeholders at every level.

Our policy recommendations are outlined as follows:

- Allocate funds from existing grant programs to motivate HIA inclusion.
- Designate the Detroit Brownfield Redevelopment Authority as the organization responsible for implementing a HIA initiative
- Identify other potential partners in the community
- Lobby for an amendment to Michigan Public Act 381 to include health impact assessments as allowable costs for reimbursement under TIF
- Recognize the opportunity that 2015 presents for advancing these policy proposals

Allocate funds from existing grant programs to motivate HIA adoption

One short-term challenge for incorporating an HIA into the brownfield redevelopment process is that developers are not adequately motivated to pursue such activities. Introducing a
regulatory mandate could impose additional costs upon developers and discourage new brownfield mediation activities.

Instead, we propose to realign incentives by: a) providing developers with the resources required to conduct HIAs, b) prioritizing approval for projects that incorporate HIA into the redevelopment process, and c) fast-tracking projects with outsize potential to improve health outcomes.

Considering the weak tax base of the City, imposing additional tax burdens on individuals or businesses could counterproductively discourage investment in the City. However, extant federal and state grant funds could be used to support HIA activity associated with brownfield redevelopment:

- **Federal Neighborhood Stabilization Program:** This grant program is also administered through HUD. The funds are earmarked for the purpose of stabilizing communities through the purchase and redevelopment of abandoned properties.71

- **Federal Community Development Block Grants:** The Community Development Block Grant (CDBG) program is administered through HUD, providing funds for a variety of eligible activities, including demolition or rehabilitation of blighted structures. Detroit qualifies as an “Entitlement Community,” meaning that the City receives a set funding level, determined by an annual formula.72 The Detroit City Council and the Mayor make funding allocation decisions, following a request-for-proposals process and citizen

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engagement through meetings and public hearings. DBRA should prepare to apply to receive CDBG funding for HIA efforts during the next RFP cycle.

- **State-level sources of financing:** Aside from tax increment financing available through the DBRA, brownfield developers can seek assistance in clean-ups and redevelopment through a number of sources. The MDEQ, for example, offers grants and low-interest loans to help with BEAs and due care activities for contaminated properties. Eligibility is based primarily on the economic benefits of the project, however. Similarly, to qualify for a Clean Michigan Initiative Brownfield Redevelopment Grant, a “proposed project must result in economic benefit for the community greater than the amount of the grant through job creation, private investment, and/or property tax increase.” There is no mention of public health benefits in the criteria. The Site Reclamation Grant and Revitalization Revolving Loan Fund similarly focus on economic benefits. Only the Site Assessment Fund Grant requires a property to “result in both environmental and economic benefit” to qualify. The Michigan Community Revitalization Program, which offers grants and loans through the Michigan Strategic Fund requires extensive showing of the economic benefits of the project it financings, while only requesting a short

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statement of “how the project will act as a catalyst for additional revitalization of the community in which it is located.”

Designate the Detroit Brownfield Redevelopment Authority as the stakeholder responsible for implementing a HIA initiative.

The Detroit Brownfield Redevelopment Authority (DBRA) is a public-private partnership under the umbrella of the Detroit Economic Growth Corporation. Established under Michigan Public Act 381 of 1996, the group is responsible for promoting the revitalization of brownfields within the City. DBRA is already charged with approval of brownfield redevelopment projects, which makes the organization a natural choice for introducing HIA into the brownfield redevelopment process.

DBRA should conduct (or contract out to a capable organization) health impact assessments for proposed redevelopment projects, rather than tasking individual developers with the responsibility. This will assure uniformity in the quality and scope of assessments; having developers conduct HIAs would be de facto “self-regulation,” and could suffer from attendant biases and self-interest. DBRA must weigh what measures might be necessary to prevent regulatory capture in the long-term.

Identify other potential partners in the community

Though DBRA is well-situated to take the helm of a health impact assessment initiative, the organization is not equipped to carry out the initiative alone. Accordingly, it should partner with community stakeholders that are necessary to the success of HIA, and/or possess the capacity to carry out specialized responsibilities.

• **Strong Cities, Strong Communities (SC2):** Launched in 2011 as an interagency program, SC2 is a “pilot initiative that aims to strengthen neighborhoods, towns, cities and regions around the country by strengthening the capacity of local governments to develop and execute their economic vision and strategies.”\(^8^1\) The program places early- and mid-career professionals in local governments—including Detroit—to facilitate strategic priorities identified by the city.\(^8^2\) The program could directly provide human capital to assist in the implementation of a health impact assessment initiative.

• **Data Driven Detroit:** While DBRA may be able to coordinate HIA implementation and monitoring, it probably isn’t equipped for ongoing data analysis. Data Driven Detroit is a local nonprofit organization whose operations focus on data analysis, visualization, and mapping for community partners. Data Driven Detroit has collaborated in the past with the City of Detroit Planning and Development Department, the Detroit Economic Growth Corporation, and other city stakeholders.

• **Local health providers/organizations:** HIA findings should be disseminated to health care providers and organizations in the area. This will alert providers in high-risk regions of the City that chronic diseases may be exacerbated as a consequence of the built environment, not just genetic and behavioral factors. With increased coverage as a result of health reform, trends may become more readily apparent. Local public health organizations may also be interested in chronic disease burden and etiologic trends.


• **Local developers and businesses:** Engage with local developers and businesses to determine the least intrusive and disruptive way to introduce health impact assessments to existing processes.

• **Detroit residents:** Health impact assessments necessarily require the participation of residents to ascertain the relative importance of differential health outcomes.

*Lobby for an amendment to Michigan Public Act 381 to include health impact assessments as allowable costs for reimbursement under TIF*

In the long-term, stakeholders should reach out to state legislators to reopen Michigan Public Act 381 to include HIAs within the definition of allowable costs. Currently, certain environmental impact assessments fall within the purview of costs eligible for TIF funding, but it is unclear whether this language is flexible enough to capture HIA efforts. This would secure an additional source of support in the event that grant funding is unavailable for HIA activity in a given year.

*Recognize the opportunity that 2014 presents for advancing these policy proposals*

• **Administrative turnover:** Mike Duggan will replace current Mayor Dave Bing in January 2014, bringing a new administration—and a new set of policy priorities—to the City of Detroit. Stakeholders with an interest in brownfield redevelopment and community health should impress upon him the benefits of adopting a “health in all policies” approach, and opportunities for incorporating health considerations into urban redevelopment contexts. The presence of the Emergency Financial Manager should not pose a barrier to the allocation of federal- and state-level grant funds.
• **The Affordable Care Act:** In order to retain their tax-exempt status, nonprofit hospitals must provide a certain level of “community benefit”. The ACA introduces new requirements and for transparency and accountability in this domain.\(^{83}\)

Historically, providers have met this requirement by providing charity care to uninsured individuals; with the enactment of the ACA, the share of uninsured will decline, increasing pressure to provide community benefit through other measures. Supporting health impact assessments in redevelopment might be a qualified activity under the “community health improvement” umbrella.

Moreover, in tandem with passing the Affordable Care Act, the Obama administration developed an initiative for “place-based budgeting”, an effort that fosters interagency cooperation in determining fiscal priorities. Federal departments are required to consider geography in their funding decisions, and encouraged to prioritize investment strategies that support sustainability and equity in neighborhood revitalization efforts.\(^{84}\).

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\(^{84}\) Bostic et al. (2012)