

**Center for Applied Demography & Survey Research**  
**University of Delaware**

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**Economic Impact on Delaware's Economy:  
The Brownfield Program 2015**

by

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## Executive Summary

The Center for Applied Demography & Survey Research at the University of Delaware conducted this research to measure the economic impact of Delaware's Brownfield Development Program (BDP). The research was commissioned by the Delaware Department of Natural Resources and Environmental Control. The Center conducted the study independently and the authors are solely responsible for its design and execution.

Delaware defines brownfields as “any vacant, abandoned or underutilized real property the development or redevelopment of which is hindered by the reasonably held belief that the real property may be environmentally contaminated.”<sup>1</sup> As a result, properties that could generate economic and social benefits remain undeveloped. The BDP “codifies the prospective purchaser concept and provides liability waivers and financial assistance to brownfield developers.”<sup>2</sup> The BDP thus encourages the remediation and private development on these sites with the assistance of the state.

The objectives of this research were several.

- 1) Measure the change, if any, in the economic value of the each certified and remediated site as of 2014.
- 2) Measure any change in employment and wages that occurred on the site.
- 3) Ascertain the impact of the sites collectively on Delaware's economy.
- 4) Estimate the impact on the tax base and the overall return on investment.

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<sup>1</sup> 7 Del. C. §9103(3).

<sup>2</sup> *Delaware's Brownfield Development Program Fact Sheet*,  
<http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/Brownfields.aspx>

- 5) Evaluate the experience of the site developers/owners.
- 6) Introduction to Tax Increment Financing.

It does not address other important aspects of the program, such as poverty, health, crime, urban sprawl, and the public's preference for clean properties.

Data has been collected from Delaware Department of Natural Resources and Environmental Control (DNREC), the Delaware Department of Labor (DOL), county tax assessment records, and the Center for Applied Demography & Survey Research (the Center). The report also uses output from the REMI PI+ general equilibrium model. The model is tailored to Delaware using data from the Bureau of Census, the Bureau of Economic Analysis, the Bureau of Labor Statistics, and the Energy Information Administration (among others).

In general, brownfield development has been very positive in New Castle County and Sussex County, but less so in Kent County. We attribute this differential to unfinished redevelopment in Kent County sites. Overall, large economic benefits have been generated in the state from brownfield site development. The main findings are outlined below.

### **Changes in value**

- Measurement of changes in assessed valuation were taken by combining property assessment files for the three counties 2000-2014 and extracting those records associated with the parcel numbers in each brownfield. The records for every certified brownfield were isolated from the master file and examined for completeness.
- The date of the property record coinciding with the year the certification of the completion of remediation (COCR) of the site was the starting point. Measurements of the assessed value were taken for the COCR year and 2014. The difference in valuation was computed from the fully remediated properties that had a recorded COCR. This differs from the methodology used in the earlier study. There were 76 fully remediated properties of the 199 certified brownfield sites.

- Assessed values of 61 brownfield sites increased by \$111,985,800 in New Castle County, \$674,666 in seven Kent County sites, and \$974,100 in eight Sussex County sites from 2000-2014. Property taxes are expected to increase by \$3,695,532 in New Castle County, \$10,120 in Kent County, and \$19,482 in Sussex County.

### **Employment and Wages**

- These estimates were developed by first appending the latitude and longitude of each record in the employer files provided by the Delaware Department of Labor from 2000-2014. The parcel boundaries for all brownfields in the program were located and compared with the digitized addresses on employer files to assign employment/wages to the brownfield. Employment and wages were also gathered for the year certified as a brownfield and the COCR year if available.
- The 76 brownfields throughout the period showed growth. These sites added 255 jobs between 2009 and 2014 (after the recession ended in the second quarter of 2009). Wages increased from an average annual wage of \$65,041 and \$81,000 in the brownfield sites.
- New Castle brownfields followed the pattern described for the state since they have the majority of the fully remediated brownfields. Wages not surprisingly followed the same pattern as employment. Jobs increased from 14,071 to 14,560 with average annual wages increasing from \$72,510 to \$83,453.

### **Overall Impact of the brownfields program in Delaware**

- The REMI simulation estimates that total employment within Delaware increased by 4,999 jobs above the level without a brownfields program.
- Delaware's GSP (Gross State Product) was increased by \$738 million by 2014 and Disposable Personal Income increased by \$467 million or \$504 per person. The vast majority of these results apply to New Castle County since the brownfields that have been remediated are largely located there.

- The job gains continue to stem from growth in the finance and insurance sector and the administrative support, waste management and remediation services sector as was recognized in the 2008 simulation.

### **Return on Investment (ROI)**

- The state is investing in a portfolio of brownfield sites with very different characteristics and will very likely change in value depending on those characteristics. For example, the Great Recession was preceded by increases in price by factor two or three. This was in reaction to demand from consumers and businesses brought on by very low interest rates and easy terms for borrowing.
- The ROI for the New Castle County portfolio is estimated as \$19.20 for 2014 for the 61 properties that have been fully remediated. (The assessed value of \$111,985,800 which is based on 1983 values is divided by the assessment-to-sales ratio (ASR) in 2014 of 0.306 to yield \$365,966,667. The BDP expenses for the New Castle County properties were \$19,107,747 in nominal dollars and an ROI of \$19.15).
- In 2014, primarily because of the Cannery Village site, the ROI for Sussex County is \$10.94 for the eight fully remediated properties. (The assessed value of \$974,100 which is based on 1974 values is divided by the ASR in 2014 of 0.088 to yield \$11,069,318. The BDP expenses for the Sussex County properties were \$1,012,159 in nominal dollars and an ROI of \$10.94).
- Kent County had seven fully remediated properties (including the costly Capital Scrap site) yielding an ROI of \$1.04. (The assessed value of \$674,666 which is based on 1986 values is divided by the ASR in 2014 of 0.221 to yield \$3,052,787. The BDP expenses for the Kent County properties were \$2,945,550 in nominal dollars giving an ROI of \$1.04). In the cleanup of Capital Scrap, there were \$2,000,000 of expenses and the assessed value gained was \$225,000 in 1986 dollars or roughly \$1,018,100 of 2014 market value. This reduced the ROI from \$2.15 to \$1.04.
- Overall, the ROI for Delaware for the 76 fully remediated properties was \$16.48 for 2014. This uses \$380,088,772 of market value gained and \$23,065,456 of BDP expenses.

### Surveying Brownfield Owners/Developer

- The primary objective of the survey was to collect qualitative and quantitative data in the following three areas: a) general purpose of the investment, b) satisfaction with the Brownfield program and c) additional investment generated beyond that provided by the Brownfield Program grant. These needs were identified by the earlier study.
- A total of 61 respondents of 209 potential respondents replied with usable instruments. Of those responding, 83% were owners and intended to develop the site as residential (31%), commercial (27%), industrial (19%) and other (22%).
- The ratings were positive for DNREC (80%), the mitigation report (88%), and the remediation contractors (94%). Some **39%** indicated they would have developed without the program and **64%** were willing to use the program in the future.
- Overall the 61 respondents had invested almost **\$120m** in the projects. One interesting point was revealed by this question. Of the \$120m, \$20m was spent on rehabilitation of existing structures rather than new construction. The total revenue generated in 2014 from these “rehab” projects was \$4.3m and net income was \$782,000. This implies that the total impact of the project is higher than that estimated by the gain in assessed value. Additionally the net income in 2014 for “rehab” projects was six times that of those with new construction. This is likely to mean the rehab projects with existing structures come on line more rapidly than those projects requiring construction of new structures.
- There is no valid way to extend this result to the full universe of 209 potential respondents. This is a universe with a finite population. The results reflect only the responses of those responding who may be either like the non-respondents or not.

### Tax Increment Financing

- The Brownfield Development Program (BDP) has been in existence for more than a decade and has been funded by an allocation of funds by DNREC drawn from the Hazardous Substance Cleanup Fund (HSCF).
- A more stable source of revenue has been sought through the passage of a statute known as the “Municipal Tax Increment Financing Act” (see 22 Del. C. 1701).
- When an eligible brownfield site is redeveloped by the private sector, the jurisdiction will appraise the development and assign an appropriate assessed value. Ultimately taxes will

be due on that assessed value and will be a net addition to the tax base. This net addition to the property tax base is the so-called tax increment.

- Over the period 2000-2014 just over \$3.7m has been added to the tax coffers annually as a result of the BDP. This includes only those fully remediated sites at this date.
- The concept is to allow the jurisdiction to issue revenue bonds for encouraging developers to develop even more of the existing sites and add new qualified sites. These revenue bonds would use these new property taxes to pay the debt service.
- This approach would allow the state BDP to focus its scarce resources on public and non-profit projects.

## Introduction

Delaware defines brownfields as “any vacant, abandoned or underutilized real property the development or redevelopment of which is hindered by the reasonably held belief that the real property may be environmentally contaminated.”<sup>3</sup> As a result, properties that could generate economic and social benefits remain undeveloped. The BDP “codifies the prospective purchaser concept and provides liability waivers and financial assistance to brownfield developers.”<sup>4</sup> The BDP thus encourages the remediation and public/private/non-profit development on these sites with the assistance of the state.

This report quantifies the economic impact of the Brownfield Development Program (BDP) through changes in property values on the brownfield and neighboring businesses. It does not address the social aspects of the program, such as poverty, health, crime, urban sprawl, and the public's preference for clean properties.

To further illuminate the concept and value of the BDP, consider the example of the Del Chapel Place brownfield. Between 1906 and 1982, a large chemical and textile factory operated at the Del Chapel Place brownfield. This type of manufacturing is known for releasing hazardous materials. Any potential owner of the property (including banks in a leveraged transaction) had to consider the potential liability being assumed. Not surprisingly, the property remained vacant for 16 years after closing despite a prime location.

In February 1997, the BDP conducted preliminary assessments and found the soil to be relatively clean.<sup>5</sup> A developer purchased the site for \$5.8 million within a year.<sup>6</sup> The developer received

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<sup>3</sup> 7 Del. C. §9103(3).

<sup>4</sup> *Delaware's Brownfield Development Program Fact Sheet*,  
<http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/Brownfields.aspx>

<sup>5</sup> [www.dnrec.state.de.us/DNREC2000/Divisions/AWM/sirb/Final\\_Plans/Final%20Plan%20Del%20Chapel%20OUI.pdf](http://www.dnrec.state.de.us/DNREC2000/Divisions/AWM/sirb/Final_Plans/Final%20Plan%20Del%20Chapel%20OUI.pdf)

<sup>6</sup> The sales price was obtained from New Castle County's property sales records.

financial assistance to remediate the property and liability protection. The old factory was razed and a new apartment complex was operating by 2000 (see Figure 1).

**Figure 1**

**Aerial Photographs of the Del Chapel Place Brownfield Before and After Remediation**



Source: Center for Applied Demography & Survey Research

The current assessment of \$8.9m had a 2008 market value of nearly \$37 million and in 2014 that value fell to \$30 million after the Great Recession. The cost to the state for remediating the property was \$814,000. A substantial economic benefit for the city, the state, the school districts and the owner/developers was the result.

Businesses in the immediate area have adapted to the new population. The apartment complex employs workers for maintenance and administrative purposes and contracts with other Delaware businesses. An internet café, tanning salon, car rental shop, and retail bank have opened on adjacent properties. An exercise gym, a new and used sporting goods store, and a used car dealership have since closed or relocated. As workers spend their incomes and businesses purchase inputs from other businesses, any net change in business activity is multiplied in the economy. This example ignores an important point that will be addressed later in the report. However, it illustrates how the economic impact of brownfield development will be measured.

Although the analysis may be premature, large economic gains have happened near Delaware brownfields. For every nominal dollar spent on the BDP by the state, property values have increased approximately \$16.48 for 76 fully remediated brownfields i.e. a Certification of Completion of Remedy (COCR) has been issued.)

**Table 1**  
**Delaware Brownfields Classified by Remediation Status**

County	Remediated	Active	Inactive	Total
Kent	7	10	1	18
New Castle	61	85	15	161
Sussex	8	10	2	20
Total	76	105	18	199

Source: DNREC and BDP, Center for Applied Demography & Survey Research

The BDP identified and provided information on 199 sites for this study and 76 of those sites were fully remediated by September 30, 2014. The number of sites increased by 80 since the last report was issued in 2009. As of March 31, 2016 the list of sites has been expanded to 250.<sup>7</sup>

The next several sections will explain more of the details in how the various results were reached. The first topic to be addressed is the changing values of the brownfield sites from inception to 2014. The emphasis will be on the 76 fully remediated sites.

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<sup>7</sup> An additional 10 sites were added to the list after the study commenced and were not included. Another 41 have been added as of 3/31/16 to increase the total to 250.

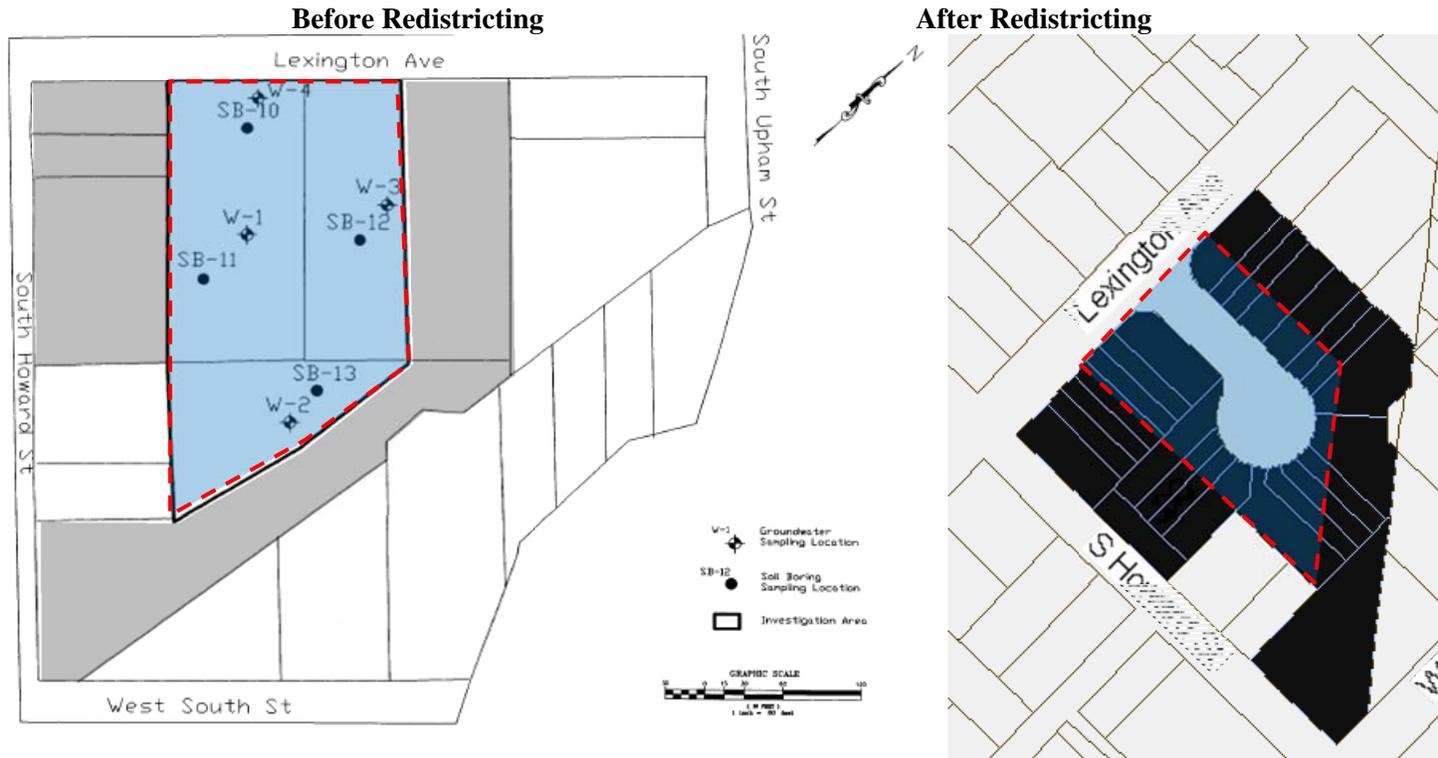
## Changes in value

The Center routinely obtains historical snapshots of all tax parcel assessments from each county's government annually. Each county had different years of data available. In New Castle County, complete electronic records begin in 1976. In Sussex and Kent counties, records are available beginning in 1991. The 2014 assessment records are available for every county. The records give the assessed value, property type, and exemption status and a number of location variables for every tax parcel. Along with this data there are digital parcel maps from different years and aerial photography also from many years. All are helpful in understanding how a particular parcel was configured and possibly changed over time.

DNREC identified each brownfield by the tax parcel ID or ID's that were relevant when the site was certified. Ordinarily this identification does not change over time for most brownfields. However, some brownfields lose their original definition/Parcel ID when land is subdivided. In these cases, a new brownfield definition was used that formed the smallest common area across time. This implies that some brownfields could be defined by different tax parcels each year.

The Lexington Avenue brownfield (DE-1357) in Smyrna is an example of this parcel subdivision. The dashed trapezoid on the left side of Figure 2 highlights three tax parcels that originally defined the brownfield. The right side of Figure 2 outlines the current tax parcels and overlays the original brownfield area. Clearly, the new tax parcels cannot replicate the original brownfield area, so an alternative definition was needed. The alternative definition includes all tax parcels in the original trapezoid and darkened region. This new definition is comparable across time unless repartitioned at a later time.

**Figure 2**  
**Lexington Avenue Brownfield in Smyrna**



Source: DNREC SIRB site files and Kent County Mapping Site

Property assessed values overcome many of the problems associated with sale prices.

Assessments are independent evaluations of the market value at the time the assessment is assigned. Each assessment assumes that the property sells in a competitive market. In addition, new assessments are mandatory with every substantive material change, so improvements will be observed even if the property does not sell. Assessments also ignore changes in the market by fixing the date of the hypothetical sale. For example, tax assessors in New Castle County assume that hypothetical transactions occur in 1983. In Sussex County and Kent County, that year is 1974 and 1986 respectively.<sup>8</sup> Because prices rose over time, assessed values must be inflated to capture the current market value.

<sup>8</sup> These years are also the last time an assessment was performed on every property at the same time. Every assessment done since that time is retrospective and reflects the prices for the particular base year.

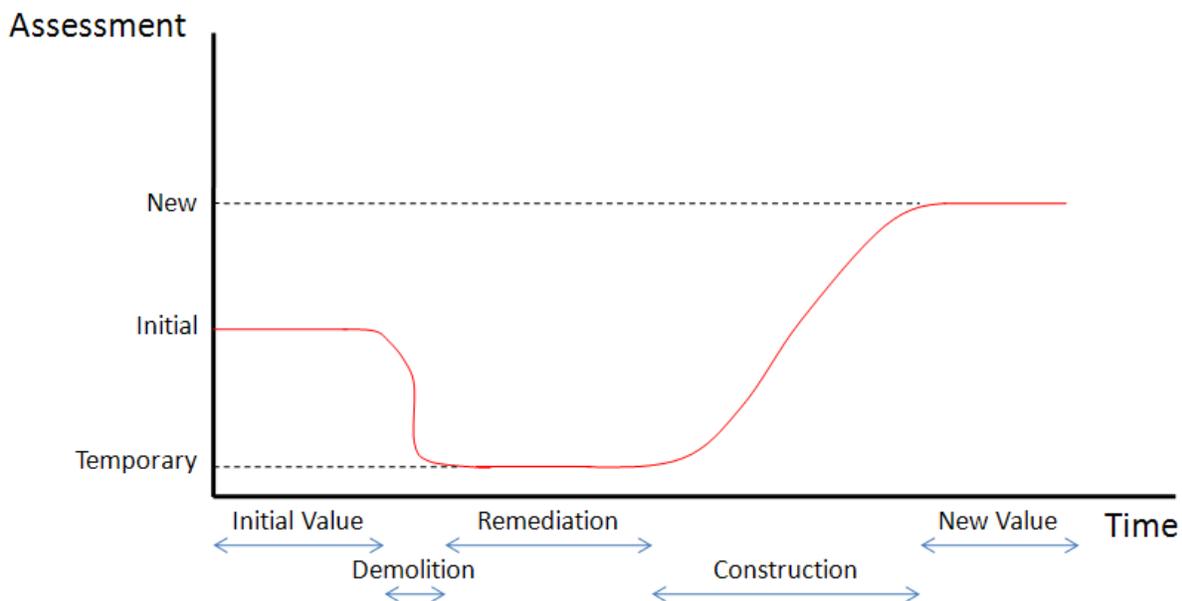
Assessment-to-sales ratios (ASR) inflate assessments to current market values. These ratios apply statistical and sampling techniques to recent sales in each school district. Separate ratios are calculated for businesses, residences, farms, and open lots. Most recently, the ASR for all properties in New Castle County was 0.306. This implies that the average assessment in New Castle County is approximately 30% of its 2014 market value. The ASR for Kent County in 2014 was 0.221 and for Sussex County 0.088.

**The Timeline of a Brownfield’s Assessed Value**

Figure 3 is a heuristic timeline of a brownfield’s assessed value. The brownfield has an initial assessment that does not change when it is underutilized or vacant. The first phase of development demolishes any existing structures causing the assessment to decline. The property is then remediated. As will be explained shortly, remediation does not affect assessed values. Construction begins and the assessment increases as new structures are built. A new assessment is available once development is complete.

This timeline will look considerably different if the project is destined for rehabilitation instead of demolition and new construction. In some cases you may have a mixture of the two options as well.

**Figure 3  
Hypothetical Timeline of Assessed Value for a Brownfield Undergoing Development**



A brownfield could be at any point on the timeline at any time. Figure 4 shows the example of the Howard St. Development Project (DE-1401 & DE-1057) on the Wilmington Riverfront. The left side is the brownfield before remediation, and the right side is after remediation and before redevelopment. Not surprisingly, its current assessment is lower than its previous assessment. However, even the most recent assessment may be out of date. A supermarket has since opened on the site, so we expect the assessment to increase substantially when the 2015 data is available.

Assessed values have two important limitations. First, assessments ignore the environmental hazard and capital depreciation. Thus, remediation by itself will not change an assessment even though market value will change.<sup>9</sup> This also implies that the initial assessment overstates market value, since brownfields are not in good condition. The change in assessed value is therefore a conservative estimate of the change in property value.

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<sup>9</sup> Theoretically, remediation increases market value by the net change in the discounted value of expected damages. In perfect competition, this equals the cost of remediation. Liability protection eliminates expected damages.

**Figure 4**  
**Howard Street Redevelopment Project**

Before Remediation

After Remediation



Source: Google Maps and Bing Maps

Photograph

The second limitation is that assessments are not continuous. Assessments are supposed to occur only with a material change to the property. For example, assessments occur when land is redistricted or when structures are modified. Any change in the structures will be valued as of the date of the last reassessment e.g. 1986(K), 1983(NC), or 1974(S) depending on the county. Because the owner pays property taxes based on the assessed value of the property, there is an incentive to reassess brownfields immediately after demolition and prolong assessments long after construction is complete. Developers can also slow/stop construction when there are few buyers (e.g. during a recession). Thus, some properties may have outdated assessments as of 2014. This is another reason why the observed change in assessed value is a conservative estimate of a change in property value.

Every year, property owners pay based on a percentage of their property's assessment. New Castle County bases this rate on 100% of assessed value. Kent County's tax base is 60% of assessed value, while Sussex County uses 50%. The tax rate itself depends on multiple factors, including the property's school district and municipality (if any).<sup>10</sup> Most nonprofit organizations, like the Sunday Breakfast Mission, Delaware Children's Museum, and the Kalmar Nyckel Challenge Program are exempt from paying property tax. In addition to these factors, there are a myriad of special concessions for groups like the elderly. Also companies moving into the county or the city may get waivers based on likely numbers of employees. These estimates are at best an upper limit of what may actually arrive a tax time.

The impact of brownfield development on property taxes is determined by multiplying the change in the tax base by the appropriate tax rate. For example, suppose that a nonexempt property in Sussex County increases \$20,000 in assessed value and the tax rate is 3%. The tax base increases \$10,000 ( $\$20,000 \times 50\%$ ), so tax revenue increases \$300. Tax revenue will fall if the assessed value declines.

### **Property Tax Results**

Measurement of changes in assessed valuation were taken by combining property assessment files for the three counties 2000-2014 and extracting those records associated with the parcel numbers in each brownfield. The records for every certified brownfield were isolated from the master file and examined for completeness. Any of the problems described above were addressed and solutions were obtained.

Brownfield sites that had been issued a certification of completion remedy (COCR) were selected. Measurements of the assessed value were taken for the year of certification and 2014. This approach anticipates that all costs of remediation covered by the BDP are known, i.e.

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<sup>10</sup> Some municipalities do not use the county assessment records as a base to levy city taxes. For example, Milton uses a tax base of 50% of 1994 market values to levy a city tax despite the fact that the county uses a base from 1974. Therefore, city tax rates in Milton are inflated with the 1994 AS ratio so that they apply to the 1974 assessment.

COCR issued. (This differs from the methodology used in the 2008 study.) Seventy-six fully remediated properties of the 199 certified brownfield sites were selected.

### **Summary of the Changes in Assessed Values**

The assessed values of 61 brownfield sites increased by \$111,985,800 in New Castle County, \$674,666 in Kent County for seven sites, and \$974,100 in Sussex County from 2000-2014 for eight fully remediated sites.

Property tax rates were obtained from an annual report produced by the Delaware Economic Development Office (DEDO).<sup>11</sup> Property taxes are expected to increase by \$3,695,532 in New Castle County, \$10,120 in Kent County, and \$19,482 in Sussex County.

It is important to understand that the increase in property tax revenue is a transfer of resources from the private sector to the public sector and likely little economic impact overall. Property taxes are collected after the redevelopment is complete and the taxing authority adds the property to the rolls. To the owner it is seen as a cost of doing business and will reduce their income.

Many taxing authorities have tax abatement programs which forgive property taxes for a period of years. That effectively removes the transfer implied by the increased property tax until the abatement expires. It is strictly an economic development selling point.

Property values for commercial and industrial firms reflect income-producing activities. For landlords the property values reflect potential rental income. That income then is related to the number of employees required and the wages they command. These two drive economic impact desired by the BDP.

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<sup>11</sup>[http://inde.delaware.gov/dedo\\_pdf/NewsEvents\\_pdf/publications/2015-2016\\_DE\\_Tax\\_Reports.pdf](http://inde.delaware.gov/dedo_pdf/NewsEvents_pdf/publications/2015-2016_DE_Tax_Reports.pdf)

## Employment and Wages

The Delaware Department of Labor (DOL) provided the number of employees, quarterly wages, and NAICS industrial code for all Delaware establishments paying unemployment insurance since 2001. The Delaware DOL data gives the employment, wages, industry, and addresses for most Delaware businesses.

**Figure 5**  
**Brownfields and Businesses with a 50 meter Buffer**



Source: Delaware Department of Labor and Center for Applied Demography & Survey Research  
Each establishment's reported Delaware address was mapped using the Center's GIS software. Some establishments could not be mapped due to irreconcilable address spellings, street changes, and Post Office box listings. Roughly 85% of the businesses in Kent and Sussex counties could be mapped and 80% of those in New Castle County. Figure 5 illustrates the mapping of

establishments around the former James Julian construction site (DE-1497) in Elsmere. The brownfield tax parcel boundary is shown as a yellow line, the 50 meter buffer around the parcel is shown in green, and mapped employment locations are shown as yellow pentagons.

Countywide brownfield activity is defined as the employment and wages of any establishment that has ever been near a brownfield. In this case near is defined as within 50 meters of the brownfield property. Countywide brownfield activity only increases if these establishments increased employment or wages. Brownfield growth is measured absolutely and relative to county growth rates. This is particularly important in the REMI model discussed later.

Brownfield development is expected to affect the employment and wages in neighboring businesses. How much brownfields influence the nearby businesses is unclear. The impact can be either negative prior to remediation or positive after remediation. In light of this uncertainty, the report only measures what changes occurred in the immediate area surrounding brownfields. How much of this activity can be directly or indirectly attributable to brownfield development remains an open question. Although in some cases it is quite apparent that the change was highly correlated with the brownfield redevelopment, in others the result is less clear cut.

This report describes historical changes between 2009 and 2014 in wages and employment near Delaware brownfields. These changes are disaggregated by industry and note any consistent changes in the composition of businesses. This is done for both local and countywide definitions of activity. These industry estimates are required in the REMI modelling later.

Consider again the Del Chapel Place brownfield discussed in the introduction. The new apartment complex directly increased jobs and wages. This increase may certainly be credited to brownfield development. But how should the change in nearby businesses be evaluated? It is reasonable that the apartment complex is partially responsible for some of the changes.

Business relocation is very important. For example, suppose an owner of a business near a brownfield sells her land to a developer and moves operations away from the brownfield (but still in the county). If the owner did not change employment or wages, did brownfield activity



Brownfield growth is measured absolutely and relative to county growth rates which are utilized in the REMI simulation which follows.

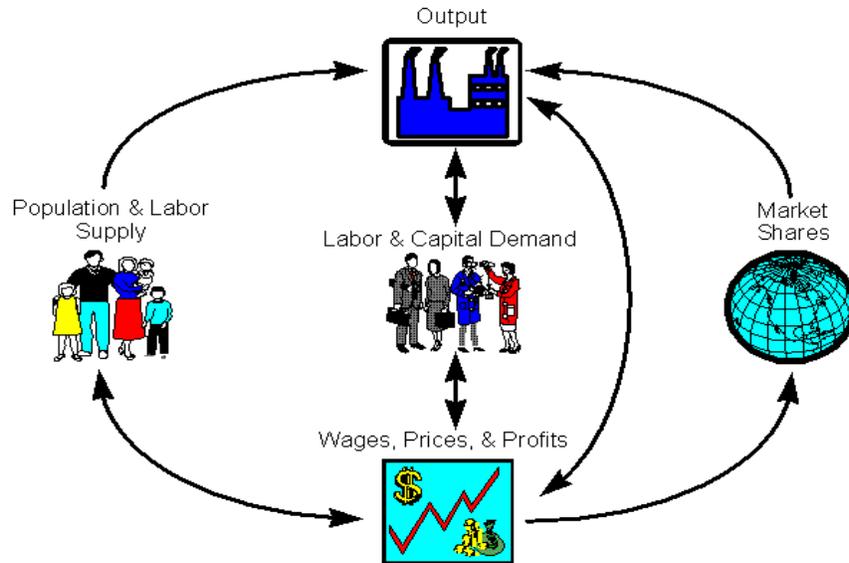
## Regional Simulation

### Overview of the REMI PI+ Model

This section estimates the total economic activity generated by brownfield establishments with a simulation. The REMI PI+ software is a dynamic and structural model of Delaware's economy that is capable of estimating causal relationships. It is a regionalized version of a benchmarked national model. Ten sub-regions, including the three counties in Delaware, Cecil County MD, Harford County MD, Salem County NJ, Delaware and Chester counties in PA (combined), Burlington County NJ, Camden County NJ, and Gloucester County NJ (combined), Bucks County PA, Montgomery County PA, Philadelphia County PA (combined) and the balance of the Delmarva Peninsula are included. Each sub-region is treated as an independent, fully functioning economy that interacts with every other sub-region specifically and with the nation in general.

The model is founded on conventional economic assumptions, such as households maximize utility and firms maximize profits. Hundreds of equations have been developed over the last 25 years to describe the economy's structure mathematically. These equations can be organized into five major components: Output and Demand, Labor and Capital Demand, Population and Labor Force, Wages-Prices-Costs, and Market Shares. Figure 6 illustrates REMI's main structure and components.

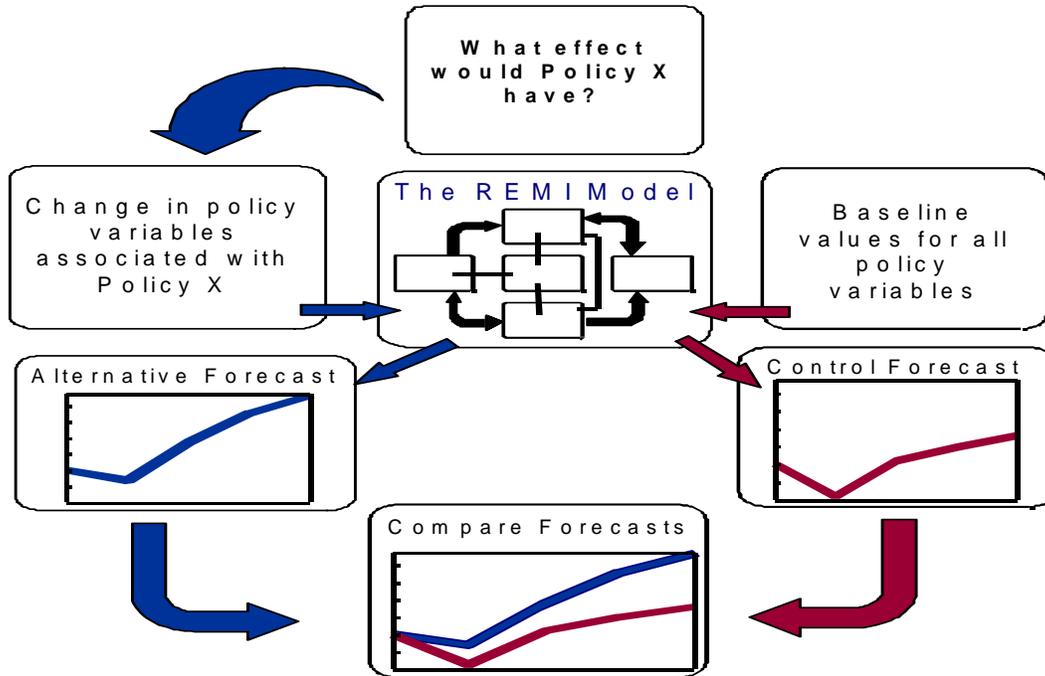
**Figure 6**  
**Illustration of the REMI PI+ Model**



The equations assume that businesses use labor, capital, and fuel as inputs to supply goods and services as output. Households (and some businesses) supply the inputs of production and generate the demand for goods and services. Wages, prices, and profits adjust to form equilibriums in each market, but the equilibrating process might take time. High market shares can generate cluster effects that influence factor productivity and input prices.

REMI PI+ is a general equilibrium model with feedback. This means that the model describes the entire economy as it changes over time. For example, changes in population, demographics, and wages each influence the labor supply at any moment, but are themselves influenced in the future by changes in the labor supply. Adjustments happen gradually, so the economy does not statically jump from one equilibrium to another. This is one main advantage of using REMI versus other economic simulation models (RIMS II, IMPLAN).

**Figure 7**  
**Illustration of a Policy Forecast in REMI**



A second advantage of using a general equilibrium model is it can capture the multiplier effect from other parts of the economy. In a sense, the multiplier effect is the cumulative impact of any single change to the economy. For example, as demand generates additional demand, one dollar of retail sales will increase sales in construction 0.28¢, sales in fabricated metal product manufacturing 0.30¢, sales in utilities 1.1¢, etc. The total impact from the multiplier effect can be quite large.

Figure 7 illustrates how REMI estimates the effects of a policy. First, the REMI model is calibrated and a standard future scenario is predicted. This is called the control forecast. A policy is then proposed that impacts the economy. A modeler adapts this policy into REMI by changing appropriate input variables and simulating the outcome. This alternative forecast is then compared to the control forecast. Differences between the two forecasts are attributed to the policy.

### **The REMI PI+ Model**

In this section we simulate the economic activity generated by the brownfield and estimate the total economic impact created by brownfield establishments. To that extent we use the REMI PI+ software. This is the same software used in a previous brownfield report but updated to include 2014 data and more updated econometric relationships and multipliers.

As it has been the case in the previous BDP report<sup>13</sup>, we assume that economic activity within the Brownfield has followed the same path as the whole county. Consequently, higher or lower activity would be presumed as result of the brownfield program. It is important to remark that deviations could be not only on the high side with brownfield activity exceeding county's activity but also during an economic slowdown like occurred 2008-2009 the drop in activity in the brownfield could be lower than in the county. In other words, when talking about employment, for instance, we could assume that the brownfield program grew faster than the county or that the drop in activity was lower than at the county level.

The diffusion of economic activity towards the periphery of the brownfield, once the program has begun, is another important point to consider prior to the impact simulation. It has been argued in the previous brownfield report that restricting the allocation of economic activity to around 50 meters of the brownfield could limit the total impact as it could extend beyond that boundary. However, the REMI model extend the overall impact to the county and state through the use of the multipliers. Additionally, using the 50 meters as the limit of the brownfield assures that the majority of the establishments are counted. The percentage of establishments allocated to the precise brownfield is approximately 85%.

The REMI model uses a 70-sector breakdown of business activity, which is formed by aggregations of two- to three-digit NAICS code. As the employment, wages, and establishments allocated data to the brownfields is identified with a six-digit NAICS code, the conversion into two- or three-digit NAICS was mostly straightforward requiring very little professional judgement.

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<sup>13</sup> Economic Impact on Delaware's Economy: The Brownfield Program. Center for Applied Demography & Survey Research, University of Delaware, 2010

## **Simulation Results**

The principal inputs to the REMI model are the employment and wages 2009-2014 measured directly at the brownfield sites. These inputs are compared with the overall growth rates for the counties. The difference between the county rate of growth and the brownfield rate of growth in employment and wages is the primary input to REMI. Property taxes are reductions in Personal Income leading to Disposable Personal Income. For companies, taxes are also a leakage whether income or property taxes. Some of this will go to pay for additional government workers and other parts will be recycled into the private sector for goods and services. The BDP expenses would enter the economy and are part of the indirect impacts. The difference between Total Employment in Table 3 and Private Non-Farm in Table 3 is Government and Farm.

The results of the REMI simulation highlight how the economy would have been if the brownfields grew at the same pace as the counties. Employment in 2014 would have increased by approximately 4,999 jobs due the activity in the brownfields. Out of that amount, 4,735 jobs are non-farm and 3,394 are resident jobs – jobs taken by residents within the State as opposed to in-commuters from neighboring States.

**Table 3**  
**Estimated Impact of Brownfield Businesses on Delaware's Economy (millions of 2014 \$)**

Category	New Castle	Sussex	Kent	Delaware
Total Employment	4997	-28	30	4999
Private Non-Farm Employment	4748	-29	16	4735
Population	2248	5	68	2321
Gross Domestic Product	\$723	\$4	\$12	\$738
Total Wage and Salary Disbursements	\$623	\$2	\$10	\$635
Personal Income	\$516	\$2	\$20	\$539
Disposable Personal Income	\$448	\$2	\$17	\$467
Disposable Personal Income per Capita*	\$567	\$8	\$78	\$653
Personal Consumption Expenditures	\$336	\$2	\$2	\$340

Source: Center for Applied Demography & Survey Research

\*Figures in 2014 \$; Figures exclude the management of companies sector due to a definitional change.

That is an important point as 28.0% of the new employees would be living outside of New Castle County and spending their income mostly outside of the State. This is the result of large numbers of net commuters entering Delaware each day. Looking into the distribution by county, the core of employment growth relies on New Castle County with 4,997 jobs created while Sussex and Kent cancel out with a drop of 28 jobs in Sussex and an increase of 30 in Kent.

The growth of employment in New Castle County was highly concentrated in Finance and Insurance while most of the other industrial classifications lost employment. It should be noted that the expansion in Finance and Insurance was concentrated in just one brownfield and due to the location of a new banking institution. The Gross Domestic Product for the State was estimated at \$738 million of 2014 Dollars with \$723 million originated in New Castle County.

Table 4  
Estimated Impact of Brownfield Businesses on Delaware, by Sector (millions of 2014 \$)

Sector	Employment			Output			Wage and Salary Disbursements		
	New Castle	Sussex	Kent	New Castle	Sussex	Kent	New Castle	Sussex	Kent
Agriculture, Forestry, Fisheries	1	0	1	\$0	\$0	\$0	\$0	\$0	\$0
Mining	-21	0	0	-\$8	\$0	\$0	\$0	\$0	\$0
Utilities	11	-1	1	\$7	\$0	\$0	\$1	\$0	\$0
<b>Construction</b>	<b>-1300</b>	<b>9</b>	<b>33</b>	<b>-\$169</b>	<b>\$1</b>	<b>\$3</b>	<b>-\$51</b>	<b>\$0</b>	<b>-\$1</b>
<b>Manufacturing</b>	<b>-32</b>	<b>-73</b>	<b>-77</b>	<b>-\$36</b>	<b>-\$11</b>	<b>-\$19</b>	<b>-\$3</b>	<b>-\$4</b>	<b>\$0</b>
Wholesale trade	-24	0	37	-\$6	\$0	\$6	-\$3	\$0	-\$3
Retail trade	773	19	29	\$61	\$1	\$2	\$26	\$1	-\$1
Transportation & warehousing	-2035	-1	2	-\$471	\$0	\$0	-\$96	\$0	\$0
Information	138	0	0	\$54	\$0	\$0	\$12	\$0	\$0
<b>Finance &amp; insurance</b>	<b>3851</b>	<b>-1</b>	<b>3</b>	<b>\$1,639</b>	<b>-\$1</b>	<b>\$1</b>	<b>\$581</b>	<b>\$0</b>	<b>\$0</b>
Real estate and leasing	101	2	3	\$55	\$0	\$0	\$3	\$0	\$0
Prof., and tech. svc	152	-1	1	\$26	\$0	\$0	\$14	\$0	\$0
Management of companies	89	-2	-1	\$20	\$0	\$0	\$12	\$0	\$0
Admin., waste, remediation svc.	1225	1	-101	\$90	\$0	-\$3	\$66	\$0	-\$1
Educational services	-6	0	27	\$0	\$0	\$1	\$0	\$0	-\$1
Health care & social assistance	474	14	57	\$44	\$2	\$4	\$25	\$1	-\$3
Arts, entertainment, recreation	217	1	4	\$13	\$0	\$0	\$6	\$0	\$0
Accommodation/food service	731	0	9	\$44	\$0	\$1	\$18	\$0	\$0
Other services excludes public administration	407	6	-13	\$26	\$0	-\$1	\$12	\$0	\$0

Source: Center for Applied Demography & Survey Research

Figures exclude the management of companies sector due to definitional change.

In summary, the largest impact of hypothetical economic activity within the brownfields was located in New Castle County, where most of the jobs would have been created in the Finance and Insurance sector, while the traditional blue collar industries, Construction and Manufacturing would have posted net losses.

## Limitations

This report has important practical and theoretical limitations that should be acknowledged. The first practical issue is that some of the brownfield definitions had to be enlarged because tax parcels changed over time. This may have increased the changes in property values and the number of establishments falling within any specified distance. Secondly, data quality is always a concern. Businesses may report incorrect or aggregate data, addresses could be incorrectly mapped, differences could exist between companies with and without matching addresses, etc. Thirdly, the REMI model offers sophisticated, but imperfect estimates. Finally, many brownfields have not completed remediation or development, so the 2014 impact is premature.

The first theoretical limitation is that the report does not address important elements like crime, poverty, and urban sprawl. Second, brownfields do not completely influence all neighboring businesses within 50 meters. It is theoretically possible that the surrounding activity influences brownfields. Future work should examine the reach and causal direction of brownfield influence. Thirdly, the analysis cannot isolate program benefits from development benefits. Of course, if the program acts as a lynchpin to development, this may be a minor point. Finally, the analysis is primarily a description of activity. It does not show that the program *caused* these changes. Causation is a difficult issue in the social sciences and requires clarification.

The program's true impact should be measured by the difference between what has happened and what would have happened without the program. The latter scenario, called the counterfactual, is difficult to estimate since it never actually happens. For example, developers might have remediated the property anyway if DNREC refused certification. (Just over 39% suggested this in the survey of owners/developers.) In that case, the state doesn't supply the grant, the developer assumes any liability risks present or remediates the hazards. The indirect impacts illustrated by the REMI model remain, and new property taxes are paid. Since that property is not in the BDP, the ROI is not biased. As another example, expanding businesses might have relocated near a brownfield or performed better than the county average regardless of brownfield development. Unfortunately, the counterfactual is never known with certainty and could not be predicted with the available data. Instead, average county trends acted as the counterfactual in this analysis and the assumptions concerning causal direction are implicit.

## Return on Investment (ROI)

The trend across the country is to refer to government expenditures as investments. Most people interpret an investment as an expenditure that will payoff sometime in the future and it generally implies that the investment will have a positive rate of return. That return may be more of something desirable or less of something undesirable e.g. better performing students and less crime. These returns however are rarely expressed in terms that the voters can easily understand or even measure. Fortunately, the Brownfield Development Program (BDP) does not have that problem. In fact, many of the sites that have entered the program do both by eliminating the environmental hazard, returning the site to a developable state, while also substantially increasing the economic value of the site through development. This is the classic win-win which is often discussed but only rarely produced and documented.

The state is investing in a portfolio of brownfield sites with very different characteristics and will very likely change in value depending on those characteristics. The BDP is allocated resources by the state to promote the remediation of selected properties, up to \$5m annually through 2014. These properties have already been certified as eligible by the BDP and the owners/developers understand the rules of the process.

The BDP will grant up to \$625,000 for public and non-profit developers and \$200,000 for private developers for an analysis of the site, development of a remediation plan, and remediation of the site. It is possible that the owner may have to pay additional costs if the grant will not cover the full remediation required by their remedial plan. The actual cost of remediation will be affected by the potential use as well but some development alternatives will have a higher valued end-use than others. A parking lot is usually a lower valued use than a 30 story office building or a high-rise condo.

For purposes of this research, the cost is the funds expended by the state to move it from its status when the site was first certified to when it is fully remediated and available for further development. At that point the hazard has either been removed or fully contained and the risk managed. The costs will not change in subsequent years unless further contamination is discovered or there is a change in the type of use desired. Finally, there are social benefits realized by the remediation but those benefits are not incorporated into this measurement (e.g. a clean property, or storm-water managed, etc.)

The gain or loss of economic value as the direct result of remediation is the other part needed for the calculation. If there was no assessed value assigned by the counties to the site before certification and there is assessed value in 2014 then that is the return. There are cases where the assessed value was positive at certification and zero at the completion of remediation. That is the case where the developer saw no economic value in the existing structures and demolished them. The third case is where the value was positive at certification and still positive at the completion of remediation. In that case the return is the difference between the value at the completion of remediation and the value in 2014.

Based upon the current BDP experience, the full impact of remediating a site on the market value will not be known until the owner/developer has fully accomplished their plan. In this calculation the full cost of remediation is recognized but it may take several years before the property is fully revitalized and a new, higher assessed value and market value are fully realized.

It is important to remember that the value measures will change as the market value of those properties change. Those changes can be positive or negative as was learned in 2008.

Return on investment (ROI) for the purposes of this report is the 2014 value of the site less the 2014 value at time of full remediation divided by the total expenses incurred by the state from time of entry into the BDP. The expenses are the implied investment by the state to aid in economic development. The return is the market value created as measured by the increase in market value of the property. New/Redeveloped commercial and industrial properties tend to be evaluated as income producing properties by assessors. An argument can be made that the ROI should be based on an annual basis rather than a static. However, the expenses are assumed to be complete and the change in assessed value will also be relatively static. Granted the investments

by the developers may exceed those of the state but the indirect returns to the state as calculated in the REMI model are significant thus the offsets support the static calculation.

The ROI for the New Castle County portfolio is estimated as \$19.20 for 2014 for the 61 properties that have been fully remediated. (The assessed value of \$111,985,800 which is based on 1983 values is divided by the ASR in 2014 of 0.306 to yield \$365,966,667. The BDP expenses for the New Castle County properties were \$19,107,747 in nominal dollars and an ROI of \$19.15).

In 2014, primarily because of the Cannery Village site, the ROI for Sussex County is \$10.94 for the eight fully remediated properties. (The assessed value of \$974,100 which is based on 1974 values is divided by the ASR in 2014 of 0.088 to yield \$11,069,318. The BDP expenses for the Sussex County properties were \$1,012,159 in nominal dollars and an ROI of \$10.94).

Kent County had seven fully remediated properties. In 2014, the ROI improved to a modest \$1.04 largely because of the expenditures for Capital Scrap site. (The assessed value of \$674,666 which is based on 1986 values is divided by the ASR in 2014 of 0.221 to yield \$3,052,787. The BDP expenses for the Kent County properties were \$2,945,550 in nominal dollars and an ROI of \$1.04). In the cleanup of Capital Scrap there were \$2,000,000 of expenses and the assessed value gained was \$225,000 in 1986 dollars or roughly \$1,018,100 of 2014 market value. In the absence of this major expense the ROI was 2.15.

Overall, the ROI for Delaware for the 76 fully remediated properties was \$16.48 for 2014. This was calculated using \$380,088,772 the market value gained divided by \$23,065,456 of BDP expenses incurred.

## Surveying Brownfield Owners/Developer

Following the completion of the 2009 study, there was general agreement that information gleaned from the owner/developer of a certified brownfield site might prove useful in a number of ways. To accomplish that end a survey was designed with three objectives. The survey was to collect qualitative and quantitative data in the following three areas: a) general purpose of the investment, b) satisfaction with the Brownfield program and c) additional investment generated beyond the Brownfield Program.

The 2015 Delaware Brownfield Development Survey included 207 individual properties that had participated in the program. For those properties specific site addresses, site names and contact names/addresses were collected.

The survey questionnaire was developed in collaboration with Delaware's Department of Natural Resources and Environmental Control and the Brownfields Development Program Coordinator keeping in mind the objectives of the study and at the same time minimizing the burden to respondents.

A pre-test pilot of the survey instrument was administered to a subset of 15 sites. Feedback from these responses was incorporated in the updated survey questionnaire. Once the survey was finalized a Human Subjects Review was obtained from the University of Delaware's Human Subject's Review Board.

Participation in the survey was voluntary. An initial contact from the DNREC Brownfields Coordinator was sent to all site contacts to alert them to the upcoming survey and encourage participation. This communication was followed up by the mailing of the survey instrument

from the UD's Center for Applied Demography & Survey Research (CADSR). In about 2 weeks a reminder card was sent to all sites that did not respond. Undeliverable mail was processed, sites were identified and updated contact/address information was obtained. The reminder card was then followed up by 2 additional mailings of the survey. In all cases a Business reply enveloped was included for respondents to further encourage participation. Responses were confidential but not anonymous, thus accommodating follow-up with non-respondents. Each mailing contained tracking information that allowed those who have already responded to be removed from the list.

Completed surveys were reviewed for accuracy and were processed utilizing a double data entry system to eliminate data entry errors. Data from the returned questionnaires was processed in a manner that prevented identification of individual responses. All precautions were taken to maintain the confidentiality of the respondents.

A total of 207 individual properties were identified. All were contacted. In some cases the same person was the contact person for different sites. In these cases one individual received several mailings, one for each site. This process ensured that data was collected as intended – specifically for Brownfield Development Program sites. Of the 207 sites we received a total of 61 respondents providing usable instruments. The overall response rate was 29% which was acceptable for this type of population. As expected, incomplete surveys were received from 4 sites. Responses from these sites indicated that the site is either under contract or too early in the process to respond to the survey.

The data presented in the upcoming section of the report is un-weighted. No adjustments were made to account for the size of the site or any other parameter of the study population. The key results are provided below:

Of those responding, 83% were owners with the balance being developers. The respondents intended to develop the site as residential (31%), commercial (27%), industrial (19%) and other (22%).

The ratings were positive for DNREC or more specifically the BDP with 80% approving. The mitigation report is a key element of the process since it defines what must be done

to make the property fit the use of the owner/developer. Some 88% of the respondents found the report on target with the respect to the remediation required and 94% approved of the work of the remediation contractors.

One of the interesting issues is whether the BDP is even needed. Some **39%** indicated they would have developed without the program and **64%** took the opposite position. The answer was likely dependent on the degree of remediation required and the amount of cost they had to bare.

Some 93% of owner/developers said that the location of the property was a key factor. That was followed by 65% who pointed to the remediation assistance offered by the BDP. Some 59% checked off the price of the property. It was interesting that only 13% selected the liability waiver as the reason for entering the program and 64% were willing to use the program in the future.

Overall the 61 respondents had invested almost **\$120m** of private resources in the projects. One interesting point was revealed by the question "Was this a rehab or a new construction project"? Of the \$120m spent by owners, \$20m was spent on rehabilitation of existing structures rather than new construction.

The total revenue generated in 2014 from these "rehab" projects was \$4.3m and net income was \$782,000. This implies that the total impact of the project is higher than that estimated by the gain in assessed value. Additionally the net income in 2014 for "rehab" projects was six times that of those with new construction. This is likely to mean the rehab projects come on line more rapidly than those using existing structures.

Finally, there is no valid way to extend this result to the full universe of 207 potential respondents. This is a universe with a finite population. The results reflect only the responses of those responding who may be either like the non-respondents or not.

## Tax Increment Financing

The Brownfield Development Program (BDP) has been in existence for more than a decade and has been funded by an allocation of funds by DNREC drawn from the Hazardous Substance Cleanup Fund (HSCF)<sup>14</sup>. While this approach provided the program with earmarked funding, it also exposes the program to any instability of that single source.

In this instance the funding was exposed to any variation in revenue derived from the gross receipts tax on petroleum products. Since the tax is ad valorem, the receipts decline with the quantities and prices of those products. The fall of oil prices from \$100 a barrel to \$40 a barrel produced significant decline in gasoline prices from nearly \$4 a gallon to under \$2 a gallon. This shift did not increase the demand for gasoline since the demand has proven to be relatively inelastic. The net result reduced the pool of funds available to HSCA and with it the funding source for the BDP remediation grants. A rethinking of this funding mechanism for the BDP is probably in order.

Funding sources can be unstable but that is moderated for most programs through the General Fund (GF). The GF has a portfolio of sources that gives significant protection from volatility. First, all of the sources do not move in concert. Second, there is a 2% buffer against unexpected volatility. Third, there is a 5% reserve fund. Unfortunately these protections are not available to earmarked funds that have been segregated even though the gross receipts tax is part of the GF portfolio. Of course, there is risk in standing as a line in the GF budget as well. However this can be mitigated to some degree by having strong support from economic development forces within

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<sup>14</sup> 7 Del. C. §9113.

the state. Alternatively, it is possible to finance the BDP at least in part with the taxable value it creates. That will not be a complete solution because the properties in the BDP are not all subject to substantial increases in market value. This approach is known as tax increment financing (TIF).

A variation on the TIF vehicle was passed some years ago and is known as the "Municipal Tax Increment Financing Act"<sup>15</sup>. The idea is relatively simple. In this report, nearly \$4 million dollars in property taxes per year (and growing) are being collected as a direct result of the BDP. The taxes are spent by the governments and school districts within which the BDP sites lie. The \$4 million added by BDP is relatively small compared to the almost \$1 billion of property taxes collected. In addition, during 2014 BDP added almost 5,000 jobs to the economy with \$635m in wages and salaries, \$467m in disposable personal income, and \$340m in personal consumption expenditures. It is reasonable to assume that taxes far in excess of the \$4m involved here were collected as well. TIF has a role to play by providing a stable revenue source for a part of the BDP and expanding the ability of the state to deal with even more of the environmentally hazardous sites in the state beyond the 209 identified by the end of 2014.

When an eligible brownfield site is redeveloped by the private sector, the jurisdiction will appraise the development and assign an appropriate assessed value. Ultimately taxes will be due on that assessed value and will be a net addition to the tax base. This net addition to the property tax base is the so-called tax increment.

The primary idea is to have the new property taxes, over and above what was being collected prior to remediating the property, to flow to a fund that would help finance the cleanup of other properties that could increase in market value and pay additional property taxes. Currently, the BDP gives fixed dollar grants for assessment and remediation and more importantly for many it provides the developer liability protection from past releases.

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<sup>15</sup> 22 Del. C. §1701.

This concept can be expanded to allow jurisdictions (city, county, or state) to issue revenue bonds encouraging developers to develop even more of the existing and any newly identified sites without further state assistance. Debt service on the revenue bonds would be made using the segregated property taxes. This approach would allow the state BDP to focus its scarce resources on public and non-profit projects which may have limited upside in assessed valuations but have significant social and environmental benefits.

## Summary and Conclusions

Delaware defines brownfields as “any vacant, abandoned or underutilized real property the development or redevelopment of which is hindered by the reasonably held belief that the real property may be environmentally contaminated.”<sup>16</sup> As a result, properties that could generate economic and social benefits remain undeveloped. The BDP “codifies the prospective purchaser concept and provides liability waivers and financial assistance to brownfield developers.”<sup>17</sup> The BDP thus encourages the remediation and public/private/non-profit development on these sites with the assistance of the state.

By 2014 when this research began there were 199 certified sites in the state and today there a total of 250. As of 2014, 76 of the sites have been fully remediated and some owners have completed redevelopment. Most of the sites are located in New Castle County (161 of 199). Kent has 18 sites and Sussex has 20.

The property tax base increased by \$111,985,800 in New Castle County, Kent by \$674,666, and Sussex by \$974,100 as these 76 sites were redeveloped. Taken together this increased property tax revenue by \$3.7m for the taxing authorities.

The intent of the BDP is to return properties to a clean and non-hazardous state and generate economic and social benefits. In this study the focus is on jobs and wages. To date jobs have increased 255 with annual average wages of \$81,000. But, these are the direct effects of the 76 fully remediated sites which are only partially redeveloped.

To determine the induced impact of the jobs and wages 2009-2014 the REMI was used to simulate the full impact over time. Over that period, total statewide employment increased by

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<sup>16</sup> 7 Del. C. §9103(3).

<sup>17</sup> *Delaware's Brownfield Development Program Fact Sheet*,  
<http://www.dnrec.delaware.gov/dwhs/SIRB/Pages/Brownfields.aspx>

4,999 employees as a result of the brownfields and a 50 meter area around each site. Of those employees some 3,394 were Delaware residents.

The Gross State Product increased by \$738m and Personal Income by \$539m.

The largest job producer was the Finance and Insurance with 3,851 followed by Administration, Waste, and Remediation services with 1,225.

The Return on Investment (ROI) compared the value produced at the sites with the expenditures of the Brownfield Development Program to encourage redevelopment. The Delaware ROI was \$16.48. The ROI's for the individual counties were New Castle County \$19.20, Kent County \$1.04 and Sussex \$10.94.

From a survey of brownfield owners/developers we learned that they had invested \$120m in addition to the \$23m in grants issued by the state. In general they liked the program but 39% indicated they would have developed their project in the absence of the program (64% thought otherwise). Of the 61 respondents, 31% were involved in residential projects as opposed to commercial/industrial/other.

The BDP has been successful but its funding stream is dependent on a volatile source, namely petroleum products subject to the Delaware Gross Receipts tax. It needs to either gain a budget line and engage in the annual fight for budget dollars or perhaps find other more stable sources of revenue. The Tax Increment Financing approach tied to increased property tax receipts developed by BDP is an option worth exploring.

# **APPENDIX**

Table A-1

## Kent County Brownfield Sites in Study

DE#	Acreage +/-	Site Name	Expenses	CERT Year	COCR Year
DE-0359	0.19	333 South Governors Avenue Site	87288.72	2012	2014
DE-1451	0.99	680 Forest Street Property	294837.31	2008	2013
DE-1526	43.5	Berry Plastics Site	112849.96	2012	2013
DE-1110	2.59	Dover Ice House	224647.44	2005	2012
DE-1424	0.57	Mt. Vernon Street Property	60157.92	2007	2011
DE-1171	1.5	Capitol Scrap	2074091.20	2003	2009
DE-0066	26.3	ACE/Eastern Disposal	91677.66	2004	2008

Source: DNREC and BDP, Center for Applied Demography & Survey Research

Table A-2

## Sussex County Brownfield Sites in Study

DE#	Acreage +/-	Site Name	Expenses	CERT Year	COCR Year
DE-1555	107	29984 Pinnacle Way	46659.33	2013	2014
DE-1491	1	Former Pep-Up Site	225000.00	2010	2013
DE-1360	51.9	Former Timmons	175632.92	2005	2009
DE-1414	13	Pep Up/Calhoun Property	188721.72	2007	2009
DE-1342	17.1	Sussex Materials	104646.42	2005	2008
DE-1357	2.4	Lexington Avenue	66814.37	2006	2007
DE-287	5.73	Former Peninsula	129521.9	2006	2007
DE-1252	35	Cannery Village	75161.93	2002	2006

Source: DNREC and BDP, Center for Applied Demography & Survey Research

Table A-3  
New Castle County Brownfield Sites in Study

DE#	Acreage +/-	Site Name	Expenses	CERT Year	COCR Year
DE-1530	1.02	501 A Street Site	288145.08	2012	2014
DE-0105	271	Former Chrysler Newark Plant Site	1042542.7	2009	2014
DE-1382	0.38	38 Vandever Avenue	423836.6	2006	2014
DE-1520	0.82	Former Chestnut Hill Exxon Site	79546.31	2012	2013
DE-1524	5.34	Former Crowell Corp. Site	64736.98	2012	2013
DE-1528	0.22	2110 Northeast Blvd. Site	138328.21	2012	2013
DE-0167	21	New Castle Gas Company Site	131135.16	2010	2013
DE-1482	0.67	Former Foulk Road Getty Site	152487.95	2009	2013
DE-1397	1.2	1101 East 8th Street	225000.01	2006	2013
DE-1328	13.24	Marina Overlook	183100.99	2004	2013
DE-1484	10.87	DMA Expansion Site	766846.17	2009	2012
DE-1458	0.58	900 S. Franklin Street Property	68146.06	2008	2012
DE-045	4.3	Deemer Landfill Property	225000	2007	2012
DE-1109	1.2	Brandywine Fibre Property	225000	2007	2012
DE-1392	3	Railroad Crossing Property	908050.21	2006	2012
DE-1322	18.5	Ion Power	50000	2004	2012
DE-1493	16.91	Harry Wood Landfill , (OU-1) Site	0	2010	2011
DE-1496	1.25	M&N Property Site	68745.76	2010	2011
DE-1497	1.31	Former James Julian Construction Site	127657.15	2010	2011
DE-1462	0.11	Consolidated Fabrication Site	145314.75	2009	2011
DE-1483	1.4	Middletown Manor Site	111585.33	2009	2011
DE-1442	2.83	B Street Pack & Processing Property	893539.17	2008	2011
DE-1418	4.7	Limestone Shopping Center Property	86126.19	2007	2011
DE-1423	0.18	Panella Ski Shop Property	58938.75	2007	2011
DE-0324	3.79	Wiley Cork	1024220.5	2005	2011
DE-1369	0.5	Naga Foods	92703.36	2005	2011
DE-1083	1.64	Sunday Breakfast Mission	816881.08	2008	2010
DE-1426	7.74	Dureco Landfill Property	232721.15	2008	2010
DE-1434	6.65	Delaware Children's Museum Property	364798.57	2008	2010
DE-1446	0.04	829 N. Church Street	57409.33	2008	2010
DE-1452	0.33	Ministry Row Property	254014.62	2008	2010
DE-1158	1.33	Former P&C Roofing Property	192656.49	2007	2010
DE-1419	1.69	Delaware and Van Buren Avenue Property	186729.25	2007	2010
DE-1425	0.33	Former Star Building Property	220575.28	2007	2010
DE-1466	0.23	Garrett House-609 Washington Street	161212.63	2009	2009
DE-1428	25.25	Crozier Center Property	176746.84	2008	2009
DE-1430	0.6	Lippincott Project	140151.83	2008	2009
DE-1431	13.62	1020 Christiana Avenue	97660.64	2008	2009

DE-1433	0.58	300 Greenhill Avenue	225457.35	2008	2009
DE-1444	0.52	605 Vandever Avenue Property	206080.39	2008	2009
DE-0131, DE-1385	5.9	Christina Crescent	11245.57	2006	2009
DE-1394	2.3	0 Miller Road Property	173748.46	2006	2009
DE-1395	0.71	Pavilion Project	440358.74	2006	2009
DE-1057	5	Penn-Del	1415.44	2005	2009
DE-1401, DE-1057	13.17	Howard Street Commercial Redevelopment Property and Penn-Del Site	3784179.4	2005	2009
DE-1377	11	Justison Landing Property	906490.15	2006	2008
DE-1372	0.76	Habitat for Humanity	0	2005	2008
DE-0163	21	Del Chapel Place	813870.88	2002	2008
DE-0270	11.74	Budd Metal	225000	2005	2007
DE-1332	0.76	Madison Garden	807781.43	2005	2007
DE-1359	1.6	DelSteel	231716.37	2005	2007
DE-1224, DE-1228, DE-1247	2	Christina Landing	129426.53	2004	2007
DE-1310	11.8	Basher Lane	225000	2004	2007
DE-1304	21.73	Wilmington Piece Dye	225000	2005	2005
DE-1181	1.7	Cobra Machine	29385.09	2004	2005
DE-1309	2.43	Riverfront	149300.72	2004	2005
DE-0199	10.2	NVF-Newark	0	2003	2005
DE-1281	30	Petrillo Prop.	0	2004	2004
DE-0084	98	Dureco	0	2002	2004
DE-1087	6.74	Deemer Steel	40000	2002	2002
DE-1206	0.9	900 French Street	0	2002	2002

Source: DNREC and BDP, Center for Applied Demography & Survey Research