

# Brownfield/Greenfield Development Cost Comparison Study

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METRO



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## 1. EXECUTIVE SUMMARY

### PROJECT OVERVIEW

The availability and location of industrial land as a resource for the creation of new employment is a major economic and policy issue throughout the State of Oregon and the Portland metropolitan area. A number of efforts have occurred or are currently underway to understand and address this issue.

As part of this ongoing regional discussion on industrial land, a consortium of public agencies (the Port of Portland, Portland Development Commission, METRO and the Portland Bureau of Planning) sponsored this Brownfield/Greenfield Development Cost Comparison Study. The goal of the project is to provide the project sponsors with a better understanding of costs and issues associated with industrial development of greenfield sites and the redevelopment of brownfield sites. In addition, a methodology was developed that calculates and compares brownfield and greenfield development costs. The challenge was to develop a model that could be replicated in future studies. Therefore, the uses could change and the sites could change, but the methodology would remain constant.

Using a case-study approach, the project compared the public and private development costs associated with specific industrial projects between brownfield sites and greenfield sites. Four types of industrial development projects were identified: general manufacturing, high tech, warehouse and distribution, and industrial park. A specific profile and site plan for each use was completed. Four greenfield sites and three brownfield sites were also identified. The site plan for one of the uses was then tested on one greenfield and one brownfield site. An analysis of costs was then prepared for each project on the two sites.

### METHODOLOGY

#### *Uses*

Four industrial uses that were appropriate for the Portland metropolitan area were identified.

- *High Tech Manufacturing* includes high technology industries that are primarily related to manufacturing and processing. In this study, a 350,000 SF high-tech facility is tested that includes two 125,000 SF fabrication plants, one 40,000 SF central utility building, one 60,000 SF office building and 725 parking spaces.
- *Industrial Park* is a series of larger individual buildings whose uses could include light industrial manufacturing, distribution or industrial services. For this project, 630,000 SF of industrial park space, divided into multiple buildings, was tested on both sites.
- *Warehouse / Distribution* includes industries primarily engaged in the warehousing, storage and distribution of goods. For this project, 400,000 SF of distribution space in a single building with 200 parking spaces and 300 trailer spaces was tested on both sites.



- *General Manufacturing* includes industries utilizing manufacturing processes. For this project, three single-user general manufacturing facilities were tested on each site. These facilities totaled 450,000 SF in three buildings – a 100,000 SF user, a 150,000 SF user, and a 200,000 SF user – and 1,100 parking stalls to serve all three facilities.

### ***Site Selection***

Since the goal of the study was to compare costs for industrial projects, it was necessary to identify sites appropriate for the user profiles based on size, zoning and location. Additional issues considered in choosing the sites included distribution around the region, extent of brownfield contamination, adjacency to the Urban Growth Boundary, surrounding industrial uses, level of existing infrastructure, and specific needs of the identified uses.

#### **Brownfield**

For this study, appropriate sites needed to be over 25 acres and zoned industrial. While the overall inventory of brownfield sites in the region is significant, with over 1,100 acres of vacant land listed in the City of Portland's Brownfield Site Inventory, the availability of large, viable brownfield sites in industrial areas in the region is limited. In addition, certain sites were identified and eventually discarded for reasons of concern about the market impacts of inclusion in the study and for potential liability issues<sup>1</sup>. While the goal was to identify four brownfield sites to include in the study, at the end only three sites were used. To compensate and still meet the original goals of the study, two different uses were put on one of the brownfield sites.

#### **Greenfield**

Four sites were selected in the Portland metropolitan region. Three of the sites are in areas where land was recently brought into the Urban Growth Boundary (UGB). One site is located within the existing UGB. The sites range between 70 and 350 total acres. Therefore, only portions of each of the greenfield sites were used for each conceptual site plan.

The following table provides site overviews, and the uses proposed on each:

<b>Use</b>	<b>Site Type</b>	<b>Site Size (acres)</b>	<b>Building Area (SF)</b>	<b>Parking Stalls</b>
High – Tech Manufacturing	Brownfield	35.75	350,000	725
	Greenfield	53.20	350,000	725
Industrial Park	Brownfield	45.50	630,000	1,130
	Greenfield	44.50	630,000	1,130
Warehouse / Distribution	Brownfield	37.95	400,000	200
	Greenfield	23.85	400,000	200
General Manufacturing	Brownfield	35.75	450,000	1,100
	Greenfield	37.95	450,000	1,100

As the study progressed, issues relating to liability and publicity were raised and concerns were expressed regarding the identification of actual brownfield sites in the report. It was determined that the brownfield sites should be generic in the final report. To make all the

<sup>1</sup> Some sites that were initially considered for inclusion in the study are currently being actively marketed for sale. The site owners indicated that they were not comfortable including their properties in this study due to potential stigma and negative sale price impacts to their properties, regardless of the author's intentions to conceal the identities of individual sites.

sites equal, it was then decided that the greenfield sites would also be made generic. Therefore, while actual sites were utilized, for the purposes of this study, all geographic identifying features have been removed.

### ***Costs***

The primary focus of this study was on quantifiable costs, including hard and soft costs both on-site as well as off-site. The cost information was classified into four major categories:

#### On-Site Construction Costs

On-site construction costs include all building costs and on-site infrastructure and parking costs, plus additional on-site costs, including site grading, lift stations, tank removal and pilings are associated with several of the brownfield and greenfield sites.

#### System Development Charges (SDC's) and Credits

Large, one-time user fees paid with the development of the site were included in this category. This includes System Development Charges (SDC's) for sanitary sewer, water, storm drainage, street improvements and parks. SDC credits were based on the extent of existing development on the site.

#### Off-Site Construction Costs

These are the costs associated with the public utilities, including sanitary sewer, water and storm drain mains, necessary to accommodate the build-out of each concept. The delivery of private utility (electric, natural gas, telecommunications) costs were not identified separately, and were assumed as part of the estimated street costs. Major utility upgrades, such as substations, transformers, water reservoirs, treatment facility expansions were not included (the presumption is that SDC fees are intended to finance these public facility expansions).

#### Environmental Remediation Costs (Brownfield Sites Only)

The potential environmental remediation requirements for each site were based on publicly available information and the project team's experience with similar properties. The estimated costs represent the minimum estimated effort required to obtain a No Further Action (NFA) letter from the Oregon Department of Environmental Quality (DEQ) for the properties. Environmental remediation costs were divided into two categories: Hard Costs and Other Costs. Hard Costs included remediation costs associated with soil and groundwater; compliance with state and local stormwater regulations; ongoing operation and maintenance of remediation efforts and remedies; and costs associated with the coordination and processing of the remediation plan, application and follow-up with DEQ and management of the remediation.

Other Costs included soft costs for insurance, environmental studies, planning and legal expenses, figured at 20% of the hard costs. Of these soft costs, 20% is insurance. The second component of Other Costs is carrying cost interest, which is the interest cost accrued during remediation, for an assumed 24-month timeline at a 30% cost of equity and 8.50% for debt. The third component of Other Costs is a risk premium, assumed to be 0.5% of total development costs based on the perceived additional risk associated with the brownfield contamination.

### ***Financial Analysis***

The financial characteristics of individual development concepts were evaluated, with a focus on determining the residual property value associated with these concepts. The residual value represented the maximum value that the development concept yields for the property (land and improvements), and equates to the maximum price that a developer would be willing to pay for the property based on the study's assumptions. If the residual value is below the market value of the property, or what the owner perceives to be market value, then the development is not considered to be viable. In some cases in this analysis, the residual land value was negative, implying that the development program yields a property value of less than zero under the assumptions used (i.e., upside-down).

### ***Public costs and benefits***

A comparison of public costs and benefits was conducted for the specific brownfield and greenfield development concepts. To the maximum extent possible within the scope, public costs and revenue streams resulting from development were estimated. The comparisons were informed by a literature review of national trends and experiences.

## **CASE STUDIES**

The case studies provided the means to compare the four uses on both brownfield and greenfield sites. The following provides a summary of the findings of these studies.

### ***Site Development Overviews***

#### **High Tech Manufacturing**

With the proposed development, the brownfield site had an estimated negative residual land value of (\$7.80) per square foot. This reflects a site that would be considered "upside-down" under the case study assumptions, with a value well below zero. In contrast, the greenfield site had a positive residual land value of \$6.42 per square foot.

#### **Industrial Park**

With the proposed development, the brownfield site had a positive residual land value of \$0.80 per square foot and the greenfield site had a positive residual land value of \$1.33 per square foot.

#### **Warehouse / Distribution**

With the proposed development, the brownfield site had a negative residual land value of (\$0.85) per square foot, while the greenfield site has a positive residual land value of \$6.88 per square foot.

#### **General Manufacturing**

With the proposed development, the brownfield site had a negative residual land value of (\$6.47) per square foot. The greenfield site has a positive residual land value of \$6.96 per square foot.

## Financial Findings

The case studies evaluated revealed the general findings that greenfield sites have an overall lower development cost than brownfield sites, and brownfield sites require lower marginal infrastructure investment than greenfield sites. The following table provides a summary of the financial comparison between the case studies.

**SUMMARY OF SCENARIOS EVALUATED**

Site/ Concept	Net Site Size/Acres	Building S.F.	Environmental Remediation 1/	Construction Cost		SDCs		Infrastructure		Total Cost/Less Land	
				Hard	Soft	Calculated	Credits	Net	Costs	Total	PSF
<b>Industrial Park</b>											
Brownfield Site - Portland	45.50	630,000	\$8,748,863	\$23,086,500	\$4,617,300	\$1,846,243	(\$25,368)	\$1,820,875	\$558,000	\$38,831,538	\$61.64
Greenfield Site - Tualatin	44.50	630,000	\$0	\$25,050,000	\$5,010,000	\$1,713,209	\$0	\$1,713,209	\$5,739,167	\$37,512,376	\$59.54
<b>General Manufacturing</b>											
Brownfield Site - Portland	35.75	450,000	\$22,980,451	\$20,857,500	\$4,171,500	\$1,212,343	(\$249,062)	\$963,281	\$24,000	\$48,996,732	\$108.88
Greenfield Site - Clackamas Co.	37.95	450,000	\$0	\$21,000,000	\$4,200,000	\$868,675	\$0	\$868,675	\$1,347,000	\$27,415,675	\$60.92
<b>High-Tech Manufacturing</b>											
Brownfield Site - Portland	35.75	350,000	\$28,027,441	\$105,900,000	\$21,180,000	\$1,383,121	(\$249,062)	\$1,134,059	\$24,000	\$156,265,500	\$446.47
Greenfield Site - Hillsboro	53.20	350,000	\$0	\$105,000,000	\$21,000,000	\$1,782,663	\$0	\$1,782,663	\$1,452,500	\$129,235,163	\$369.24
<b>Warehouse/Distribution</b>											
Brownfield Site - Portland	37.90	400,000	\$7,821,775	\$11,154,000	\$2,230,800	\$715,907	(\$75,858)	\$640,049	\$735,000	\$22,581,624	\$56.45
Greenfield Site - Portland	23.85	400,000	\$0	\$10,840,000	\$2,168,000	\$730,069	\$0	\$730,069	\$290,500	\$14,028,569	\$35.07

INDUSTRIAL PARK

Site	Cost (\$/sq ft)
Brownfield Site - Portland	\$62
Greenfield Site - Tualatin	\$60

GENERAL MANUFACTURING

Site	Cost (\$/sq ft)
Brownfield Site - Portland	\$109
Greenfield Site - Clackamas Co.	\$61

HIGH-TECH MANUFACTURING

Site	Cost (\$/sq ft)
Brownfield Site - Portland	\$446
Greenfield Site - Hillsboro	\$369

WAREHOUSE/DISTRIBUTION

Site	Cost (\$/sq ft)
Brownfield Site - Portland	\$56
Greenfield Site - Portland	\$35

INDUSTRIAL PARK

Site	Value (\$/sq ft)
Brownfield Site - Portland	\$0.63
Greenfield Site - Tualatin	\$1.33

GENERAL MANUFACTURING

Site	Value (\$/sq ft)
Brownfield Site - Portland	-\$6.47
Greenfield Site - Clackamas Co.	\$6.96

HIGH-TECH MANUFACTURING

Site	Value (\$/sq ft)
Brownfield Site - Portland	-\$7.89
Greenfield Site - Hillsboro	\$6.42

WAREHOUSE/DISTRIBUTION

Site	Value (\$/sq ft)
Brownfield Site - Portland	-\$0.85
Greenfield Site - Portland	\$6.88

1/ Includes direct hard and soft costs associated with remediation, as well as additional carrying costs, developer risk premium and lender risk premium.

### Key financial findings include:

- Under each of the scenarios, the greenfield site delivered the lowest development cost per square foot, as well as the highest residual land value. The differential was least in the Industrial Park scenarios; with the \$8.7 million cost of environmental remediation on the Portland brownfield site offset by a \$3.0 million cut and fill requirement on the greenfield site and a \$5.2 million differential in infrastructure costs.
- Infrastructure costs, as defined in this analysis, were substantially higher on three of the greenfield sites, with the exception being the Warehouse/Distribution program sites.
- The brownfield site used in the General and High-Tech Manufacturing scenarios has extremely high clean-up costs, related to soil and groundwater contamination. These add \$11.1 million in hard costs, which also dictates

higher insurance costs which are \$1.9 million. As a result, the overall environmental remediation cost under these scenarios is estimated at \$22.0 for the General Manufacturing program and \$28.0 million for the high-tech program. Higher remediation costs were assumed under the high-tech scenario, with the higher overall costs of development increasing the impact of the risk premium.

## PUBLIC COST BENEFIT ANALYSIS

Public benefits and costs were evaluated and compared for the brownfield and greenfield sites, based on a review of existing published studies and estimated public costs and revenue streams for the case study jurisdictions. For each of the sites, public benefits and costs were identified as Quantifiable – Direct or Qualitative and Other Quantifiable. Quantifiable – Direct public benefits that were similar across jurisdictions included SDC income, property tax revenue, Tri-Met payroll revenue and jobs. Annual tax revenues are greater for all of the case study examples that occur on sites located in the City of Portland and/or Multnomah County. This is due to the greater array of revenue streams within these jurisdictions compared to sites outside of Portland/Multnomah County.

Qualitative and Other Quantifiable benefits that were shared between brownfield and greenfield jurisdictions include state business tax revenue, state and local income tax revenue, utility tax revenues and achievement of economic development goals. Additional public benefits realized by the redevelopment of the brownfield sites include efficiencies realized through the utilization of existing infrastructure and the enhancement of surrounding property values.

In regard to Quantifiable – Direct public costs, standard public service infrastructure needs like fire, police, schools, public transportation and roads can generally be expected to incur costs due to increased development and population from brownfield redevelopment or greenfield development. However, the brownfield and greenfield case study development concepts in this analysis are, relatively speaking, of insufficient size to warrant significant marginal cost increases.

Marginal System Development Charges (SDC's) would be one Quantifiable- Direct public cost. While SDC's are intended to recover public costs associated with a development, they are typically set at a level below full marginal cost. The proportion of costs that are not recovered represent a public cost associated with the project.

Qualitative and Other Quantifiable costs shared between brownfield and greenfield jurisdictions include state, regional and local administrative costs. Legal costs can also be assumed for both types of sites. Public legal costs for brownfield sites, related to the risk of remediation activities, can be significant among other legal costs. Alternatively, greenfield sites can be expected to also incur significant legal and administrative costs related to UGB inclusion, site planning and other related issues unique to the Oregon land use system.

## CONCLUSIONS AND IMPLICATIONS

### *Site Development Costs*

Under each of the scenarios, the greenfield site delivered the lowest development cost per square foot, as well as the highest residual land value. And while infrastructure costs, as defined in this analysis, are generally higher on the greenfield sites, they do not exceed the brownfield remediation costs, therefore resulting in an overall cost advantage for the greenfield sites. The infrastructure costs are internalized into the development pro forma, reflecting an assumption that the development would be required to bear these costs as a condition of approval. While these costs could be defined as public costs, in this study they are the responsibility of the developer as opposed to being borne by the public.

Major off-site infrastructure and utility system upgrades, such as electrical substations and transformers, water reservoirs, wastewater treatment facility expansions, state highway expansions, etc., are not required as a result of the development programs placed on the greenfield sites. While these types of major system upgrades may, and often would, be required as part of large acreage expansions of the Urban Growth Boundary, this is not the case for these sites.

The following table summarizes the estimated remediation costs of the brownfield sites, and the cost differential to produce an equivalent product relative to the greenfield option. As shown, the cost of remediation in these instances outpaces the savings in infrastructure costs.

Use	Brownfield Remediation Costs		Differential Greenfield Infrastructure Costs		Overall Cost Differential	
	Total	PSF-Bldg.	Total	PSF-Bldg.	Total	PSF - Bldg.
High Tech Manufacturing	\$28,027,441	\$80.08	(\$1,428,500)	(\$4.08)	\$27,030,337	\$77.23
Industrial Park	\$8,748,863	\$13.89	(\$5,181,167)	(\$8.22)	\$1,319,162	\$2.09
Warehouse/Distribution	\$7,821,775	\$19.55	\$444,500	\$1.11	\$8,553,055	\$21.38
General Manufacturing	\$22,980,451	\$51.07	(\$1,323,000)	(\$2.94)	\$21,581,057	\$47.96

The general findings of this study do not support the hypothesis that the costs associated with the remediation and redevelopment of brownfield sites can be on par with the costs to develop new greenfield sites; however, it would be unreasonable to draw any final conclusions based on the limited number of comparisons completed as part of this contract. A variety of issues can affect site development costs and these vary between sites. The methodology developed as part of this study does provide a foundation from which to look at a variety of sites and development scenarios to aid in addressing this policy question.

### *Brownfield Remediation Costs*

Brownfield remediation costs, in all of the case studies, were greater than the infrastructure costs associated with development of the greenfield sites. It is important to understand however, what makes up the site development costs and how the assumptions can influence costs. The total brownfield development costs are composed of hard and soft construction costs, hard and soft remediation costs, carrying costs during cleanup, and the risk premium. These latter three remediation costs (soft, carrying and risk premium) have a significant impact on the overall redevelopment costs.

Methodologically, the analysis in this study approaches the development scenarios from the perspective of a private sector developer doing a speculative development. This assumption limits the direct applicability of the findings to this type of development. Alternative development approaches under a different scenario could include remediation by an end user, or remediation by a public sector entity. Under both approaches, remediation costs would be considerably less, particularly under a public sector remediation.

### ***No Two Sites Are the Same – The Difficulty of Generalizations***

Generalizations are difficult to make because each site, whether brownfield or greenfield, has its own unique characteristics. No two sites are the same, whether they are brownfield or greenfield. Each has unique issues and characteristics that affect costs and development issues; e.g. the types of constituents that make up the contamination, adjacency to a body of water, the potential for migration of the contamination, the location of the site in relation to existing infrastructure, location in relation to specialized infrastructure, the size of the site, etc.

The study showed that there is a continuum of site preparation costs for both brownfield and greenfield sites. Taking remediation and infrastructure factors into account it would be possible to categorize the sites in this study by their intensity of color – a continuum of brownness or greenness. For the brownfield sites, a light brownfield site would be one that has minimal contamination issues and low cost clean-up requirements. A dark brownfield site would have major contamination issues, and high cleanup costs. A moderate brownfield site would be in the middle.

The same type of continuum of color could be created for the greenfield sites in the study, only focusing on availability of infrastructure and site development costs. A light greenfield site would have readily available infrastructure and be “shovel ready” with few additional requirements. A dark greenfield site would have major infrastructure needs and require substantial site preparation work. A moderate greenfield site would be in the middle.

These continuums, as applied to the case studies, are shown in the following table:

Use	Brownfield site	Greenfield site	PSF Differential	Conclusion
High Tech Manufacturing	Dark	Light	\$77.23	Same site as General Manufacturing site – more expensive use
Industrial Park	Moderate	Dark	\$2.09	Difficult greenfield site
Warehouse/Distribution	Moderate	Light	\$21.38	Greenfield site is better served than brown
General Manufacturing	Dark	Moderate	\$47.96	Very difficult brownfield site

### ***Public Sector Costs***

The case study development concepts in this analysis were not of sufficient size to pose significant, measurable public costs for affected jurisdictions. By design of the study, these costs are borne by the private sector. Internalization of brownfield remediation and infrastructure costs by the developer, rather than incurred by the affected jurisdiction(s), clear the public sector of the largest potential public cost disadvantage of brownfield redevelopment compared to greenfield development. To the extent that a jurisdiction assumes remediation costs, which may be a favorable policy option to enhance financial



feasibility of clean up and crystallize actual site remediation and redevelopment, public cost streams would increase by the magnitude of remediation costs estimated for each brownfield concept.

### ***Public Sector Benefits***

Benefits to the public sector, particularly in terms of revenue enhancement, were substantially greater for brownfield redevelopment concepts compared to greenfield development for the case studies considered in this analysis. By location of the case study sites, the revenue differential is largely due to the greater array of revenue streams within Multnomah County and the City of Portland compared to suburban jurisdictions. The following table provides a comparison of annual revenue stream differences for each development concept.

	<b>Brownfield Public Benefits</b>	<b>Greenfield Public Benefits</b>	<b>Public Benefit Differential</b>
<b>Use</b>	<b>Annual</b>	<b>Annual</b>	<b>Annual</b>
High-Tech Manufacturing	\$3,430,000	\$2,100,000	\$1,330,000
Industrial Park	\$1,400,000	\$977,000	\$423,000
Warehouse/Distribution	\$482,000	\$308,000	\$174,000
General Manufacturing	\$1,300,000	\$465,000	\$835,000

In addition to the quantifiable public benefits cited above, a wide variety of benefits would also accrue to affected jurisdictions that are not quantifiable due to the limitations of the case study approach and sizes of sites considered in this analysis. The scope of these benefits is broader for brownfield remediation and redevelopment, also due in part to the location of case study sites in Multnomah County. In general, however, brownfield redevelopment poses the following public benefits not accrued by greenfield development:

- Local income tax revenues;
- Public land conservation and environmental policy goals;
- Social benefits of contaminated site remediation and economic revitalization; and
- Enhancement of surrounding property values.

### ***It is a Challenge to Keep Brownfield Sites Industrial***

There is an economic challenge to maintaining industrial zoned brownfields as industrial properties after they are cleaned up. The remediation costs of bringing an “upside down” brownfield site “right side up” often cannot be recovered when the site can be developed only for industrial land values. Industrial land values in the Portland metropolitan area tend to range from \$3.50 to \$6.50 per square foot, the lowest value of any major land use. For comparison, office and residential land ranges from \$7.50 to \$10.00 per square foot, while commercially zoned land is valued at significantly higher levels. As remediation costs must be deducted from land value, industrially zoned property has the most limited ability to absorb clean up costs while still maintaining a positive residual land value.

### ***It’s “Easier” to Develop Greenfield Sites***

Brownfield sites come with stigmas. For many developers, the unknowns and the difficulties of developing a brownfield site are too great. It is perceived that suburban greenfield sites are faster and less constrained than urban brownfields. This also applies to



site selectors, who are under contract for users to find them a location for a new industrial investment. Issues of liability, cost and risk are all part of this challenge. This dilemma can make it difficult for brownfield sites to get full exposure in the market and make it difficult for sites to be considered for redevelopment. The result of this is that most difficult brownfield sites require experienced developers who have extensive knowledge with redeveloping these sites. Traditional developers tend to shy away from these sites. It is therefore necessary for outside parties, such as public agencies, who desire for brownfield sites to be redeveloped, to create relationships with experienced brownfield developers.

### ***An Inventory of Sites is Required to Meet a Variety of Industry Needs***

Physical site issues can play a role in a specific type of user choosing between or having the ability to locate on a brownfield or a greenfield site. However, the physical site that a company chooses is only one issue in a diverse mix of criteria that they use in deciding investment locations. Some users are very specific about the location of the property they are interested in using. Factors that can influence this include: access to transportation infrastructure (i.e., rail, water); proximity to other firms, either suppliers or customers (agglomeration or cluster effects); zoning, for example heavy industrial vs. light industrial, business park or high tech. These locational factors may outweigh or at least mitigate the brownfield vs. greenfield site issues.

Matching the locational needs of different types of industries and the market opportunities of different geographic locations will enhance brownfield redevelopment. It is critical to understand which types of companies can go where. Some industries and development types will be able to take on the brownfield challenges, others will not, and will focus their development decisions on greenfield sites. Each type of land, brownfield and greenfield, has a role to play in a regional economic development strategy.

### ***Focus on the Brownfield Sites that have a Demand in the Market***

The old saying of “location, location, location” in real estate is as valid in brownfields as it is in greenfields. As this study shows, different brownfield sites have different remediation cost profiles. However, brownfield sites located in areas of high market demand are better able to remain viable real estate investment opportunities if there is likely to be a high residual land value. The public sector should focus available assistance dollars to those sites that have the highest remediation costs and that are located in an industrial area that has market demand.

### ***The Public Sector’s Role in Brownfield Redevelopment***

There is a role for public incentives that support the goal of keeping industrial brownfields for industrial uses because the private marketplace will be less likely to do this, due to the lower market value of industrial land.

#### **Risk Reduction**

First, the data provided in this study shows clearly that the cost of high risk capital to conduct site study and clean-up is a significant factor. The rate of return required by equity investors and the lack of debt capital are factors to which many states and municipalities have turned their attention. The creation of state revolving loan funds, tax-free bonds, private debt funds and participating grant money are all mechanisms that are being used to reduce the cost of capital.

One of the major issues associated with brownfield sites is the uncertainty created by unknown liability (“inflated risk assumptions”). Environmental insurance is a way to mitigate this risk. The cost and quality of environmental insurance is not only a direct cost factor but also an indirect cost. Comprehensive environmental insurance policies for these projects eliminate or lessen reduction in residual land value associated with stigma (the risk factor). Several states have created pooled, state-subsidized environmental insurance. These programs have reduced the direct cost of insurance policies and provided for broader coverage and longer terms than insurance that is available for individual projects.

#### Site Characterization Assistance

Another potential area for public involvement is in site characterization. The cost for preliminary, investigative studies to characterize contamination conditions at a site are not only a significant project expense, but frequently becomes a barrier to entry. Few private entities are willing to spend thousands, often hundreds of thousands of dollars to characterize a site that may or may not turn out to be suitable for redevelopment. Direct subsidy of characterization costs will create an expanded market of brownfield sites. The sites in this study have been sufficiently characterized for remediation estimating and insurance. However if that were not the case, it is unlikely that a third party developer could have supported those costs. State and municipal brownfield initiatives can provide forgivable loans for characterization. If the investigative results support development, the loan is repayable. If not, the loan becomes a forgivable grant.

#### ***Study Methodology Limitations***

The purpose of this study was to determine the development costs for a specific development use, compared between a specific brownfield site and a specific greenfield site. The methodology used in the study is a case study approach, using a specific development project of a certain size and then preparing a pro forma analysis that is based on a private developer doing a speculative development. The study shows that the approach and the model function, and can be replicated with other uses and on different sites. It is also the case that the output of the model, in terms of costs and therefore residual land value, would change if different assumptions were used.

The actual development characteristics of each of the sites in this study are unique and site specific. Each has a cost structure for either remediation or new infrastructure services that are different from each other and from any other site in the Portland region. And the number of sites, only seven, provides a limited number of case studies from which to draw generalizations. So while the study found that it was more costly to remediate a brownfield site, than provide infrastructure to a greenfield site, the study’s analysis should be considered as proposing a general theoretical construct for appropriately evaluating specific sites, as opposed to generating rules of thumb that can be consistently applied across all brownfields and greenfields in the region.

## 2. INTRODUCTION

### PROJECT OVERVIEW

The availability and location of industrial land as a resource for the creation of new employment is a major economic and policy issue throughout the State of Oregon and the Portland metropolitan area. A number of efforts have occurred or are currently underway to understand and address this issue. These efforts include the State's Industrial Lands Task Force and their study Positioning Oregon for Prosperity; the City of Portland's Citywide Industrial Land Inventory and Assessment and the Portland Harbor Industrial Lands Study; METRO's industrial site inventories and analyses to inform Urban Growth Boundary (UGB) expansion for industrial uses based on the Regional Industrial Lands Study, and the regionally funded Greater Metropolitan Employment Lands Study.

As part of this ongoing regional discussion on industrial land, a consortium of public agencies (the Port of Portland, Portland Development Commission, METRO and the Portland Bureau of Planning) has sponsored this Brownfield/Greenfield Development Cost Comparison Study. The purpose of the study is to analyze and understand the costs of new industrial development on brownfield as compared to greenfield sites.

The regional inventory of industrial lands includes land that has not been previously developed, often referred to as "greenfield" sites. These sites are located within the UGB<sup>1</sup> and/or are undeveloped sites that are brought into an expanded UGB. The land inventory also includes sites within the UGB that have had previous industrial development on them, some of which are referred to as "brownfield" sites. The EPA defines a brownfield site as "abandoned, idle, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination."

Major challenges for the redevelopment of brownfield industrial property include the prior use, current zoning, potential environmental contamination, perceived environmental impairment and potential for infrastructure upgrades. The redevelopment of these sites is challenged by the costs and liabilities associated with their cleanup. There are also costs to the servicing of new greenfield sites. Sewer and water extensions, transportation and road improvements, private utility expansions and site preparation are potential costs associated with these undeveloped sites. Gaining an understanding of these costs and the issues associated with developing on a brownfield as compared to a greenfield site is the major focus of this study.

Using a case-study approach, the project compares the public and private development costs associated with specific industrial projects between brownfield sites and greenfield sites. Four types of industrial development projects are identified: general manufacturing, high tech, warehouse and distribution, and industrial park. A specific profile and site plan for each use has been completed. Four greenfield sites and three brownfield sites are also identified. The site plan for one of the uses is then placed on one greenfield and one brownfield site. An analysis of costs is then presented for each project on the two sites.

The goal of the project is to provide the project sponsors with a better understanding of the costs and issues associated with industrial development of greenfield sites and the redevelopment of brownfield sites. This information will further inform public policy and

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<sup>1</sup> The urban growth boundary (UGB) marks the separation between rural and urban land.

investment decisions to support the continued availability of sites suitable for new employment uses.

## ORGANIZATION OF REPORT

The remainder of this report is organized as follows:

*Section 3 Methodology* details the approach used to compare the development costs of industrial uses on brownfield and greenfield sites, including how the uses and specific sites were selected and the financial analysis for each conceptual development scenario.

*Section 4 Case Studies* describes the conceptual site plans placed on each site and the public and private costs associated with development, therefore enabling a cost comparison between the differing scenarios.

*Section 5 Public Cost Benefit Analysis* compares the quantifiable and non-quantifiable costs and benefits to be assumed by the public in relation to the development of each brownfield and greenfield scenario.

*Section 6 Conclusions and Implications* provides conclusions to the study and the policy and incentive implications to stimulate brownfield redevelopment. The detailed financial conclusions of the case studies, previously provided in Section 3, are restated here in summary form, with an emphasis on the most critical issues. The public cost and benefits discussion in Section 4 are also summarized. Finally, the study's methodology is reviewed, with comments on potential future work.

*Section 7 Exhibits* provides additional information and reports utilized in the study.

### 3. METHODOLOGY

The purpose of the study was to compare the development costs of industrial uses on brownfield and greenfield sites. The approach was to identify four different industrial uses and to place each of those uses on a brownfield site and a greenfield site. Identifying one brownfield and one greenfield site for each use would have resulted in eight total sites being part of the study (four brownfield and four greenfield). As the study progressed, only three brownfield sites were identified, due to a limited supply of brownfield sites that possess both attractive real estate value (location, proximity to urban centers and transportation, access, physical configuration, etc.) and sufficient size to permit development of a moderately sized project. Therefore, two different industrial uses were placed on one of the brownfield sites.

Site plans were developed for each of the industrial uses and laid out on each of the sites. Site development costs were identified for each of the sites. Pro forma analyses, evaluating the return on investment, were completed for each of the development programs. Costs between each of the development programs on the brownfield site and the greenfield site were then analyzed and compared.

This methodology was developed to identify an approach for analyzing brownfield versus greenfield development costs. The goal was to develop a model that could be replicated. The uses could change and the sites could change, but the methodology was one that could be used in future studies.

As the study progressed, issues relating to liability and publicity were raised and concerns were expressed regarding the identification of actual brownfield sites in the report. It was determined that the brownfield sites should be generic in the final report. To make all the sites equal, it was then decided that the greenfield sites would also be made generic. Therefore, while actual sites were utilized, for the purposes of this study all geographic identifying features of each site have been removed.

#### USES

The uses were picked in consultation between the clients and the consultant team. The goal was to identify a variety of industrial uses that are all appropriate for the Portland metropolitan area. These uses are also a subset of the uses the Oregon Economic and Community Development Department has identified as part of their statewide Industrial Site Certification process. The four uses selected are as follows:

- *High Tech Manufacturing* includes high technology industries that are primarily related to manufacturing and processing. Generally, this use has special site needs such as high volume water and/or pressure demand, back-up secondary electrical service, hazardous chemical requirements and sensitivity to vibration and noise. These uses could also include industries that are primarily related to the assembly and light manufacturing of high technology and other electronic equipment/components, and may include a higher amount of office type space.
- *Industrial Park* is a series of larger individual buildings that are usually occupied by tenants on a lease basis. The tenants may occupy an entire building or may lease only a portion of a building. Uses could include light industrial manufacturing, distribution or industrial services. A small support office may also be included for

each tenant. The buildings would include dock and drive-in loading doors. The industrial park would have lower parking ratios and standard truck maneuvering areas.

- *Warehouse / Distribution* includes industries that furnish local or long-distance trucking or transfer services or are primarily engaged in the warehousing, storage (excluding self-service storage), wholesale and distribution of goods. Generally, these uses require relatively more site area devoted to loading and trailer storage since the primary function is related to the movement of goods.
- *General Manufacturing* includes industries utilizing less intensive manufacturing processes, when compared to a heavy industrial manufacturing category. These types of facilities are typically one-step removed from wholesalers and are a broader activity than the high/tech manufacturer, who requires more specialized facilities.

## SITE SELECTION

A significant amount of time was spent selecting the sites – particularly brownfield – that would be used for the study. Since the goal was to compare costs for industrial projects, it was necessary to identify sites appropriate for the user profiles based on size, zoning and location. Additional issues considered in choosing the sites included distribution around the region, extent of brownfield contamination, adjacency to the Urban Growth Boundary, surrounding industrial uses, level of existing infrastructure and specific needs of the identified uses (the State’s Industrial Development Profile Matrix was used as a resource for this information).

### ***Brownfield***

For this study, appropriate sites needed to be over 25 acres, zoned industrial, in a viable industrial area, and ideally, located around the Portland metropolitan area. Selection criteria included site size, scale and configuration, location, zoning, extent of environmental issues, and economics. However, while the overall inventory of brownfield sites in the region is significant, with over 1,100 acres of vacant land listed in City of Portland’s Brownfield Site Inventory, the availability of large, viable brownfield sites in industrial areas in the region is limited. In addition, certain sites were identified and eventually discarded for reasons of concern about the market impacts of inclusion in the study and for potential liability issues<sup>1</sup>. While the goal was to identify four brownfield sites to include in the study, at the end only three sites were used. To compensate and still meet the original goals of the study, two different uses were put on one of the brownfield sites. The level and types of contamination of the sites became less of an issue than anticipated (or desired), due to the limited inventory of sites from which to choose. The brownfield sites selected included:

- A 35.75-acre site with significant cleanup issues, located in the City of Portland, made up of multiple ownerships that is fully serviced with infrastructure.

<sup>1</sup> Some sites that were initially considered for inclusion in the study are currently being actively marketed for sale. The site owners indicated that they were not comfortable including their properties in this study due to potential stigma and negative sale price impacts to their properties, regardless of the author’s intentions to conceal the identities of individual sites.

- A 45.50-acre site, of which only a portion has moderate contamination located in the City of Portland, under single ownership that required upgrades in existing infrastructure.
- A moderately contaminated, 37.90-acre site located in the City of Portland, with two ownerships, that required upgrades in existing infrastructure.

### ***Greenfield***

Four sites were selected from around the Portland metropolitan region. Three of the sites are in areas where land was recently brought into the Urban Growth Boundary (UGB). One site is located within the existing UGB. These sites were chosen based on their locations and the range of infrastructure improvements expected to be required with each site. The sites range between 70 and 350 total acres. Therefore, only portions of each of the greenfield sites were used for each conceptual site plan. The greenfield sites selected include:

- A large, 203-acre site located in Hillsboro, on the west side of the metro area. This site was recently brought into the UGB and has specific site size and use requirements for development. A 53-acre portion of this site was utilized for this study. Infrastructure is available to the site boundary. However, for the purposes of this study, the site area selected was a portion of the site that would require a moderate extension of infrastructure and a public street improvement.
- A large, 249-acre site located in Tualatin, in the southwest sector of the Portland metro area. This site was recently brought into the UGB. A 45-acre portion of this site was utilized for this study. These portions are comparable to the site acreage of the associated brownfield site. A significant amount of infrastructure improvements are required with the development of the entire site. These infrastructure costs were applied proportionally to the portion of the site utilized in this study.
- A site located in northeast Portland. This site includes several tax lots that, when combined, provide a large greenfield site within Portland's city limits. The overall site is 70 acres in size. A 26-acre portion of this site was utilized for this study. It is served, for the most part, by existing infrastructure, with limited improvements needed.
- A large, 377-acre site located in Clackamas County in the southeast portion of the metro area. This site was recently brought into the UGB. A 38-acre portion of this site, directly adjacent to the existing edge of urban development, was utilized for this study. For the purposes of this study, it was assumed that infrastructure improvements were limited to bringing utilities and street to and through the portion of the site being analyzed.

## **SITE ANALYSIS**

A site analysis of each site was completed. This included reviewing surrounding uses, the physical characteristics of the site, available infrastructure and utilities, streets and access issues, and environmental or natural resource constraints.



### ***Environmental Analysis***

The potential environmental remediation requirements for each site were determined based on publicly available information and the project team's experience with similar properties. Conceptual scopes of work were prepared that represent the minimum effort required to get the sites development ready and/or obtain site closure from the Oregon Department of Environmental Quality (DEQ). DEQ information regarding each of the brownfield properties was not complete; therefore the project team also relied on conversations with knowledgeable personnel, the respective DEQ project managers, and experience with other sites similar to each of the study's sites. The document review and interviews were used to prepare the conceptual scopes of work and associated potential environmental costs for each brownfield site. Detailed analysis for each site can be found in Exhibit B.

The key components used to prepare the potential environmental costs were:

- *Document Review* – Reviewed selected environmental documents available in regulatory files. The files included site descriptions, site history, and extent of contamination, regulatory status, and proposed environmental work.
- *Interviews with Key Project Participants* – When appropriate, interviews with key personnel (DEQ staff, project consultants) were held to discuss current site conditions and conceptual scopes of work.
- *Development of Conceptual Scopes of Work* – Based on each site evaluation, conceptual level scopes of work for remediation activities required at each property prior to redevelopment were developed. The scopes of work address each of the issues of concern identified by the DEQ and the team's own preliminary evaluation of site conditions. During preparation of these scopes of work, it was assumed that the appropriate use of the less stringent remediation goals for proposed industrial uses would allow use of remedies where much of the contaminated soil and groundwater could be left in place with minimal treatment or stabilization. Remedies requiring treatment or removal of contaminated media are often more expensive and were, therefore, recommended in a few cases but were not preferred. The proposed remedial measures have been successfully applied at sites with similar types and levels of soil and groundwater contamination.
- *Key Assumptions and Unknowns* – Site-specific assumptions and unknowns were developed to further define the understanding of the most probable conditions at the properties and the basis for the scope of work and estimated development costs associated with each conceptual development plan. Assumptions were made regarding site conditions, investigation derived waste, project schedule, and reporting.



One critical assumption made for all of the sites was that all sources of environmental impact to the properties had been identified during previous investigations. Given the level of effort made investigating subsurface conditions at each of the sites, we believe this assumption is reasonable. Records of Decision (ROD<sup>1</sup>) have been completed for the High Tech / General Manufacturing site and the Industrial Park site. ROD's are only issued for sites that have been completely characterized. The Warehouse/Distribution site is still in an intermediate phase of characterization.

Based on the evaluation of the past site uses, potential contaminant sources, and the available analytical data, the project team believes discovery of additional areas of contamination on any of the sites that would require a large characterization or remediation effort is unlikely. The team is not aware of ongoing sources of environmental impact other than those described in the files, and assumed that there will be no future contributions to soil or ground water contamination.

For the purposes of this study, conservative state and/or federal screening values were used to evaluate the analytical data. Data from the investigation was used to evaluate environmental risk for the proposed industrial uses, plan for site cleanup, and to secure a No Further Action (NFA) letter from the DEQ for areas that are clean or to develop a remediation plan as appropriate. It was assumed that the site investigation would proceed under the oversight of the DEQ. The nature of the oversight was not determined. It was also assumed that technical review, oversight, and/or programmatic influence from other agencies would not occur in a manner that affects the implementation, investigative approach, time frame, or costs set forth in this cost estimate.

## CONCEPTUAL SITE PLANS

Conceptual site plans, based on the site analysis, were completed for each of the sites. Because the brownfield sites were significantly smaller than the greenfield sites, development on each brownfield site was maximized to its full potential. This directed the amount of greenfield site utilized in order to ensure that similar development plans were compared in each. However, due to site configurations, natural resource constraints and topography, the amount of land required for the same development differed from brownfield site to greenfield site.

Based on the brownfield findings, site plans were adjusted to respond to the contamination issues, and where possible, the development was incorporated into the remediation plan. For example, if remediation included capping a portion of the site, buildings or parking areas were sited in these areas to capitalize on the cap as part of the site plan.

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<sup>1</sup> *Record of Decision (ROD)* – An official document that states the decision on a selected remedial action, jointly agreed to by the U.S. Environmental Protection Agency and/or the Oregon Department of Environmental Quality, and the responsible party. It includes a responsiveness summary and a bibliography of documents that were used to reach the remedial decision. The responsiveness summary includes all comments that were received from regulators and the general public, and the response to these comments. A Record of Decision also documents all Removal Actions that have taken place during a project.

The following table provides an overview of the sites, and the uses proposed on each:

Use	Site Type	Site Size (acres)	Building Area (SF)	Parking Stalls
High – Tech Manufacturing	Brownfield	35.75	350,000	725
	Greenfield	53.20	350,000	725
Industrial Park	Brownfield	45.50	630,000	1,130
	Greenfield	44.50	630,000	1,130
Warehouse / Distribution	Brownfield	37.95	400,000	200
	Greenfield	23.85	400,000	200
General Manufacturing	Brownfield	35.75	450,000	1,100
	Greenfield	37.95	450,000	1,100

## COSTS

The primary focus of this study was on quantifiable costs, including hard and soft costs both on-site as well as off-site. The cost information is broken down into four major categories:

- On-Site Construction Costs
- System Development Charges (SDC's) and Credits
- Off-Site Construction Costs
- Environmental Remediation Costs (brownfield sites only)

What follows is an explanation of how the costs were determined. Additional information or costs are provided in Exhibit F.

### *On-Site Costs*

On-site construction costs, referred to as the “Base Hard Costs” in this study, are associated with the development of a particular use. These costs include all building costs and on-site infrastructure and parking costs. Group Mackenzie developed the costs ranges, with input from a local construction firm, to provide an understanding of the general “order of magnitude” costs for the plans proposed<sup>1</sup>. These cost ranges may vary considerably from actual costs due to the conceptual nature of the plans in this study.<sup>2,3</sup>

These costs are assumed to be equivalent on both brownfield and greenfield sites. Note that in many brownfield redevelopment cases – albeit not in any of the specific sites considered in this study – existing on-site infrastructure can provide significant cost savings opportunities. Additional costs associated with a specific brownfield or greenfield site are listed separately. The following table lists the on-site costs assumed for each use:

<sup>1</sup> Costs are based on Group Mackenzie's expertise in the development arena based on similar recent projects. Cost ranges were reviewed with a local construction firm to provide additional confirmation of the range accuracy at this conceptual level.

<sup>2</sup> It should be noted that the final construction costs will be significantly impacted, based on actual project circumstances and timing. It is recommended that prior to any significant outlay of funding, projects have specific cost estimates prepared, to confirm the accuracy of these estimates, relative to that particular project.

<sup>3</sup> On-site costs include costs to demolish any existing buildings.

Use	Construction Cost Range
High – Tech Manufacturing	\$200 – \$300 per building SF
Industrial Park	\$30 – \$35 per building SF
Warehouse / Distribution	\$22 – \$27 per building SF
General Manufacturing	\$40 – \$45 per building SF

Additional on-site costs are associated with several of the brownfield and greenfield sites. These costs, discussed below, are identified separately for each development case, and when added to the on-site construction costs (Base Hard Costs) make up the Total On-Site Construction costs.

- *Cut and Fill (Grading):* Two of the greenfield sites required a significant amount of grading due to the existing topography. These costs are included at a rate of \$5 per cubic yard of cut and fill.
- *Lift Station:* One brownfield and one greenfield site required private lift stations for sanitary sewer service. (Each of these sites had the same use and were therefore part of the same case study.) These costs are identified as a separate line item, and are dependent on the use and size of station required.
- *Tank removal:* One of the brownfield sites required the removal of a significant number of existing storage tanks. These costs are identified as a lump sum, based on the number and size of tanks removed.
- *Pilings:* One of the brownfield sites requires pilings for significant structures due to the use (high tech) and the presence of contamination on the site. The piling costs are higher than would be incurred at a comparable greenfield site due to the need for special construction conditions that will not spread the contamination to deep groundwater resources. These costs are identified at a rate of \$3 per building SF.
- *Brownfield Sitework Costs:* Regardless of the extent of contamination, construction on the three brownfield sites requires specialized equipment and staff. For example, regulatory agencies often require oversight and monitoring of environmental site conditions during the initial stages of development. Associated costs include labor, analytical expenses, reporting, and regulatory agency fees. As such, an additional sitework cost was added to the brownfield construction costs, to account for these needs. This cost adds an additional 25% to the sitework costs for each use, which are assumed to be 12% of the overall construction cost for all uses except high-tech manufacturing, where sitework is assumed to be 2% of the overall construction cost.<sup>1</sup>
- *Soft Costs:* These costs include design and consultant fees as well as permit fees for the development and are assumed to be 20% of the construction cost. Additional soft costs, above and beyond these fees are associated with

<sup>1</sup> Sitework costs are typically 10% to 15% of the overall construction costs of a project. This analysis assumed an average of 12% of the on-site construction costs were associated with sitework. However, due to the high cost of construction associated with the specialized interior spaces of high-tech uses, this number was reduced to 2% for the high-tech scenarios. With a brownfield site, the contamination zones require additional effort and specialized equipment. As such, a surcharge of 25% of the sitework costs was added to account for this additional cost.

brownfield sites, such as costs for environmental insurance. Those costs are identified and discussed under “Environmental Remediation Costs.”

### ***System Development Charges***

Large, one-time user fees paid with the development of the site are included in this category. This includes System Development Charges (SDC's) for sanitary sewer, water, storm drainage and street improvements. One jurisdiction also requires a Parks SDC for industrial development. These fees are estimates only, based on the proposed development plan, and include the fees pertinent to a specific site, in a particular jurisdiction. These fees vary by rate and method of measurement in each jurisdiction. As such, these fees differ between sites and uses. For example, in all jurisdictions, the sanitary sewer SDC is a flat rate per equivalent dwelling units (EDU's); however, the flat rate is different in each jurisdiction, as is the number of fixtures equivalent to one EDU – in Portland, 7 fixture units equals 1 EDU; in Hillsboro and Tualatin and Clackamas County, 16 fixture units equals 1 EDU.

### **System Development Charge Credits**

The redevelopment of a site is often eligible for credits to SDC's paid for by the new use. These credits are based on the extent of existing development on the site. Records were reviewed for each of the brownfield sites and credits identified. All three were eligible for water SDC credits based on existing water meters, which were assumed to be replaced with the redevelopment of the site. One site was eligible for a Sanitary Sewer SDC credit and one site for a Street SDC credit, based on the existing operations on site. Within the jurisdiction of all three brownfield sites, the Storm Sewer SDC is based on new impervious area; as such, two of the sites received a “credit” (i.e., no charge) for existing impervious area, which was significant, 40% of the site area on one of the brownfield sites. The other brownfield site received no credit for the purposes of this study, as all existing development has been removed and no records remain regarding impervious area.

It is important to note that some of the SDC's for greenfield sites may not be required, due to requirements for development to pay for and construct off-site improvements. Depending on the extent of improvements and their designations on the jurisdiction's Capital Improvement Program (CIP), such improvements would be done in lieu of paying SDC's. This determination is made at the time of development and was not incorporated into this study.

### ***Off-Site Costs***

These costs are the costs associated with the public infrastructure necessary to accommodate the build-out of each concept. Utilities includes public sanitary sewer, water and storm drain mains. The delivery of private utility (electric, natural gas, telecommunications) costs is not identified separately, and is assumed as part of the estimated street costs. Major utility upgrades, such as substations, transformers, water reservoirs, treatment facility expansions have not been included (the presumption is that SDC fees are intended to finance these public facility expansions)<sup>1</sup>. Access (streets) costs include frontage improvements (street widening)

<sup>1</sup> Discussions with PGE identified potential supply and distribution upgrades that may be required for two of the greenfield sites. These upgrades may be required to meet the demands created by full or partial build-out of the entire sites. The development projects used as part of this project's methodology where not sufficient to trigger larger system upgrades, therefore these potential costs are not included as part of the pro forma analysis.

or new streets necessary to serve the individual site. Street costs include, excavation, private utilities lines, curbs, asphalt, sidewalks, street lighting, traffic signals (as required) and landscaping.

For the greenfield sites, off-site infrastructure improvements were assessed based on the impacts of the proposed development. The four greenfield sites are located in various jurisdictions and each are at different stages of planning for development. As such, the information available on infrastructure improvements necessary to mitigate for the impacts of each larger greenfield varied. However, with each scenario, it was assumed that the off-site improvements required for the development of each specific site would be passed on to the developer, either as a monetary charge, or as a condition of approval for the specific development. The following identifies how the off-site infrastructure improvements were assessed for each greenfield:

- *High-Tech Manufacturing* – Impacts of the development of the entire 203-acre greenfield site have been identified with the UGB Concept Development Plans, previously completed by the City of Hillsboro and available to the public. The street and public utility plans were reviewed and assessed based on the 53-acre site utilized for the concept plan. Based on these plans, specific improvements applicable to the concept plan, including extending public streets and infrastructure through the site, were identified and costs assessed. Per the UGB Concept Development Plan, no other off-site improvements, including system capacity upgrade, were identified as being required with the development.
- *Industrial Park* – Conceptual infrastructure plans and costs for off-site improvements associated with the entire 249-acre site have been completed and were obtained from the City of Tualatin. These improvements included the street and utility extensions required to serve the site and mitigate for its build-out, as well as system capacity upgrades required as a result of the build-out of this 249-acre site. As the proposed site plan only utilizes 45 acres of the larger site, and the infrastructure improvements are conceptual in nature, a proportionate share of the costs for streets, water, sanitary sewer, and storm drainage, were allocated to the proposed concept plan.
- *Warehouse / Distribution* – The subject site is within the City of Portland limits and served by existing streets and utilities. No system capacity upgrades are required. The available site is 70 acres in its entirety; however, the concept plan utilizes the westerly 26 acres. Limited off-site improvements were necessary to accommodate the proposed plan. These improvements were identified and costs were assessed.
- *General Manufacturing* – The selected site is the western 38 acres of a 377-acre site recently brought into the UGB. Because conceptual planning for this area is just being initiated, no costs associated with serving the entire 377-acre site were available. As such, with the selected portion being directly adjacent to existing development, infrastructure improvements were identified to pull utilities to and through the site, rather than an assessment of the entire 377 acres. As only 38 acres of the site are developed in this study, it was assumed that no system capacity upgrades were required.

### ***Environmental Remediation Costs***

As indicated previously, the potential environmental remediation requirements for each site are based on publicly available information and the project team's experience with similar properties. Detailed information on the analysis for each site can be found in Exhibit B. A cost estimate was prepared for each of the tasks identified in the conceptual scopes of work. The estimated task costs were based on the team's experience with the actual remediation costs at similar sites. Remedial costs are related in part to the volume or surface area of contaminated media requiring a remedy and the length of time each remedy must be applied. The estimated costs represent the minimum estimated effort required to obtain a No Further Action (NFA) letter from the DEQ for the properties. The costs are based on current understanding of site conditions and regulatory requirements. It is recognized that this understanding may change based on new information. In order to facilitate site redevelopment and reduce expenses during remediation, the cost estimates assume that all site investigation activities will be completed within two years. The remediation cost estimates are based on the most probable conditions anticipated for the property. The actual cost of site remediation will be based on actual conditions.

Environmental remediation costs can be divided into two categories: hard costs and other costs. These are identified below.

#### **Hard Costs**

Costs were determined based on the key assumptions and remediation proposed. In general, these costs were divided into categories based on the type of remediation needed, as follows:

- *Soil* – Costs associated with treatment of on-site soil associated with contamination and remediation. Specific to each brownfield site, these costs include capping contaminated areas with surcharge material, treatment of soil, and soil stabilization. These costs assume minimal removal of contaminated soil because soil removal is typically more expensive than in-situ remediation.
- *Groundwater* – Costs associated with treatment of on-site groundwater associated with contamination and remediation. Specific to each brownfield site, these costs include pilot tests, treatment system and well installation, analytical costs, well decommissioning, and associated labor and expenses.
- *Storm Water Management* – Additional costs associated with compliance with state and local storm water regulations, including the treatment of on-site storm water.
- *Operations and Maintenance* – Costs associated with ongoing operation and maintenance of remediation efforts and remedies.
- *Project Management and DEQ Costs* – Costs associated with the coordination and processing of the remediation plan, application and follow-up with DEQ and management of the remediation.



### Other Costs

There are other costs associated with the remediation of the brownfield sites. These costs include:

- *Soft Costs* – Remediation soft costs include insurance costs, environmental studies, planning and legal expenses, and are typically 20% of the hard costs. Of these soft costs, 20% is insurance; the remaining 80% will fluctuate depending on the specific site and the extent of studies and expenses needed. It was assumed that environmental insurance will be purchased for each brownfield site. The insurance coverage will consist of two types: (1) Remediation Stop Loss (RSL), and (2) Pollution Legal Liability. Remediation Stop Loss insurance provides protection against cost overruns arising out of site remediation. Pollution Legal Liability (PLL) insurance provides protection against the discovery of previously unknown pollution conditions. PLL provides coverage for cleanup costs and third party liability, including property damage and bodily injury. Environmental insurance costs were estimated using a combination of site-specific data, intended future use, and estimated cleanup costs, past experience with similar projects, and conceptual discussions with insurance underwriters and brokers.

The insurance calculations were based on a number of assumptions, and reflected variations in coverage as well as differential rates based on type of contamination. The RLL coverage assumed 100% cost overrun coverage, 12% rate on line for coverage, 20% buffer above cleanup cost estimate and a 5-year policy term. The PLL coverage assumed a \$100,000 deductible aggregated at 3x, a 10-year policy limit, a \$10 million limit of liability for the industrial park and warehouse/distribution sites, and a \$20 million limit of liability for the high-tech and general manufacturing site.

- *Carrying Cost Interest* – The Carrying Cost Interest is the interest cost accrued during remediation, for an assumed 24-month timeline at a 30% cost of equity and 8.50% for debt.
- *Risk Premium* – The risk premium is assumed to be 0.5% of total development costs based on the perceived additional risk associated with the brownfield contamination. This low premium assures the developers of these properties are experienced in brownfield redevelopment. The risk premium is further discussed in the next subsection, “Financial Analysis.”

## FINANCIAL ANALYSIS

A series of eight site-specific development programs were evaluated in this analysis. Static pro formas<sup>1</sup> were prepared for each program, incorporating traditional costs as well as factoring in costs typically associated with brownfield developments.

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<sup>1</sup> Pro forma is Latin for “as a matter of form,” and a pro forma analysis outlines a series of assumptions and the associated anticipated financial outcome. Static pro formas are simply financial evaluations that do not include a projection of cash flow over time. This type of analysis allows for calculating relatively straightforward measures of financial performance such as return on investment (ROI), while not allowing for the calculation of more complex measures of return, such as the internal rate of return (IRR).

The financial characteristics of individual development concepts were evaluated, with a focus on determining the residual property value associated with these concepts. This is the key determinant of the viability of the development forms. The residual value represents the maximum value that the development concept yields for the property (land and improvements), and equates to the maximum price that a developer would be willing to pay for the property based on our assumptions. If the residual value is below the market value of the property, or what the owner perceives to be market value, then the development is not considered to be viable. In some cases in this analysis, the residual land value is negative, implying that the development program yields a property value of less than zero under the assumptions used (i.e., upside-down).

Each development concept was evaluated using a static analysis, with the primary measure of return used being Return On Investment (ROI), otherwise referred to as return on cost. In our analysis, ROI is defined as the first stabilized year of net operating income divided by total development cost, including property acquisition. A threshold ROI was assumed of 9.25% in most instances, which reflects an assumption that this is the minimum ROI a developer would consider to be acceptable. Under the brownfield scenarios, the threshold ROI was increased by 0.50% to reflect an assumption that a higher yield would be necessary to justify the risk associated with brownfield development. In other words, a developer would view the uncertainty surrounding the development of a brownfield site as increasing his risk, therefore increasing the expected return required to make the development compelling. There is no way to quantify an appropriate risk premium, but components contributing to this factor include:

- The degree to which the history of the site is known;
- Available information on contamination;
- Site geology and other factors that may affect the impact of contamination, or impact the cost of clean-up;
- Entitlements in place;
- Marketability of the site; and
- Alternatives available.

This premium would be substantially higher if environmental insurance was not available to mitigate some of the risk. Without this type of insurance, financing would be either unavailable or prohibitively expensive.

Both the threshold ROI and the adjustment associated with brownfield risk are highly speculative, with individual developers using a wide range of measures to evaluate viability. As noted in the developer focus group, the 0.50% risk premium was seen by many of the attendees as below what would be necessary to support the additional perceived risk. As perceived risk represents a considerable factor in assessing the viability of brownfield development, individuals and/or firms that have a higher tolerance for risk will typically be the most likely to pursue this type of development. More risk-adverse developers would require a higher return premium for this type of development, which would translate into lower residual land values and a lower likelihood that redevelopment would be viewed as viable.

The model used is largely intended to reflect the decision criteria of a developer, and not a corporation developing the property for their own needs. The two manufacturing programs are likely to house end-users, as this type of development typically represents a specialized improvement that is not well suited to multi-tenant or speculative development. We believe the most likely scenario for this type of development would be a build-to-suit program,



with a developer tying up the property, cleaning up the site and building the facility to end-user specifications, and selling the property at completion. Under this scenario, the risk would be perceived to be generally lower, making the return threshold of 9.25% for the greenfield site and 9.75% for the brownfield site too high and implying a higher residual land value. Nonetheless, the costs associated with remediation would be considered to be similar, as clean-up costs and risks would be equivalent.

The residual property value calculations reflect the property acquisition cost that the development concept could bear and still produce the threshold yield. Acceptable returns will vary for individual developers, and these should be viewed as merely general guidelines.

Assumptions with respect to achievable revenues were produced by Johnson Gardner, and are based on general market knowledge. Net lease rates were estimated at \$5.00 per square foot for warehouse/distribution space, \$6.54 blended for industrial flex space, \$8.00 for general manufacturing and \$35.00 for high tech manufacturing. The lease rates for the manufacturing uses are largely set on the basis of return on improvements, as the improvements are specialized and the lease rates for this type of space are typically not market driven. For the speculative space, a 10% vacancy and collection loss was assumed.

While we consider these assumptions to represent reasonable guidelines, the assumptions used by individual developers are likely to vary substantively. As a result, the resulting calculations of the underlying value of the property will also vary.

The cost estimates used are based on the mid-point of estimates produce by Group Mackenzie of hard costs, with an assumed 20% gross up for soft costs. Group Mackenzie also provided estimates of SDC's as well as necessary infrastructure improvements.

Financial assumptions were made with respect to lending terms based on recent experience. The interest rates are a bit above current levels, reflecting our expectation that rates will be higher by the time any of these concepts proceed. The following is a brief summary of financial assumptions common throughout the analysis:

Capitalization Rate:	8.25%
Minimum Debt Coverage Ratio:	1.20
Loan to Value Ratio Max:	80%
Permanent Loan Interest Rate:	7.00%

The financing terms do not impact the ROI calculation, and therefore are relevant in our analysis only in their impact on soft costs associated with construction loan interest. Acquisition costs were assumed at \$5.00 per square foot, but have no impact on the residual land value calculations outside of their impact on assumed holding costs during remediation. In all likelihood, a site with considerable contamination would have a value below this assumption, marginally reducing the holding cost component of the remediation if recognized by the landowner. The model used in this analysis solves for a residual land value, or maximum land value supported under our assumptions. The actual transaction value would be lower if the market rate for property is below the residual level. While end-users may be able to support a higher land value, they will not pay a price above-market just because their program provides them the opportunity to.

Hard costs associated with environmental remediation were provided based on estimates from ERM, with insurance costs provided by Renova Partners. Soft costs were calculated at

20% of the hard costs, which may be too conservative in many instances. Environmental assessment is typically required of the property owner, and would have been available on any of the brownfield sites evaluated. As a result, this cost would not have been borne by the developer. If site characterization is available, or if the cost of this is borne by the property owner, the remediation soft costs may be reduced to only insurance. Additional costs for carrying the property during remediation utilized the following assumptions:

Clean Up Period:	24 Months
Cost of Equity:	30% (based on input from Renova Partners)
Cost of Debt:	8.50%

Holding costs assumed full acquisition of the property at the beginning of the period, with clean up costs allocated at an average value of 50% of cost during the period.

A key component of the remediation was an assumption of a 0.5% increase in the threshold ROI required to stimulate development. This is seen as a very conservative assumption, and reflects an additional perceived risk associated with development on a site that has been remediated. While this factor was alluded to in the sensitive analysis meeting with the development professionals<sup>1</sup>, there is no empirical evidence documenting that these adjustments are made in the market. The discount is unlikely to apply in a highly competitive market, with a substantial number of developers willing to purchase these sites without a significant risk premium.

## POTENTIAL EMPLOYMENT

For each concept plan, the total number of jobs potentially generated as a result of the development plan was calculated based on the building square footage and the typical number of employees per square foot associated with a specific category of use. Two numbers are provided for each concept plan: the total number of jobs, and a ratio of employees per acre. The total number of jobs is provided as a range to reflect the variety of users that could occupy the buildings. The following assumptions were utilized in calculating the total number of jobs<sup>2</sup>:

High-Tech Manufacturing:	1 job per 400 – 650 SF of manufacturing building area; and 1 job per 200 – 350 SF of office building; (no jobs were allocated to the Central Utility Building).
Industrial Park:	1 job per 400 – 2000 SF of building area (a combination of general industrial and distribution; could also include a nominal office space).
Warehouse / Distribution:	1 job per 1400 – 2000 SF of building area.
General Manufacturing:	1 job per 400 – 650 SF.

<sup>1</sup> Held June 3, 2004: See Exhibit F for meeting notes.

<sup>2</sup> The source of these job density numbers includes a combination of METRO sources (1997 Urban Growth Report Update; September 1999 Employment Density Study; 7/02 telephone conversation with Dennis Yee) and Group Mackenzie's architectural experience.

## SENSITIVITY ANALYSIS

To review and confirm the methodology of this study, a sensitivity analysis meeting was held with a group of professionals who make development investment decisions. The meeting was intended to review, confirm/dispute, and clarify the project team's preliminary findings and identify other factors that drive development and public investment decisions on these or similar sites. In this meeting, the methodology was reviewed and discussed with attendees by reviewing the gathered data on two of the use types and four of the sites (two brownfield, two greenfield). Input from this meeting was incorporated into the findings by means of providing additional data, and adjusting or clarifying statements. The minutes from this meeting are included as Exhibit F.

## PUBLIC COSTS AND BENEFITS

A comparison of public benefit and cost issues was conducted for the specific brownfield and greenfield development concepts reviewed in this study. Methodology for conducting the comparison was as follows:

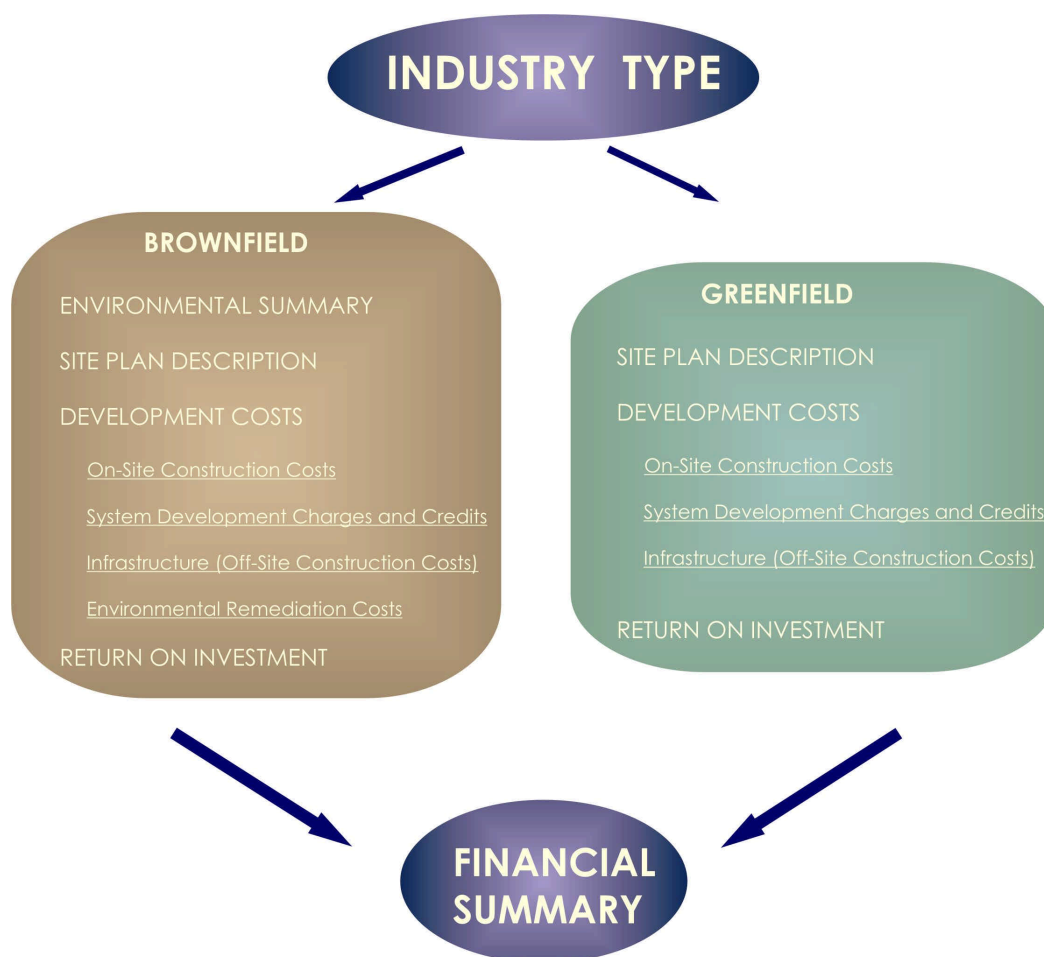
- *Literature Review:* A review of existing published studies regarding public benefits and costs of brownfield development of jurisdictions was conducted. The following recent studies in particular proved invaluable:
  - Redeveloping Brownfields: How States and Localities Use CDBG Funds,** Research Triangle, Prepared for U.S. Department of Housing and Urban Development, October 1998.
  - Brownfields Redevelopment in Wisconsin: Program, City-Wide and State-Level Studies,** Kris Wernstedt and Robert Hersch, *Resources of the Future*, November 2003.
  - Brownfields Development: The Implications for Urban Infrastructure,** The Brownfields Center of Carnegie Mellon University and the University of Pittsburgh, Ongoing.
  - Public Strategies for Cost-Effective Community Brownfield Redevelopment, Practice Guide #1,** H. Wade VanLandingham and Peter B. Meyer, University of Louisville, Center for Environmental Policy and Management, 2003.
- *Revenue and Cost Projections:* Public costs and benefits related to development of each brownfield and greenfield prototype were documented in a comparison table for each development type. These comparisons are informed by the trends and experiences of other jurisdictions nationwide documented in the above studies. To the maximum extent possible, within the scope of this analysis, public costs and revenue streams resulting from development were estimated accordingly. However, the narrow scope of this study and the unique features of each brownfield and greenfield site case study render comprehensive estimates of costs and revenues unattainable at this time.

## 4. CASE STUDIES

### SITE DEVELOPMENT OVERVIEWS

This section presents information on the costs associated with developing specified industrial uses on brownfield and greenfield sites. The information is divided into subsections based on industry type. In order to determine estimated development costs, a conceptual plan is generated for each brownfield site. The size of the brownfield sites directs the amount of building square footage and the associated amenities for each use concept, and a similar concept is placed on the affiliated greenfield site. Costs are then identified for each concept, including on-site construction costs, system development charges and credits, off-site construction costs (the cost to develop the public infrastructure necessary to accommodate the development on each site), and the environmental remediation costs associated with the brownfield sites. Based on the development costs, return on investment analyses (ROI) are completed for each site. A financial comparison for the respective brownfield and greenfield sites is provided at the end of each industry type subsection.

The following chart provides a graphic representation of the information provided in this section.



## HIGH-TECH MANUFACTURING

This category includes high technology industries that are primarily related to manufacturing and processing. Generally, this category includes uses that have special site needs such as high volume water and/or pressure demand, back-up secondary electrical service, hazardous chemical requirements and sensitivity to vibration and noise. This category also includes industries related to the assembly and light manufacturing of high technology and other electronic equipment/components, and typically require a higher amount of office space.

For this use, a 350,000 SF high-tech facility is placed on the respective brownfield and greenfield sites. The development includes two 125,000 SF fabrication plants, one 40,000 SF central utility building, one 60,000 SF office building and 725 parking spaces.

## HIGH-TECH MANUFACTURING – BROWNFIELD SITE

The high-tech brownfield site is 35.75 acres in size. The site is zoned Heavy Industrial by the City of Portland. The site is generally pie shaped, with a narrow strip of land at one end. The site has frontage on a major collector, but no direct access; access to the site is via a local street connection. Existing utilities serving the site include a 60" sanitary sewer line, a 12" water main, and 60" and 48" storm drains in the local street.

### *Environmental Summary*

DEQ records indicate the entire site has been contaminated with radioactive materials, metals, pesticides, and volatile organic compounds. For the purpose of this analysis, the site has been divided into three sub-site areas based on ownership, levels of contamination and methods of remediation. These three areas are identified on Figure 1. There are no active investigations associated with the conditions on Sub-Site 1 and Sub-Site 2, while Sub-Site 3 is currently the subject of a DEQ-ordered Remedial Investigation.

The following summarizes the contamination within each sub-site and the proposed remediation:

#### Sub-Site 1

The western 10.51 acres were used as a landfill for the disposal of low-level radioactive materials. The site was capped with 9" of soil with DEQ approval in the 1980's. Because of the radionuclide contamination, large structures located in this area will require pilings.

**Remediation – Soil:** Based on current DEQ regulations, it is unlikely that the existing 9" cap will be sufficiently protective of human health and the environment for the proposed change in use, therefore the entire site will be capped with an additional 2 feet of clean soil. Operation and Maintenance (O&M<sup>1</sup>) of the cap will be ongoing.

#### Sub-Site 2

The eastern 6.46 acres were used for lead acid battery recycling, smelting, and refining. Lead, arsenic, cadmium, zinc, antimony and sulfuric acid were released on the property and lead was stabilized on the site. Though the metal-contaminated sediment and soil has been capped and a Record of Decision (ROD) has been completed, it is not recommended that this portion of the site be utilized for any structures.

**Remediation – General:** Appropriate remediation for the site has been completed. Operation and maintenance of the cap will be ongoing.

#### Sub-Site 3

The remaining 18.78 acres of the site was subject to the discharge of untreated wastes on-site and off-site including pesticides, dioxins and furans, dichlorobenzene, phenols, aerosols, BTEX, lead, and arsenic. Soil excavation of contaminated sediments was previously approved and completed; however, Non-

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<sup>1</sup> O&M measures are designed to maintain a remedy at a site to ensure that the remedy remains protective of human health and the environment.

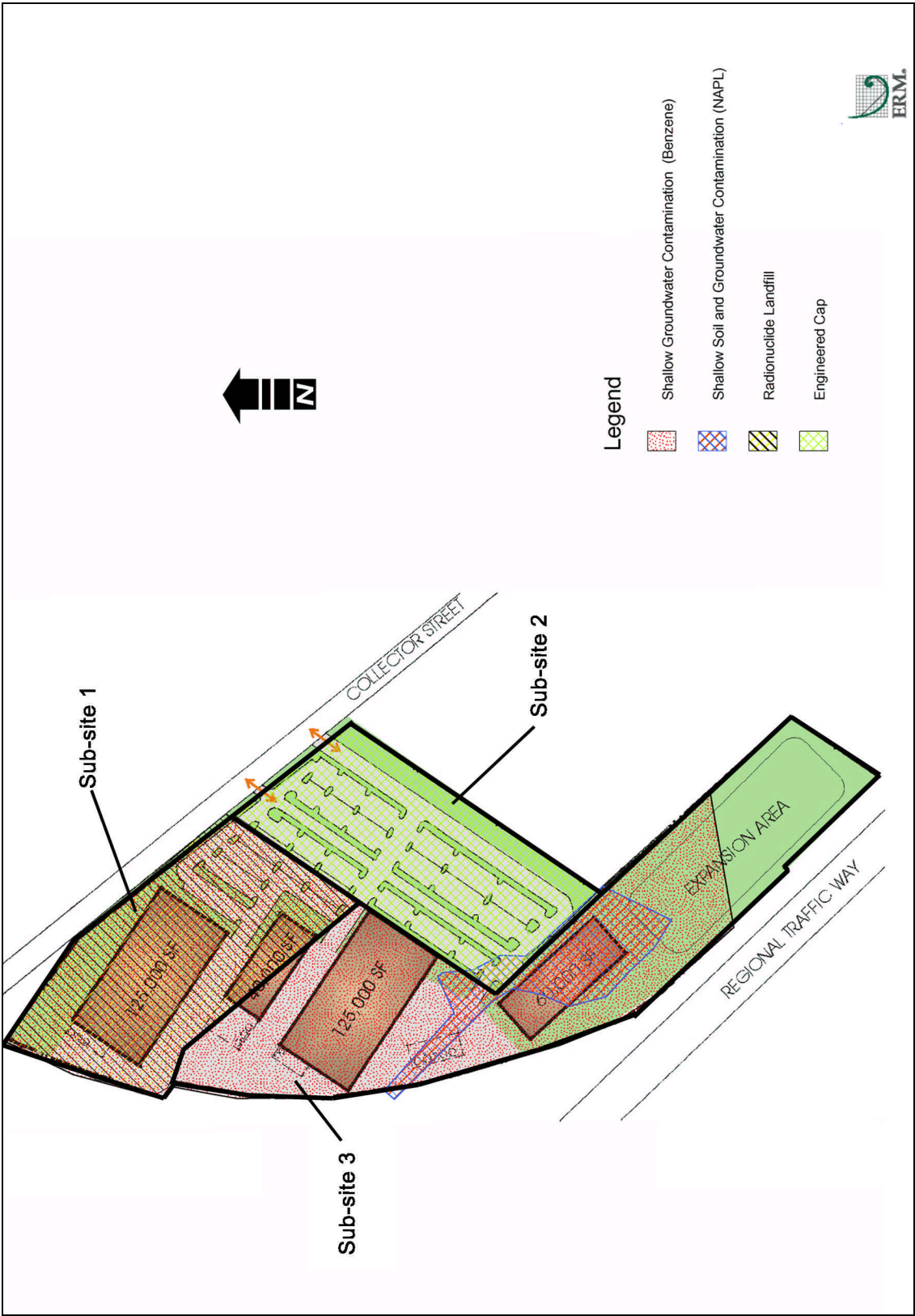
Aqueous Phase Liquids (NAPL) contamination has been detected near the west central portion of the property and remediation will be required. Groundwater contamination on the site, including pesticide and Volatile Organic Compounds (VOC's), will also require remediation.

**Remediation – Soil:** Stabilize the top 5 feet of soil over 2 acres with concrete slurry, treat NAPL with a ChemOx remediation system, and cap the site with 2 feet of clean fill. Operation and Maintenance of the cap will be ongoing.

**Remediation – Groundwater:** Install a system to prevent migration of groundwater contaminants into the adjacent waterbody.

**Remediation – Stormwater:** Provide stormwater treatment.





**Figure 1 – High Tech Brownfield Environmental Contamination Locations**  
(Source: ERM – See Exhibit B)



### ***Site Plan Description***

The development includes two 125,000 SF fabrication plants, one 40,000 SF central utility building, one 6,000 SF office building, and 725 parking spaces. The site plan (Figure 2) is laid out to examine how the constraints of the land and the costs for additional structural improvements would impact the development. The site plan locates one of the 125,000 SF fabrication plants within the landfill area. Because the landfill area lacks soil stability, this building will require pilings. The central utility building and second fabrication plant are sited across from the first plant to maximize the adjacency needs of the facility. Due to the site configuration and prohibition on structures in the northeast portion of the site, the corporate office building is separated from the production portion of the facility. The strip of land to the south is left vacant with this plan, providing an expansion area for the future.

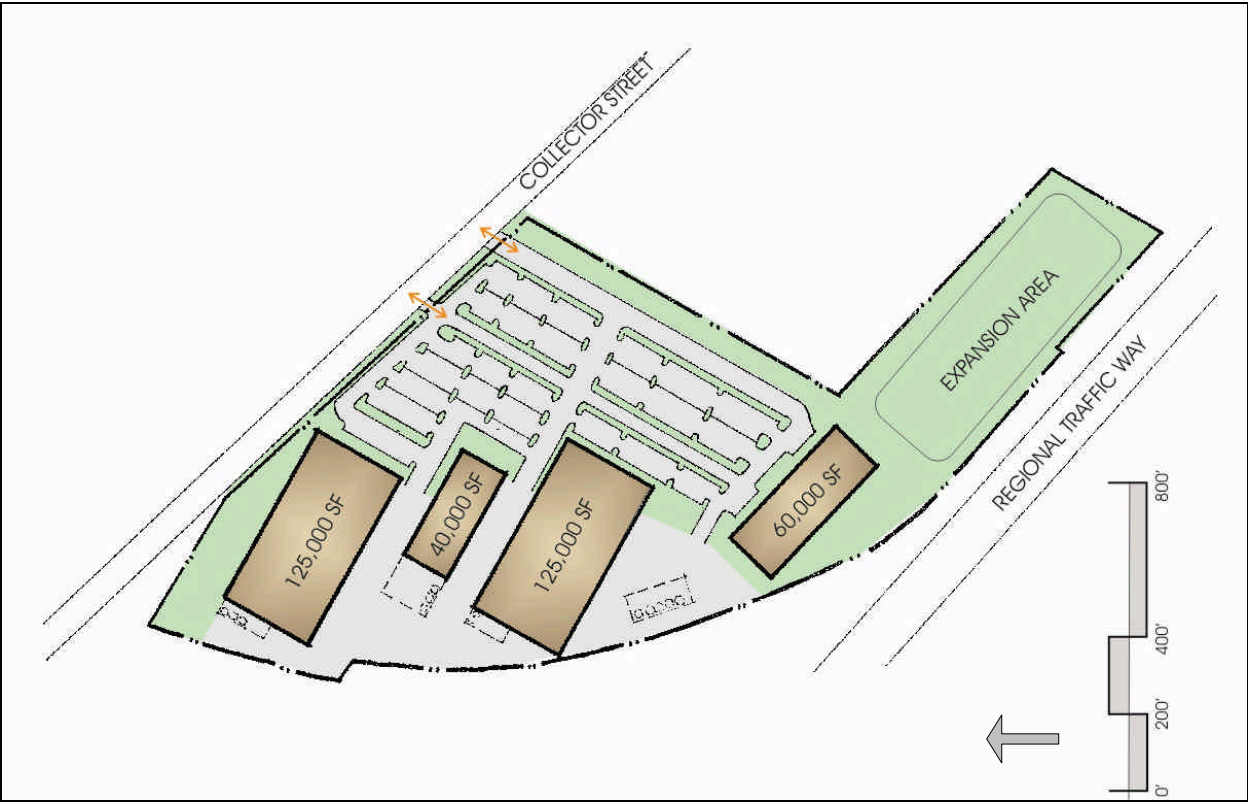


Figure 2 – High Tech Brownfield Conceptual Site Plan

***Development Costs***

Development costs for the conceptual site plan are generated based on the methodology and assumptions identified in Section 2 of this report. Overall, the costs to develop this site are significantly higher (approximately \$27 million) than the costs to develop the same site plan on the greenfield site.

**On-Site Construction Costs**

The on-site construction costs for this use are estimated to be \$200 - \$300 per building square foot. These costs are significantly higher for the high tech use compared to the other three uses in this study due to the extraordinary facility costs associated with a high tech user. Additional costs are associated with the structural pilings required for the fabrication plant and also with the sitework, due to the specialized equipment and staff required with construction on a brownfield site. The hard costs for on-site construction total nearly \$1.6 million. When soft costs associated with the on-site construction are included, the total on-site construction cost for the high tech use is slightly over \$127 million.

**ON-SITE CONSTRUCTION COSTS**

Cost	Rate	Fee
Base Hard Costs	\$200 – \$300 per building SF	\$105,000,000
Structural Pilings for Fabrication Plant	\$3 per building SF (125,000 SF building)	\$375,000
Brownfield Sitework Surcharge	additional 25% of sitework costs <sup>1</sup>	\$525,000
<b>Hard Costs</b>		<b>\$105,900,000</b>
<b>Soft Costs</b>	20% of construction costs	<b>\$21,180,000</b>
<b>Total On-Site Construction Costs</b>		<b>\$127,080,000</b>

**System Development Charges and Credits (SDC's)**

Redevelopment of the site will require the payment of SDC's for sanitary sewer, water, storm drainage, and streets. These fees vary by jurisdiction in terms of rate and method of measurement. One of the storm drainage SDC's is based on new impervious area. As this site is currently vacant and all existing development has been removed, this project assumes no existing impervious area. However, any existing impervious area accounted for would reduce the overall storm drainage SDC.

While the site is currently vacant, prior development on the site retained records for two existing 8" water meters. With the redevelopment of the site, and the replacement of these meters, a \$249,062 credit is available for this site, reducing total SDC fees to \$1,134,059: this is \$648,574 less than the SDC's for the greenfield site.

<sup>1</sup> Sitework costs are included in the base hard costs and include those costs associated with on-site grading, infrastructure and site improvements. Sitework costs are assumed to be 2% of the total base hard costs. For brownfield sites, this 2% is multiplied by 25% to provide an estimate cost for the specialized equipment and staff required for brownfield sitework.

**SYSTEM DEVELOPMENT CHARGES AND CREDITS (SDC'S)**

Cost	Rate	Fee <sup>1</sup>
Sanitary Sewer	\$2,680 per EDU <sup>2</sup>	\$522,600
Water	2 – 6" meters @ \$77,842 each	\$155,684
Storm Drainage	Combined fee <sup>3</sup>	\$142,358
Streets	\$1.61 per building SF	\$563,500
Parks	No fee	\$0
Subtotal		\$1,383,121
SDC Credits	Two 8" meters at \$124,531	<\$249,062>
<b>Net Total SDC Costs</b>		<b>\$1,134,059</b>
<p>1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.</p> <p>2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (7 fixture units=1 EDU). The concept assumed 195 EDU's, or 1,365 fixture units. Dependent on the water needs of a specific high-tech manufacturing facility, this fee could be assessed on actual water usage/discharge, which may result in a significantly higher SDC.</p> <p>3 Storm SDC based on three fees: (1) \$110 per 1,000 SF of new impervious area, (2) \$3.52 per linear feet of street frontage; and (3) \$1.80 per daily vehicle trip</p>		

**Off-Site Construction Costs**

Infrastructure improvements identified with this concept plan include:

- *Sanitary Sewer* – The existing 60" sanitary sewer within the adjacent collector street is sufficient to serve the proposed development.
- *Water* – The existing 12" water main within the adjacent collector street is sufficient to serve the proposed development.
- *Storm Drainage* – The existing 60" and 48" storm drains within the adjacent collector street are sufficient to serve the proposed development. However, due to the site's location near a water body, and the on-site contamination issues, storm drainage may be required to connect to the sanitary sewer system, resulting in additional ongoing operations costs.
- *Street Improvements* – A half-street improvement, including sidewalk and street trees, is required along the site's collector street frontage.

The total costs associated with these off-site improvements are \$24,000. This is \$1,428,500 less than the off-site improvement costs associated with the greenfield site. These costs are shown in the chart below.

**OFF-SITE CONSTRUCTION COSTS**

Cost	Fee
Sanitary Sewer	\$0
Water	\$0
Storm Drainage	\$0
Street	\$24,000
<b>Total Off-Site Construction Costs (Infrastructure)</b>	<b>\$24,000</b>

### Environmental Remediation Costs

The environmental remediation proposed for the site is identified in the Environmental Summary portion of this section, on page 19. The following identifies the costs associated with this remediation.

#### **ENVIRONMENTAL REMEDIATION HARD COSTS**

<b>Cost</b>	<b>Fee</b>
Cap radionuclide landfill	\$850,000
Soil remediation	\$3,000,000
Groundwater remediation	\$3,500,000
Stormwater management	\$500,000
Regulatory / PM Costs	\$3,250,000
<b>Total Environmental Remediation Hard Costs</b>	<b>\$11,100,000</b>

There are also other costs associated with the remediation of this site. Remediation soft costs include insurance costs, and planning and legal expenses. The Carrying Cost Interest is the interest cost accrued during remediation, for an assumed 24-month timeline at a 30% cost of equity and 8.50% cost for debt. The risk premium is assumed to be 0.5% of total development costs based on the perceived additional risk associated with the brownfield contamination.

#### **ENVIRONMENTAL REMEDIATION OTHER COSTS**

<b>Cost</b>	<b>Fee</b>
Soft Cost	\$4,152,000
Carrying Cost Interest	\$4,768,905
Risk Premium	\$8,006,536
<b>Total Environmental Remediation Soft Costs</b>	<b>\$16,927,441</b>

### ***Financial Characteristics / Residual Land Value***

The cost to develop the high-tech program on the brownfield site is considerably lower than the cost to develop the greenfield site summarized later in this section. The primary advantages from a construction cost perspective are relatively lower SDC's and significantly lower off-site construction costs. This translates into a \$4.8 million cost advantage for the brownfield site compared to the greenfield site for the high-tech development scenario. This advantage, however, is offset by the estimated \$28 million cost of environmental remediation. The high cost of remediation shifts the indicated residual property value from a robust \$15.9 million (\$10.20 per square foot) for a clean site to a negative value of \$12.1 million. Under this scenario, the hard and soft costs associated with physical remediation efforts largely negate any property value, with carrying costs and risk premium turning the deal "upside down."

The following pro forma summarizes these characteristics.

**Brownfield Site - Portland**  
**HIGH TECH MANUFACTURING**  
**SUMMARY INFORMATION**

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		35.75		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,557,270			7.00%	7.00%
Building Size (SF)		350,000			25	25
Leasable Area (SF)		350,000			1.20	
Site Coverage/Net		22.48%				80%
INCOME SUMMARY:					\$12,250,000	\$12,250,000
	Total SF	Annual Net Rent/SF	Annual Rent			8.25%
Office Space	0	\$0.00	\$0		\$120,362,123	\$118,787,879
Distribution Space	0	\$5.00	\$0		\$10,208,333	\$10,074,816
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	350,000	\$35.00	\$12,250,000	Total Development Cost/Excluding Remediation:		
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		
Vacancy & Collection		0%	\$0	Net Equity Required		
<b>TOTAL</b>	350,000	\$35.00	\$12,250,000	MEASURES OF RETURN:		
COST SUMMARY:				Return on Investment (ROI)		9.01%
	Per SF	Units	Total	Return on Equity (ROE)		22.83%
Real Market Value 6/	\$5.00	1,557,270	\$7,786,350	Threshold ROI		8.50%
Direct Construction Cost				Residual Property Value		\$15,879,588
On-Site Construction Costs	\$302.57	350,000	\$105,900,000	Residual Property Value PSF/Net		\$10.20
Soft Costs	\$60.51	350,000	\$21,180,000	ENVIRONMENTAL REMEDIATION COSTS		
SDCs - Net	\$3.24	350,000	\$1,134,059	Hard Costs		\$11,100,000
Offsite Construction Costs	\$0.07	350,000	\$24,000	Soft Costs 2/		\$4,152,000
<b>TOTAL/Less Remediation</b>	\$388.64	350,000	\$136,024,409	Clean-Up Period (Months)		24
				Carrying Cost Interest		\$4,768,905
				Developer Risk Premium - ROI		0.50%
				Developer Risk Premium		\$8,006,536
				Adjusted Residual Property Value 3/		(\$12,147,853)
				Adjusted Residual Property Value PSF/Net		(\$7.80)

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

6/ Source of Real Market Value is County tax assessor records.

## HIGH-TECH MANUFACTURING – GREENFIELD SITE

The high-tech greenfield site is located in Hillsboro, Oregon. It is a portion of a larger site that was recently brought into the Urban Growth Boundary. Specific development requirements regarding the type of industrial use and size of development were placed on the site when it was brought into the Urban Growth Boundary. The larger site is bound to the south and east by major arterials and has direct access to a freeway.

Utilities are available adjacent to the overall site. However, dependent on where a user locates, extension of infrastructure, including water, sewer, storm and a local street, could be required. For the purposes of this study, the high-tech manufacturer is sited on a portion of the greenfield that would require utility extensions. As stated in the methodology outlined in Section 2, this is done to provide a broad range of greenfield sites that would provide a varied analysis. It should be noted that if a user developed on a different portion of the larger site, infrastructure extension requirements may be significantly reduced.

The portion of the greenfield selected for development is 53.2 acres in size and is zoned Industrial Park. The site is generally square in shape and includes a 50-foot wide natural resource that divides the site into two areas and another natural resource on its western edge. The site is bound on its eastern side by a major collector. Development of the site will require a full street improvement of a local street along the site's southern boundary, including the extension of water, storm, and sanitary sewer mains to the site.

### ***Site Plan Description***

The site concept that is placed on the brownfield site is also placed on this site: two 125,000 SF fabrication plants, one 40,000 SF central utility building, one 60,000 SF office building and 725 parking spaces. With few constraints, this site plan is more compact and adjacency requirements between facilities are more easily accommodated. However, with the natural resource areas, where development is limited, the overall site area is actually larger than the brownfield site. The site plan is shown in Figure 3.



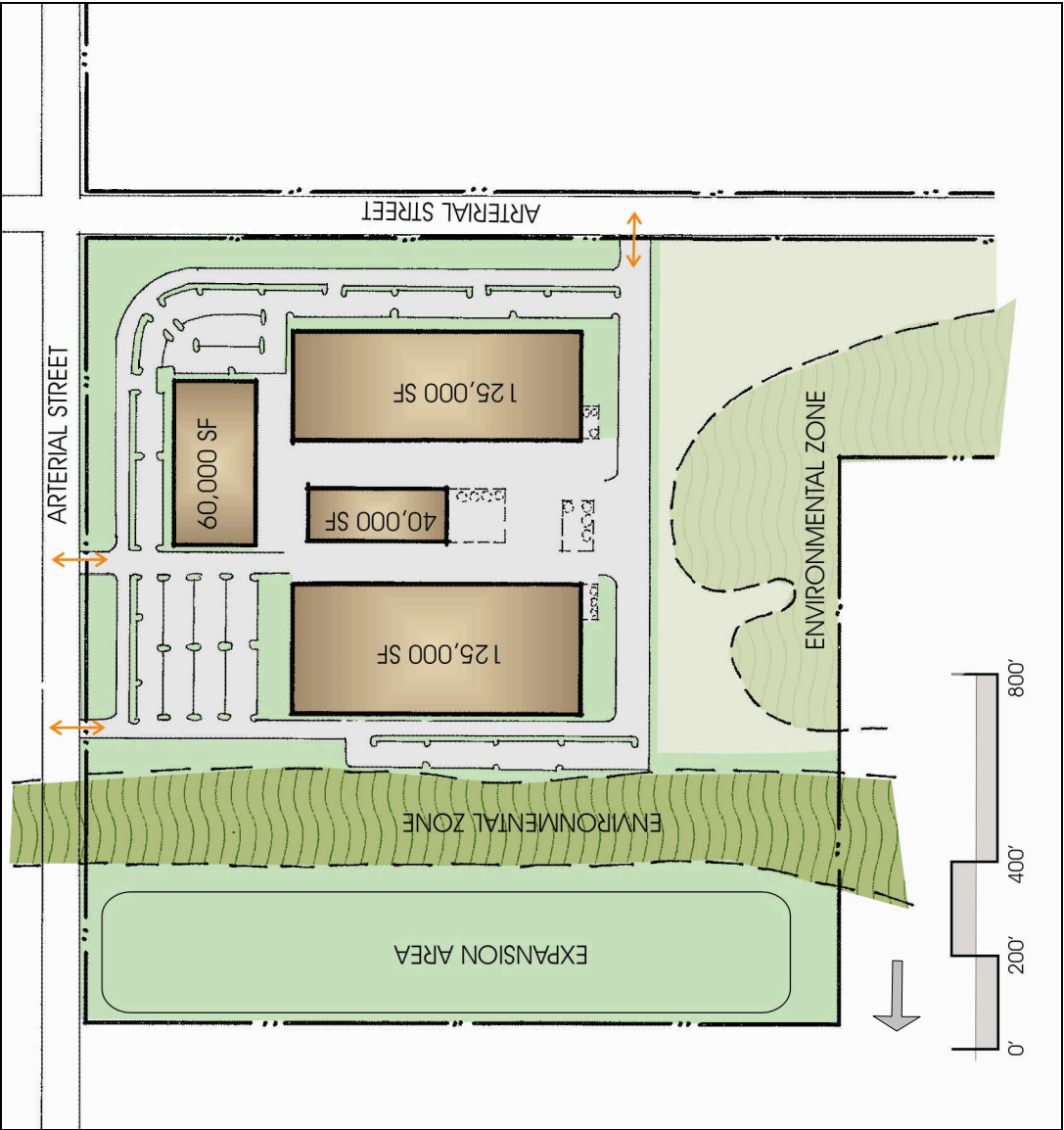


Figure 3 – High Tech Greenfield Conceptual Site Plan

***Development Costs***

Development costs for the conceptual site plan are generated based on the methodology and assumptions identified in Section 2. Overall, the costs to develop this site are significantly lower (approximately \$27 million) than the costs to develop the same program on the brownfield site.

**On-Site Construction Costs**

The base hard costs are identical to the brownfield scenario and no additional site costs are necessary for the development of this site. When soft costs are added to the hard costs, the total on-site construction costs equal \$126 million. This is approximately \$1 million less than the on-site construction costs for the brownfield site.

**ON-SITE CONSTRUCTION COSTS**

Costs	Rate	Fee
Base Hard Costs	\$200 - \$300 per building SF	\$105,000,000
Hard Costs		\$105,000,000
Soft Costs	20% of construction costs	\$21,000,000
<b>Total On-Site Construction Costs</b>		<b>\$126,000,000</b>

**System Development Charges and Credits (SDC's)**

Development will require the payment of SDC's for sanitary sewer, water, storm drainage, streets, and parks. The site has historically been utilized for agricultural uses. As such, it is assumed that no SDC credit for prior development is applicable. However, it should be noted, that it is likely that a portion of the off-site improvements required with the development may be eligible for SDC credits, thereby reducing the overall SDC costs for the project.

The SDC's total \$1,782,633 for this concept plan. These SDC's are \$648,574 more than the SDC's associated with a comparable concept plan on the brownfield site.

### SYSTEM DEVELOPMENT CHARGES AND CREDITS (SDC'S)

Cost	Rate	Fee <sup>1</sup>
Sanitary Sewer	\$2,500 per EDU <sup>2</sup>	\$212,500
Water	Two 6" meters @ \$80,000 each (estimate)	\$160,000
Storm Drainage	\$500 per 2,640 SF impervious area	\$372,931
Streets	\$259 per trip <sup>3</sup>	\$659,932
Parks	\$343 per parking space	\$377,300
Subtotal		\$1,782,663
SDC Credits	None	\$0
<b>Net Total SDC Costs</b>		<b>\$1,782,633</b>

- 1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.
- 2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (16 fixture units=1 EDU). This concept assumed 85 EDU's, or 1,365 fixture units. Dependent on the water needs of a specific high-tech manufacturing facility, this fee could be assessed on actual water usage/discharge, which may result in a significantly higher SDC.
- 3 Trips are estimated at 3.85 trips per 1,000 SF of manufacturing and 16.31 trips per 1,000 SF general office.

### Off-Site Construction Costs<sup>1</sup>

This site is a portion of a larger greenfield site, which was recently brought into the UGB. As part of the concept planning for the larger area, off-site infrastructure improvements are identified. With this study, those off-site infrastructure improvements associated with the development of the selected portion of the greenfield site have been identified. These improvements are as follows:

- *Sanitary Sewer* – Extension of 1,000 linear feet of sanitary storm main from the adjacent arterial along the collector frontage, half the cost of an 8" force main through the site to the adjacent arterial, and half the cost of a lift station. Due to the topography in this location, a lift station is necessary to serve the north end of the larger greenfield site and it is assumed that this development would bare half the cost.
- *Water* – Extension of 3,400 linear feet of 18" water main along the site's arterial and collector frontages. This site would be required to bare half the cost of this extension.
- *Storm Drainage* – Extension of 30" storm drain line from the collector street to the water body on the northern portion of the site.
- *Streets* – Half-street improvements for the extension of the collector street through the site and signal improvements at the intersection of the collector and the adjacent arterial. This includes a full street improvement along the site's south frontage – it is assumed that this development would pay the full

<sup>1</sup> For the purposes of this study, the high-tech manufacturer was sited on a portion of the greenfield that would require utility extensions. It should be noted that should a user site in a different location on this greenfield, infrastructure extension requirements may be significantly reduced.

cost of the street for half of its length (which is equal to a half-street improvement along the site's entire frontage).

The total costs associated with these off-site improvements is \$1,452,500, which is \$1,428,500 more than the infrastructure costs associated with the brownfield site. These costs are shown on the chart below.

#### OFF-SITE CONSTRUCTION COSTS

Cost	Fee
Sanitary Sewer	\$333,500
Water	\$204,000
Storm Drainage	\$132,000
Street	\$783,000
<b>Total Off-Site Construction Costs (Infrastructure)</b>	<b>\$1,452,500</b>

#### *Financial Characteristics / Residual Land Value*

The high-tech greenfield site evaluated represents an unusually straightforward development site, with no significant grading costs. Compared to other uses, the cost of construction for a high-tech facility is very high, with hard costs estimated at \$300 per square foot and overall costs estimated at over \$400 per square foot. Due to the specialized nature of high-tech facilities, development is rarely done on a speculative basis and is consistently discounted compared with cost of construction if resold. The pro forma approach used in the analysis requires an assumption with respect to lease rates, which is set largely on the basis of return on investment as this type of space is not typically leased. As a result, the return on investment is largely consistent with the threshold in this instance. The residual land value under the assumptions used in this scenario is \$6.42.

A key factor in this type of development from a financial perspective is the relatively low proportion of the overall development cost represented by the land; in this case, the residual land value is approximately 10% of overall development cost.

The following pro forma summarizes these characteristics.

**Greenfield Site - Hillsboro**  
**HIGH TECH MANUFACTURING**  
**SUMMARY INFORMATION**

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		53.20		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		2,317,392			7.00%	7.00%
Building Size (SF)		350,000			25	25
Leasable Area (SF)		350,000			1.20	
Site Coverage/Net		15.10%				80%
INCOME SUMMARY:					\$12,250,000	\$12,250,000
	Total SF	Annual Net Rent/SF	Annual Rent			8.25%
Office Space	0	\$0.00	\$0		\$120,362,123	\$118,787,879
Distribution Space	0	\$5.00	\$0		\$10,208,333	\$10,074,816
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	350,000	\$35.00	\$12,250,000	Total Development Cost/Excluding Remediation:		
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		
Vacancy & Collection		0%	\$0	Net Equity Required		
<b>TOTAL</b>	350,000	\$35.00	\$12,250,000	15.6%		
COST SUMMARY:				MEASURES OF RETURN:		
	Per SF	Units	Total	Return on Investment (ROI)		
Real Market Value 6/	\$5.00	2,317,392	\$11,586,960	Return on Equity (ROE)		
Direct Construction Cost				Threshold ROI		
On-Site Construction Costs	\$300.00	350,000	\$105,000,000	Residual Property Value		
Soft Costs	\$60.00	350,000	\$21,000,000	Residual Property Value PSF/Net		
SDCs - Net	\$5.09	350,000	\$1,782,663	ENVIRONMENTAL REMEDIATION COSTS		
Offsite Construction Costs	\$4.15	350,000	\$1,452,500	Hard Costs		
<b>TOTAL/Less Remediation</b>	\$402.35	350,000	\$140,822,123	Soft Costs 2/		
				Clean-Up Period (Months)		
				Carrying Cost Interest		
				Developer Risk Premium - ROI		
				Developer Risk Premium		
				Adjusted Residual Property Value 3/		
				Adjusted Residual Property Value PSF/Net		

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

6/ Source of Real Market Value is County tax assessor records.

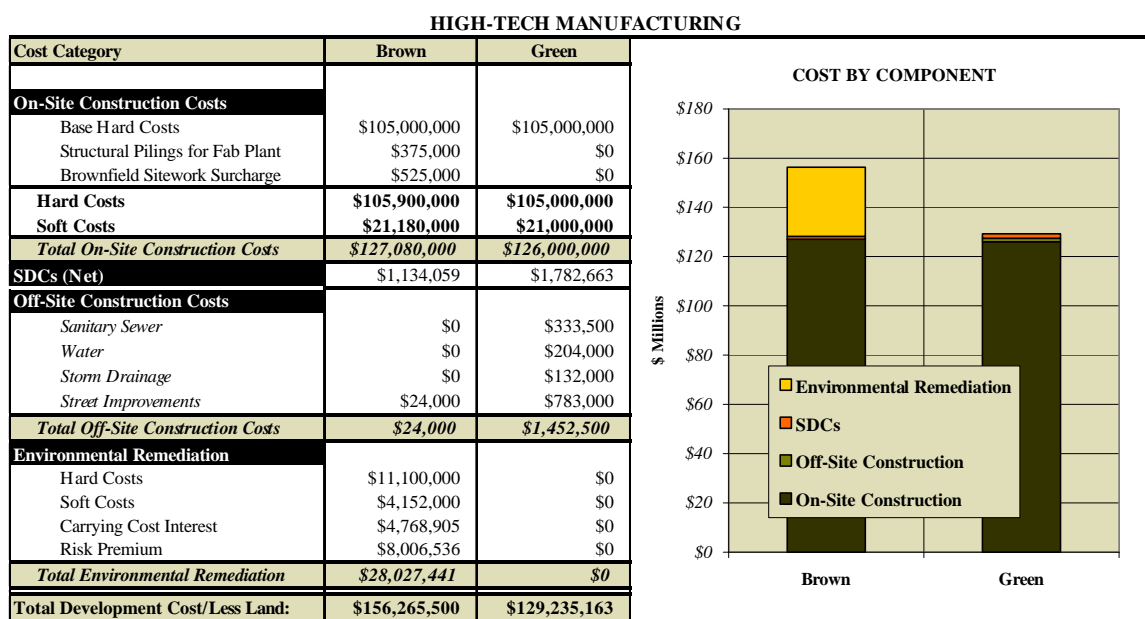
## HIGH-TECH MANUFACTURING – FINANCIAL SUMMARY

The high-tech manufacturing program is a 350,000 square foot facility, supporting an estimated employment count of 556 to 925 jobs.

On-site construction costs are largely consistent on both sites, with some additional costs related to pilings and additional site work on the brownfield site. Off-site costs are higher for the greenfield site, at an estimated \$1.4 million.

The costs of environmental remediation are extremely high, at an estimated \$28.0 million. This reflects addressing soil and groundwater contamination, as well as capping the site. Soft costs were estimated at \$4.1 million, which included a \$1.9 million cost for insurance. Carrying costs and the assumed risk premium added an additional \$12.7 million to the remediation costs. This site was also utilized to evaluate the general manufacturing use. The primary differential between the remediation costs on the site under this program is that the high-tech's higher overall project cost led to a higher risk premium, which is calculated as a percent of cost.

Under this scenario, the brownfield site has an estimated negative residual land value of over \$12.0 million. This reflects a site that would be considered “upside-down” under these assumptions, with a value well below zero.



The cost of the high-tech development program on the brownfield site is considerably lower than the cost on the greenfield site. The primary advantages from a construction cost perspective are somewhat lower SDC's and sharply lower off-site construction costs. This translates into a \$4.8 million cost advantage for the brownfield site as compared to the greenfield site under the high-tech program. This advantage is more than offset though by the estimated \$28.0 million cost of environmental remediation. The high cost of remediation shifts the indicated residual property value from a robust \$15.9 million (\$10.20 per square foot) for a clean site to a negative value of \$12.1 million. Under this scenario, the hard and soft costs associated with physical remediation efforts largely negate any property value, with carrying costs and risk premium turning the deal “upside-down.”

The high-tech greenfield site evaluated represents an unusually straightforward development site, with no significant grading costs. The estimated cost of construction for a high-tech facility is very high, with hard costs estimated at \$300 per square foot and overall costs estimated at over \$400 per square foot. Due to the specialized nature of these types of sites, they are rarely done on a speculative basis, and are deeply discounted if resold. The pro forma approach used in our analysis requires an assumption with respect to lease rates, which is set largely on the basis of return on investment as this type of space is not typically leased. As a result, the return on investment is largely consistent with the threshold in this instance. The residual land value under the assumptions used in this scenario would be \$6.42.

A key factor in this type of development from a financial perspective is the relatively low proportion of the overall development cost represented by the land, in this case the residual land value is approximately 10% of overall development cost.



## INDUSTRIAL PARK

Industrial Park developments are typically a series of larger individual buildings occupied by tenants on a lease basis. The tenants may occupy an entire building or may lease only a portion of a building. Uses include light industrial manufacturing, distribution or industrial services. A small support office may also be provided for each tenant. The buildings usually include dock and drive-in loading doors. The industrial park would have lower parking ratios and standard truck maneuvering areas.

For this project, 630,000 SF of industrial park space, divided into multiple buildings, is placed on both sites.

## INDUSTRIAL PARK – BROWNFIELD SITE

The industrial park brownfield site is 45.50 acres in size and zoned Heavy Industrial by the City of Portland. The site is generally rectangular in shape and relatively flat. The site is accessed via a private street that connects to a major collector. Existing utilities serving the site include 12" and 15" sanitary sewer lines within the property limits and a 24" public water main adjacent to the property's north and east frontages. A public storm drain is located 800 feet north of the site.

### *Environmental Summary*

This site is a former petroleum storage facility. For the purposes of the environmental analysis, the site is divided two areas based on the development history: Sub-Site 1 (west) is developed and Sub-Site 2 (east) is undeveloped. Based on the history of the site, it is likely that any remaining soil contamination is shallow and likely to be intercepted with construction. It is also a fair assumption, based on the prior use of the site, that the minor petroleum contamination contributes to the groundwater plumes indicated on Figure 4. The following summarizes the contamination within both areas and the remediation associated with each:

#### Sub-Site 1

The western 10.32 acres of the site are contaminated due to petroleum discharge – spills, leaks and work practices over the facility's lifetime. A small portion of the facility was used as a mixing location for pentachlorophenol (PCP), a wood treatment compound. The soils contaminated with PCP were removed from a portion of the facility but not the entire site. The portion of contaminated soil that remains is detailed on Figure 4. These soils were stockpiled on the property and resulted in additional PCP contamination of groundwater. In 1997, the stockpiled soils were removed from the site.

Additional soil contamination exists throughout Sub-Site 1. A preliminary assessment concluded that these soils contain petroleum hydrocarbons and low levels of polyaromatic hydrocarbons.

The plume of PCP contamination around the PCP mixing area has also resulted in the contamination of the groundwater. In addition, petroleum hydrocarbon groundwater contamination exists in both the west and south terminal areas. A pump-and-treat system is currently used for the treatment of PCP contaminated groundwater.

**Remediation – Soil:** Remove TPH hot spots if discovered during construction. Stabilize top 5 feet of soil with concrete slurry. Cap landscaped areas with 2 feet of clean fill.

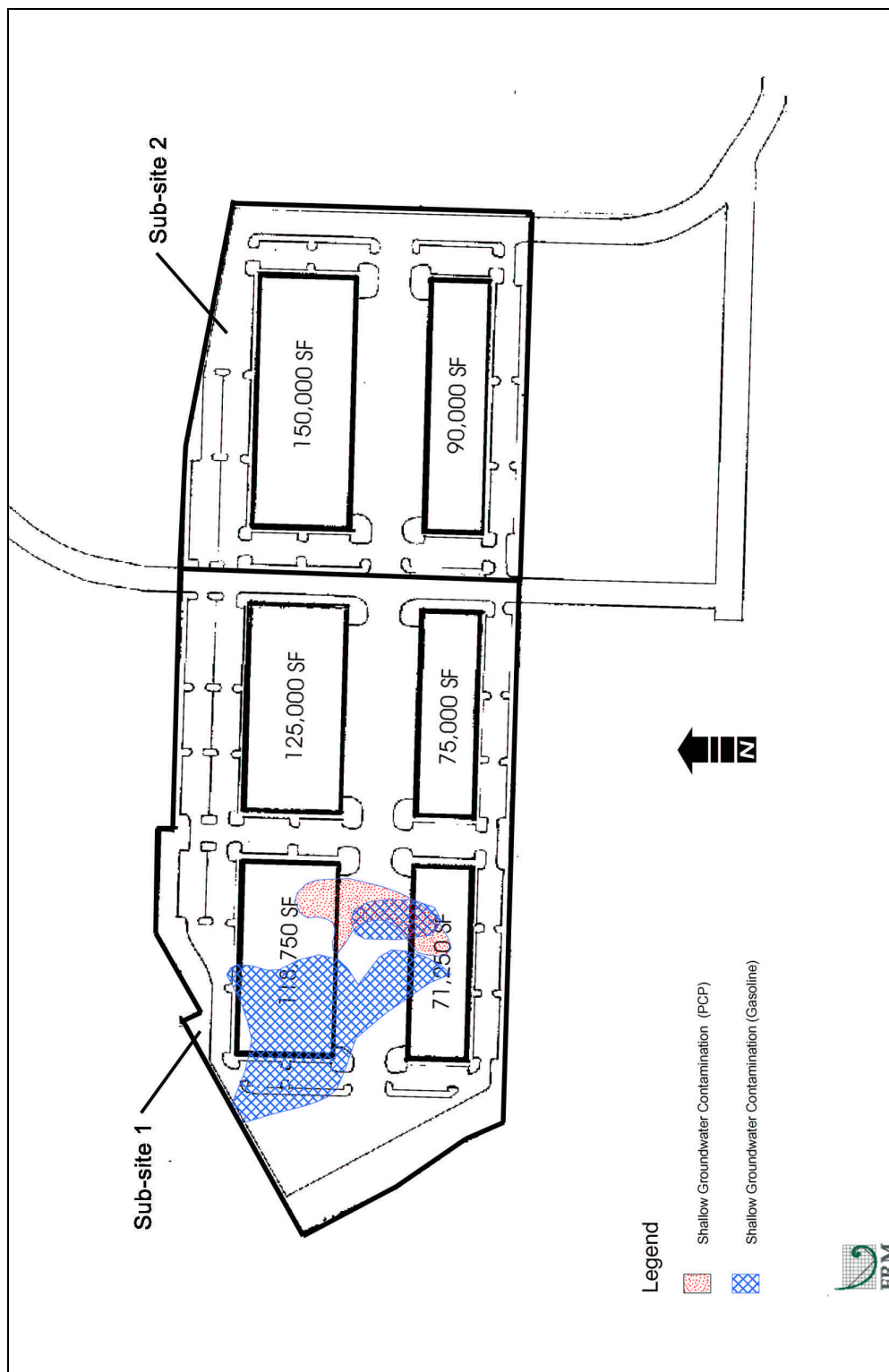
**Remediation – Groundwater:** Continue operation of the existing PCP pump-and-treat system. Install an active or passive vapor control system. Enhanced bioremediation and/or monitored natural attenuation is required for the petroleum contaminated groundwater.

**Remediation – Stormwater:** Treatment will be required if the site is not surface clean.

Sub-Site 2

The eastern portion of the site has limited petroleum hydrocarbon contamination from oil used on the road to suppress dust in the air. Soil was removed and resulted in an Easement and Equitable Servitude (E&ES) agreement limiting its use to commercial and industrial uses. No further action is required.

**Remediation – Soil:** Remediation completed. No further action is required.



**Figure 4 – Industrial Park Brownfield Environmental Contamination Locations**  
(Source: ERM – See Exhibit B)

***Site Plan Description***

The conceptual development plan includes 630,000 SF of industrial park space in six buildings. These buildings are located on the site to maximize efficiency and take advantage of double loading dock/truck areas. The private street is extended through the site with separate access points for autos and trucks.

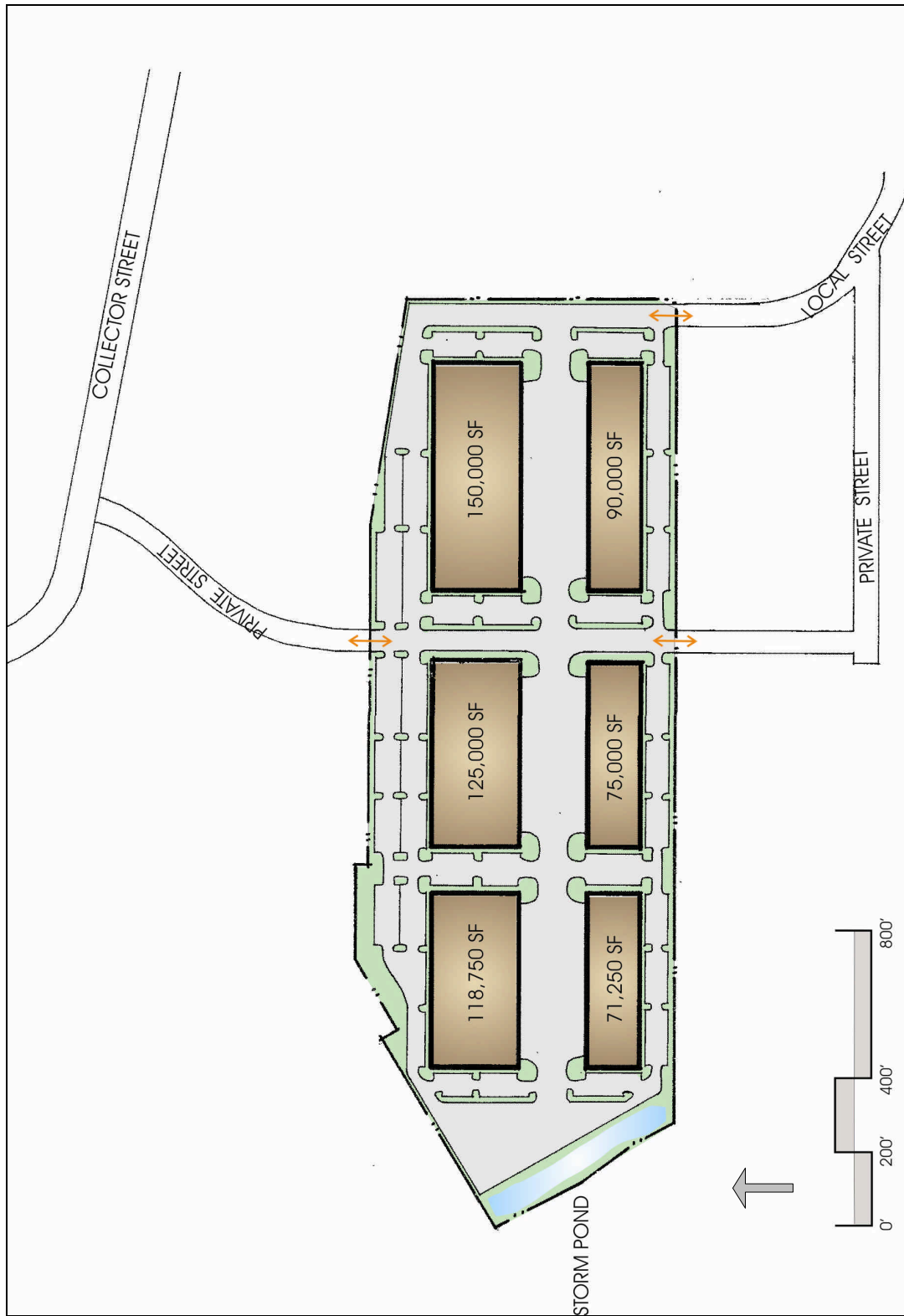


Figure 5 – Industrial Park Brownfield Conceptual Site Plan

***Development Costs***

Development costs for the conceptual site plan are compiled based on the methodology and assumptions identified in Section 2 of this report. The costs to develop this site are only slightly higher (approximately \$900,000) than the same use on the greenfield site.

**On-Site Construction Costs**

The on-site construction costs for the industrial park use are estimated to be \$30 – \$35 per building square foot. Additional costs are associated with the removal of existing tanks on the site and with the sitework, due to the specialized equipment and staff required with construction on a brownfield site. The hard costs for on-site construction total approximately \$23 million. When soft costs associated with the on-site construction are included, the total on-site construction costs for the industrial park use is approximately \$27.6 million. This is \$2,416,200 less than the on-site construction costs associated with the respective greenfield site.

**ON-SITE CONSTRUCTION COSTS**

<b>On-Site Construction Costs</b>	<b>Rate</b>	<b>Fee</b>
Base Hard Costs	\$30 – \$35 per building SF	\$22,050,000
Tank Removal	21 tanks – rate based on size of tank	\$375,000
Brownfield Sitework Surcharge	additional 25% of sitework costs <sup>1</sup>	\$661,500
Hard Costs		\$23,086,500
Soft Costs	20% of construction costs	\$4,617,300
<b>Total On-Site Construction</b>		<b>\$27,703,800</b>

**System Development Charges and Credits (SDC's)**

Redevelopment of the site will require the payment of System Development Charges for sanitary sewer, water, storm drainage, and streets. These fees vary by jurisdiction in terms of rate and method of measurement. As this site has existing development, credits are available for an existing water meter and sanitary sewer system impacts. No records are available regarding street SDC credits. In addition, this project assumed an existing impervious area of 10% of the site; as such, the storm SDC charge is reduced. The total SDC's associated with this concept are \$1,820,875, which is \$107,666 higher than the SDC's associated with the greenfield site.

<sup>1</sup> Sitework costs are included in the base hard costs and include those costs associated with on-site grading, infrastructure and site improvements. Sitework costs are assumed to be 12% of the total base hard costs. For brownfield sites, this 12% is multiplied by 25% to provide an estimate cost for the specialized equipment and staff required for brownfield sitework.



**SYSTEM DEVELOPMENT CHARGES AND CREDITS (SDC'S)**

Cost	Rate	Fee <sup>1</sup>
Sanitary Sewer	\$2,680 per EDU <sup>2</sup>	\$584,240
Water	Seven 2" meters @ \$12,453	\$87,171
Storm Drainage	Three fees <sup>3</sup>	\$160,531
Streets	\$1.61 per building SF	\$1,014,300
Parks	No fee	\$0
Subtotal		\$1,846,243
SDC Credits	One 3" meter, 1 EDU	<\$25,368>
<b>Net Total</b>		<b>\$1,820,875</b>

- 1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.
- 2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (7 fixture units = 1 EDU). This concept assumed 218 EDU's, or 1,526 fixture units. Dependent on the water needs of specific tenants, this fee could be assessed on actual water usage/discharge, which may result in a different SDC.
- 3 Storm SDC based on three fees: 1) \$110 per 1,000 SF of new impervious area, 2) \$3.52 per linear feet of street frontage; 3) \$1.80 per daily vehicle trip

**Off-Site Construction Costs**

Infrastructure improvements identified with this concept plan include:

- *Sanitary Sewer* – The existing 12" and 15" mains within the site boundary are sufficient to serve the proposed development.
- *Water* – The existing 24" main adjacent to the site is sufficient to serve the proposed development.
- *Storm Drainage* – A connection to the existing system, 800 feet north of the site, to serve the proposed development.
- *Street* – Improvements to the private street, which bisects the site and provides connections to the north and south, are necessary with development of the site.

The total costs associated with the off-site improvements are \$558,000. This total is \$5,181,167 less than the off-site costs associated with the greenfield site.

**OFF-SITE CONSTRUCTION COSTS**

Cost	Fee
Sanitary Sewer	\$0
Water	\$0
Storm Drainage	\$48,000
Street	\$510,000
<b>Total</b>	<b>\$558,000</b>

### Environmental Remediation Costs

The environmental remediation proposed for the site is identified in the Environmental Summary portion of this section, on page 36. The following identifies the costs associated with this remediation.

#### **ENVIRONMENTAL REMEDIATION HARD COSTS**

<b>Cost</b>	<b>Fee</b>
Soil remediation	\$790,000
Groundwater remediation	\$1,000,000
Stormwater management	\$200,000
Regulatory / PM Costs	\$200,000
<b>Total</b>	<b>\$2,190,000</b>

There are other costs associated with the remediation of this site. Remediation soft costs include insurance costs, planning and legal expenses. The Carrying Cost Interest is the interest cost accrued during remediation, for an assumed 24-month timeline at a 30% cost of equity and 8.50% cost for debt. The risk premium is assumed to be 0.5% of total development costs based on the perceived additional risk associated with the brownfield contamination.

#### **ENVIRONMENTAL REMEDIATION OTHER COSTS**

<b>Cost</b>	<b>Fee</b>
Soft Cost	\$950,800
Carrying Cost Interest	\$3,552,246
Risk Premium	\$2,055,817
<b>Total</b>	<b>\$6,558,863</b>

### ***Financial Characteristics / Residual Land Value***

The industrial park program, when applied to the brownfield site, yields a modest residual land value of approximately \$1.26 million (\$0.63 per square foot). This value would significantly increase to \$10 million (\$5.08 per square foot) if the \$8.6 million in remediation costs are excluded. Carrying costs and risk premiums account for the majority of remediation costs, with hard and soft costs totaling just over \$3.0 million. Off-site costs in this scenario are minimal, adding only \$0.89 per square foot to the overall cost prior to remediation.

The following pro forma summarizes these characteristics.

# **Brownfield Site - Portland** **INDUSTRIAL PARK** **SUMMARY INFORMATION**

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		45.50		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,981,980			7.00%	7.00%
Building Size (SF)		630,000			25	25
Leasable Area (SF)		630,000			1.20	
Site Coverage/Net		31.79%				80%
INCOME SUMMARY:					\$3,708,180	\$3,708,180
	Total SF	Annual Net Rent/SF	Annual Rent			8.25%
Office Space	0	\$0.00	\$0		\$36,434,646	\$35,958,109
Distribution Space	0	\$5.00	\$0		\$3,090,150	\$3,049,733
Industrial/Flex Space	630,000	\$6.54	\$4,120,200	EQUITY ASSUMPTIONS:		
Retail Space	0	\$0.00	\$0	Total Development Cost/Excluding Remediation:		\$39,992,575
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		(35,958,109)
Vacancy & Collection		10%	(\$412,020)	Net Equity Required		10.1%
TOTAL	630,000	\$5.89	\$3,708,180			\$4,034,466
COST SUMMARY:				MEASURES OF RETURN:		
	Per SF	Units	Total	Return on Investment (ROI)		9.27%
Real Market Value 6/	\$5.00	1,981,980	\$9,909,900	Return on Equity (ROE)		29.52%
Direct Construction Cost				Threshold ROI		9.25%
On-Site Construction Costs	\$36.65	630,000	\$23,086,500	Residual Property Value		\$10,005,757
Soft Costs	\$7.33	630,000	\$4,617,300	Residual Property Value PSF/Net		\$5.05
SDCs - Net	\$2.89	630,000	\$1,820,875	ENVIRONMENTAL REMEDIATION COSTS		
Offsite Construction Costs	\$0.89	630,000	\$558,000	Hard Costs		\$2,190,000
TOTAL/Less Remediation	\$63.48	630,000	\$39,992,575	Soft Costs 2/		\$950,800
				Clean-Up Period (Months)		24
				Carrying Cost Interest		\$3,552,246
				Developer Risk Premium - ROI		0.50%
				Developer Risk Premium		\$2,055,817
				Adjusted Residual Property Value 3/		\$1,256,894
				Adjusted Residual Property Value PSF/Net		\$0.63

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

6/ Source of Real Market Value is County tax assessor records.

## INDUSTRIAL PARK – GREENFIELD SITE

The industrial park greenfield site is located in Tualatin, Oregon. It is a portion of a larger, 249-acre site that was recently brought into the Urban Growth Boundary and will be zoned Industrial in the future. Currently, access to the site is from a local street to the north; however, the development of the entire greenfield site will require considerable street infrastructure extensions adjacent to and through the site. Significant utility extensions for water, sanitary, and storm drainage will also be required.

The portion of the greenfield selected for development is 44.5 acres in size. The site is generally square in shape and the north side of the site is bound by an area with an environmental overlay. Based on the conceptual master plan for the overall site, development of the 44.5-acre area will require either the construction of improvements at the time of development, or a financial contribution from the developer equivalent to the site's proportionate share of the overall cost to extend all infrastructure to and through the site.

The identical program that was used for the brownfield site was applied to the greenfield site: 630,000 SF of industrial park space in six buildings. Due to the site's shape and the required street and infrastructure improvements, the configuration differs from the brownfield site. Five buildings are located east of the street extension and share parking and truck areas, while the sixth building and the on-site storm detention are located west of the street extension.

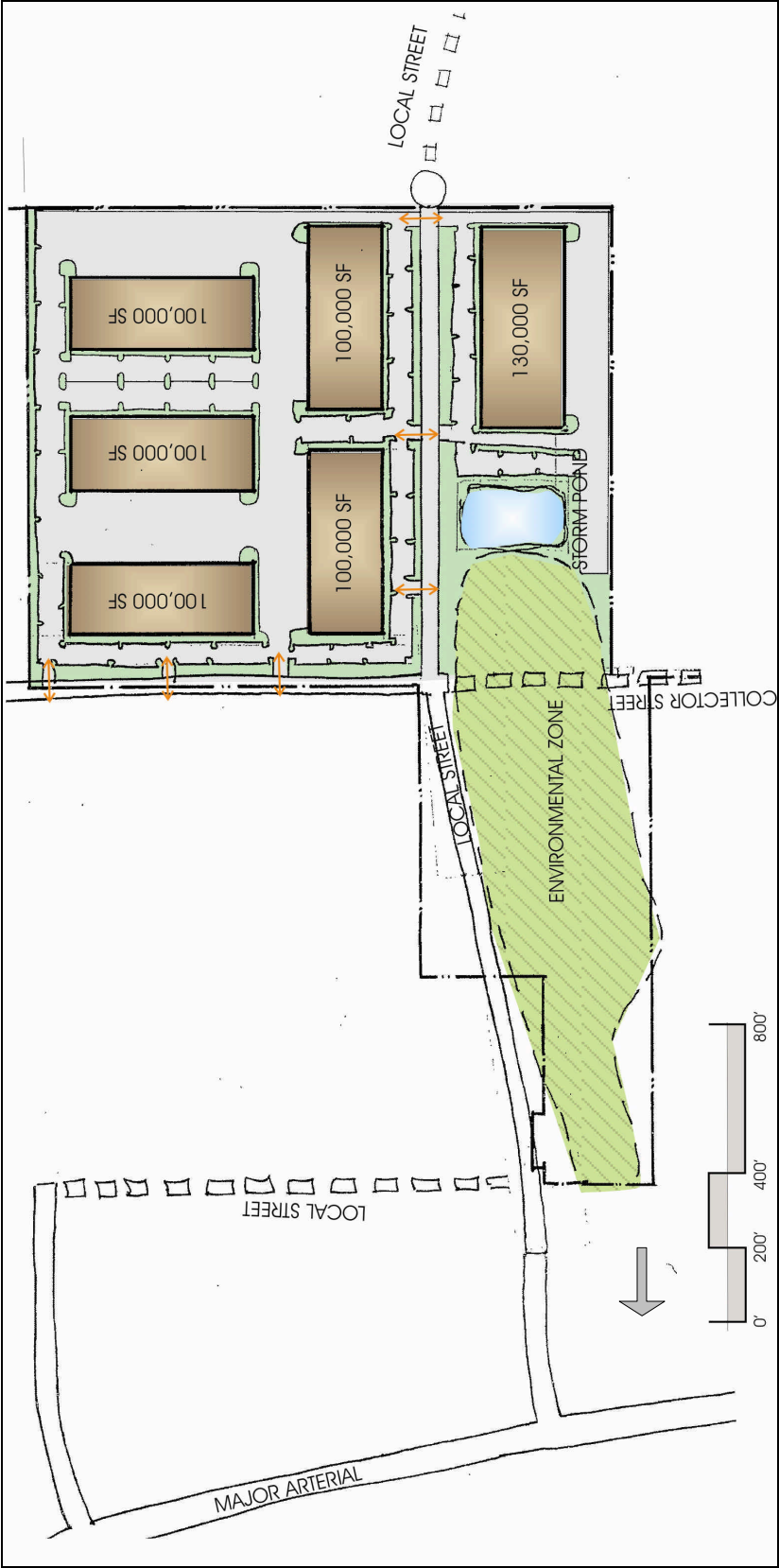


Figure 6 – Industrial Park Greenfield Conceptual Site Plan

***Development Costs***

Development costs for the conceptual site plan are determined based on the methodology and assumptions identified in Section 2 of this report. Overall, the costs to develop this site are only slightly lower (approximately \$900,000) than the costs to develop the same site plan on the brownfield site.

**On-Site Construction Costs**

The base hard costs are identical to the brownfield site plan; however, due to the existing topography of the site, significant grading is required to prepare this site for development. The \$3 million grading costs exceed the additional sitework costs required for the brownfield site by over \$1.9 million. When the soft costs are added to the hard costs, total on-site construction costs for this site are \$30 million, exceeding the total brownfield on-site costs by approximately \$2.5 million.

**ON-SITE CONSTRUCTION COSTS**

<b>Costs</b>	<b>Rate</b>	<b>Fee</b>
Base Hard Costs	\$30 – \$35 per building SF	\$22,050,000
Grading (cut and fill)	600,000 c.y. @ \$5/c.y.	\$3,000,000
Hard Costs		\$25,050,000
Soft Costs		\$5,010,000
<b>Total On-Site Construction</b>		<b>\$30,060,000</b>

**System Development Charges and Credits**

Development will require the payment of SDC's for sanitary sewer, water, storm drainage and streets. The site has historically been utilized for mining uses. As such, it is assumed that no SDC credit for prior development is applicable. However, it should be noted that the off-site improvements likely to be required with the development of the site, as discussed below, might be eligible for SDC credits, thereby reducing the overall SDC costs for the project. The total SDC's associated with the concept on this site are \$1,713,209. This is \$107,666 less than the SDC's associated with the brownfield site.

**SYSTEM DEVELOPMENT CHARGES AND CREDITS**

<b>Cost</b>	<b>Rate</b>	<b>Fee<sup>1</sup></b>
Sanitary Sewer	\$2,500 per EDU <sup>2</sup>	\$237,500
Water	Seven – 2" meters at \$22,068	\$154,476
Storm Drainage	\$500 per 2,640 SF impervious area	\$183,938
Streets	\$259 per trip	\$1,137,295
Parks	No charge	\$0
Subtotal		\$1,713,209
SDC Credits	None	\$0
<b>Net Total</b>		<b>\$1,713,209</b>

- 1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.
- 2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (16 fixture units = 1 EDU). This concept assumed 95 EDU's, or 1,526 fixture units. Dependent on the water needs of a specific industrial park tenant, this fee could be assessed on actual water usage/discharge, which may result in a different SDC.

### Off-Site Construction Costs

The selected site is a portion of a larger greenfield site, which requires significant infrastructure extensions including sanitary sewer, water, storm drainage and street improvements. Preliminary plans and costs for these improvements have been developed. As such, for this study it is assumed that the specific site would contribute a proportionate share of the overall infrastructure improvements necessary to serve the area.<sup>1,2</sup>

The total off-site infrastructure costs for this site are \$5,739,167. These costs are around \$5.1 million more than the off-site costs for the brownfield site.

#### **OFF-SITE CONSTRUCTION COSTS**

<b>Cost</b>	<b>Fee</b>
Sanitary Sewer	\$950,780
Water	\$631,057
Storm Drainage	\$1,080,498
Street	\$3,076,832
<b>Total</b>	<b>\$5,739,167</b>

### ***Financial Characteristics / Residual Land Value***

The return on investment and residual land value under this scenario is substantially impacted by the unusually high off-site construction costs required on this site, as well as a \$3 million grading requirement. The overall development cost less remediation on this site is \$7.2 million greater than that on the brownfield site. As a result of the unusually high construction costs, the residual land value under this scenario is a relatively modest \$2.5 million, reflecting a value of \$1.33 per square foot.

The following pro forma summarizes these characteristics.

<sup>1</sup> Discussions with PGE identified potential supply and distribution upgrades that may be required for this greenfield site. These upgrades may be required to meet the demands created by full or partial build-out of the entire site. The development projects used as part of this project's methodology were not sufficient to trigger larger system upgrades, therefore these potential costs are not included as part of the pro forma analysis. If these costs were necessary and this development project was required to participate, it is possible the total costs associated with this greenfield site would exceed the brownfield site.

<sup>2</sup> Conceptual infrastructure plans and costs for off-site improvements associated with the entire 249-acre site were completed by CH2M Hill for the City of Tualatin. These costs were applied proportionately to the 44.5-acre site studied. Costs included all infrastructure necessary to accommodate the development of the site. See the Methodology Section (page 22) for additional information.



# **Greenfield Site - Tualatin INDUSTRIAL PARK SUMMARY INFORMATION**

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		44.50			DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,938,420		Interest Rate	7.00%	7.00%
Building Size (SF)		630,000		Term (Years)	25	25
Leasable Area (SF)		630,000		Debt-Coverage Ratio	1.20	
Site Coverage/Net		32.50%		Loan-to-Value		80%
INCOME SUMMARY:				Stabilized NOI	\$3,708,180	\$3,708,180
	Total SF	Annual Net Rent/SF	Annual Rent	Assumed CAP Rate		8.25%
Office Space	0	\$0.00	\$0	Supportable Mortgage	\$36,434,646	\$35,958,109
Distribution Space	0	\$5.00	\$0	Annual Debt Service	\$3,090,150	\$3,049,733
Industrial/Flex Space	630,000	\$6.54	\$4,120,200	EQUITY ASSUMPTIONS:		
Retail Space	0	\$0.00	\$0	Total Development Cost/Excluding Remediation:		\$47,204,476
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		(35,958,109)
Vacancy & Collection		10%	(\$412,020)	Net Equity Required	23.8%	\$11,246,367
<b>TOTAL</b>	630,000	\$5.89	\$3,708,180	MEASURES OF RETURN:		
COST SUMMARY:				Return on Investment (ROI)		7.86%
	Per SF	Units	Total	Return on Equity (ROE)		10.59%
Real Market Value 6/	\$5.00	1,938,420	\$9,692,100	Threshold ROI		9.25%
Direct Construction Cost				Residual Property Value		\$2,576,056
On-Site Construction Costs	\$39.76	630,000	\$25,050,000	Residual Property Value PSF/Net		\$1.33
Soft Costs	\$7.95	630,000	\$5,010,000	ENVIRONMENTAL REMEDIATION COSTS		
SDCs - Net	\$2.72	630,000	\$1,713,209	Hard Costs		\$0
Offsite Construction Costs	\$9.11	630,000	\$5,739,167	Soft Costs 2/		\$0
<b>TOTAL/Less Remediation</b>	\$74.93	630,000	<b>\$47,204,476</b>	Developer Risk Premium - ROI		0.00%
				Developer Risk Premium		\$0
				Adjusted Residual Property Value 3/		\$2,576,056
				Adjusted Residual Property Value PSF/Net		\$1.33

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

6/ Source of Real Market Value is County tax assessor records.

## INDUSTRIAL PARK – FINANCIAL SUMMARY

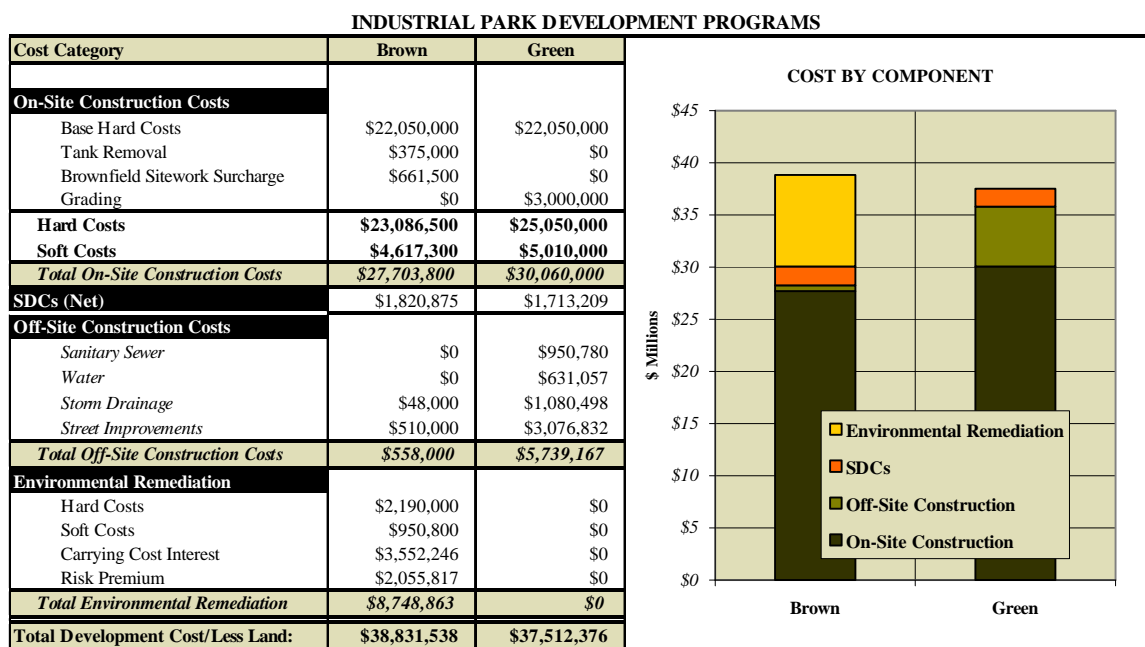
The industrial park program evaluated includes 630,000 square feet of industrial/flex space, in multiple single-story buildings with surface parking. When fully leased, the site would provide 315 to 1,575 jobs.

Baseline direct hard construction costs under both scenarios are estimated at just over \$22.0 million. Additional costs on the brownfield sites include tank removal (\$325,000) and a 25% increase in overall sitework costs (\$661,500). The greenfield site evaluated has an additional cost of \$3.0 million for cut and fill requirements, more than offsetting the additional costs on the brownfield site.

Off-site construction costs are significantly higher for the greenfield site in this instance, as major infrastructure extensions and improvements are necessary to facilitate the assumed program. Soft costs for both sites are fairly consistent in this instance.

The cost of environmental remediation on the brownfield site is almost \$8.5 million, with carrying cost interest during clean-up and risk premiums having a more substantive impact than hard and soft costs associated with the actual clean-up.

In this instance, total estimated development costs are quite similar, with environmental remediation costs on the brownfield offset to a large extent by the cut and fill requirements and unusually high off-site costs on the greenfield site. Under this scenario, a brownfield site with a relatively low level of contamination is largely equivalent from a development standpoint to a greenfield site with unusually high off-site and on-site costs.



The industrial park program on the selected brownfield site yields a modest residual land value of \$1.6 million (\$0.80 per square foot). This value would be a more respectable \$10.0 million (\$5.08 per square foot) if the \$8.6 million in remediation costs are excluded. Carrying costs and risk premiums account for the majority of remediation costs, with hard

and soft costs totaling just over \$3.0 million. Off-site costs in this scenario are quite small, adding only \$0.89 per square foot to the overall cost prior to remediation.

The return on investment and residual land value under the greenfield scenario are substantially impacted by the unusually high off-site construction costs required on this site, as well as a \$3.0 million grading requirement. The overall development cost, less remediation, on this site is \$7.2 million greater than that on the brownfield site. As a result of the unusually high construction costs, the residual land value under this scenario is a relatively modest \$2.5 million, reflecting a value of \$1.33 per square foot.

## WAREHOUSE / DISTRIBUTION

This use includes industries that furnish local or long-distance trucking or transfer services or are primarily engaged in the warehousing, storage (excluding self-service storage), wholesale and distribution of goods. Generally, these uses require relatively more site area devoted to loading and trailer storage since the primary function is related to the movement of goods.

For this project, 400,000 SF of distribution space in a single building with 200 parking spaces and 300 trailer spaces is placed on both sites.

## WAREHOUSE / DISTRIBUTION – BROWNFIELD SITE

The warehouse/distribution brownfield site is 37.90 acres. The site is zoned General Industrial by the City of Portland. The site is triangular in shape and slopes to the north. The northern portion of the site is also within an environmental overlay, with limited development potential. Existing utilities include a 6" water main in the adjacent local street and 36" and 42" sanitary sewer mains located 200 feet south of the site. There is a 36" storm drain along the western property line; however, drainage to an adjacent water body is also a possibility

### *Environmental Summary*

Because the site comprises two different ownerships (and thus two separate use histories), it can be divided into two sub-site areas: Sub-Site 1 (northern area) and Sub-Site 2 (southern area). These two areas are identified on Figure 7. The subsurface conditions for the entire area have not been fully characterized. However, available data indicates that subsurface soil and groundwater are tainted with a broad range of contaminants, including a free-product petroleum. The following summarizes the contamination within both areas and the proposed remediation associated with each:

#### Sub-Site 1

Uncharacterized soil contamination is present in the former lagoon area.

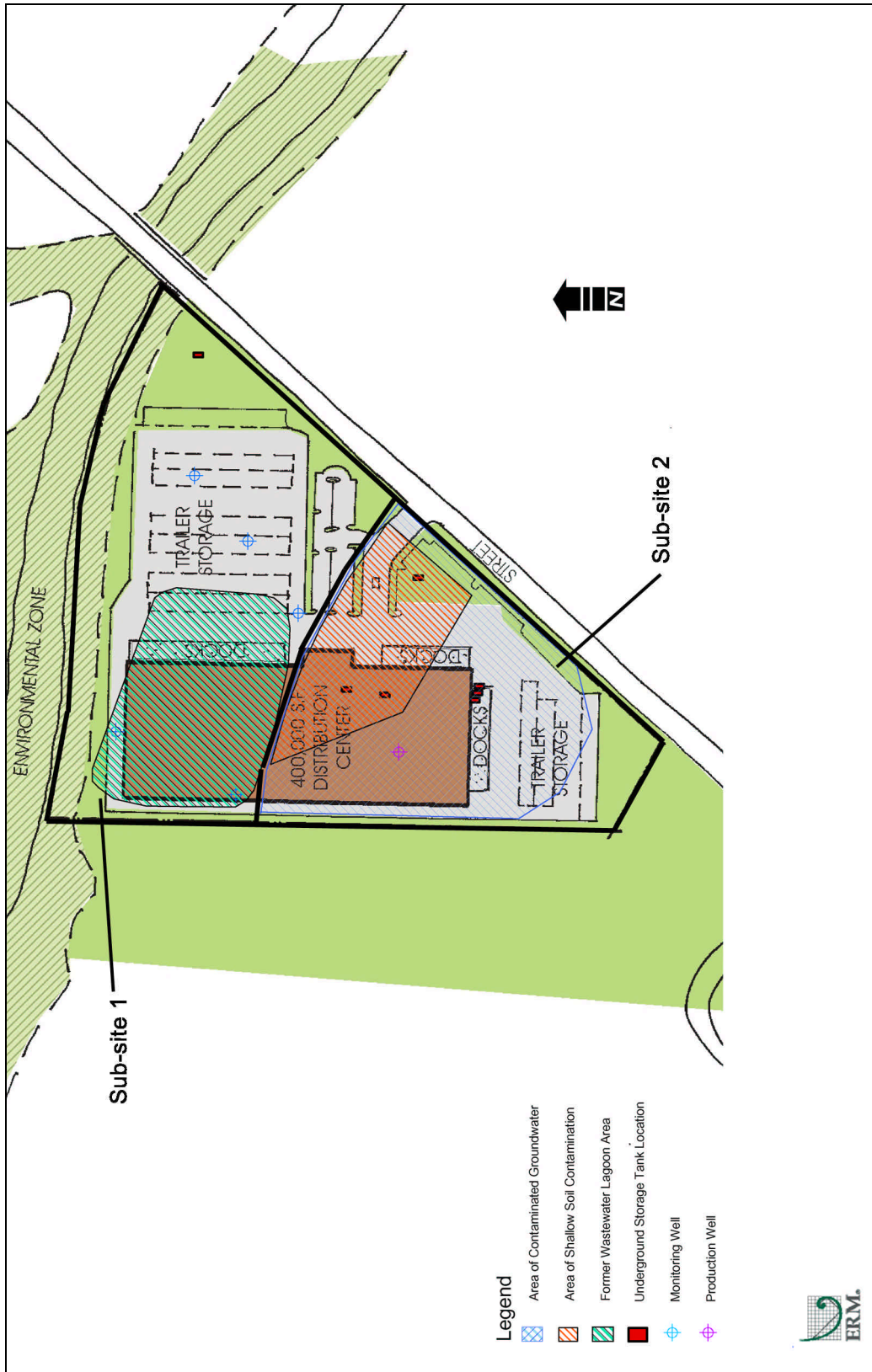
**Remediation – Soil:** The area will be capped with surcharge material and the warehouse building foundation.

#### Sub-Site 2

Shallow polynuclear aromatic hydrocarbon (PAH) contamination exists in this area. Petroleum hydrocarbon contamination may be present near the identified Underground Storage Tank (UST) locations. Some contaminated soil has already been removed. In addition, volatile contaminants have been detected in the groundwater.

**Remediation – Soil:** The area will be capped with surcharge material and the warehouse building foundation.

**Remediation – Groundwater:** Groundwater monitoring will be required for 5 years.



**Figure 7 – Warehouse Distribution Environmental Contamination Locations**  
(Source: ERM – See Exhibit B)

***Site Plan***

The conceptual development plan includes a 400,000 SF distribution center with 300 trailer spaces and 200 parking spaces. The triangular shape of the site directed the concept plan, such that the distribution center has truck access on only two sides. The building is located such that a portion of the foundation can be utilized as the soil “cap” for remediation.

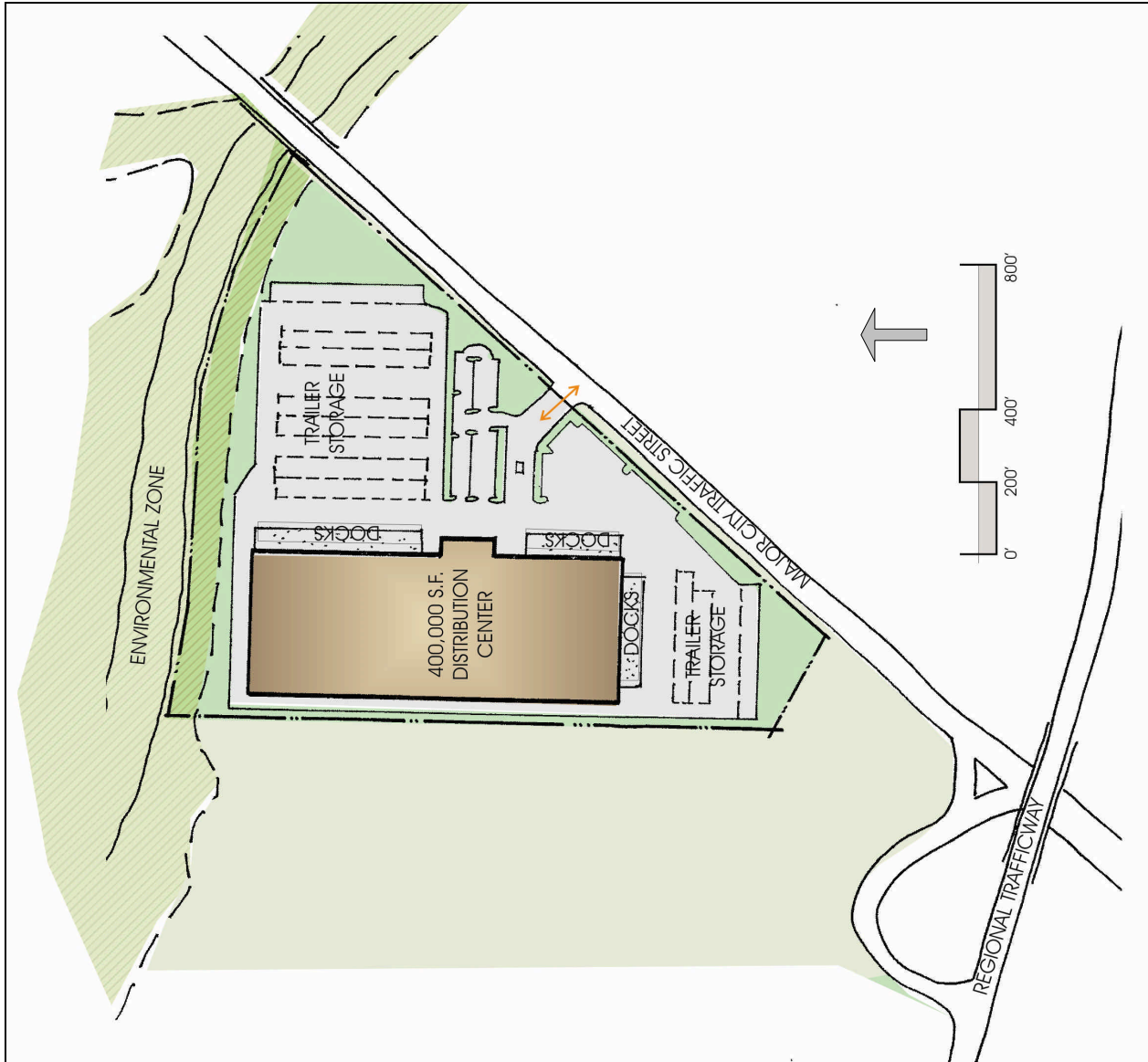


Figure 8 – Warehouse Distribution Conceptual Site Plan



***Development Costs***

Development costs for the conceptual site plan are compiled based on the methodology and assumptions identified in Section 2 of this report. Overall, the costs to develop this site are moderately higher (when compared to the other uses) at approximately \$8.5 million more than the costs to develop the same site plan on the greenfield site.

**On-Site Construction Costs**

The on-site construction costs for this use are estimated to be \$22 - \$27 per building square foot. Additional costs are associated with a private lift station required to serve the site due to topography and also with the sitework, due to the specialized equipment and staff required with construction on a brownfield site. The hard costs for on-site construction total approximately \$11 million. Soft costs associated with the on-site construction are also included. When soft costs associated with the on-site construction are included, the total on-site construction cost for the warehouse and distribution use is slightly over \$13 million. These costs are only \$376,800 more than the greenfield on-site construction costs.

**ON-SITE CONSTRUCTION COSTS**

<b>Cost</b>	<b>Rate</b>	<b>Fee</b>
Base Hard Costs	\$22-\$27 per building SF	\$10,800,000
Lift Station		\$30,000
Brownfield Sitework Surcharge	additional 25% of sitework costs <sup>1</sup>	\$661,500
Hard Costs		\$11,491,500
Soft Costs	20% of construction costs	\$2,298,300
<b>Total</b>		<b>\$13,789,800</b>

**System Development Charges and Credits**

Redevelopment of the site will require the payment of System Development Charges for sanitary sewer, water, storm drainage, and streets. These fees vary by jurisdiction in terms of rate and method of measurement. As this site has existing development, credits are available for two existing water meters and for existing street impacts. No records are available regarding sanitary sewer SDC credits. No records are available regarding street SDC credits. In addition, this project assumes an existing impervious area of 40% of the site; as such, the storm SDC takes this existing impervious area into account. The total SDC's for this site are \$640,050. This is \$90,019 less than the SDC's associated with the greenfield site.

<sup>1</sup> Sitework costs are included in the base hard costs include those costs associated with on-site grading, infrastructure and site improvements. These Sitework costs are assumed to be 12% of the on-site construction total base hard costs. For brownfield sites, this 12% is multiplied by 25% to provide an estimate cost for the specialized equipment and staff required for brownfield sitework.

**SYSTEM DEVELOPMENT CHARGES AND CREDITS**

<b>Cost</b>	<b>Rate</b>	<b>Fee<sup>1</sup></b>
Sanitary Sewer	\$2,680 per EDU <sup>2</sup>	\$160,800
Water	One 2" meter @ \$12,453	\$12,453
Storm Drainage	Combined fee <sup>3</sup>	\$82,654
Streets	\$1.15 per building SF	\$460,000
Parks	No fee	\$0
Subtotal		\$715,907
SDC Credits	One 3" meter, existing Street SDC	<\$75,858>
<b>Net Total</b>		<b>\$640,049</b>

- 1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.
- 2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (7 fixture units = 1 EDU). This concept assumed 60 EDU's or 420 fixture units. Dependent on the water needs of a specific user, this fee could be assessed based on actual water usage/discharge, which may result in a different SDC.
- 3 Storm SDC based on three fees: (1) \$110 per 1,000 SF of new impervious area, (2) \$3.52 per linear feet of street frontage; (3) \$1.80 per daily vehicle trip.

**Off-Site Construction Costs**

Infrastructure improvements identified with this concept plan include:

- *Sanitary Sewer* – Extend sewer from 42" interceptor located 200' south of site, across railroad, to serve the site. Includes private lift station due to site topography.
- *Water* – Upsize the existing 6" service with a 12" waterline from site to the existing main 1,000 l.f. to the south. It should be noted that the service is not looped and will be a dead-end to the site.
- *Storm Drainage* – This concept assumes storm drainage will outfall to the adjacent water body.
- *Street Improvements* – Construct a half-street improvement, including sidewalk and street trees, along the site's frontage.

The total costs associated with these off-site improvements are \$735,000. This is \$444,500 more than the off-site construction costs associated with the greenfield site.

**OFF-SITE CONSTRUCTION COSTS**

<b>Cost</b>	<b>Fee</b>
Sanitary Sewer	\$35,000
Water	\$200,000
Storm Drainage	\$0
Street	\$500,000
<b>Total</b>	<b>\$735,000</b>

### Environmental Remediation Costs

The environmental remediation proposed for the site is identified in the Environmental Summary portion of this section on page 52. The following identifies the costs associated with this remediation.

#### **ENVIRONMENTAL REMEDIATION HARD COSTS**

<b>Cost</b>	<b>Fee</b>
Site Surcharge	\$720,000
Site Cap	\$200,000
Regulatory / PM Costs	\$350,000
<b>Total</b>	<b>\$1,270,000</b>

There are other costs associated with the remediation of this site. Remediation soft costs include insurance costs, planning and legal expenses. The Carrying Cost Interest is the interest cost accrued during remediation, for an assumed 24-month timeline at a 30% cost of equity and 8.50% cost for debt. The risk premium is assumed to be 0.5% of total development costs based on the perceived additional risk associated with the brownfield contamination.

#### **ENVIRONMENTAL REMEDIATION OTHER COSTS**

<b>Cost</b>	<b>Fee</b>
Soft Cost	\$606,400
Carrying Cost Interest	\$4,768,905
Risk Premium	\$1,176,471
<b>Total</b>	<b>\$6,551,776</b>

### ***Financial Characteristics / Residual Land Value***

The brownfield site used for this scenario presented a number of additional cost factors, increasing the total cost without remediation by \$3.8 million relative to the greenfield site evaluated. As a result, the indicated residual land prior to remediation costs is \$6.4 million, or \$3.89 per square foot. With an estimated \$7.8 million in overall remediation costs, the property is seen as having a negative value of \$1.4 million under the scenario evaluated.

The following pro forma summarizes these characteristics.

**Brownfield Site - Portland**  
**WAREHOUSE/DISTRIBUTION**  
**SUMMARY INFORMATION**

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		37.90		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,650,924			7.00%	7.00%
Building Size (SF)		400,000			25	25
Leasable Area (SF)		400,000			1.20	
Site Coverage/Net		24.23%				80%
INCOME SUMMARY:						
	Total SF	Annual Net Rent/SF	Annual Rent		\$1,800,000	\$1,800,000
Office Space	0	\$0.00	\$0			8.25%
Distribution Space	400,000	\$5.00	\$2,000,000		\$17,685,863	\$17,454,545
Industrial/Flex Space	0	\$0.00	\$0		\$1,500,000	\$1,480,381
General Manufacturing	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
Parking	0	\$0.00	\$0	Total Development Cost/Excluding Remediation:		
Vacancy & Collection		10%	(\$200,000)	(-) Permanent Loan 1/		
TOTAL	400,000	\$4.50	\$1,800,000	Net Equity Required 24.2%		
COST SUMMARY:				MEASURES OF RETURN:		
	Per SF	Units	Total	Return on Investment (ROI)		
Real Market Value 6/	\$5.00	1,650,924	\$8,254,620	Return on Equity (ROE)		
Direct Construction Cost				Threshold ROI		
On-Site Construction Costs	\$27.89	400,000	\$11,154,000	Residual Property Value		
Soft Costs	\$5.58	400,000	\$2,230,800	Residual Property Value PSF/Net		
SDCs - Net	\$1.60	400,000	\$640,049	ENVIRONMENTAL REMEDIATION COSTS		
Offsite Construction Costs	\$1.84	400,000	\$735,000	Hard Costs		
TOTAL/Less Remediation	\$57.54	400,000	\$23,014,469	Soft Costs 2/		
				Clean-Up Period (Months)		
				Carrying Cost Interest		
				Developer Risk Premium - ROI		
				Developer Risk Premium		
				Adjusted Residual Property Value 3/		
				Adjusted Residual Property Value PSF/Net		

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.


1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

6/ Source of Real Market Value is County tax assessor records.

## WAREHOUSE / DISTRIBUTION – GREENFIELD SITE

This vacant greenfield site is 25.91 acres. The site is zoned General Industrial by the City of Portland. It is generally rectangular in shape and has relatively flat topography. Adjacent property includes a large undeveloped area that could be combined with this site to provide a larger development area; however, the size and capacity of the brownfield site directed the utilization of this site. The site is adjacent to an area that contains natural resources; however, no environmental overlay designations are located on the subject site. Access to the site is via two local streets that intersect at the midpoint of the site's southern boundary. The northern boundary fronts a major collector; however no direct access is permitted. Utilities are available in the local streets and include an existing 12" waterline. Sanitary sewer service is available 900 feet to the south.

### *Site Plan Description*

With the shape and location of the site, the 400,000 SF distribution center and the 300 trailer and 200 auto parking spaces are sited on 25.91 acres, while 37.9 acres are required for the brownfield site. While this site has the ability to accommodate a distribution facility with truck access and docks on multiple sides, the plan shows a concept comparable to the brownfield concept with limited options for docks and truck access.

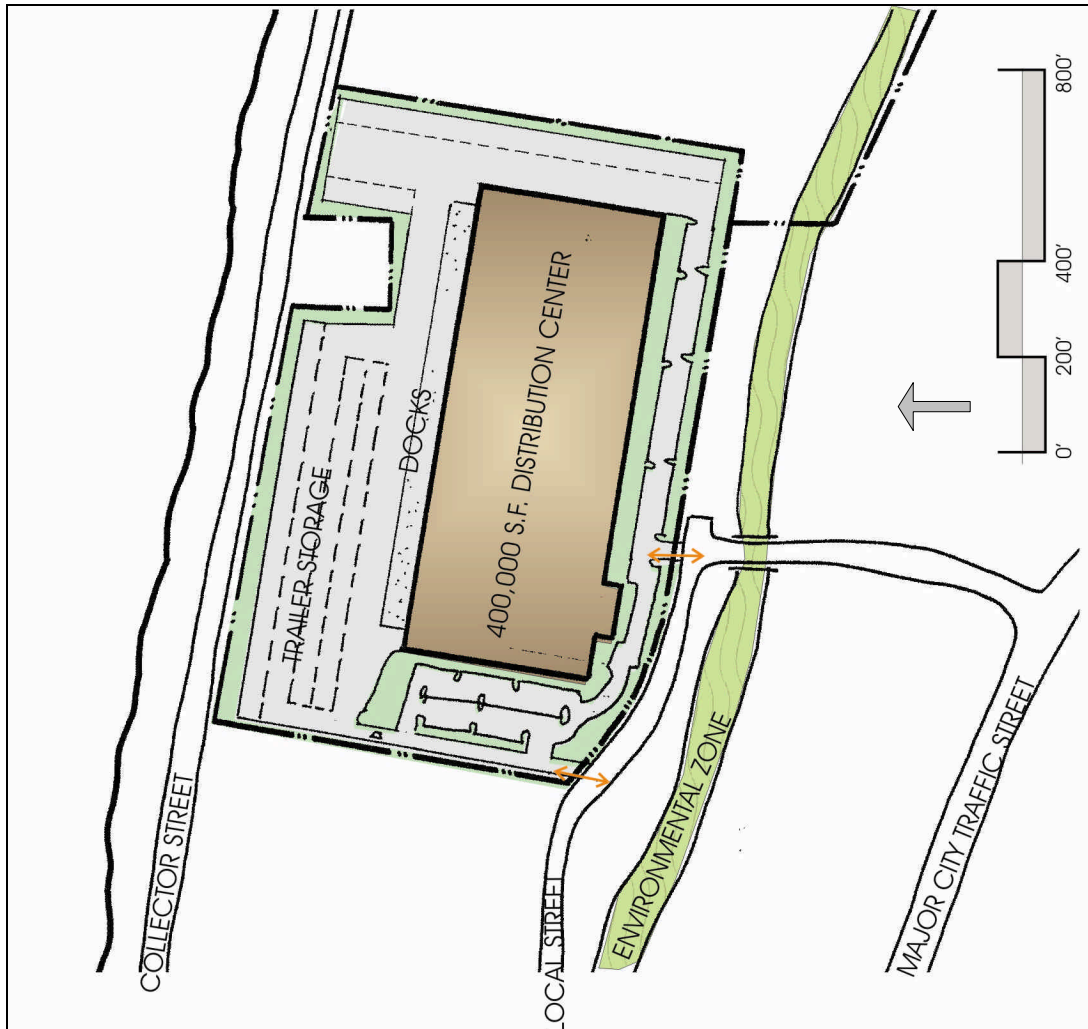


Figure 9 – Warehouse Distribution Greenfield Conceptual Site Plan

***Development Costs***

Development costs for the conceptual site plan are compiled based on the methodology and assumptions identified in Section 2. Overall, the costs to develop this site are moderately lower (when compared with the other greenfield sites), approximately \$8.5 million less than the costs to develop the same site plan on the brownfield site.

**On-Site Construction Costs**

The base hard costs are the same as for the brownfield site plan, plus the addition of a lift station for sanitary sewer service. This brings the total hard costs to \$10.8 million. When the soft costs are added, the total on-site construction costs are \$13 million. These cost are only \$376,800 less than the brownfield costs.

**ON-SITE CONSTRUCTION COSTS**

<b>Cost</b>	<b>Rate</b>	<b>Fee</b>
Base Hard Costs	\$22 – \$27 per building SF	\$10,800,000
Lift Station		\$40,000
Hard Costs		\$10,840,000
Soft Costs		\$2,168,000
<b>Total</b>		<b>\$13,008,000</b>

**System Development Charges and Credits**

Development will require the payment of SDC's for sanitary sewer, water, storm drainage, streets, and parks. The site is vacant and has historically been utilized for agricultural uses. As such, it is assumed that no SDC credit for prior development is applicable. However, it should be noted that a portion of the off-site improvements required with the development of the site might be eligible for SDC credits, thereby reducing the overall SDC costs for the project. The total SDC's for the greenfield site are \$730,069. This is \$90,019 more than the SDC's associated with the brownfield site.

**SYSTEM DEVELOPMENT CHARGES AND CREDITS**

<b>Cost</b>	<b>Rate</b>	<b>Fee<sup>1</sup></b>
Sanitary Sewer	\$2,680 per EDU <sup>2</sup>	\$160,800
Water	One 2" meter @ \$12,453	\$12,453
Storm Drainage	Three fees <sup>3</sup>	\$96,816
Streets	\$1.15 per building SF	\$460,000
Parks	No charge	\$0
Subtotal		\$730,069
SDC Credits	None	\$0
<b>Net Total</b>		<b>\$730,069</b>

- 1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.
- 2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (7 fixture units = 1 EDU). This concept assumed 60 EDU's or 420 fixture units. Dependent on the water needs of a specific user, this fee could be assessed based on actual water usage/discharge, which may result in a different SDC.
- 3 Storm SDC based on three fees: (1) \$110 per 1,000 SF of new impervious area, (2) \$3.52 per linear feet of street frontage; and (3) \$1.80 per daily vehicle trip.

### Off-Site Construction Costs

This greenfield site is within the City limits and served by existing infrastructure. With the development of the site, limited off-site improvements are required. These are as follows:

- *Sanitary Sewer* – Extend sanitary sewer service 900 l.f. from existing service. Provide private lift station to serve the site due to topography.
- *Water* – The existing 12" water main in the adjacent street is sufficient to serve the proposed development.
- *Storm Drainage* – This concept assumes storm drainage will outfall to the adjacent water body.
- *Street Improvements* – Extend a full-street improvement the length of the site's frontage.

The total costs associated with these off-site improvements are \$290,500. This is \$444,500 less than the off-site improvements associated with the brownfield costs. These costs are identified in the chart below.

#### **OFF-SITE CONSTRUCTION COSTS**

<b>Cost</b>	<b>Fee</b>
Sanitary Sewer	\$63,000
Water	\$0
Storm Drainage	\$0
Street	\$227,500
<b>Total</b>	<b>\$290,500</b>

### ***Financial Characteristics / Residual Land Value***

The greenfield site scenario evaluated with the warehouse/distribution program yield a strong residual property value under our assumptions of \$7.1 million, or \$6.88 per square foot. The site selected requires minimal off-site costs, and SDCs are also quite low. As a result, the indicated residual land value is largely consistent with current market prices for this type of use.

The following pro forma summarizes these characteristics.



**Greenfield Site - Portland**  
**WAREHOUSE/DISTRIBUTION**  
**SUMMARY INFORMATION**

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		23.85		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,038,906			7.00%	7.00%
Building Size (SF)		400,000			25	25
Leasable Area (SF)		400,000			1.20	
Site Coverage/Net		38.50%				80%
INCOME SUMMARY:					\$1,800,000	\$1,800,000
	Total SF	Annual Net Rent/SF	Annual Rent			8.25%
Office Space	0	\$0.00	\$0		\$17,685,863	\$17,454,545
Distribution Space	400,000	\$5.00	\$2,000,000		\$1,500,000	\$1,480,381
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	0	\$0.00	\$0	Total Development Cost/Excluding Remediation:		
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		
Vacancy & Collection		10%	(\$200,000)	Net Equity Required		
<b>TOTAL</b>	400,000	\$4.50	\$1,800,000	10.0%		
COST SUMMARY:				MEASURES OF RETURN:		
	Per SF	Units	Total	Return on Investment (ROI)		
Real Market Value 6/	\$5.00	1,038,906	\$5,194,530	Return on Equity (ROE)		
Direct Construction Cost				Threshold ROI		
On-Site Construction Costs	\$27.10	400,000	\$10,840,000	Residual Property Value		
Soft Costs	\$5.42	400,000	\$2,168,000	Residual Property Value PSF/Net		
SDCs - Net	\$1.83	400,000	\$730,069	ENVIRONMENTAL REMEDIATION COSTS		
Offsite Construction Costs	\$0.73	400,000	\$290,500	Hard Costs		
<b>TOTAL/Less Remediation</b>	\$48.06	400,000	\$19,223,099	Soft Costs 2/		
				Clean-Up Period (Months)		
				Carrying Cost Interest		
				Developer Risk Premium - ROI		
				Developer Risk Premium		
				Adjusted Residual Property Value 3/		
				Adjusted Residual Property Value PSF/Net		

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

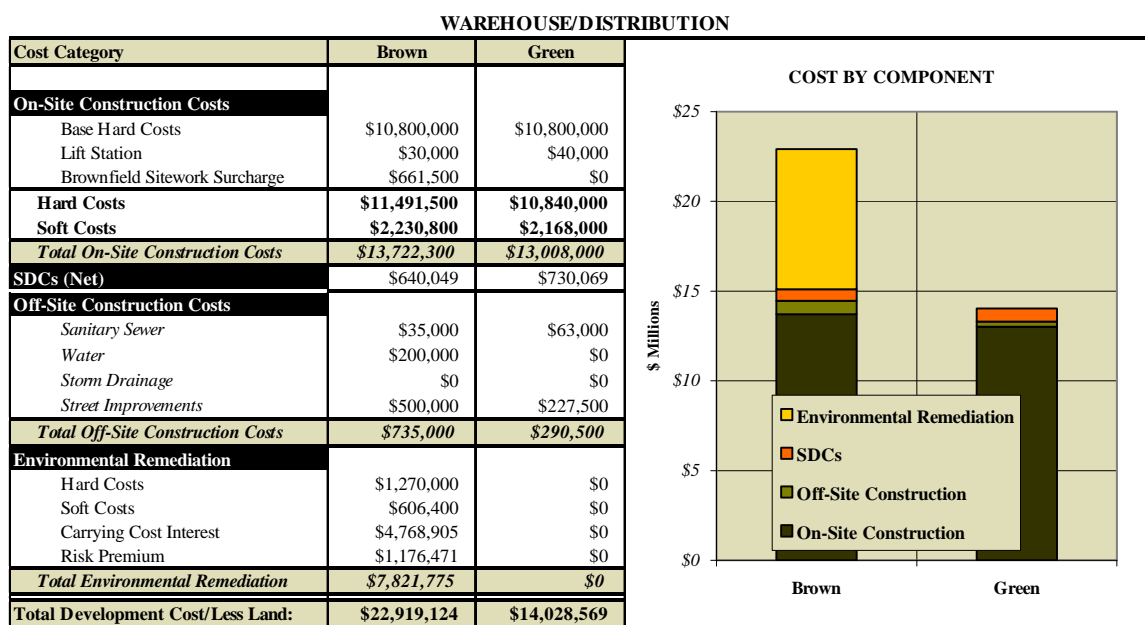
5/ Loan to Value Ratio

6/ Source of Real Market Value is County tax assessor records.

## WAREHOUSE / DISTRIBUTION – FINANCIAL SUMMARY

The warehouse/distribution program evaluated is a 400,000 square foot facility, supporting an estimated employment count of 200 to 286 people.

On-site construction costs for this type of facility are relatively low, and are largely consistent for either site. Off-site costs in this instance are also largely a push, with the brownfield site requirement of a \$200,000 water system improvement and \$500,000 street improvement outweighing the relatively low costs on the greenfield site.



The estimated cost of environmental remediation on this brownfield site is \$7.8 million, and largely reflects the carrying costs and risk premium.

The brownfield site used for this scenario presents a number of additional cost factors, increasing the total cost without remediation by \$3.8 million relative to the greenfield site evaluated. As a result, the indicated residual land prior to remediation costs is \$6.4 million, or \$3.89 per square foot. With an estimated \$7.8 million in overall remediation costs, the property is seen as having a negative value of \$1.4 million under the scenario evaluated.

The greenfield site scenario evaluated with the warehouse/distribution program yields a strong residual property value under our assumptions of \$7.1 million, or \$6.88 per square foot. The site selected requires minimal off-site costs, and SDC's are also quite low. As a result, the indicated residual land value is largely consistent with current market prices for this type of use.

Despite the relatively low remediation costs, the differential in overall construction costs from a percentage standpoint is second highest of all comparisons. This reflects the low value of improvements, and the resulting high percentage of overall cost associated with land. The low level of off-site requirements on this particular greenfield site also contributes to the high differential.

## GENERAL MANUFACTURING

General manufacturing includes industries utilizing less intensive manufacturing processes, when compared to a heavy industrial manufacturing category. These types of facilities are typically one step removed from wholesalers and are a broader activity than the high-tech manufacturer, who require more specialized facilities.

For this project, based on the size and configuration of the brownfield site, three single-user general manufacturing facilities are placed on each site. These facilities totaled 450,000 SF in three buildings – a 100,000 SF user, a 150,000 SF user, and a 200,000 SF user – and 1,100 parking stalls to serve all three facilities.

## GENERAL MANUFACTURING – BROWNFIELD SITE

The general manufacturing brownfield site is 35.75 acres and is the same site utilized for the high-tech manufacturing analysis. The site is zoned Heavy Industrial by the City of Portland. The site is generally pie shaped, with a narrow strip of land at one end. The site has frontage on a major collector, but no direct access; access to the site is via a local street connection. Existing utilities serving the site include a 60" sanitary sewer line, a 12" water main, and 60" and 48" storm drains in this local street. Limited street improvements are anticipated with the development of the site.

### *Environmental Summary*

DEQ records indicate the entire site has been contaminated with radioactive materials, metals, pesticides, and volatile organic compounds. For the purposes of this analysis, the site has been divided into three sub-site areas based on ownership, levels of contamination and methods of remediation. These three areas are identified on Figure 10. There are no active investigations associated with the conditions on Sub-Site 1 and Sub-Site 2, while Sub-Site 3 is currently the subject of a DEQ-ordered Remedial Investigation.

The following summarizes the contamination within each sub-site and the proposed remediation:

#### Sub-Site 1

The western 10.51 acres were used as a landfill for the disposal of low-level radioactive materials. The site was capped with 9" of soil with DEQ approval in the 1980's. Because of the radionuclide contamination, large structures located in this area will require pilings.

**Remediation – Soil:** Based on current DEQ regulations, it is unlikely that the existing 9" cap will be sufficiently protective of human health and the environment for the proposed change in use, therefore the entire site will be capped with an additional 2 feet of clean soil. Operation and Maintenance (O&M) of the cap will be ongoing.

#### Sub-Site 2

The eastern 6.46 acres were used for lead acid battery recycling, smelting, and refining. Lead, arsenic, cadmium, zinc, antimony and sulfuric acid were released on the property and lead was stabilized on the site. Though the metal-contaminated sediment and soil has been capped and a Record of Decision (ROD) has been completed, it is not recommended that this portion of the site be utilized for any structures.

**Remediation – General:** Appropriate remediation for the site has been completed. Operation and maintenance of the cap will be ongoing.

#### Sub-Site 3

This portion of the site was subject to the discharge of untreated wastes on-site and off-site including pesticides, dioxins and furans, dichlorobenzene, phenols, aerosols, BTEX, lead, and arsenic. Soil excavation of contaminated sediments was previously approved and completed; however, Non-Aqueous Phase Liquids (NAPL) contamination has been detected near the west central portion of the property and

remediation will be required. Groundwater contamination on the site, including pesticide and Volatile Organic Compounds (VOC's), will also require remediation.

**Remediation – Soil:** Stabilize the top 5 feet of soil over 2 acres with concrete slurry, treat NAPL with a ChemOx remediation system, and cap the site with 2 feet of clean fill.

**Remediation – Groundwater:** Install a system to prevent migration of groundwater contaminants into the adjacent water body.

**Remediation – Stormwater:** Provide stormwater treatment.



**Figure 10 - General Manufacturing Brownfield Environmental Contamination Locations**  
(Source: ERM – See Exhibit B)

### ***Site Plan Description***

The site plan is laid out with the same restrictions as the high-tech development; however, due to the size and anticipated loads of a general manufacturer, no additional structural improvements (i.e., pilings) are required for this concept plan. This provides an additional layer of comparison of the costs associated with a specific use on a particular site. No structures can be located on the northeast portion of the site, due to the contamination issues discussed above. With this restriction, parking for all three facilities is located in this area, with the manufacturing buildings located adjacent to and around the parking areas, but outside the area of concern.

The concept plan includes three general manufacturing users – a 100,000 SF user, a 150,000 SF user, and a 200,000 SF user – and 1,100 parking stalls to serve all three facilities.

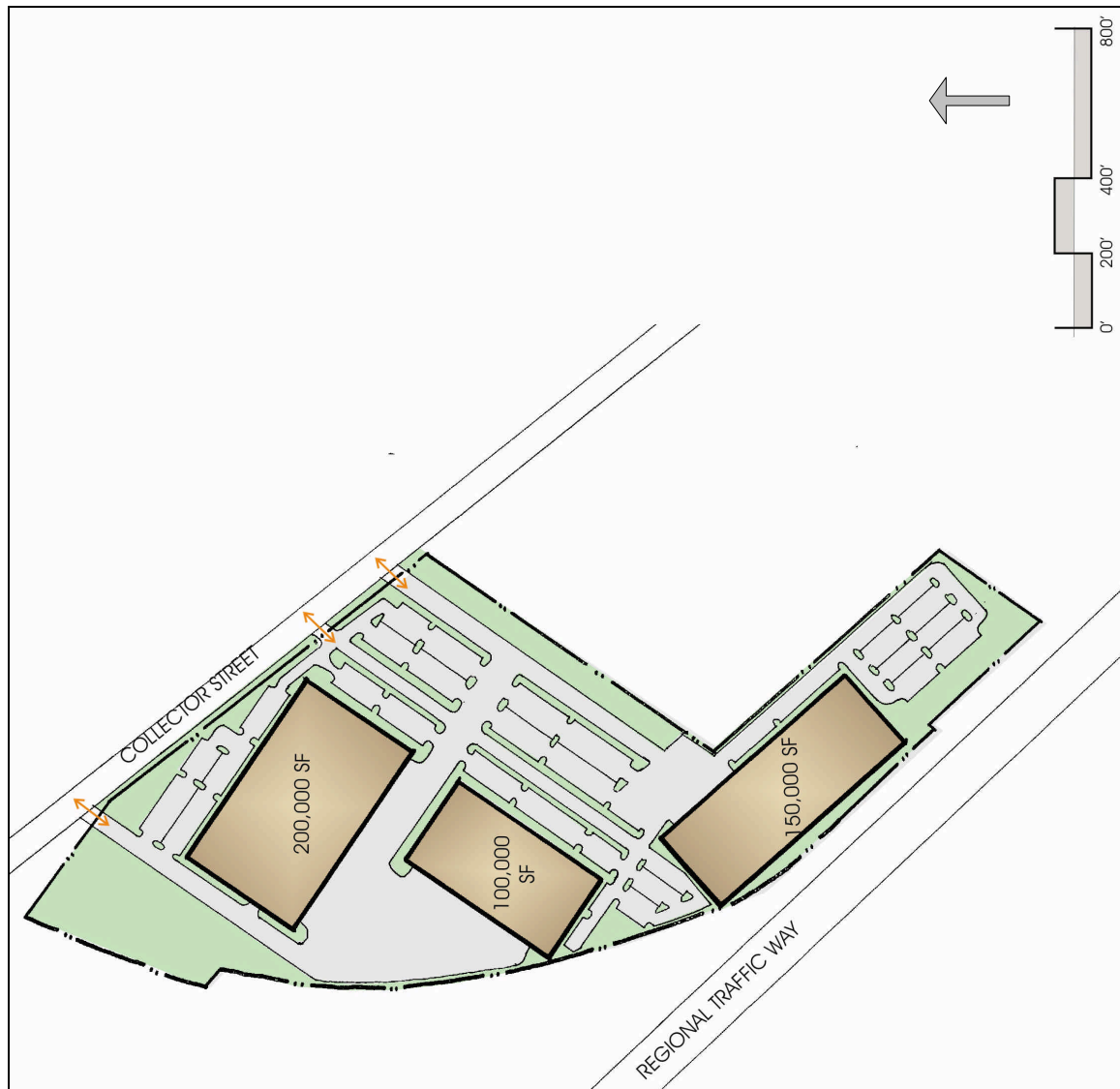


Figure 11 – General Manufacturing Brownfield Conceptual Site Plan



## ***Development Costs***

Development costs for the conceptual site plan are compiled based on the methodology and assumptions identified in Section 2 of this report. Overall, the costs to develop this site are significantly higher (approximately \$21.5 million) than the costs to develop the same site plan on the greenfield site. This site is the same brownfield site as is used for the high tech use, so it not surprising to see this differential in development costs.

### **On-Site Construction Costs**

The on-site construction costs for this use are estimated to be \$40 - \$45 per building square foot. Additional costs are associated with the sitework, due to the specialized equipment and staff required with construction on a brownfield site. The hard costs for on-site construction total approximately \$20.8 million. Soft costs associated with the on-site construction are also included. When soft costs associated with the on-site construction are included, the total on-site construction cost for the general manufacturing use is slightly over \$25 million. These costs are only \$171,000 less than the on-site costs for the greenfield site.

#### **ON-SITE CONSTRUCTION COSTS**

<b>Cost</b>	<b>Rate</b>	<b>Fee</b>
Base Hard Costs	\$40 – \$45 per building SF	\$20,250,000
Brownfield Sitework Surcharge	additional 25% of sitework costs <sup>1</sup>	\$607,500
Hard Costs		\$20,857,500
Soft Costs	20% of construction costs	\$4,171,500
<b>Total</b>		<b>\$25,029,000</b>

### **System Development Charges and Credits**

Redevelopment of the site will require the payment of System Development Charges for sanitary sewer, water, storm drainage, and streets. These fees vary by jurisdiction in terms of rate and method of measurement. One of the storm drainage SDC's is based on new impervious area. As this site is currently vacant and all existing development has been removed, this project assumed no existing impervious area. However, any existing impervious area accounted for would reduce the overall storm drainage SDC.

While the site is currently vacant, prior development on the site retained records for two existing 8" water meters. With the redevelopment of the site, and the replacement of these meters, a \$249,062 credit is available for this site.

The total SDC's for this site are \$963,281. This is \$94,606 more than the total SDC's associated with the greenfield site.

<sup>1</sup> Sitework costs include those costs associated with on-site grading, infrastructure and site improvements. These costs are assumed to be 12% of the base on-site construction costs.

**SYSTEM DEVELOPMENT CHARGES AND CREDITS**

Cost	Rate	Fee <sup>1</sup>
Sanitary Sewer	\$2,680 per EDU <sup>2</sup>	\$308,200
Water	Three 2" meters @ \$37,359	\$155,684
Storm Drainage	Three fees <sup>3</sup>	\$142,285
Streets	\$1.61 per building SF	\$724,500
Parks	No fee	\$0
Subtotal		\$1,212,343
SDC Credits	Two 8" meters @ \$124,531	<\$249,062>
<b>Net Total</b>		<b>\$963,281</b>

- 1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.
- 2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (7 fixture units = 1 EDU). This concept assumed 115 EDU's, or 805 fixture units. Dependent on the water needs of a specific manufacturing facility, this fee could be assessed on actual water usage/discharge, which may result in a different SDC.
- 3 Storm SDC based on three fees: (1) \$110 per 1,000 SF of new impervious area, (2) \$3.52 per linear feet of street frontage; and (3) \$1.80 per daily vehicle trip

Off-Site Construction Costs

Infrastructure improvements identified with this concept plan include:

- *Sanitary Sewer* – The existing 60" sanitary sewer within the adjacent collector street is sufficient to serve the proposed development.
- *Water* – The existing 12" water main within the adjacent collector street is sufficient to serve the proposed development.
- *Storm Drainage* – The existing 60" and 48" storm drains within the adjacent collector street are sufficient to serve the proposed development. However, due to the site's location near a water body, and the on-site contamination issues, storm drainage may be required to connect to the sanitary sewer system, resulting in additional ongoing operations costs.
- *Street Improvements* – A half-street improvement, including sidewalk and street trees, is required along the site's collector street frontage.

The total costs associated with these off-site improvements are \$24,000. This is \$1,323,000 less than the off-site improvement costs associated with the greenfield site. These costs are shown in the chart below.

#### OFF-SITE CONSTRUCTION COSTS

Cost	Fee
Sanitary Sewer	\$0
Water	\$0
Storm Drainage	\$0
Street	\$24,000
<b>Total</b>	<b>\$24,000</b>

#### Environmental Remediation Costs

The environmental remediation proposed for the site is identified in the Environmental Summary portion of this section, on page 67. The following identifies the costs associated with this remediation.

#### REMEDIATION HARD COSTS

Cost	Fee
Cap radio nuclide landfill	\$850,000
Soil remediation	\$3,000,000
Groundwater remediation	\$3,500,000
Stormwater management	\$500,000
Regulatory / PM Costs	\$3,250,000
<b>Total</b>	<b>\$11,100,000</b>

There are other costs associated with the remediation of this site. Remediation soft costs include insurance costs, planning and legal expenses. The Carrying Cost Interest is the interest cost accrued during remediation, for an assumed 24-month timeline at a 30% cost of equity and 8.50% cost for debt. The risk premium is assumed to be 0.5% of total development costs based on the perceived additional risk associated with the brownfield contamination.

#### ENVIRONMENTAL REMEDIATION OTHER COSTS

Cost	Fee
Soft Cost	\$4,152,000
Carrying Cost Interest	\$5,732,609
Risk Premium	\$1,995,842
<b>Total</b>	<b>\$11,880,451</b>

#### ***Financial Characteristics / Residual Land Value***

The pro forma evaluation of this site indicates a relatively strong residual land value for the program prior to remediation costs, which is then more than offset by remediation costs approaching \$23 million. If remediated, the site would have a residual land value of \$12.9 million using our assumptions, while the value with remediation is a negative \$10.1 million.

The following pro forma summarizes these characteristics.

### Brownfield Site - Portland

## GENERAL MANUFACTURING

## SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:			
Parcel Size (Acres-Net)		35.75		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service		DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,557,270				7.00%	7.00%
Building Size (SF)		450,000				25	25
Leasable Area (SF)		450,000				1.20	
Site Coverage/Net		28.90%					80%
INCOME SUMMARY:							
	Total SF	Annual Net Rent/SF	Annual Rent			\$3,600,000	\$3,600,000
Office Space	0	\$0.00	\$0				8.25%
Distribution Space	0	\$5.00	\$0				
Industrial/Flex Space	0	\$0.00	\$0			\$35,371,726	\$34,909,091
General Manufacturing	450,000	\$8.00	\$3,600,000			\$3,000,000	\$2,960,762
Parking	0	\$0.00	\$0				
Vacancy & Collection		0%	\$0				
TOTAL	450,000	\$8.00	\$3,600,000				
COST SUMMARY:				EQUITY ASSUMPTIONS:			
	Per SF	Units	Total			Total Development Cost/Excluding Remediation:	\$36,917,171
Real Market Value 6/	\$7.00	1,557,270	\$10,900,890			(-) Permanent Loan 1/	(33,225,454)
Direct Construction Cost						Net Equity Required	10.0%
On-Site Construction Costs	\$46.35	450,000	\$20,857,500				
Soft Costs	\$9.27	450,000	\$4,171,500				
SDCs - Net	\$2.14	450,000	\$963,281				
Offsite Construction Costs	\$0.05	450,000	\$24,000				
TOTAL/Less Remediation	\$82.04	450,000	\$36,917,171				
				MEASURES OF RETURN:			
				Return on Investment (ROI)		9.75%	
				Return on Equity (ROE)		31.32%	
				Threshold ROI		9.25%	
				Residual Property Value		\$12,902,638	
				Residual Property Value PSF/Net		\$8.29	
				ENVIRONMENTAL REMEDIATION COSTS			
				Hard Costs		\$11,100,000	
				Soft Costs 2/		\$4,152,000	
				Clean-Up Period (Months)		24	
				Carrying Cost Interest		\$5,732,609	
				Developer Risk Premium - ROI		0.50%	
				Developer Risk Premium		\$1,995,842	
				Adjusted Residual Property Value 3/		(\$10,077,813)	
				Adjusted Residual Property Value PSF/Net		(\$6.47)	

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

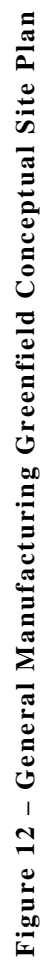
6/ Source of Real Market Value is County tax assessor records.

## GENERAL MANUFACTURING – GREENFIELD SITE

The general manufacturing greenfield site is located in Clackamas County. It is a portion of a larger, 377-acre site that was recently brought into the urban growth boundary. The larger site is bound to the south by an arterial street and to the far east by a collector. The southwest 37.9 acres of the larger greenfield are selected for this study. This location is chosen due to its likelihood of being the first portion of this site to develop. Existing utilities include an 18" water main in the southerly arterial, and a 24" sanitary sewer main is anticipated to be brought to the western side of the site by the county within the next two years.

### *Site Plan Description*

The same concept utilized in the brownfield site is placed on the greenfield site. The concept plan includes three general manufacturing users – a 100,000 SF use, a 150,000 SF user, and a 200,000 SF user – and 1,100 parking spaces to serve all three facilities. With few constraints and existing conditions, this site plan is more readily able to accommodate separate parking and exterior storage/loading areas for each facility and includes a public street extension through the center of the site to provide direct access to each user.



**Development Costs**

Development costs for the conceptual site plan are compiled based on the methodology and assumptions identified in Section 2 of this report. Overall, the costs to develop this site are substantially lower than the costs to develop the same site plan on the brownfield site.

**On-Site Construction Costs**

The base hard costs are the same as for the brownfield site plan; however, due to the topography of the site, additional costs for grading are required with the development of this site. Hard costs total \$21 million and with soft costs added in, the total on-site construction costs are \$25.2 million. With grading costs for the greenfield site being almost equal to the site surcharge for the brownfield site, these two sites have basically the same overall on-site costs.

**ON-SITE CONSTRUCTION COSTS**

<b>Cost</b>	<b>Rate</b>	<b>Fee</b>
Base Hard Costs	\$40 – \$45 per building SF	\$20,250,000
Grading	150,000 c.y. cut/fill @ \$5/c.y.	\$750,000
Hard Costs		\$21,000,000
Soft Costs		\$4,200,000
<b>Total</b>		<b>\$25,200,000</b>

**System Development Charges and Credits**

Development will require the payment of SDC's for sanitary sewer, water, storm drainage, streets, and parks. The site has historically been utilized for agricultural uses. As such, it is assumed that no SDC credit for prior development is applicable. However, it should be noted that a portion of the off-site improvements required with the development of the site may be eligible for SDC credits, thereby reducing the overall SDC costs for the project. The total SDC's for this site are \$868,675. This is \$94,606 less than the total SDC's associated with the brownfield site.

**SYSTEM DEVELOPMENT CHARGES AND CREDITS**

<b>Cost</b>	<b>Rate</b>	<b>Fee<sup>1</sup></b>
Sanitary Sewer	\$2,200 per EDU <sup>2</sup>	\$121,000
Water	Three 2" meters @ \$18,359	\$55,077
Storm Drainage	\$205 per 2,500 SF impervious area	\$115,248
Streets	\$1,283 per TSFGFA	\$577,350
Parks	No fee	\$0
Subtotal		\$868,675
SDC Credits	None	\$0
<b>Net Total</b>		<b>\$868,675</b>

- 1 These fees are strictly estimates based on the conceptual site plan and base assumptions. Actual fees are paid at the time of building permit issuance and may vary based on specific development plans, rate at time of permit issuance, and additional information provided to the appropriate bureau.
- 2 Sanitary Sewer SDC is based on Equivalent Dwelling Units (16 fixtures = 1 EDU). This concept assumed 50 EDU's, or 805 fixture units. Dependent on the water needs of a specific manufacturing facility, this fee could be assessed on actual water usage/discharge, which may result in a different SDC.

**Off-Site Construction Costs**

With the selected portion of the greenfield site, extension of infrastructure is required. However, this analysis assumes that the development of this portion of the

site would not be required to participate proportionately in the overall improvements required to serve the larger greenfield. Rather, for the purposes of this study, off-site improvements include only those necessary to bring infrastructure to and through the specific study area. It is also assumed that the sanitary sewer main anticipated to be extended to the western side of this site will be completed at no cost to the development.

Infrastructure improvements identified with this concept plan include:

- *Sanitary Sewer* – A 24" sanitary sewer will be extended in close proximity to the western edge of the site in the next one to two years. A such, the concept plan infrastructure extends an 8" line from this main 2,100 l.f. across the site to serve the development.
- *Water* – An 18" water main exists in the arterial street along the south side of the site. This concept pulls a 12" water main from this line to and through the site within the local and collector streets constructed with the development of the site.
- *Storm Drainage* – Storm drainage will outfall to the adjacent water body. 2,800 l.f. of drainage pipe is necessary to provide this outfall.
- *Street Improvements* – The construction of collector street improvements along the eastern frontage of this site, and the construction of a local street through the site, are required.

The total costs associated with these off-site improvements are \$1,347,000. This is \$1,323,000 more than the off-site costs associated with the brownfield site. These costs are shown in the chart below.

#### OFF-SITE CONSTRUCTION COSTS

Cost	Fee
Sanitary Sewer	\$105,000
Water	\$242,000
Storm Drainage	\$280,000
Street	\$720,000
<b>Total</b>	<b>\$1,347,000</b>

#### ***Financial Characteristics / Residual Land Value***

The greenfield site evaluated has significantly higher off-site construction requirements, yielding a lower residual land value prior to remediation of \$6.96 per square foot (compared to a \$8.29 per square foot on the brownfield site). Despite this differential, the high cost of remediation leaves the brownfield site with a negative residual value, while the value of the greenfield site is again largely consistent with recent market values.

The following pro forma summarizes these characteristics.



**Greenfield Site - Clackamas Co.  
GENERAL MANUFACTURING  
SUMMARY INFORMATION**

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		37.95			DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,653,102		Interest Rate	7.00%	7.00%
Building Size (SF)		450,000		Term (Years)	25	25
Leasable Area (SF)		450,000		Debt-Coverage Ratio	1.20	
Site Coverage/Net		27.22%		Loan-to-Value		80%
INCOME SUMMARY:				Stabilized NOI	\$3,600,000	\$3,600,000
	Total SF	Annual Net Rent/SF	Annual Rent	Assumed CAP Rate		8.25%
Office Space	0	\$0.00	\$0	Supportable Mortgage	\$35,371,726	\$34,909,091
Distribution Space	0	\$5.00	\$0	Annual Debt Service	\$3,000,000	\$2,960,762
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	450,000	\$8.00	\$3,600,000	Total Development Cost/Excluding Remediation:		\$38,987,389
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		(34,909,091)
Vacancy & Collection		0%	\$0	Net Equity Required	10.5%	\$4,078,298
<b>TOTAL</b>	450,000	\$8.00	\$3,600,000	MEASURES OF RETURN:		
COST SUMMARY:				Return on Investment (ROI)		9.23%
	Per SF	Units	Total	Return on Equity (ROE)		28.35%
Real Market Value 6/	\$7.00	1,653,102	\$11,571,714	Threshold ROI		9.25%
Direct Construction Cost				Residual Property Value		\$11,503,244
On-Site Construction Costs	\$46.67	450,000	\$21,000,000	Residual Property Value PSF/Net		\$6.96
Soft Costs	\$9.33	450,000	\$4,200,000	ENVIRONMENTAL REMEDIATION COSTS		
SDCs - Net	\$1.93	450,000	\$868,675	Hard Costs		\$0
Offsite Construction Costs	\$2.99	450,000	\$1,347,000	Soft Costs 2/		\$0
<b>TOTAL/Less Remediation</b>	\$86.64	450,000	\$38,987,389	Developer Risk Premium - ROI		0.00%
				Developer Risk Premium		\$0
				Adjusted Residual Property Value 3/		\$11,503,244
				Adjusted Residual Property Value PSF/Net		\$6.96

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the Real Market Value.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

6/ Source of Real Market Value is County tax assessor records.

## GENERAL MANUFACTURING – FINANCIAL SUMMARY

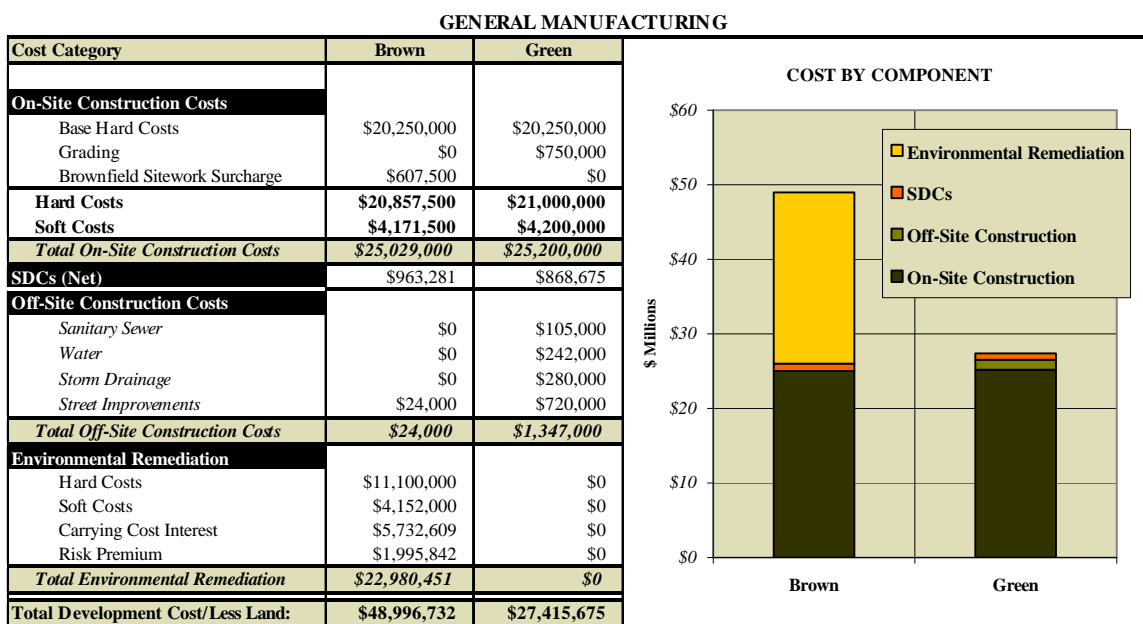
The general manufacturing program evaluated is a 450,000 square foot facility, supporting an estimated employment count of 692 to 1,125 jobs. On-site construction costs are slightly higher for the greenfield site, reflecting a \$750,000 estimated cost for cut and fill requirements. Off-site costs are also considerably higher for the greenfield site, although well below those found in the Tualatin greenfield site used in the industrial park program.

The pro forma evaluation of the brownfield site indicates a relatively strong residual land value for the program prior to remediation costs, which is more than offset by remediation costs approaching \$23.0 million. If remediated, the site would have a residual land value of \$12.9 million using our assumptions, while the value with remediation is a negative \$10.1 million.

On-site construction costs are slightly higher for the greenfield site, reflecting a \$750,000 estimated cost for cut and fill requirements. Off-site costs are also considerably higher for the greenfield site, although well below those found in the Tualatin greenfield site used in the industrial park program.

The costs of environmental remediation are extremely high on this brownfield site, at an estimated \$22.0 million. This reflects addressing soil and groundwater contamination, as well as capping the site. Soft costs are estimated at \$4.1 million, which includes a \$1.9 million cost for insurance. Carrying costs and the assumed risk premium add an additional \$7.7 million to the costs of remediation.

The greenfield site is clearly more marketable, with the brownfield site having an estimated negative residual land value of over \$10.0 million. This reflects a site that would be considered “upside-down” under these assumptions, with a value well below zero.



As demonstrated in this analysis, a site with the contamination assumed in this scenario cannot be expected to redevelop without significant outside assistance. Estimated remediation costs are \$14.75 per square foot when averaged across the land area, well above the underlying land values for industrial property in the Portland metropolitan area.

## FINANCIAL FINDINGS

The evaluation performed in the site development overviews highlights the financial difference between brownfield and greenfield sites. Key findings are presented below.

- Under each of the scenarios, the greenfield site delivers the lowest development cost per square foot, as well as the highest residual land value. The differential is least in the Industrial Park scenarios; with the \$8.7 million cost of environmental remediation on the Portland brownfield site offset by a \$3.0 million cut and fill requirement on the greenfield site and a \$5.2 million differential in infrastructure costs. The unusually high infrastructure costs are associated with a need to extend sanitary sewer, water, storm drainage and street improvements to the greenfield site in Tualatin.
- Infrastructure costs, as defined in this analysis, are generally higher on the greenfield sites, with the exception of the Warehouse/Distribution programs. These costs are internalized into the development pro forma, reflecting an assumption that the development would be required to bear these costs as a condition of approval. While the costs can be defined as public costs, the costs identified in this analysis are typically the responsibility of the developer as opposed to being borne by the public.
- The brownfield site used in the General and High-Tech Manufacturing scenarios has extremely high clean-up costs, related to soil and groundwater contamination. These add \$11.1 million in hard costs, which also results in higher insurance costs (\$1.9 million). As a result, the overall environmental remediation cost under these scenarios is estimated at \$22.0 for the General Manufacturing program and \$28.0 million for the high-tech program. Higher remediation costs are assumed under the high-tech scenario, with the higher overall costs of development increasing the impact of the risk premium.
- There are a number of public good arguments that can be made in favor of redeveloping brownfield sites, primarily based on more efficient use of existing infrastructure. In addition, fiscal arguments can also be advanced regarding this pattern of development, particularly in jurisdictions with few other options. While these factors will be discussed in greater detail as part of the overall analysis, the direct costs associated with making brownfield sites competitive on the margin with greenfield sites can be calculated. The following table summarizes the estimated remediation costs of the brownfield sites, and the cost differential to produce an equivalent product relative to the greenfield option. As shown, the cost of remediation in these instances outpaces the savings in infrastructure costs.

Use	Remediation Costs		Infrastructure Costs		Overall Cost Differential	
	Total	PSF-Bldg.	Total	PSF-Bldg.	Total	PSF - Bldg.
Industrial Park	\$8,748,887	\$13.89	(\$5,181,167)	(\$8.22)	\$1,319,186	\$2.09
General Manufacturing	\$22,980,475	\$51.07	(\$1,323,000)	(\$2.94)	\$21,581,081	\$47.96
High Tech Manufacturing	\$28,027,465	\$80.08	(\$1,428,500)	(\$4.08)	\$27,030,361	\$77.23
Warehouse/Distribution	\$7,821,799	\$19.55	\$444,500	\$1.11	\$8,553,079	\$21.38

- While useful in assessing residual value in the private market, the costs outlined would not be expected to accrue to a public clean-up effort. In addition, a publicly assisted clean up would likely be limited to land development, reducing carrying costs during remediation. A cost/benefit assessment for public intervention should separate remediation costs associated with development risk premiums and carrying costs from the direct remediation efforts.
- Another key factor that cannot be quantified but places the brownfield sites at a competitive disadvantage as compared to the greenfield sites is availability. Within this analysis we are assuming that the period needed to complete the environmental remediation is two years. This time delay would be considered largely unacceptable to an end user, and would require a speculative developer to initiate the process without an end user in hand.
- As demonstrated in the case studies evaluated, the general rules of thumb do not always apply. Greenfield sites are not always less costly to develop than brownfield sites, and brownfield sites do not always offer the advantage of less marginal infrastructure investment. The actual development characteristics of these properties are unique and site specific, and this analysis should be considered as proposing a general theoretical construct for appropriately evaluating these sites, as opposed to generating rules of thumb that can be consistently applied.
- The advantages outlined in this report reflect development costs excluding land acquisition. Property with unusually high development costs will typically be discounted compared to sites with lower development costs, as the residual land values are lower. This allows for the market to make the necessary adjustments to offset high development costs. This function does not work in the instance of a site that is “upside-down,” having a residual land value less than zero. In this case, the highest and best use disposition of the property from the property owner’s perspective is to do nothing (unless contamination is spreading or there is a desire to address the potential liability for other reasons).

## SUMMARY OF SCENARIOS EVALUATED

Site/ Concept	Net Site Size/ Acres	Building S.F.	Environmental Remediation 1/	Construction Cost		SDCs		Infrastructure	Total Cost/Less Land		
				Hard	Soft	Calculated	Credits	Net	Costs	Total	PSF
<b>Industrial Park</b>											
Brownfield Site - Portland	45.50	630,000	\$8,748,863	\$23,086,500	\$4,617,300	\$1,846,243	(\$25,368)	\$1,820,875	\$558,000	\$38,831,538	\$61.64
Greenfield Site - Tualatin	44.50	630,000	\$0	\$25,050,000	\$5,010,000	\$1,713,209	\$0	\$1,713,209	\$5,739,167	\$37,512,376	\$59.54
<b>General Manufacturing</b>											
Brownfield Site - Portland	35.75	450,000	\$22,980,451	\$20,857,500	\$4,171,500	\$1,212,343	(\$249,062)	\$963,281	\$24,000	\$48,996,732	\$108.88
Greenfield Site - Clackamas Co.	37.95	450,000	\$0	\$21,000,000	\$4,200,000	\$868,675	\$0	\$868,675	\$1,347,000	\$27,415,675	\$60.92
<b>High-Tech Manufacturing</b>											
Brownfield Site - Portland	35.75	350,000	\$28,027,441	\$105,900,000	\$21,180,000	\$1,383,121	(\$249,062)	\$1,134,059	\$24,000	\$156,265,500	\$446.47
Greenfield Site - Hillsboro	53.20	350,000	\$0	\$105,000,000	\$21,000,000	\$1,782,663	\$0	\$1,782,663	\$1,452,500	\$129,235,163	\$369.24
<b>Warehouse/Distribution</b>											
Brownfield Site - Portland	37.90	400,000	\$7,821,775	\$11,154,000	\$2,230,800	\$715,907	(\$75,858)	\$640,049	\$735,000	\$22,581,624	\$56.45
Greenfield Site - Portland	23.85	400,000	\$0	\$10,840,000	\$2,168,000	\$730,069	\$0	\$730,069	\$290,500	\$14,028,569	\$35.07

TOTAL DEVELOPMENT COST/LESS LAND			
<b>INDUSTRIAL PARK</b> 	<b>GENERAL MANUFACTURING</b> 	<b>HIGH-TECH MANUFACTURING</b> 	<b>WAREHOUSE/DISTRIBUTION</b> 

CALCULATED RESIDUAL LAND VALUES			
<b>INDUSTRIAL PARK</b> 	<b>GENERAL MANUFACTURING</b> 	<b>HIGH-TECH MANUFACTURING</b> 	<b>WAREHOUSE/DISTRIBUTION</b> 

1/ Includes direct hard and soft costs associated with remediation, as well as additional carrying costs, developer risk premium and lender risk premium.

## 5. PUBLIC COST BENEFIT ANALYSIS

Public benefits and costs were evaluated and compared for the brownfield and greenfield sites, based on a review of existing published studies and estimated public costs and revenue streams for the case study jurisdictions. Information is provided below regarding general findings on public benefits and costs, followed by case-study specific data.

### GENERAL PUBLIC BENEFITS AND POLICY OBJECTIVES

The following are the most commonly experienced public benefits and policy objectives achieved by other jurisdictions nationwide in specific brownfield redevelopment efforts. This will likely be realized by brownfield redevelopment in the Portland metro area given the findings of the development case studies in this analysis.

#### *Property Values and Tax Revenues*

- The value of improvements from brownfield redevelopment contribute positively to property tax revenues for the affected jurisdiction. As indicated elsewhere in this analysis, without feasible redevelopment of a site, brownfield land has little effective property value.
- Property values of parcels in the immediate vicinity of a brownfield have been empirically shown to frequently suffer lower effective property value than they would have otherwise. Redevelopment of the brownfield site can, therefore, serve to bolster surrounding property values and increase property tax revenue flow accordingly.
- The additional economic activity resulting from successfully redeveloped creates additional indirect and induced local economic activity, and provides additional gains in other tax and fee revenue sources that would otherwise not have occurred.
- Given the specifics of individual sites, the amortization of the less extensive cost of clean up and infrastructure improvements through a bond levy can frequently be covered significantly by the enhancement of land and improvement property value with brownfield site redevelopment. Enhancement of surrounding property values would also contribute.

#### *Infrastructure*

- New users on redeveloped sites, assuming infrastructure requirements are not significantly different from previous user need, can save fiscal resources by relying on existing road, power, and water/sewer/stormwater. Greenfield development, frequently at the margin of jurisdictions, require additional new infrastructure investment while existing investment serving underdeveloped brownfields is underutilized.
- New users on redeveloped sites also take advantage of existing investments in administrative, public safety and health service providers or at worst, incur frequently minor additional cost at the margin. Greenfield sites, alternatively, would likely require greater additional investment in these service costs at the margin.

- System development charges and user fees can provide much of the necessary revenue required to provide additional infrastructure investment necessary for site redevelopment, though the fees would be offset by their largely direct cost reimbursement.

### ***Public Policy Goals***

Redevelopment of brownfields also helps to achieve numerous public policy goals for the affected jurisdiction:

- Greater efficiency of land use within the jurisdiction by decelerating absorption of available greenfield industrial inventory.
- Reversing underutilization of existing transportation infrastructure rather than requiring additional roads and transit investment related to greenfields industry need and workforce need elsewhere in the region.
- Reinvigorating the local area and neighborhood economy with nearby jobs, many of which would likely pay quality wages given likely industrial sectors.
- Achieving targeted employment gains consistent with economic development policies and project-specific job creation criteria.
- Retaining employment within the jurisdiction, thereby creating urban workforce housing demand for existing, underutilized housing stock as well as spurring continued development of infill residential sites.
- Expanding and diversifying jurisdictional expertise and administrative service capacity to encourage and manage additional brownfield redevelopment projects with greater frequency.

The majority of public costs of brownfield redevelopment generally depend on the jurisdiction's chosen approach to financing of clean-up and other redevelopment costs. If a jurisdiction was to choose to become involved in publicly supporting brownfield redevelopment, the policy decision generally has three important variables:

- The extent to which Federal or State grants are pursued to cover the cost of studies, clean-up, infrastructure improvements or other major cost items;
- The extent to which the jurisdiction in question invests in administrative capability to coordinate with Federal, State or other interests with regard to project management and other requirements of grant/funding compliance; and
- The extent to which clean up, infrastructure and other costs are "internalized" as a hard or off-site cost borne by the private interest in its financial considerations.

The extent to which a jurisdiction chooses to provide redevelopment incentives for brownfields via tax abatement, credits, subsidy or other economic development measures would impact how the jurisdiction directly incurs costs. The financial analysis in this study has assumed that off-site infrastructure costs for both brownfield and greenfield sites, and clean-up and other costs unique to brownfields redevelopment would be the responsibility of the developer. These costs have been "internalized" as private costs of development for

financial feasibility modeling purposes. Accordingly, the small individual parcel sizes in the case studies and development-internalized remediation costs generally translate into minimal marginal costs to public jurisdictions.

## CASE STUDY-SPECIFIC ISSUES AND FINDINGS

### ***Direct Quantifiable Public Costs***

For each development prototype, SDC-retrieved infrastructure costs are reported in the Cost/Benefit summary tables. Due to the nature of site-specific features, quantifiable public costs are largely incurred at the local jurisdictional level. Derivation of system development charges and appropriate credits are discussed in greater depth in Section 3.

While system development charges are intended to recover public costs associated with a development, they are typically set at a level below full marginal cost. The percent recovery varies on a jurisdictional as well as service provider level, but the general relationship is that these charges will recover only a proportion of marginal costs. The SDC's paid are internalized into the development pro forma, and are subsequently a private cost. The proportion of costs that are not recovered represent a public cost associated with the project.

Direct remediation costs and other costs related to remediation have been modeled as borne by the developer rather than by the public. To the extent a jurisdiction chooses to absorb remediation costs to spur redevelopment activity, public costs would increase accordingly. Further discussion of implications is reserved for Section 5.

### ***Qualitative and Other Quantifiable Costs***

Public costs will also be incurred that are not quantifiable at this time due to the specific scope of this analysis. Actual development activities for specific sites within specific jurisdictions, including appropriate traffic studies and other requirements not included in the scope of this analysis, would be required to quantify several public cost streams. These include the following:

#### **State, Regional and Local Administrative Costs**

Cost items related to the administration of remediation project management, grant/program coordination and compliance, as well as standard building permitting, planning, inspection and other related administrative needs.

#### **Net New Demand for Public Services and Infrastructure**

Standard public service infrastructure needs like fire, police, schools, public transportation and roads can generally be expected to incur costs due to increased development and population from brownfield redevelopment or greenfield development. Brownfield development would, on average, generate lower marginal cost streams due to the greater likelihood that the site is already served by existing police and fire capabilities, transit routes, roads, water/wastewater and the like.

Greenfield sites often require substantial infrastructure investment that, in many jurisdictions nationwide, rivals remediation costs of sites already served by



underutilized public service, utility and transportation infrastructure. This is generally true for the case studies in this analysis. However, in the case of the warehouse/distribution greenfield concept, the location of this site within the city limits renders it significantly less expensive to serve with infrastructure due to its adjacency to existing infrastructure.

However, based on the literature review conducted for this analysis, substantially greater parcels of land or industrial areas generally require measurable ongoing public cost increases. The brownfield and greenfield case study development concepts in this analysis are, relatively speaking, of insufficient size to warrant significant marginal cost increases.

#### Legal Costs

Brownfield and greenfield site development will incur legal costs both publicly and privately. Public legal costs for brownfield sites can be significant, related to the risk of remediation activities, among others. Alternatively, greenfield sites can be expected to also incur significant legal and administrative costs related to UGB inclusion, amendment, site planning and other related issues unique to the Oregon land use system.

#### ***Quantifiable-Direct Public Benefits (Revenues)***

For each development prototype, the following public sector benefits, or revenues, are estimated and documented in the Cost/Benefit summary tables. Due to the nature of site-specific features, quantifiable public revenues are largely incurred at the local jurisdictional level.

#### System Development Charges

Derivation of SDC's for each brownfield and greenfield prototypical development are discussed at length in Section 3. While system development charges are intended to recover public costs associated with a development, they are typically set at a level below full marginal cost. The proportion of costs that are not recovered represent a public cost associated with the project and are reflected as such in the charts.

#### Property Tax Revenues

A representative property tax levy rate for each pertinent jurisdiction (City of Portland, City of Hillsboro, City of Tualatin, and Unincorporated Clackamas County within the UGB) was selected to model likely property tax revenues generated by incremental improvement and land value resulting from brownfield and greenfield development.

- City of Portland: \$20.7906 per \$1,000 assessed value
- City of Tualatin: \$17.4026 per \$1,000 assessed value
- Clackamas County: \$13.4252 per \$1,000 assessed value
- City of Hillsboro: \$15.5884 per \$1,000 assessed value

Incremental property tax revenue generated is then simply the annual increase in property value created by development activities (Section 3) less compression adjustment, discounts and delinquencies.

It is important to note that the property tax levy rates utilized reflect combined levy rates for municipalities, State education, special services districts and other entities that receive property tax revenue.

#### Portland Business License

The City of Portland would benefit from tax/fee revenue resulting from net new businesses locating within the City in either recovered brownfield sites or greenfield sites. The City levies a 2.2% tax on qualified business income. For the purpose of this analysis, it was assumed that the following industries under the North American Industrial Classification System (NAICS), and their average annual taxable business income as reported by the Oregon Department of Revenue, would roughly comprise sectors locating in developed space:

- High-Tech Manufacture: Computer & Electronic Component Manufacturing
- Industrial Park: Manufacturing
- Warehouse/Distribution: Warehouse and Storage
- General Manufacturing: Fabricated Metal Manufacturing (the most common Manufacturing sector in the Portland metropolitan area as recorded by establishment county)

#### Portland Schools Surcharge

Portland Public Schools receives revenue stream from an additional 0.4% tax on Portland business income. The 0.4% tax rate is applied to business income estimates as derived for the Portland Business License fee.

#### Multnomah County Business Income Tax (BIT):

Multnomah County fiscally benefits from a 1.45% tax on business income generated within the County. Levy and receipt of this revenue stream is estimated with similar methodology described for the Portland Business License fee.

#### City of Tualatin Business License Fee

The City of Tualatin receives funds from an annual business license fee for firms located within its jurisdiction. Firms with 11 to 50 employees pay \$120 annually, while firms with more than 50 employees pay no more than \$250 annually, regardless of sector.

#### City of Hillsboro Business License Fee

Hillsboro benefits from businesses locating within its jurisdiction via a business license fee, administered similarly to the City of Tualatin fee. Hillsboro charges \$25 per firm and an additional \$5 per employee beyond two. Hillsboro charges an annual maximum of \$750 for any firm.

#### Tri-Met Payroll Tax

Regional transit, i.e. Tri-Met, would benefit from the Tri-Met payroll tax for businesses within its services district. Tri-Met currently charges \$6.218 tax per \$1,000 of company payroll. This tax rate was then applied to total payroll by prototypical site, which was in turn estimated by applying average payroll by identified sector in each county as reported by the Oregon Employment Department average employment generated by each prototypical development.

Jobs

The range of jobs created by each prototypical development type is documented in Section 3, based on potential industry and average space-per-job requirements.

***Qualitative and Other Quantifiable Benefits***

Public benefits will also be realized that are not quantifiable at this time due to the specific scope of this analysis. As with public costs, actual site planning, development efforts, including more detailed site planning and traffic studies, and knowledge of specific industry, firm or user would be necessary. These include the following:

State Business Tax Revenue

Oregon Business Income Tax, Fuel Tax and a host of other tax streams generated by industrial development would increase due to net new development at either underutilized brownfield sites or new greenfield sites. One-time tax revenues from construction and remediation activities would also result, in addition to permanent, ongoing revenue from resulting commerce.

State and Local Income Tax Revenue

Net new population resulting from development site job creation would result in increased State and, potentially, Multnomah County income tax depending upon the final residential choice of households.

Utility Tax Revenues

Consumption of utility services, during construction/remediation and ongoing resulting commerce, would generate tax revenues for affected jurisdictions.

Achievement of Public Policy Goals

Efficient use of industrial land within the regional Urban Growth Boundary achieves State, regional and local public policy goals consistent with State land-use law.

Economic Development Goals

Community Vision and Economic Development Strategy goals can be achieved by either brownfields recovery or the location of quality wage employers on greenfield sites. Balance of competing economic development goals may pose a social/policy trade-off already summarized above.

The following is a discussion of public benefit and cost issues for each specific case study concept.

## CASE STUDY PUBLIC BENEFIT/COST COMPARISON

***High-Tech Manufacturing Comparison***

At full build-out, high-tech manufacturing at the brownfield case study site poses significantly greater annual tax revenues for the local jurisdiction than for the greenfield case study site, largely due to the greater array of revenue streams in Portland and Multnomah County. However, as tax and fee revenues are determined to offset public costs incurred, the broader scope of generated revenues also signals likely reutilization of existing services and infrastructure. Social gains, public policy and economic development gains, as well as increased adjacent property values and reutilized public services capacity, from brownfield remediation and redevelopment should be considered greater as well.

Marginal costs to the public due to brownfields redevelopment are likely minimal under the methodology of this study. \$28 million in direct remediation costs and nearly \$17 million in other remediation costs are assumed to be borne by the private developer in these case studies. To the extent that public policy is set to absorb remediation costs, public cost burden would increase accordingly. However, potentially significant bond capacity for remediation cost is generated by increased assessed value of the brownfield property. Marginal increases in ongoing public services costs are not likely significant given the small scale of this single development concept.

High Tech – Brownfield – Portland

BENEFITS	COSTS
<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC's: \$1.8 million</li> <li>▪ Property tax revenues: \$2.94 million annual estimate</li> <li>▪ Portland business license: \$154,000 annual estimate</li> <li>▪ Portland schools surcharge: \$28,000 annual estimate</li> <li>▪ Multnomah County BIT: \$102,000 annual estimate</li> <li>▪ Tri-Met payroll tax: \$200,000 annual estimate</li> <li>▪ Annual total: <b>\$3.43 million</b> estimate</li> <li>▪ Jobs: 556 to 925 FTE's</li> </ul>	<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$1.8+ million</li> </ul>
<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State and local income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Social benefits</li> <li>▪ Public policy goals</li> <li>▪ Economic development goals</li> <li>▪ Existing infrastructure efficiencies</li> <li>▪ Enhancement of surrounding property values</li> </ul>	<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ Administrative Costs</li> <li>▪ Legal costs</li> <li>▪ Policy choices/trade-off</li> <li>▪ Net new demand for public services if no excess capacity/diverted</li> </ul>

High Tech – Greenfield – Hillsboro

BENEFITS	COSTS
<p><u>Quantifiable - Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDCs: \$1.8 million</li> <li>▪ Property tax revenues: \$1.9 million annual estimate</li> <li>▪ Hillsboro business license: \$750 to \$980 annual estimate</li> <li>▪ Tri-Met payroll tax: \$206,000 annual estimate</li> <li>▪ Annual total: <b>\$2.1 million</b> estimate</li> <li>▪ Jobs: 556 to 925 FTE's</li> </ul>	<p><u>Quantifiable - Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$1.8+ million</li> </ul>
<p><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Economic development goals</li> </ul>	<p><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ Net new public service costs</li> <li>▪ Social/land use policy trade-off</li> <li>▪ Planning and legal costs</li> </ul>

### ***Industrial Park***

Industrial park development at the brownfield case study site poses nearly double the revenue generated directly by greenfield site development, due to the different fiscal structure of Portland and Multnomah County compared to Tualatin/ Washington County in this example.

Marginal costs to the public due to brownfields redevelopment are likely minimal under the methodology of this study. For similar reasons cited in the High-Tech Manufacturing comparison, the dramatically greater revenue generated by brownfield development signals likely absorption of existing infrastructure and public services capacity. Alternatively, \$2.9 million in direct remediation costs and nearly \$6.5 million in other remediation costs are assumed to be borne by the private developer in these case studies rather than the public. To the extent that public policy is set to absorb remediation costs, public cost burden would increase accordingly. Significant bond capacity generated by remediation and improvements can be expected to largely mitigate remediation costs if such a policy is pursued.

#### Industrial Park – Brownfield – Portland

BENEFITS	COSTS
<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC's: \$1.85 million</li> <li>▪ Property tax revenues: \$870,000 annual estimate</li> <li>▪ Portland business license: \$128,000 annual estimate</li> <li>▪ Portland schools surcharge: \$23,000 annual estimate</li> <li>▪ Multnomah County BIT: \$84,000 annual estimate</li> <li>▪ Tri-Met payroll tax: \$278,000 annual estimate</li> <li>▪ Annual total: <b>\$1.4 million</b> estimate</li> <li>▪ Jobs: 315 to 1,575 FTE's</li> </ul>	<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$1.85+ million</li> </ul>
<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State and local income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Social benefits</li> <li>▪ Public policy goals</li> <li>▪ Economic development goals</li> <li>▪ Existing infrastructure efficiencies</li> <li>▪ Enhancement of surrounding property values</li> </ul>	<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ Administrative costs</li> <li>▪ Net new demand for public services if no excess capacity/diverted</li> <li>▪ Legal costs</li> <li>▪ Policy choices/trade-off</li> </ul>

Industrial Park – Greenfield – Tualatin

BENEFITS	COSTS
<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC's: \$1.71 million</li> <li>▪ Property tax revenues: \$533,000 annual estimate</li> <li>▪ Tualatin Business License: \$750-\$980 annual estimate</li> <li>▪ Tri-Met payroll tax: \$206,000 annual estimate</li> <li>▪ Annual total: <b>\$740,000</b> estimate</li> <li>▪ Jobs: 315 to 1,575 FTE's</li> </ul>	<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$1.71+ million</li> </ul>
<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Economic development goals</li> </ul>	<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ Significant new public infrastructure cost (SDC and internalized)</li> <li>▪ Net new marginal public service costs</li> <li>▪ Social/policy trade-off (farm land to industrial)</li> <li>▪ Planning and legal costs</li> </ul>

### ***Warehouse/Distribution***

Unlike other case study development concepts, both brownfield and greenfield development sites are within the City of Portland. Accordingly, public revenue generation is not as significantly different as for other concepts. Brownfield redevelopment generates a greater annual revenue stream due largely to the greater enhancement of assessed brownfield site property value after development based on the financial analysis findings. Given the direct comparison of development concepts within the City of Portland, brownfield redevelopment for warehouse/distribution use poses significantly greater benefits public policy, environmental and economic goals for the City. Enhanced utility of existing infrastructure will also be greater for the brownfield redevelopment concept given the greater transportation network infrastructure dependence of warehouse/distribution use.

Under the methodology of this study, marginal costs to the public due to greenfield development may actually exceed marginal costs for brownfield redevelopment. With \$1.3 million in direct remediation costs and \$6.6 million in other related remediation costs assumed to be borne by the private developer, new public service provision and infrastructure serving the greenfield site can be expected to exceed enhanced utilization of existing services and infrastructure serving the brownfield site. To the extent that remediation costs are borne by the public sector, the cost differential would reverse. Of note, however, is the fact that improved property value for warehouse and distribution is less than for other, higher-value industrial uses. Accordingly, generated bond capacity for remediation purposes may be insufficient as a tool for brownfield warehouse/distribution reuse.

### **Warehouse/Distribution – Brownfield – Portland**

<b>BENEFITS</b>	<b>COSTS</b>
<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC's: \$716,000</li> <li>▪ Property tax revenues: \$310,000 annual estimate</li> <li>▪ Portland business license: \$61,000 annual estimate</li> <li>▪ Portland schools surcharge: \$11,000 annual estimate</li> <li>▪ Multnomah County BIT: \$40,000 annual estimate</li> <li>▪ Tri-Met payroll tax: \$59,000 annual estimate</li> <li>▪ Annual total: <b>\$482,000</b> estimate</li> <li>▪ Jobs: 200 to 286 FTE's</li> </ul>	<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$716,000 +</li> </ul>
<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State and local income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Social benefits</li> <li>▪ Public policy goals</li> <li>▪ Economic development goals</li> <li>▪ Existing infrastructure efficiencies</li> <li>▪ Enhancement of surrounding property values</li> </ul>	<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ Administrative costs</li> <li>▪ Net new demand for public services if no excess capacity/diverted</li> <li>▪ Legal costs</li> <li>▪ Policy choices/trade-off</li> </ul>



Warehouse/Distribution – Greenfield – Portland

BENEFITS	COSTS
<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC's: \$730,000</li> <li>▪ Property tax revenues: \$136,000 annual estimate</li> <li>▪ Portland business license: \$61,000 annual estimate</li> <li>▪ Portland schools surcharge: \$11,000 estimate annual</li> <li>▪ Multnomah County BIT: \$40,000 estimate annual</li> <li>▪ Tri-Met payroll tax: \$59,000 annual estimate</li> <li>▪ Annual total: <b>\$308,000</b> estimate</li> <li>▪ Jobs: 200 to 286 FTE's</li> </ul>	<p style="text-align: center;"><u>Quantifiable – Direct</u></p> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$730,000 +</li> </ul>
<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State and local income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Economic development goals</li> </ul>	<p style="text-align: center;"><u>Qualitative and Other Quantifiable</u></p> <ul style="list-style-type: none"> <li>▪ Net new marginal public service costs</li> <li>▪ Social/policy trade-off (farm land to industrial)</li> <li>▪ Planning and legal costs</li> </ul>

***General Manufacturing***

General manufacturing facility development at the brownfield case study site poses significantly greater revenue than generated directly by greenfield site development, again due to the different fiscal structure of Portland and Multnomah County compared to Clackamas County in this example. Local taxes on payroll and business income count for a greater share of brownfield redevelopment revenue benefit due to the relatively higher wage of manufacturing compared to the relatively lower value of improvements for general manufacturing use.

Marginal costs to the public due to brownfields redevelopment are again likely minimal under the methodology of this study. For similar reasons cited in the High-Tech Manufacturing and Industrial Park comparisons, the dramatically greater revenue generated by brownfield development signals likely absorption of existing infrastructure and public services capacity.

To the extent that public jurisdictions elect to absorb \$11.1 million in direct remediation costs and nearly \$11.9 million in other remediation costs, rather than a private developer as modeled in this analysis, public costs would increase accordingly. Similarly to the brownfield Warehouse/Distribution use, property tax revenues generated by General Manufacturing facility improvements may not be sufficient as a remediation finance tool. Only High-Tech Manufacturing brownfield site remediation is more expensive than the costs for the General Manufacturing case study site, though taxable improvement value is dramatically lower for General Manufacturing facilities. Additional funding sources for this brownfield development concept will be necessary.

Alternatively, greenfield development of General Manufacturing facilities is significant in terms of infrastructure investment required to serve the site. Although significantly recovered by SDC's, the location of the site and likely increase in public service costs to this unincorporated case study site will represent greater proportional increases in ongoing services and costs.

General Manufacturing – Brownfield – Portland

BENEFITS	COSTS
<u>Quantifiable – Direct</u> <ul style="list-style-type: none"> <li>▪ SDC's: \$1.2 million</li> <li>▪ Property tax revenues: \$579,000 annual estimate</li> <li>▪ Portland business license: \$285,000 annual estimate</li> <li>▪ Portland schools surcharge: \$52,000 annual estimate</li> <li>▪ Multnomah County BIT: \$188,000 annual estimate</li> <li>▪ Tri-Met payroll tax: \$238,000 annual estimate</li> <li>▪ Annual total: <b>\$1.3 million</b> estimate annual</li> <li>▪ Jobs: 692 to 1,125 FTE's</li> </ul>	<u>Quantifiable – Direct</u> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$1.2+ million</li> </ul>
<u>Qualitative and Other Quantifiable</u> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State and local income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Social benefits</li> <li>▪ Public policy goals</li> <li>▪ Economic development goals</li> <li>▪ Existing infrastructure efficiencies</li> <li>▪ Enhancement of surrounding property values</li> </ul>	<u>Qualitative and Other Quantifiable</u> <ul style="list-style-type: none"> <li>▪ Administrative costs</li> <li>▪ Net new demand for public services if no excess capacity/diverted</li> <li>▪ Legal costs</li> <li>▪ Policy choices/trade-off</li> </ul>

General Manufacturing – Greenfield – Clackamas County

BENEFITS	COSTS
<u>Quantifiable – Direct</u> <ul style="list-style-type: none"> <li>▪ SDC's: \$869,000</li> <li>▪ Property tax revenues: \$205,000 annual estimate</li> <li>▪ Tri-Met payroll tax: \$261,000 annual estimate</li> <li>▪ Annual total: <b>\$465,000</b> estimate</li> <li>▪ Jobs: 692 to 1,125 FTE's</li> </ul>	<u>Quantifiable – Direct</u> <ul style="list-style-type: none"> <li>▪ SDC-related impacts: \$869,000 +</li> </ul>
<u>Qualitative and Other Quantifiable</u> <ul style="list-style-type: none"> <li>▪ State business tax revenue</li> <li>▪ State income tax revenue</li> <li>▪ Utility tax revenue</li> <li>▪ Economic development goals</li> </ul>	<u>Qualitative and Other Quantifiable</u> <ul style="list-style-type: none"> <li>▪ Net new marginal public service costs</li> <li>▪ Social/policy trade-off</li> <li>▪ Planning and legal costs</li> </ul>

## 6. CONCLUSIONS AND IMPLICATIONS

This chapter provides conclusions to the study and the policy and incentive implications to stimulate brownfield redevelopment. The detailed financial conclusions of the case studies have been provided in Section 3. They are restated here in summary form, with an emphasis on the most critical issues. The public cost and benefits discussion in Section 4 are also summarized. Finally, the study's methodology is reviewed, with comments on potential next steps.

### CONCLUSIONS

#### *Site Development Costs*

Under each of the scenarios, the greenfield site delivered the lowest development cost per square foot, as well as the highest residual land value. Infrastructure costs, as defined in this analysis, are generally higher on the greenfield sites, with the exception of the warehouse/distribution programs. These costs are internalized into the development pro forma, reflecting an assumption that the development would be required to bear these costs as a condition of approval. While these costs could be defined as public costs, in this study they are the responsibility of the developer as opposed to being borne by the public.

Major off-site infrastructure and utility system upgrades, such as electrical substations and transformers, water reservoirs, wastewater treatment facility expansions, state highway expansions, etc., are not required as a result of the development programs placed on the greenfield sites. While these types of major system upgrades may, and often would, be required as part of large acreage expansions of the Urban Growth Boundary, this is not the case for these sites.

The greenfield sites picked as part of the study are either in the existing Urban Growth Boundary (UGB) or just on the edge and recently added. One of the greenfield sites, the warehouse/distribution site, is located within the UGB and is well served by existing infrastructure. The high-tech site is located on an edge of the Urban Growth Boundary, and is well served by both municipal and private utilities. The industrial park greenfield site has major off-site costs associated with its development as part of a larger site. These costs are allocated proportionally on a per acre basis in the development pro forma and include system upgrades necessary for the development of the site. The general manufacturing site requires off-site improvements specific to the development program, and does not have any proportional costs allocated to it to serve the larger greenfield site of which it was a part.

The site development case studies used in this study do not trigger any major public or private utility upgrades. In the methodology, all off-site improvements required for the development program are assumed to be the responsibility of the developer/user, either as a monetary charge or as a condition of approval and paid through System Development Charges (SDC). These costs are internalized into the development pro forma.

Taking both of these facts into account – no major off-site utility system upgrades, and all necessary off-site costs being the responsibility of the developer/user – this study does not identify any major off-site costs associated with the development programs that would be the responsibility of the public sector on either the greenfield or brownfield sites.

The finding of no public costs associated with off-site upgrades to the greenfield sites, while a conclusion of this study, is based primarily on the methodology used for the study.

The case study approach, using a specific development project of a certain size and then preparing a pro forma analysis based on a private developer approach to analyze the costs associated with the development, results in there being no major public expenditures requirements for new infrastructure to service the greenfield sites.

It is clear from the Portland regional experience of major expansions of the Urban Growth Boundary, that there are examples of the need for significant investment of public monies to provide new infrastructure to new industrial greenfield sites. The most recent example is the costs that will be associated with the utility, infrastructure and transportation needs of the Damascus area. So, while it is a finding of this study that no major expenditures of public funds for infrastructure were required to service the greenfield sites, it cannot be said that this conclusion would be reached in all cases of greenfield and brownfield site comparisons.

### ***Brownfield Remediation Costs***

Brownfield remediation costs, in all of the case studies, are greater than the infrastructure cost associated with development of the greenfield sites. It is important to understand however, what makes up the site development costs and how the assumptions can influence costs.

A brownfield site with a relatively low level of contamination is largely equivalent, from a development cost standpoint, to a greenfield site with unusually high off-site and on-site costs. This is the case of comparing the greenfield and brownfield sites used for the industrial park use. In comparing these two sites, the greenfield site's on-site construction costs are \$3 million higher and the off-site construction costs are approximately \$5.2 million higher. Total environmental remediation costs for the brownfield site are almost \$8.7 million, with carrying cost interest during clean-up and risk premiums having a more substantive impact than the hard and soft costs associated with the actual clean-up, which are approximately \$4 million. These total costs are comparable, equalizing these sites.

A brownfield site with extremely high environmental remediation costs that result in the cleanup costs being significantly higher than the underlying land values is not likely to redevelop without some sort of public assistance. This is the case of the brownfield site used for the high-tech and general manufacturing uses. Estimated remediation costs were \$14 to \$17 per square foot, well above the assumed current market rate for industrial land of \$5 per square foot.

The total brownfield development costs are composed of hard and soft construction costs, hard and soft remediation costs, carrying costs during cleanup, and the risk premium. These latter three remediation costs (soft, carrying and risk premium) have a significant impact on the overall redevelopment costs.

Hard costs associated with environmental remediation are provided based on estimates from ERM, with insurance costs provided by Renova Partners. Soft costs are calculated at 20% of the hard costs, which may be too conservative in many instances. Environmental assessment is typically required of the property owner, and would have been available on any of the brownfield sites evaluated. As a result, this cost would not have been borne by the developer. If site characterization is available, or the cost of this is borne by the property owner, the remediation soft costs may be reduced to only insurance.

Another key component of the remediation costs is carrying costs during clean up. These costs are primarily attributed to interest required on both debt and equity during remediation. Governmental intervention to further enhance the likelihood of brownfield sites redeveloping would include reducing the cost of funds, through methods such as financial assurances, provision of second and first position debt at below market rates, and direction of federal monies to assist in clean-up. As an example, shifting the cost of funds during remediation from the assumed levels to a flat 4.5% would reduce carrying costs in the high-tech brownfield scenario from just under \$4.8 million to just under \$1.5 million.

Risk is a major factor that influences a developer's decision to pursue a project. What risks does the developer have in front of them that will influence their ability to get a return on investment? In a brownfield case the risk is greater due to a number of factors: entitlements; the degree to which the history of the site is known; available information on contamination; cleanup costs; future liabilities; marketability of the site; and others. Environmental insurance is a critical risk-mitigating tool for the brownfield redeveloper. Without this type of insurance, financing would be either unavailable or prohibitively expensive.

In this study, risk is incorporated by assuming a 0.5% increase in the threshold ROI required to stimulate development. This is seen as a very conservative assumption, and reflects an additional perceived risk associated with development on a site that has been remediated. While this factor was alluded to in the developer focus group, there is no empirical evidence documenting that these adjustments are made in the market. The discount is unlikely to apply in a highly competitive market, with a substantial number of developers, with a relatively high-level of confidence in developing on these types of sites, willing to purchase these sites without a significant risk premium.

Taken together, the other costs beyond the hard remediation costs have a significant impact on the total remediation costs of each of the brownfield sites. The following table shows this relationship.

Use	TOTAL REMEDATION COST	TOTAL REMEDIATION COST BREAKDOWN						
		Environmental Remediation Hard Costs		Environmental Remediation Other Costs				
		Total Hard Costs	% of Total Remediation Costs	Soft Costs	Carrying Cost Interest	Risk Premium	Total Other Costs	% of Total Remediation Costs
High Tech Manufacturing	\$ 28,027,441	\$11,100,000	39.6%	\$4,152,000	\$4,768,905	\$8,006,536	\$ 16,927,441	60.4%
Industrial Park	\$ 8,671,732	\$ 2,190,000	25.3%	\$910,800	\$3,515,115	\$2,055,817	\$ 6,481,732	74.7%
Warehouse/Distribution	\$ 7,821,776	\$ 1,270,000	16.2%	\$606,400	\$4,768,905	\$1,176,471	\$ 6,551,776	83.8%
General Manufacturing	\$ 22,980,451	\$11,100,000	48.3%	\$4,152,000	\$5,732,609	\$1,995,842	\$ 11,880,451	51.7%

Methodologically, the analysis in this study approaches the development scenarios from the perspective of a private sector developer doing a speculative development. As such, the direct applicability of the findings is limited to this type of speculative development. Alternative development approaches under a different scenario could include remediation by an end user, or remediation by a public sector entity. Under both approaches,

remediation costs would be considerably less, particularly under a public sector remediation.

The public sector has a number of advantages compared to the private sector when assessing remediation costs. These include a lower cost of funds, lower time-value of money assumptions, no need for equity, and lower carrying costs and the ability to discount risk. The result of these advantages would be a sharply lower cost of remediation for a public-sector entity as opposed to what would be required for the private sector.

### ***No Two Sites Are the Same – The Difficulty of Generalizations***

The direct costs associated with making brownfield sites competitive on the margin with greenfield sites can be calculated. The following table summarizes the estimated remediation costs of the brownfield sites, and the cost differential to produce an equivalent product relative to the greenfield option. As shown, the cost of remediation in these instances outpaces the savings in infrastructure costs.

Use	Brownfield Remediation Costs		Differential Greenfield Infrastructure Costs		Overall Cost Differential	
	Total	PSF-Bldg.	Total	PSF-Bldg.	Total	PSF - Bldg.
High Tech Manufacturing	\$28,027,441	\$80.08	(\$1,428,500)	(\$4.08)	\$27,030,337	\$77.23
Industrial Park	\$8,748,863	\$13.89	(\$5,181,167)	(\$8.22)	\$1,319,162	\$2.09
Warehouse/Distribution	\$7,821,775	\$19.55	\$444,500	\$1.11	\$8,553,055	\$21.38
General Manufacturing	\$22,980,451	\$51.07	(\$1,323,000)	(\$2.94)	\$21,581,057	\$47.96

The findings of the pro forma analyses show that under each of the scenarios, the greenfield site delivers the lowest development cost per square foot, as well as the highest residual land value. And while infrastructure costs, as defined in this analysis, are generally higher on the greenfield sites, they do not exceed the remediation costs, therefore resulting in an overall cost advantage for the greenfield sites.

However, this generalization is difficult to make because each site, whether brownfield or greenfield, has its own unique characteristics. No two sites are the same, whether they are brownfield or greenfield. Each has unique issues and characteristics that affect costs and development issues; e.g. the types of constituents that make up the contamination, adjacency to a body of water, the potential for migration of the contamination, the location of the site in relation to existing infrastructure, location in relation to specialized infrastructure, the size of the site.

There is a continuum of site preparation costs for both brownfield and greenfield sites. The industrial park scenario demonstrates that the marginal difference between a brownfield site with relative low levels of contamination can be largely equivalent to a greenfield site with high infrastructure and site development costs. In cases in which remediation costs are higher or marginal greenfield infrastructure needs are lower, the greenfield sites offer a clear advantage from a financial perspective.

Taking remediation and infrastructure factors into account it would be possible to categorize the sites in this study by their intensity of color – a continuum of brownness or greenness. For the brownfield sites, a light brownfield site would be one that has minimal contamination issues and low cost clean-up requirements. A dark brownfield site would have major contamination issues, high cleanup costs. A moderate brownfield site would be in the middle.

The same type of continuum of color could be created for the greenfield sites in the study, only focusing on availability of infrastructure and site development costs. A light greenfield site would have readily available infrastructure and be “shovel ready” with very little additional requirements. A dark greenfield site would have major infrastructure needs and require substantial site preparation work. A moderate greenfield site would be in the middle.

Taking these continuums, the previous table would be seen as follows:

Use	Brownfield site	Greenfield site	PSF Differential	Conclusion
High Tech Manufacturing	Dark	Light	\$77.23	Same site as General Manufacturing site – more expensive use
Industrial Park	Moderate	Dark	\$2.09	Difficult greenfield site
Warehouse/Distribution	Moderate	Light	\$21.38	Greenfield site is better served than brown
General Manufacturing	Dark	Moderate	\$47.96	Very difficult brownfield site

These differences within the two categories make it very difficult to generalize about costs between the two types of sites. The actual development characteristics of each of the sites in this study are unique and site specific, and the study’s analysis should be considered as proposing a general theoretical construct for appropriately evaluating these sites, as opposed to generating rules of thumb that can be consistently applied.

### ***Public Sector Costs***

The case study development concepts in this analysis were not of sufficient size to pose significant, measurable public costs for affected jurisdictions that are not borne by the private sector by design of this study. Individual sites, as opposed to entire industrial districts, pose insignificant marginal cost impacts on an ongoing basis. In the particular case of brownfields, a greater degree of existing public services investment already exists and may likely be underutilized. The larger the jurisdiction, i.e. the State and region, the lesser the marginal cost impact to that jurisdiction of these individual site cost items.

Internalization of brownfield remediation and infrastructure costs by the developer, rather than incurred by the affected jurisdiction(s), clear the public sector of the largest potential public cost disadvantage of brownfield redevelopment compared to greenfield development. To the extent that a jurisdiction assumes remediation costs, which may be a favorable policy option to enhance financial feasibility of clean up and crystallize actual site remediation and redevelopment, public cost streams would increase by the magnitude of remediation costs estimated for each brownfield concept summarized above.

### ***Public Sector Benefits***

Benefits to the public sector, particularly in terms of revenue enhancement, are substantially greater for brownfield redevelopment concepts compared to greenfield development for the case studies considered in this analysis. By definition of the case study sites, the revenue differential is largely due to the greater array of revenue streams within Multnomah County and the City of Portland compared to suburban jurisdictions. The following table provides a comparison of annual revenue stream differences for each development concept.



	<b>Brownfield Public Benefits</b>		<b>Greenfield Public Benefits</b>		<b>Public Benefit Differential</b>
<b>Use</b>	<b>Annual</b>		<b>Annual</b>		<b>Annual</b>
High-Tech Manufacturing	\$3,430,000	Portland	\$2,100,000	Tualatin	\$1,330,000
Industrial Park	\$1,400,000	Portland	\$977,000	Clackamas Co.	\$423,000
Warehouse/Distribution	\$482,000	Portland	\$308,000	Hillsboro	\$174,000
General Manufacturing	\$1,300,000	Portland	\$465,000	Portland	\$835,000

In addition to the quantifiable public benefits cited above, a wide variety of benefits would also accrue to affected jurisdictions that are not quantifiable due to the limitations of the case study approach and sizes of sites considered in this analysis. The scope of these benefits is broader for brownfield remediation and redevelopment, also due in part to the location of case study sites in Multnomah County. In general, however, brownfield redevelopment poses the following public benefits not accrued by greenfield development:

- Local income tax revenues;
- Public land conservation and environmental policy goals;
- Social benefits of contaminated site remediation and economic revitalization; and
- Enhancement of surrounding property values.

Brownfield redevelopment will also produce greater utilization of existing infrastructure than greenfield sites studied in this analysis. This is particularly true for the industrial park development concept brownfield site relative to the Tualatin greenfield site that will require substantial infrastructure investment.

## IMPLICATIONS

### ***Brownfield Redevelopment Costs are Generally Higher***

An emerging hypothesis is that costs associated with brownfield remediation can be similar to the provision of new greenfield infrastructure. The policy discussion then becomes, is it better, or at least of some comparative value, to focus on remediation of brownfields as opposed to developing new greenfield sites. These assumptions have some support in the findings of De Sousa<sup>1</sup> in his Toronto work that was cited by the Port of Portland in their May 2004 “Comparing Brownfield and Greenfield Industrial Development: a literature review of public and private costs and benefits” where they say “brownfield redevelopment could reduce the net annual public cost incurred for industrial development by \$21 million to \$32 million (Canadian) – his calculation used parameters such as tax revenues, transportation externalities, agricultural preservation, air pollution, etc.”

The findings of the pro forma analyses in this study showed that under each of the scenarios, the greenfield site delivered the lowest development cost per square foot, as well as the highest residual land value. And while infrastructure costs, as defined in this analysis, are generally higher on the greenfield sites, they did not exceed the remediation costs, thereby resulting in an overall cost advantage for the greenfield sites. However, in one scenario, the Industrial Park, the development cost differences are minimal. This shows that it is possible to identify two sites that, because of their specific conditions, can be very close to parity.

<sup>1</sup> De Sousa, C.A. (2002) Measuring the public costs and benefits of brownfield versus greenfield development in the Greater Toronto Area. *Environment and Planning B: Planning and Design*, 29, 251-280

Case studies in this analysis do reveal that brownfield site redevelopment generally poses substantially greater public benefits via revenue streams than does greenfield development with minimal difference in likely public cost. As a result, financial considerations alone can provide an incomplete picture of likely total costs and, therefore, further narrow the total economic cost difference between brownfield and greenfield concepts. The fact of greater public revenue streams is because all of the brownfield case study sites are located in Multnomah County and the City of Portland. Each of these jurisdictions has business taxes (Business Income Tax in Multnomah County and City License Fee in Portland) that the suburban communities, in which the greenfield sites are located, do not have. This revenue spectrum will be the case for much of the metropolitan area, due to the situation that Portland/Multnomah County has the greater share of brownfield sites compared to suburban greenfields.

The general findings of this study do not support the hypothesis that the costs associated with the remediation and redevelopment of brownfield sites can be on par with the costs to develop new greenfield sites; however, it would be unreasonable to draw any final conclusions based on the limited number of comparisons completed as part of this contract. A variety of issues can affect site development costs and these vary between sites. The methodology developed as part of this study does provide a foundation from which to look at a variety of sites and development scenarios to aid in addressing this policy question.

### ***It is a Challenge to Keep Brownfield Sites Industrial***

There is an economic challenge to maintaining industrial zoned brownfields as industrial properties after they are cleaned up. The remediation costs of bring an “upside down” brownfield “right side up” often cannot be recovered when the site can be developed only for industrial land values. Industrial land values in the Portland metropolitan area tend to range from \$3.50 to \$6.50 per square foot, the lowest value of any major land use. For comparison, office and residential land ranges from \$7.50 to \$10.00 per square foot, while commercially zoned land is valued at significantly higher levels. As remediation costs must be deducted from land value, industrially zoned property has the most limited ability to absorb clean up costs while still maintaining a positive residual land value.

There are examples of brownfield sites where the owners conduct cleanup and disposition of their sites for reasons other than the market. Often the gaps between increased development costs on brownfield sites are taken up by the sellers of the property who may be motivated to sell the property by something more complex than simply a maximum sale price or a sale price consistent with greenfield raw land values. Viable brownfield deals still occur on properties that are “upside down” because the seller is motivated by a variety of reasons (cleaning up balance sheet, ceasing operations, M&A, etc.) to dispose of particular properties.

### ***It's “Easier” to Develop Greenfield Sites***

Brownfield sites come with stigmas. For many developers, the unknowns and the difficulties of developing a brownfield site are too great. It is perceived that suburban greenfield sites are faster and less constrained than urban brownfields. This also applies to site selectors, who are under contract for users to find them a location for a new industrial investment. Owners of brownfield sites are concerned with containing, or at least, managing the information that is available. Buyers/developers want full disclosure prior to sale. This point was made in the sensitivity analysis meeting with the development

professionals<sup>1</sup> and was found in the carrying out of this study. Issues of liability, cost and risk are all part of this challenge. In the case of this study, potential brownfield sites for the case studies were eliminated due to the property owner's concern with exposing information that would have a potential negative impact on their marketability.

This dilemma can make it difficult for brownfield sites to get full exposure in the market and make it difficult for sites to be considered for redevelopment. The result of this is that most difficult brownfield sites require experienced developers who have extensive knowledge with redeveloping these sites. Traditional developers tend to shy away from these sites. It is therefore necessary for outside parties, such as public agencies, who desire for brownfield sites to be redeveloped, to create relationships with experienced brownfield developers.

### ***An Inventory of Sites is Required to Meet a Variety of Industry Needs***

Physical site issues can play a role in a specific type of user choosing between or having the ability to locate on a brownfield or a greenfield site. A warehouse and distribution use or an industrial park may be better able to locate on a brownfield site due to their ability to use a capping remedy as part of their site development plan. For these types of primary uses, paved parking and building pads can be part of a site reuse strategy. On the other hand, as was discussed in the sensitivity analysis meeting with the development professionals<sup>2</sup>, other users e.g., pharmaceuticals and food, which require federal clean manufacturing practices, may not be viable uses on brownfield sites. Also mentioned in the sensitivity analysis meeting was the potential restrictions on basements on brownfield sites, which also can have negative effects on certain types of users.

However, the physical site that a company chooses is only one issue in a diverse mix of criteria that they use in deciding investment locations. Some users are very specific about the location of the property they are interested in using. Factors that can influence this include: access to transportation infrastructure (i.e., rail, water); proximity to other firms, either suppliers or customers (agglomeration or cluster affects); zoning, for example heavy industrial vs. light industrial, business park or high tech. These locational factors may outweigh or at least mitigate the brownfield vs. greenfield site issues. In other words, if a user needs to be in a heavy industrial zone, with rail or river access, and in proximity to machine shops, they may be amenable to a brownfield site, because only these sites are available and meet their locational requirements. On the other hand, a high tech company that wants to locate in a business park, in an area with a high concentration of similar firms, would focus on greenfield sites, because these are the types of sites that meet their broader locational requirements.

Each type of land, brownfield and greenfield, has a role to play in a regional economic development strategy. There can be a relationship between industry needs and the reuse of brownfield sites. Matching the locational needs of different types of industries and the market opportunities of different geographic locations will enhance brownfield redevelopment. It is critical to understand which types of companies can go where. Some industries and development types will be able to take on the brownfield challenges, others will not, and will focus their development decisions on greenfield sites.

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<sup>1</sup> Held June 3, 2004; see Exhibit F for meeting notes

<sup>2</sup> *ibid.*

### ***Focus on the Brownfield Sites that have a Demand in the Market***

The old saying of “location, location, location” in real estate is as valid in brownfields as it is in greenfields. As this study shows, different brownfield sites have different remediation cost profiles. However, brownfield sites located in areas of high market demand are better able to remain viable real estate investment opportunities if there is likely to be a high residual land value. Private sector market forces are likely to result in the eventual redevelopment of all but the most contaminated properties in high demand areas without assistance from the public sector. The public sector should focus available assistance dollars to those sites that have the highest remediation costs and that are located in an industrial area that has market demand. A longer-term strategy would be to focus public assistance on sites that are located in areas of depressed market demand.

### ***The Public Sector’s Role in Brownfield Redevelopment***

The redevelopment of brownfields is a public policy goal that enhances the urban environment by restoring deteriorating or vacant sites, creating jobs close to urban centers, efficiently utilizing existing infrastructure, particularly transportation systems, and controlling the growth of sprawl. However, as this study shows, the cost to bring these industrial properties to market and keep them for industrial use can be significantly greater than that for servicing available greenfield sites. The private marketplace will be less likely to do this, due to the lower market value of industrial land. Because of this policy goal, there is a role for public programs and incentives that support brownfield redevelopment.

There are a variety of currently available public programs for the stimulation of brownfield redevelopment<sup>1</sup>. They include:

- Voluntary Cleanup Program; Oregon Department of Environmental Quality
- Prospective Purchaser Agreement; Oregon Department of Environmental Quality
- Brownfields Assessment Demonstration Pilot Grants; U.S. Environmental Protection Agency
- Federal Brownfields Tax Incentive Program; Oregon Department of Environmental Quality
- Brownfields Redevelopment Fund; Oregon Economic and Community Development Department
- Brownfields Economic Development Initiative; Housing and Urban Development Department
- Targeted Brownfield Assessments; Oregon Department of Environmental Quality

In addition to these existing programs, this study identified risk reduction and site characterization assistance as additional opportunities where public funds could be used to address the cost disparity of keeping brownfield sites for industrial use.

### **Risk Reduction**

First, the data provided in this study shows clearly that the cost of high risk capital to conduct site study and clean up is a significant factor. The rate of return required by equity investors and the lack of debt capital are factors to which many states and municipalities have turned their attention. The creation of state revolving loan funds, tax-free bonds, and

<sup>1</sup> A full explanation of these existing incentive programs can be found in Exhibit G

private debt funds and participating grant money are all mechanisms that are being used to reduce the cost of capital.

One of the major issues associated with brownfield sites is the uncertainty created by unknown liability (“inflated risk assumptions”). Environmental insurance is a way to mitigate this risk. The cost and quality of environmental insurance is not only a direct cost factor but also an indirect cost. Comprehensive environmental insurance policies for these projects eliminate or lessen reduction in residual land value associated with stigma (the risk factor). Several states have created pooled, state-subsidized environmental insurance. These programs have reduced the direct cost of insurance policies and provided for broader coverage and longer terms than insurance that is available for individual projects.

Risk is inherent in the brownfield process. Insurance is one way to address the monetary uncertainty. Regulatory uncertainty is also a risk factor that affects time of development, since time equals money for a developer, the public sectors ability to reduce regulatory uncertainty results in saving time, therefore money for the developer. This does not require actual public money, just regulatory certainty. The Perspective Purchasers Agreement with the Oregon Department of Environmental Quality (DEQ) provides some measure of certainty, with an agreement between the state and the buyer on the level of acceptable clean up. Other, local and state process issues should also be looked at as a way to enhance the competitive opportunities of brownfield sites.

Reducing liability uncertainty, does not however, mean that the liability for remediation shifts to the public sector. The “polluter pays” principal is the foundation of brownfields remediation. While there may be a role for the public sector in risk reduction, it is critical that public decision makers understand that the public sector and ultimately the taxpayer must be prepared to absorb the costs associated with escalating cleanup costs that are not knowable until site development is well underway.

#### Site Characterization Assistance

Another potential area for public involvement is in site characterization. The cost for preliminary, investigative studies to characterize contamination conditions at a site are not only a significant project expense, but frequently becomes a barrier to entry. Few private entities are willing to spend thousands, often hundreds of thousands of dollars to characterize a site that may or may not turn out to be suitable for redevelopment. Direct subsidy of characterization costs will create an expanded market of brownfield sites. The sites in this study have been sufficiently characterized for remediation estimating and insurance. However if that were not the case, it is unlikely that a third party developer could have supported those costs. State and municipal brownfield initiatives can provide forgivable loans for characterization. If the investigative results support development, the loan is repayable. If not, the loan becomes a forgivable grant.

#### Other Considerations

The focus of this study has been on the development costs between developing on a brownfield site compared to a greenfield site. And further, between cleanup costs and new infrastructure costs. This frames the discussion of one versus the other. This raises the question, when thinking about a public role and the use of incentives, is it possible to substitute existing incentive programs between brownfield and greenfield sites? Are existing incentive programs fungible between brownfield and greenfield sites?

The answer to this, is generally no. Many public incentive programs are based on the forgiveness of local property taxes. The Enterprise Zone program and urban renewal tax abatement programs are two examples. It is not possible to trade these programs off between a brownfield site in one jurisdiction with a greenfield site in another. Since property taxes are the responsibility of the local jurisdiction, any incentive program tied to property tax abatement could not be “traded” between two sites in two different jurisdictions.

The local nature of taxes, fees and revenues makes it difficult to imagine any incentive program that could be used both for brownfield redevelopment and/or for greenfield infrastructure.

It is possible to suggest, in addition to the ideas presented at the beginning of this section, some other potential ideas for additional programs that could support brownfield redevelopment. These ideas were discussed in the sensitivity analysis meeting and with the clients. Each of these would require additional investigation to determine their feasibility.

- ? Waiver of impervious surface SDC’s for stormwater when surface is used as a cap as part of an approved remediation plan.
- ? Property tax abatement on improvements to a brownfield site (land and buildings).
- ? Capture some of the incremental tax value of land coming into the UGB and allocate it to brownfield remediation. This concept would need to address the larger issue of creating regional funds from sub-regional jurisdictional-specific benefits.
- ? Establishment of urban renewal districts that include brownfield sites. These districts provide the opportunity to utilize tax increment financing to contribute to remediation, site preparation and infrastructure costs associated with brownfield redevelopment.

### ***Study Methodology Limitations and Recommendations for Further Research***

The purpose of this study is to determine the development costs for a specific development use, compared between a specific brownfield site and a specific greenfield site. The methodology used in the study is a case study approach, using a specific development project of a certain size and then preparing a pro forma analysis that is based on a private developer doing a speculative development. The pro formas analyze the costs associated with the development. The model that has been developed can now be used to:

- Compare the four identified uses on other brownfield and greenfield sites
- Compare other uses on the seven sites that are part of this study

The study shows that the approach and the model function, and can be replicated with other uses and on different sites. It is also the case that the output of the model, in terms of costs and therefore residual land value, would change if different assumptions were used. Among the possible changes would be:



### ***A Non-Speculative Development***

It is assumed in this model that the site development plans would be done on a speculative basis. If a project is assumed to be done on a non-speculative basis, e.g directly by an end user, on a build-to-suit basis for an end user, by an experienced brownfields redeveloper, or by a public agency, it would be possible to assume a lower, or no risk premium at all, thus reducing or eliminating one of the Other Costs associated with the brownfield sites.

### ***Use of Public Funds***

Certain Soft Costs may not be necessary or could be reduced through public sector participation in brownfield remediation. These are discussed in the Conclusions section and include reducing soft costs by assuming that site characterizations would be done with public sector funding or by assuming insurance costs could be reduced by establishment of a publicly subsidized insurance pool.

### ***Using a Single Development Plan***

In this study, four different site development plans are developed and tested on the individual sites. While this gives a cost structure that was different for each of the sites, it does not change the underlying result of brownfield remediation being greater than greenfield infrastructure. If the purpose of a study is to analyze and compare site costs it does not matter what the use is. The site development plan can be fixed, thus reducing one level of complexity from the study. If however, the purpose is to test uses on sites, then the site plan is important.

### ***Other Methodological Issues***

The actual development characteristics of each of the sites in this study are unique and site specific. Each has a cost structure for either remediation or new infrastructure services that are different from each other and from any other site in the Portland region. And the number of sites, only seven, provides a limited number of case studies from which to draw generalizations. So while the study found that it was more costly to remediate a brownfield site, than provide infrastructure to a greenfield site, the study's analysis should be considered as proposing a general theoretical construct for appropriately evaluating specific sites, as opposed to generating rules of thumb that can be consistently applied across all brownfields and greenfields in the region.

One of the benefits of the case study approach is to give property owners information on how their site can be developed and the costs associated with a particular use. This approach works as a site analysis tool to determine the financial feasibility of specific site development scenarios. In this study, this outcome was not specifically achieved, because the individual sites could not be officially identified. Property owners of brownfield sites are hesitant to involve their sites in publicly funded studies, which would bring additional profile to their site, without any perceived benefit. This results in the study having to remove any reference to actual sites, even though any contamination issues are identified only through publicly available information. Finding a way to make property owners comfortable with the work, and engaging them in the study itself, would be an important goal in future studies in order to meet the opportunities of the case study approach.

There are limitations of this study created by the focus on site development as the standard of analysis. The premise is to start with the size of the development project. This drives the acreage requirement for both the brownfield and greenfield sites. It is therefore necessary to find a brownfield site big enough to meet the project need (not an easy task

based on the inventory of brownfield sites) and reduce the size of the greenfield parcel to the project size (in most cases the total size of the greenfield site was larger, thus requiring a prorated share of costs being put into the project pro forma). While this approach creates actual numbers that can be compared between sites, it makes it very difficult to provide general statements comparing the overall development cost between brownfield and greenfield sites.

The case study development concepts in this analysis are not of sufficient size to pose significant, measurable public costs for affected jurisdictions that are not borne by the private sector. The methodology internalizes the off-site development costs into the pro forma and made them the responsibility of the developer. The effect of this is that there are no public costs to servicing the greenfield sites. Individual sites, as opposed to entire industrial districts, pose insignificant marginal cost impacts on an ongoing basis. It would be necessary to take a different approach than the case study, looking at larger acreage additions of new greenfields to the UGB, to more fully understand the potential impacts on public sector costs.



## **7. EXHIBITS**

- A. Site Summary Sheets
- B. Environmental Brownfield Site Analysis (ERM)
- C. Cost Summary Sheets
- D. Comparative Cost and Residual Land Valuations (Johnson Gardner)
- E. Construction Cost Estimate Ranges
- F. Sensitivity Analysis Meeting Minutes (Port of Portland)
- G. Currently Available Public Programs for Stimulation of Brownfield Redevelopment



EXISTING SITE DATA

ZONING	IH - Heavy Industrial
SITE SIZE	37.95 acres - Development Area
DEVELOPMENT STANDARDS	
Maximum Height:	No Limit
Min. Building Setbacks:	5' (front)
Max. Building Setbacks:	None
Max. Building Coverage:	100% of site area
Parking Ratio:	1 per 750 SF of floor area (Manufacturing and Production)
INFRASTRUCTURE	
Water:	12" line in Neighborhood Collector Street Outfall to main in Neighborhood Collector Street
Storm:	60" line in Neighborhood Collector Street
Sewer:	Street; several other existng services to the site
Streets:	Neighborhood Collector Street, Regional Trafficway and Major City Traffic Street

CONCEPT PLAN DATA

USE	High Tech Manufacturing
DEVELOPMENT AREA	37.95 acres
BUILDING AREA	350,000 SF (250,000 SF - High Tech 60,000 SF - Office 40,000 SF - Cub)
PARKING	725 +/- regular stalls
TOTAL JOBS	
1 job/400 - 650 SF of building area - High Tech	385 - 625 jobs
1 job/200 - 350 SF of building area - Office	171 - 300 jobs
	556 - 925 jobs TOTAL (15 - 29 jobs/acre)

DEVELOPMENT COSTS

ON-SITE	
\$200 - \$300/SF	\$105,000,000
Pilings	\$375,000
Brownfield Sitework Surcharge	\$525,000
Soft Costs	\$21,180,000
	\$127,080,000

SDC'S	
Water (2-6" meter)	\$155,664
Sanitary (195 EDU's)	\$522,600
Storm	\$141,358
Street (\$1.51/SF)	\$563,500
	\$1,383,121

SDC CREDITS	
Water (2-8" meters)	(\$249,062)
Sanitary Sewer	No Credit
Storm Drainage	No Credit
Street Improvements	No Credit
	(\$249,062)

OFF-SITE	
Sanitary Sewer	\$0
Water	\$0
Storm Drainage	\$0
Street Improvements (curb and 6' sidewalk)	\$24,000
	\$24,000

REMEDIATION COSTS	
Cap Radionuclide Landfill	\$850,000
Soil Remediation	\$3,000,000
Groundwater Remediation	\$3,500,000
Stormwater Management	\$500,000
Regulatory/PM Costs	\$3,250,000
	\$11,100,000

OTHER REMEDIATION COSTS	
Soft Costs	\$4,152,000
Carrying Costs	4,768,905
Risk Premium	8,006,536
	\$16,927,441

GRAND TOTAL \$156,265,500

Brownfield/Greenfield Development Cost Comparison

City of Portland

HT/B B - High-Tech Manufacturing Brownfield

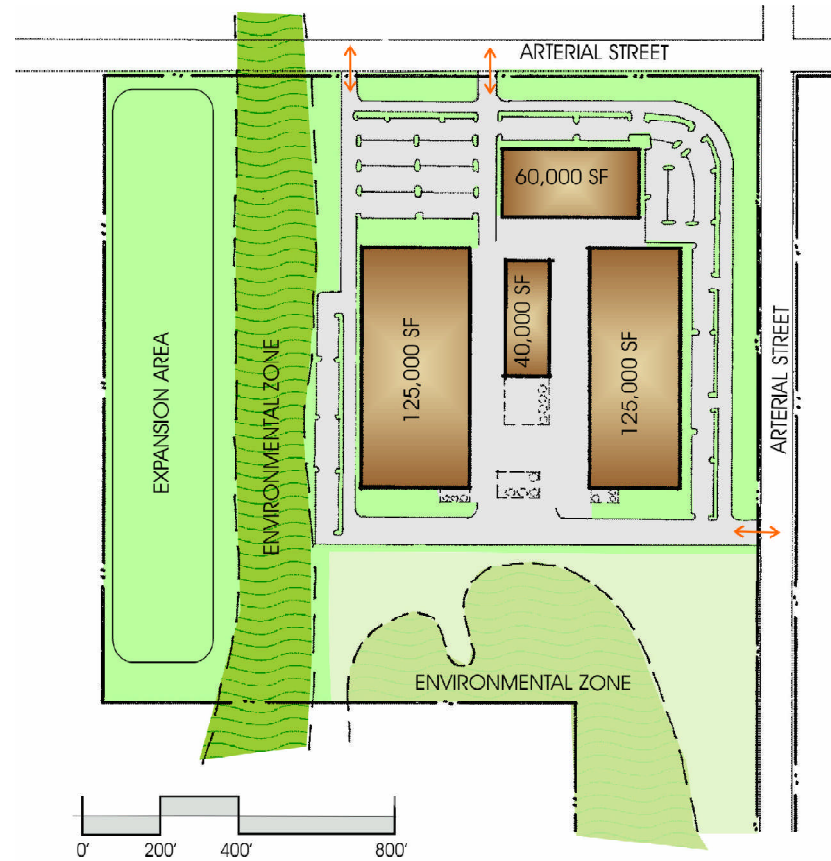
- NOTES
1. See Appendix D for additional cost information.
  2. The costs provided are preliminary estimates providing general "order of magnitude" costs for the concept plans. Prior to any significant out lay of funding, it is recommended that specific cost estimates be prepared.
  3. The contamination profiles were gathered from specific sites located in the Portland metropolitan area. The contamination information for each site was gathered from publicly available information. The remediation cost estimates are based on the experience of the consultants with similar constituents on other sites, and are not applicable to any specific site. The specific sites have not been identified to ensure that there is no connection between the sites and potential remediation costs.

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MACKENZIE



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DECEMBER 2004  
Job # 2040104.00



## EXISTING SITE DATA

<b>ZONING</b>	SSID
<b>SITE SIZE</b>	203 acres (Overall Site) 53.2 acres (Developable Area)
<b>DEVELOPMENT STANDARDS</b>	45'
Maximum Height:	35' (front)
Min. Building Setbacks:	25' (side) 25' (rear) None
Max. Building Setbacks:	50% of site area
Max. Building Coverage:	1.6 per 1,000 SF of GFA
Parking Ratio:	(Manufacturing)
<b>INFRASTRUCTURE</b>	18" line
Water:	Drainage to local waterbody
Storm:	12" main in Collector Street
Sewer:	Collector Street, Arterial Street
Streets:	

## CONCEPT PLAN DATA

<b>USE</b>	High Tech Manufacturing
<b>DEVELOPMENT AREA</b>	53.2 acres
<b>BUILDING AREA</b>	350,000 SF (250,000 SF - High Tech 60,000 SF - Office 40,000 SF - Cub)
<b>PARKING</b>	725 +/- regular stalls
<b>TOTAL JOBS</b>	
1 job/400 - 650 SF	385 - 625 jobs
of building area - High Tech	
1 job/200 - 350 SF	171 - 300 jobs
of building area - Office	
	556 - 925 jobs TOTAL (15 - 29 jobs/acre)

## DEVELOPMENT COSTS

<b>ON-SITE</b>	
\$200 - \$300/SF	\$105,000,000
Soft Costs	\$21,000,000
	<b>\$126,000,000</b>

<b>SDC'S</b>	
Water (2-6" meter)	\$160,000
Sanitary (85 EDU's)	\$212,500
Storm	\$372,931
Street (\$244/trip)	\$659,932
Parks (\$343/parking space)	\$377,300
	<b>\$1,782,663</b>

<b>SDC CREDITS</b>	
Water	No Credit
Sanitary Sewer	No Credit
Storm Drainage	No Credit
Street Improvements	No Credit
	<b>\$0</b>

<b>OFF-SITE</b>	
Sanitary Sewer	\$333,500
(new service and 1/2 cost of new lift station and new force main)	
Water	\$204,000
(1/2 cost of frontage lines)	
Storm Drainage	\$132,000
(30" drain from waterbody to Collector Street)	
Street Improvements	\$783,000
(1/2 cost of Collector Street extension and 1/2 cost of new signal)	
	<b>\$1,452,500</b>

<b>REMEDIATION COSTS</b>	
None	<b>\$0</b>
<b>OTHER REMEDIATION COSTS</b>	
None	<b>\$0</b>

**GRAND TOTAL \$129,235,163**

## Brownfield/Greenfield Development Cost Comparison

*City of Hillsboro*

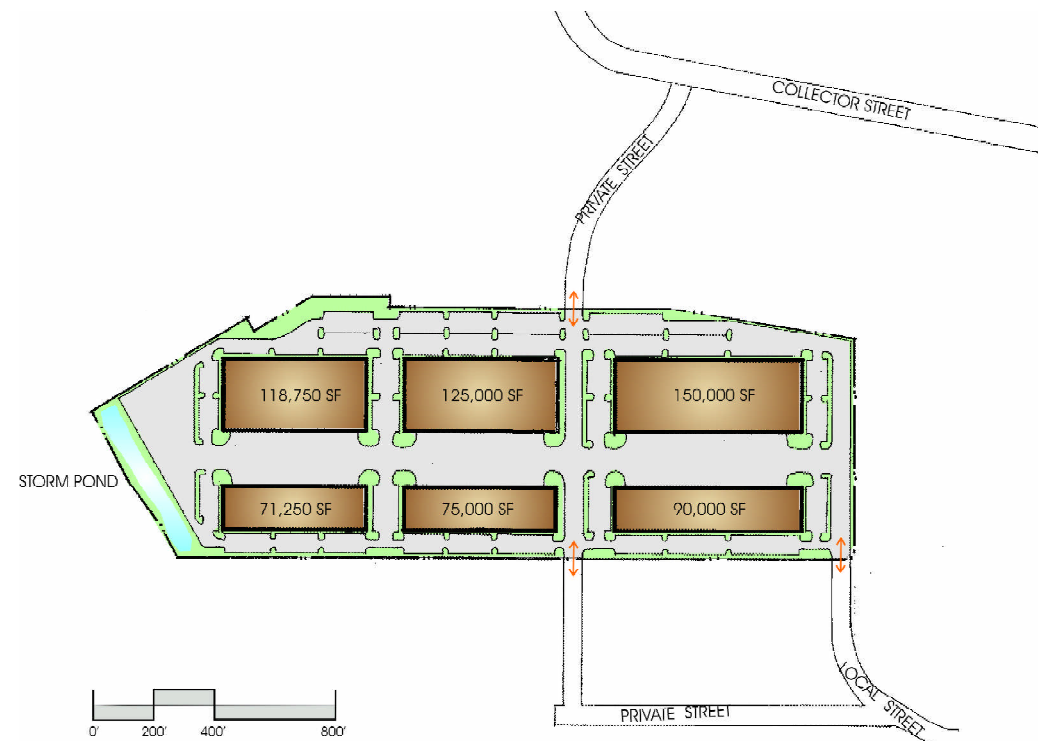
## HT/M G - High Tech Manufacturing Greenfield

- NOTES
1. See Appendix D for additional cost information.
  2. The costs provided are preliminary estimates providing general "order of magnitude" costs for the concept plans. Prior to any significant out lay of funding, it is recommended that specific cost estimates be prepared.

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**MACKENZIE**



DECEMBER 2004  
Job # 2040104.00



## EXISTING SITE DATA

<b>ZONING</b>	Heavy Industrial
<b>SITE SIZE</b>	45.5 acres - Overall Site
<b>DEVELOPMENT STANDARDS</b>	
Maximum Height:	No limit
Min. Building Setbacks:	5' (front) 0' (side and rear)
Max. Building Setbacks:	None
Max. Building Coverage:	100%
Parking Ratio:	1 per 500 SF (General Office); 1 per 750 SF (Manufacturing)
<b>INFRASTRUCTURE</b>	
Water:	12" main
Storm:	Discharge to City system
Sewer:	8" line
Streets:	Arterial Street, Local Street, Collector Street

## CONCEPT PLAN DATA

<b>USE</b>	Industrial Park
<b>DEVELOPMENT AREA</b>	45.5 acres
<b>BUILDING AREA</b>	630,000 SF
<b>PARKING</b>	1,130 +/- regular stalls
<b>TOTAL JOBS</b>	
1 job/400 - 2,000 SF of building area	315 - 1,575 jobs (7 - 35 jobs/acre)

## DEVELOPMENT COSTS

<b>ON-SITE</b>	
\$30 - \$35/SF	\$22,050,000
Tank Removal	\$375,000
Brownfield Sitework Surcharge	\$661,500
Soft Costs	\$4,607,300
	<b>\$27,703,800</b>

<b>SDC'S</b>	
Water (7-2" meter)	\$87,171
Sanitary (218 EDU's)	\$584,240
Storm	\$160,531
Street (\$1.61/SF)	\$1,014,300
	<b>\$1,846,243</b>

<b>SDC CREDITS</b>	
Water	\$22,688
Sanitary Sewer	\$2,680
Storm Drainage	No Credit
Street Improvements	No Credit
	<b>(\$25,368)</b>

<b>OFF-SITE</b>	
Sanitary Sewer	\$0
Water	\$0
Storm Drainage	\$48,000
(Public storm drain 800' north of site)	
Street Improvements	\$510,000
(Private street improvements north and south)	
	<b>\$558,000</b>

<b>REMEDIATION COSTS</b>	
Soil	\$790,000
Groundwater	\$1,000,000
Stormwater	\$200,000
PM/DEQ	\$200,000
	<b>\$2,190,000</b>

<b>OTHER REMEDIATION COSTS</b>	
Soft Costs	\$950,800
Carrying Costs	\$3,552,246
Risk Premium	\$2,055,817
	<b>\$8,748,863</b>

**GRAND TOTAL                      \$38,831,538**

## Brownfield/Greenfield Development Cost Comparison

*City of Tualatin*

## IP G - Industrial Park Brownfield

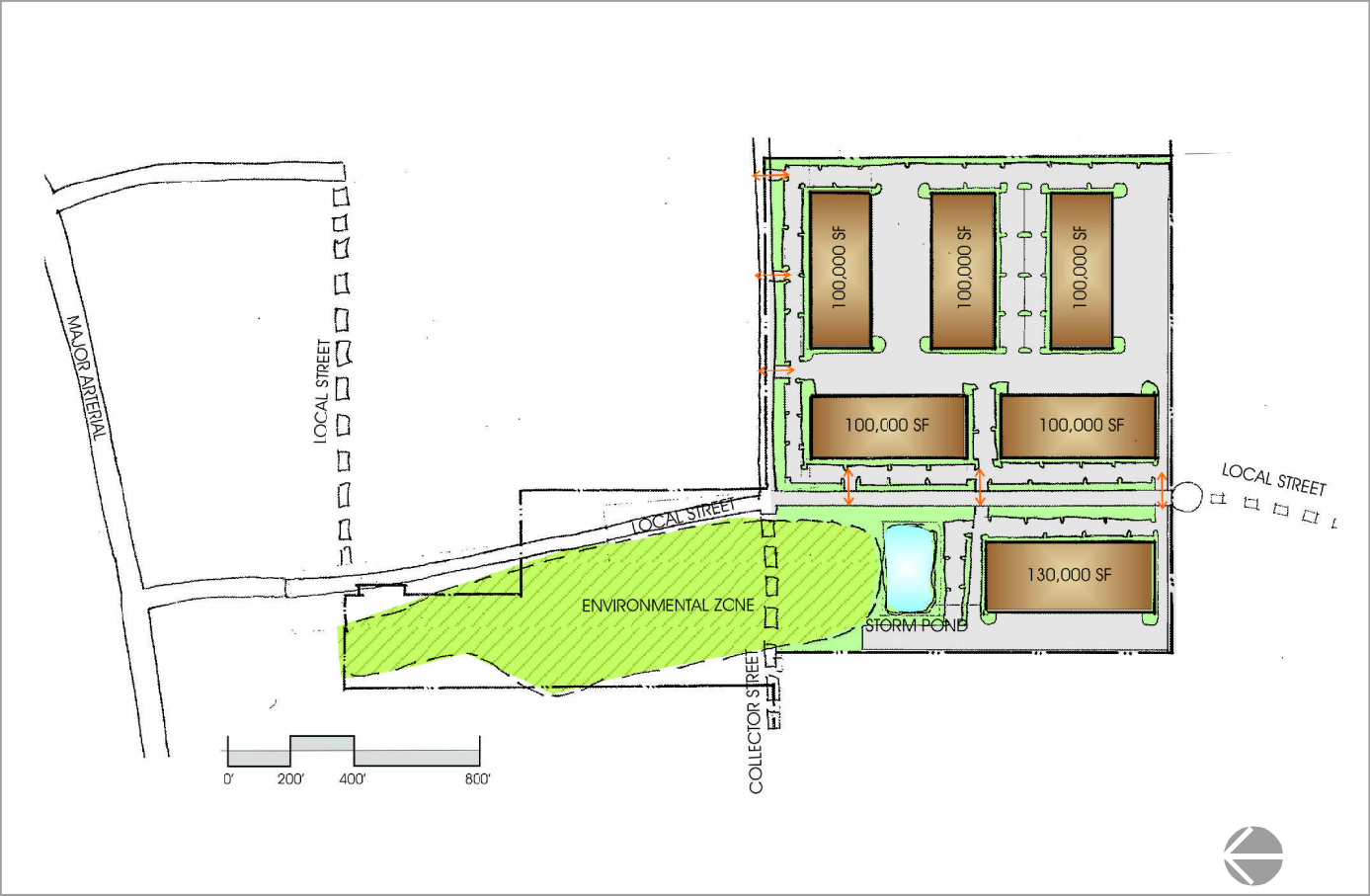
- NOTES
1. See Appendix D for additional cost information.
  2. The costs provided are preliminary estimates providing general "order of magnitude" costs for the concept plans. Prior to any significant outlay of funding, it is recommended that specific cost estimates be prepared.

GROUP  
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**RENOVA**

**DECEMBER 2004**  
Job # 2040104.00



EXISTING SITE DATA	
ZONING	General Manufacturing (MG)
SITE SIZE	248.5 acres - Overall Site 44.5 - Development Area
DEVELOPMENT STANDARDS	
Maximum Height:	60'
Min. Building Setbacks:	30' (front) 0 - 50' (side and rear; determined through architectural review)
Max. Building Setbacks:	None
Max. Building Coverage:	None
Parking Ratio:	2.7 per 1,000 SF of GFA (General Office); 1.6 per 1,000 SF of GFA (Manufacturing)
INFRASTRUCTURE	
Water:	12" main
Storm:	Discharge to City system
Sewer:	8" line
Streets:	Arterial Street, Local Street, Collector Street

CONCEPT PLAN DATA	
USE	Industrial Park
DEVELOPMENT AREA	44.5 acres
BUILDING AREA	630,000 SF
PARKING	1,130 +/- regular stalls
TOTAL JOBS	
1 job/400 - 2,000 SF of building area	315 - 1,575 jobs (7 - 35 jobs/acre)

DEVELOPMENT COSTS

ON-SITE	
\$30 - \$35/SF	\$22,050,000
Cut/Fill @ \$5/cy	\$3,000,000
Soft Costs	\$5,010,000
	<b>\$30,060,000</b>

SDC'S	
Water (7-2" meter)	\$154,476
Sanitary (95 EDU's)	\$237,500
Storm	\$183,938
Street (\$259/trip)	\$1,137,295
	<b>\$1,713,209</b>

SDC CREDITS	
Water	No Credit
Sanitary Sewer	No Credit
Storm Drainage	No Credit
Street Improvements	No Credit
	<b>(\$0)</b>

OFF-SITE	
Sanitary Sewer	\$950,780
(Based on cost/acre for sewer improvements)	
Water	\$631,057
(Based on cost/acre for water improvements)	
Storm Drainage	\$1,080,498
(Based on cost/acre for storm drainage improvements)	
Street Improvements	\$3,076,832
(Based on cost/acre for street improvements; signal required)	
(Proportionate Share/Development Area)	<b>\$5,739,167</b>

REMEDIATION COSTS	
None	<b>\$0</b>

OTHER REMEDIATION COSTS	
None	<b>\$0</b>

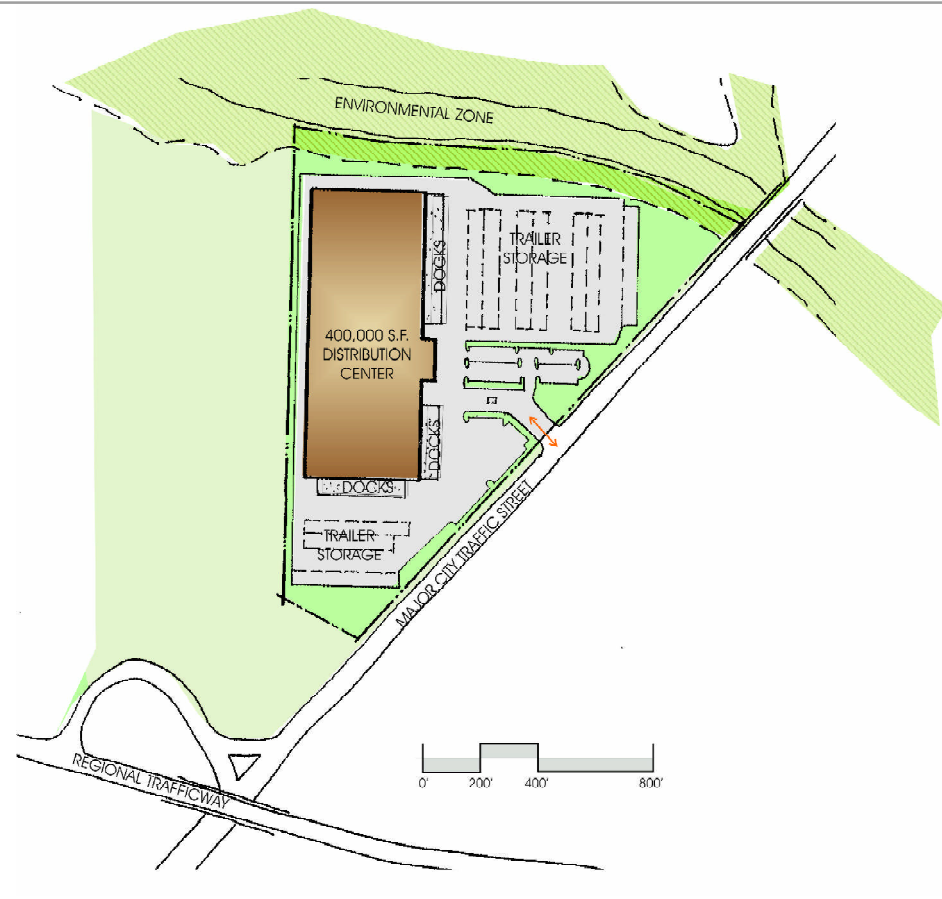
GRAND TOTAL \$37,512,376

Brownfield/Greenfield Development Cost Comparison

City of Tualatin  
IP G - Industrial Park  
Greenfield

NOTES  
1. See Appendix D for additional cost information.  
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### EXISTING SITE DATA

<b>ZONING</b>	IG2 - General Industrial 2
<b>SITE SIZE</b>	37.95 acres
<b>DEVELOPMENT STANDARDS</b>	
Maximum Height:	No Limit
Min. Building Setbacks:	25' (front)
Max. Building Setbacks:	None
Max. Building Coverage:	85% of site area
Parking Ratio:	1 per 750 SF of floor area for the first 3,000 SF; 1 per 3,000 SF of floor area thereafter
<b>INFRASTRUCTURE</b>	
Water:	6" main in Major City Traffic Street
Storm:	Outfall to waterbody
Sewer:	42"/36" sewer along RR
Streets:	Major City Traffic Street

### CONCEPT PLAN DATA

<b>USE</b>	Warehouse/Distribution
<b>DEVELOPMENT AREA</b>	37.95 acres
<b>BUILDING AREA</b>	400,000 SF
<b>PARKING</b>	200 +/- regular stalls 275 +/- trailer stalls
<b>TOTAL JOBS</b>	
1 job/1,400 - 2,000 SF of building area	200 - 286 jobs (5-8 jobs/acre)

### DEVELOPMENT COSTS

<b>ON-SITE</b>	
\$22 - \$27/SF	\$10,800,000
Lift Station	\$30,000
Brownfield Sitework Surcharge	\$661,500
Soft Costs	\$2,230,800
	<b>\$13,722,300</b>

<b>SDC'S</b>	
Water (1-2" meter)	\$12,453
Sanitary (60 EDU's)	\$160,800
Storm	\$82,624
Street (\$1.15/SF)	\$460,000
	<b>\$715,907</b>

<b>SDC CREDITS</b>	
Water	(\$27,242)
(1-3" meter/1-1" meter)	
Sanitary Sewer	No Credit
Storm Drainage	No Credit
Street Improvements (\$1.51/existing SF)	(\$48,616)
	<b>(\$75,858)</b>

<b>OFF-SITE</b>	
Sanitary Sewer (new service and lift station)	\$35,000
Water (12" service to site)	\$200,000
Storm Drainage (Discharge to waterbody)	\$0
Street Improvements (1/2 street improvements Major City Traffic Street frontage)	\$500,000
	<b>\$735,000</b>

<b>REMEDIATION COSTS</b>	
Site investigation	\$350,000
Site Surcharge	\$720,000
Cap	\$200,000
	<b>\$1,270,000</b>

<b>OTHER REMEDIATION COSTS</b>	
Soft Costs	\$606,400
Carrying Costs	\$4,768,905
Risk Premium	\$1,176,471
	<b>\$6,551,776</b>

**GRAND TOTAL** **\$22,919,124**

### Brownfield/Greenfield Development Cost Comparison

*City of Portland*

### W/D B - Warehouse Distribution Brownfield

#### NOTES

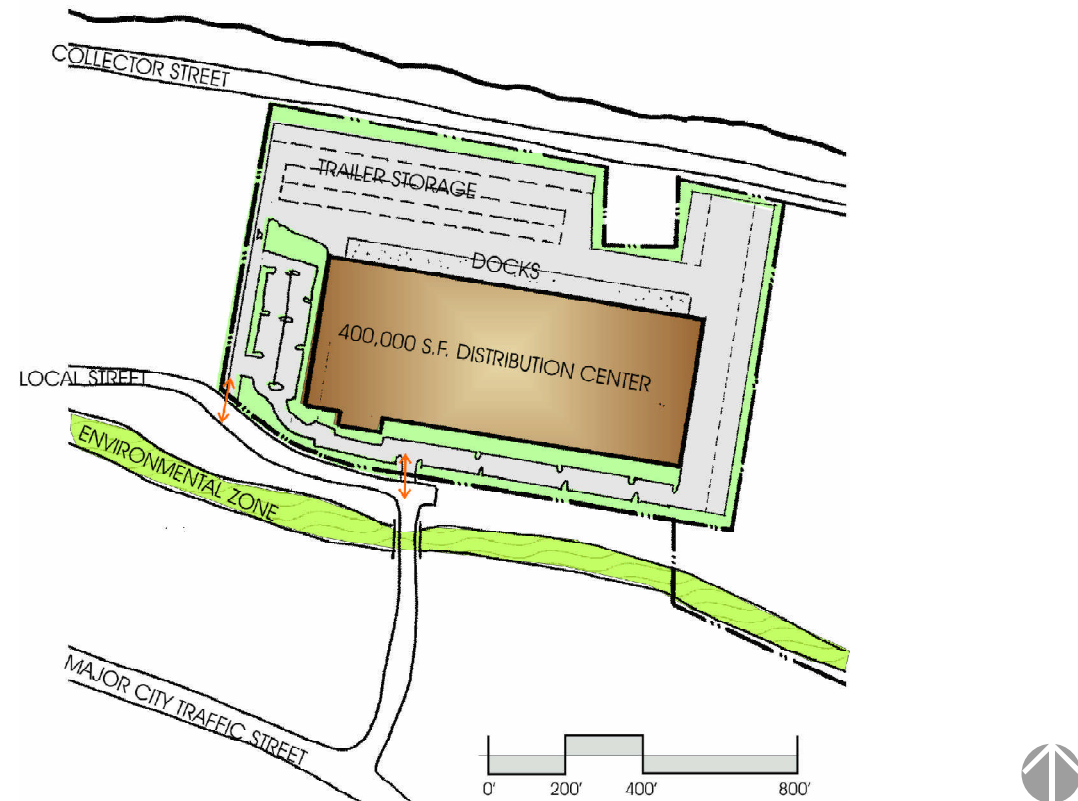
1. See Appendix D for additional cost information.
2. The costs provided are preliminary estimates providing general "order of magnitude" costs for the concept plans. Prior to any significant out lay of funding, it is recommended that specific cost estimates be prepared.
3. The contamination profiles were gathered from specific sites located in the Portland metropolitan area. The contamination information for each site was gathered from publicly available information. The remediation cost estimates are based on the experience of the consultants with similar constituents on other sites, and are not applicable to any specific site. The specific sites have not been identified to ensure that there is no connection between the sites and potential remediation costs.
4. Cleanup costs are estimates only. Capping site is assured to include retaining contaminated dirt or site and 'capping' with paving or building. If surcharge is not sufficient, additional costs may be required for structural pilings.

GROUP  
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**RENOVA**

**DECEMBER 2004**  
Job # 2040104.00



### EXISTING SITE DATA

**ZONING** IG2 - General Industrial 2

**SITE SIZE** 70 acres - Overall site  
25.91 - Development Area

#### DEVELOPMENT STANDARDS

Maximum Height: No Limit\*  
Min. Building Setbacks: 25' (Local Street)  
0' (adjacent to other lot lines)  
Max. Building Setbacks: None  
Max. Building Coverage: 85% of site area  
Parking Ratio: 1 per 750 SF of floor area for the first 3,000 SF; 1 per 3,000 SF of floor area thereafter

\*Except areas within 200 feet of Collector Street ROW. See Zoning Code.

#### INFRASTRUCTURE

Water: 12" main at Local Street intersection  
Storm: Outfall to waterbody  
Sewer: 8" main at Major City Traffic Street  
Streets: Collector Street, Local Street

### CONCEPT PLAN DATA

**USE** Warehouse/Distribution

**DEVELOPMENT AREA** 25.91 acres

**BUILDING AREA** 400,000 SF

**PARKING** 200 +/- regular stalls  
275 +/- trailer stalls

**TOTAL JOBS** 1 job/1,400 - 2,000 SF of building area  
200 - 286 jobs (8 - 11 jobs/acre)

### DEVELOPMENT COSTS

#### ON-SITE

\$22 - \$27/SF	\$10,800,000
Lift Station	\$40,000
Soft Costs	\$2,168,000
	<b>\$13,008,000</b>

#### SDC'S

Water (1-2" meter)	\$12,453
Sanitary (60 EDU's)	\$160,800
Storm	\$96,816
Street (\$1.15/SF)	\$460,000
	<b>\$730,069</b>

#### SDC CREDITS

Water	No Credit
Sanitary Sewer	No Credit
Storm Drainage	No Credit
Street Improvements	No Credit
	<b>(\$0)</b>

#### OFF-SITE

Sanitary Sewer (Extension and lift station)	\$63,000
Water	\$0
Storm Drainage	\$0
Street Improvements (650' extension of Caneron Way)	\$227,500
	<b>\$290,500</b>

#### REMEDIATION COSTS

None	<b>\$0</b>
------	------------

#### OTHER REMEDIATION COSTS

None	<b>\$0</b>
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**GRAND TOTAL \$14,028,569**

## Brownfield/Greenfield Development Cost Comparison

*City of Portland*

### W/D G - Warehouse Distribution Greenfield

- NOTES
1. See Appendix D for additional cost information.
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GROUP  
**MACKENZIE**



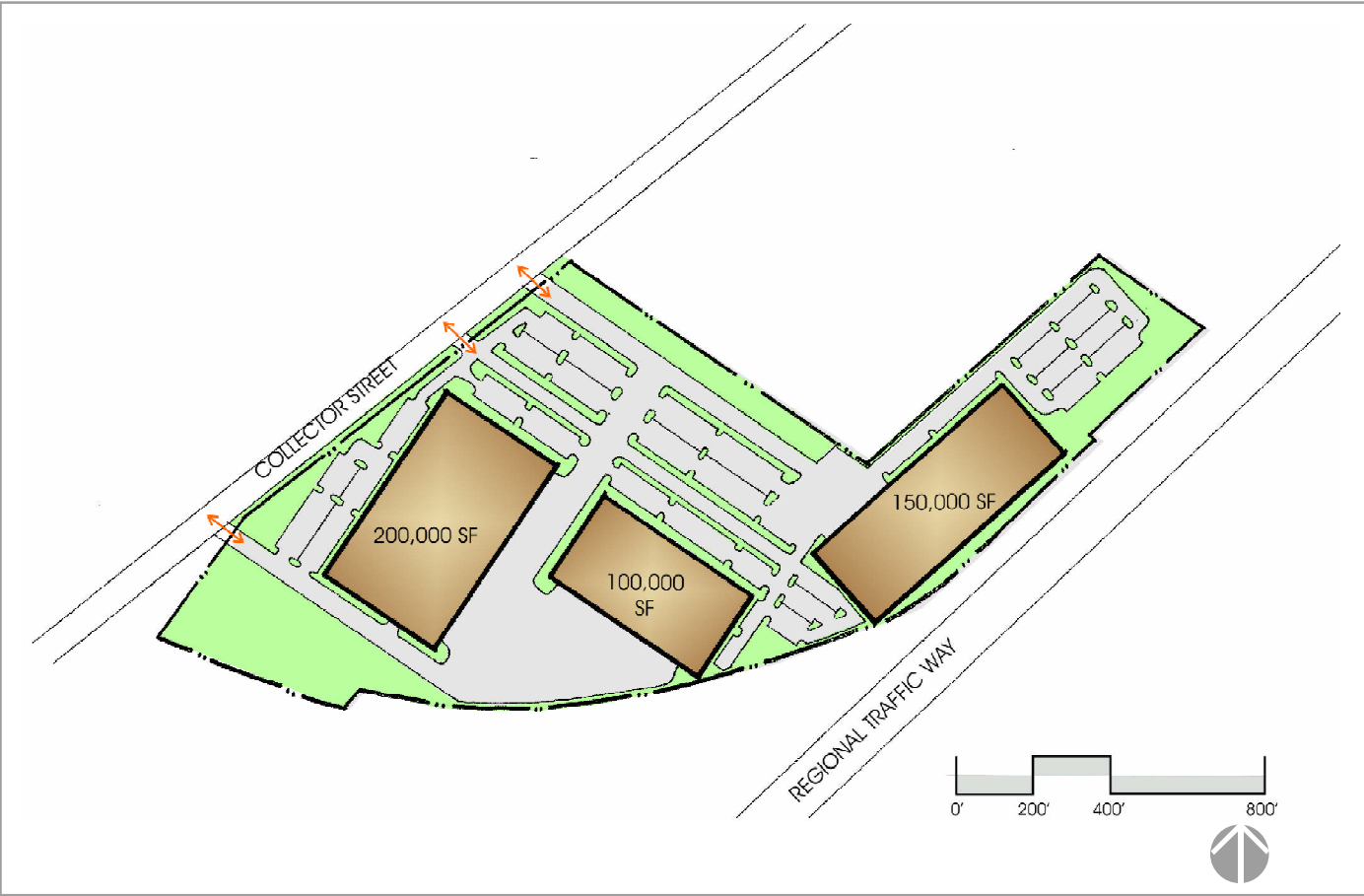
RENOVA

DECEMBER 2004  
Job # 2040104.00

Brownfield/Greenfield  
Development Cost Comparison

Clackamas County

GM G - General Manufacturing  
Brownfield



EXISTING SITE DATA

ZONING IH - Heavy Industrial

SITE SIZE 37.75 acres - Development Area

DEVELOPMENT STANDARDS

Maximum Height: No Limit  
Min. Building Setbacks: 5' (front)  
Max. Building Setbacks: None  
Max. Building Coverage: 100% of site area  
Parking Ratio: 1 per 750 SF of floor area (Manufacturing and Production)

INFRASTRUCTURE

Water: 12" line in Neighborhood Collector Street  
Outfall to main in Neighborhood Collector Street  
Storm: 60" line in Neighborhood Collector Street; several other existing services to the site  
Sewer: Neighborhood Collector Street, Regional Trafficway and Major City Traffic Street  
Streets:

CONCEPT PLAN DATA

USE General Manufacturing

DEVELOPMENT AREA 37.75 acres

BUILDING AREA 450,000 SF

PARKING 1,100 +/- regular stalls

TOTAL JOBS 692 - 1,125 jobs (18 - 30 jobs/acre)  
1 job/400 - 650 SF of building area

DEVELOPMENT COSTS

ON-SITE

\$40 - \$45/SF	\$20,250,000
Brownfield Sitework Surcharge	\$607,500
Soft Costs	\$4,171,500
	<b>\$25,029,000</b>

SDC'S

Water (3-2" meter)	\$37,359
Sanitary (115 EDU's)	\$308,200
Storm	\$142,285
Street (\$1.61/SF)	\$724,500
	<b>\$1,212,343</b>

SDC CREDITS

Water	\$249,062
Sanitary Sewer	No Credit
Storm Drainage	No Credit
Street Improvements	No Credit
	<b>(\$249,062)</b>

OFF-SITE

Sanitary Sewer	\$0
Water	\$0
Storm Drainage	\$0
Street Improvements (6' sidewalk)	\$24,000
	<b>\$24,000</b>

REMEDIATION COSTS

Cap Radionuclide Landfill	\$850,000
Soil Remediation	\$3,000,000
Groundwater Remediation	\$3,500,000
Stormwater Management	\$500,000
Regulatory/PM Costs	\$3,250,000
	<b>\$11,100,000</b>

OTHER REMEDIATION COSTS

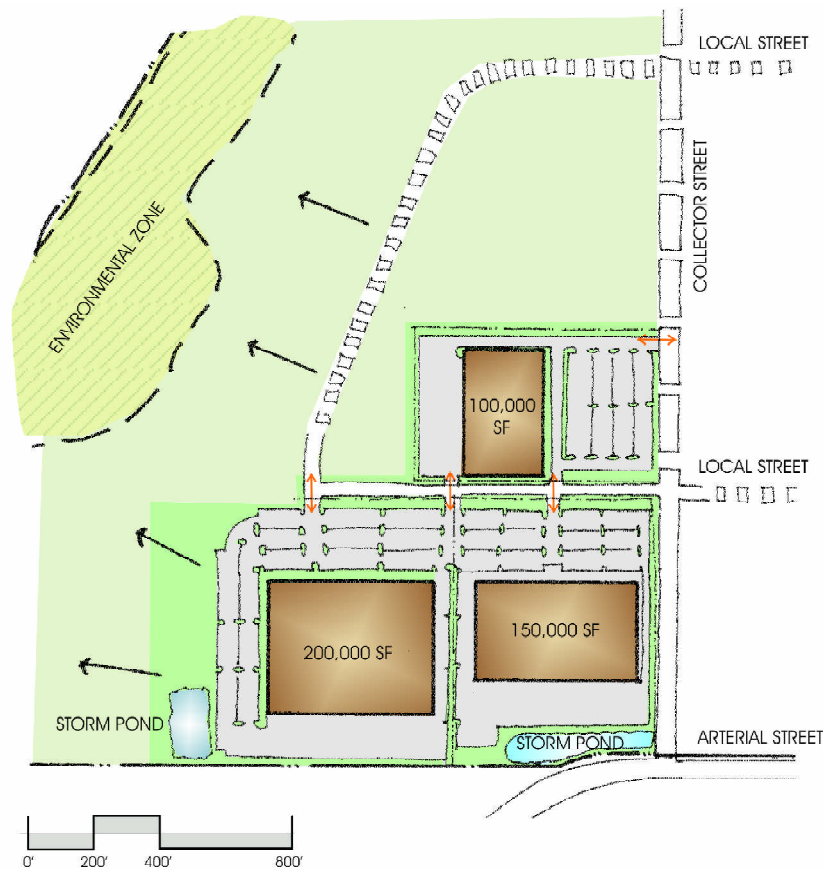
Soft Costs	\$4,152,000
Carrying Costs	\$5,732,609
Risk Premium	\$1,995,842
	<b>\$11,880,451</b>

GRAND TOTAL \$48,996,732

NOTES

1. See Appendix D for additional cost information.
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### EXISTING SITE DATA

**ZONING** General Industrial (I-3)  
(Clackamas County)

**SITE SIZE** 377 acres - Overall Site  
37.95 - Development Area

**DEVELOPMENT STANDARDS**  
Maximum Height: Dependent on Building Type  
(see code)  
Min. Building Setbacks: 20' (front);  
No side yard setback  
required if abutting  
I-2 or I-3 zone  
Max. Building Setbacks: None  
Max. Building Coverage: Dependent on Building Type  
(see code)  
Parking Ratio: 1.6 per 1,000 SF of GFA min.  
(Manufacturing)

#### INFRASTRUCTURE

Water: 12" main adjacent to Arterial Street  
extends close to Collector Street  
Storm: Discharge to nearby waterbody  
Sewer: 24" main extension from nearby  
waterbody - estimated 2 years  
Streets: Arterial Street, Collector Street, Local  
Street

### CONCEPT PLAN DATA

**USE** General Manufacturing

**DEVELOPMENT AREA** 37.95 acres

**BUILDING AREA** 450,000 SF

**PARKING** 1,100 +/- regular stalls

**TOTAL JOBS**  
1 job/400 - 650 SF  
of building area 692 - 1,125 jobs  
(18 - 30 jobs/acre)

### DEVELOPMENT COSTS

#### ON-SITE

\$40 - \$45/SF	\$20,250,000
150,000 cy cut/fill @ \$5/cy	\$750,000
Soft Costs	\$4,200,000
	<b>\$25,200,000</b>

#### SDC'S

Water (3-2" meter)	\$55,077
Sanitary (50 EDU's)	\$121,000
Storm	\$115,248
Street (\$1,243/TSFGFA)	\$577,350
	<b>\$868,675</b>

#### SDC CREDITS

Water	No Credit
Sanitary Sewer	No Credit
Storm Drainage	No Credit
Street Improvements	No Credit
	<b>\$0</b>

#### OFF-SITE

Sanitary Sewer	\$105,000
(extend new main)	
Water	\$242,000
(extend main)	
Storm Drainage	\$280,000
(new main)	
Street Improvements	\$720,000
(construct frontage streets)	
	<b>\$1,347,000</b>

#### REMEDIATION COSTS

None	<b>\$0</b>
------	------------

#### OTHER REMEDIATION COSTS

None	<b>\$0</b>
------	------------

**GRAND TOTAL \$27,415,675**

## Brownfield/Greenfield Development Cost Comparison

*Clackamas County*

**GM G - General Manufacturing  
Greenfield**

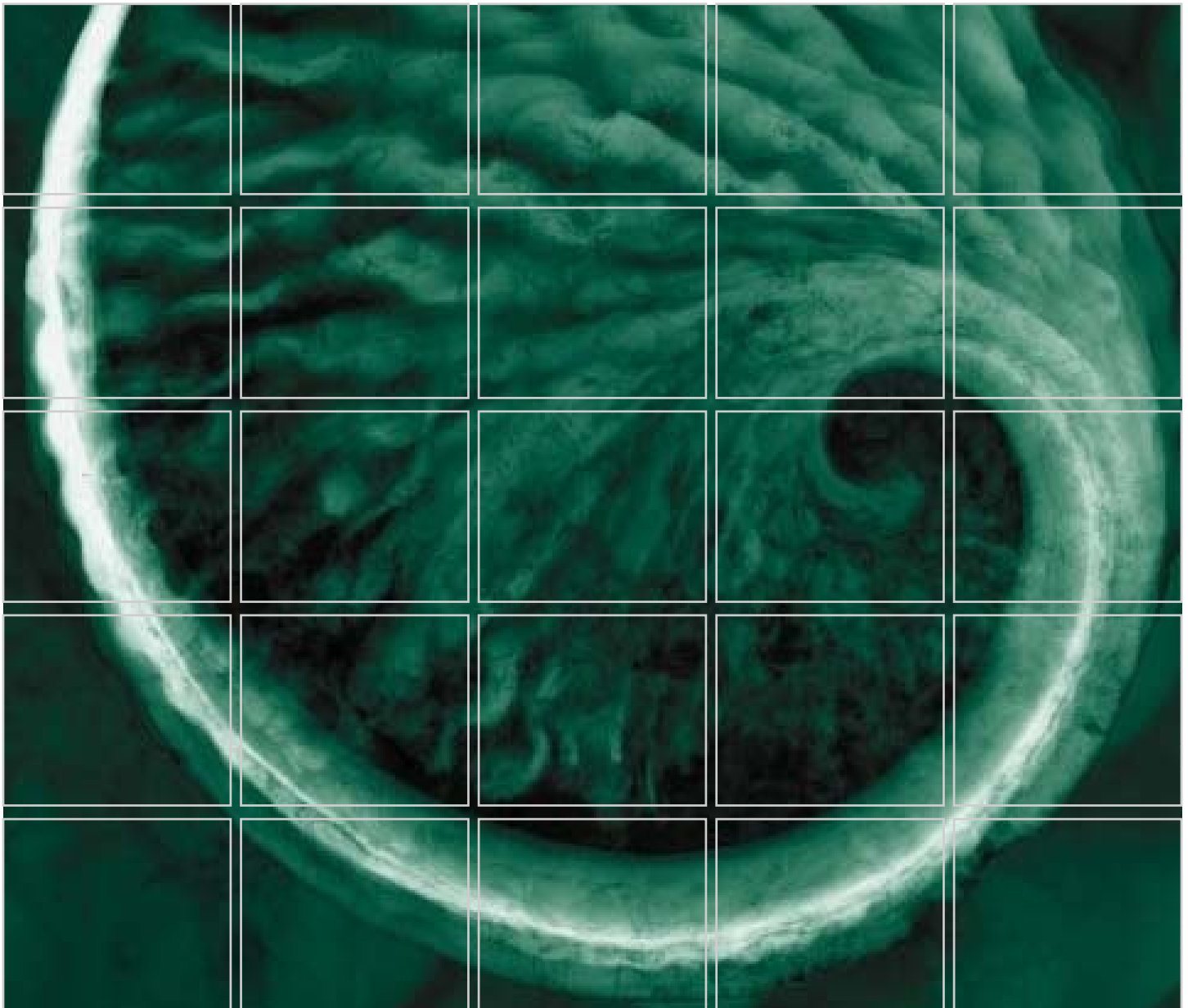
- NOTES  
1. See Appendix D for additional cost information.  
2. The costs provided are preliminary estimates providing general  
"order of magnitude" costs for the concept plans. Prior to any  
significant out lay of funding, it is recommended that specific cost  
estimates be prepared.

GROUP  
**MACKENZIE**



RENOVA

DECEMBER 2004  
Job # 2040104.00



# **BROWNFIELD/GREENFIELD DEVELOPMENT COST COMPARISON STUDY**

## **Potential Environmental Costs**

September 2004

Prepared for:  
Port of Portland  
City of Portland  
Portland Development Commission  
METRO

[www.erm.com](http://www.erm.com)

# **BROWNFIELD/ GREENFIELD DEVELOPMENT COST COMPARISON STUDY**



## **Potential Environmental Costs**

Based on publicly available information and our experience with similar properties, we considered the potential environmental remediation requirements for each site. The information was used to prepare conceptual scopes of work representing the minimum effort required to get the sites development ready and/or obtain site closure from the Department of Environmental Quality (DEQ). DEQ information regarding each of the brownfield properties was not complete; therefore we also relied on conversations with knowledgeable personnel, the respective DEQ project managers, and experience with other sites similar to each site. The document review and interviews were used to prepare conceptual scopes of work and associated potential environmental costs for the three brownfield sites.

The key components used to prepare the potential environmental costs were:

- Document Review – We reviewed selected environmental documents available in regulatory files. The files included site descriptions, site history, extent of contamination, regulatory status, and proposed environmental work.
- Interviews with Key Project Participants – When appropriate we interviewed key personnel to discuss current site conditions and conceptual scopes of work.
- Development of Conceptual Scope of Work and Associated Cost Estimate - Based on our evaluation of the sites, we developed a cost estimate for completion of the scopes of work that included site investigations and remedial assessment scope of work and associated assumptions. The costs represent the minimum estimated effort required to obtain a No Further Action (NFA) letter from the DEQ for the properties. The estimated costs are based on our current understanding of site conditions and regulatory requirements. We recognize that this understanding may change based on new information. The cost estimates assume that all site investigation activities will be completed in 2004 and 2005. The remediation cost estimates are based on the most probable conditions anticipated for the property. The actual cost of site remediation will be based on actual conditions.
- Key Assumptions and Unknowns – Site-specific assumptions and unknowns were developed to further define our understanding of the most probable conditions at the properties and the basis for the scope of work and estimated development costs associated with each conceptual development plan. Assumptions were made regarding site conditions, investigation derived waste, project schedule, and reporting.

One critical assumption made for each site was that all sources of environmental impact to the properties have been identified. We were not aware of ongoing sources of environmental impact other than those described in the files, and assumed that there will be no future contributions to soil or ground water contamination. Conservative state and/or federal screening values will be used to evaluate the analytical data. Data from the investigation will be used to evaluate environmental

risk, plan for site cleanup, and to secure an NFA letter from the DEQ for areas that are clean or to develop a remediation plan as appropriate. The site investigation will proceed under the oversight of the DEQ. The nature of the oversight has not been determined. Technical review, oversight, and/or programmatic influence from other agencies will not occur in a manner that affects the implementation, investigative approach, time frame, or costs set forth in this cost estimate. We have not included environmental costs associated with the demolition of buildings, slabs, or foundations in the estimate.

An outline of the site conditions and potential environmental development costs for each of the three brownfield sites are presented below.

## Warehouse /Distribution Facility

The subsurface conditions on the two parcels that comprise the site have not been fully characterized. However, available data indicates that subsurface soil and groundwater are contaminated with a broad range of contaminants, including free-product petroleum.

### Description

#### Soil

- 1) Shallow PAH contamination is present in the central portion of the site.
- 2) Uncharacterized contamination is present in the lagoon area.
- 3) Petroleum hydrocarbon contamination may be present near current and former UST locations, some contaminated soil has been removed.

#### Groundwater

- 1) Volatile contaminants have been detected in groundwater.

### Key Assumptions

- 1) Contamination present on the parcels is below applicable DEQ action levels for soil and groundwater.
- 2) There has been no offsite migration of contaminants.
- 3) No soil removal other than a limited amount of TPH.
- 4) The current owner will provide indemnity from contamination issues associated with the adjacent waterways.
- 5) Only standard storm water BMPs will be required for the site.

### Key Unknowns

- 1) The extent and nature of groundwater contamination.
- 2) The volume of soil removal that may be required for development.

### Remedy

#### Soil

- 1) The site will be capped with surcharge material and the warehouse building.

#### Groundwater

- 1) Groundwater monitoring will be required for 5 years.

### Development Plan Costs

1) Site Investigation and Remedial Assessment	\$350,000.
2) Site Surcharge	\$720,000
3) Cap	<u>\$200,000</u>
<b>Warehouse/Distribution Total</b>	<b>\$1.29 million.</b>

## High Tech Facility

The subsurface conditions on the three sites that comprise the proposed facility have not been fully characterized. There are no active investigations associated with conditions on Site 1 and Site 2. Site 3 is currently the subject of a DEQ-ordered Remedial Investigation. DEQ information indicates that the entire site has been contaminated with radioactive materials, metals, pesticides, and volatile organic compounds.

### High Tech Facility - Site 1

#### Description

- 1) Site 1 was used for disposal of low-level radioactive materials.
- 2) The site was "capped" with nine inches of soil with DEQ approval in the 1980s.

#### Key Assumptions

- 1) There are no groundwater issues associated with the site.
- 2) No removal of soil will be required.
- 3) There has been no offsite contaminant migration.
- 4) The seller will provide indemnity from any in stream cleanup requirements.
- 5) Only standard storm water BMP's will be required for the site.
- 6) Utility installation costs should be calculated at 1.25 times normal rates.

#### Remedy

- 1) The entire site will be capped with 2 feet of clean soil.

#### Development Plan Costs

1) Cap	\$850,000
2) PM and regulatory costs at	<u>\$250,000</u>
<b>Site 1 Total</b>	<b>\$1.1 million</b>

## High Tech Facility - Site 2

A Record of Decision (ROD) has been completed, metal-contaminated sediment and soil has been capped on the site.

### Description

- 1) The site was used for lead acid battery recycling, smelting, and refining. Lead, arsenic, cadmium, zinc, antimony and sulfuric acid were released on the property. Lead was stabilized on the site. O and M activities are ongoing.

### Key Assumptions

- 1) The site is "surface clean".
- 2) Any subsurface workers will need to be HAZWOPER trained.
- 3) Regulatory oversight will be required for redevelopment.
- 4) There are no groundwater issues that require remediation.
- 5) Utility installation costs should be calculated at 1.25 times normal rates.

### Key Unknowns

- 1) The nature of development that the DEQ will allow on the cap.

### Remedy

- 1) The remedy for the site has been completed.
- 2) O and M of cap will be ongoing.

### Development Plan Costs

1) Project Management and Regulatory Costs	\$500,000
2) Operations and Maintenance of cap for 5 years at \$200,000 annually.	<u>\$1,000,000</u>
<b>Site 2 Total</b>	<b>\$1.6 million</b>

## High Tech Facility - Site 3

Discharge of untreated wastes onsite and offsite included pesticides, dioxins and furans, dichlorobenzene, phenols, aerosols, BTEX, lead, and arsenic.

### Description

#### Soil

- 1) Metal contamination from former sediments was excavated and placed on the Site 2. Site 3 was then filled.
- 2) NAPL contamination has been identified near west central portion of the property. The NAPL contamination will require remediation.

#### Groundwater

- 1) Site-wide groundwater contamination, including pesticides and VOCs including benzene, is present.
- 2) Contaminated groundwater appears to be migrating toward the river.

### Key Assumptions

- 1) The seller will provide indemnity for any river contamination.
- 2) No removal of soil will be required.
- 3) On site containment.
- 4) No vapor barrier will be required to prevent VOC intrusion into buildings.
- 5) Utility installation costs should be calculated at 1.25 times normal rates.

### Remedy

#### Soil

- 1) Stabilization of top 5 feet of soil over 2 acres with concrete slurry.
- 2) Treatment of NAPL with a ChemOx remediation system.
- 3) Cap the site with 2 feet of clean fill.

#### Groundwater

- 1) Remediation system to prevent migration to the river.
- 2) NAPL cleanup with a ChemOx remediation system.

#### Storm Water Management

- 1) Treatment will be required if the site is not surface clean.



## Development Plan Costs

### Soil

- |  |             |
|--|-------------|
| 1) Stabilization of 2 acres of soil near former lake | \$800,000   |
| 2) NAPL cleanup                                      | \$1,000,000 |
| 3) Cap 14.4 acres with two feet of clean fill        | \$1,200,000 |

### Groundwater

- |                                 |             |
|---------------------------------|-------------|
| 1) Remediation system           | \$1,000,000 |
| 2) System O and M for 5 years   | \$2,500,000 |
| 3) NAPL cost included with soil |             |

### Storm Water

- |                          |           |
|--------------------------|-----------|
| 1) Storm water treatment | \$500,000 |
|--------------------------|-----------|

PM and DEQ costs	<u>\$1,500,000</u>
------------------	--------------------

<b>Site 3 Total</b>	<b>\$8.5 million</b>
---------------------	----------------------

<b>High Tech Facility Total</b>	<b>\$11.2 million</b>
---------------------------------	-----------------------

## Industrial Park Site

East Property: Petroleum hydrocarbon contamination resulting from road oiling for dust suppression.

West Terminal area: Contamination resulting from spills, leaks and work practices over facility lifetime. Small portion of facility used as a mixing location for a pentachlorophenol (PCP) wood treating compound. Remainder of facility has contamination indicative of petroleum discharge: BTEX, polyaromatic hydrocarbons (PAH); and lead.

## Description

### Soil

- 1) Soils contaminated with PCP were removed from the portion of the facility that had been leased. Soils were stockpiled on the property and some additional PCP contamination of groundwater occurred. Stockpiled soils were removed and disposed of in 1997.
- 2) Soils on the east (undeveloped) property were impacted with petroleum hydrocarbons resulting from road oiling for dust control. A soil removal action was completed and the east property has received an Easement and Equitable Servitude (E&ES) agreement limiting its use to commercial/industrial but requiring no further action.
- 3) Additional soil contamination exists throughout the terminal (west and south) portions of the site. A preliminary assessment indicates that soils are only contaminated with petroleum hydrocarbons and low levels of polyaromatic hydrocarbons.

### Groundwater

- 1) A well-defined and confined plume of PCP contamination exists in the vicinity of the PCP mixing area.
- 2) Petroleum hydrocarbon contamination exists in both the west and south terminal areas.
- 3) A pump-and-treat system for PCP contaminated groundwater exists.

## Key Assumptions

- 1) The seller will provide indemnity for any river contamination.
- 2) Utility installation costs should be calculated at 1.25 times normal rates.

## Key Unknowns

- 1) Soil removal may be required.
- 2) On site containment of groundwater contamination may be required.
- 3) Maintenance of the PCP pump-and-treat system may be required with a new wastewater treatment methodology.

## General Remedy

### Soil

- 1) Removal of TPH hot-spots as discovered during construction.
- 2) Stabilization of top 5 feet of soil over 2 acres with concrete slurry.
- 3) Install an active or passive vapor control system for areas with current groundwater contamination.
- 4) Cap landscaped areas with 2 feet of clean fill.

### Groundwater

- 1) Continuing PCP pump and treatment system.
- 2) Enhanced bioremediation and/or monitored natural attenuation for the petroleum contaminated groundwater.

### Storm Water Management

- 1) Treatment will be required if the site is not surface clean.

## Development Plan Costs

### Soil

- |  |               |
|--|---------------|
| 1) Passive Soil Vapor Extraction System  | \$ 240,000 or |
| 2) Active SVE System   | \$ 500,000    |
| 3) Hot spot removal @ \$70/cu. yard    assume<br>2,000 cu. yards disposed                              | \$140,000     |
| 4) Cap landscaped areas with two feet of clean fill<br>@ \$15/cu. yard installed, assume 75,000 sq. ft | \$150,000     |

### Groundwater

- |                               |           |
|-------------------------------|-----------|
| 1) System O and M for 5 years | \$500,000 |
| 2) Enhanced bioremediation    | \$500,000 |

### Storm water

- |                          |                  |
|--------------------------|------------------|
| 1) Storm water treatment | \$200,000        |
| PM and DEQ costs         | <u>\$200,000</u> |

<b>Industrial Park Total (active)</b>	<b>\$2.19 million</b>
<b>Industrial Park Total (passive)</b>	<b>\$1.93 million</b>

Brownfield/Greenfield Development Cost Summary  
Construction Cost, System Development Charges and Credits Comparison

2040104  
12/03/04

	HIGH-TECH MANUFACTURING				INDUSTRIAL PARK				WAREHOUSE/DISTRIBUTION				GENERAL MANUFACTURING			
	Brownfield Site - Portland		Greenfield Site - Hillsboro		Brownfield Site - Portland		Greenfield Site - Tualatin		Brownfield Site - Portland		Greenfield Site - Portland		Brownfield Site - Portland		Greenfield Site - Clackamas County	
SITE DATA																
Site Area (SF)	37.75 ac +/-	1,557,584	53.2 ac +/-	2,316,557	45.5 ac +/-	1,981,980	44.5 ac +/-	2,639,000	37.9 ac +/-	1,653,078	25.91 ac +/-	1,038,500	37.75 ac +/-	1,557,584	37.95 ac +/-	1,653,492
Existing Impervious Area (SF)	Assume 0%	0	Assume 0%	0	Assumes 10%	198,198	Assume 0%	0	Assume 40%	661,231	Assume 0%	0	Assume 0%	0	Assume 0%	0
Proposed Impervious Area (SF)	Assume 85%	1,323,946	Assume 85%	1,969,073	Assume 85%	1,684,683	Assume 85%	2,243,150	Assume 85%	1,405,116	Assume 85%	882,725	Assume 85%	1,323,946	Assume 85%	1,405,468
Existing Building SF	Vacant	0	Vacant	0	Assumes 0 SF	0	Vacant	0		30,196	Vacant	0	Vacant	0	Vacant	0
Building SF		350,000		350,000		630,000		630,000		400,000		400,000		450,000		450,000
Employees	1/400 - 650 SF of building area	667	1/400 - 650 SF of building area	667	1 / 400-2000 SF building area	525	1 / 400-2000 SF building area	525	1/1400-2000 SF of building area	235	1/1400-2000 SF of building area	235	1/400 - 650 SF of building area	857	1/400 - 650 SF of building area	857
Equivalent Dwelling Units	1 EDU = 7 fixture units	195	1 EDU = 16 fixture units; does not include SDC for high-water manufacturing	85	1 EDU = 7 fixture units	218	1 EDU = 16 fixture units	95	1 EDU = 7 fixture units	60	1 EDU = 7 fixture units	60	1 EDU = 7 fixture units	115	1 EDU = 16 fixture units	50
ON-SITE CONSTRUCTION COST																
Construction Cost / SF	\$200-\$300 / SF	\$105,000,000	\$200-\$300 / SF	\$105,000,000	\$30 - \$35/SF	\$22,050,000	\$30 - \$35/SF	\$22,050,000	\$22 - \$27 / SF	\$10,800,000	\$22 - \$27 / SF	\$10,800,000	\$40 - \$45 / SF	\$20,250,000	\$40 - \$45 / SF	\$20,250,000
Additional Site Costs	Pilings (\$3/SF)	\$375,000		\$0	Tank removal	\$325,000	600,000 c.y. cut/fill @ \$5/cy	\$3,000,000	Lift station	\$30,000	Lift Station	\$40,000		\$0	150,000 c.y. cut/fill @ \$5/c.y.	\$750,000
Additional Brownfield Construction Costs	25% of sitework costs	\$525,000			25% of sitework costs	\$661,500			25% of sitework costs	\$324,000			25% of sitework costs	\$607,500		
Total On-Site Construction Cost		\$105,900,000		\$105,000,000		\$23,036,500		\$25,050,000		\$11,154,000		\$10,840,000		\$20,857,500		\$21,000,000
Brownfield Clean-Up Costs	Esco Cap Esco PM/DEQ NL O&M Cap NL PM/DEQ RP Soil RP Groundwater RP Stormwater RP PM/DEQ	\$850,000			Soil	\$790,000			Site Investigation	\$350,000			Esco Cap	\$850,000		
		\$250,000			Groundwater	\$1,000,000			Site Surcharge	\$720,000			Esco PM/DEQ	\$250,000		
		\$1,000,000			Stormwater	\$200,000			Cap	\$200,000			NL O&M Cap	\$1,000,000		
		\$500,000			PM/DEQ	\$200,000							NL PM/DEQ	\$500,000		
		\$3,000,000											RP Soil	\$3,000,000		
		\$3,500,000											RP Groundwater	\$3,500,000		
		\$500,000											RP Stormwater	\$500,000		
		\$1,500,000											RP PM/DEQ	\$1,500,000		
Total Brownfield Costs			\$11,100,000		\$0		\$2,190,000		\$0		\$1,270,000		\$0		\$11,100,000	
Total Costs		\$117,000,000		\$105,000,000		\$25,226,500		\$25,050,000		\$12,424,000		\$10,840,000		\$31,957,500		\$21,000,000
SDC																
Water	2 - 6" meters	\$155,664	2 - 6" meters (estimated)	\$160,000	7 - 2" meters	\$87,171	7 - 2" meters	\$154,476	1 - 2" meter	\$12,453	1 - 2" meter	\$12,453	3 - 2" meters	\$37,359	3 - 2" meters	\$55,077
Sanitary	\$2680 / EDU	\$522,600	\$2500 / EDU	\$212,500	\$2680 / EDU	\$584,240	\$2500 / EDU	\$237,500	\$2680 / EDU	\$160,800	\$2680 / EDU	\$160,800	\$2680 / EDU	\$308,200	\$2200 / EDU	\$121,000
Storm	\$110/1,000 SF new impervious area	\$135,043	\$500 per 2640 SF impervious area	\$372,931	\$110/1,000 SF new impervious area	\$151,621	\$500 per 2,640 SF impervious area	\$183,938	\$110/1,000 SF new impervious area	\$75,876	\$110/1,000 SF new impervious area	\$90,038	\$110/1,000 SF new impervious area	\$135,043	\$205 per 2,500 SF impervious area	\$115,248
Storm	\$3.52 per linear foot of street frontage; 1,000 LF +/-	\$3,070	No fee	\$0	\$3.52 per linear foot of street frontage; 1,000 LF +/-	\$3,070	No fee	\$0	\$3.52 per linear foot of street frontage; 1,000 LF +/-	\$3,070	\$3.52 per linear foot of street frontage; 1,000 LF +/-	\$3,070	\$3.52 per linear foot of street frontage; 1,000 LF +/-	\$3,070	No fee	\$0
Storm	\$1.80/daily vehicle trip; 9.27 trips/1,000 SF	\$3,245	No fee	\$0	\$1.80/daily vehicle trip; 9.27 trips/1,000 SF	\$5,840	No fee	\$0	\$1.80/daily vehicle trip; 9.27 trips/1,000 SF	\$3,708	\$1.80/daily vehicle trip; 9.27 trips/1,000 SF	\$3,708	\$1.80/daily vehicle trip; 9.27 trips/1,000 SF	\$4,172	No fee	\$0
Streets	\$1.61 per building SF	\$563,500	\$259 per trip; 3.85 trips /1,000 SF manufacturing; 16.31 trips /1,000 SF general office	\$659,932	\$1.61 per building SF	\$1,014,300	\$259 per trip; 6.97 trips / 1,000 SF	\$1,137,295	\$1.15 per building SF	\$460,000	\$1.15 per building SF	\$460,000	\$1.61 per building SF	\$724,500	\$1,283 / TSFGFA	\$577,350
Parks	No fee	0	\$343 / parking space; 1,100 spaces	\$377,300	No fee	0	No fee	\$0	No fee	\$0	No fee	\$0	No fee	0	No fee	\$0
Total SDC's		\$1,383,121		\$1,782,663		\$1,846,243		\$1,713,209		\$715,907		\$730,069		\$1,212,343		\$868,675
SDC CREDITS																
Water - Existing Meters	2 - 8" meters	\$249,062	No credit	\$0	1 - 3" meter	\$22,688	No credit	\$0	1 - 3" meter; 1 - 1" meter	\$27,242	No credit	\$0	2 - 8" meters	\$249,062	No credit	\$0
Sanitary	No credit	\$0	No credit	\$0	1 EDU = 7 fixture units	\$2,680	No credit	\$0	No credit	\$0	No credit	\$0	No credit	\$0	No credit	\$0
Storm	No charge for existing impervious area	\$0	No credit	\$0	No credit	\$0	No credit	\$0	No charge for existing impervious area	\$0	No credit	\$0	No charge for existing impervious area	\$0	No credit	\$0
Streets	Site is vacant	\$0	No credit	\$0	No credit	\$0	No credit	\$0	\$1.61 / existing SF	\$48,616	No credit	\$0	No credit	\$0	No credit	\$0
Total SDC Credits		\$249,062		\$0		\$25,368		\$0		\$75,858		\$0		\$249,062		\$0
TOTAL SDC (SDC-Credits)	\$1,134,059		\$1,782,663		\$1,820,875		\$1,713,209		\$640,050		\$730,069		\$868,675			

Brownfield / Greenfield Development Cost Summary  
Infrastructure Cost Comparison

2040104  
12/03/04

	HIGH-TECH MANUFACTURING		INDUSTRIAL PARK		WAREHOUSE/DISTRIBUTION		GENERAL MANUFACTURING	
	Brownfield Site - Portland	Greenfield Site - Hillsboro	Brownfield Site - Portland	Greenfield Site - Tualatin	Brownfield Site - Portland	Greenfield Site - Portland	Brownfield Site - Portland	Greenfield Site - Clackamas County
Sanitary Sewer	\$0	\$333,500	\$0	\$950,780	\$35,000	\$63,000	\$0	\$105,000
Provider	City of Portland	CWS & Hillsboro	City of Portland	Tualatin	City of Portland	City of Portland	City of Portland	WES
Sewer Size at Site	60 inch	12 inch	12 inch	8 inch	42 inch	8 inch	60 inch	8 to 24 inch
Lift Sta. Required	no	yes	no	yes	yes	yes	no	no
Issues or Notes	note 1	note 5	note 9	note 13,34	note 17	note 21	note 25	note 29,35
Water	\$0	\$204,000	\$0	\$631,057	\$200,000	\$0	\$0	\$242,000
Provider	City of Portland	City of Hillsboro	City of Portland	Tualatin	City of Portland	City of Portland	City of Portland	Sunrise Water
Size of Main at Site	12 inch	18 inch	24 inch	12 inch	12 inch	12 inch	12 inch	18 inch
Looped System	yes	no		yes	no	yes	yes	no
Issues or Notes	note 2	note 6	note 10	note 14,34	note 18	note 22	note 26	note 30,35
Storm Drainage	\$0	\$132,000	\$48,000	\$1,080,498	\$0	\$0	\$0	\$280,000
Jurisdiction	City of Portland	City of Hillsboro	City of Portland	Tualatin	MCDD	MCDD	City of Portland	Clackamas County
Discharge to	Main in street	Waibel Creek	Main in street	city system	Slough	Slough	Main in street	Rock Creek
Regional WQ or Detention	no	no	no	yes	no	no	no	no
Issues or Notes	note 3,33	note 7	note 11	note 15,34	note 19	note 23	note 27,33	note 31,35
Street Improvements	\$24,000	\$783,000	\$510,000	\$3,076,832	\$500,000	\$227,500	\$24,000	\$720,000
Jurisdiction	City of Portland	City of Hillsboro	City of Portland	Tualatin	City of Portland	City of Portland	City of Portland	Clackamas County
Signal required	no	yes	no	yes	no	no	no	no
Issues or Notes	note 4	note 8	note 12	note 16,34	note 20	note 24	note 28	note 32,35
Total Infrastructure Costs	\$24,000	\$1,452,500	\$558,000	\$5,739,167	\$735,000	\$290,500	\$24,000	\$1,347,000

NOTES

- 1 Existing 60 inch sanitary sewer located in neighborhood collector street. Several existing services to the site.
- 2 Existing 12 inch waterline in neighborhood collector street.
- 3 Existing 60 inch and 48 inch storm drain in neighborhood collector street. Property may be required to drain to sanitary sewer resulting in additional monthly sewer charges.
- 4 Improvements include 6 foot sidewalk.
- 5 Includes half cost of lift station (\$100,000), 1,000 lf of 12 inch main to collector and one half cost of 8 inch force main to arterial.
- 6 One half cost of the frontage lines in arterial and collector. Total of 3,400 lf of 18 inch line.
- 7 Includes cost of 30 inch storm drain from creek to collector street.
- 8 Includes one half the cost of 2,300 lf collector street xtension and collector/arterial signal.
- 9 12" main south and 15:" main east within property limits
- 10 24" public main norht and east adjacent to propety frontage wihtin existing easement
- 11 Public storm drain main 800 ft north of site
- 12 Private street improvements north and south of site
- 13 Based on per acre cost for sewer improvements. (CH2M Wastewater Infrastructure Assessment - draft 8/30/2002)
- 14 Based on per acre cost for water improvements. (CH2M Water System Infrastructure Assessment - draft 8/30/2002)
- 15 Based on per acre cost for storm drainage improvements. (CH2M Stormwater Infrastructure Assessment - draft 8/30/2002)
- 16 Based on per acre cost for street improvements. (CH2M Phase 1 Transportation - draft 8/30/2002)
- 17 42 inch interceptor south of RR, adjacent to site. Existing service to site unknown. Cost includes new service. (Private lift station costs included in on-site construction costs).
- 18 Existing 6 inch water to site. Cost assumes replacement with 12 inch waterline to 1,000 ft from site. System is not looped. Dead end service to site.

NOTES

- 19 Site is adjacent to slough. Assumes stormwater discharge to slough. Will require treatment and environmental review for outfall.
- 20 Assumes half street improvements to major city traffic street for 2,000lf frontage.
- 21 Existing sewer is at major city traffic street. Assume 900 ft extension to serve site. (Private lift station costs included in on-site construction costs).
- 22 Existing water main at local street/ collector street intersection.
- 23 Site is adjacent to slough. Assumes stormwater discharge to slough. Will require treatment and environmental review for outfall.
- 24 Assumes 650 ft extension of local street along site frontage.
- 25 Existing 60 inch sanitary sewer located in neighborhood collector street. Several existing services to the site.
- 26 Existing 12 inch waterline in neighborhood collector street.
- 27 Existing 60 inch and 48 inch storm drain in neighborhood collector street. Property may be required to drain to sanitary sewer resulting in additional monthly sewer charges.
- 28 Improvements include 6 foot sidewalk.
- 29 Extend new main from 24 inch sewer planned for east side of waterway. Projected construction 2 years.
- 30 Existing 18 inch main adjacent to arterial street extended to near collector street.. Extend to collector street then north for project frontage. Dist has good supply and pressure in area.
- 31 Construct new public main from new waterway outfall to and through site.
- 32 Construct frontage streets only. Does not assume any improvements to highway. Assumes no signal is required.
- 33 Maybe required to connect storm to sanitary sewer, resulting in additional monthly fees.
- 34 Estimated infrastructure cost is based on proportionate share of the total infrastructure costs (based on site area).
- 35 Estimated infrastructure cost is based on costs to extend infrastructure to serve subject area.



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DATE: October 25, 2004  
TO: PORT OF PORTLAND  
FROM: JOHNSON GARDNER, LLC  
RE: Comparative Cost and Residual Land Value Calculations

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## MEMORANDUM

Johnson Gardner has prepared a series of summary pro formas, evaluating the return on investment associated with a series of conceptual development programs produced by Group Mackenzie. The programs were developed for four product types, with identical programs evaluated on both greenfield as well as brownfield sites. This memorandum outlines our assumptions and key findings of our evaluation.

### A. BASIC ASSUMPTIONS

A series of eight site-specific development programs were evaluated in this analysis. Static pro formas were prepared for each program, incorporating traditional costs as well as factoring in costs typically associated with brownfield developments.

Static pro formas are simply financial evaluations that do not include a projection of cash flow over time. This type of analysis allows for calculating relatively straightforward measures of financial performance such as return on investment (ROI), while not allowing for the calculation of more complex measures of return, such as the internal rate of return (IRR).

The financial characteristics of individual development concepts were evaluated, with a focus on determining the residual property value associated with these concepts. This is the key determinant of the viability of the development forms. The residual value represents the maximum value that the development concept yields for the property (land and improvements), and equates to the maximum price that a developer would be willing to pay for the property based on our assumptions. If the residual value is below the market value of the property, or what the owner perceives to be market value, then the development is not considered to be viable. In some cases in this analysis, the residual land value is negative, implying that the development program yields a property value of less than zero under the assumptions used.

Each development concept was evaluated using a static analysis, with the primary measure of return used being Return On Investment (ROI), otherwise referred to as return on cost. ROI in our analysis is defined as first stabilized year net operating income divided by total development cost, including property acquisition. A threshold ROI was assumed of 9.25% in most instances, which reflects an assumption that this is the minimum ROI that a developer would consider to be acceptable. Under the brownfield scenarios, the threshold ROI was increased by 0.50% to reflect an assumption that a higher yield would be necessary to justify the risk associated with brownfield development. In other words, a developer would view the uncertainty surrounding the development



of a brownfield site as increasing his risk, therefore increasing the expected return required to make the development compelling. There is no way to quantify an appropriate risk premium, but components contributing to this factor include entitlement risk:

- *The degree to which the history of the site is known;*
- *Available information on contamination;*
- *Site geology and other factors that may affect the impact of contamination, or impact the cost of clean-up;*
- *Entitlements in place;*
- *Marketability of the site; and*
- *Alternatives available.*

This premium would be substantially higher if environmental insurance was not available to mitigate some of the risk. Without this type of insurance, financing would be either unavailable or prohibitively expensive.

Both the threshold ROI and the adjustment associated with brownfield risk are highly speculative, with individual developers using a wide range of measures to evaluate viability. As noted in the developer focus group, the 0.50% risk premium was seen by many of the attendees as below what would be necessary to support the additional perceived risk. As perceived risk represents a considerable factor in assessing the viability of brownfield development, individuals and/or firms that have a higher tolerance for risk will typically be the most likely to pursue this type of development. More risk adverse developers would require a higher return premium for this type of development, which would translate into lower residual land values and a lower likelihood that redevelopment would be viewed as viable.

The model used is largely intended to reflect the decision criteria of a developer, and not a corporation developing the property for their own needs. The two manufacturing programs are likely to house end-users, as this type of development typically represents a specialized improvement which is not well suited to multi-tenant or speculative development. We believe that the most likely scenario for this type of development would be a build-to-suit program, with a developer tying up the property, cleaning up the site and building the facility to end-user specifications and selling the property at completion. Under this scenario, the risk would be perceived to be generally lower, making the 9.25% return threshold too high and implying a higher residual land value. Nonetheless, the costs associated with remediation would be considered to be similar, as clean-up costs and risks would be equivalent.

The residual property value calculations reflect the property acquisition cost that the development concept could bear and still produce the threshold yield. Acceptable returns will vary for individual developers, and these should be viewed as merely general guidelines.

Assumptions with respect to achievable revenues were produced by Johnson Gardner, and are based on general market knowledge. Net lease rates were estimated at \$5.00 per square foot for warehouse/distribution space, \$6.54 blended for industrial flex space, \$8.00 for general manufacturing and \$35.00 for high tech manufacturing. The lease rates for the manufacturing uses are largely set on the basis of return on improvements, as the improvements are specialized and the lease rates for this type of space are typically not market driven. For the speculative space, a 10% vacancy and collection loss was assumed.



While we consider these assumptions to represent reasonable guidelines, the assumptions used by individual developers are likely to vary substantively. As a result, their resulting calculations of the underlying value of the property will also vary.

The cost estimates used are based on the mid-point of estimates produce by Group Mackenzie of hard costs, with an assumed 20% gross up for soft costs. Group Mackenzie also provided estimates of SDCs as well as necessary infrastructure improvements.

Financial assumptions were made with respect to lending terms based on recent experience. The interest rates are a bit above current levels, reflecting our expectation that rates will be higher by the time any of these concepts proceed. The following is a brief summary of financial assumptions common throughout the analysis:

Capitalization Rate:	8.25%
Minimum Debt Coverage Ratio <sup>1</sup>	1.20
Loan to Value Ratio Max	80%
Permanent Loan Interest Rate	7.00%

The financing terms do not impact the Return on Investment (ROI) calculation substantively, and therefore are relevant in our analysis only in their impact on soft costs associated with construction loan interest. Acquisition costs were assumed at \$5.00 per square foot, but have no impact on the residual land value calculations outside of their impact on assumed holding costs during remediation. In all likelihood, a site with considerable contamination would have a value below this assumption, marginally reducing the holding cost component of the remediation if recognized by the landowner. The model used in this analysis solves for a residual land value, or maximum land value supported under our assumptions. The actual transaction value would be lower if the market rate for property is below the residual level. While end-users may be able to support a higher land value, they will not pay a price above-market just because their program provides them the opportunity to.

Hard costs associated with environmental remediation were provided based on estimates from ERM, with insurance costs provided by Renova Partners. Hard costs were grossed up by 20% to account for soft costs in this analysis, which may be too conservative in many instances. Environmental assessment is typically required of the property owner, and would have been available on any of the brownfield sites evaluated. As a result, this cost would not have been borne by the developer. If site characterization is available, or the cost of this is borne by the property owner, the remediation soft costs may be reduced to only insurance.

Additional costs for carrying the property during remediation utilized the following assumptions:

<i>Clean Up Period:</i>	<i>24 Months</i>
<i>Cost of Equity:</i>	<i>30% (Based on input from Renova Partners)</i>
<i>Cost of Debt:</i>	<i>8.50%</i>

Holding costs assumed full acquisition of the property at the beginning of the period, with clean up costs allocated at an average value of 50% of cost during the period.

A key component of the remediation costs was an assumption of a 0.5% increase in the threshold ROI required to stimulate development. This is seen as a very conservative assumption, and reflects an additional perceived risk associated with development on a site that has been remediated. While

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<sup>1</sup> Debt Coverage Ratio is defined as the Net Operating Income (NOI) in the first stabilized year divided by the debt service requirement. A 1.20 debt coverage ratio indicates that operating income should be adequate to meet 120% of debt service requirements.





this factor was alluded to in the developer focus groups, there is no empirical evidence documenting that these adjustments are made in the market. The discount is unlikely to apply in a highly competitive market, with a substantial number of developers willing to purchase these sites without a significant risk premium.

## B. KEY FINDINGS

- Under each of the scenarios, the greenfield site delivered the lowest development cost per square foot, as well as the highest residual land value. The differential was least in the Industrial Park scenarios; with the \$8.7 million cost of environmental remediation on the Portland brownfield site offset by a \$3.0 million cut and fill requirement on the greenfield site and a \$5.2 million differential in infrastructure costs. The unusually high infrastructure costs were associated with a need to extend sanitary sewer, water, storm drainage and street improvements to the greenfield site in Tualatin.
- Infrastructure costs, as defined in this analysis, were generally higher on the greenfield sites, with the exception of the Warehouse/Distribution programs. These costs were internalized into the development pro forma, reflecting an assumption that the development would be required to bear these costs as a condition of approval. While the costs can be defined as public costs, the costs identified in this analysis are typically the responsibility of the developer as opposed to being borne by the public.
- The brownfield site used in the General and High Tech Manufacturing scenarios had extremely high clean-up costs, related to soil and groundwater contamination. These added \$11.1 million in hard costs, which also resulted in higher insurance costs (\$1.9 million). As a result, the overall environmental remediation cost under these scenarios was estimated \$22.0 for the General Manufacturing program and \$28.0 million for the high-tech program. Higher remediation costs were assumed under the high-tech scenario, with the higher overall costs of development increasing the impact of the risk premium.
- There are a number of public good arguments that can be made in favor of redeveloping brownfield sites, primarily based on more efficient use of existing infrastructure. In addition, fiscal arguments can also be advanced regarding this pattern of development, particularly in jurisdictions with few other options. While these factors will be discussed in greater detail as part of the overall analysis, the direct costs associated with making brownfield sites competitive on the margin with greenfield sites can be calculated. The following table summarizes the estimated remediation costs of the brownfield sites, and the cost differential to produce an equivalent product relative to the greenfield option. As shown, the cost of remediation in these particular instances outpaces the savings in infrastructure costs.

Use	Brownfield Remediation Costs		Differential Greenfield Infrastructure Costs		Overall Cost Differential	
	Total	PSF-Bldg.	Total	PSF-Bldg.	Total	PSF - Bldg.
Industrial Park	\$8,748,863	\$13.89	(\$5,181,167)	(\$8.22)	\$1,319,162	\$2.09
General Manufacturing	\$22,980,451	\$51.07	(\$1,323,000)	(\$2.94)	\$21,581,057	\$47.96
Warehouse/Distribution	\$7,821,775	\$19.55	\$444,500	\$1.11	\$8,553,055	\$21.38
High Tech Manufacturing	\$28,027,441	\$80.08	(\$1,428,500)	(\$4.08)	\$27,030,337	\$77.23

- Within the analysis, we have quantified remediation costs consistent with the assumed perception of a developer building the assumed programs. A significant portion of this cost reflects a premium on acceptable return associated to correct for perceived risk. This premium was also



applied to the overall development program, which disproportionately impacted programs with high value improvements such as those assumed in the high-tech manufacturing scenario. This is seen as a very conservative assumption, and reflects an additional perceived risk associated with development on a site that has been remediated. While this factor was alluded to in the developer focus groups, the discount is unlikely to apply to all developers, particularly in a competitive market. As a result, developers most likely to develop this type of site will be ones with a relatively high-level of confidence in developing on these types of sites.

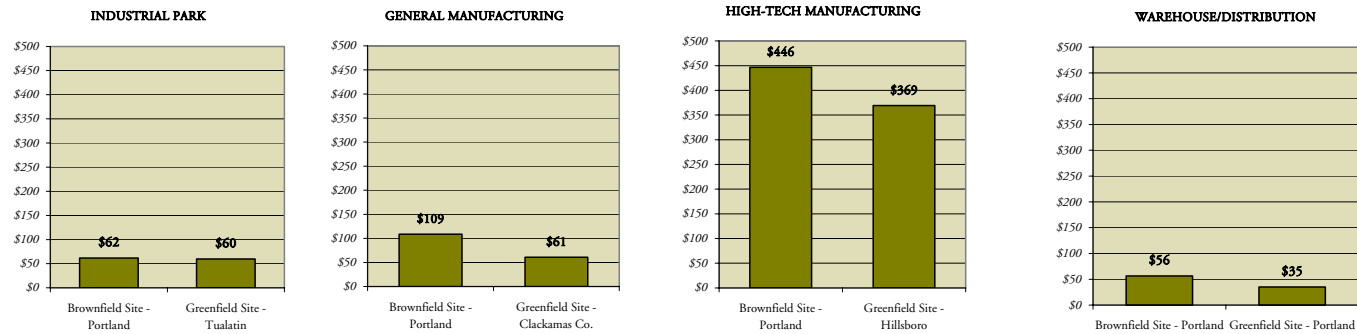
- While useful in assessing residual value in the private market, the costs outlined would not be expected to accrue to a public clean-up effort. In addition, a publicly assisted clean up would likely be limited to land development, reducing carrying costs during remediation. A cost/benefit assessment for public intervention should separate remediation costs associated with development risk premiums and carrying costs from the direct remediation efforts.
- Another key component of the remediation costs is carrying costs during clean up. These costs are primarily attributed to interest required on both debt and equity during remediation. Governmental intervention to further enhance the likelihood of brownfield sites redeveloping would include reducing the cost of funds, through methods such as financial assurances, provision of second and first position debt at below market rates, and direction of federal monies to assist in clean-up. As an example, shifting the cost of funds during remediation from the assumed levels to a flat 4.5% would reduce carrying costs in the High-Tech Brownfield scenario from just under \$4.8 million to just under \$1.5 million.



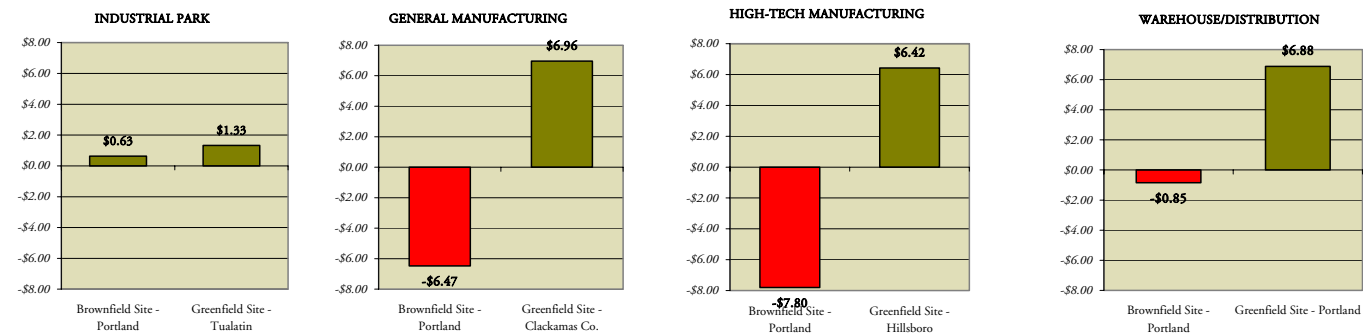
## SUMMARY OF SCENARIOS EVALUATED

Site/ Concept	Net Site Size/Acres	Building S.F.	Environmental Remediation 1/	Construction Cost		SDCs			Infrastructure	Total Cost/Less Land	
				Hard	Soft	Calculated	Credits	Net	Costs	Total	PSF
Industrial Park											
Brownfield Site - Portland	45.50	630,000	\$8,748,863	\$23,086,500	\$4,617,300	\$1,846,243	(\$25,368)	\$1,820,875	\$558,000	\$38,831,538	\$61.64
Greenfield Site - Tualatin	44.50	630,000	\$0	\$25,050,000	\$5,010,000	\$1,713,209	\$0	\$1,713,209	\$5,739,167	\$37,512,376	\$59.54
General Manufacturing											
Brownfield Site - Portland	35.75	450,000	\$22,980,451	\$20,857,500	\$4,171,500	\$1,212,343	(\$249,062)	\$963,281	\$24,000	\$48,996,732	\$108.88
Greenfield Site - Clackamas Co.	37.95	450,000	\$0	\$21,000,000	\$4,200,000	\$868,675	\$0	\$868,675	\$1,347,000	\$27,415,675	\$60.92
High-Tech Manufacturing											
Brownfield Site - Portland	35.75	350,000	\$28,027,441	\$105,900,000	\$21,180,000	\$1,383,121	(\$249,062)	\$1,134,059	\$24,000	\$156,265,500	\$446.47
Greenfield Site - Hillsboro	53.20	350,000	\$0	\$105,000,000	\$21,000,000	\$1,782,663	\$0	\$1,782,663	\$1,452,500	\$129,235,163	\$369.24
Warehouse/Distribution											
Brownfield Site - Portland	37.90	400,000	\$7,821,775	\$11,154,000	\$2,230,800	\$715,907	(\$75,858)	\$640,049	\$735,000	\$22,581,624	\$56.45
Greenfield Site - Portland	23.85	400,000	\$0	\$10,840,000	\$2,168,000	\$730,069	\$0	\$730,069	\$290,500	\$14,028,569	\$35.07

### TOTAL DEVELOPMENT COST/LESS LAND



### CALCULATED RESIDUAL LAND VALUES



1/ Includes direct hard and soft costs associated with remediation, as well as additional carrying costs, developer risk premium and lender risk premium.



- Another key factor that cannot be quantified but places the brownfield sites at a competitive disadvantage vis-à-vis the greenfield sites is availability. Within this analysis we are assuming that the period needed to complete the environmental remediation is two years. This time delay would be considered largely unacceptable to an end user, and would require a speculative developer to initiate the process without an end user in hand.
- As demonstrated in the case studies evaluated, the general rules of thumb do not always apply. Greenfield sites are not always less costly to develop than brownfield sites, and brownfield sites do not always offer the advantage of less marginal infrastructure investment. The actual development characteristics of these properties are unique and site specific, and this analysis should be considered as proposing a general theoretical construct for appropriately evaluating these sites, as opposed to generating rules of thumb that can be consistently applied.
- There is a continuum of site preparation costs for both brownfield and greenfield sites. The Industrial Park scenario evaluated demonstrates that the marginal difference between a brownfield site with relatively low levels of contamination can be largely equivalent to a greenfield site with high infrastructure and site development costs. In cases in which remediation costs are higher or marginal greenfield infrastructure needs are lower, the greenfield sites offer a clear advantage from a financial perspective.
- The advantages outlined in this report reflect development costs excluding land acquisition. Property with unusually high development costs will typically be discounted vis-à-vis sites with lower development costs, as the residual land values are lower. This allows for the market to make the necessary adjustments to offset high development costs. This function does not work in the instance of a site that is “inside out”, having a residual land value less than zero. In this case, the highest and best use disposition of the property from the property owner’s perspective is to do nothing (unless contamination is spreading or there is a desire to address the potential liability for other reasons).

## C. DEVELOPMENT PROGRAM COMPARISONS

This section summarizes the financial characteristics of the four development programs, both for the assumed greenfield and brownfield sites.

### Industrial Park

The industrial park program evaluated included 630,000 square feet of industrial/flex space, in multiple single-story buildings with surface parking. When fully leased, the site would house an estimated 525 workers.

Baseline direct hard construction costs under both scenarios were estimated at just over \$22.0 million. Additional costs on the brownfield sites included tank removal (\$325,000) and a 25% increase in overall sitework costs (\$661,500). The greenfield site evaluated had an additional cost of \$3.0 million for cut and fill requirements, more than offsetting the additional costs on the brownfield site.

Off-site construction costs were significantly higher for the greenfield site in this instance, as major infrastructure extensions and improvements were necessary to facilitate the assumed program. Soft costs for both sites were fairly consistent in this instance.

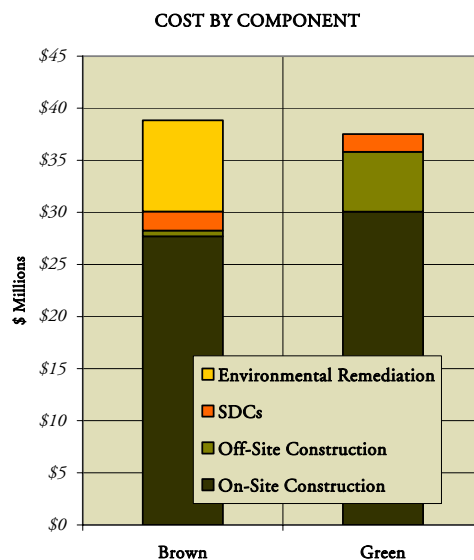
The cost of environmental remediation on the brownfield site was almost \$8.5 million, with carrying cost interest during clean-up and risk premiums having a more substantive impact than hard and soft costs associated with the actual clean-up.



In this instance, total estimated development costs were quite similar, with environmental remediation costs on the brownfield offset to a large extent by the cut and fill requirements and unusually high off-site costs on the greenfield site. Under this scenario, a brownfield site with a relatively low level of contamination was largely equivalent from a development standpoint to a greenfield site with unusually high off-site and on-site costs.

#### INDUSTRIAL PARK DEVELOPMENT PROGRAMS

Cost Category	Brown	Green
<b>On-Site Construction Costs</b>		
Base Hard Costs	\$22,050,000	\$22,050,000
Tank Removal	\$375,000	\$0
Brownfield Sitework Surcharge	\$661,500	\$0
Grading	\$0	\$3,000,000
<b>Hard Costs</b>	<b>\$23,086,500</b>	<b>\$25,050,000</b>
<b>Soft Costs</b>	<b>\$4,617,300</b>	<b>\$5,010,000</b>
<b>Total On-Site Construction Costs</b>	<b>\$27,703,800</b>	<b>\$30,060,000</b>
<b>SDCs (Net)</b>	<b>\$1,820,875</b>	<b>\$1,713,209</b>
<b>Off-Site Construction Costs</b>		
Sanitary Sewer	\$0	\$950,780
Water	\$0	\$631,057
Storm Drainage	\$48,000	\$1,080,498
Street Improvements	\$510,000	\$3,076,832
<b>Total Off-Site Construction Costs</b>	<b>\$558,000</b>	<b>\$5,739,167</b>
<b>Environmental Remediation</b>		
Hard Costs	\$2,190,000	\$0
Soft Costs	\$950,800	\$0
Carrying Cost Interest	\$3,552,246	\$0
Risk Premium	\$2,055,817	\$0
<b>Total Environmental Remediation</b>	<b>\$8,748,863</b>	<b>\$0</b>
<b>Total Development Cost/Less Land:</b>	<b>\$38,831,538</b>	<b>\$37,512,376</b>



The industrial park program on the selected brownfield site yielded a modest residual land value of approximately \$1.26 million (\$0.63 per square foot). This value would have been a more respectable \$10.0 million (\$5.08 per square foot) if the \$8.6 million in remediation costs were excluded. Carrying costs and risk premiums accounted for the lion's share of remediation costs, with hard and soft costs totaling just over \$3.0 million. Offsite costs in this scenario were quite small, adding only \$0.89 per square foot to the overall cost prior to remediation.

The return on investment and residual land value under the greenfield scenario are substantially impacted by the unusually high off-site construction costs required on this site, as well as a \$3.0 million grading requirement. The overall development cost, less remediation, on this site is \$7.2 million greater than that on the brownfield site. As a result of the unusually high construction costs, the residual land value under this scenario is a relatively modest \$2.5 million, reflecting a value of \$1.33 per square foot.

#### General Manufacturing

The general manufacturing program evaluated was a 450,000 square foot facility, supporting an estimated employment count of 857. On-site construction costs were slightly higher for the greenfield site, reflecting a \$750,000 estimated cost for cut and fill requirements. Offsite costs were also considerably higher for the greenfield site, although well below those found in the Tualatin greenfield site used in the industrial park program.



The pro forma evaluation of the brownfield site indicates a relatively strong residual land value for the program prior to remediation costs, which is then more than offset by remediation costs approaching \$23.0 million. If remediated, the site would have a residual land value of \$12.9 million using our assumptions, while the value with remediation is a negative \$10.1 million.

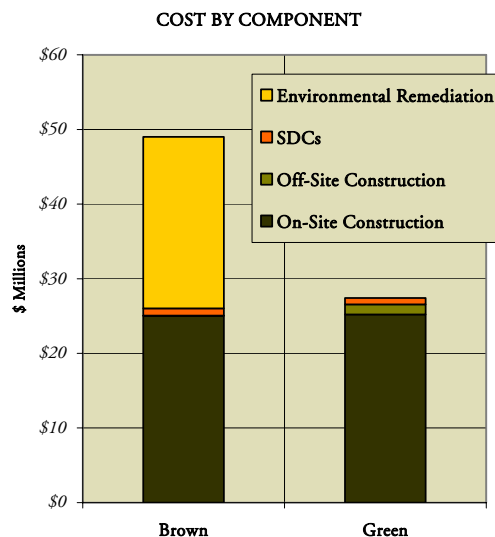
On-site construction costs were slightly higher for the greenfield site, reflecting a \$750,000 estimated cost for cut and fill requirements. Offsite costs were also considerably higher for the greenfield site, although well below those found in the Tualatin greenfield site used in the industrial park program.

The costs of environmental remediation are extremely high on this brownfield site, at an estimated \$22.0 million. This reflects addressing soil and groundwater contamination, as well as capping the site. Soft costs were estimated at \$4.1 million, which included a \$1.9 million cost for insurance. Carrying costs and the assumed risk premium added an additional \$7.7 million to the costs of remediation.

In contrast to the previous example, the greenfield site is clearly more marketable, with the brownfield site having an estimated negative residual land value of over \$10.0 million. This reflects a site that would be considered “inside out” under these assumptions, with a value well below zero.

#### GENERAL MANUFACTURING

Cost Category	Brown	Green
<b>On-Site Construction Costs</b>		
Base Hard Costs	\$20,250,000	\$20,250,000
Grading	\$0	\$750,000
Brownfield Sitework Surcharge	\$607,500	\$0
<b>Hard Costs</b>	<b>\$20,857,500</b>	<b>\$21,000,000</b>
<b>Soft Costs</b>	<b>\$4,171,500</b>	<b>\$4,200,000</b>
<b>Total On-Site Construction Costs</b>	<b>\$25,029,000</b>	<b>\$25,200,000</b>
<b>SDCs (Net)</b>	<b>\$963,281</b>	<b>\$868,675</b>
<b>Off-Site Construction Costs</b>		
Sanitary Sewer	\$0	\$105,000
Water	\$0	\$242,000
Storm Drainage	\$0	\$280,000
Street Improvements	\$24,000	\$720,000
<b>Total Off-Site Construction Costs</b>	<b>\$24,000</b>	<b>\$1,347,000</b>
<b>Environmental Remediation</b>		
Hard Costs	\$11,100,000	\$0
Soft Costs	\$4,152,000	\$0
Carrying Cost Interest	\$5,732,609	\$0
Risk Premium	\$1,995,842	\$0
<b>Total Environmental Remediation</b>	<b>\$22,980,451</b>	<b>\$0</b>
<b>Total Development Cost/Less Land:</b>	<b>\$48,996,732</b>	<b>\$27,415,675</b>



As demonstrated in this analysis, a site with the contamination assumed in this scenario cannot be expected to redevelop without significant outside assistance. Estimated remediation costs were \$14.75 per square foot when averaged across the land area, well above the underlying land values for industrial property in the Portland metropolitan area.

#### High-Tech Manufacturing

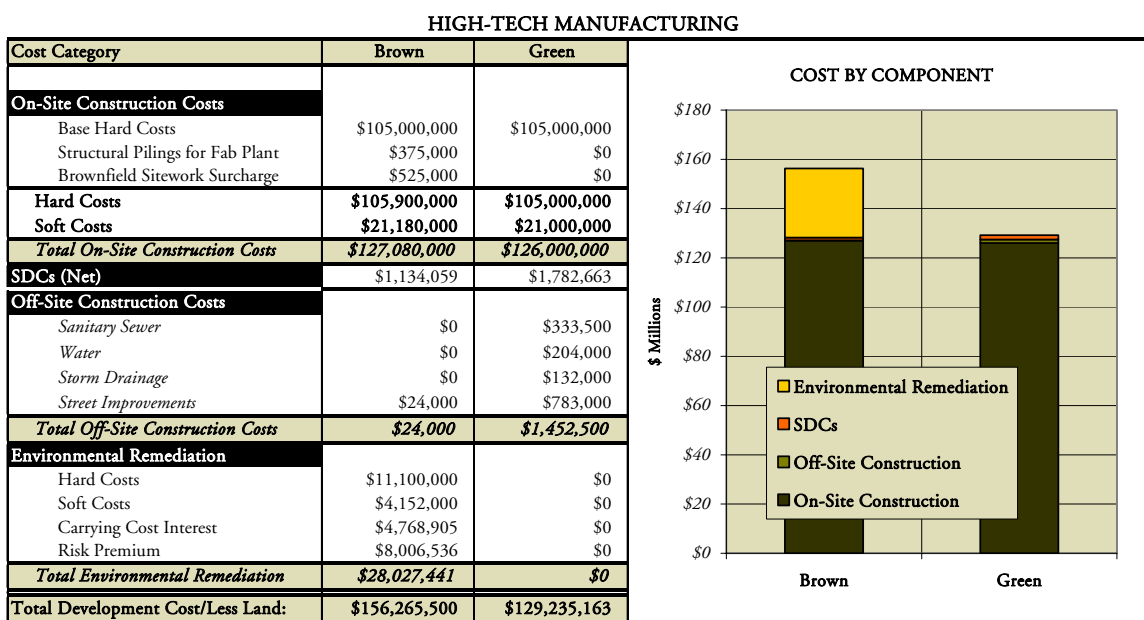
The high-tech manufacturing program was a 350,000 square foot facility, supporting an estimated employment count of 667. The two sites evaluated included a brownfield site in Portland, which was also used in the previously summarized general manufacturing scenarios, as well as a greenfield site in Hillsboro.



On-site construction costs were largely consistent on both sites, with some additional costs related to pilings and additional site work on the brownfield site. Offsite costs were higher for the greenfield site, at an estimated \$1.4 million.

As the brownfield site is the same one used in the previous program, the costs of environmental remediation are also extremely high, at an estimated \$28.0 million. The primary differential between the remediation costs on the site under this program is that the higher overall project cost led to a higher risk premium, which is calculated as a percent of cost.

Under this scenario, the brownfield site has an estimated negative residual land value of over \$12.0 million. As with the previous scenarios, this reflects a site that would be considered “inside out” under these assumptions, with a value well below zero.



The cost of the high-tech development program on the brownfield site was considerably lower than the cost on the greenfield site. The primary advantages from a construction cost perspective were somewhat lower SDCs and sharply lower offsite construction costs. This translated into a \$4.8 million cost advantage for the brownfield site vis-à-vis the greenfield site under the high-tech program. This advantage was more than offset though by the estimated \$28.0 million cost of environmental remediation. The high cost of remediation shifted the indicated residual property value from a robust \$15.9 million (\$10.20 per square foot) for a clean site to a negative value of \$12.1 million. Under this scenario, the hard and soft costs associated with physical remediation efforts largely negate any property value, with carrying costs and risk premium turning the deal “inside out”.

The high-tech greenfield site evaluated represented an unusually straightforward development site, with no significant grading costs. The estimated cost of construction for a high tech facility is very high, with hard costs estimated at \$300 per square foot and overall costs estimated at over \$400 per square foot. Due to the specialized nature of these types of sites, they are rarely done on a speculative basis, and are deeply discounted vis-à-vis cost of construction if resold. The pro forma approach used in our analysis requires an assumption with respect to lease rates, which was set largely on the basis of return on investment as this type of space is not typically leased. As a result, the return on



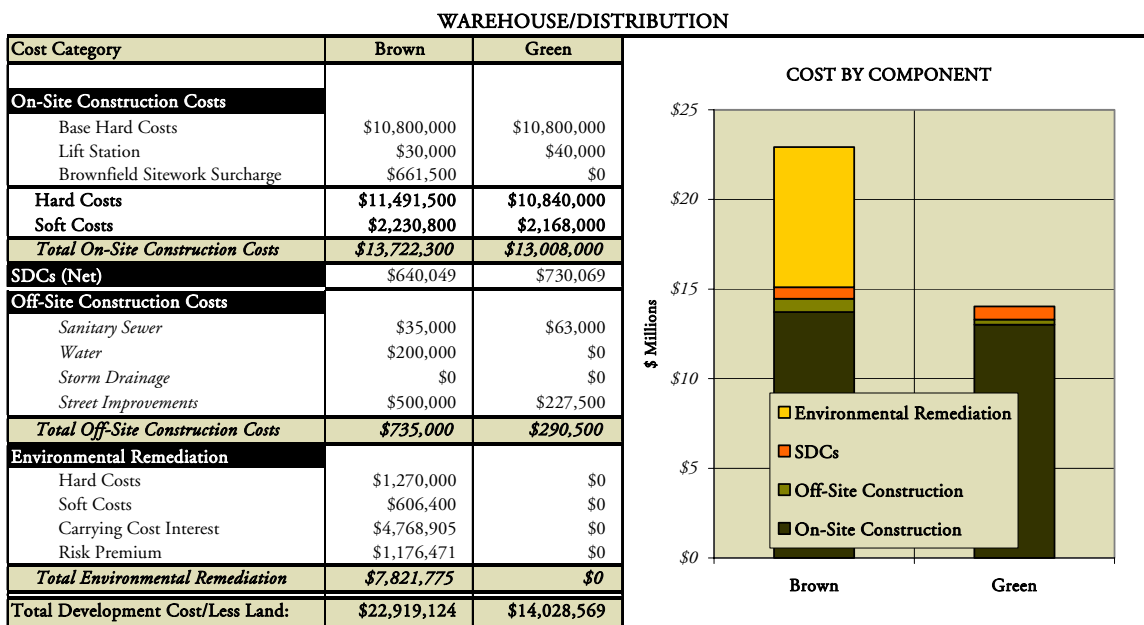
investment is largely consistent with the threshold in this instance. The residual land value under the assumptions used in this scenario would be \$6.42.

A key factor in this type of development from a financial perspective is the relatively low proportion of the overall development cost represented by the land, in this case the residual land value is approximately 10% of overall development cost.

### Warehouse/Distribution

The warehouse/distribution program evaluated was a 400,000 square foot facility, supporting an estimated employment count of 235.

On-site construction costs for this type of facility are relatively low, and were largely consistent for either site. Off-site costs in this instance were also largely a push, with the brownfield site requirement of a \$200,000 water system improvement and \$500,000 street improvement outweighing the relatively low costs on the greenfield site.



The estimated cost of environmental remediation on this brownfield site was \$7.8 million, and largely reflects the carrying costs and risk premium.

The brownfield site used for this scenario presented a number of additional cost factors, increasing the total cost without remediation by \$3.8 million relative to the greenfield site evaluated. As a result, the indicated residual land prior to remediation costs was \$6.4 million, or \$3.89 per square foot. With an estimated \$7.8 million in overall remediation costs, the property is seen as having a negative value of \$1.4 million under the scenario evaluated.

The greenfield site scenario evaluated with the warehouse/distribution program yielded a strong residual property value under our assumptions of \$7.1 million, or \$6.88 per square foot. The site selected required minimal offsite costs, and SDCs were also quite low. As a result, the indicated residual land value is largely consistent with current market prices for this type of use.





Despite the relatively low remediation costs, the differential in overall construction costs from a percentage standpoint was second highest of all comparisons. This reflects the low value of improvements, and the resulting high percentage of overall cost associated with land. The low level of off-site requirements on this particular greenfield site also contributed to the high differential.

# Brownfield Site - Portland

## INDUSTRIAL PARK

### SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)			45.50	Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)			1,981,980		7.00%	7.00%
Building Size (SF)			630,000		25	25
Leasable Area (SF)			630,000		1.20	
Site Coverage/Net			31.79%			80%
INCOME SUMMARY:						
	Total SF	Annual Net Rent/SF	Annual Rent			
Office Space	0	\$0.00	\$0		\$3,708,180	\$3,708,180
Distribution Space	0	\$5.00	\$0			8.25%
Industrial/Flex Space	630,000	\$6.54	\$4,120,200		\$36,434,646	\$35,958,109
Retail Space	0	\$0.00	\$0		\$3,090,150	\$3,049,733
Parking	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
Vacancy & Collection		10%	(\$412,020)	Total Development Cost/Excluding Remediation:		
TOTAL	630,000	\$5.89	\$3,708,180	(-) Permanent Loan 1/		
COST SUMMARY:				Net Equity Required		
	Per SF	Units	Total	10.1%		
Acquisition Cost	\$5.00	1,981,980	\$9,909,900	MEASURES OF RETURN:		
Direct Construction Cost				Return on Investment (ROI)		
On-Site Construction Costs	\$36.65	630,000	\$23,086,500	9.27%		
Soft Costs	\$7.33	630,000	\$4,617,300	Return on Equity (ROE)		
SDCs - Net	\$2.89	630,000	\$1,820,875	29.52%		
Offsite Construction Costs	\$0.89	630,000	\$558,000	Threshold ROI		
TOTAL/Less Remediation	\$63.48	630,000	\$39,992,575	Residual Property Value		
				\$10,005,757		
				Residual Property Value PSF/Net		
				\$5.05		
				ENVIRONMENTAL REMEDIATION COSTS		
				Hard Costs		
				\$2,190,000		
				Soft Costs 2/		
				\$950,800		
				Clean-Up Period (Months)		
				24		
				Carrying Cost Interest		
				\$3,552,246		
				Developer Risk Premium - ROI		
				0.50%		
				Developer Risk Premium		
				\$2,055,817		
				Adjusted Residual Property Value 3/		
				\$1,256,894		
				Adjusted Residual Property Value PSF/Net		
				\$0.63		

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes environmental studies, planning, legal and insurance.

3/ Residual value reflects the value of site after remediation, and is not affected by the assumed acquisition cost.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

# Greenfield Site - Tualatin

## INDUSTRIAL PARK

### SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		44.50		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,938,420			7.00%	7.00%
Building Size (SF)		630,000			25	25
Leasable Area (SF)		630,000			1.20	
Site Coverage/Net		32.50%				80%
INCOME SUMMARY:						
	Total SF	Annual Net Rent/SF	Annual Rent			
Office Space	0	\$0.00	\$0			
Distribution Space	0	\$5.00	\$0			
Industrial/Flex Space	630,000	\$6.54	\$4,120,200			
Retail Space	0	\$0.00	\$0			
Parking	0	\$0.00	\$0			
Vacancy & Collection		10%	(\$412,020)			
TOTAL	630,000	\$5.89	\$3,708,180			
COST SUMMARY:				EQUITY ASSUMPTIONS:		
	Per SF	Units	Total	Total Development Cost/Exluding Remediation:		\$47,204,476
Acquisition Cost	\$5.00	1,938,420	\$9,692,100	(-) Permanent Loan 1/		(35,958,109)
Direct Construction Cost				Net Equity Required		23.8% \$11,246,367
<i>On-Site Construction Costs</i>	\$39.76	630,000	\$25,050,000	MEASURES OF RETURN:		
<i>Soft Costs</i>	\$7.95	630,000	\$5,010,000	Return on Investment (ROI)		7.86%
<i>SDCs - Net</i>	\$2.72	630,000	\$1,713,209	Return on Equity (ROE)		10.59%
<i>Offsite Construction Costs</i>	\$9.11	630,000	\$5,739,167	Threshold ROI		9.25%
TOTAL/Less Remediation	\$74.93	630,000	\$47,204,476	Residual Property Value		\$2,576,056
				Residual Property Value PSF/Net		\$1.33
				ENVIRONMENTAL REMEDIATION COSTS		
				Hard Costs		\$0
				Soft Costs 2/		\$0
				Developer Risk Premium - ROI		0.00%
				Developer Risk Premium		\$0
				Adjusted Residual Property Value 3/		\$2,576,056
				Adjusted Residual Property Value PSF/Net		\$1.33

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2/ Includes studies and carrying cost.

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4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

# Brownfield Site - Portland

## GENERAL MANUFACTURING

### SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		35.75		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,557,270			7.00%	7.00%
Building Size (SF)		450,000			25	25
Leasable Area (SF)		450,000			1.20	
Site Coverage/Net		28.90%				80%
INCOME SUMMARY:						
	Total SF	Annual Net Rent/SF	Annual Rent			
Office Space	0	\$0.00	\$0			
Distribution Space	0	\$5.00	\$0			
Industrial/Flex Space	0	\$0.00	\$0			
General Manufacturing	450,000	\$8.00	\$3,600,000			
Parking	0	\$0.00	\$0			
Vacancy & Collection		0%	\$0			
TOTAL	450,000	\$8.00	\$3,600,000			
COST SUMMARY:						
	Per SF	Units	Total			
Acquisition Cost	\$7.00	1,557,270	\$10,900,890			
Direct Construction Cost						
<i>On-Site Construction Costs</i>	\$46.35	450,000	\$20,857,500			
<i>Soft Costs</i>	\$9.27	450,000	\$4,171,500			
<i>SDCs - Net</i>	\$2.14	450,000	\$963,281			
<i>Offsite Construction Costs</i>	\$0.05	450,000	\$24,000			
TOTAL/Less Remediation	\$82.04	450,000	\$36,917,171			

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4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

# Greenfield Site - Clackamas Co. GENERAL MANUFACTURING SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		37.95			DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,653,102		Interest Rate	7.00%	7.00%
Building Size (SF)		450,000		Term (Years)	25	25
Leasable Area (SF)		450,000		Debt-Coverage Ratio	1.20	
Site Coverage/Net		27.22%		Loan-to-Value		80%
INCOME SUMMARY:				Stabilized NOI	\$3,600,000	\$3,600,000
	Total SF	Annual Net Rent/SF	Annual Rent	Assumed CAP Rate		8.25%
Office Space	0	\$0.00	\$0	Supportable Mortgage	\$35,371,726	\$34,909,091
Distribution Space	0	\$5.00	\$0	Annual Debt Service	\$3,000,000	\$2,960,762
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	450,000	\$8.00	\$3,600,000	Total Development Cost/Excluding Remediation:		\$38,987,389
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		(34,909,091)
Vacancy & Collection		0%	\$0	Net Equity Required	10.5%	\$4,078,298
<b>TOTAL</b>	450,000	\$8.00	\$3,600,000	MEASURES OF RETURN:		
COST SUMMARY:				Return on Investment (ROI)		9.23%
	Per SF	Units	Total	Return on Equity (ROE)		28.35%
Acquisition Cost	\$7.00	1,653,102	\$11,571,714	Threshold ROI		9.25%
Direct Construction Cost				Residual Property Value		\$11,503,244
<i>On-Site Construction Costs</i>	\$46.67	450,000	\$21,000,000	Residual Property Value PSF/Net		\$6.96
<i>Soft Costs</i>	\$9.33	450,000	\$4,200,000	ENVIRONMENTAL REMEDIATION COSTS		
<i>SDCs - Net</i>	\$1.93	450,000	\$868,675	Hard Costs		\$0
<i>Offsite Construction Costs</i>	\$2.99	450,000	\$1,347,000	Soft Costs 2/		\$0
<b>TOTAL/Less Remediation</b>	\$86.64	450,000	<b>\$38,987,389</b>	Developer Risk Premium - ROI		0.00%
				Developer Risk Premium		\$0
				Adjusted Residual Property Value 3/		\$11,503,244
				Adjusted Residual Property Value PSF/Net		\$6.96

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4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

# Brownfield Site - Portland

## HIGH TECH MANUFACTURING

### SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		35.75		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,557,270			7.00%	7.00%
Building Size (SF)		350,000			25	25
Leasable Area (SF)		350,000			1.20	
Site Coverage/Net		22.48%				80%
INCOME SUMMARY:					\$12,250,000	\$12,250,000
	Total SF	Annual Net Rent/SF	Annual Rent		8.25%	
Office Space	0	\$0.00	\$0		\$120,362,123	\$118,787,879
Distribution Space	0	\$5.00	\$0		\$10,208,333	\$10,074,816
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	350,000	\$35.00	\$12,250,000	Total Development Cost/Excluding Remediation:		\$136,024,409
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		(118,787,879)
Vacancy & Collection		0%	\$0	Net Equity Required		12.7%
						\$17,236,530
TOTAL				MEASURES OF RETURN:		
	350,000	\$35.00	\$12,250,000	Return on Investment (ROI)		
COST SUMMARY:				Return on Equity (ROE)		
	Per SF	Units	Total	Threshold ROI		
Acquisition Cost	\$5.00	1,557,270	\$7,786,350	Residual Property Value		
Direct Construction Cost				Residual Property Value PSF/Net		
<i>On-Site Construction Costs</i>	\$302.57	350,000	\$105,900,000	ENVIRONMENTAL REMEDIATION COSTS		
<i>Soft Costs</i>	\$60.51	350,000	\$21,180,000	Hard Costs		\$11,100,000
<i>SDCs - Net</i>	\$3.24	350,000	\$1,134,059	Soft Costs 2/		\$4,152,000
<i>Offsite Construction Costs</i>	\$0.07	350,000	\$24,000	Clean-Up Period (Months)		24
TOTAL/Less Remediation	\$388.64	350,000	\$136,024,409	Carrying Cost Interest		\$4,768,905
				Developer Risk Premium - ROI		0.50%
				Developer Risk Premium		\$8,006,536
				Adjusted Residual Property Value 3/		(\$12,147,853)
				Adjusted Residual Property Value PSF/Net		(\$7.80)

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5/ Loan to Value Ratio

# Greenfield Site - Hillsboro

## HIGH TECH MANUFACTURING

### SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)	53.20			Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)	2,317,392				7.00%	7.00%
Building Size (SF)	350,000				25	25
Leasable Area (SF)	350,000				1.20	
Site Coverage/Net	15.10%					80%
INCOME SUMMARY:					\$12,250,000	\$12,250,000
	Total SF	Annual Net Rent/SF	Annual Rent		8.25%	
Office Space	0	\$0.00	\$0		\$120,362,123	\$118,787,879
Distribution Space	0	\$5.00	\$0		\$10,208,333	\$10,074,816
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	350,000	\$35.00	\$12,250,000	Total Development Cost/Excluding Remediation:		
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		
Vacancy & Collection		0%	\$0	Net Equity Required		
<b>TOTAL</b>	350,000	\$35.00	\$12,250,000	15.6%		
COST SUMMARY:				MEASURES OF RETURN:		
	Per SF	Units	Total	Return on Investment (ROI)		
Acquisition Cost	\$5.00	2,317,392	\$11,586,960	8.70%		
Direct Construction Cost				Return on Equity (ROE)		
<i>On-Site Construction Costs</i>	\$300.00	350,000	\$105,000,000	17.86%		
<i>Soft Costs</i>	\$60.00	350,000	\$21,000,000	Threshold ROI		
<i>SDCs - Net</i>	\$5.09	350,000	\$1,782,663	Residual Property Value		
<i>Offsite Construction Costs</i>	\$4.15	350,000	\$1,452,500	\$14,882,484		
<b>TOTAL/Less Remediation</b>	\$402.35	350,000	\$140,822,123	Residual Property Value PSF/Net		
				\$6.42		
				ENVIRONMENTAL REMEDIATION COSTS		
				Hard Costs		
				\$0		
				Soft Costs 2/		
				\$0		
				Clean-Up Period (Months)		
				0		
				Carrying Cost Interest		
				\$0		
				Developer Risk Premium - ROI		
				0.00%		
				Developer Risk Premium		
				\$0		
				Adjusted Residual Property Value 3/		
				\$14,882,484		
				Adjusted Residual Property Value PSF/Net		
				\$6.42		

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

3/ Residual value reflects the value of site after remediation, and is not affected by the assumed acquisition cost.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio

# Brownfield Site - Portland

## WAREHOUSE/DISTRIBUTION

### SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)		37.90		Interest Rate Term (Years) Debt-Coverage Ratio Loan-to-Value Stabilized NOI Assumed CAP Rate Supportable Mortgage Annual Debt Service	DCR 4/	LTV 5/
Parcel Size (SF-Net)		1,650,924			7.00%	7.00%
Building Size (SF)		400,000			25	25
Leasable Area (SF)		400,000			1.20	
Site Coverage/Net		24.23%				80%
INCOME SUMMARY:						
	Total SF	Annual Net Rent/SF	Annual Rent			
Office Space	0	\$0.00	\$0			
Distribution Space	400,000	\$5.00	\$2,000,000			
Industrial/Flex Space	0	\$0.00	\$0			
General Manufacturing	0	\$0.00	\$0			
Parking	0	\$0.00	\$0			
Vacancy & Collection		10%	(\$200,000)			
TOTAL	400,000	\$4.50	\$1,800,000			
COST SUMMARY:				EQUITY ASSUMPTIONS:		
	Per SF	Units	Total	Total Development Cost/Exluding Remediation: \$23,014,469		
Acquisition Cost	\$5.00	1,650,924	\$8,254,620	(-) Permanent Loan 1/ (17,454,545)		
Direct Construction Cost				Net Equity Required 24.2% \$5,559,924		
<i>On-Site Construction Costs</i>	\$27.89	400,000	\$11,154,000	MEASURES OF RETURN:		
<i>Soft Costs</i>	\$5.58	400,000	\$2,230,800	Return on Investment (ROI) 7.82%		
<i>SDCs - Net</i>	\$1.60	400,000	\$640,049	Return on Equity (ROE) 10.40%		
<i>Offsite Construction Costs</i>	\$1.84	400,000	\$735,000	Threshold ROI 8.50%		
TOTAL/Less Remediation	\$57.54	400,000	\$23,014,469	Residual Property Value \$6,416,622		
				Residual Property Value PSF/Net \$3.89		
				ENVIRONMENTAL REMEDIATION COSTS		
				Hard Costs \$1,270,000		
				Soft Costs 2/ \$606,400		
				Clean-Up Period (Months) 24		
				Carrying Cost Interest \$4,768,905		
				Developer Risk Premium - ROI 0.50%		
				Developer Risk Premium \$1,176,471		
				Adjusted Residual Property Value 3/ (\$1,405,154)		
				Adjusted Residual Property Value PSF/Net (\$0.85)		

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2/ Includes environmental studies, planning, legal and insurance.

3/ Residual value reflects the value of site after remediation, and is not affected by the assumed acquisition cost.

4/ Debt Coverage Ratio, or Net Operating Income (NOI) in the first stabilized year divided by the annual debt service requirement.

5/ Loan to Value Ratio



# Greenfield Site - Portland

## WAREHOUSE/DISTRIBUTION

### SUMMARY INFORMATION

CONCEPT SUMMARY:				PERMANENT FINANCING ASSUMPTIONS:		
Parcel Size (Acres-Net)	23.85				DCR 4/	LTV 5/
Parcel Size (SF-Net)	1,038,906			Interest Rate	7.00%	7.00%
Building Size (SF)	400,000			Term (Years)	25	25
Leasable Area (SF)	400,000			Debt-Coverage Ratio	1.20	
Site Coverage/Net	38.50%			Loan-to-Value		80%
INCOME SUMMARY:				Stabilized NOI	\$1,800,000	\$1,800,000
	Total SF	Annual Net Rent/SF	Annual Rent	Assumed CAP Rate		8.25%
Office Space	0	\$0.00	\$0	Supportable Mortgage	\$17,685,863	\$17,454,545
Distribution Space	400,000	\$5.00	\$2,000,000	Annual Debt Service	\$1,500,000	\$1,480,381
Industrial/Flex Space	0	\$0.00	\$0	EQUITY ASSUMPTIONS:		
General Manufacturing	0	\$0.00	\$0	Total Development Cost/Excluding Remediation:		\$19,223,099
Parking	0	\$0.00	\$0	(-) Permanent Loan 1/		(17,300,789)
Vacancy & Collection		10%	(\$200,000)	Net Equity Required	10.0%	\$1,922,310
<b>TOTAL</b>	400,000	\$4.50	\$1,800,000	MEASURES OF RETURN:		
COST SUMMARY:				Return on Investment (ROI)		9.36%
	Per SF	Units	Total	Return on Equity (ROE)		30.08%
Acquisition Cost	\$5.00	1,038,906	\$5,194,530	Threshold ROI		8.50%
Direct Construction Cost				Residual Property Value		\$7,147,902
<i>On-Site Construction Costs</i>	\$27.10	400,000	\$10,840,000	Residual Property Value PSF/Net		\$6.88
<i>Soft Costs</i>	\$5.42	400,000	\$2,168,000	ENVIRONMENTAL REMEDIATION COSTS		
<i>SDCs - Net</i>	\$1.83	400,000	\$730,069	Hard Costs		\$0
<i>Offsite Construction Costs</i>	\$0.73	400,000	\$290,500	Soft Costs 2/		\$0
<b>TOTAL/Less Remediation</b>	\$48.06	400,000	<b>\$19,223,099</b>	Clean-Up Period (Months)		0
				Carrying Cost Interest		\$0
				Developer Risk Premium - ROI		0.00%
				Developer Risk Premium		\$0
				Adjusted Residual Property Value 3/		\$7,147,902
				Adjusted Residual Property Value PSF/Net		\$6.88

1/ Permanent loan is limited to no greater than 90% of development cost.

2/ Includes studies and carrying cost.

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5/ Loan to Value Ratio

**MEMORANDUM**

PROJECT NUMBER: 2040104 DATE: October 1, 2004  
 PROJECT NAME: Port of Portland Brownfield / Greenfield Development Cost Comparison

TO: File  
 FROM: Geraldene Moyle

**SUBJECT: Construction Cost Estimate Ranges**

The project team developed the cost ranges listed below, with input from local contraction firms, to help understand the general “order of magnitude” for the costs associated with the brownfield remediation required on the three brownfield sites and the development of the concept plans proposed. These costs are based on the team’s experience and knowledge gained from recent comparable projects. These cost ranges vary considerably due to the uncertainty of the final design parameters, building materials and construction market conditions. It should be noted that the final construction costs will also be significantly impacted, based on actual project circumstances and timing. These cost ranges do not include “soft costs” such as architectural and engineering fees, permitting fees, and system development charges. We recommend that prior to any significant outlay of funding, a project have specific cost estimates prepared, to confirm the accuracy of our estimate relative to that particular project.

<b>ON-SITE CONSTRUCTION COSTS</b>	
<b>Base Site Costs<sup>1</sup></b>	
High-Tech Manufacturing	\$200 - \$300 / SF of building
Industrial Park	\$ 30 - \$ 35 / SF of building
Warehouse / Distribution	\$ 22 - \$ 27 / SF of building
General Manufacturing	\$ 40 - \$ 45 / SF of building
<b>Additional Site Costs</b>	
Pilings	\$3 / SF of building
Tank Removal – based on tank diameter	\$10,000 - \$35,000 per tank
Lift Station – site specific	\$30,000 - \$40,000 per station
Cut / Fill	\$5 / cubic yard
<b>Additional Brownfield Construction Costs<sup>2</sup></b>	
	25% of sitework costs

<b>OFF-SITE CONSTRUCTION COSTS</b>	
<b>Sanitary Sewer</b>	
Line installation - based on line size	\$50 - \$80 / linear foot

- 1 The Site Work / Surface Parking costs are included in the base square footage costs. None of the sites have extensive existing development. Demolition of small outbuildings is included in the base square footage costs.
- 2 Regardless of the extent of contamination, construction on the brownfield sites requires specialized equipment and staff. For example, regulatory agencies often require oversight and monitoring of environmental site conditions during the initial stages of development. Associated costs include labor, analytical expenses, reporting and regulatory agency fees. These costs are added as a surcharge based on the sitework costs. Sitework costs are typically 10% to 15% of the overall construction costs of a project. This analysis assumed that an average of 12% of the on-site construction costs were associated with the sitework. However, due to the high costs of construction associated with the specialized interior spaces of high-tech uses, this number was reduced to 2% for the high-tech scenarios.

Public lift station	\$100,000
Railroad crossing	\$25,000
<b>Water</b>	
Line installation - based on line size	\$50 - \$120 / linear foot
Railroad crossing	\$50,000
<b>Storm Drainage</b>	
Line installation - based on line size	\$60 – \$120 / linear foot
<b>Street</b>	
Minor improvements to existing street	\$20 / linear foot
New Half – street improvement	\$250 - 300 / linear foot
New Full – street improvement	\$350 - 450 / linear foot
Signal – site specific	\$300,000

<b>ENVIRONMENTAL COSTS</b>	
<b>Capping</b>	
Future construction areas	\$1.85 – 2.00 / SF of 2 foot thick cap
Future landscaped areas	\$1.20 – 1.50 / SF of 2 foot thick cap
Operation and Maintenance	\$ 100,000 to 200,000 annually
Site Surcharge – Non-engineered fill	
<b>Remedial Investigation</b>	
Field Investigation	\$ 200,000 one time cost
Risk Assessment	\$150,000 one time cost
<b>Soil Stabilization</b>	\$ 9.00 – \$10.00 / SF 15 to 20 foot soil column
<b>Soil and Groundwater NAPL Treatment</b>	\$ 2,500 per point/15 foot grid over 2 acres
<b>Storm Water Treatment</b>	\$ 200,000 – \$500,000 installation and 5-year maintenance
<b>Soil Vapor Extraction</b>	
System Costs	\$ 240,000 – \$ 500,000 / system
O & M Costs	\$ 100,000 / year
<b>Hot Spot Removal and Disposal – Non Hazardous Waste</b>	\$ 70 / cubic yard
<b>Groundwater Vapor Extraction – O &amp; M Costs</b>	\$ 100,000 / year
<b>Enhanced Bioremediation</b>	\$ 500,000 one time cost
<b>Regulatory Costs</b>	10% of Total Project Cost

**BROWN/GREEN SENSITIVE STUDY AND COST REVIEW**  
*Port of Portland*  
*June 3, 2004*

**MEETING NOTES**

**PRESENT**

Rashid Ahmed  
Bob Carson  
Mark Clemons  
Jim Edwards  
Ann Gardner  
Mary Gibson  
Jerry Johnson  
Steve Kountz  
Charlie Landman  
Keith Leavitt  
Geraldene Moyle  
Sun Noble  
Mike Ogan  
Jack Payne  
Todd Sheaffer  
Dick Sheehy  
Greg Theisen  
Ken Wilhite  
Alan Willis

**REPRESENTING**

Portland Development Commission  
ERM  
Group Mackenzie  
Westside Economic Alliance  
Schnitzer Industries  
Port of Portland  
Johnson Gardner  
Portland Planning Bureau  
Department of Environmental Quality  
Port of Portland  
Group Mackenzie  
City of Portland  
Portland Development Commission  
IDC  
Specht Development  
IDC  
Port of Portland  
Port of Portland  
Port of Portland

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**SITE ANALYSIS AND DEVELOPMENT COSTS**

- The meeting focused on the Warehouse/Distribution use on both the brownfield and Greenfield sites. The Cost Comparison Summary Sheets were reviewed and the thoroughness of the cost items, the accuracy of the numbers and assumptions, and the implications of the results were discussed. Additional discussion concerning “other costs” occurred, as well as a discussion of externalities and marginal costs and benefits.

**COSTS**

***Development Costs Brownfield vs. Greenfield***

- There is an assumption that the off-site charges for brownfields are less than greenfields. However, this is not the case with all of the examples presented at today’s meeting. It is, however, the case for the Warehouse/Distribution greenfield and brownfield scenarios.
- Storm water drainage costs were included in utilities and street improvements.
- Separation of combined storm/sewer is required on a brownfield site.
- Question: Off-site improvements to W/D greenfield site regarding street improvements - are they adequate to serve the industrial use? The response was yes and costs to improve are included in the summary sheet.
- Contamination issues restrict the ability to provide basements on brownfield sites.
- Comment/Clarification -

- Are all on-site costs such as construction and other unique costs listed separately? Not in all cases. The lift station will be listed separately as it does not apply to both sites.

#### *Clean-up costs*

- Clean-up costs were based on findings from DEQ and similar case findings. Additional carry and risk premium was taken into account in the clean-up costs. The examples provided assume no additional clean up costs.
- Additional construction costs associated with clean-up include equipment / protective clothing etc for employees.
- Additional on-site construction costs are figured at 1.25x Greenfield sites
- Additional costs for demolition
- DEQ can control some risk costs such as: buyer and DEQ agree to level of clean up and once the agreement is met, the state will not come back to require additional clean up. The agreement is called *perspective purchaser agreement*. Question - do the DEQ requirements meet the requirements of EPA? A perspective purchaser agreement in Oregon will protect developer from going back to meet new EPA requirements. The perspective purchaser agreement does not protect the developer from law suits after the site is closed. The developer would have to purchase insurance to cover any potential law suits. Insurance costs could be included in costs as 'other costs.' Question – Are insurance costs included? And if so, where? How accurately are they tied to the site conditions?
- What happens if the firm who indemnifies is not strong enough?

### **GENERAL DISCUSSION**

- Values are based on residuals. Greenfields are coming up in the black. Some of the brownfields are coming up in the red. There may be trouble getting debt on those brownfields in the red. Owners are interested in containing knowledge of the brownfield issues; buyers /developers are interested in exposing all issues prior to sale.
- Question - Why is it important to make the distinction between public/private costs in the study? Don't need to, but we need to recognize that private costs reflect cost for developer. SDC will go in as revenue. There are some public funds that cannot be used for private development. To make project feasible, need to separate public/private costs. If there is public benefit to clean up a piece of land, and you can get agreement to pay for it, that is the way to do it.
- Comment – Another concern for developers is the time to market from acquisition – i.e. how long do they have to carry the land while clean-up occurs and the exposure risk to employers/employees. Lease vs. own land
- Comment - Many developers do not want a site with any contamination. Food, pharmaceuticals companies, environmentally sensitive companies, lender/investor. Any product manufacturer/handler that might require regulatory oversight from someplace like the FDA would not be interested in a brownfield site. The smaller universe of potential tenants raises the risk premium on the site.

#### Comments –

- Suburban sites are less expensive.
- Perception is that suburban Greenfield sites are faster to develop, less constrained
- Some users need to be within the city limits or are very specific about the location of the property they are interested in (suburban, rural or urban). Those users may be willing to

look at a brown site if it meets their primary need. However, this type of user represents a very small number. Response/Task - Identify the primary need?

- We are not finding easy generalized observations to make given the sites and the proposed developments. Response/Task – Without generalizations what sort of conclusions can we reach? That each site is unique – both brown and green. But can we say the green market is easier to generalize? I tend to think not (Greg comment) but the market perception is such that it is. It is not just the property itself; it's also what's next door.
- Very few lenders who will consider a brownfield site based on liability and the value of the collateral if it ends up under their ownership.
- There are a few tenants who use site selectors to find a location for their business rather than using developers who will clean-up and build on the sites. But most simply lease from a developer.

Question - What are the public benefits to developing brownfield sites?

- Tax implications
- Utilization of investment of existing infrastructure, very little resource to duplicate
- Utilization of existing transportation infrastructure e.g. rail, water, freeways
- Property values
- Health benefits
- Air quality
- Proximity to labor force
- Neighborhood improvements, etc are factors that are implicit and explicit in developing brownfield sites. There are also many social benefits to developing contaminated sites e.g. clean up results in a better community feeling; and neighboring property values increase; jobs for the community
- Comment – There is a public value to developing brownfield sites but there is little to no public money available to do so. As such, there is a desire but no commitment.

## **FINANCING/DEVELOPMENT TRENDS**

- Off-set remediation - When seller is asking too high of a price for their property, could ask City to step in and condemn property and adjustor will make it worthwhile?
- The difficulty lies in creating value with the cleanup of brownfield sites. In most examples the subject site is developed with a higher value use than industrial, creating the value needed to make the project feasible. Seldom are the brownfield industrial sites developed with industrial uses. If the east coast is not converting brownfield industrial sites to industrial sites, is it realistic to expect it to work in the PNW? See NJ and NY in response.
- It may require the public sector to step in to meet the financial gap created by public policy wanting to keep industrial brownfields as industrial redevelopment sites
- Clean brownfields in the city are not a replacement for greenfields in suburbs.
- Would like to get a list of the use classifications firms that would be likely to move into a clean brownfield site included in this report. Look to the Central East Side or NINA for examples and characteristics thereof. (Gary Randall is an industrial broker for Cushman Wakefield was mentioned as a potential contact person) Look at Santa Clara/San Jose firms for examples of industrial to industrial. Land values in California off-set the equation.
- The only inhibitor to converting brownfields is economics. Need to determine a way around this issue. Again, funding options and availability
- Identify marginal value less risk premium.

- City could indemnify sites to help make sites feasible.
- Next steps will be to determine finance options, and looking at other jurisdictions.
- Tax increment was discussed as potential resource
- Capture some of the incremental value of land coming into the UGB and allocate it to brownfield remediation

#### **PERSPECTIVES ON THE CHALLENGES OF BROWN VS. GREEN SITES**

- What are the specific factors that drive development decisions between greenfield and brownfield sites?
- Are brownfield sites a viable option in the regional supply of developable land?
- What tools are need to assist in the (re)development of sties (brown and green)?

## MEMORANDUM

PROJECT NUMBER: 2040104.00 DATE: July 23, 2004  
PROJECT NAME: Brownfield/Greenfield Development Cost Comparison Study

TO: File  
FROM: Mark Clemons (Group Mackenzie)/Michael McMullen(Renova Partners)

**SUBJECT: Currently Available Public Programs for Stimulation of Brownfield Redevelopment**

The following is a summary of currently available public programs for stimulation of brownfield redevelopment:

- ? Voluntary Cleanup Plans provide a vehicle for integrating cleanup with development outside of the traditional regulatory framework that is both more time consuming and generally provides less consideration of the future reuse of the site. DEQ created its Voluntary Cleanup Program to provide oversight to property owners and others wishing to investigate and clean up hazardous substance sites in a voluntary, cooperative manner. The goal of the program is to increase the number of remediated sites by streamlining the cleanup process while ensuring compliance with Oregon environmental regulations. Projects range from simple sites with a limited amount of contaminated soil to complex sites with multiple contaminants in soil, groundwater, surface water, sediment, and/or air. The Voluntary Cleanup Program offers two options for cleaning up contaminated sites, the Independent Cleanup Pathway and the Voluntary Cleanup Pathway.
- ? Prospective Purchaser Agreement (PPA) may be available for an individual, business, government body, or any other entity with an interest in and ability to purchase contaminated property. A PPA is a legally binding agreement between DEQ and a prospective purchaser, which limits the purchaser's liability to DEQ for environmental cleanup of the property in return for a commitment by the purchaser to undertake and/or fund some of the necessary site cleanup activities. The PPA does not provide liability protection from the Federal Government or from any activities that may result in additional contamination after the property is purchased. A PPA must be negotiated with DEQ prior to the purchase of the site.
- ? A Brownfields Assessment Demonstration Pilot is a competitive grant of \$200,000 over two years. The grant must be used for environmental response activities prior to cleanup, such as site assessment, site identification, site characterization, and/or cleanup planning and design. The grant cannot be used for cleanup activities. The grant is awarded by EPA. Eligible Applicants include States, political subdivisions (including cities, towns, counties), and federally recognized Indian Tribes. Private entities do not qualify. Eligible sites include those where hazardous substances have been released or where there is a substantial threat of a release, sites where there is a reason to believe a release has occurred or is about to. Sites with petroleum as the sole contaminant do not qualify. However, sites with contaminants in addition to petroleum can qualify.
- ? The Federal Brownfields Tax Incentive Program allows property owners who did not contaminate their property to deduct from income, in the year incurred, their costs in investigating and cleaning up the contamination. The taxpayer must hold the property for business or income generation purposes. The taxpayer must also receive certification from a state agency that the property is or may be contaminated by hazardous substances. In Oregon, the taxpayer must submit an Affidavit and other information to



DEQ to receive the certification. Properties listed on, or proposed for listing on, the Environmental Protection Agency's National Priorities List, do not qualify for the incentive. Neither do sites contaminated or threatened by a release of petroleum products (gasoline, diesel, heating oil, etc.). However, properties contaminated or threatened by a mixture of petroleum products and other hazardous substances may still qualify for the incentive.

- ? OECD's Brownfields Redevelopment Fund is a direct loan and/or grant program. The maximum project award is \$200,000 if the brownfield is located in an economically distressed community; otherwise the maximum award is \$150,000. Term or bridge loans are available to all eligible applicants. Non-municipal grant applicants are eligible for grants only if the applicant is not liable according to ORS 465.255 and the subsequent redevelopment will provide a substantial public benefit. Municipal applicants are eligible to apply for grants under most circumstances. All grant awards require match. For municipal grant recipients, acceptable grant match includes cash, in-kind services, or other contributions of measurable value. For non-municipal grant applicant, match must be cash from funding sources other than the department. Eligible applicants include any individual, business, non-profit organization, prospective purchaser, municipality, port, tribe, or special district. However, an applicant under an enforcement order for the site is not eligible. Sites with petroleum releases are eligible. Demolition and site clearance activities are eligible as long as they are in conjunction with a removal or remedial action at the site.
- ? Brownfields Economic Development Initiative (BEDI) grants enhance the security or improve the viability of a project financed with new Section 108 guaranteed loan authority. Section 108 is the loan guarantee provision of the Community Development Block Grant (CDBG) program. Section 108 provides communities with a source of financing for economic development, housing rehabilitation, public facilities and large-scale physical development projects. BEDI funds may be used for any eligible activities under the Section 108 Loan Guarantee program. HUD intends BEDI and Section 108 funds to finance projects and activities that will provide near-term results and demonstrable economic benefits, such as job creation and increases in the local tax base. BEDI funds can support a wide variety of activities. For example, a local government may use BEDI fund to address site remediation costs, or a local government may use a combination of Section 108 and BEDI funds to acquire a brownfield property and convey the site to a private sector party at a discounted price from its purchase price. The redevelopment focus for BEDI-assisted projects is prompted by the need to provide additional security for the Section 108 loan guarantee beyond the pledge of CDBG funds.
- ? Targeted Brownfield Assessments (TBA) are performed by DEQ or its contractors, and funded through DEQ's Cooperative Agreement with EPA. A TBA generates detailed information on soil and groundwater conditions at a site, and if necessary provides recommendations and cost estimates for cleanup. A TBA is designed to remove any environmental stigma from a property, by providing detailed information on whether it is contaminated, and to what extent. DEQ addresses concerns about the site in an advisory, rather than an enforcement capacity. Neither DEQ nor EPA will require additional further action unless the TBA indicates contamination that presents an imminent threat to human health or the environment.

TAP/ems