Technical Appendix

Phase 3: Regional Industrial Land Study

for the

Portland – Vancouver Metropolitan Area

RILS

PREPARED BY

Otak, Inc.

IN ASSOCIATION WITH

ECONorthwest
Parametrix

October 31, 2001

Preparation of this report was funded in part with Oregon State Lottery funds administered by the Oregon Economic and Community Development Department. Funding programs included: Northwest Oregon Economic Alliance Regional Investment Fund; Mt. Hood Economic Alliance Regional Investment Fund; and the Multnomah-Washington Regional and Rural Investment Board.

Table of Contents
Regional Industrial Land Study
Technical Appendix

List of Tables

Appendix A — Planning Context

Recent Regional Industrial Planning Efforts

Over the past few years, several public agencies have conducted studies that were used to shed light on existing and potential industrial land requirements. Relevant work is summarized below.

Regional Industrial Land Study for the Portland-Vancouver Metro Region (Phase 2), December 1, 1999.

The precursor to this study focused on measuring and classifying industrial land supply and forecasting industrial land needs. The study concluded that under current job growth projections, the existing ready-to-develop industrial land supply will be consumed in less than ten years — and sooner in some parts of the region like Clackamas and Washington Counties. The study estimated existing industrial supply to be 9,050 acres in the study area. The total industrial supply within the tri-county UGB was estimated to be 4,379 net acres.[1]

Industrial land demand for the through the year 2020 was estimated to be 6,310 net acres, with tri-county UGB demand estimated at 4,587 net acres. Clark County industrial demand was estimated at 1,469 net acres and its supply was estimated at 2,869 net acres for the same time period.

The majority (63%) of the remaining industrial land supply in the study region was identified to have one or more constraints. Hence, the study recommended various policy measures to be explored to help address land constraints and abate subregional industrial land shortages.

Table A-1 provides a comparison of RILS supply and demand findings by county. The existing vacant industrial land supply is expected to have an influence on where and how the study region can accommodate future industrial job growth.

---

[1] The supply calculations from RILS Phase 2 are based upon 1998 RILS data and interviews and comments from public sector land use planners and real estate brokers as of May 1999. Supply estimates include parcels of at least 0.5 net acre.

Table A-1: Summary of Industrial Land Demand and Supply (Net Buildable Acres) Portland-Vancouver PMSA, Projected 2000 to 2025

	Demand [1]	Supply [2]	
County	***Buildable Land Requirements***	***Total Net Available Industrial Inventory***	***Net Available Tier A Inventory[2]***
Clackamas	2,000	865	47
Multnomah	900	2,572	442
Washington	2,100	1,766	483
Columbia	50	883	70
Yamhill	250	243	—
Oregon Subtotal	**5,300**	**6,329**	**1,042**
Clark	1,600	2,869	1,345
Total	**6,900**	**9,198**	**2,387**

[1] Compiled by ECONorthwest, as part of RILS Phase 3 Economic Growth and Development Density Analysis, August 2001
[2] Derived from Regional Industrial Land Study, December 1999, Table 25 (page 50).

Report to Clark County on Current Industrial Land Inventory, Columbia River Economic Development Council, Industrial Land Committee, November 2000.

This report reviewed the availability of industrial land and absorption trends in Clark County. The report concluded that prime industrial land (vacant, served by infrastructure, and over 10 acres) could be depleted by 2005. The study concluded that Clark County is deficient in its supply of contiguous and/or large parcels of land that are needed to retain and attract significant industrial employers. The study assumed a 50 percent market factor[3] and calculated land needs over the 2000 to 2022 period to be on the order of 4,446 net acres (9 jobs per acre); 5,002 acres (8 jobs per acre); and 10,005 acres (4 jobs per acre). Study recommendations:

1. Designation of an additional 3,000 acres of prime industrial lands in the County;
2. Geographic dispersal of the County's industrial land inventory to ensure a sufficient tax base for all jurisdictions.
3. Move aggressively to remove development constraints from secondary industrial lands through the provision of infrastructure, wetland mitigation, and other techniques;

---

[2] Tier A refers to vacant industrial land that is considered "ready for development".
[3] The industrial market factor is an approach that is sometimes used to estimate total long-term land needs. It is used to account for flexibility in the market place (i.e., various parcel size, shape, location, etc.), because not every parcel will meet every requirement. It is applied by factoring up the net minimum amount of land demand to a gross amount of land area required to meet future demand. [net land needs * market factor = total land required].

4. Enforce a "no net loss" policy on the conversion of industrial designated parcels to non-industrial use.
5. Reconsider tertiary industrial zoned land and reclassify it to non-industrial use if limitations are deemed too severe to overcome.

***1997 Urban Growth Report Update, Metro Growth Management Services Department, September 1999*.**

Metro's Urban Growth Report and its periodic updates are one tool Metro uses to evaluate how it is meeting its own urban form goals, as well as the statewide land use goals. The report concluded:

1. Under the current adopted (Title 3) protected riparian area assumptions, there is an employment land surplus of 270 acres. The report estimates industrial land demand in the tri-county area to be 4,088 acres and supply to be 7,061 acres.
2. If the proposed Endangered Species Act (ESA) provisions and/or potential Goal 5 regulations for fish and wildlife habitat increase setbacks by up to 200 feet from each side of streams and water bodies, industrial land would still have a surplus capacity of 999 acres.[4]

Findings and assumptions that pertain to industrial land needs included an estimated demand for 4,088 acres within the tri-county UGB area over the 1997 to 2017 time period. This demand calculation assumed that redevelopment within general industrial, high/tech, flex and warehouse/distribution space would capture 21 percent of the job growth, and that Clark County would capture about 16 percent of the four-county job growth projection. The average floor-to-area (FAR) ratio for industrial was assumed to be 0.32 for industrial areas and 0.37 for employment areas, and a non-residential vacancy rate of 6.0 percent was held as a constant.[5]

Metro's supply estimate includes vacant and potentially developable parcels of at least 0.25 acres or larger in net buildable area. While the Metro report concluded there is a sufficient supply of vacant industrial inventory to serve 20-year land needs, the report recognized the importance of a periodic review process for meeting future land needs and the need to identify/explore avenues for converting constrained land to ready-to-develop industrial land. Metro staff also recognized the need to, in the future, examine location, parcel size, and type of industrial use. Metro is already required by state law and its own code to periodically review its land supply every five years.

---

[4] This information was compiled by Otak using Metro data sources. The Metro Urban Growth Report did not extend its analysis to conclude an industrial surplus assuming Goal 5 extensions to account for fish and wildlife habitat protection. Goal 5 regulations have not been adopted by Metro.
[5] Metro Report, 1997 Urban Growth Report Update, Table 35., p.55, September 1999

Local Economic Development Plans and Studies

Each local government generally has its own set of goals or objectives for industrial development and/or job creation. A brief summary of these local economic development efforts includes:

- Clackamas County Economic Development Plan, 1997
- Clark County Economic Development Plan within the "Comprehensive Growth Management Plan," 1994
- Columbia Pacific Economic Development District, Economic Development Plan, 1998
- Columbia River Economic Development Council Industrial Lands Policy, update August 2001
- Gresham and East Multnomah County Mayor's Economic Development Action Plan, 2001
- Hillsboro Economic Development Plan, within the "Hillsboro 2020 Comprehensive Plan," 2000
- City of Portland "Quality Jobs Program" and comprehensive plan designation of "industrial sanctuaries"
- Westside Economic Alliance Mission Statement, 1998

The policies in these and other local economic development plans and missions tend to support growth of family wage jobs and public investments that promote industrial development. At present, there may be an opportunity to improve the coordination of economic development efforts among local private and public agencies and larger regional and state development agencies.

Appendix B — Industrial Demand Trends

The New Economy era of information and knowledge based economics, with its reliance upon technology, communications, and e-commerce, is redefining all sectors of our economy — including services, manufacturing, and agriculture. This phase of RILS attempts to build upon the latest thinking on industrial development trends. Several recent studies and expert opinions help document industrial growth dynamics.

Welcome to the New Economy

Over the past 15 years, a "New Economy" has emerged in the United States. The reason it is "new" is because fundamental change is perpetually occurring in all industries. According to economists Dr. Robert Atkinson, Progressive Policy Institute, and Dr. Paul Gottlieb, Case Western Reserve University, The Center for Regional Economic Issues, "the emergence of the New Economy is equivalent in scope and depth to the rise of the manufacturing economy in the 1890s and the emergence of the mass production, corporate economy in the 1940s and '50s".[6]

The New Economy relies upon global knowledge and "instant" exchange of ideas, capital, and products. Wealth and job creation is now tied to ideas, technology, and market interaction. Underlying the strength of the new economy is free flowing information and the exchange of knowledge and ideas. Not withstanding the dot-com failures that have led to poor stock market performance in recent months nor the poor economic performance of global trading nations, this New Economy is here to stay.

Industrial Jobs in the New Economy

While technology and automation are changing the way business is being conducted in the New Economy, industrial jobs are still generally defined by the goods or services they provide. Although many industries are related, each contains a unique combination of occupations, production techniques, commerce requirements, and business characteristics. These unique characteristics are interpreted by individual work establishments into areas of specialization or Strategic Industrial Classification (SIC).

The definition of industrial jobs in the New Economy are still "just like the old one" with elements of goods-producing and service-producing sectors. According to Harvey Moskowitz and Carl Lindbloom, industry is defined as: "Those fields of economic activity including forestry, fishing, hunting, and trapping; mining; construction; manufacturing; transportation; communication; electric, gas, and sanitary services; and wholesale trade." [7] The RILS focuses on these activities with the exception of forestry, fishing, hunting, trapping and mining. One can find a wide

[6] Robert Atkinson, Ph.D. and Paul Gottlieb, Ph.D., The Metropolitan New Economy Index, Benchmarking Economic Transformation in the Nation's Metropolitan Areas, April 2001.
[7] Harvey Moskowitz and Carl Lindbloom, New Illustrated Book of Development Definitions, 1993.

variety of job occupations within the industrial sector — including executive and managerial positions, technicians, marketing and sales respresentatives, administrative support personnel (e.g., computer systems, accounting, finance), operators, fabricators, and laborers.

Emerging Trends

ECONorthwest and Otak reviewed a variety of literature and talked with local "experts" to ascertain emerging industrial development trends. Notes describing the literature are provided in Appendix C, and the list of interviews is provided in Appendix D.

Any region that wants to remain competitive in the global economy must understand industrial operations and development. Several themes about the dynamics of industrial development are summarized below.

E-commerce Increases Need for Warehousing and Distribution Space

The advent of e-commerce and "just in time" deliveries is driving up demand for warehousing and distribution facilities. The average size of warehouse establishments is increasing with growth in the number of very large (100,000 to 1,000,000 square feet) buildings. Ceiling heights are rising to 30 feet (up from 20 to 22 feet in the 1980s). Site size requirements appear to be trending upward, given the desire to build larger facilities, and the need to allow for better truck circulation/access onsite. Technology improvements are leading to more efficient inventory, storage, and retrieval systems (more automation), which is keeping employment density stable despite increasing storage volumes (due to higher ceilings).

Increased Reliance on Efficient Freight Movement

Efficient multi-modal transportation networks are now mandatory for business to compete in the global market place. The trend towards specialization and global business-to-business trading patterns are increasing our dependence upon all modes of transportation. As a result, freight volumes are increasing at a rate two times faster than economic growth rates.[8]

The Portland region, with its diverse road, air, water and rail transportation network, relatively inexpensive and reliable energy supply; and competitive land costs, and wage rates has enabled over 9,000 industrial establishments to locate here over the past two decades. Competitive warehouse and distribution sites are generally located within one mile of interstate freeways, and have good access to air, rail, and marine freight facilities.

---

[8] Susie Lahsene, The New Economy, Do We Need a New Vision for Transportation with more Emphasis on Freight?, The Westsider, Second Quarter, 2001.

High-tech Site Selection Focus on Work Force and Quality of Life
High-tech employment is expected to rise significantly in the Portland-Vancouver PMSA. Primary sectors that high-tech comprises include non-electrical machinery (SIC 35), electrical machinery (SIC 36), and instruments (SIC 38). The electrical and non-electrical machinery categories are predicted to experience the most growth (expected to add 28,700 jobs in the PMSA by 2025) while the instruments sector remains flat.[9] The American Electronics Association also includes software and computer services (SIC 737) as part of high-tech employment, which is another rapidly growing sector of the economy.

While the old saw about location, location, location still applies to high-tech companies, the criteria these firms consider when selecting a site differ dramatically from the rest of the manufacturing sector. Technology companies must keep abreast of the latest trends and have access to skilled workers. They want proximity to research institutions from which "patentable" technology flows, and access to "hard" information infrastructure, such as Digital Subscriber Line (DSL) and fiber optic networks. They also tend to choose locations that offer a diverse housing mix and quality of life factors, such as recreational amenities.

Importance of Industry Clusters
Several studies around the United States have documented the importance of "industrial clusters" as ways to understand regional competitive advantages. Regional clusters are defined as the propensity of a specific industry (e.g., electronics and high technology) to locate or cluster within a region. Drawing upon recent work by Michael Porter at the Harvard Business School, the Regional Connections Project by the PSU Institute of Portland Metropolitan Studies identified several region-wide clusters of industrial activity in the greater Portland region.[10] Their analysis identified the benefits of industrial clusters and noted five evident clusters of activity in the greater Portland region: electronics and high technology; metals, machinery, and transportation equipment; lumber and wood products; nursery products; and specialty food/craft beverages. Concentrations of firms tend to build up over time as long as growth fundamentals are positive.

While most industrial clusters are measured on a regional level, they tend to grow out from a central activity or core industry, then extend outward into the region. Industrial development experts expressed mixed views on sub-regional clustering patterns. While there tends to be some market preference or requirements for high-tech firms to locate within a few miles from their clients or competitors, factors such as access to labor and availability of land also enter into location decisions. One

---

[9] Economic Report to the Metro Council, Metro Data Resource Center, January 2000.
[10] Progress of a Region: The Metropolitan Portland Economy in the 1990s, Technical Report of the Regional Connections Project, Institute of Portland Metropolitan Studies, College of Urban and Public Affairs, Portland State University, April 1999.

recent example was identified by the City of Tualatin's Community Development Director, Doug Rux — noting that after Novellus broke ground on its new 58-acre national R&D facility, several smaller companies from the Bay Area expressed intent to locate in the Tualatin vicinity close to their important customer.

Perpetual Focus on Cost Reduction and Quality Control

The recent economic slump in the United States and in global markets combined with increasing automation in production and warehousing/distribution is placing new emphasis on profitability, cost cutting, and product re-engineering. All aspects of business overhead are being reviewed — including number of workers, benefit programs, transportation/shipping logistics, and building efficiency. Outsourcing functions such as shipping and warehousing, manufacturing of specialized product components, packaging, and legal and accounting services are increasingly common measures of controlling costs. Industrial outsourcing is partially responsible for the declining share of industrial jobs as a percentage of total jobs.

National Trend Towards Smaller and Larger Establishments

Today, approximately three out of four American workers are employed by organizations and one out of four are independent or small business owners.[11] MIT professors Thomas Malone and Robert Laubacher noted that "when it is cheaper to conduct transactions internally, within the bounds of the corporation, organizations grow larger, but when it is cheaper to conduct them externally, within independent entities in the open market, organizations stay small or shrink."[12] Nationally, experts expect to see most job growth occurring in small and very large companies, not middle size companies.

In recent years, Oregon has bucked these national trends as the number of small industrial establishments has decreased and/or expanded into middle-size categories. According to data provided by the Oregon Employment Department, the past few years have evidenced growth from all but the very small establishments and those with 100 to 199 workers within the tri-county (Multnomah, Clackamas, and Washington County) area. According to the Oregon Employment Department, during the 1996 to 2000 time period, the number of small reporting establishments with less than 49 employees declined slightly while medium establishments with 50 to 99 employees and 200 to 999 employees increased. The largest growth in industrial establishments was recorded by the very large organization with over 1,000 employees, as indicated on Table B-1.

---

[11] Daniel Pink, Free Agent Nation, Warner Books, N.Y., N.Y., 2001.
[12] Thomas W. Malone and Robert J. Laubacher, "The Dawn of the E-Lance Economy," Harvard Business Review, Sept./Oct., 1998.

Table B-1
Formation of Industrial Establishments by Number of Workers*
Metro UGB

	Number of Establishments					
	1996		2000		Change: 1996-2000	
Workers per Establishment	Number	% Dist.	Number	% Dist.	Number	% Change
Less than 10	5,617	62%	5,497	62%	-120	-2%
10 to 49	2,499	28%	2,411	27%	-88	-4%
50 to 99	475	5%	506	6%	31	7%
100 to 199	253	3%	231	3%	-22	-9%
200 to 999	138	2%	169	2%	31	22%
1,000 to 2,999	17	0.2%	22	0.2%	5	29%
3,000 or More	2	0.02%	2	0.02%	0	0%
Total	**9,001**	**100%**	**8,838**	**100%**	**-163**	**-2%**

**Includes SICs 10-17, 20-51, 737, 75 and 76.*
Source: Oregon Employment Department, compiled by Otak, Inc.

The increase in the number of large industrial employers during a period where total establishments actually declined may reflect significant expansion from existing industrial operations in the tri-county region.

Industry Wants Land and Facilities that Can Accommodate Future Expansion

Most companies have business plans that include detailed strategies to allow them to grow or expand overtime. Companies such as Intel, Tektronix, LSI Logic, and In-Focus all invested in sites that would accommodate some future growth needs and allow them to expand overtime. The U.S. Department of Commerce estimates that approximately two-thirds of all job growth is attributed to the expansion of existing establishments. Hence, it is important to recognize local businesses desire to grow and expand over time.

Given rapid changes in global market opportunities and shorter time to respond quickly to new market opportunities, businesses must be able to change quickly. Industrial sites are often planned with "land banking" to accommodate future buildings and/or expanded facilities as business grows over time. Opportunities for "land banking" and the desire to invest in areas that can accommodate future growth are fundamental issues for almost all industries.

Pace of Product Innovation May Lead to Higher Industrial "Churn Rate"

Where economic growth in the "old economy" stemmed from increases in resource-based natural resources (such as extractive mining or export of raw materials), growth in the New Economy is heavily dependent upon technological innovation. Innovation is now responsible for more than two-thirds of per capita economic growth.[13] Over 63 percent of the revenue from high-tech companies in Oregon are derived from products that are less than two years old.[14] It is apparent that industrial development in the New Economy will require periodic reconstruction and equipment upgrades that result in a high "churn rate" of land and facilities. Hence, industrial vacancy rates may trend upwards over time to account for higher "churn rates".

Increasing Encroachment from Non-Industrial Land Uses
As land use intensifies, potential conflicts between industrial and non-industrial uses (e.g., from residential and commercial) can rise. Conflicts due to noise (e.g., impacts of late night shifts), truck movements, odors, and visual impacts become more apparent. While the trend towards cleaner (e.g., non-smoke stack) industries is helping to ameliorate some of these conflicts, encroachment is often a major concern of industrial site operations managers. If encroachment is unchecked, it can result in an out-migration of certain industries to industrial locations with adequate land area and buffer separations. RILS findings indicate that about 20 percent of the land designated for industrial use is occupied by commercial/non-industrial activities. Recent trends suggest little change in encroachment within heavy industrial zones, but rising encroachment in light-industrial and mixed-industrial locations.

Emergence of Regional Public-Private Partnerships
Higher levels of collaboration and coordination among various local governments are resulting in integrated strategic marketing efforts and more formalized structures for networks of civic-minded entrepreneurs from business, government, and education communities. Successful examples of New Economy style regional governance include Joint Venture Silicon Valley, Cleveland Tomorrow Foundation, The Carolinas Partnership, and the Central Indiana Partnership. These organizations serve as effective venues to form regional economic policies, develop creative economic strategies, exchange/transfer knowledge and ideas, and build widespread consensus for action.

Conclusion

The literature review and interviews revealed that the gradual shift in our nation's economy from manufacturing to service sectors combined with technological advances are beginning to have some measurable impact on industrial development. Emerging trends generally include:

- **Not all jobs in "industrial" sectors require industrial-designated land**. It is estimated that 15 percent of new industrial jobs can be accommodated though "refill" and redevelopment. According to data provided by the Oregon

[13] Kenan Patrick, Jarboe and Robert D. Atkinson, "The Case for Technology in the Knowledge Economy: R&D, Economic Growth, and the Role of Government", Progressive Policy Institute, 1998.
[14] Oregon Technology Benchmarks, State of the Industry Report, American Electronics Association, 2000.

Employment Department, 17 percent of industrial jobs tend to locate into commercial areas, such as Downtown Portland or Kruse Way.

- **Not all industrial-designated land is used by "industrial sectors"**. Uses such as restaurants, retail, athletic clubs, churches, and training/education facilities currently occupy about 20 percent of the industrial land base.

- **Some building-to-land-area densities are decreasing while others are increasing**. Warehouse/distribution building-floor-area to land-area densities appear to be declining as building heights increase. The focus on administration/management and research and development occupations is expected to increase building densities for high-tech/flex buildings moderately. General industrial building densities are expected to remain fairly constant.

- **Employment densities are also changing**. Increased automation is leading to a lower employment densities for warehouse/distribution and general industrial uses. On the other hand, more focus on research and development and management/administrative positions is leading to higher employment densities for high-tech/flex building types.

- **A variety of parcel sizes is required to meet future industrial demand requirements**. In response to increasing demands from the global and domestic markets, industrial operations must constantly strive to become more efficient and more cost effective. Industrial land users desire sites and building facilities that foster flexible and efficient production and/or distribution environments.

Appendix C — Literature Review

Appendix D — Interviews

Appendix E — Employment Growth And Development Density Analysis

ECONorthwest conducted an evaluation of economic trends that impact industrial land needs as part of RILS Phase 3. Their findings, included in Appendix F (PowerPoint presentation) and Appendix G (parcel demand analysis) take into account the above-mentioned anecdotal conclusions from the literature review and interviews. Their data was derived primarily from Metro, the Oregon Employment Department, and the Washington Employment Security Department.

Key conclusions from the analysis include:

- Average annual population growth in the PMSA over the 1999 to 2025 period is expected to be 1.5 percent compared to 1.0 percent for the nation as a whole. Overall annual average employment growth in the PMSA is expected to be 1.8 percent compared to 1.1 percent for the nation.

- Despite the recent slow-down in national and regional economic activity, industrial job growth in the study region is expected to increase by 148,000 jobs over the 2000 to 2025 time period.[15] Regional industrial job growth has generally trended upwards since the national recession that occurred in the early 1980s. Industrial job growth in the PMSA is expected to increase at an average annual rate of 0.9 percent, compared to 0.3 percent for the nation.[16]

- Sensitivity analysis was conducted using minimum, maximum, and mean job and building densities. ECO concluded that net industrial land demand in the PMSA by year 2025 likely ranges from 4,700 to 11,500 acres, with 6,900 acres as the "best estimate" for net vacant land requirements.

- This new estimate for industrial land needs cannot be compared directly to the 7,800 net acres of projected net industrial land demand from RILS Phase 2 report, since the Phase 2 estimate included demand for both vacant and redevelopment land. Instead of including a supply-side estimate of redevelopment land area, ECO's analysis adjusted total industrial job growth to account for "refill" — defined as jobs that can be accommodated on land that Metro considers to be already developed. ECO assumed the "refill" factor to be 15 percent, which is slightly lower than Metro's Urban Growth Report "refill" assumption of 21 percent. The justification for this change is based on the fact that the larger Metro estimate was derived from an analysis of development activity that occurred between 1994-1996. That time period occurred immediately after a national recession that led to high vacancy levels. Hence, the lower factor (15 percent) was considered to be a more realistic long-term estimate of "refill".

[15] Industrial jobs shown on Figure 1include the following sectors: construction, manufacturing, transportation, communication, and public utilities. Job forecasts are from the "Economic Report to the Metro Council", Metro Data Resource Center, January 2000.
[16] Industrial jobs include construction, manufacturing, transportation, communication and public utilities. Derived from the "Economic Report to the Metro Council", Metro Data Resource Center, January 2000.

- Table E-1 provides a comparison of assumptions between RILS Phase 2 and 3 work efforts.

Table E-1
Comparison of RILS Phase 2 and Phase 3 Assumptions for Long-Term Industrial Land Demand Forecasts

Gross Building Square Feet Per Employee	***Phase 3 Assumption***	***Phase 2 Assumption***
Warehouse/Distribution	1350	1100
General Industrial	533	550
Tech/Flex	467	450

Floor to Area Ratio	***Phase 3***	***Phase 2***
Warehouse/Distribution	0.31	0.33
General Industrial	0.30	0.30
Tech/Flex	0.26	0.22

Percentage of Jobs in Each sector that Need Industrial Land	***Phase 3***	***Phase 2***
Construction and Mining	30%	25%
Manufacturing	91%	97%
TCPU	63%	68%
Trucking/Warehouse	93%	100%
Water Transportation	93%	100%
Air Transportation	93%	100%
Communications	48%	50%
Electricity, Gas, Sanitation	48%	50%
Other TCPU	18%	0%
Wholesale	82%	95%
Retail	0%	0%
Fire	0%	0%
Services	9%	9%
Computer, Data Processing	88%	100%
Auto Repair, Service Parking	93%	100%
Miscellaneous Repair	93%	100%
Other Services	0%	0%
Other (Government)	2%	0%

Source: ECONorthwest and Otak, Incorporated

- ECO concluded that it is important to consider not only parcel size and availability, but the location and land-use designation. They noted that “if firms don’t find the right type of land, it doesn’t matter how much total industrial land is available.”

- A sensitivity analysis of parcel size requirements was conducted (see Appendix G). The analysis applied density assumptions (square feet per job, and floor area ratios for buildings) for each firm size cohort. In sensitivity number 1, the density assumptions were weighted based upon the existing distribution of establishments by size cohort. In sensitivity number 2, the distribution of future establishments took into account recent trends. In sensitivity number 3, the same assumptions as sensitivity number 1 applied, but adjustments were made for land banking preferences. The results of the sensitivity forecasts are shown below in Table 4.

Table E-2
Comparison of Industrial Parcel Demand and Supply

	Projected Parcel Demand 2000 to 2025 (net acres)			*Estimated Parcel Supply (Gross Buildable Acres)[1]*		
Parcel Size (Acres)	*Low*	*High*	***Mid-Point***	*Total Vacant Industrial Parcels*	*Vancant & Uncon-strained Parcels*	*Conclusions*
Less than 3	623	3,715	***2,169***	730	188	Significant infill/redevelopment opportunities in this segment.
3 to 11	187	282	***235***	710	218	Market appears to be addressing this segment.
11 to 50	54	62	***58***	284	62	Market appears to be addressing this segment.
50 to 100[2]	4	14	***9***	21	2	Need to identify/preserve strategic sites for industrial use.
100 and above[3]	2	10	***6***	7	1	Need to identify/preserve strategic sites for industrial use.
Total	869	4,083	***2,476***	1,752	471	

[1]In addition to these parcels, there are approximately 24 vacant unconstrained parcels (less than 15 acres) in small cities outside the Metro UGB (including Estacada, Molalla, Sandy, Canby, North Plains, Banks, Newberg, McMinnville, Sheridan, St. Helens, etc.)
[2]Adjusted to include the +/-75-acres James River site in St. Helens, Columbia County.
[3]Updated to reflect recent absorption/sales at Southshore Corporate Park and Westmark Industrial Park.

Source: Demand projections by ECONorthwest and Otak; supply estimates by Otak, Inc. derived from RILS Phase 2 Draft Final Report, December 1999 (with adjustments for sites over 75 acres).

- Table E-2 also compares the mid-point of the parcel demand projections, to the supply of existing industrial land in the study region. Land supply estimates were derived from RILS Phase 2 and include an updated tally of parcels greater than 75 acres. A comparison of parcel size and demand results in the following conclusions:

1. The shortfall of small parcels (less than 3 acres) indicates strong potential for industrial redevelopment and infill;
2. The market appears to be addressing the need for medium size parcels in the 3- to 11-acre category.
3. Parcels within the 11-50 acre category should be more closely monitored, especially within the upper end of that range (i.e., parcels over 20 acres).
4. Land constraints on parcels above 50-acres in size appear to be limiting the industrial development potential for the region.
5. There is a need to identify and preserve large parcels for industrial users if the region desires to pursue that as a growth objective.

Appendix F — Employment Growth And Development Density Analysis PowerPoint Presentation

Appendix G — Industrial Land Parcel Demand Analysis

Phase 3 of the Regional Industrial Land Study includes a preliminary analysis of industrial parcel demand over the 2000 to 2025 time period. The steps used to estimate parcel demand are described below and provided in the following tables.

Step 1 — Identify projected employment growth within the six-county region using data provided by Metro Data Resources Center.

Step 2 — Estimate percentage of total jobs within each employment sector that are classified as "industrial jobs". These estimates were derived using assumptions from prior RILS phase 2 work.

Step 3 — Estimate the percentage of industrial jobs that is likely to be accommodated through "refill" or reuse and optimization of existing buildings rather than through development of vacant industrial land. These assumptions were derived from prior Metro analysis of the period between 1993 and 1996, and adjusted downward slightly (from 21% to 15%) to account for long-run expectations.

Step 4 — Estimate the distribution of industrial jobs by building types: warehousing/distribution; general industrial; and high tech/flex buildings. Building distribution estimates are similar to those used in the prior RILS Phase 2 work.

Step 5 — Estimate Job Density (square feet per employee) by industrial building type. Assumes similar assumptions to RILS Phase 2, but makes some adjustments based upon input from interviews and literature results.

Step 6 — Assume vacancy rate of 6.0% to allow for market flexibility and turnover.

Step 7 — Forecast the future distribution of industrial establishments by firm size. This step utilized confidential ES-202 data from the Oregon Employment Department and was completed for three alternatives or sensitivity forecasts: 1) current distribution of industrial establishments; 2) weighted distribution of establishments that take into account recent trends towards larger establishment sizes; and 3) current distribution of industrial establishments but making allowances for land banking preferences by rounding parcel demand upwards to the next highest round number for parcel requirements.

It should also be noted that step 7 also assumed existing industrial establishments would prefer to consolidate their operations over time. Hence , large employers such as Intel are counted as one establishment even though their land holdings are in at least four separate locations. This assumption tends to show relatively higher demand for larger parcels than would be shown if large employers continue their status quo allocation of operations.

Step 9 — Allocate the industrial firm size forecasts into parcel size cohorts that are consistent with prior RILS Phase 2 projections for parcel supply estimates.

Step 10 — Calculate a mid-point of parcel demand as a “most likely scenario” using the extremes of the three sensitivities described in Step 7.

Appendix H — Inside UGB/UGA Case Studies

At the conclusion of RILS Phase 2, the study sponsors determined that a more detailed understanding of the land supply inside the UGB/UGA is needed to determine if policy efforts can result in better use of the existing industrial land supply. Industrial land case studies were reviewed to evaluate the costs of converting constrained industrial land into land that is ready for industrial use. The case study analysis sheds light upon the relative costs of developing constrained industrial land inside the Metro UGB and Clark County UGA. Additional analysis was conducted to ascertain the type of constraints that are attributed to constrained industrial parcels. It was determined that three primary categories of constraints exist on constrained lands:

1. Physical Constraints — reflect rolling site topography and proximity to wetlands, flood plains, and Goal 5 riparian buffers;
2. Infrastructure Constraints — include sites significantly lacking in adequate on- and off-site roads, sewer, and water system utilities.
3. Ownership Constraints — include sites that are held by property/business owners (for internal expansion or land banking) and sites with special zoning regulations that limit the type of industrial development that is allowed (e.g., maritime use restrictions in Rivergate Industrial area).

Industrial parcels listed as having potential “brownfield” constraints represent an additional category of constrained land that was not evaluated as part of RILS Phase 3. The listing of potential brownfields in the study region includes approximately 23 parcels with an aggregate land area of 258 acres. These parcels range in size from 5.8 to 54.9 acres. While addressing brownfield cleanup and redevelopment is considered important, it accounts for less than four percent of the study region’s constrained land supply.

Methodology for Selecting Case Study Locations

The project consultant team and the MAC developed criteria that were used to select case study locations. The criteria relied on quantitative measures as much as possible to prevent subjective site selection biases.

The criteria for identifying case study prospects inside the UGB/UGA included:

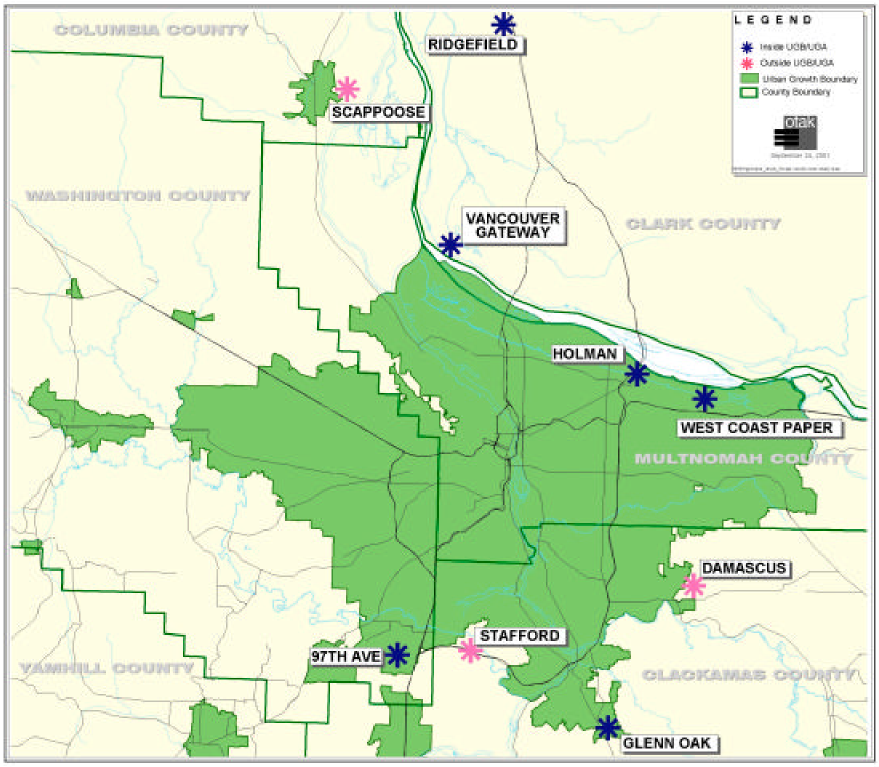
1. Establishing a goal/range for the number of case studies by geographic area based upon the distribution of constrained land throughout the region and available budget for this study.
2. Establishing a goal/range for the number of case studies constrained by ownership, physical features, and infrastructure.
3. The following factors for prospective case study locations were considered by the MAC:

- Gross buildable land area (net of steep slopes, wetlands, flood plains, etc.). Case studies that approached the average size (9 +/- gross buildable acres) for all constrained land were preferred.
- Prior RILS Phase 2 designation as constrained.
- Recent construction activity, development plans, or background studies.
- Geographic location.
- Property ownership (preference was made for sites having less than two separate owners).

The process for selecting specific case study locations included:

1. Prospective case study locations were identified based upon the above criteria, mapped using GIS, and coded according to the three types of constraints: physical, infrastructure, and ownership.
2. MAC members reviewed case study prospects that were identified by the project team and recommended additions for consideration and discussion. Using this approach the list of case study prospects inside UGB/UGA areas included 20 separate locations. Please refer to Appendix K for a summary of the case study prospects.
3. A facilitated discussion with MAC membership resulted in a consensus for evaluating seven locations inside the UGB/UGA.

While the selected list of case study locations is intended to represent the spectrum of constraints, this study recognizes the limits of its research. There are significant costs associated with gathering in-depth information on a statistically valid sample of industrial developments. Hence, this study focuses on a diverse range of case studies in hope of drawing broad conclusions regarding public and private efforts needed to rectify land constraints, and is not a statistically valid sample. The following map shows the general location of the case studies.



Once the case studies were selected, the Otak project team conducted site visits to ascertain development constraints. Interviews were conducted with development and planning representatives to compile information regarding site development issues and costs. For the purpose of this case study analysis, conversion costs are defined as: *"extra-ordinary on- or off-site development costs required to make the property ready readily developable for industrial use."*

The inside UGB/UGA case studies are summarized below. Please refer to Appendix K for a more detailed summary of each case study location.

West Coast Paper (M-2)
This case study represents a recently developed industrial parcel in the City of Portland. The site was classified as Tier B during RILS Phase 2 due to its proximity to the Columbia Slough (within Title 3 resource buffer), varied site topography, property owner "land banking" (which changed after the site changed ownership), inadequate local road network, and existing peak-period congestion levels on I-84.

The site eventually developed following transfer of ownership to Eastern Western Corporation (developer) and approval of an industrial subdivision. A new interior public street was added at the owner's expense, and development permits were approved under Metro's Title 3 regulations. Since the resource buffer barely impacted the site, it did not pose a constraint to development. Special grading and provision of the new street has made it possible to develop this site into two 9-acre parcels.

Existing traffic congestion on I-84 (which was a RILS Phase 2 constraint factor) was identified in the Metro Regional Transportation Plan as "grossly intolerable" but did not pose a barrier to development. And while special grading and storm water quality treatment was needed, those costs were found to be minimal.

After discussions with the broker representing the site and onsite visits by Otak, it was determined that once this site changed ownership, it had very few development constraints. In particular, land banking was not a constraint. The cost of constructing and dedicating the new local street, when shared among adjacent property owners, is considered a typical onsite development cost.

West Coast Paper was the first site occupant with 91 jobs in a new 176,500 square-foot warehouse/distribution building on 10.75 net acres (FAR = 0.38). Their job density is 1,950 square feet of building floor area per job or 8.5 jobs per net acre.

This case study provides evidence that the private market sector can fund and construct necessary onsite infrastructure and ancillary water quality facilities without public intervention when the following factors are met:

- Property owner is willing to develop their property;
- Conversion costs are less than $3,000 per net acre;
- Adjacent properties have consistent zoning and owners are willing to share funding new road/utility connections; and
- The site can be subdivided into a rectangular parcel configuration.

This case study also shows that:

- Land banking may not be a long-term constraint as long as the property owner is willing to develop their property.
- Depending on the configuration of the land, Metro's Title 3 resource buffer setback regulations may not be a significant constraint as long as the net buildable land area exceeds some minimum amount of land area.

This case study also indicates that the prior RILS Phase 2 definitions of constraints do not account for varying degrees of transportation, environmental, and ownership constraints. While this site once was classified as having constraints due to ownership, infrastructure, transportation, and environmental issues, all of those factors were addressed by the new property owner, or upon additional research, were found to be manageable.

Holman Redevelopment Area (M-3)

Located in Portland in the southeast quadrant of I-205 and Airport Way, the Holman Industrial Area represents a built-out urban industrial location in outlying Portland. The designation of industrial zoning in this area led to the presence of several non-conforming single family residences and small and medium-size parcels under multiple ownership. The Portland Development Commission (PDC) originally planned to include this area in the Airport Way Urban Renewal District in the early 1990s, but did not due to passage of Measure 5. After development of six “flex” warehouse/distribution buildings, PDC commissioned a planning study to evaluate the costs associated with facilitating industrial development on the remaining land inside the Holman Industrial District.

The Holman case study area includes approximately 32 net buildable acres within 28 ownerships. The site was identified as having a mix of redevelopment constraints. The presence of high-value non-conforming residential properties was identified as the largest constraint, given the need to acquire and assemble multiple parcels into larger opportunities for industrial development. Other constraints include the need for significant road and intersection improvements, water quality facilities, and sanitary sewer system upgrades. Proximity to the well fields also created unique permitting requirements, such as the requirement to provide onsite spill containment facilities.

Conversion costs in the Holman redevelopment area are estimated at $290,000 per acre — the highest cost among the RILS case studies. The Holman case study provides an example of the challenges associated with industrial redevelopment and the necessity of public land assembly to optimize development potential. Non-conforming residential and parking land uses in this area will likely continue, without private incentives to upgrade their land or public land assembly.

Glenn Oak Industrial Park (C-3)

This case study site straddles the Oregon City municipal boundary with a portion of the site outside the city limits (but still in the UGB). The case study includes a proposed industrial park on approximately 51 acres of net buildable land area. There are six separate property owners. The site was identified during RILS Phase 2 as having infrastructure, ownership, and physical constraints. It was also found to possess “political” constraints associated with voter-approved annexation.

The conversion costs for this site primarily involve new roads and traffic signals. While the conversion costs were found to be on the high end of the case studies ($155,000 per acre), the most significant constraints, however, are likely to be the political issues associated with the local zoning process and voter-approved annexation. While County and City planning staff currently recommend industrial zoning, there is pressure from local property owners and educational institutions to allow for future high school expansion and housing.

The Glenn Oak Industrial Park case study demonstrates the challenges associated with a fringe UGB site in a city that has competing needs vying for the use of limited vacant land. This case study demonstrates that the "hard" infrastructure costs may be only one factor in converting land to industrial use. Political issues and surrounding property owner preferences can be equally challenging to resolve.

97th Avenue Site (WA-8)

This case study site is located within the City of Tualatin on 12.5 acres (7.0 net buildable acres) along the Tualatin-Sherwood Highway (Highway 99W). The site was identified during RILS Phase 2 as having physical constraints and was also found to have environmental constraints due to the presence of a "wetland." An innovative development partnership included participation of a soils/grading contractor to help minimize the cost of extra-ordinary site grading. On- and off-site wetland mitigation and ongoing maintenance agreements were successfully formulated to address resource issues.

Site grading and construction of a new flex building is underway with anticipated Fall 2001 completion and occupancy. The extra-ordinary conversion costs related primarily to soils work and wetland mitigation and were borne entirely by the developer. Discussions with the project manager indicated that commercial uses had to be accommodated to enable the project to become financially feasible. Hence, 36 percent of the net site area (2.5 acres) is to be used for commercial purposes (e.g., fuel stations and car rental) and the remaining 4.5 acres will include flex industrial/office space. In this case, the higher lease/sales revenues from commercial development allowed the developer to address some of the site conversion costs.

The 97th Avenue case study provides evidence that the private sector can incur some of the extra-ordinary site development costs for conversion to developable land. However, as private site development costs rise, there is evidence that some non-industrial (e.g., commercial development) is required to keep the project financially feasible.

This case study is a good example of how innovative development partnerships (e.g., developer and grading contractor partnership), in conjunction with on- and off-site wetland mitigation, can allow environmentally constrained sites to develop, as long as permitting/regulations do not hold up development, limited commercial is allowed, and adequate parcel sizes are provided.

Ridgefield (CK-2)

The prior phase of RILS determined that a significant share of our region's industrial land base is located near I-5 in the Ridgefield area in north Clark County. Much of this land area was classified as constrained since it did not have adequate public utilities. An existing I-5 interchange and recent upgrades to the sewer treatment plant and water system capacity by the City and Port of Ridgefield have set the stage for industrial growth in this area. Existing conversion costs now pertain primarily to construction of water, storm water, sanitary sewer, and gas line upgrades and hookups. Cost sharing agreements among several property owners should spread these utility costs out in a manner that does not over burden one site with conversion costs.

The Ridgefield case study illustrates the economies of scale in developing fairly large sites that have major infrastructure facilities in place, and the ability for certain constrained industrial parcels to develop without onsite allowance of commercial development.

Columbia Gateway in Vancouver (CK-3)

This is a unique case study area that is now being evaluated for development by the Port of Vancouver. The case study includes a large amount of vacant land (575 net acres) that is currently constrained by lack of infrastructure, flood plain, and ownership (use/lease restrictions). The site master plan alternatives include a mix of heavy and light industry uses with marine, highway, and rail access. Major offsite improvements (e.g., Mill Plain extension) have already been made by the City of Vancouver. Additional extra-ordinary site development costs include new roads, rail spur, storm sewer, sanitary sewer, water, and gas lines. Depending upon the development alternative, significant site "fill" will be required to raise elevations of development parcels above the flood plain. As such, total conversion costs are estimated to be on the high end of the range identified in the case studies (approximately $78,000 to $119,000 per net acre of land area). A draft environmental impact statement on this case study site is scheduled for release by late Summer 2001. This case study represents an example of the relatively high cost associated with developing large vacant sites. Once total conversion costs exceed a certain threshold (e.g., $10s of millions) the site most likely will require a public entity (such as the Port of Vancouver) to provide the "patient equity" necessary to address conversion costs.

Comparison of Inside UGB/UGA Case Study Findings

Recent examples of developing constrained land indicate that the challenges generally include: cost issues, permitting issues, and political issues.

The analysis (summarized in Table H-1) found each site to vary significantly in size and cost. The case study analysis included six separate areas inside the UGB/UGA that ranged in size from 7 to 575 net acres. Given the wide variance in site size and cost, the MAC identified key benchmarks that help compare costs on an “apples to apples” basis, including:

- conversion cost per industrial job; and
- conversion cost per net acre.

The conversion cost per industrial job for the case studies ranges from $180 per job (West Coast Paper case study) to $16,300 per job (Columbia Gateway Alternative 4).

Table H-1
Summary of Case Study Results

Site No.		*Name*	*Net Buildable Acres*	*Avg. Parcel Size*	*Estimated Industrial Jobs on Site*	*Tier A Conversion Cost Adjusted to Industrial Uses*	*Tier A Conversion Cost Per Industrial Job Ratio*	*Tier A Conversion Cost Per Acre Ratio*
M-2		West Coast Paper	18.4	9.2	276	$50,000	$180	$2,700
M-3		Holman Area	32	1.9	848	$9,286,800	$10,950*	$290,175
C-3		Glenn Oak Industrial Park	51	3.9	1,548	$7,905,000	$5,110	$155,104
WA-8		97th Ave Site	7	1.8	124	$555,000	$4,476	$79,286
CK-2		Ridgefield	44	44	579	$550,000	$950	$12,501
CK-3		Columbia Gateway	375 to 575	N/A	4,200 (Alt.2) to 4,450 (Alt. 4)	$29.3M (Alt 2) to $68.54M (Alt 4)	$6,980 to $15,402	$78,130 to $119,200

**Long-term cost per job is $2,685 after sales/lease revenue is added.*
Source: Otak, Incorporated.

A summary of conversion costs showing a breakdown of major cost categories (transportation, utilities, property assembly, and other) is shown in Table H-2.

- The largest recurring cost item is transportation (e.g., provision of adequate roads, intersections, and traffic signals) which represents about three-quarters of the conversion costs.
- The cost of property assembly may exceed transportation costs for urban redevelopment sites smaller than four net acres. However, a portion of the up-front land assembly costs may be recouped overtime in the form of land lease/sales proceeds.
- Utility costs typically represent about 10 to 20 percent of the total land conversion costs. Other miscellaneous costs account for 5 to 15 percent of the total land conversion costs.

Table H-2
Summary of Inside UGB/UGA Case Study Costs

			Tier A Conversion Costs Per Net Buildable Acre[1]				
Site No.	***Name***	***Net Buildable Acres***	**Transportation**	***Utilities***	***Property Assembly***	***Other[2]***	***Total***
M-2	West Coast Paper	18.4	–	–	–	$3,000	$3,000
M-3	Holman Area	32	$64,000	$31,000	$175,000	$19,000	$290,000
C-3	Glenn Oak Industrial Park	51	$155,000	–	–	–	$155,000
WA-8	97th Ave Site	7	–	–	–	$79,000	$79,000
CK-2	Ridgefield	44	–	$13,000	–	–	$13,000
CK-3 (Alt 2)	Vancouver Gateway	375	$68,000	$10,000	–	–	$78,000
CK-3 Alt 4)	Vancouver Gateway	575	$89,000	$13,000	–	$17,000	$119,000
Average[3]		**88**	**$48,000**	**$9,000**	**–**	**$17,000**	**$103,000**

Notes:
[1]Conversion costs adjusted for industrial-related cost share.
[2]"Other" costs typically include extraordinary site work, grading and environmental remediation.
[3]Average of case studies assumes Alt 2 Vancouver Gateway.

Other general conclusions from the inside UGB/UGA case studies include:

1. The sites that are most developable are those that have fairly good highway access (within one-quarter mile of state routes) and have about five or more net acres of contiguous land area in a rectangular configuration.
2. There may be a need to allow commercial (or other non-industrial) uses on constrained sites to enable the developer to meet financial return on investment requirements.
3. The pressure to provide commercial and other non-industrial development on industrial-zoned land rises as conversion costs increase. These case studies indicate there is some capability for the private sector to pay for conversion costs up to a point. However, there is definitely a trade-off with the amount of commercial development that is needed to keep the project feasible when conversion costs rise.
4. There are varying degrees of constraints and certain constraints, such as ownership and permitting/regulations can change overtime. The potential for a developer to address site constraints depends on factors such as: parcel size and location; permitting impacts; up-front cost; financial return on investment; and risk.
5. Public land assembly is likely needed as a catalyst for smaller urbanized vacant or redevelopment parcels with separate ownership (e.g., Holman area).

6. The analysis indicates that in some cases costs are only one factor that can inhibit conversion. Local political and community preferences can also hinder industrial development (e.g., Glenn Oak case study) given growth pressure from non-industrial uses such as schools and “competing” interests.

Appendix I — Outside UGB/UGA Case Studies

In addition to an evaluation of case studies inside the UGB/UGA, the project team conducted an analysis of three areas outside the UGB. The sites included two sites that are now being evaluated for urbanization by Metro, and one site located near Scappoose. This case study analysis helps shed light upon the relative costs of developing constrained industrial land outside urban service boundaries.

Methodology for Selecting Case Study Locations

Prior phases of RILS did not inventory or evaluate land outside Oregon UGBs or Clark County UGAs, but this phase of RILS evaluates the costs and productivity of providing industrial land outside the UGB/UGA. Focus of this work is on areas that are currently being evaluated by Metro as part of a land use productivity study in advance of the next Metro UGB evaluation, which is scheduled during the Fall of 2002.

As with the selection of inside UGB/UGA case studies, the project team and the MAC identified specific site selection criteria. The criteria relied upon quantitative measures to the extent possible to help prevent site selection biases. The criteria included:

1. Establishing a goal/range for the number of case studies given available project budget.
2. Establishing a goal/range for the number of case studies by geographic area based upon the distribution of land within former designated urban reserve areas.
3. The following factors were also considered by the MAC:
   - Location of site must be within one mile of current UGB/UGA.
   - Approximate amount of gross buildable land area (net of steep slopes, flood plains, etc.).
   - Contiguous parcel size in excess of 20 acres.
   - Site must be in or near former urban reserves.[17]
   - Preference towards sites that were previously identified as urban reserves.

The process for selecting specific case studies included:

1. Prospective case study locations were identified based upon the above criteria and mapped using aerial photographs.
2. MAC members reviewed case study prospects that were identified by the project team and recommended additions for consideration and discussion. Using this approach, the list of case study prospects inside the UGB/UGA areas were narrowed to seven separate locations. Please refer to Appendix K for a summary of the case study prospects.
3. A facilitated discussion with MAC membership resulted in a consensus for evaluating three locations outside the UGB/UGA.

[17] Pertains to areas inside Metro planning boundary.

Once the case studies were selected, the Otak project team assembled background information to ascertain development potential and conversion costs. Similar to the inside UGB/UGA case studies, conversion costs are defined as: *"extra-ordinary on- or off-site development costs required to make the property ready for industrial use."*

Given the significant size of these case study sites and varied land uses that were planned in the Damascus and Stafford case study locations, the MAC recommended a cost adjustment factor to account for the approximate share of infrastructure costs that are attributed to areas slated for non-industrial uses. As such, the cost estimating methodology for case studies includes an estimate of total and adjusted conversion costs. The cost-sharing methodology is derived from a detailed analysis of transportation costs and trip making assumptions and only applies to case studies that include non-industrial land uses (including Stafford/Borland and Damascus). Please refer to Appendix K for a tabular analysis of trip generation for those areas.

While the cost sharing methodology used for this case study analysis is adequate for long-range planning, other cost sharing methods, such as the use of local improvement districts and formation of urban renewal areas, can be implemented at the time of development to allocate infrastructure costs among land uses.

The outside UGB/UGA case studies are summarized below. Please refer to Appendix K for a more detailed summary of each case study.

Stafford/Borland Area (C-2B)

The Stafford/Borland case study is an example of a potential new mixed-use employment center. This case study includes the property that has been designated by Metro as Urban Reserve Area 34 (URA 34). URA 34 is a 567-acre area located in Clackamas County adjacent to the City of Tualatin. The case study area includes the land centered along Borland Road between I-205 and the Tualatin River. The area is a potential location for office, high-tech, and retail job-supporting land uses, and limited residential development. Much of the findings from this case study are derived from a recent annexation study commissioned by the City of Tualatin and completed in Winter 2001.[18]

The Stafford/Borland case study area includes 227 gross buildable acres of land area and 159 acres of land that is constrained by streams, slopes, and riparian buffers. Preliminary development plans for the area include approximately 79.7 acres of light industrial (e.g., research and development and flex space). Office and retail uses are planned for another 107.9 and 39.7 acres, respectively.

[18] *City of Tualatin, URA Fiscal Impact Analysis*, prepared by ECONorthwest and Otak (endorsed by City Council Winter 2001)

Conversion costs include transportation infrastructure (roads, signals, and pathways), storm sewer, water quality, sanitary sewer and water facilities. Total conversion costs are estimated to be $70 million. By far the largest single cost item is transportation, with an estimated cost of $89,000 per acre or 68 percent of total conversion costs.

Given the mix of land uses planned for this area, the project team conducted an analysis of trip generation based upon expected build-out of the area. The trip generation analysis (included in Appendix K) takes into account anticipated levels of development by land use type and applies trip generation rates derived from the Institute of Transportation Engineers, *Trip Generation Handbook (6th edition), 1997*. Using that approach, it is estimated that industrial development will account for roughly 10 to 20 percent of the conversion costs. The mid-point of this estimate (15 percent) was selected for this analysis.[19]

Damascus Area (C-1A and C-1B)

The Damascus case study area is a potential industrial area that is somewhat distant from an interstate highway. The large size of this area (3,806 gross acres) lent itself to be evaluated in whole and in part. Hence, the project team conducted an analysis of the entire Damascus area and a subset of the area that includes the Southwest Quadrant of land bordered by Highway 212 to the south, Sunnyside Road to the north, 172nd Avenue to the east, and Rock Creek to the west (hereby referred to as the SW Quadrant).

The case study findings were derived primarily from a recent study conducted by Clackamas County through a grant by the ODOT/DLCD Transportation Growth Management Program.[20] The study prepared and evaluated three development concepts, including an Employment Concept that is provided in Appendix K. The Employment Concept serves as the basis for this case study analysis.

The Damascus area is expected to accommodate approximately 1,324 buildable acres of land area for a variety of land use types. Two locations have been identified for industrial jobs-supporting land — the SW Quadrant (with 223 net acres for industrial) and the northern portion of the study area near the confluence of Foster Road and 172nd (with 246 net acres for industrial). Both of these areas are comprised partly of Exclusive Farm Use lands and are now being evaluated by Metro.

There are significant transportation costs related to development in the Damascus area. The low end of the spectrum pertains to development of the SW Quadrant only with required widening of Highway 212 between the Carver Junction near Rock

[19] It should be noted that the actual share of industrial-related cost share may be lower than that assumed if existing land uses utilize any of the new transportation capacity or if the public share of capital costs is greater than zero.

[20] *Damascus Concept Planning Study* (prepared by Clackamas County), June 2001.

Creek and 172nd Avenue. Developing the SW Quadrant would also require widening of 172nd Avenue and a portion of Sunnyside Road, as well as three new traffic signals and intersection capacity improvements. These transportation related costs are estimated at approximately $116,000 per acre, and another $11,000 per acre is estimated for storm sewer, water quality, water, and power facilities.

On the high-end of the cost spectrum, developing the entire Damascus area would require several new roads and the widening of existing streets, along with costly utility extensions. The base assumption for conversion costs in the entire Damascus area is approximately $284,000 per acre for transportation and $21,000 per acre for utilities.

Otak conducted a cost-sharing analysis to determine the potential allocation of transportation costs among various land uses planned for the Damascus Area. The cost sharing analysis (included in Appendix K) indicates that approximately 35 to 40 percent of the transportation costs could be attributed to demand for new industrial growth. The high-end of this estimate (40 percent) was used for the case study analysis.[21]

The Metro Regional Transportation Plan also indicates the need to construct the Sunrise Corridor highway connection between US 26 and I-205 at some point in the next 20 years. In light of the expected long-term statewide need for the Sunrise Corridor, its related cost has been excluded from the Damascus conversion cost requirements.

Scappoose Airport Area (CO-2)

This case study represents a relatively large yet remote parcel of land that is located adjacent to a local airport. The Scappoose case study includes a 300-acre parcel of land that is in EFU zoning. The site is adjacent to the Scappoose City limits and is now being used for a mix of agriculture and mining activities. The site was recently considered as a prospective location for an Oregon Bureau of Safety Training (BST) education and law enforcement center (was ranked fourth out of four sites evaluated by BST). The BST analysis serves as the basis for the cost estimates for this case study area.

The lack of a potable water system is this site's largest single infrastructure constraint, with approximately $9.45 million to upgrade the local water plant and provide adequate pipeline connections. Once again transportation was a leading conversion cost at an estimated $26,000 per acre, but utility costs were found to be higher at $47,000 per acre. Other costs include storm sewer/drainage, sanitary sewer, and irrigation improvements at a cost of approximately $1,000 per acre.

[21] It should be noted that the actual share of industrial-related cost share may be lower than that assumed if existing land uses utilize any of the new transportation capacity or if the public share of capital costs is greater than zero.

Outside UGB/UGA Case Study Conclusions

The case studies that were evaluated evidenced conversion issues that are generally similar to the inside UGB/UGA case studies, including: cost issues, permitting issues, and political issues. However all of these issues are magnified for the areas outside of the UGB/UGA.

The RILS analysis found each site to vary significantly in size and cost. Industrial development opportunities in the case studies range from 80 to 532 net acres. Conversion costs per site vary from $10.5 million to $162.2 million. Using the key benchmarks of cost per job and cost per acre to help compare costs on an "apples to apples" basis, findings shown in Table I-1 include:

- The conversion cost per industrial job for the case studies ranges from $3,900 per job (Stafford/Borland area) to $12,700 per job (Scappoose Airport area).
- The average conversion cost for outside UGB/UGA case studies is approximately $9,000 per job.
- The conversion cost per acre ranges from $72,800 (Scappoose) to $346,000 (Damascus).

Table I-1
Summary of Outside UGB/UGA Case Studies

Site No.	*Name*	*Net Buildable Acres*	*Avg. Parcel Size*	*Estimated Industrial Jobs On Site*	*Conversion Cost Adjusted to Industrial Uses[2]*	*Conversion Cost Per Industrial Job*	*Conversion Cost Per Acre*
C-2B	Stafford Area	80	N/A	2,708	$10,504,500	$3,879	$131,306
C-1A	Damascus[1]	532	N/A	15,095	$162,240,000	$10,748	$345,928
C-1B	Damascus (SW Quad.)[1]	234	N/A	5,537	$29,775,000	$5,383	$133,520
CO-2	Scappoose	300	150	1,470	$21,850,000	$12,700	$72,813

[1]Tier A conversion cost for Damascus property excludes Units 1-2 of Sunrise corridor ($520M) given its assumed statewide/regional need.
[2]Applies to Damascus and Stafford mixed-use areas where planned non-industrial land uses must share infrastructure capacity.

A summary of conversion costs with a breakdown of major cost categories including transportation, utilities, property assembly and other (site work/grading and environmental mitigation) is provided in Table I-2. The largest re-occurring cost item is transportation (e.g., provision of adequate roads, intersections, and traffic signals).

Table I-2
Summary of Outside UGB/UGA Case Study Costs

			Tier A Conversion Costs Per Net Buildable Acre[1]			
Site No.	***Name***	***Net Buildable Acres***	***Transportation***	***Utilities***	***Other***[2]	***Total***
C-2B	Stafford Area	80	$89,000	$42,000	–	$131,000
C-1A	Damascus	532	$284,000	$21,000	–	$305,000
C-1B	Damascus (SW Quadrant)	234	$116,000	$11,000	–	$127,000
CO-2	Scappoose	300	$26,000	$47,000	1,000	$74,000
Average[3]		**205**	**$77,000**	**$33,000**	**–**	**111,000**

Notes:
[1]*Conversion costs adjusted for industrial-related cost share.*
[2] *"Other" costs typically include extraordinary site work, grading and environmental remediation.*
[3]*Average of case studies assumes C-1B Damascus subarea.*

Other general conclusions from the outside UGB/UGA case study analysis includes:

1. Development phasing and cost-sharing agreements will likely be very important for areas outside the UGB/UGA, given the large amounts of funding required to construct needed infrastructure;
2. The amount of transportation investment needed in these case study areas is so large that new cost sharing methods (e.g., systems development charges, local improvement districts, and/or urban renewal districts) and/or new dedicated funding sources (e.g., serial bond levies) for roads would be needed.
3. While the total development costs were found to be higher for the case studies outside the UGB/UGA, the cost per job and cost per net buildable acre are on par with the range of costs identified for case studies inside the UGB/UGA.
4. While transportation infrastructure is the largest cost factor for case studies near urban areas, the additional lack of basic (sewer and water) infrastructure in rural locations can also limit any significant industrial development from occurring there as well.
5. All case study areas outside a UGB would have to meet state and local land use law requirements to come into the UGB, prior to industrial development.

Appendix J — Analysis of Case Study Prospects

Appendix K — Constrained Land Supply Analysis

Constrained Land Supply Inside UGB/UGA

The RILS Phase 2 study concluded that approximately 26 percent of the study area's industrial land inventory was "ready to develop" and 74 percent was "constrained" by various factors including lack of infrastructure, land use restrictions, environmental issues, and ownership (e.g., land banking). As indicated in Table J-1, the constrained land is primarily concentrated in Multnomah, Washington, Clark, and Clackamas Counties.

Table K-1
Analysis of Constrained Industrial Land Distribution*
Net Buildable Acres

	Net Buildable Acres			
	Tier B (Constrained by Lack of Infrastructure, Ownership, Environmental Issues, an Land Use Restrictions)	***Tier C (Infill Parcels less than 1 Acre)***	***Tier D (Redevelopment and Brownfield Parcels)***	***Total***
Clackamas	651	–	166	817
Multnomah	1,960	87	83	2,130
Washington	1,205	26	53	1,284
Columbia	590	–	223	813
Yamhill	238	–	5	243
Oregon Subtotal	4,644	113	530	5,287
Clark	1,163	71	290	1,524
Total	5,807	184	820	6,811

	Distribution of Land			
County	***Tier B***	***Tier C***	***Tier D***	***Total***
Clackamas	10%	0%	2%	12%
Multnomah	39%	1%	1%	31%
Washington	18%	0%	1%	19%
Columbia	9%	0%	3%	12%
Yamhill	3%	0%	0%	4%
Oregon Subtotal	79%	2%	8%	78%
Clark	17%	1%	4%	22%
Total	85%	3%	12%	100%

**Constrained land tally derived from RILS Phase II report, December 1999 (Table 23).*

Over the past two decades, the Portland-Vancouver PMSA's economy has diversified from a timber and agricultural based economy to one that also includes high-tech manufacturing, research, and development and professional/business services. The presence of international and domestic multi-modal transportation facilities, combined with a relatively affordable housing stock and outstanding quality of life, are appealing attributes to industrial establishments looking for a presence in the western United States.

Oregon and Washington's unique land use planning systems generally require the region and its member jurisdictions to accommodate future job growth by providing an adequate *long-term* (20-year) land supply.

RILS Phase 3 is intended to shed light upon the costs of converting constrained land to ready-to-develop land. That information, combined with the findings from the literature review and interviews, can be used to formulate industrial development strategies for our region