

# The Industrial Land Market and Trade Growth in Metro Vancouver

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Port Metro Vancouver

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## Report Conclusions

Given the importance of Metro Vancouver's transportation sector, industrial lands are essential to the future vitality of the local, regional, and national economy. There is strong and growing demand for well-located industrial sites which have been filled, serviced, zoned, and are ready to build. Increasing and developing an expanded land supply is essential to help satisfy demand and keep the many economic benefits of logistics from relocating outside the region.

Metro Vancouver's supply of vacant industrial lands is moderate and declining rapidly. A serious logistics land shortage is expected to become ever more evident and have negative implications for the regional economy by 2020, becoming more severe by buildout, expected in 2025. This is the projected time frame when the supply of well-located industrial will be nearly exhausted under normal growth projections and anticipated port developments needed to meet increasing container demand. Port Metro Vancouver's proposed Roberts Bank Terminal 2 expansion, which would double container capacity at Robert's Bank and increase annual logistics oriented land demand by up to 30%, would, if approved, increase the need to find suitable sites to support associated growth in off-dock container activity. Other planned expansion and improvements at Centerm and Deltaport will further strain the capacity of the region's industrial land supply in the near term.

The land shortage, coupled with congested rail and highway traffic, has made the Lower Mainland a less favourable location for some distribution centre operations. Port Metro Vancouver users have indicated that an ample supply of vacant industrial land is critical to expanding their facilities and for allowing them to add increasingly sophisticated logistics services. Without an expanded full service logistics industry to complement PMV, sub-users will be attracted to other larger, more "full service" ports such as L.A. - Long Beach, CA, or commit to less efficient goods handling in Calgary, AB.

The following are some of the conclusions developed from the analysis.

- The total direct and indirect economic impact of every 100 acres of logistics development is equal to approximately \$1.9 billion of economic value. It is thus critically important for Metro Vancouver and British Columbia to try and keep this economic benefit within the province.
- Location is critical in the logistics industry and Metro Vancouver offers the best location for most logistics operations. Alternatives such as Calgary are viable, however, they are generally less efficient due to their distance from PMV and the need for additional transportation and resulting greenhouse gas emissions. In addition, longer travel times increase costs and therefore eventually the prices of consumer goods.
- Metro Vancouver will likely exhaust its supply of logistics-oriented industrial land within the next ten years. The vacant logistics land supply is estimated to be 1,067 acres and absorption is well over 100 acres per year. Without land to develop, it will be very difficult for PMV and the Gateway to support the growth in container handling within the region.
- Logistics oriented lands are under pressure from upzoning to more valuable forms of industrial or non-industrial uses. The market and the approving authorities are unable to secure an adequate supply of logistics lands and the interests of the supply chain cannot be met without direct non-market intervention.
- In order to secure the future of the Gateway, PMV should continue to acquire large industrial properties able to accommodate new marine terminals and expanding container logistics demand.

- If logistics-oriented lands are inadequate, the national impact will be the reduction of the role of PMV as it will not be able to provide a full range of efficient services and therefore will become less competitive with alternative ports and forms of transportation.

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# 1. STUDY DESCRIPTION AND REGIONAL CONTEXT

## 1.1 INTRODUCTION

This report was commissioned by Port Metro Vancouver in May 2015 and completed in June and July 2015 by Site Economics Ltd. The purpose of the report is to provide a comprehensive summary of the state of the industrial real estate market in the Metro Vancouver region and its relationship to anticipated port growth. The report uses all available land supply information including an assessment of the industrial demand and associated economic impacts of logistics related industrial uses in the region. Much of the information in this report is compiled from other previously published sources including Metro Vancouver, various municipalities, the major real estate brokerages, and previous Site Economics work on the topic done over the past 14 years.

This analysis is intended to address the following:

- **The industrial real estate market, characteristics and factors**
- **The demand for industrial lands, particularly port and supply chain / logistics related**
- **The existing supply of industrial lands across the region, and potential new supply**
- **The economic, employment and taxation impact of industrial land development and use**

In general, the report is designed to provide market and economic parameters to assist Port Metro Vancouver and other parties with the requisite base market and economic information to understand all parameters of the supply and demand of industrial land in the Metro Vancouver region.

The broad assumptions contained in the report are typical of a market study and are required in order to complete a standard real estate analysis and forecast. The estimates used in this assessment are conservative and consistent. Widely accepted industry standards have been used, when required, throughout the report.

## 1.2 IMPORTANCE OF INDUSTRIAL LANDS AND PORT FUNCTIONS

Transportation related activities play an important role in the Metro Vancouver region in terms of economic and employment implications. Port Metro Vancouver (PMV) is the largest port in Canada, servicing the nation's interests in terms of export and import trade. Accordingly, port activity has implications far beyond the immediate port facilities and operations themselves. The consequences of the industrial land shortage in the Metro Vancouver region has the following impacts:

- Makes Port Metro Vancouver less competitive for future trade related growth.
- Reduces the attractiveness of the gateway for industrial development with corresponding loss of investment and jobs.
- Reduces the wide range of needed services if the gateway is to grow and evolve.
- Loss of future economies of scale that benefit large concentrations of similar businesses.
- Loss of new public infrastructure a larger Gateway would require.
- Longer truck trips moving containers to the less than ideal industrial sites across the region.

- Increased energy use with attendant environmental impacts.
- Very high real estate prices and increased operating costs for industrial tenants.

Furthermore, demand for industrial land continues to be strong, due to the growth of the regional economy and growth of port trade:

- Annual land demand for logistics space will increase from 100 acres currently to 160 acres (status quo) or 213 acres per year due to increases of container throughput after completion of Roberts Bank Terminal 2 (RBT2).
- The container industry with RBT2 will require approximately 2,500 acres of well-located developable industrial land by 2035, even with dramatically improved efficiency.
- Metro Vancouver's non port industrial land demand has historically been 150 acres annually and it will require at least 3,000 acres by 2035.

Therefore the region needs at least 5,500 acres of well-located industrial land over the next 20 years, even with the assumption that a large share of demand will go outside the region, particularly to Calgary. It is estimated that Calgary currently accommodates at least 50 acres of industrial land demand, which would have located in Metro Vancouver if not for the land shortage.

This report touches on possible solutions to address the growing demand and constrained supply of industrial land. Specifically, efforts can be grouped under the following category of optimize existing industrial:

- Making better use of the existing industrial land base is important and ongoing but it is already largely optimized.
- Industrial densification and assembly is already well underway. To increase densification further is difficult and prohibitively expensive, and at some point becomes counter-productive.
- Optimizing all forms of industrial land use, even to the maximum possible, is already underway yet is insufficient to satisfy even a small fraction of new demand.

### **1.3 METRO VANCOUVER REGION GEOGRAPHY AND FEATURES**

This section of the report describes the Metro Vancouver region in terms of geography, transportation infrastructure, access, and land development patterns.

The Metro Vancouver region extends from the Township of Langley in the east to West Vancouver, approximately 50 km wide, with a population of over 2.3 million and over one million jobs. Highway 1 provides access into the region from the Fraser Valley and the rest of Canada to the east. The eastern Fraser Valley, including Abbotsford, is not part of the jurisdictional region of Metro Vancouver however comprises part of the larger 'Lower Mainland' region. Other major features of the region are as follows:

- Mountains along the North Shore
- Ocean to the west and south-west
- Burrard Inlet and Fraser River waterways
- USA border to the south
- Fraser Valley to the east

- Significant lands protected for agricultural uses under the Agricultural Land Reserve

Major transportation features include:

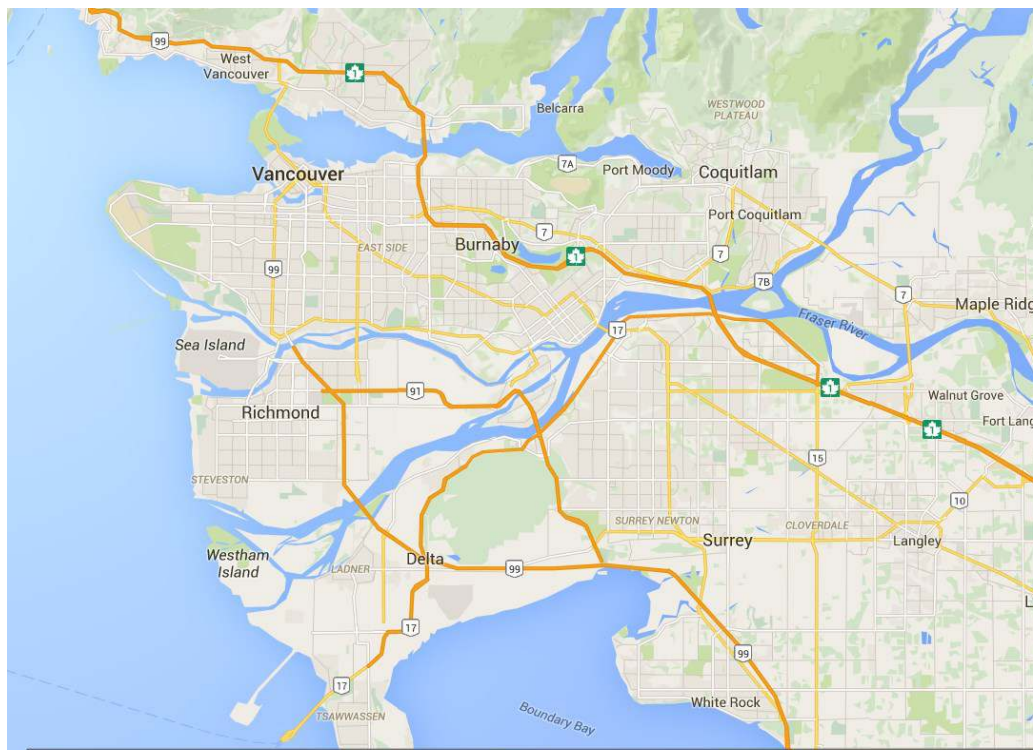
- YVR international airport on Sea Island
- Multiple deep sea terminals, including three primary container terminals (Centerm, Vanterm, DeltaPort)
- Three Class I Rail lines - CP, CN, BNSF
- Two large intermodal yards - CP and CN

Major recent and proposed transportation infrastructure upgrade projects include:

- Completion of the South Fraser Perimeter Road in 2014 (Highway 17 and the connector to Highway 91)
- Completion of the new Port Mann Bridge in 2012
- Proposed replacement of the Massey Tunnel
- Roberts Bank Roberts Bank Rail Corridor Project

The following illustrates the region and the major highway network. The deep water port facilities tend to be on the west edge of the map and the CN and CP inter-modal yards are the on the east side of the map.

## REGIONAL LOCATION



This basic map of the region provides an overview of the study area. Not all areas are suitable and the logistics industry has tended to locate on the waterways and near transportation services. The criteria tends to narrow the possible location of logistics-oriented development.

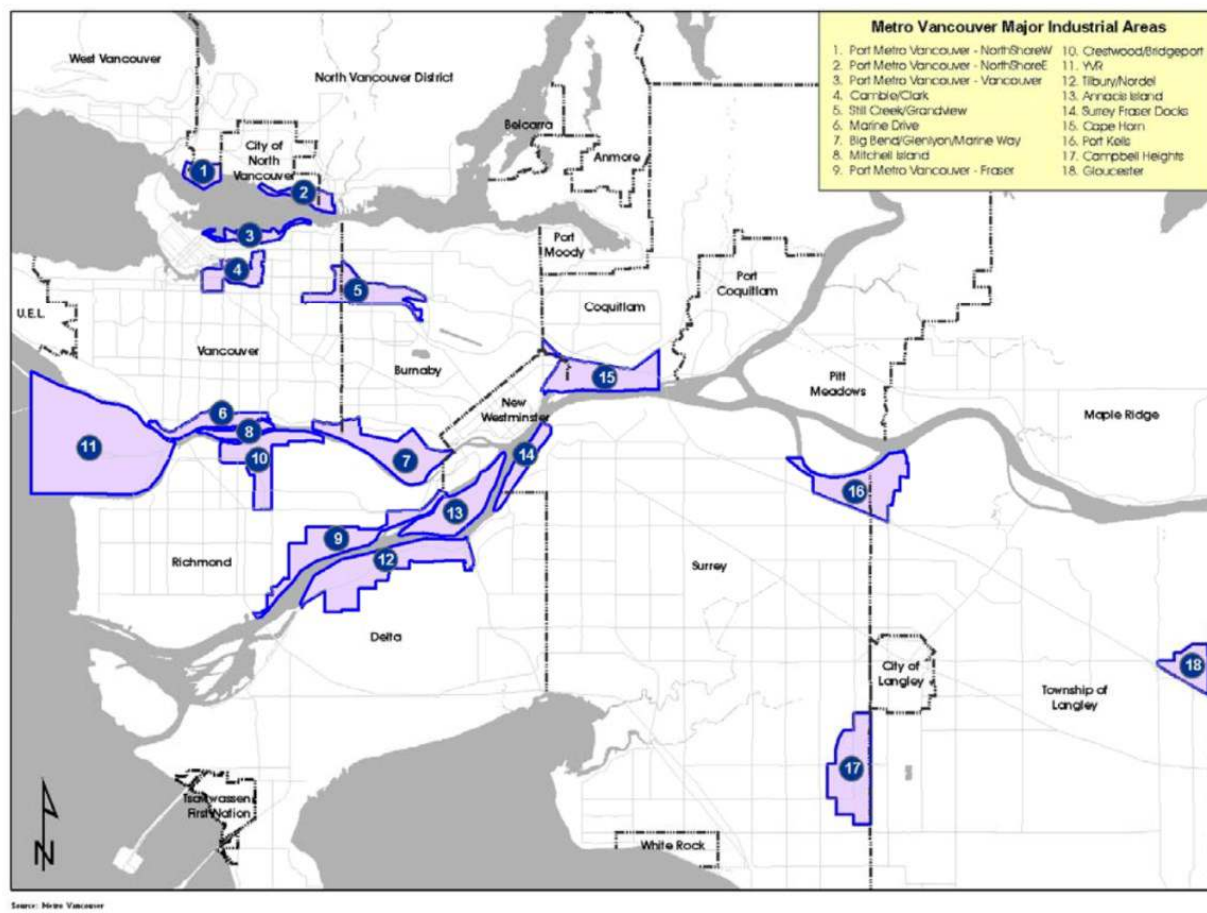


A primary determinant of suitability for industrial land uses is access, particularly to the transportation network. Industrial users typically prefer sites that are strategically located with access to the highway and port network, and potentially rail. Lands that are essentially flat are ideal for large scale warehouses. Location-wise, ideal sites are positioned for most types of industrial uses, particularly international goods movement in the Pacific Gateway, due to proximity to the US border, Deltaport Container Terminal, the massive industrial infrastructure off Highway 91 and industrial facilities along the Fraser River.

Major clusters of port / logistics related industrial activities in the Metro Vancouver region include:

- Major port terminals in Burrard Inlet, the Fraser River and at Roberts Bank
- Annacis Island (in Delta) industrial businesses include state-of-the-art goods-handling, light manufacturing, warehousing, distribution services and a wide variety of other uses.
- Delta River Road / Tilbury
- South-east Richmond (–Richmond Logistics Hub, Kingswood)
- Port Kells Surrey / Langley
- Surrey Campbell Heights
- Pitt Meadows

## MAJOR INDUSTRIAL AREAS IN METRO VANCOUVER



## 1.4 REGIONAL LAND USE REGULATIONS AND DESIGNATIONS

### Context

The urban area of Metro Vancouver is relatively densely developed and geographically small given the large and growing population. The region has always been subject to development constraints; however this has now reached very serious levels, particularly for industrial land.

Any form of development requires a number of different approvals from a variety of agencies, including, as applicable, the host municipality, Metro Vancouver (GVRD), and/or Port Metro Vancouver. Under certain circumstances the Agricultural Land Commission is an approving agency where land is proposed for release from the Agricultural Land Reserve.

### Regional Land Use Designations

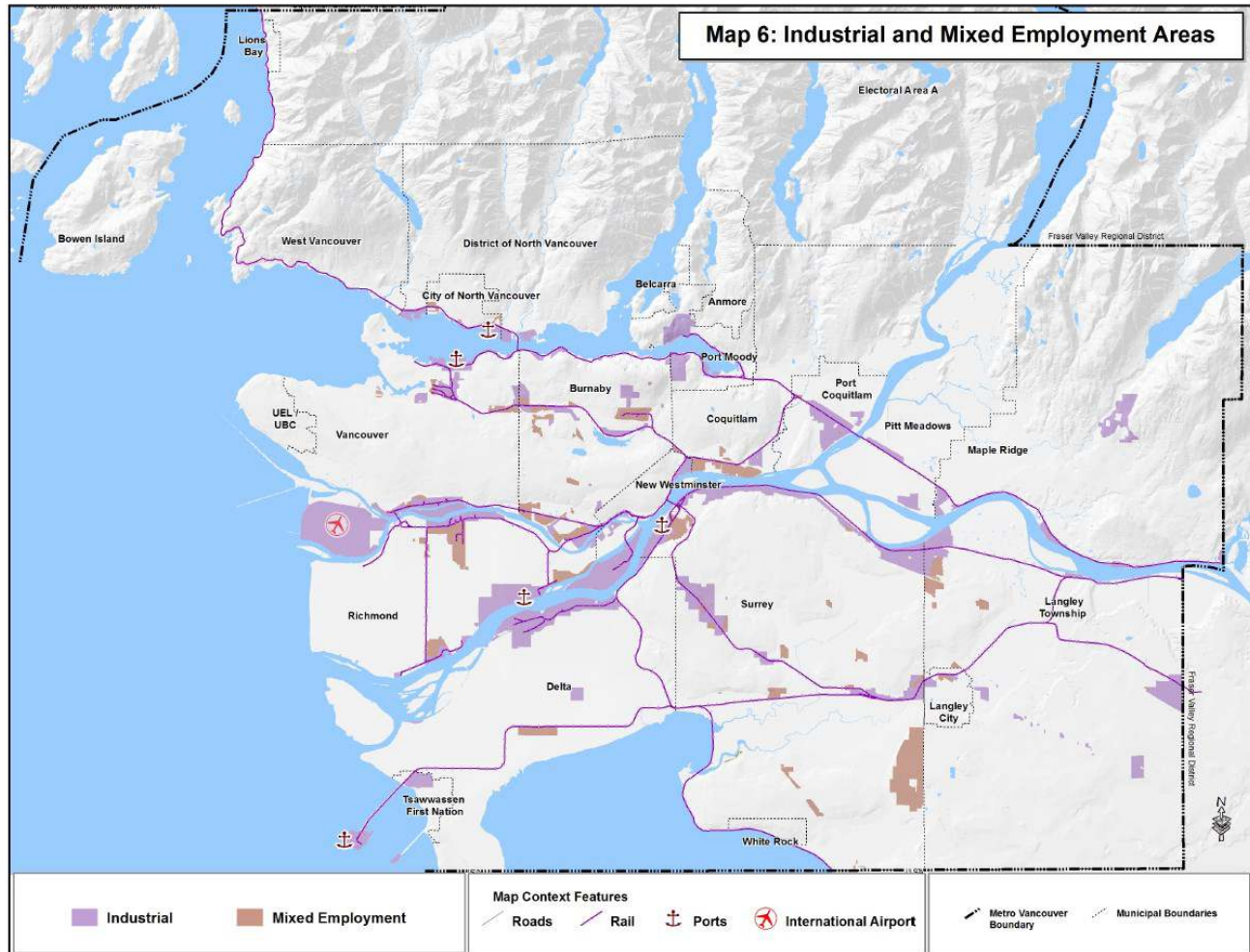
The Metro Vancouver Regional Growth Strategy (RGS) contains six regional land use designations. In addition, these designations are defined by the Urban Containment Boundary, which is intended to limit development to urban areas only. The RGS also includes 26 urban centres which are identified for concentrated growth.

The following map illustrates the RGS Industrial and Mixed Employment land use designations only. The RGS Industrial areas are intended to protect long-term industrial uses on these lands. These designations are described as follows:

- **Industrial** areas are primarily intended for heavy and light industrial activities, and appropriate accessory uses. Limited commercial uses that support industrial activities are appropriate. Residential uses are not intended.
- **Mixed Employment** areas are intended for industrial, commercial and other employment related uses to help meet the needs of the regional economy. They are intended to continue to support industrial activities, and complement and support the planned function of Urban Centres and Frequent Transit Development Areas. Mixed Employment areas located within Urban Centres and Frequent Transit Development Areas provide locations for a range of employment activities and more intensive forms of commercial development.

As indicated on the RGS Industrial and Mixed Employment land map below, the location of regionally significant industrial lands are situated along waterways and along major road and rail corridors. It is important to note that the Metro Vancouver Board is able to and has redesignated some industrial and Mixed Employment lands to other uses since the RGS was adopted in 2011 (according to the RGS annual performance measure report, between 2011 and 2014, 57 hectares of land (net) were redesignated from Industrial).

## METRO VANCOUVER INDUSTRIAL AND MIXED EMPLOYMENT LAND USE DESIGNATIONS



Member municipalities prepare Regional Context Statements (RCSs), which form part of their Official Community Plan (OCP), which explains how the OCP is consistent, or will become consistent, with the regional growth strategy. The individual RCSs are considered for acceptance by the Metro Vancouver Board.

### 1.5 PORT METRO VANCOUVER LAND USE PLAN

The Port Metro Vancouver Land Use Plan, completed in 2014, provides a framework for the growth and development of port lands and waters over the next 15 to 20 years. The Land Use Plan articulates Port Metro Vancouver's ongoing commitment to stewardship of port lands and waters, and demonstrates PMV's responsiveness to social, environmental and economic trends that will impact Canada's Pacific Gateway and the broader community.

The purpose of land use designations in the Plan is to provide for the orderly development and management of lands and waters within Port Metro Vancouver's jurisdiction, and to provide clarity on long-term development. The designations apply to all lands and waters within Port Metro Vancouver's jurisdiction, and identify the types of uses that may be considered on each site.

All developments and activities proposed within Port Metro Vancouver's jurisdiction are subject to the PMV Project Review Process, which has recently undergone a thorough review, and must be consistent with the PMV Land Use Plan.

The PMV Land Use Plan contains the following five goals:

1. Port Metro Vancouver manages port growth and activity in support of Canada's competitiveness and trade objectives while preparing for anticipated transitions in the global economy.
2. Port Metro Vancouver is a leader in ensuring the safe and efficient movement of port-related cargo, traffic and passengers throughout the region.
3. Port Metro Vancouver is a global leader among ports in the environmental stewardship of the lands and waters it manages.
4. Port Metro Vancouver activity and development is a positive contributor to local communities and First Nations.
5. Port Metro Vancouver is a leader in communication and engagement in support of the use and development of port lands and waters.

Furthermore, the PMV Plan includes eight land use designations that are consistent across Port Metro Vancouver's jurisdiction, each having a specific intent and list of associated uses.



## PORT PLAN - PLANNING JURISDICTION



### 1.6 AGRICULTURAL LANDS AND THE ALR DESIGNATION

Urban development across the region is physically limited by mountains, the Pacific Ocean and the US border. A fourth constraint on urban development is the Agricultural Land Reserve (ALR), administered by the provincial Agricultural Land Commission, with a mandate to preserve agricultural land. The following maps show the ALR lands in the region, extended to Hope to the east.

### AGRICULTURAL LAND RESERVE

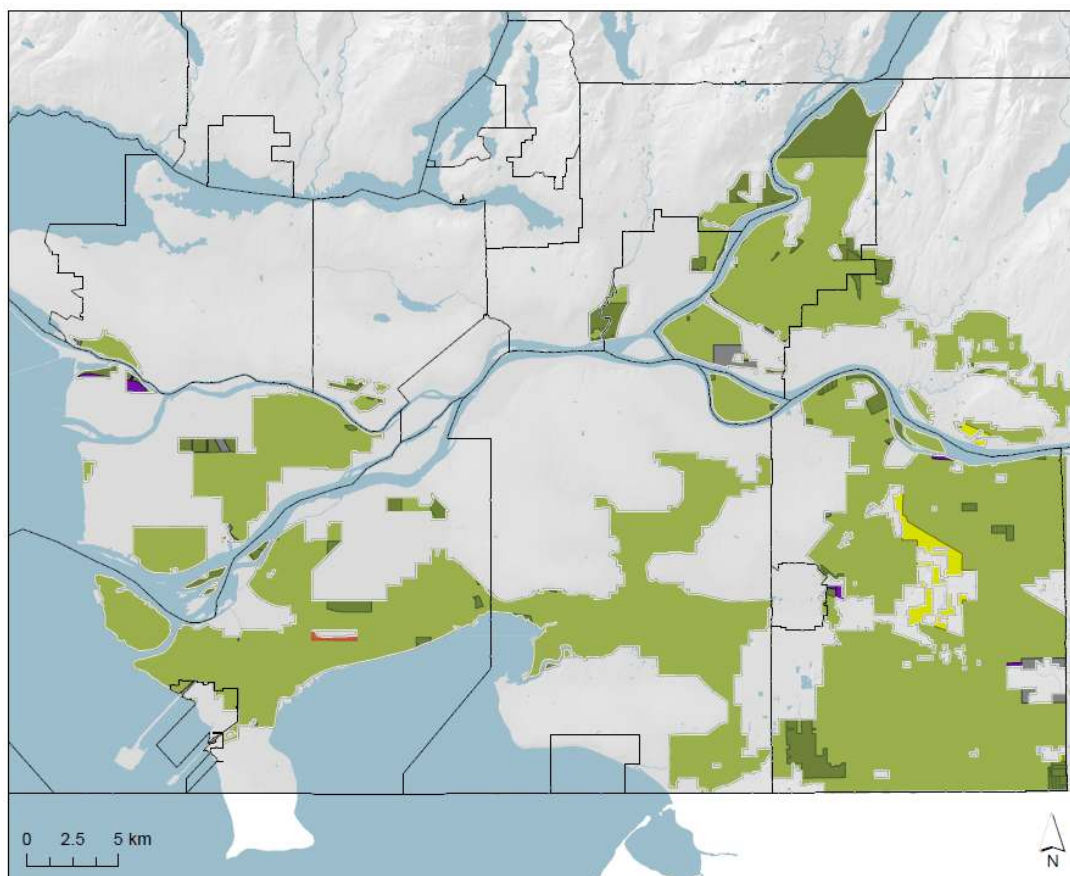


The Agricultural Land Reserve (ALR) is a provincial designation in which agriculture is recognized as the priority use. Farming is encouraged and non-agricultural uses are controlled. The Agricultural Land Reserve takes precedence over, but does not replace other legislation and bylaws that may apply to the land. Local and regional governments, as well as other provincial agencies, are expected to plan in accordance with the provincial policy of preserving agricultural land.

Metro Vancouver's Regional Growth Strategy (RGS) provides regional land use designations that establish a long-term regional land use framework and provide the basis for defining matters of regional significance. Areas designated Agricultural in the RGS are intended for agriculture use and supporting services, with an emphasis on food production.

The RGS Agricultural designation and the ALR designation are not synonymous. As the following map illustrates, the boundaries vary in multiple areas. In fact, each of the RGS Land Use designations contains a percentage of the region's ALR land. The amount of ALR Lands in each of the RGS Land Use Designations is indicated in the chart.

## AGRICULTURAL LAND RESERVE AND THE REGIONAL GROWTH STRATEGY LAND USE DESIGNATIONS, 2013



Source: Metro Vancouver

**ALR Lands in RGS Land Use Designations**

	RGS DESIGNATION	TOTAL ALR LANDS (HA)	% OF ALR LANDS
	<span style="display: inline-block; width: 15px; height: 15px; background-color: #90EE90; border: 1px solid black;"></span> Agricultural	54,668	90.0%
	<span style="display: inline-block; width: 15px; height: 15px; background-color: #228B22; border: 1px solid black;"></span> Conservation & Recreation	4,389	7.2%
	<span style="display: inline-block; width: 15px; height: 15px; background-color: #9ACD32; border: 1px solid black;"></span> Rural	848	1.4%
	<span style="display: inline-block; width: 15px; height: 15px; background-color: #A9A9A9; border: 1px solid black;"></span> General Urban	581	1.0%
	<span style="display: inline-block; width: 15px; height: 15px; background-color: #800080; border: 1px solid black;"></span> Industrial	190	0.3%
	<span style="display: inline-block; width: 15px; height: 15px; background-color: #FF4500; border: 1px solid black;"></span> Mixed Employment	59	0.1%
	<span style="display: inline-block; width: 15px; height: 15px; background-color: #FFFFFF; border: 1px solid black;"></span> Total ALR in the Region	60,736	100.0%
	Total Regional Land Base	280,107	

*Based on RGS Land Use Designations as of July 2013 and the ALR Boundary as of August 2013*

Source: Metro Vancouver

## 2. TRANSPORTATION INFRASTRUCTURE

In general, and compared to most regions of a similar size, the regional transportation infrastructure and network across the entire urban area experiences significant periods of congestion on an ongoing basis. The region ranks second to Los Angeles as the most congested city in North America.

In a port setting, that network consists of marine, road and rail transportation modes that all connect together to move cargo through the supply chain. While marine navigation is largely within PMV's jurisdiction, transportation to and from Port Metro Vancouver by land relies on a transportation network that is developed, owned and managed by a variety of external organizations including municipalities, TransLink and the Province for road and CN, CP, BNSF and SRY for rail infrastructure.

### 2.1 THE LINK BETWEEN INFRASTRUCTURE AND DEVELOPMENT

Accessibility is critical for all types of real estate development, particularly industrial. Desirable industrial sites offer excellent accessibility to significant infrastructure investment (highway, rail, and port) and substantial efficiencies could result for logistics facilities which are concentrated in the area immediately serviced by this infrastructure. Proximity to transportation infrastructure and services increases economic synergy, reducing cost, travel times and environmental impact.

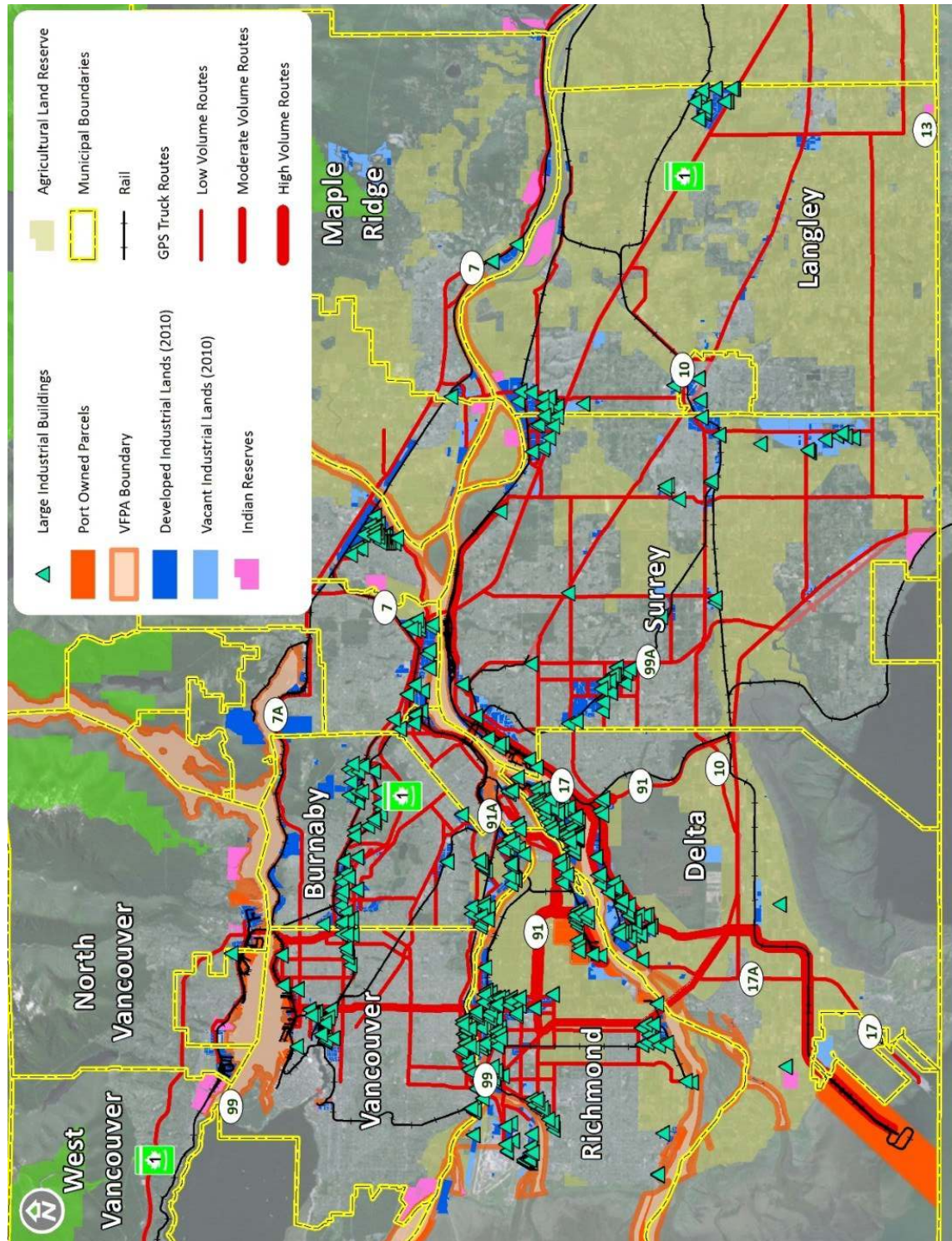
Specifically, sites with proximity to Deltaport, Canadian National Railway or Canadian Pacific Railway Inter-modal yards, and Highways #1, 91, 99 via the South Fraser Perimeter Road, all have the potential to host a major logistics hub. Both the railways and highways provide access to the interior of British Columbia and Canada to the east and the various terminals and port facilities located within Metro Vancouver, and US border to the south.

The international goods handling industry typically requires a location accessible to Port Metro Vancouver and the major intermodal facilities and proximity to major highways. They require these features as their business involves constant transportation activity, most often by truck and for some instances, particularly for exports, by rail.

In Delta, the strong link between transportation infrastructure and the value of employment-related development clarifies how land values for large users generally lead the region. This is primarily a result of very good access to Deltaport and the excellent highway network. Delta now hosts some of the most strategic industrial sites in the region, due to infrastructure from the new South Fraser Perimeter Road (SFPR) to the Alex Fraser Bridge to the planned George Massey Tunnel Replacement Project to the west. The following maps illustrate, in terms of public and private transportation and building infrastructure, access in the region by land means.



## INDUSTRIAL INFRASTRUCTURE MAP



## MAP OF INDUSTRIAL AREAS AND TRANSPORTATION NETWORK





## LAND MARINE TRANSPORTATION NETWORK



Source: Port Metro Vancouver

## 2.2 NEW TRANSPORTATION INFRASTRUCTURE

At present the region faces traffic issues associated with both road and rail. This is being remedied through massive new infrastructure spending by all levels of government in recognition of the importance of accessibility to the competitiveness of the region and Port Metro Vancouver. The following section and maps show the ongoing transportation infrastructure investments in the region, which greatly improve transportation access for port related uses.

Marine ports, railways, roads, and airports provide efficient, reliable market access, and support economic growth and development. In general, port trucks use the provincial highways managed by the provincial Ministry of Transportation and Infrastructure, regional roads and bridges managed by TransLink, and truck routes owned and managed by individual municipalities. Transport Canada (federal) also has a role in facilitating transportation infrastructure solutions to support Canada's economic interests, and thus has a significant role in facilitating goods movement in the region.

Both the federal and provincial governments support an expanded gateway and trade role through Port Metro Vancouver. Specifically, the Asia-Pacific Gateway and Corridor Initiative is an integrated set of investment and policy measures focused on expanded trade with the Asia-Pacific Region.

## Highway Investments

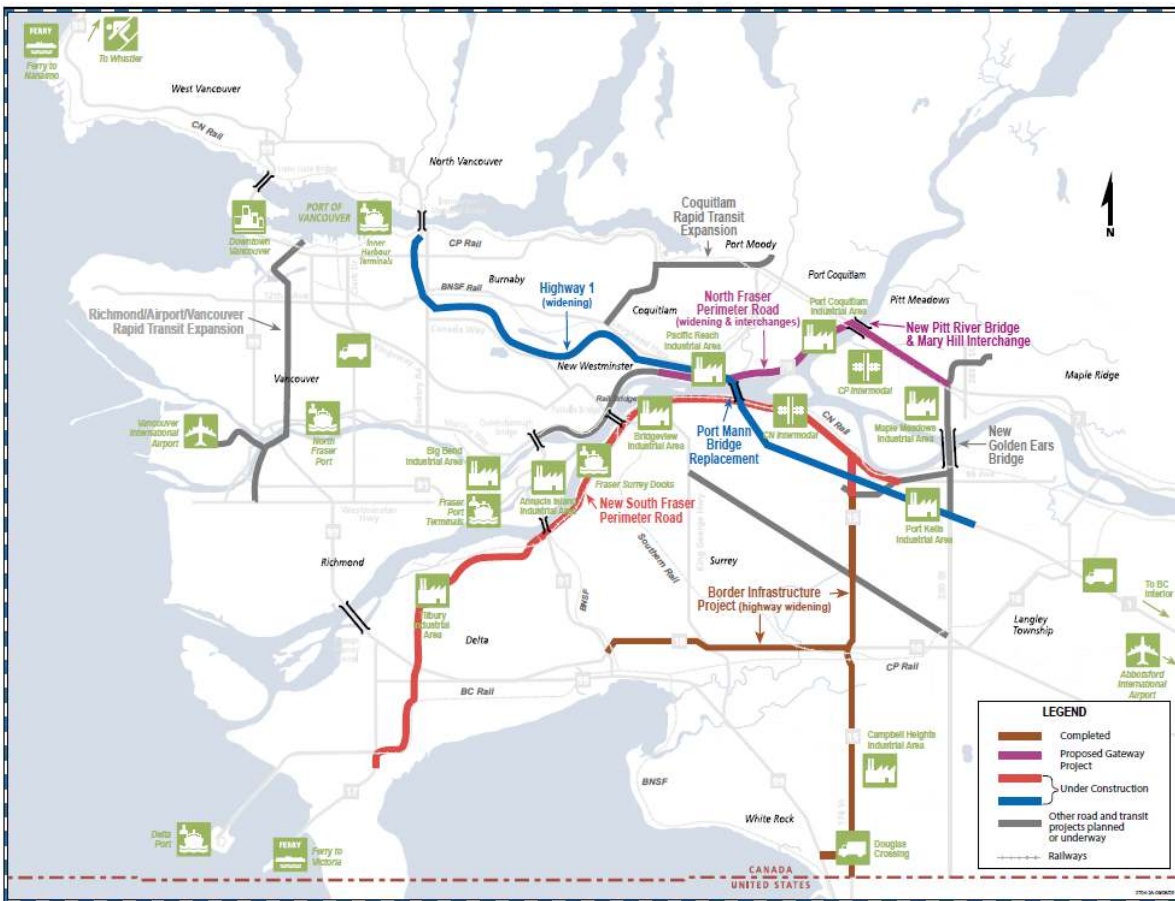
The \$3 billion Gateway Program was established by the Province of British Columbia in 2003 in response to the impact of growing regional congestion, and to improve the movement of people, goods and transit throughout the Lower Mainland with efficient transportation choices and better connections. The Gateway Program reflects the need for a balance of transit, road and bridge improvements that will keep traffic moving, the economy strong and the region liveable.

In terms of major new arterial roads which impact private vehicle circulation and improve mobility, the most important are the widening of Highway 1 and the South Fraser Perimeter Road. The largest of the recent transportation projects in Metro Vancouver are the replacement of the Port Mann Bridge and the widening of Highway 1 to 6 lanes. The industrial areas which benefited the most were Port Kells and the other industrial parks in Surrey and Langley.

The South Fraser Perimeter Road (SFPR) which connects Highway 1 in Surrey with Deltaport in the west has a strong positive impact on real estate mostly in Delta. The SFPR has reduced travel times for container trucks, particularly for trips to and from Deltaport at Roberts Bank.

The replacement of the George Massey Tunnel will have limited impact in terms of opening up the Fraser River to additional shipping opportunities. The Province's replacement of the tunnel will eliminate the current Fraser River draft restriction at that location. The river has similar draft restrictions at other points. In addition, the channel width adjacent to Fraser Surrey Docks limits the length of vessels which can be handled. These restrictions prevent the terminal from handling larger and increasingly common Panamax-sized vessels. The draft and turning radius restrictions are not, however, limiting factors for smaller vessels and short sea shipping. Although the replacement of the tunnel, and associated highway improvements, may spur port-related redevelopment interest in the area, any marine use will be limited by the physical constraints of the channel and the pending decision to preserve or remove the George Massey Tunnel.

## GATEWAY PROGRAM PROJECT MAP



Port Metro Vancouver has undertaken on its own or in cooperation with others significant other infrastructure investments including:

- 232nd St Overpass, Langley
- Highway 17 improvements under the Deltaport Third Berth Project, Delta
- Low Level Road, North Shore
- Lynn Creek Rail Bridge & Brooksbank Ave Project, North Shore
- South Shore Corridor Project, Vancouver

In general, much of the new transportation infrastructure is located in the areas where new residents of the region are expected to locate. Large scale industrial development is expected to follow as the vast majority of all new industry and population growth will locate south of the Fraser River. This is desirable as more jobs are needed in these predominantly residential areas and the prospects for major new office development in the south-eastern suburbs are limited.

Port Metro Vancouver is also proposing a new container terminal adjacent to the existing terminals at Roberts Bank. The proposed Roberts Bank Terminal 2 Project is a three-berth marine container terminal that could provide additional capacity of 2.4 million TEUs per year to meet forecast demand to 2030. Subject to permitting and environmental approvals, the project could be fully operational by the early 2020s. This incoming demand for container capacity would approximately double demand for logistics related real estate in Metro Vancouver.

The proposed Terminal 2 at Roberts Bank would dramatically increase port throughput, particularly container imports. While the use of short sea shipping within Port Metro Vancouver would not be able to replace the need for a new terminal, the proposed Roberts Bank Terminal 2 Project is being designed to accommodate a future modification to add a short sea shipping operation, should this activity become feasible at some time.

### **Increased Terminal Capacity**

The Container Capacity Improvement Program is Port Metro Vancouver's long-term strategy to deliver projects to meet anticipated growth in container capacity demand until 2030.

Container traffic through Canada's Pacific Gateway is expected to double over the next 15 years. Current projections indicate more than four million twenty-foot equivalent units (TEUs) of additional capacity will be needed to meet west coast container demand by 2030.

The Program looks at the following opportunities for creating container capacity:

- Improvements that can be made to existing terminals and infrastructure to accommodate growth; and
- New infrastructure that may be required as demand continues to increase.

Port Metro Vancouver is planning now to ensure that capacity is in place to meet the anticipated demand and support Canadian trade growth for decades to come.

The Container Capacity Improvement Program (CCIP) is a long-term strategy to reliably support growing international trade in containerized cargoes in an efficient and sustainable manner. As part of this program, PMV has been working with the Province and Deltaport operator Global Container Terminals to develop a plan to increase Deltaport's container capacity by 600,000 twenty-foot equivalent units (TEUs) to a total of 2.4 million TEUs.

In addition to capacity expansion for the container sector, many other port terminals are planning for increased capacity or are already undertaking capacity improvements through investments in equipment, improvements to operating procedures and/or making better use of their sites in support of increased throughput.

Other ongoing or proposed projects to increase capacity include:

- Centerm Expansion Project, Vancouver
- Deltaport Terminal, Road and Rail Improvement Project, Roberts Bank
- Tsawwassen Container Examination Facility, Tsawwassen

## 2.3 RAIL SERVICED LAND

Port Metro Vancouver is served by three Class 1 rail companies — Canadian National Railway (CN), Canadian Pacific Railway (CP), and Burlington Northern Santa Fe Railway (BNSF), as well as a local short-line rail service, Southern Railway of British Columbia (SRY).

An analysis of every industrial building in Metro Vancouver with rail service was conducted to determine the extent to which rail service is used. This was done by following each rail line and matching it visually to each building. It was found that the total building area on sites with rail access is approximately 7.6 million sq. ft. or less than 5% of the industrial market. Many sites with rail connections do not utilize this infrastructure, including areas of Annacis Island and Port Kells. This lack of use often results from a number of factors including the high costs of dealing with the rail companies for relatively smaller volumes as opposed to the more competitive trucking industry.

The need for industrial buildings to have rail is changing wherein the Gateway initiative is creating more demand for distribution facilities with rail connections. Those buildings which have functioning rail access typically accommodate businesses which have no other choice than rail. Their requirements relate to the movement of chemicals or other materials such as steel and lumber. Often, firms with rail facilities are in the export business and this business is expected to grow with inbound container volumes.

Discussions with senior real estate agents and others in the industry indicated that rail access is generally considered by both tenants and landlords to be too expensive and very often unneeded. Over the past ten years, very few buildings were developed with rail access. The major exceptions leased port lands and transload facilities, which fill containers with heavy commodities moved by rail, and prepared for export.

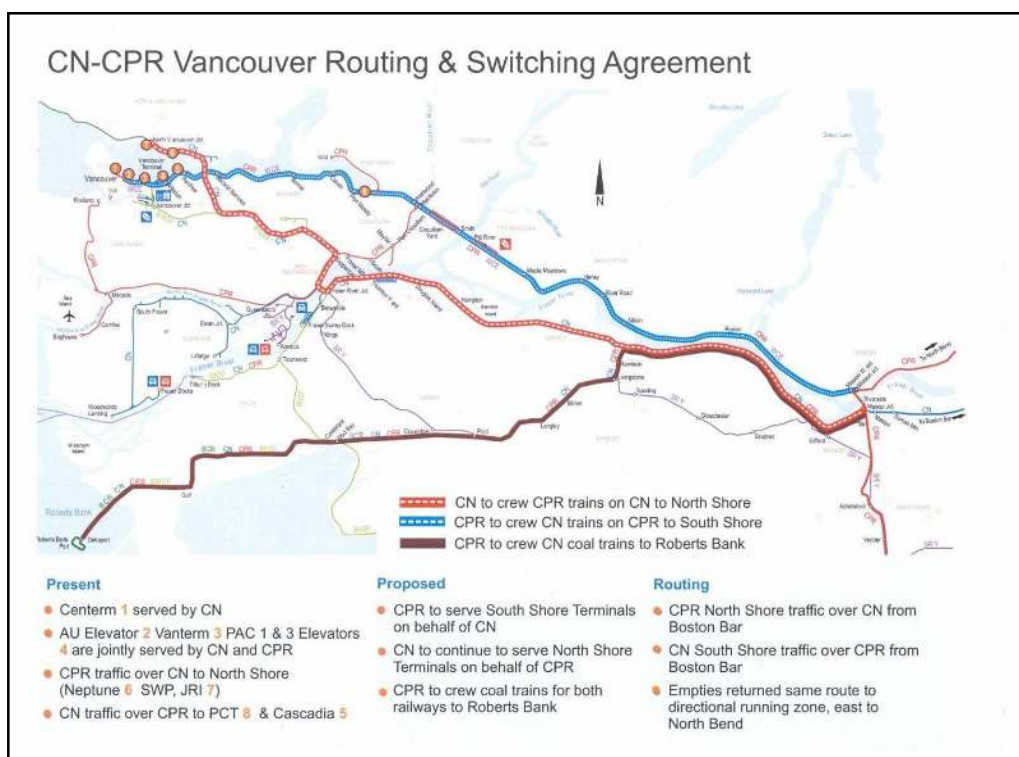
Tenants, in general, report that the cost of rail access and the high cost and restrictions of rail service operation result in their services being far more expensive than other modes of transportation for local delivery, specifically truck. The construction of facilities dependent on rail access is generally avoided, and non-port related business models that depend on direct rail access are not a dominant force within Metro Vancouver.

Nevertheless, there are logistics businesses which require direct rail access to their facilities (including some forest product exporters). Rail access on industrial lands should be considered and evaluated carefully, to determine if appropriate for certain areas.

Even if rail is not extended to a site, it may be nearby, as shown in the following rail map. This means that other nearby businesses who rely on rail can have an impact on the area. For example, a distribution centres generate large volumes of empty containers which have to be transported for reloading or storage. These containers can be efficiently transferred to rail-served export transload facilities for stuffing with commodities such as lumber for transfer via truck to PMV terminals for export.



## THE RAILWAY NETWORK IN METRO VANCOUVER



Source: Port Metro Vancouver

### 2.4 SHORT SEA SHIPPING POTENTIAL

Metro Vancouver Regional District commissioned our consulting team to complete a study on Short Sea Shipping in early 2015. The following includes the results of the study.

Short sea shipping is defined as the movement of cargo by water over relatively short distances, excluding transoceanic voyages; for the Metro Vancouver region, this activity includes both domestic and trans-border (US) traffic. Short sea shipping can be used for a variety of cargoes. Within Metro Vancouver, these include dry bulk cargoes such as aggregates or coal; liquid bulk cargoes such as petroleum products; breakbulk cargo such as lumber or steel; and containerized cargo.

There are two primary methods for loading and unloading cargo. Lift on/lift off (LO/LO) uses cranes or other material handling equipment for loading and unloading. Roll on/roll off (RO/RO) vessels and barges specialize in carrying wheeled vehicles (autos, trucks, rail cars) which are loaded and unloaded via a ramp.

There has been much discussion about the potential of expanding short sea shipping in the Metro Vancouver region as an alternative means to transporting goods with an aim to reducing drayage truck traffic on the region's roads. The scale and viability of expanded short sea shipping operations has been studied to limited degrees by a number of organizations over the past decade.

Interest in expanding short sea shipping has focused on the transportation of containers within the region via waterways, driven primarily by a desire to reduce air emissions, traffic congestion, accidents, and noise. The



hope expressed is to shift goods movement from truck to barge and thereby reduce the number of truck trips to and from Port terminals.

Existing short sea shipping services are easily scalable to accommodate expanded volumes if demand increases. Short sea shipping for existing traffic can be increased through intensification of existing facilities. In most cases, new forms of short sea shipping, such as containers, would require significant new infrastructure investment.

Practically, operational factors limit the location of a short sea shipping terminal to areas in close proximity to existing container import, export and storage facilities; or would require significant investments in the development of an efficient “cluster” of facilities. Further, the potential scale of short sea shipping of containers within the region is limited to the 26% of containers currently moved by truck from Port terminals to transload or intermodal facilities.

In most cases, trucking is the established form of transporting containers within the region, and offers a flexible, timely, and cost effective option. The primary activity of existing SSS relates to areas which cannot be served by truck such as Vancouver Island. There is an example of it being successfully executed in the form of the SSS link between the Centerm Deep Water Terminal and Nanaimo.

## **2.5 INLAND TERMINALS POTENTIAL**

Inland terminals have been explored as a means of conserving lands by shifting port-related industrial activity inland. Potential advantages include reducing the local port land footprint, and enhancing traffic mode flexibility.

The most feasible role of a typical inland terminal is to prepare containerized cargo for export. This entails commodities being transported by rail or truck from inland destinations for stuffing into containers at export transload facilities rather than doing it within Metro Vancouver.

A study for the Corporation of Delta analyzed the impacts of an export-oriented inland terminal in the Ashcroft area. The study concluded that an inland export terminal handling 56,000 containers a year could reduce Lower Mainland truck trips by 217,670, of which 191,850 would be local drayage trips. It would have only a moderate impact on growing land demand.

Containerized forest products exports, which represent the largest share of containerized exports at Port Metro Vancouver would likely be the primary role of a small inland terminal. The only currently operating inland container terminal in BC is CN’s Prince George transload facility, which loads containers for export via the Port of Prince Rupert.

The impact of a typical inland terminal on the land base is moderate as the most land intensive use is for import containers, not export. Imports in general should be dealt with inside a major urban centre, ideally Greater Vancouver and if not possible then Calgary, Toronto, or a location outside of BC. These large scale import oriented inland terminals must be able to absorb hundreds of acres of industrial development per year and be able to offer well priced land for future industrial development.

The success of Calgary as an inland import distribution hub and terminal can be attributed in part to the greater availability of industrial land. This is in contrast to Metro Vancouver, which has more expensive and less land available.



### 3. PORT RELATED ACTIVITIES AND IMPACTS

The Port Metro Vancouver's mandate, among other things, is to manage Canada's trade in a safe and environmentally responsible manner. As the fourth largest tonnage port in North America, PMV consists of 27 major marine cargo and passenger terminals and connects with three Class 1 railroads and one short line railroad, providing a full range of facilities and services to the international and domestic shipping community.

Port logistics activities include transportation, container storage, freight forwarding, warehouses, and other distribution functions. These activities keep the region connected to Canada and the rest of the world, and are essential in global trade.

Port Metro Vancouver owns approximately 3,600 acres of land, most of which is occupied. Only about 200 acres of undeveloped land remain under Port Metro Vancouver's jurisdiction. Recent studies indicate that the Vancouver Gateway will need over 2,500 additional acres by 2025 to meet increasing cargo demand.

#### 3.1 PORT METRO VANCOUVER OPERATIONS AND IMPACTS

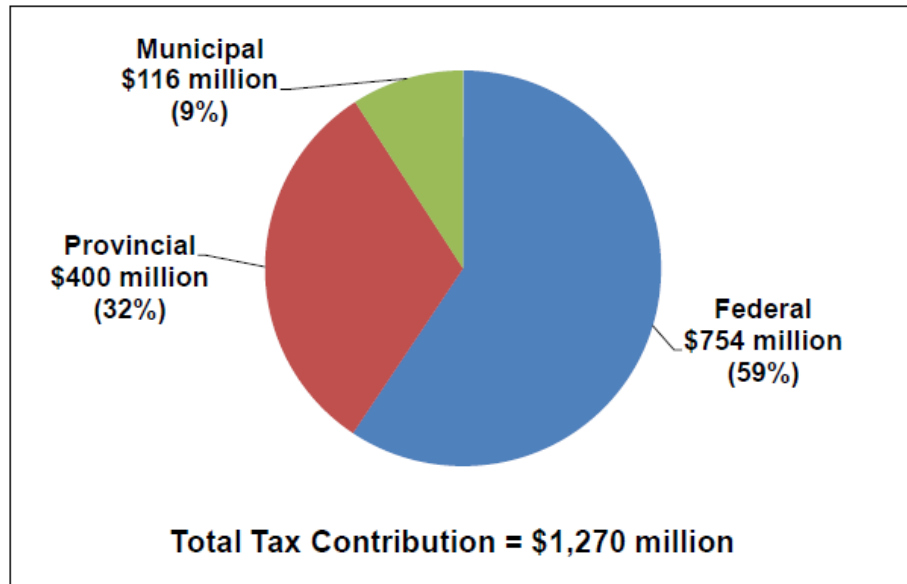
Port Metro Vancouver is Canada's largest and busiest port, a dynamic gateway for domestic and international trade and tourism, and a major economic force that strengthens the Canadian economy. PMV facilitates trade with more than 160 world economies, and handles 135 million tonnes of cargo each year. Almost 95 percent of PMV's total volume serves Canadian import and export markets. Including indirect and induced effects, in round numbers, the total impacts of ongoing operations at businesses related to Port Metro Vancouver across Canada are:

- 98,800 jobs;
- \$9.7 billion in Gross Domestic Product (GDP);
- \$20.3 billion in economic output; and
- \$6.1 billion in wages.

On-going operations at Port Metro Vancouver generate more than \$1,270 million per annum in government tax revenues. This analysis also estimated the current contribution of the Port Metro Vancouver business community to government revenues through various taxes to all levels of government. Tax revenue is described as follows:

- Federal tax revenue of more than \$754 million.
- Provincial tax revenue of approximately \$336 million in British Columbia, over \$22 million in Alberta, more than \$14 million in Ontario, nearly \$9 million in Manitoba, approximately \$12 million in Québec and close to \$7 million in Saskatchewan.
- Government revenue in port municipalities of approximately \$110 million in property taxes, and \$6 million in payments-in-lieu of property taxes.

## PMV ESTIMATED ANNUAL TAX REVENUES TO GOVERNMENT



### 3.2 PORT INFRASTRUCTURE AND TERMINALS

The following figure shows the marine and off-dock terminals. Growth in trade activity and more intensive use of port lands will mean that the connecting regional transportation corridors will themselves be more intensively used in the future. These transportation corridors will require active management and significant investments to provide the additional capacity needed to accommodate growth efficiently and effectively, and in a manner that addresses the impacts of transportation on surrounding communities.

#### MAJOR MARINE TERMINALS AND OFF-DOCK FACILITIES



### 3.3 PORT CONTAINER IMPORTS AND EXPORTS

The relationships within the import/export container industry are important to understand as logistics building development is evaluated.

Based on 2014 data, approximately 69% of the deep-sea laden container imports that arrive by ship at Metro Vancouver's container terminals are transferred to rail at the deep-sea terminals. The ratio is significantly lower for all export containers (laden and empty) that arrive at the deep-sea terminals by rail.

These 'on-dock' rail transfers occur to and from trains which are assembled at one of two intermodal yards (these being the CN facility at Port Kells in Surrey and the CPR in Pitt Meadows) or routed directly from Deltaport to destination. Most of the inbound containers (imports) are transported long distances by rail to distribution centres in Calgary, Toronto, Montreal, and Chicago.

In 2014 approximately 31% deep-sea terminal container imports left the deep-sea terminals by truck. Based on 2009 data approximately 70% of these trucked containers are destined to or are originating from logistics facilities in the Metro Vancouver region to be destuffed (imports) or stuffed for export.

The (off-dock) buildings and lands where these trucked containers are loaded or emptied in Metro Vancouver are important logistics facilities which range from large scale distribution centres to both large and small export consolidators, import consolidators as well as individual exporters and importers. The goods inside these containers are sometimes manipulated (organized by destination or consolidated for export), processed (sorted, value added, etc.), transloaded directly to/from highway trailers and/or otherwise warehoused temporarily. Much of the imported freight in containers leaving the deep-sea terminal by truck is transloaded directly (or sorted and consolidated and reloaded) into larger highway trailers (at logistics facilities), which are then loaded onto rail cars and ‘piggybacked’ to their ultimate destinations elsewhere in North America. Some are also delivered regionally.

The volume of containerized freight that is handled within the Metro Vancouver region is impacted by logistics, labour and land costs. In some instances, the containers which are shipped east to Calgary or elsewhere are broken down there, and then some goods may be transported back to Vancouver if required.

The high cost of land and labour, coupled with relatively congested rail and highway traffic, has made Metro Vancouver a less favourable location for some distribution centre operations. Accordingly, pro-active steps need to be taken to enhance Metro Vancouver’s goods handling capacity and PMV’s overall competitiveness.

Location and transportation infrastructure are critical because they reduce travel times and costs, and improve the efficiency of the distribution economy. Most desired for container handling are large industrial sites with development potential situated very close to Deltaport and future Roberts Bank terminal facilities, as well Class I rail access, and excellent highway access (proximity to Highway 99, Highway 17, and the South Fraser Perimeter Road).

There is a shortage of well-located large-scale vacant industrial development sites. Available sites that are well located, have the advantages and attributes required to become very successful logistics parks with other industrial businesses and able to attract logistics facilities and become important logistics hubs. Interviews with large-scale logistics tenants have revealed that they prefer locations that have lower transportation costs, between Port Metro Vancouver and the rail intermodal yards. Tenants’ interest in reducing operational costs will eventually be reflected in a faster absorption rate for the lands.

### **3.4 PORT COMPETITION**

Port Metro Vancouver is the largest port in Canada by tonnage, and the third largest on the west coast by container volume. The west coast ports compete with each other for business, and their ability to compete is impacted by a variety of factors.

A forecast by Ocean Shipping Consultants indicates that Metro Vancouver enjoys a ship size advantage relative to US ports, with slightly deeper water at Deltaport. This means that the largest vessels anticipated for the transpacific container trade can be accommodated at PMV.

### **3.5 PORT METRO VANCOUVER FORECASTS OF KEY SECTORS**

Container traffic through Canada’s Pacific Gateway is expected to double over the next 10 to 15 years. Current projections indicate over five million twenty-foot equivalent units (TEUs) of additional capacity will be needed to meet West Coast container demand by 2030.

As illustrated in the figures from the PMV Land Use Plan, forecasts indicate that growth is anticipated across almost all commodity and business sectors currently handled at Port Metro Vancouver.

The extent to which Port Metro Vancouver is able to facilitate and manage the anticipated growth will depend largely on its ability to develop the required additional infrastructure and service capacity within the constraints provided by PMV's physical context, as well as the need to grow in a sustainable manner that considers the interests of local communities. The PMV Land Use Plan provides strategic guidance to ensure that Port Metro Vancouver is prepared to accommodate that growth so Canadians can continue to benefit from the resulting economic activity.

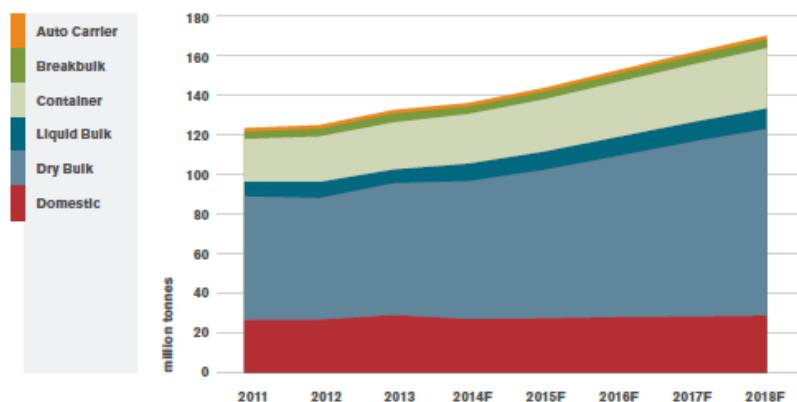
## PORT TRADE FORECASTS

Figure 7: Port Metro Vancouver Trade Forecast

Sector (million tonnes)	2011	2012	2013	2014F	2015F	2016F	2017F	2018F
Auto Carrier	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.3
Breakbulk	3.8	3.9	3.5	3.8	4.0	4.2	4.4	4.6
Container	21.7	23.0	24.8	25.1	26.4	27.8	29.1	30.5
Liquid Bulk	7.3	8.2	8.6	8.9	9.3	9.7	9.9	10.4
Dry Bulk	82.5	81.4	88.3	89.7	74.9	81.4	88.4	94.5
Domestic*	26.9	27.1	29.3	27.4	27.8	28.4	28.7	29.1
<b>Total Cargo</b>	<b>122.5</b>	<b>123.9</b>	<b>135</b>	<b>135.3</b>	<b>142.7</b>	<b>151.7</b>	<b>160.8</b>	<b>169.5</b>
Cruise (*000s passengers)	663	666	812	816	840	875	890	905
Auto (*000s units)	298	384	379	317	324	318	311	319

\*Domestic cargo means both the cargo's origin and destination are in Canada. Cargo is moved from one Canadian location to another Canadian location.

Figure 8: Port Metro Vancouver Trade Forecast



Port Metro Vancouver handled 140 million tonnes of cargo in 2014, up 3% from the previous year's 135 million tonnes. The 2014 Statistics Overview tabulates the volume of cargo shipped through Port Metro Vancouver over the past three years (2012 - 2014). Various breakdowns are provided, including: imports, exports, major commodities, containerized cargo, principal trading economies, vessel arrivals, and cruise volumes.

Increased traffic is projected across all of the major business segments and cargo types handled at PMV. However, the largest increase will come from the container sector.

While there are many inherent uncertainties with long term forecasting, the forecasts are intended to be a tool to guide, coordinate and identify the use of existing land and water assets in a manner that will allow for

sustainable growth to meet future opportunities. PMV will monitor trade volume and adapt to changing market conditions to ensure that there is sufficient flexibility to deal with new opportunities.

Some land requirements will not be based on growth in the key sectors, but on the need to meet requirements from PMV operations (such as road and rail transportation, security and environment). In some instances and for some commodities, improvements to terminal efficiencies may be sufficient to avoid or postpone terminal expansion with increasing throughput. This is not the case with container throughput expansion with its higher growth rate and the sector's integral need for industrial facilities and support systems within the supply chain.

The future growth for all Port traffic sectors is reviewed in this section. While non-container import and (primarily) export cargoes are integral to the fabric and objectives of Port Metro Vancouver, it is expected that bulk and break bulk land requirements in the future will be modest in comparison to those required by the container sector, and it is expected that most of these (non-container traffic land demand) will generally be accommodated within the existing commodity-specific land base. It is possible that commodity exports will eventually reach capacity and as such several new marine terminals may be required. New terminals are considered on currently vacant land, together with conversion of existing terminal land.

### **Liquid Bulk**

Liquid bulk cargo includes petroleum, petrochemicals and edible oils. In Port Metro Vancouver, three terminals handle petrochemical cargoes including Univar, Pacific Coast Terminals and Canexus. Five terminals handle petroleum products including Shellburn (Shell), Stanovan (Chevron), Westridge Marine Terminal (Kinder Morgan), PetroCanada and Imperial Oil (IOCO) Terminal. Edible oils are handled at Pacific Coast Terminals, Vancouver Wharves and West Coast Reduction. Other planned facilities include a jet fuel import facility and a potential LNG export terminal on the Fraser River.

### **Dry Bulk**

The dry bulk sector generates some of the highest commodity volumes at PMV. The most noteworthy include coal, grain and other agricultural products, potash, sulphur, mineral ores and concentrates.

Coal is the largest volume commodity handled through Port Metro Vancouver and is exported through Westshore Terminals at Roberts Bank and Neptune Bulk Terminals in Burrard Inlet. Strong demand from Asia is expected to increase throughput over the long-term. This growth could potentially take place within the existing capacity of the terminals with increased efficiency. New export capacity is being pursued by Fraser Surrey Docks at its terminal in Surrey.

Grain and other agricultural products are handled through five major terminals in Burrard Inlet including Cascadia Terminals, James Richardson International Terminal, Alliance Grain Terminal, Viterra's Pacific Elevators, and Cargill Terminals. Smaller quantities of agricultural products are also handled at Neptune Bulk Terminals, Columbia Containers, Vancouver Wharves and Fraser Surrey Docks. James Richardson International Terminal is doubling the size of their facility. New terminal and capacity expansions are being pursued within Port Metro Vancouver over the medium term.

Bulk fertilizer commodities in Port Metro Vancouver include potash and sulphur. Sulphur is handled at Vancouver Wharves and Pacific Coast Terminals while potash and other fertilizers (such as urea and ammonium



sulphate) are handled at Neptune Bulk Terminals. Pacific Coast Terminals will handle potash exports within the next few years.

Mineral ores and concentrates are handled at Vancouver Wharves. Wood chips and pellets (both domestic and offshore) are handled at Fibreco. Domestic shipments of wood chips are loaded onto barges at sites along the Fraser River.

### **Break Bulk**

Break bulk cargoes include forest products such as lumber, pulp, wood panels and other general cargo including steel and special project cargoes. The major terminals handling break bulk at PMV include Lynnterm, Vancouver Wharves and Fraser Surrey Docks.

Logs constitute the largest break bulk commodity handled at PMV. However most of this traffic is not handled at the marine terminals. Wood pulp and lumber are also very important throughputs.

### **Automobiles**

Port Metro Vancouver has two auto terminal facilities located on the Fraser River including the former Fraser Wharves and Annacis auto terminal both operated by Wallenius Wilhelmsen Logistics. PMV auto terminals are extremely efficient compared to other west coast auto ports. The two terminals are being evaluated to assess their capacity, and the port authority is investigating the possibility of consolidating operations at Annacis Island in the future. PMV purchased the Fraser Wharves site in early 2013.

### **Containerized Cargo**

Metro Vancouver's international container import/export industry is substantial, and extends well beyond the deep-sea terminals that are the direct interface between container ships and the ground transportation network which handles the containers after they arrive and before they leave. Increasing container throughput demand generates the requirement for additional land to load/unload, store and mobilize the containers at the 'dock' and to transport, handle, load, unload and store containers and handle their contents in the Greater Vancouver area ("off-dock" facilities).

Both inbound and outbound containers generate demand for land through the many logistics and other businesses involved in the supply chain. These import/export land demands are sometimes different (e.g. export consolidators vs. import agents), and sometimes they come together (e.g. at the deep-sea terminals and 'off-dock' storage locations).

Container industry land requirements, as they affect Port Metro Vancouver, have been divided into several (current and future) industry functional areas as follows:

- Deep-sea marine terminal operations (Centerm, Vanterm and Deltaport);
- Traditional Metro Vancouver 'off-dock' container businesses (e.g. operators, 3PL's, freight forwarders, logistics companies, consolidators, agents, distributors, importers, exporters, storage companies, etc);
- Significant, new, 'high velocity' distribution centres (DC's);
- Inter-modal rail yards;
- Major 'Inland Container Terminals' such as the Richmond Logistics Hub ; and
- Short-sea shipping transfer terminals.

Most of the growth in PMV cargo volume to 2025 is expected to be generated by the container sector (as shown in the forecasts described earlier). The export container market continues to grow more rapidly than the breakbulk business. Overall inbound container throughput growth is expected to continue, but at a lower pace than has been realized over the last decade.

**Cruise Ship Passengers**

Port Metro Vancouver has three cruise ship berths, all located at Canada Place. PMV continues to implement improvements at Canada Place to handle larger ships but has no plans to add additional cruise facilities in PMV.

**Other Land Requirements and Issues**

Land will also be required for specific projects and PMV initiatives that are not directly related to the throughput demand factors discussed above. These land requirements may include land assembly for security projects, habitat compensation, transportation initiatives and/or protection of industrial land (buffers). Additional land demand of this type is difficult to predict and is often project specific. In addition and on occasion, unpredictable requests for land arise that support one or more of the many and varied cargo throughput uses of Port Metro Vancouver.

Port related uses have numerous different forms of land requirements generally characterized in the following table.

Cargo Type	Land Characteristics
Automobile Terminal	<ul style="list-style-type: none"> <li>• Minimum 50 acres in size</li> <li>• Berth required for ships</li> <li>• Rail access essential</li> <li>• Good road access essential</li> <li>• Flat site</li> </ul>
Cruise Terminal	<ul style="list-style-type: none"> <li>• Minimum 5-10 acres in size</li> <li>• Berth required for ship</li> <li>• Good road access essential along with sufficient staging and parking for buses/taxis</li> <li>• Flat site</li> </ul>
Container Terminal	<ul style="list-style-type: none"> <li>• Minimum 100 acres in size</li> <li>• Berth required for ship</li> <li>• Rail access essential</li> <li>• Road access essential</li> <li>• Flat site</li> </ul>
Bulk Terminal	<ul style="list-style-type: none"> <li>• 10-100 acres in size</li> <li>• Berth required for ship</li> <li>• Superior rail access essential</li> <li>• Road access essential</li> <li>• Flat site</li> </ul>
Logistics Hub	<ul style="list-style-type: none"> <li>• Minimum of 600 acres</li> <li>• Waterfront access preferred</li> <li>• Rail access essential</li> <li>• Road access essential</li> <li>• May include land adjacent to an existing logistics hub</li> <li>• Flat site</li> </ul>
Short Sea Shipping	<ul style="list-style-type: none"> <li>• Minimum of 20 acres</li> <li>• Waterfront access essential</li> <li>• Rail access preferred</li> <li>• Road access essential</li> <li>• Flat site</li> </ul>
Inland Container Facility	<ul style="list-style-type: none"> <li>• Minimum 500 acres</li> <li>• Rail access essential</li> <li>• Road access essential</li> <li>• Flat site</li> </ul>
Project Specific Acquisitions	<ul style="list-style-type: none"> <li>• Driven by the requirements of a specific project and are usually small parcels. May include habitat compensation, air rights, access agreements etc.</li> </ul>
Protection of Industrial Lands	<ul style="list-style-type: none"> <li>• Generally includes buffer areas around existing terminals to ensure incompatible uses</li> </ul>

### 3.6 PORT TRADE VOLUMES AND CAPACITY

There is a direct and important correlation between TEU (international shipping containers) throughput handled by Port Metro Vancouver's (PMV) various terminals and industrial land demand. These containers, both inbound and outbound, generate demand for very large scale industrial warehouse space typically accommodated in industrial buildings over 100,000 square feet.

This report defines container volumes and PMV forecasts and, based on past correlations, makes reliable and reasonable forecasts of the need for Port related industrial space. One key variable incorporated into the analysis is the operating efficiency ratio of large-scale container logistics buildings (expressed in square feet per TEU). The past supply and future demand conditions for large-scale industrial buildings (i.e. those larger than 100,000 square feet in total area) are linked to vacant industrial land and thus to a logical and probable absorption schedule for industrial land development in the region.

Based on these inter-relationships, PMV's container throughput forecasts were used as the basis to identify large scale logistics building space demand (and the associated logistics related demand for industrial land) in Metro Vancouver in 2015, 2020 and 2025.

These logistics-related land demand forecasts were prepared under three separate scenarios. It is detailed in section 7.6 and relates to container growth in section 3.8.

The impact of the PMV expansion on overall industrial real estate will be to increase past levels of demand from approximately 275 acres of land per year to 350 or even 375 acres per year. The pending industrial land shortage would become acute soon after 2020. Additional lands must be added to industrial supply in order to meet critical port expansions required by the supply chain.

### 3.7 PORT IMPACTS ON REGIONAL INDUSTRIAL LANDS

Goods handling and other port related businesses account for most of Metro Vancouver's industrial economy. These logistics businesses, facilities and services generate the demand for well over half of all industrial development on the Lower Mainland, and this ratio is believed to be increasing.

As the key port in Canada for traffic to and from Asia, Port Metro Vancouver has excellent prospects for growth over the short, medium, and long term. The ability to realize those prospects depends, in part, on the availability of suitable and properly located industrial land and transportation infrastructure.

Port Metro Vancouver's impact on the industrial real estate market primarily relates to the container industry and the deep-sea terminals that handle the majority of this traffic. The region's principal container-port (Deltaport) located in Delta accounts for 60% of the region's container traffic, with the older terminals of Vanterm and Centerm in downtown Vancouver together accounting for most of the remainder.

Deltaport is larger than the other two terminals because it has excellent rail and highway connections and more supporting land and infrastructure. Given the limited area for growth at Vanterm and Centerm, and the congestion issues confronting rail and road traffic arriving at and leaving those facilities, the majority of container throughput growth on the Lower Mainland will occur at Deltaport and any possible future container facilities constructed at Roberts Bank. These container industry demands, needs and trends directly affect the

opportunity for development of new industrial lands in support of the expanding container logistics industry. Lands very close to Deltaport, if effectively planned and developed, will serve the container industry well and generate revenue and economic benefits for the host community. Demand is very strong regardless of whether the proposed RBT2 is approved. In recognition of this, significant capacity improvements are planned at Centerm and may be pursued at Vanterm as demand and opportunities arise.

## 4. INDUSTRIAL REAL ESTATE MARKET CONDITIONS

### 4.1 INDUSTRIAL FLOOR SPACE INVENTORY

According to different brokerage report sources, the total industrial building inventory in the Lower Mainland (Metro Vancouver as well as Abbotsford) is in the 190 to 200 million sq. ft. range. Richmond, Surrey, Burnaby, Delta and Vancouver are the largest markets. The overall vacancy rate in early 2015 was approximately 4%, varying by submarket. Average asking rent prices also varied by submarket, with an overall average of \$8.00 per sq. ft. For 2014, there was an estimated net absorption of 2.8 million sq. ft. of space, and another 1.8 million sq. ft. under construction which was completed in early 2015

Specifically for the Delta submarket, which is most well located relative to port transportation infrastructure, with approximately 26 million sq. ft. of industrial inventory (11% of the regional total), has a vacancy rate of 6% and average rents of \$7.50. Although Delta is a geographically large community, because of the Agricultural Land Reserve and other constraints, it has a proportionally smaller share of both industrial lands and industrial buildings.

### THE INDUSTRIAL MARKET BY MUNICIPALITY

Market / Submarket	Total Inventory SF	Headlease Vacant Space (SF)	Sublease Vacant Space (SF)	Vacant Space for Sale (SF)	Total Vacant Space (SF)	Vacancy Rate	Weighted Avg Asking NNN Rent (\$/SF)	Weighted Avg Asking Additional Rent (\$/SF)
Richmond	34,102,899	828,028	204,942	180,914	1,203,867	3.6%	\$8.31	\$3.41
Surrey	32,082,525	467,750	34,891	132,725	575,565	1.8%	\$7.90	\$2.85
Delta	26,420,673	1,405,915	17,402	229,573	1,525,544	5.8%	\$7.54	\$3.09
Burnaby	25,361,377	811,176	81,446	101,284	933,321	3.7%	\$8.27	\$3.49
Vancouver	19,844,228	682,134	24,750	49,291	731,559	3.7%	\$9.86	\$3.96
Langley	19,092,266	268,321	118,834	47,541	394,696	2.1%	\$9.21	\$3.14
Abbotsford	7,547,631	116,698	0	7,719	124,417	1.6%	\$7.24	\$2.73
Coquitlam	7,130,551	91,841	11,960	133,890	266,732	3.7%	\$7.79	\$3.82
Port Coquitlam	7,037,516	219,977	8,340	29,226	257,543	3.7%	\$7.77	\$3.50
North Vancouver	4,716,763	119,392	13,346	41,357	166,925	3.1%	\$13.18	\$5.79
New Westminster	3,199,655	545,059	0	2,142	545,059	17.0%	\$6.52	\$4.65
Chilliwack	3,137,125	6,560	0	0	20,658	0.7%	\$7.58	\$2.40
Maple Ridge-Pitt Meadows	2,899,266	156,644	0	32,320	160,655	5.5%	\$7.02	\$2.02
Port Moody	561,059	10,838	0	0	10,838	1.9%	\$10.68	\$3.76
Metro Vancouver Grand Total	193,133,536	5,730,333	515,911	995,279	6,904,696	3.6%	\$8.03	\$3.34

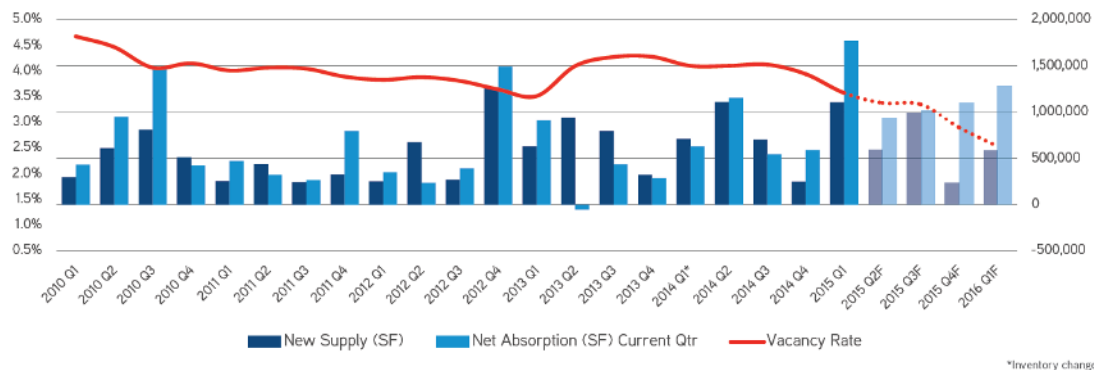
Source: Colliers International, Metro Vancouver Market Report Q1 2015.

### 4.2 CURRENT INDUSTRIAL MARKET CONDITIONS

The following chart shows the new industrial building supply and absorption, as well as vacancy rate, over the 2010-2016 period. Distribution companies prefer more efficient properties that feature higher ceiling heights, more loading doors, and a better location.

The vacancy rates is one of the lowest in North America and some businesses cannot open or are forced to locate in Calgary due to their inability to find a suitable site.

## MARKET TRENDS AND FORECAST: NEW SUPPLY ABSORPTION AND VACANCY

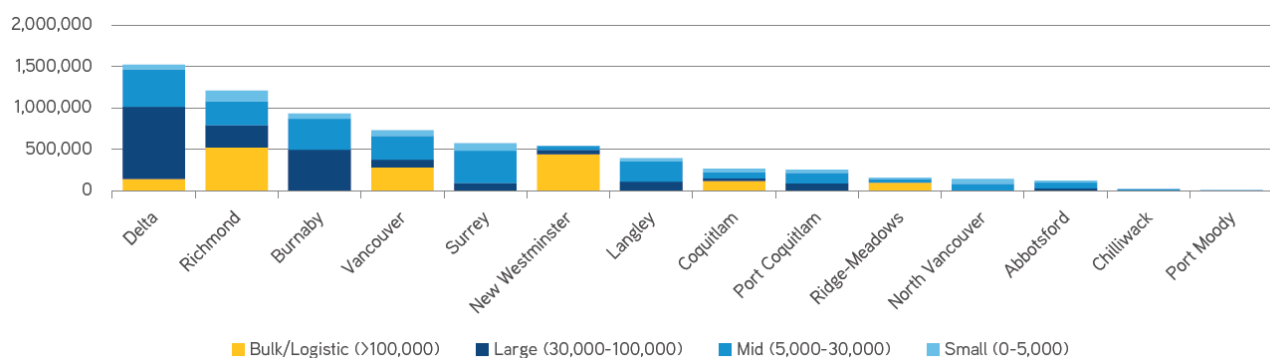


Source: Colliers International, Vancouver Industrial Report, Q1 2015

### 4.3 SIZES AND BUILDING CEILING HEIGHTS

In Delta, Burnaby and Richmond, a substantial proportion of the vacancy is in Bulk/Logistics type buildings, followed by large and medium buildings. Surrey, Vancouver and Langley are the next largest markets, but most space is smaller sized (5,000-30,000 sq. ft.)

#### VACANT SPACE BY PROPERTY SIZE (SQ. FT.)



Source: Colliers, Vancouver Industrial Report, Q1 2015

As for building heights, analysis by CBRE indicates that most space (4.5 million sq. ft. or 64%) is between 20 and 27 ft. high. In addition 1.7 million sq. ft. of buildings are 28 ft. and over. Of the space with higher ceilings, much of it is located in Delta (28+ ft.), with Burnaby and Richmond having a larger inventory of the next highest ceiling height category (25-27 ft.). New distribution buildings in the Lower Mainland have 36 ft. ceilings and operations are highly mechanized thereby reducing the footprint required for a given throughput capacity. High ceiling heights ensure that the logistics industry makes the most efficient use of its available lands. Ongoing increases in productivity can help to slow the growth of total land demand. In terms of new technology Ikea has 108 feet ceilings in a portion of their distribution centres in Savannah and Tacoma to accommodate the Automated Storage and Retrieval System (ASRS). Canadian Tire's distribution centre in Montreal has 42 foot ceilings.

## METRO VANCOUVER INDUSTRIAL BUILDING HEIGHTS

Submarket	<20'	20-24'	25-27'	≥28'	Total	<20'	20-24'	25-27'	≥28'
Total Available sq. ft.						% of Total Available Space			
Vancouver	66,168	-	117,548	-	183,716	36	0	64	0
Burnaby	209,169	86,884	724,258	316,084	1,336,395	16	7	54	24
Richmond	205,600	639,261	600,929	105,340	1,551,130	13	41	39	7
Tri-Cities/New Westminster	83,876	284,778	187,715	121,883	678,252	12	42	28	18
Delta	114,330	504,697	401,346	559,305	1,579,678	7	32	25	35
Surrey	33,293	153,418	379,173	283,618	849,502	4	18	45	33
Langley		166,422	115,746	376,725	658,893	0	25	18	57
Maple Ridge	37,697	39,480	104,964	-	182,141	21	22	58	0
Abbotsford	25,000	-	-	-	25,000	100	0	0	0
North Vancouver	209,169	86,884	724,258	316,084	1,336,395	36	0	64	0
Total	775,133	1,874,940	2,631,679	1,762,955	7,044,707	11	27	37	25

Source: CBRE Industrial Land Market Report, Metro Vancouver, Q4 2014.

### 4.4 COMPARISON TO OTHER REGIONS

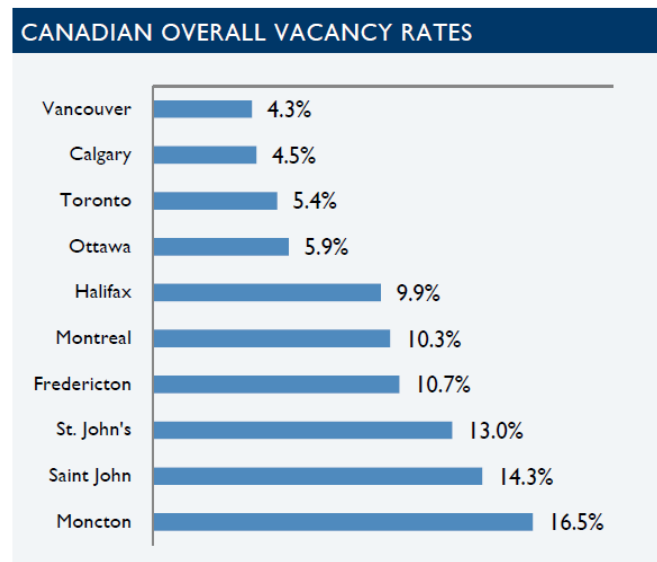
The information was taken from the Cushman and Wakefield North American industrial market review for year-end 2014. It illustrates industrial vacancy rates for different jurisdictions in North America. As can be seen, Metro Vancouver has the lowest vacancy rates in Canada.

Vancouver's industrial markets have seen a clear positive shift in expansionary momentum with overall absorption of 2.8 million sq. ft. in 2014. Acquisitions are hot, sales at historical highs, and cap rates at historical lows. Scarcity of product continues to be a limiting factor and developers are looking hard at long-term land plays for development. Manufacturing activity has seen a healthy strengthening of product demand, and this should continue in the face of a strong U.S. economy and low Canadian dollar. Vacancy remains extremely tight at 4.3% and there is optimism that the market is gaining strength. Consolidation and efficiency are driving some real estate decisions. Improved momentum may lead to upward pressure on rental rates in key submarkets over 2015.

The vacancy rate in Metro Vancouver is easily the lowest in Canada and one of the lowest in North America. It is also one of the most expensive in North America.



## CANADIAN OVERALL VACANCY RATES



Source: Cushman Wakefield, North American Industrial Market Report, Year End 2014.

### 4.5 INVESTMENT OVERVIEW

In Delta, Tsawwassen First Nations' (TFN) leased 57 acres to GWL Realty Advisors who have committed to developing 1.1 million sq. ft. of new warehouse space. These buildings will be the first phase of the 330-acre Tsawwassen Gateway Logistics Centre next to Deltaport near west Delta. The 110-acre Chatterton Lands and the Vito Shipyards in North Delta have also been sold.

Average asking lease rates for Metro Vancouver are \$8.00 per sq. ft. and vacancy rates are unchanged from the second quarter rate of 4.2%, according to Cushman & Wakefield.

Strata product in new markets, such as River's Edge Business Park in Port Coquitlam is enjoying strong sales. Older product sales remain slower despite the lower asking price per sq. ft. A new strata project in South Burnaby, by the Beedie Group, will indicate near term trends once it becomes available. (Source: Marketbeat Industrial Snapshot, Vancouver, Cushman & Wakefield, Q3 2014).

- Strata title industrial buildings sell for approximately twice the price of large logistics buildings. Many new industrial projects are strata and this is putting severe pressure on the logistics industry which simply cannot pay the higher rents required to compete.

## METRO VANCOUVER RENTAL RATES AND ASKING SALES PRICES



Source: CBRE Industrial Land Market Report, Metro Vancouver, Q4 2014.

Few new buildings are over 150,000 sq. ft. largely because sites are so difficult to secure, however there is ample demand. Amazon, Costco and the B.C. Liquor Distribution Board are all examples of tenants who are looking for premises which range in size from 500,000 to 1,000,000 sq. ft. There are numerous others searching for premises in the 250,000 sq. ft. range. In addition there are many tenants who want to relocate into larger newer premises and there are some tenants who have located in Calgary but would still like a major warehouse located in Metro Vancouver. Examples of logistics warehouse space users who would like to expand their footprint in greater Vancouver include virtually all major national chain retailers, such as Costco, Canadian Tire, Sears, and Wal-Mart.

## 5. INDUSTRIAL LAND SUPPLY - LOGISTICS

### 5.1 INTRODUCTION

There have been a number of studies exploring industrial land supply in the Metro Vancouver region. All analysis of this topic confirms there is a shortage and industrial land will only become more rare and valuable. A detailed review of industrial lands and buildings is provided in other related reports.

This section of the report provides a logistics land inventory for Metro Vancouver. It also provides a detailed assessment of the land supply inventory in terms of medium and long term market readiness. It summarizes the most important supply aspects of the industrial real estate market and includes summaries of other important studies, such as the North American Industrial and Office Properties (NAIOP) industrial land report, and the Metro Vancouver Industrial Land Inventory Report.

### 5.2 LOWER MAINLAND INDUSTRIAL LAND INVENTORY

The industrial land inventory of the Lower Mainland, mostly in Metro Vancouver, is based upon the most recent work by Metro Vancouver and with reservations, is considered reliable as to the remaining vacant industrial land base. The industrial lands in the Fraser Valley Regional District, specifically Chilliwack and Mission are limited in both size and location.

In 2010, Metro Vancouver completed a study to estimate the inventory of industrial land in the region, quantity currently utilized for industrial purposes, and the quantity of vacant industrial land available for development.

The industrial land supply study prepared by Metro Vancouver in 2010/2011 includes the following definitions and results, which shows the distribution of all industrial lands (developed and vacant) in the region as of mid-2010. These inventory lands are defined in the Metro Vancouver study as:

- Industrial Land – designated by municipal Official Community Plans for industrial uses, or land zoned and utilized for industrial use.
- Developed Industrial Land – industrial land that is wholly or partially utilized for industrial related uses, which includes properties used for outdoor storage. This also includes office, retail, or institutional uses that are allowed within municipal industrial zones.
- Vacant Industrial Land – industrial land that is not utilized for industrial related uses, which includes industrial properties that are completely vacant as well as industrial properties currently utilized for residential and agriculture uses.

The industrial land inventory indicates that Metro Vancouver had 28,200 acres of industrial lands as of mid-2010, of which approximately 6,600 acres (25%) were vacant and 21,600 acres (75%) were developed.

The Surrey sub-region comprised 22% of the region's industrial lands. Richmond comprised a further 16% and Delta/TFN 14% of the region's industrial lands, and Burnaby/New Westminster an additional 13%.

A similar Metro Vancouver study in 2005 showed that the total industrial land inventory for the region at that time was approximately 27,000 acres (20,400 acres developed, 6,600 acres vacant).

During the 2005-2010 period, there were large and small additions to the industrial land inventory, including 332 acres of new vacant industrial lands through a one-time treaty arrangement with the Tsawwassen First Nation (TFN), as well as other additions such as Pitt Meadows Airport (188 acres), Delta Tilbury (185 acres), and Delta Gravel Pit Lands (163 acres). There were also deletions from the inventory during this period, including: Surrey Campbell Heights (231 acres due to environmental / topographic constraints), Surrey South Fraser Perimeter Road (200 acres), Coquitlam Fraser Mills (65 acres), and Delta South Fraser Perimeter Road (44 acres). The overall net impact was an increase in the total developed industrial land inventory of 1,200 acres, and little net change to the vacant industrial land inventory.

The increase of approximately 1,200 acres of developed industrial lands in the region, between 2005 and 2010, indicates an average absorption rate of approximately 250 acres per year. This rate of absorption is comparable with past absorption rates and can be used to forecast into the future as a conservative estimate of annual demand based on past conditions. As the international Pacific Gateway project expands, along with Delta port capacity, industrial land demand will increase and easily exceed the past absorption rate of 250 acres per year. This assumes that in future there is a sufficient supply of well-located vacant industrial land available to accommodate market demand as fuelled by the PMV expansion.

Of note, roughly 3% (807 acres) of the developed land inventory included properties zoned and utilized for industrial uses but not designated for industrial activities in municipal Official Community Plans (OCPs). These lands were included in the inventory. However, it is important to note that these lands are anticipated to convert over to non-industrial uses in the future and therefore may not form part of Metro Vancouver's long-term industrial land supply.

The Metro Vancouver Regional Growth Strategy (RGS) establishes two regional land use designations for industrial related uses: 'Industrial' and 'Mixed Employment'. Of the total 2010 industrial lands inventory, 66% was located within the RGS Industrial designation, 23% within the Mixed Employment designation, 9% within General Urban, and 2% within other RGS designations.

Of the 21,600 acres of developed industrial land in the region, approximately 6,300 acres or 29% is used for 'non-market' type uses, as part rail tracks and intermodal yards, port terminals, or large tank storage facilities. Although these lands are industrial and provide important functions, they are not readily available for market uses or redevelopment.

- **The land shortage has discouraged municipalities from permitting low density, large scale, logistics uses whether in the form of an intermodal yard or simply very large warehouses. Municipalities have the objective of maximizing the number of employees and the property tax generated on their industrial lands. Thus, logistics oriented development is actively discouraged by the municipalities, who favour smaller tenants and more dense development which offers higher taxes and more employees per sq. ft.**

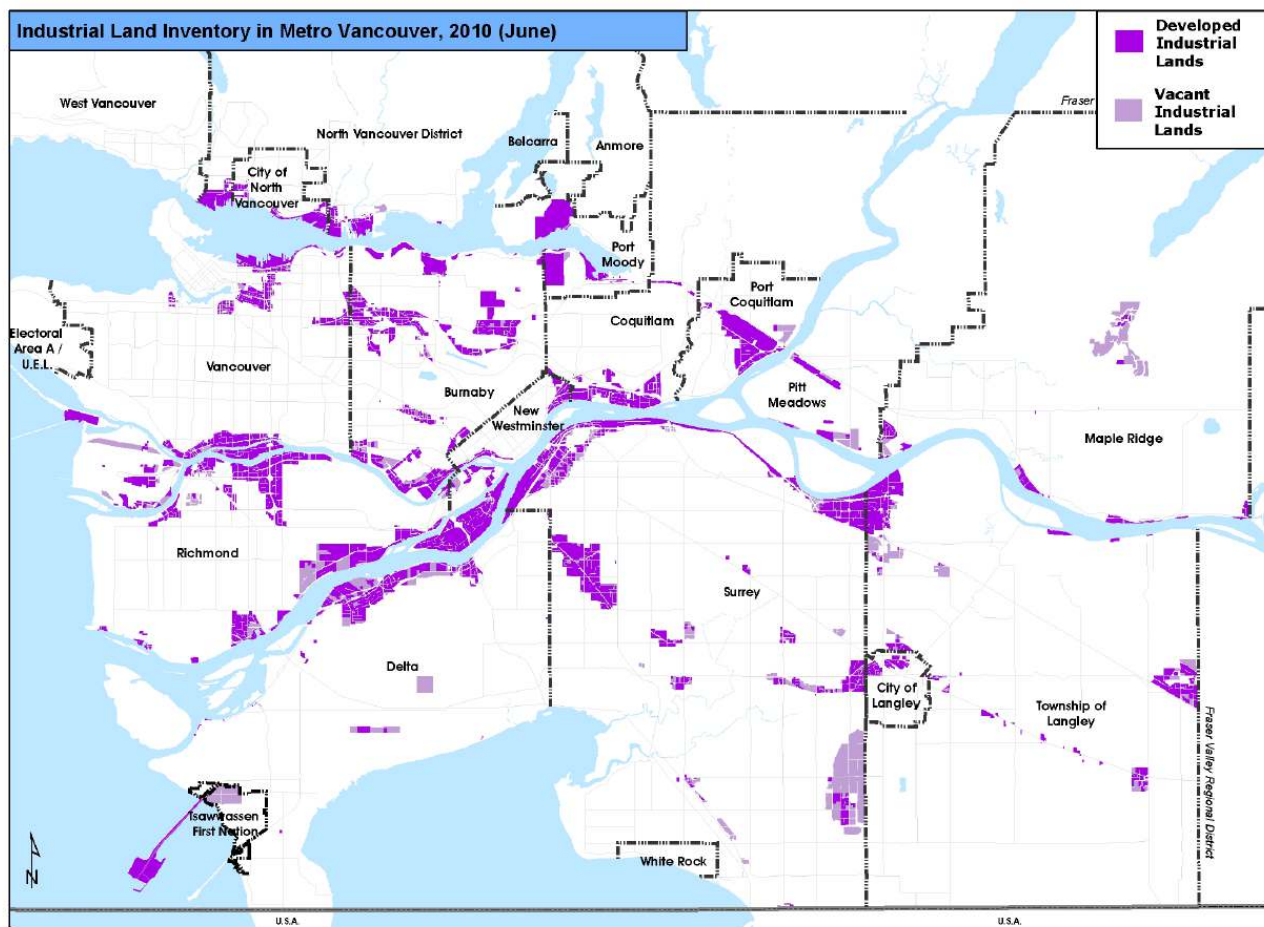
### 5.3 VACANT INDUSTRIAL LAND INVENTORY RESULTS

As of 2010, of the approximately 6,600 acres of vacant industrial lands, Surrey had the largest inventory of vacant industrial land with over 2,200 acres (35% of the regional total). This was followed by Delta/TFN and Richmond, each with approximately 1,000 acres of vacant land, and Langley with 700 acres. The vacant industrial land base of the inner urban areas is very moderate and will be absorbed and built out in the short

term. Most of the high value inner urban industrial land base and large portions of suburban industrial parks are developed for small scale local industrial businesses.

The vacant inventory of the north-eastern Metro Vancouver communities (Maple Ridge-Pitt Meadows) is substantial, but most properties are not well suited for container logistics businesses (the most significant demand of new industrial lands in the region) due to their, size, distance from Port Metro Vancouver and the region's rail intermodal yards (CPR and CNR) and highways.

## METRO VANCOUVER INDUSTRIAL LANDS INVENTORY, 2010



Source: Metro Vancouver 2010 Industrial Lands Inventory Study 2011

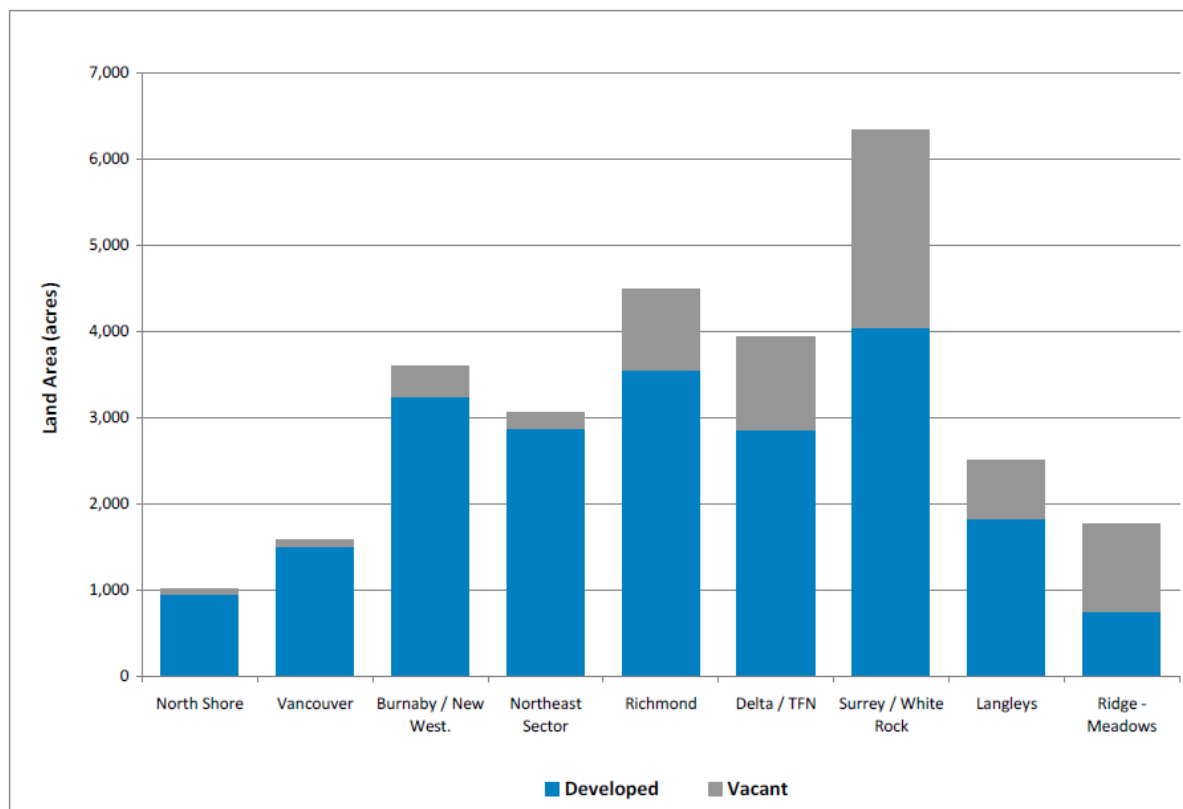
## DISTRIBUTION OF METRO VANCOUVER INDUSTRIAL LAND, 2010

Subregion	Developed Industrial Land (acres)	Vacant Industrial Land (acres)	Total Industrial Land (acres)	Regional Share
North Shore	955	59	1,014	3.60%
Vancouver	1,510	67	1,577	5.60%
Burnaby / New West.	3,241	349	3,590	12.70%
Northeast Sector	2,870	183	3,053	10.80%
Richmond	3,552	935	4,487	15.90%
Delta / TFN	2,860	1,066	3,926	13.90%
Surrey / White Rock	4,041	2,293	6,334	22.40%
Langleys	1,829	674	2,503	8.90%
Ridge - Meadows	754	1,008	1,762	6.20%
<b>Metro Vancouver</b>	<b>21,612</b>	<b>6,634</b>	<b>28,246</b>	<b>100.00%</b>

Sources:

Metro Vancouver Industrial Land Study and Site Economics Ltd.

## INDUSTRIAL LANDS BY DEVELOPED AND VACANT STATUS, 2010



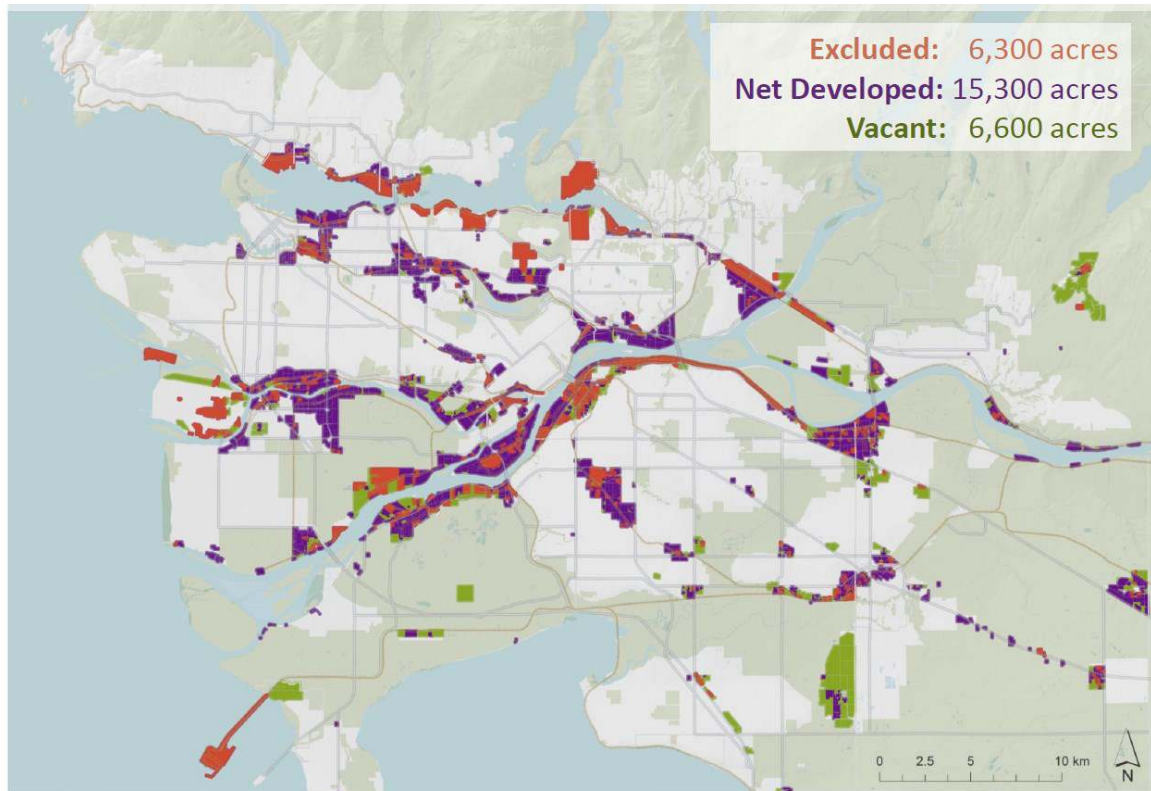
The logistics industry in Metro Vancouver tends to locate in large building and sites in areas with lower than average land costs, despite the need for good highway access.



As seen in the map below, the vast majority of vacant land is located too far east and too far south to be ideal for logistics which requires a location between PMV and the intermodal yards.

Also, much of the vacant industrial land has soil-related building constraints, or other problems which make it less than ideal for the logistics industry. The following map was from the 2010 study which overestimated the vacant industrial land base. The vacant land can be seen in green and the 6,600 acres that were identified is far larger than what is actually vacant or available.

### THE METRO VANCOUVER INDUSTRIAL LAND INVENTORY



*Source: Metro Vancouver Planning Department*

Campbell Heights in Surrey accounts for 30% of the area of vacant sites greater than 10 acres, and 18% of the area of vacant sites less than 10 acres. This land is unlikely to be used for logistics development because:

- It is not well located relative to PMV and rail intermodal terminals, and has no rail service.
- Surrey's Neighbourhood Concept Plan for Campbell Heights indicates that the industrial land uses will be limited to technology and business parks, mixed commercial/residential, and live/work developments.

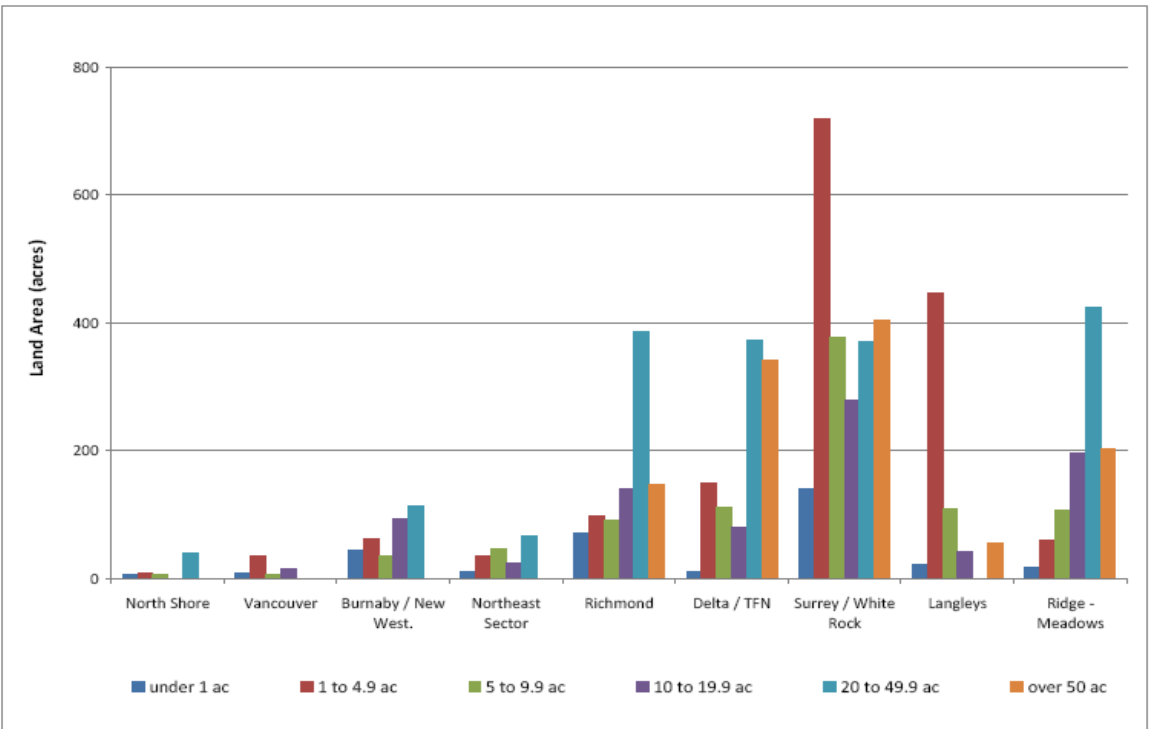
Delta, with its excellent location relative to PMV and excellent access to the highway network, is an ideal location for future industrial development. There are limited amounts of quality vacant industrial land in Delta and there is a pending land shortage for the region.

5.4 VACANT INDUSTRIAL PARCEL SIZES

Based on the 2010 Metro Vancouver industrial land inventory, the following describes the breakdown of vacant industrial land by parcel size and subregion. It shows that approximately 29% (1,900 acres) of the vacant industrial land was in the form of parcels less than 5 acres in size, 26% (1,800 acres) on parcels between 5 to 20 acres, and 45% (3,000 acres) on parcels greater than 20 acres. Approximately 41% of the large vacant industrial parcels greater than 20 acres in size were located in Surrey/White Rock and Richmond, with also a significant amount in Delta/TFN and Ridge-Meadows. Surrey/White Rock and the Langleys had a relatively large supply of parcels less than 5 acres. Of the developed industrial lands, 73% were in the form of parcels under 20 acres in size.

The following figure shows the distribution by parcel size of vacant industrial lands within each sub-region. The regional supply of larger (greater than 20 acres) vacant industrial properties was predominantly located in Richmond, Delta / TFN, Surrey / White Rock, and Ridge – Meadows. Surrey / White Rock and the Langleys had a significant number of smaller (under 5 acres) properties. This shows that there are few large sized parcels which are the types of properties needed for major port and logistics facilities.

VACANT INDUSTRIAL LANDS BY PARCEL SIZE AND SUB-REGION, 2010



Note: The term vacant industrial lands includes lands planned for future industrial use, but not currently utilized for industrial activity; this may include properties with non-industrial uses, as well as properties having environmental and other constraints on development. The term developed industrial lands includes both lands wholly or partially utilized for industrial related purposes; these lands may have additional development capacity.

Source: Metro Vancouver Planning Department

Although some small parcels can be assembled and consolidated, dealing with multiple owners can significantly hamper and delay the viability of bringing large sites to market.

## 5.5 INDUSTRIAL LAND INVENTORY - MARKET READINESS

As part of further analyzing the vacant industrial land supply, factors which impact industrial development potential were explored. This included the potential development timing of the land or 'market readiness' of the vacant lands identified in the 2010 inventory.

The market readiness of vacant industrial land is a general assessment of the potential or probable availability and development timing of the lands. This does not include an assessment of all potential constraints on development. Properties included as market ready may still require further utility / infrastructure investments, rezoning and other development approvals, be hindered by factors such as location or accessibility, current uses, lot assembly, soil conditions, need for pre-loading, etc.

The following two categories of market readiness timing were used:

- Short/Medium Term (within 5 years from January 2012 / before 2017)
- Long Term (5+ years from January 2012 / 2017 and after)

In order to assist with the market readiness exercise, the assessment was completed as a general overview of larger industrial areas, not as a parcel by parcel review of individual lands. Infrastructure servicing and municipal designations and zoning were considered when estimating the development potential / market readiness of vacant industrial lands (or areas).

Based on these and any other relevant factors, municipalities were asked to estimate the likelihood of the vacant industrial lands being available for development as typical industrial uses within the next 5 years (as of early 2012). It is recognized that this exercise includes certain subjectivity and professional judgement was required to consider if the criteria are adequately in place to likely allow development. Further, it is recognized that other factors, such as site constraints or land ownership patterns, may limit the development potential and timing of lands.

Summary findings reflecting the estimated likelihood of vacant industrial lands being available for development as typical industrial uses within the next 5 years are shown in the following tables and charts. It was estimated that approximately 70% of vacant industrial lands would be available for development within 5 years. Note that these are high level estimates and are not necessarily indicative of the development potential of individual properties.

## INDUSTRIAL LAND MARKET READINESS - BY SUBREGION

Subregion	Short / Medium Term <sup>1</sup> Before 2017 (Acres)	Long Term <sup>2</sup> 2017 & After (Acres)	Total Vacant 2011 Industrial Land Inventory <sup>3</sup>
North Shore	59	-	59
Vancouver	67	-	67
Burnaby/New West.	349	-	349
Northeast Sector	183	-	183
Richmond	841	94	935
Delta / TFN	708	358	1,066
Surrey/White Rock	1,560	719	2,279
Langley	395	168	563
Ridge-Meadows	359	649	1,008
<b>Metro Vancouver</b>	<b>4,521</b>	<b>1,988</b>	<b>6,509</b>

### Notes

<sup>1</sup> Short/Medium Term - lands which are likely to be developed for typical industrial uses before 2017.

<sup>2</sup> Long Term - lands which are likely to be developed for typical industrial uses at some point in 2017 or thereafter.

<sup>3</sup> Some lands that were reported as 'vacant' in the 2010 Industrial Land Inventory (ILI) have since been removed from the Industrial Land Inventory (ILI) at the request of municipal planning staff.

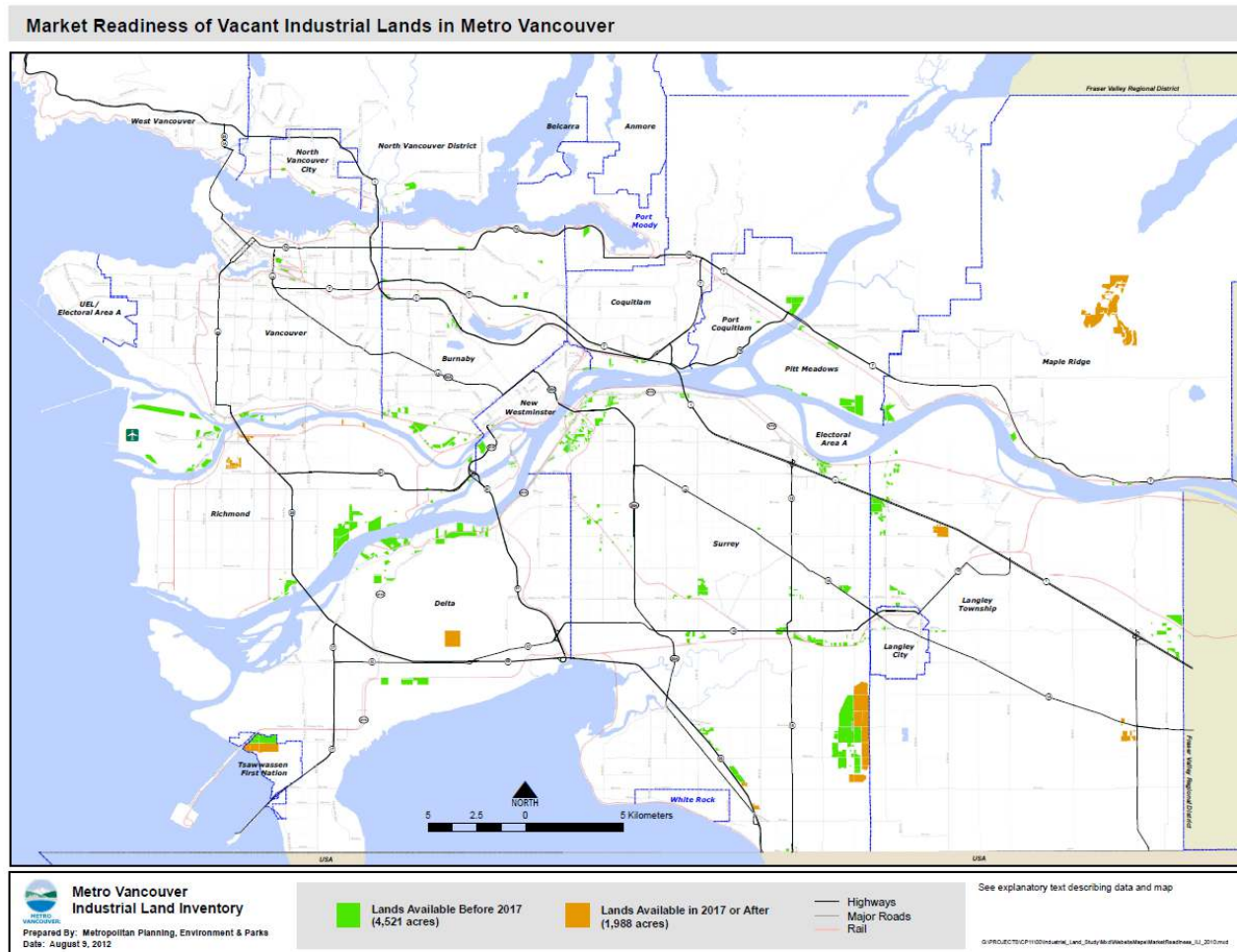
According to a study by Metro Vancouver, as of mid-2010, the inventory of zoned and/or designated vacant industrial land was approximately 6,500 acres. However, this includes lands that have various constraints, including poor locations. Of this total inventory, according to a 2012 Metro Vancouver publication, an estimated 4,500 acres of industrial land is available or likely to be developable within the short term (within 5 years).

Preliminary results of a market readiness exercise by Metro Vancouver indicate that the actual inventory of vacant industrial land which could be feasibly brought into production before 2017 is perhaps only two-thirds of the initial unrefined estimate. Large land areas have servicing, geo-technical, environmental and/or topographic constraints, are remote from transportation infrastructure, or may ultimately be developed in a non-industrial form. In addition, large portions of Maple Ridge and Surrey's industrial land base are not ideal as they are distant from the intermodal yards and the main highways.

The vast majority of the remaining vacant industrial land in the region has little or no servicing and is not ready to support development in the short term or even possibly in the long term. Historically the developed industrial areas reflect that the best sites were used first and most of the remaining vacant sites are less attractive with minimal rail or highway access and peripheral locations. The non-developed industrial land base typically reflects the poorest industrial locations or sites with the worst soils or with difficult servicing requirements.

- **The 6,600 acre inventory (as of mid-2010) of vacant industrial lands is far higher than could practically be developed, as significant portions of these lands are at unsuitable locations, have limited development capability, servicing constraints, difficult topography, small sizes, etc.**
- **The share of these vacant lands suitable for logistics is extremely small.**

## MARKET READINESS OF VACANT INDUSTRIAL LANDS



### 5.6 THE NAIOP VACANT INDUSTRIAL LAND REPORT FINDINGS

The North American Industrial and Office Properties Association (NAIOP) completed in 2013 the first of a detailed analysis of a sub-set of the vacant industrial land inventory in the region based on earlier Metro Vancouver work.

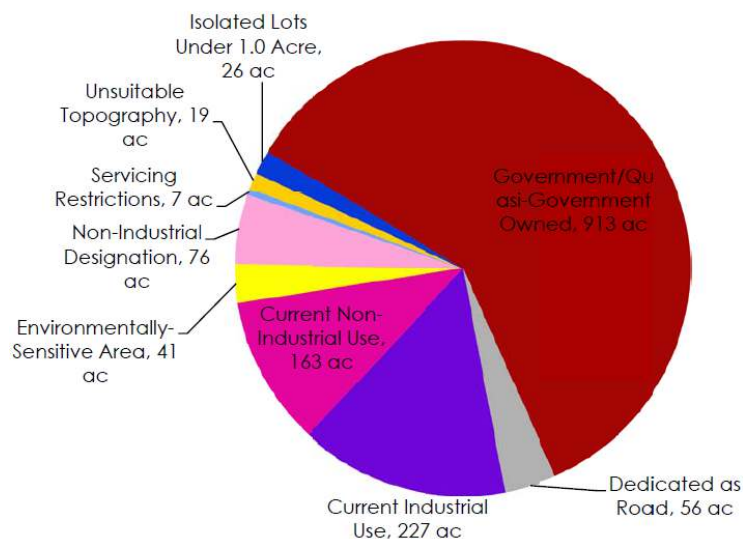
According to NAIOP, 4,521 acres were identified in the Metro Vancouver report as available for industrial development before 2017. Of those, 792 acres consisted of isolated, non-contiguous individual parcels categorized as unavailable for short term development and therefore not included in the analysis. The remaining 3,729 acres were organized into 17 areas to assist in the analysis. Based on recent market information (not available to Metro Vancouver at the time of their 2012 report), an additional 241 acres were also included for a total of 3,970 acres.

The NAIOP analysis determined that 1,527 acres of land were impacted by at least one development constraint. Of the categories identified, Government or Quasi-Government ownership was the most prevalent restriction



(or constraints or encumbrances, as noted in the NAIOP report) which encumbered 913 acres of land. This resulted in 2,443 acres of serviced, privately-owned land available for near term development.

### RESTRICTED LANDS FOR DEVELOPMENT BEFORE 2017



The analysis also demonstrates that the availability of land for large distribution, regional contractors, food service and agricultural cold storage facilities, national and international logistics, e-commerce, and large scale manufacturing corporations is limited in the short to medium term. Additional industrial lands are considered to be available after 2017. Although the Metro Vancouver report indicates 4,521 acres of available industrial land in the region, this does not mean that all the properties available meet the needs of tenants or end users in the market. NAIOP found only a handful of sites that would meet the large distribution tenant's criteria. It is important to note that smaller industrial businesses and activities can be accommodated on smaller sites.

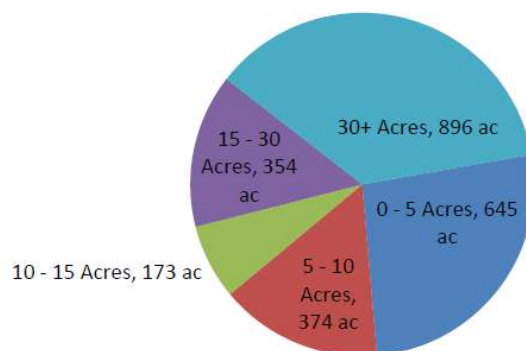
- Of the 2443 acres of land, the greatest source of available land, 1,250 acres, is from lots that are 15 acres and greater in size; however, these lands are distributed amongst 34 parcels. Conversely, the largest number of lots, 373, can be found with lot areas between 0 and 5 acres, occupying a total of 645 acres. Within this category are 137 lots that are less than 1 acre in size, representing 44 acres in total.
- Currently only 16 lots are in the 15 to 30 acre range that can offer potential options for large manufacturers and transportation companies. Lot sizes in excess of 30 acres are needed to attract national and international logistics, e-commerce, and medium to large scale manufacturing corporations to Metro Vancouver. Currently, only 18 lots are in excess of 30 acres in size.



## LOT SIZE DISTRIBUTION

Lot Size (Acres)	# of Lots	Lot % of Total	# of Acres	Acre % of Total	Typical Users
0 - 5	373	79	645	26	Small owner/occupier
5 - 10	53	11	374	15	Small to medium sized manufacturers
10 - 15	14	3	173	7	Regional contractors, cold storage facilities and developers
15 - 30	16	3	354	15	Large manufacturers, transportation companies, and developers
30+	18	4	896	37	National and International logistics, e-commerce, manufacturing corporation, and developers

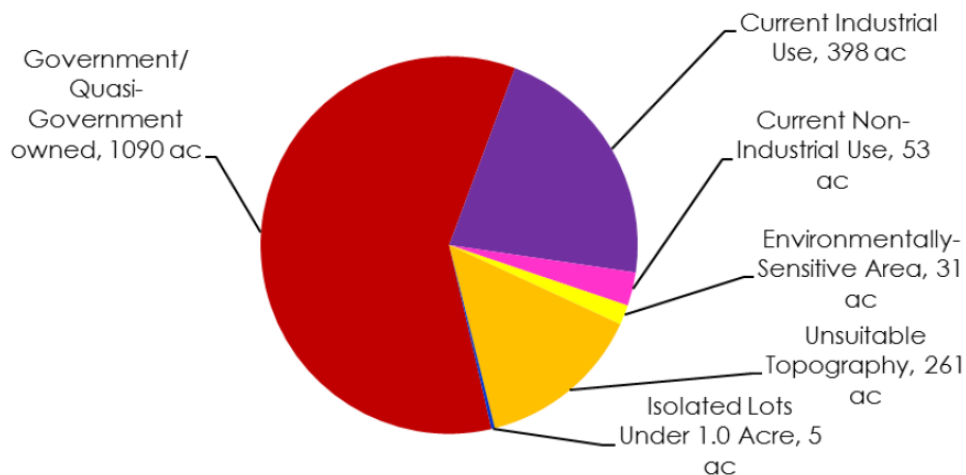
## PARCEL SIZE BREAKDOWN OF LANDS AVAILABLE FOR DEVELOPMENT



The more recent NAIOP report, titled "Long-Term Forecast and Analysis of Metro Vancouver's Industrial Lands", published in October 2014, looked specifically at lands identified as being readily available for long-term development.

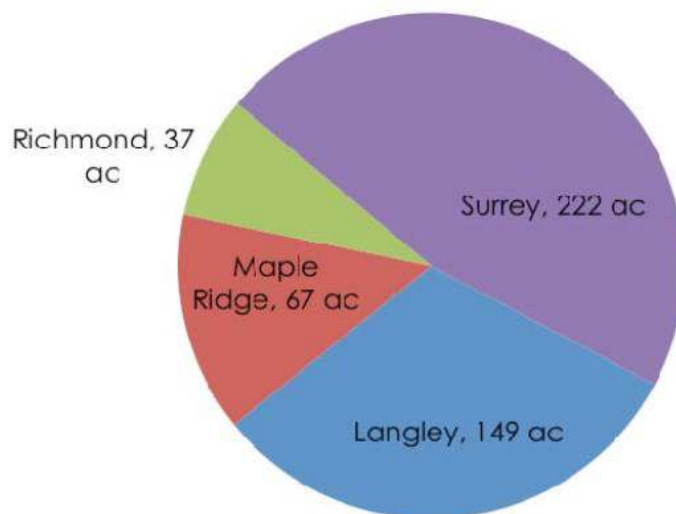
Metro Vancouver's 2012 report, Market Readiness of Metro Vancouver Vacant Industrial Lands, identified 1,988 acres as available for industrial development after 2017. Further review by NAIOP determined a more accurate total area for the lands to be 2,313 acres. However, by reviewing each individual lot, the analysis also determined that 1,838 acres of land were affected by at least one development constraint; Government/Quasi-Government ownership was the most prevalent restriction, encumbering 1,090 acres of land. The analysis shows that of the 2,313 acres, only 476 acres are serviceable, privately owned lands available for development.

## RESTRICTED LANDS FOR DEVELOPMENT IN OR AFTER 2017



The chart below summarizes NAIOP's findings and provides a graphical representation of the total lands available for development by municipality, after factoring in those lands that are restricted by government-ownership. Surrey is shown as having the largest proportion of land available for development at 222 acres, with Langley offering the second largest amount of land available at 149 acres.

## LANDS AVAILABLE FOR DEVELOPMENT AFTER 2017



### 5.7 LOGISTICS SUITABLE INDUSTRIAL LANDS

The most important issue in this section of the report is the inventory of vacant industrial land suitable for logistics. Metro Vancouver has completed a series of studies, however, these are dated and their newest study on vacant industrial lands will not be finished until early 2016. In addition, they do not specifically differentiate types of industrial uses, such as logistics suitable industrial sites. While the NAIOP study is a type of update, it

does not specifically consider logistics lands. In order to determine the scale of vacant logistics suitable lands, the following preliminary analysis was prepared.

The international goods handling industry typically requires a location between Port Metro Vancouver and the major intermodal facilities and proximity to a major highway, ideally Highway 1 or the SFPR. The sites require these features as their business involves constant transportation activity, most often by truck.

The vacant logistics land base was arrived at by means of reference to all previous studies, Assessment and land use data, and interviews with industry and municipalities. The following is an outline of the rationale for estimating the vacant logistics lands:

- Only sites over 5 acres in size and with very moderate or no improvements were considered.
- Large areas of the Metro region were excluded due to obvious problems with the location, their too high value, their steep topography or the clear intention to develop high density general industrial. The area also suffers from very extensive traffic congestion.
- The inner urban municipalities, Vancouver, Burnaby and the North Shore have very few remaining large scale sites and logistics is not a viable use.
- The other municipalities on the north of the Fraser River, such as New Westminster, Coquitlam, Port Coquitlam and Pitt Meadows have a few large scale vacant lands and these few sites have been clearly identified.
- Those areas located east of the Golden Ears Bridge, such as Maple Ridge, are not suitable for international logistics as trucks would have to drive longer and unnecessary distances east, past the intermodal yards.
- Large portions of the Surrey land base are not suitable as the main industrial park, Campbell Heights, is too far south of the intermodal yards and it does not have a major highway or rail service. The few large sites which remain in central and south Surrey are being rezoned or developed to a high density form of industrial or mixed employment. Port Kells is essentially built out and the only remaining logistics lands in Surrey tend to be in the north east on and near the Fraser River.
- Vacant logistics lands in Langley are focussed in the far north east as few other remaining sites are centrally located and are being developed to a higher density. Although the north east is east of the inter-modal yards it is not too distant and they are connected by Hwy 1.
- The primary inventory of suitable logistics lands are located in the ideally located municipalities Richmond, Delta and Tsawwassen First Nation.
- Even this reduced vacant logistics land base, which is generally suitable for the logistics industry, is available for use by all types of general industrial users, who typically pay higher prices and have more on site employment per acre.
- Many identified industrial sites which are properly zoned for logistics development may be unsuitable because they do not have adequate access to the transportation network (road, rail and potentially water) to function effectively or they require excessive fill and are prohibitively expensive. Other sites require extensive land assembly and consolidation, such as in Delta on River Road. Assembly is prohibitive when the proposed end use is logistics which has a lower than average land value.
- Demand for industrial land in Delta is extremely strong now that the new South Fraser Perimeter Highway is complete. Demand for industrial land uses will continue to grow regardless of whether Roberts Bank Terminal 2 is eventually approved. The incoming demands for container trade, and

capacity increase such as RBT2 will double the demand for logistics land and make the already serious industrial land shortage even more serious.

- The estimated vacant logistics land inventory 1,067 acre as indicated in the following table and map. A higher resolution map image is available but anyone familiar with the large site vacant inventory can clearly identify most of the land parcels.



Vacant and Potentially Available Logistics Lands (2015)



## 5.8 USABILITY OF VACANT INDUSTRIAL LANDS

The international goods handling industry typically requires a location between Port Metro Vancouver and the major intermodal facilities and proximity to a major highways. The sites require these features as their business involves constant transportation activity, most often by truck.

The following is a description of the major industrial areas and their suitability for development for logistics uses:

- The inner urban municipalities and those on the north side of the Fraser River, tend to have minimal vacant lands available and steep topography, and therefore, have limited development potential.
- Those areas located east of the Golden Ears Bridge are less suitable for international logistics as trucks would have to drive longer and unnecessary distances, past the intermodal yards.
- Of the previously noted inventory numbers, if the areas with limited appeal to the container logistics industry are removed, the inventory is reduced by over 50%. The most suitable lands consist primarily of Richmond, Delta / Tsawwassen First Nation, Surrey, and Langley. Large portions of Surrey's land base are not ideal as the main industrial park, Campbell Heights, is well to the south of the intermodal yard. Highway 1 and the SFPR.
- The prime lands are those with existing and well located logistics facilities, such as the PMV's 'Richmond Logistics Hub'.
- This reduced vacant industrial land base, which is generally suitable for the logistics industry, is available for use by all types of industrial users, not just container industry logistics providers. It tends to be the best and most development ready lands and it will be absorbed first, before the more remote lands located east of the inter-modal yards.
- The area with greatest industrial development potential generally includes Richmond, Delta, and the Surrey Fraser Docks Area. Many sites which are properly zoned for logistics development may be unsuitable because they do not have adequate access to the transportation network (road, rail and potentially water) to function effectively or they require excessive fill and are prohibitively expensive.
- In Delta, there are a number of small and large sites on the Fraser River which could be consolidated. The former Fraser River Port Authority had been assembling land in this area in anticipation of construction of the South Fraser Perimeter Road. There are significant vacant industrial lands located between River Road on the North and the new South Fraser Perimeter Road alignment on the south. The problem is that they are very difficult if not impossible to assemble because they often have a higher value as smaller sites.
- Demand for industrial land in Delta is extremely strong now that the new South Fraser Perimeter Highway is complete. Demand for industrial land uses will continue to grow regardless of whether Roberts Bank Terminal 2 is eventually approved. The incoming demands for container trade, and capacity increase such as RBT2 will simply make the already serious industrial land shortage even more severe.



## 5.9 THREATS TO THE INDUSTRIAL LAND SUPPLY

The following are some threats to the industrial land supply in Metro Vancouver:

- **Rezoning:** In every municipality, the industrial land base is under pressure by developers who look to rezone industrial properties to more valuable residential and commercial uses. Waterfront industrial sites are particularly vulnerable given their potential for community amenities and once converted are extremely unlikely to be available for industrial re-use.
- **Incompatible Development:** Residential development has encroached on major industrial facilities having a negative impact on their ability to operate 24-hours a day.
- **Access - Lack of Rail, Road or Water:** Those industrial lands with the best access and location are often those most threatened by conversion to a non-logistics industrial use or rezoning.

The amount of land actually available for development of the logistics sector is substantially smaller than the total vacant land inventory for the following reasons:

- The Industrial Land Inventory includes all zoning categories classed as Industrial; many of these have land use restrictions such as minimum Floor Area Ratios, limitations on outside storage, restrictions on stacking heights for containers, setback requirements, etc. which make it impossible or uneconomical to develop logistics facilities.
- Many sites do not have adequate access to the transportation network (road, rail and water) to function effectively for the logistics sector.
- Many sites are un-serviced or have poor soil conditions, which is why they remain vacant.
- Soil contamination.
- Municipal regulations encouraging higher density industrial and actively discouraging logistics.

There is very little well located industrial land left in the Metro Vancouver region, as all of the well-located industrial lands have been developed. The inventory of vacant industrial lands tends to be remote and not well suited for the transportation industry.

At the current and projected rate of logistics land absorption there will be a significant negative impact from the land shortage before the year 2000 increasing in severity until buildout, perhaps by 2025.

## 6. INDUSTRIAL LAND DEMAND

This section describes industrial land demand in general and the correlation between large industrial building space (inventory and demand) and container throughput volumes at Port Metro Vancouver's deep-sea container terminals. Port related activity directly generates demand for almost half of all industrial space in the region and is critical to understanding and estimating land demand. Absorption trends for large-scale industrial buildings which support the container industry and their associated land requirements are important.

### 6.1 INTRODUCTION

The vacant industrial areas which could serve port and logistics related industrial uses are estimated to comprise less than 2,000 acres. With a minimum ongoing annual absorption of approximately 250 acres, the current supply of vacant usable industrial lands could be exhausted in ten to fifteen years. The higher quality and well located lands which remain will be developed first, leaving poor locations for future development or in many instances, no feasible development at all.

In the past, the inner municipalities received the vast majority of industrial and other forms of development. Only once the vacant land supply was exhausted and prices increased did major new development commence in the more distant suburbs.

There is a severe shortage of well-located or logistics suitable industrial land. The absence of sites is already impacting the pattern of industrial development and limiting economic activity. The most recent studies quoted are from the past five years but they remain the most accurate and important studies available and their findings are valid. It is important to note the incoming demand for container trade, which are necessitating capacity increases such as the Roberts Bank Terminal 2, will drive even more demand for industrial land for which there are limited opportunities to develop.

The industrial land demand projections rely on the determined relationships between large-scale logistics facilities and container industry activity forecasts in Metro Vancouver, current trends and operating ratios for container logistics businesses, and the overall industrial market for non-port business activities. The relevant data, information, assumptions, analyses, forecasts and estimated demand are described in the balance of this section.

Based on extensive past analysis, industrial space in Metro Vancouver is growing on an average of just over 4 million sq. ft. per year. The growth of large industrial building space is estimated to be a quarter of the total, or about 1 million square feet per year. Container related logistics and industrial space is expected to account, directly or indirectly, for the vast majority of this "large industrial space" demand growth. Regardless, the share of industrial space devoted to large-scale (over 100,000 square feet) buildings remains at approximately 41% of all industrial space.

### 6.2 ABSORPTION

The key factor to determine is whether or not the existing suitable land inventory is sufficient for container industry demand. While there have been no major publicly available studies of absorption, average absorption over the 2001 to 2011 period for new industrial land development was 250 acres per year. This is based on a

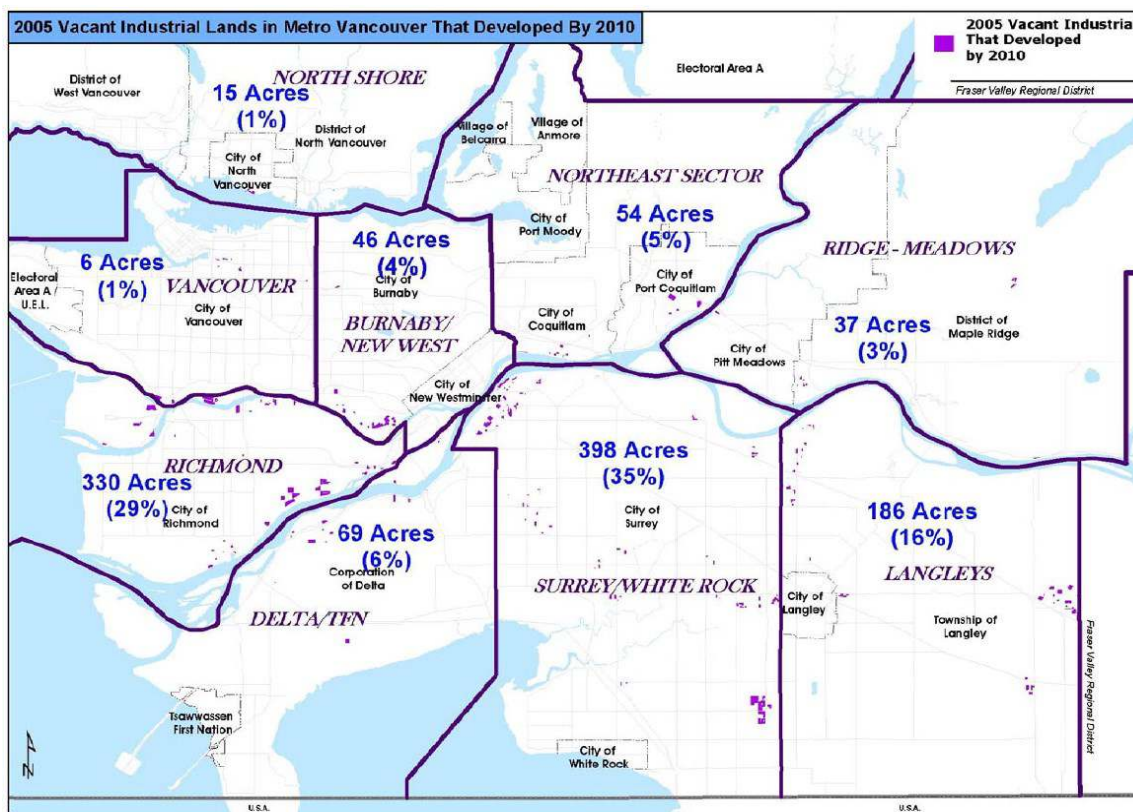
simple calculation of the confirmed newly built area of 4 million sq. ft. and converting it into its required land component at a reasonable average FSR.

According to the Metro Vancouver 2010 Industrial Lands Inventory Study, between 2005 and 2010 there was a net increase in the total industrial land inventory in the region of 1,226 acres (a 4.5% increase over the period). This comprised a notable net increase in the amount of developed lands (1,242 acres), and a minor net decrease in the amount of vacant lands (16 acres).

Over the 2005 to 2010 period, there was a net 1,242 acre increase in lands that were identified as developed which can be considered absorbed. This can be attributed to previously vacant (or used for other purposes) lands that were developed (as defined in this study) and added to the industrial inventory of developed lands, minus any developed industrial lands that were removed from the inventory over this time. This represented, on average, a net annual absorption rate of approximately 250 acres for the five-year period. However it is important to note that this absorption of land represents industrial lands as defined in this study. Lands that went from a vacant classification to a developed classification may have actually only become associated with industrial activity, including outdoor storage, rather than the construction of an industrial building.

The following map provides the location of lands that were absorbed during the 2005 to 2010 period. The text labels within each sub-area note the net amount of industrial land absorbed over the period, and the percent of the regional total this represents. These lands (which became developed over the five-year period) were distributed throughout the region, with significant areas in Surrey, Richmond, and the Langley's. Delta had only moderate absorption in large part because there was a shortage of serviced vacant lands.

## VACANT INDUSTRIAL LANDS DEVELOPED BETWEEN 2005 AND 2010



This rate of 250 acres per year is consistent with past studies, and this absorption rate is expected to continue for the medium to long term as long as suitable land remains available. Average absorption may range up to 300 acres per year, however this would exceed the long term trend and depend on new sources of demand such as significantly increased container traffic.

Even if Port Metro Vancouver were to increase its stature as a major Gateway for North American containerized cargo (including US destined cargo) most containers are expected to continue to be transferred directly to/from rail at the deep-sea terminals. These direct to/from rail transfers generate demand for industrial and logistical space at their destination (for imports) and origin (for exports), but not in Metro Vancouver.

Nevertheless, PMV container throughput is expected to continue growing, and this will generate increasing demand for suitable, regionally located logistics facilities and land despite the growing ratio of direct rail transfers at the dock. It is likely that between 25% and 35% of all industrial demand is associated with the development of large scale industrial buildings which exceed 100,000 square feet in size. This growth is expected regardless of whether RBT2 is eventually approved.

According to the NAIOP report, based on the historical average of land absorption of 250 acres per year (as determined by Metro Vancouver using statistics from 2005 to 2010), NAIOP-estimated 2,443 acres of serviced, privately-owned land available for near term industrial development represents approximately a 10 to 12 year supply from 2013. This is only a potential supply constraint and could be offset by a number of factors and trends, both globally and locally. Local development economics could also add supply through the redevelopment of underutilized lands and designation of new lands that can all impact absorption and supply.

Further, at a higher absorption rate of 300 to 350 acres per year and with no change in fundamental development economics (such as increases in effective lease rates or reductions in development costs) the 2,443 acres represents a supply of only 6 to 9 years. Certain market segments within the 10-acre and larger parcel sizes could potentially be exhausted sooner depending on whether the economics work for these types of users.

Variations in the growth of land demand will result, in part, from the expected increase in the occupancy and utilization of existing space over the next several years and, in part, from the extent to which actual throughput volume differs from PMV's base forecasts. Nevertheless, over the next decade or two, the demand for container logistics and related facilities within Metro Vancouver is expected to be significant and continue to grow.

The following figure indicates the expected growth and change to the industrial space inventories for Metro Vancouver. A comparison between past and projected rates of growth indicates that, to a large degree, industrial space will increase much as it has in the past, although the share of employment which is industrial will gradually decline.

**INDUSTRIAL FLOOR SPACE FORECAST (SQ. FT.), GVRD, 2001-2021**

<b>Metro Vancouver Industrial</b>							
<b>Year</b>	<b>Inventory (Sq.Ft.)</b>	<b>Sq. Ft. per Employee</b>	<b>Employment in Industrial</b>	<b>Population</b>	<b>Total Employment</b>	<b>Share of Inventory</b>	<b>Share of Employment</b>
<b>1991</b>	107,092,682	448	238,800	1,647,358	816,882	100.0%	29.2%
<b>1996</b>	132,429,259	502	263,700	1,910,165	919,470	100.0%	28.7%
<b>2001</b>	146,414,609	542	269,900	2,072,206	1,022,058	100.0%	26.4%
<b>2006</b>	168,731,379	564	289,596	2,224,744	1,124,646	100.0%	25.8%
<b>2011</b>	183,618,216	587	312,945	2,397,006	1,227,234	100.0%	25.5%
<b>2016</b>	204,897,397	610	335,780	2,569,268	1,329,822	100.0%	25.3%
<b>2021</b>	227,259,599	635	358,103	2,741,531	1,432,410	100.0%	25.0%

The implications for industrial and business parks across the region are very clear. There is very strong future demand for well located, serviced industrial lands. Such industrial lands are essential to the future economic vitality of individual communities and the wider region. The current inventory of well located, vacant industrial land in the region is limited.

**Vacancy Rates**

Past industrial vacancy rates for buildings are marginal at only 3% for the region and they will drop over time as urban land becomes ever scarcer and the cities densify. This is well under any level which could impact a 20 year regional demand projection. In the future, all vacancy rates are expected to drop and over building is expected to become less and less prevalent. Lower vacancy rates will result from the following factors:

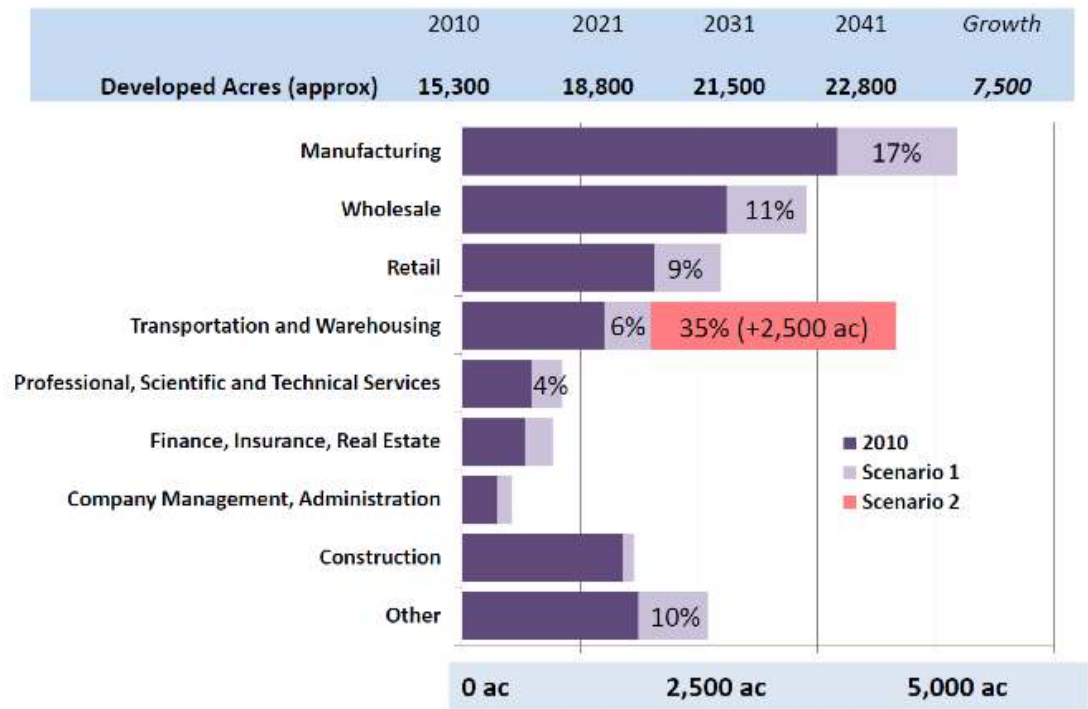
- The overall real estate industry becomes mature;
- It becomes ever more disciplined to avoid over-building;
- It has ever more strict financing conditions; and
- It operates within a limited land base with fewer vacant land parcels.

**6.3 METHODOLOGY: PORT GROWTH DEMAND SCENARIOS****Assumptions**

A critical issue is the conversion of the total employment projections for the entire Metro Vancouver into real estate space demand for one area in terms of expected real estate supply. The geographic allocation of future real estate space is based on past research, population growth, location (which includes infrastructure), professional judgment, land capacities and other salient factors.

Two scenarios for future industrial development were prepared by Metro Vancouver to estimate a potential time-frame for the take-up of the existing industrial land supply.

PROJECTED INDUSTRIAL LAND DEMAND



Source: Metro Vancouver

Under Scenario 1, where current industrial activity grows in proportion to the region’s projected population and employment growth, the land supply would likely be taken up by the mid-2020s. Under Scenario 2, which includes the assumptions under Scenario 1 plus “High Case” growth in international container trade through Metro Vancouver, the land supply would likely be taken up by 2020. Economically this is a critical situation for the region as industrial development ensures employment growth and increased tax revenues for all levels of government.

The red band in the above chart represents the total industrial land capacity for transportation and warehousing. The total 28,200 acres includes a buffer of about 2,400 acres to recognize constraints on industrial development viability. The constraints include RGS Urban or Mixed Employment designation which allows non-industrial development; topographic and environmental constraints; or existing and viable non-industrial use. The buffer also considers that, as the land supply reaches 85-90% saturation, the remaining supply will include smaller, scattered remnant parcels that may not be viable for industrial development due to limited site area, topography issues or a poor location.

Industrial land intensification is the term which is used to describe when land is being used in the most concentrated and efficient way possible. This means that building space and/or throughput is maximized for the tenant(s). For a building, this may mean multiple levels and for a high velocity distribution centre, this may mean extremely high operating efficiencies and volumes.

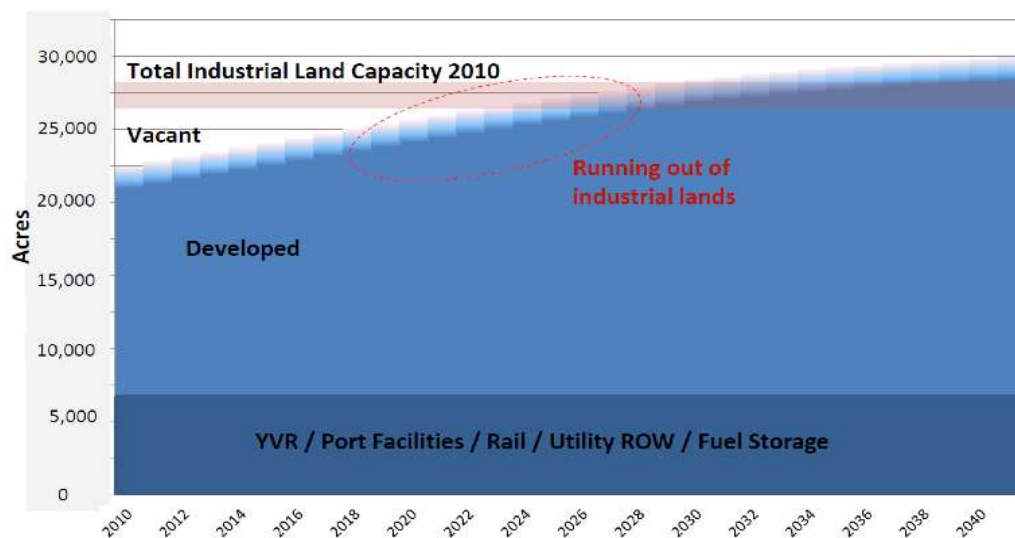


Under Scenario 1, without intensification (better use of vacant land), industrial demand would require an additional 2,200 acres by 2021, and another 1,700 acres by 2031. At this rate the land supply could be adequate into the mid-2020s. This is the minimum amount of land required and an unlikely scenario.

Under Scenario 2, assuming no intensification, land demand would require an additional 3,400 acres by 2021, and another 2,700 acres by 2031. The chart shows that, at this rate, land supply would be largely taken up by 2020. Land absorption on the chart assumes all land in the ILI is equally viable for development. A significant qualification under scenario 2 is that the warehousing and transportation land uses would require larger sites and seek strategic locations and access near the major highway routes. Both qualifications limit the viability of the remaining vacant lands for the key logistics sector. This is the maximum amount of land and more likely.

Based on any standard reasonable analysis, Metro Vancouver can be expected to have a serious industrial land shortage as early as 2023. While some surplus demand is currently being handled by Calgary, as an inland terminal, it is not as well located or as efficient, and most businesses would prefer to be near PMV. The land shortage is already having a major impact on the real estate market, driving up prices and creating undue speculation.

### INDUSTRIAL LAND DEMAND & SUPPLY



Source: Metro Vancouver

The incoming demand for container trade, which are necessitating capacity increases such as the Roberts Bank Terminal 2, would make that land shortage far more severe

## 6.4 PORT METRO VANCOUVER, INDUSTRIAL DEVELOPMENT AND LAND DEMAND

Port Metro Vancouver has many aspects, but the most important for the industrial real estate market relate to the container industry and the deep-sea terminals that handle the majority of this traffic. The region's largest container port (Deltaport) has developed and expanded, and the port authority is planning a major expansion known as the Roberts Bank Terminal 2 Project. Deltaport currently accounts for 60% of the region's container traffic, with the older terminals of Vanterm and Centerm in downtown Vancouver together accounting for most

of the remainder. Deltaport is larger than the other two terminals because it has excellent rail and highway connections and scale of supporting land and infrastructure. While the inner harbour terminals have potential for higher container volumes, Roberts Bank with Deltaport and the potential Terminal 2 have the potential for the largest share of container handling growth.

These container industry demands, needs and trends directly affect the opportunity to develop the industrial lands in support of the expanding container logistics industry. The relationships within the import/export container industry are important to understand as logistics related building developments drives demand for industrial lands.

The land shortage, coupled with congested rail and highway traffic, has made the Lower Mainland a less favourable location for some distribution centre operations. Port users have indicated that an ample supply of vacant industrial land is critical to expanding their facilities and for allowing them to add increasingly sophisticated logistics services. Without an expanded full service logistics industry to complement Port Metro Vancouver, sub-users will be attracted to other larger, more “full service” ports, such as LA Long Beach.

At present the region faces traffic congestion issues associated with both road and rail. This is being remedied through massive new infrastructure spending by all levels of government in recognition of the importance of accessibility and therefore competitiveness of PMV. Location and transportation infrastructure are critical because they reduce travel times and costs, and improve the efficiency of the distribution economy. Critical to satisfy all aspects of this need is ample, well located, vacant, industrial land.

The shortage of industrial sites which support port operations and expansion is already impacting the pattern of industrial development and limiting potential economic activity generated by PMV. The greatest evidence of this is the location of many large-scale import distribution centres (DC’s) far to the east (e.g. Calgary) rather than in suburban Metro Vancouver because the users simply cannot find suitable lands.

A distribution centre generates employment and property taxes as well as secondary employment across a wide area. Its economic impacts are seen on the docks, in the trucking industry, in the rail yards and in various other industries and geographic areas. This type of industrial activity is not just local, but is essential for the regional and national economy.

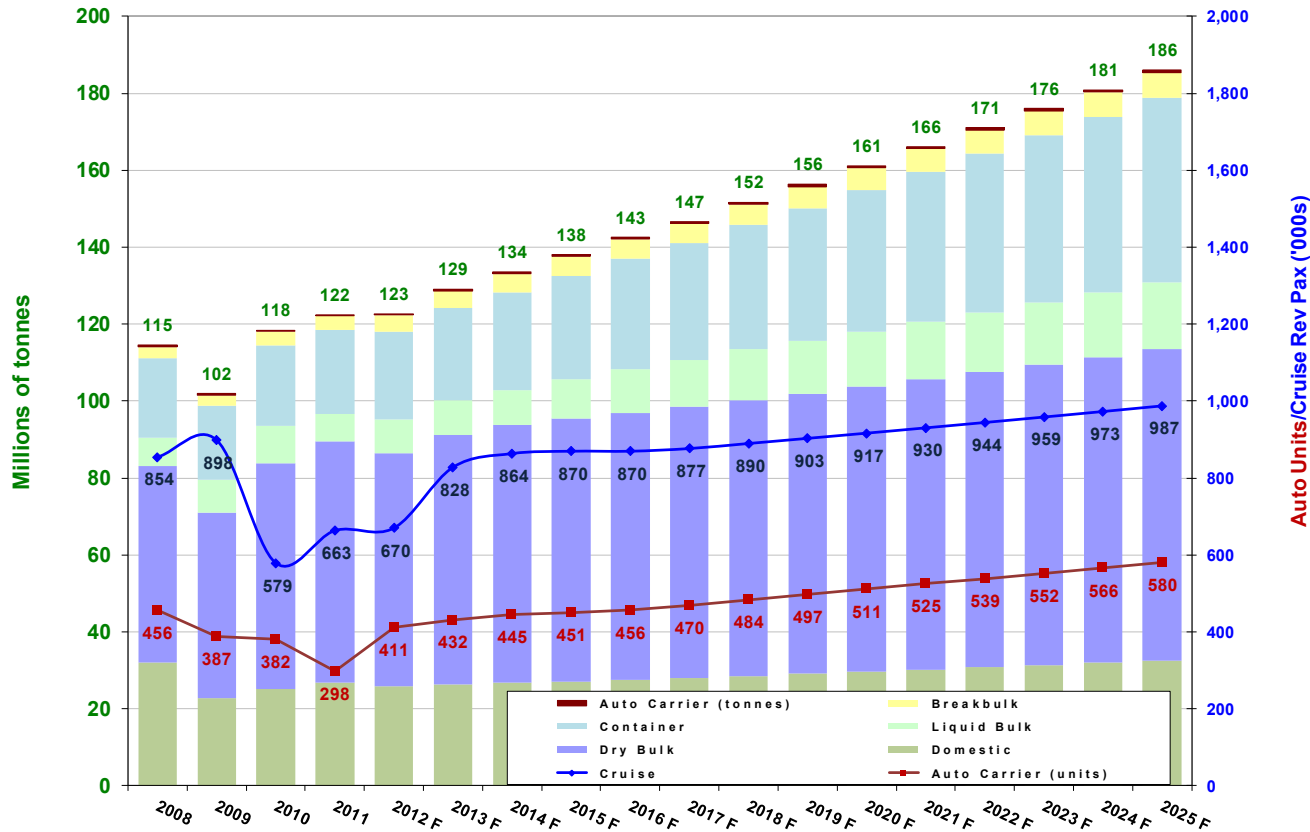
Industrial space in Metro Vancouver is growing at an average of over 4 million square feet per year. The growth of large industrial building space is estimated to be a quarter of the total, or approximately one million square feet per year. Container related logistics and industrial space is expected to account, directly or indirectly, for the majority of this “large industrial space”. The share of industrial space devoted to large-scale buildings (over 100,000 square feet) remains at approximately 41% of all industrial space within Metro Vancouver.

Industrial land demand projections rely on the determined relationships between large-scale logistics facilities and container industry activity forecasts in Metro Vancouver, as well as current trends and operating ratios for container-related businesses. The relevant data, information, assumptions, analyses, forecasts and estimated demand are described in this chapter of the report.

Use of PMV is growing and, with it, demand for industrial land. This section outlines projected growth at Port Metro Vancouver and defines the scale of the challenge to find lands which can accommodate and facilitate this growth and thereby support the Gateway program.

The highest expected throughput growth rates at Port Metro Vancouver are containers, liquid bulk commodities and dry bulk commodities as illustrated in below.

PORT METRO VANCOUVER - THROUGHPUT FORECASTS 2008 – 2025



A summary of the forecast of container throughput for Port Metro Vancouver (prepared by Ocean Shipping Consultants in 2012) is provided in below. For the period to 2025, potential demand forecasts for Vancouver and Prince Rupert are based on a four-step process as follows:

- Continental demand forecasts are based on the historical relationship between container volumes and North American Gross Domestic Product (GDP).
- The share of demand captured by Pacific Northwest Ports (Vancouver, Prince Rupert, Seattle and Tacoma) is assumed to remain constant over the forecast period.
- Import demand forecasts for the Ports of Metro Vancouver and Prince Rupert are based on expectations for Western Canadian GDP growth.
- Export demand forecasts for the Ports of Metro Vancouver and Prince Rupert are based on GDP forecasts for major destination markets in Asia.

Beyond 2025 a scenario-based approach was used. The resulting forecasts are shown below for the Pacific Gateway (including both Port Metro Vancouver and the Port of Prince Rupert).

## PACIFIC GATEWAY PORT (VANCOUVER AND PRINCE RUPERT) CONTAINER THROUGHPUT FORECASTS (TEU'S X 1 MILLION) 2011-2035

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2025	2030	2035
Low Case	2.92	3.11	3.26	3.41	3.56	3.74	3.91	4.08	4.25	4.42	5.27	5.91	6.41
Base Case	2.92	3.24	3.32	3.51	3.7	3.92	4.15	4.39	4.64	4.88	6.18	7.22	8.1
High Case	2.92	3.14	3.35	3.56	3.78	4.05	4.33	4.64	4.97	5.33	7.22	8.9	10.4

*Source: Ocean Shipping Consultants, 2013*

Forecasts for Metro Vancouver traffic were then developed in a further two step process:

- The baseline forecast is based on the North American and Pacific Northwest Ports' potential demand with Vancouver's share remaining constant.
- In addition to this baseline growth, the forecast assumes a 20% increase in traffic to Central and Eastern Canada due to an increase in market share, based on estimates of relative intermodal costs.

Based on the Ocean Shipping Consultants' forecast, overall potential import demand is driven not by the growth in North American GDP but, rather, by the growth in Western Canadian GDP. This has been, and is forecast to continue to be, higher than that for the continent as a whole. It will have the effect of driving import demand at a faster pace for this region than is anticipated for the entire market.

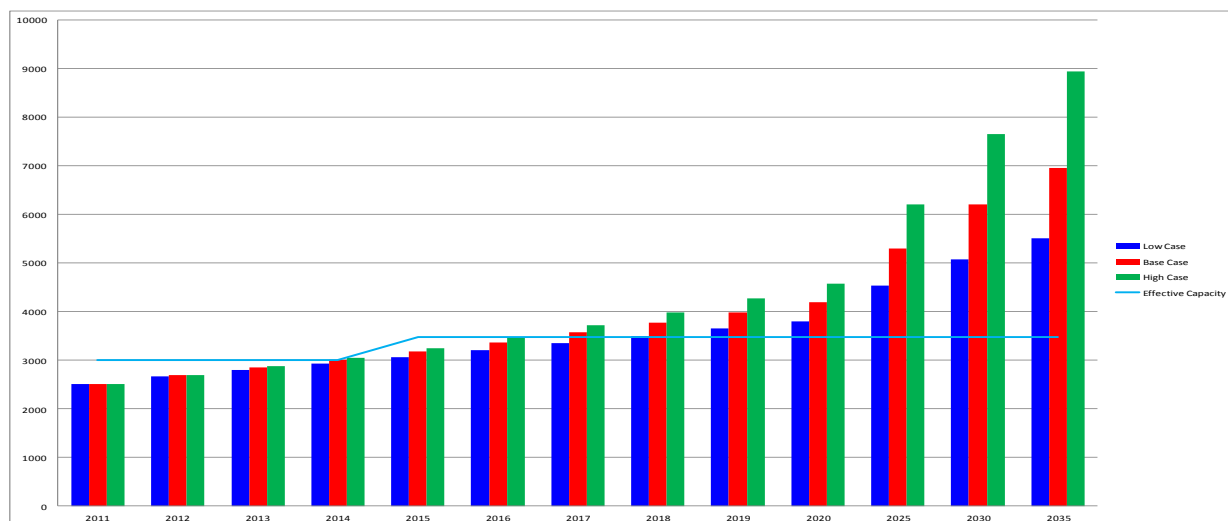
The long term forecasts (2011 to 2050) for container throughput at Port Metro Vancouver is summarized below in three forecast scenarios ('low', 'base' and 'high').

The Ocean Shipping forecasts assume that the actual level of year-on-year demand growth in exports will be driven by demand from the Asian markets – specifically China, and the current and stable link between GDP in these markets and overall demand growth is forecast to continue over the period to 2025. There will be strong and sustained demand growth in this sector, although port throughput of containers and commodities will remain vulnerable to short term disruptions at the macro-economic level in East Asia.

Achievement of these container throughput levels will require expansion of terminal capacity. Ocean Shipping Consultants forecasts suggest that for the 'Base Case', container throughput demand will exceed effective capacity (estimated at 85% of design capacity) in 2014 and from 2017 onward.

A comparison of the above container throughput is provided below.

## PORT METRO VANCOUVER CONTAINER THROUGHPUT FORECASTS VS. CONTAINER TERMINAL CAPACITY (TEU'S X 1,000) 2011-2035

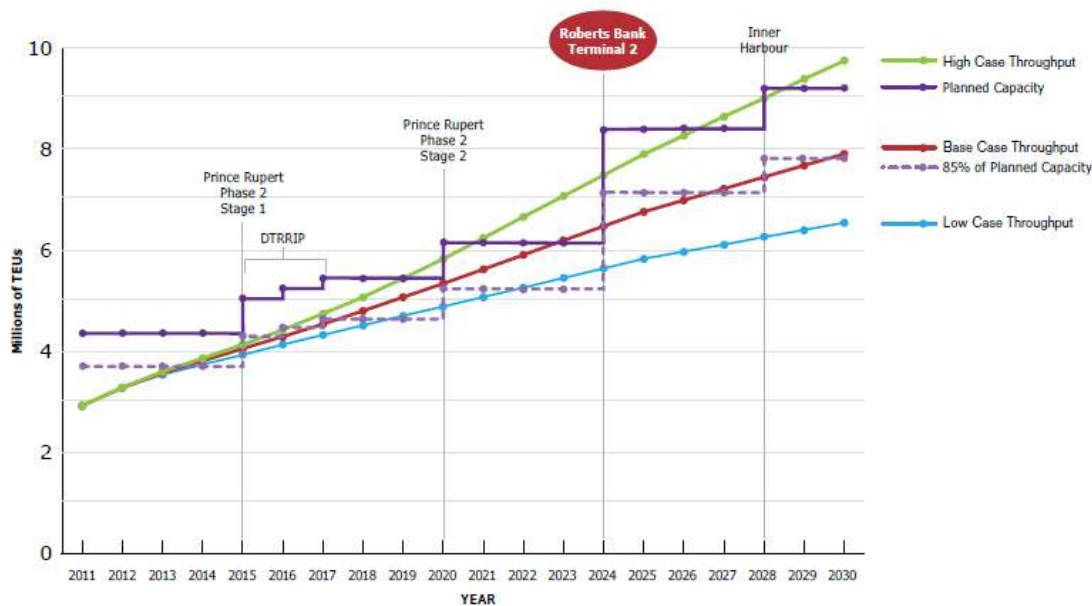


The expansion of capacity shown in 2015 is due to the anticipated completion of the 'Deltaport Terminal, Road and Rail Improvement Project' which includes reconfiguration of the intermodal yard, road access and rail tracks at Deltaport, boosting capacity by 600,000 TEU's per year to 2.4 million. Thereafter, capacity expansion through development of the new Terminal 2 at Roberts Bank and at Centerm would be required to remedy the capacity shortfall. RBT2 is a major undertaking and it would require many approvals before it would be permitted to proceed.

The requirement for additional capacity is clearly evident in the near future, even if the Low Case growth scenario is applied. It can be concluded that there is already a pressing need for some form of investment and expansion.

A comparison of Canada's west coast container throughput demand to PMV and Prince Rupert capacity with anticipated the development and expansion plans (at PMV and Prince Rupert) is provided below.

## CANADA WEST COAST (PMV & PRINCE RUPERT) CONTAINER THROUGHPUT FORECASTS VS. CONTAINER TERMINAL CAPACITY (TEU'S X 1,000) 2011-2035



Based on the current project schedule, and subject to environmental certification, the Roberts Bank Terminal 2 Project could be operational by the early 2020s.

Source: Ocean Shipping Consultants, 2013

Future plans centre on intermodal improvements to boost capacity at Deltaport and development of a second container terminal on reclaimed land at Robert's Bank. The port authority has plans to increase the capacity at Roberts Bank through the development of RBT2, with operations due to commence in 2024, as the following confirms:

- By reconfiguring the intermodal yard, road access and rail tracks, capacity can be boosted at the existing Deltaport terminal by 0.6 m TEU/year.
- The planned second terminal would also have 3 berths and capacity to handle 2.4m TEU/year when fully built up.

The model used later in this section utilizes ratios of land demand per container to forecast the growth in demand for large-scale buildings (over 100,000 sq. ft.) and their associated lands. As it is based on direct historical facts and the correlation between containers and container-related real estate, it is an authoritative and accurate method. The historical correlation is used for its ratio which may change slightly with increased efficiency but is relatively constant. The forecast and use of the ratio is used to forecast port-related land demand, tied to these container throughput forecasts. This provides a clear estimate of sq. ft. of new logistics building demand per increased container volumes.



## 6.5 DEMAND FOR LARGE SCALE INDUSTRIAL BUILDINGS SUITABLE FOR LOGISTICS

Currently, container related industrial land demand is for 110 acres of vacant land per year, which is slightly less than half the total industrial land demand. Based simply on growing infrastructure, container demand will add an additional 50 acres of demand each year to the status quo of 110 acres per year. This is a very significant increase in demand. In a high demand scenario, which assumes approval of Roberts Bank Terminal 2, an additional 100 acres would be added to the status quo of 110 acres per year. Based on these forecasts, total industrial land demand would be above 300 acres per year. It can reasonably be expected that industrial activity will be constrained by a severe land shortage within the next decade regardless of whether RBT2 is approved. There is very strong industrial demand and its development is not dependent upon container expansion at Roberts Bank.

The growth of large (over 100,000 sq. ft.) industrial building space is estimated to account for a quarter of the annual 4 million sq. ft. total, or about 1 million sq. ft. of new industrial space per year. Before 2001, large buildings represented 40% of the industrial market but average building sizes declined with the advent of the small and mid-sized owner-user market. Container related logistics and industrial space is expected to account, directly or indirectly, for the majority of “large scale industrial space” in buildings over 100,000 sq. ft. in size.

The federal and provincial governments have invested heavily in the Pacific Gateway, making it the International Marine Gateway to Canada and parts of the US. The incoming demand for container capacity necessitating the possible expansion of DeltaPort by means of a new intermodal yard (DPIY), and completion of a second terminal at Roberts Bank (RBT2), would lead to a dramatic increase in container volume. If approved, the new Port infrastructure would increase absorption to over 300 acres of industrial land per year. Regardless of possible Port expansion current demand is already more than sufficient much of the region's vacant industrial land base within the next decade.

Industrial businesses maintain that they cannot secure industrial land in the Lower Mainland and real estate brokers advise that there is currently unsatisfied demand for over 4 million sq. ft. of building area. This is equal to one year of pent up demand and it reflects the growing severity of the land shortage. Both the NAIOP report and the Metro Vancouver report indicate there are ever fewer well located, vacant sites ready for future large-scale container logistics developments.

Interviews with large-scale logistics tenants has revealed that they prefer locations which have lower transportation costs with immediate proximity to either Port Metro Vancouver or rail intermodal yards. Overwhelming demand and the lack of alternatives, supports the development of additional industrial lands to support the national supply chain and general industrial businesses.

In 2012, extensive research was conducted on the inventory of large industrial buildings and the logistics industry. It is based on supporting research undertaken by the BC Assessment Authority that was merged with Site Economics' database to generate a definitive list of all large industrial buildings in Metro Vancouver. In order to target large buildings only, a significant research project, which involved specialized B.C. Assessment Authority records, identified detailed information on each large-scale, single tenant industrial building in the region. These large buildings are the type built for and required by the logistics industry. The buildings constructed over the past four years have not been included and are not essential for this trend analysis. This

inventory is the primary research aspect of this report and a key element within this supply and demand assessment.

As of year-end 2010, the regional industrial market consisted of approximately 188 million sq. ft. of built space. This total includes all industrial buildings, both large and small. Richmond, Surrey, Burnaby and Delta account for the greatest supply and are clearly the dominant markets for both large and small industrial buildings.

The industrial building market in Metro Vancouver was 147 million square feet in 2001 and it grew by an average of 4.1 million square feet per year to its current size of 188 million square feet. This 4.1 million square feet is equal to a land area of 94 acres of one level buildings. When the parking lots, turning lanes, loading, landscaping and set backs are all accounted for, the regional industrial market absorbs 261 acres annually based on an industry standard of 0.36 Floor Space Ratio (FSR).

A significant and detailed research project using BC Assessment records provided detailed information on each large-scale, single tenant industrial building in the region. The large industrial building market in Metro Vancouver was 66 million square feet in 2001 and it grew by an average of one million square feet per year to its 2011 size of 76.6 million square feet. This annual building area expansion equates to a land area of 24.4 acres of large scale, one level buildings. When the parking lots, turning lanes, loading, landscaping and set backs are all included, the industrial market absorbs 60.1 acres of land annually based on the same 0.36 FSR.

Ever more efficient buildings make better use of the industrial land base and the most recent industrial buildings have an FSR of over 40%. If an average FSR of 0.425 is applied to the new building areas, annual land demand would drop to 57 acres for large industrial buildings and 221 acres for all industrial buildings. This average annual demand over the past ten years could reasonably be projected forward over the next ten years to assess large building industrial land demand. However, this study is designed to project land demand for large-scale logistics buildings based on PMV container throughput forecasts (expressed in TEU's).

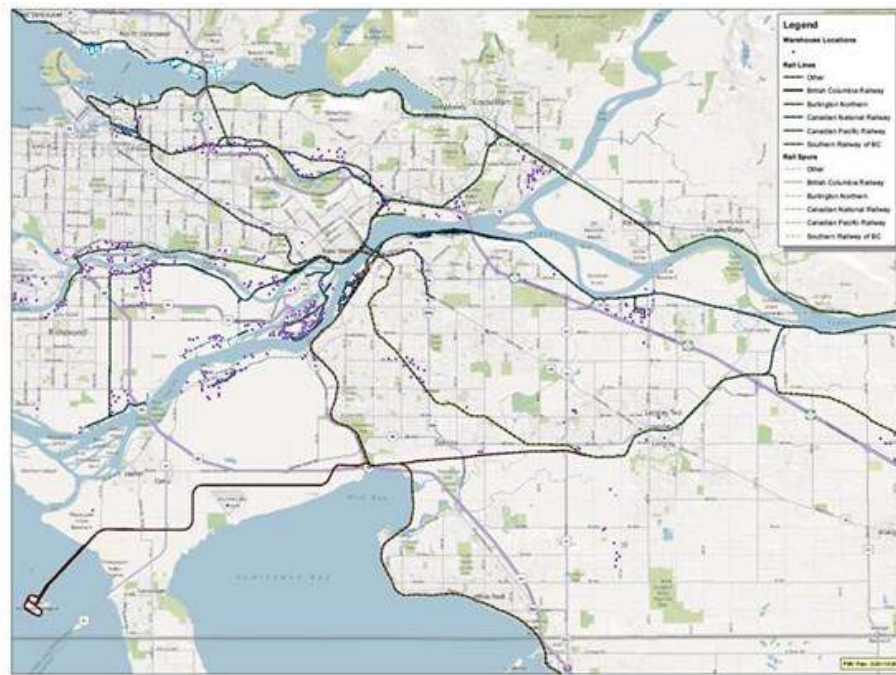
The share of the industrial market accounted for by large buildings has declined from 45% of all industrial buildings in 2001 to 41% in 2011. In terms of new industrial buildings only, large buildings account for 26% of the total, as shown in the following summary table and illustrated in the following map.

### TOTAL AND LARGE-SCALE INDUSTRIAL BUILDING SPACE - 2001 TO 2011

	2001	2011	Annual change
LARGE INDUSTRIAL ONLY SQ.FT.	65,984,946	76,594,758	1,060,981
ACRES OF LAND AT .36 FSR	4,208	4,884	68
SMALL INDUSTRIAL ONLY SQ.FT.	81,015,054	111,405,242	3,039,019
ACRES OF LAND AT .36 FSR	5,166	7,104	194
TOTAL INDUSTRIAL SQ.FT.	147,000,000	188,000,000	4,100,000
ACRES OF LAND AT .36 FSR	9,374	11,989	261
LARGE BUILDINGS SHARE OF TOTAL	45%	41%	26%

The large building inventory indicated that Richmond, Delta, Burnaby, Surrey, Vancouver and Langley are the main industrial centres in terms of total supply. In terms of growth over the past ten years, the largest expansion has occurred in Richmond, Port Coquitlam, Langley and Surrey.

## MAP OF LARGE INDUSTRIAL BUILDINGS



Source: Site Economics Ltd. Landcor and B.C. Assessment Authority

While the existing inventory of large buildings is concentrated in Richmond and Delta, the supply in Langley and Surrey is growing very quickly. Port Coquitlam and Burnaby also have significant inventories of large scale buildings. The recent expansion of the large building inventory in Richmond resulted from the availability of suitable vacant lands. The recent limited growth of large industrial buildings in Delta was due to the absence of suitable serviced vacant industrial lands. The new focus on Surrey and Langley is, in large part, due to the large inventory of vacant lands within these municipalities.

The older cities are experiencing very little growth as there is minimal vacant land available. Delta accounted for very little new industrial space as there were few large, serviced and ready-to-build sites. Delta's rate of growth would be much higher if a significant vacant industrial land base were serviced and made available. In the recent past, there has been a series of major developments such as the Boundary Bay Industrial Park. It is clear that when large serviced sites are made available in Delta, they are quickly developed in order to supply very high levels of demand.

## LARGE INDUSTRIAL BUILDINGS BY MUNICIPALITY

City	Total 2001	Build since 2001	Loss since 2001	Total 2011	Total Difference	Percent Increase
Abbotsford	737,617	-	-	737,617	-	0%
Burnaby	9,589,856	1,085,639	501,140	10,174,355	584,499	6%
Chilliwack	224,354	460,211	-	684,565	460,211	205%
Coquitlam	1,705,316	517,023	-	2,222,339	517,023	30%
Delta	11,669,610	953,646	342,776	12,280,480	610,870	5%
<b>Langley</b>	<b>4,013,479</b>	<b>1,368,954</b>	-	<b>5,382,433</b>	<b>1,368,954</b>	<b>34%</b>
Maple Ridge	6,552,542	-	-	6,552,542	-	0%
New Westminster	1,673,876	-	-	1,673,876	-	0%
This North Shore	354,877	61,750	-	416,627	61,750	17%
Van North Vancouver	244,100	-	-	244,100	-	0%
thru Port Coquitlam	3,218,998	1,858,726	132,000	4,945,724	1,726,726	54%
thru Richmond	13,045,368	4,216,459	598,622	16,663,205	3,617,837	28%
The Surrey	5,775,373	1,490,839	211,647	7,054,565	1,279,192	22%
Vancouver	7,179,580	549,227	678,477	7,050,330	(129,250)	-2%
Total	65,984,946	12,562,474	2,464,662	76,082,758	10,097,812	15%

defined as buildings of over 100,00 square feet in size.

In 2011, we prepared a detailed inventory and analysis of large-scale industrial building space in Metro Vancouver. Various container throughput measures were used to compare with the inventory of industrial and logistics building space. The following results for large logistics building space only in the Metro Vancouver region (and how that related to actual container throughput) were reported in that study.

## PORT METRO VANCOUVER LARGE-SCALE LOGISTICS FACILITIES OPERATING EFFICIENCY RATIOS, 2001 AND 2011

	2001	2011
Large Industrial Building Space (Square Feet)	66.0 million	76.6 million
Large Logistics Building Space (Square Feet)	46.2 million	61.3 million
Large Logistics Building Land Area (Acres)	2651	3517
Operating Efficiency Ratio – Regional Average (Sq. ft. / TEU)	36.9	24.4(*)

(\*) Note: 2011 building space inventory was divided by 2010 container volume for this ratio.

There is a direct link between the number of containers handled to and from the region's deep-sea terminals and the demand for logistics facilities and services within Metro Vancouver. This demand results, primarily, from container handling and cargo manipulation within Metro Vancouver before the (export) laden containers

arrive at the deep-sea terminals by truck, and after the (import) laden containers leave the deep-sea terminals by truck.

A model was developed to provide revised estimates of new, logistics-related land requirements through 2030. This model reflects the increasing efficiency and flexibility (overall) of Metro Vancouver’s logistics and distribution system capabilities.

In simple terms, the analysis calculates the demand for industrial floor space in square feet per container handled based on 2011 actual numbers. Using the historical data and the analysis in 2011, the (average) relationship between large, logistics building space and laden container throughput was 24.4 square feet per TEU at that time. The consistent calculation and application of this ‘operating efficiency ratio’ combined with PMV’s container throughput forecasts are key components of the model, which translates port activity directly to real estate demand. The model forecasts real estate demand based on TEU (container) throughput.

PMV’s most recent container throughput forecasts were used as the basis to estimate large-scale logistics building space demand (and the associated logistics-related demand for industrial land) in Metro Vancouver for the years 2020, 2025 and 2030. The results are reported in this document and indicate average annual building demand as well as the associated real estate demand (in acres using a FSR of 0.4) required to accommodate those logistics buildings.

These logistics-related land demand forecasts were prepared for the three forecast scenarios undertaken for PMV by Ocean Shipping Consultants in 2013 (i.e. the ‘low’ case, the ‘base’ case and the ‘high’ case) under the assumption that deep-sea container terminal capacity will **not** constrain the container throughput forecasted. This assumes, therefore, that the Deltaport Intermodal Yard (DPIY) and Terminal 2 (RBT2) will proceed and provide additional capacity generally as planned. To the extent that capacity expansion does not take place, or is delayed beyond that expected, PMV container throughput may not be as forecast and the resulting land demand may be correspondingly lower than anticipated. The low scenario would be applicable if there is no expansion of Deltaport, and RBT2 does not proceed. This was done for the proposed RBT2 expansion and does not reflect the proposed 600,000 TEU expansion at Centerm in Downtown Vancouver. Thus, given two terminals could possibly expand dramatically, the high scenario below is clearly much more likely than the low scenario.

The three scenarios used for the total container throughput forecasts by ‘Ocean Shipping’ and associated ‘large-scale’ logistics facility land requirements are as follows:

- Low Scenario = Scenario 1 – Existing PMV Capacity
- Base Scenario = Scenario 2 – Existing PMV Capacity + the DPIY
- High Scenario = Scenario 3 – Existing PMV Capacity + DPIY + RBT2

Demand for container throughput and logistics space are identical under all scenarios to 2017, or the first five years of the TFN industrial land development project.

The following table summarizes the demand forecasts for large-scale logistics buildings and the associated industrial land area under each ‘throughput forecast scenario’ through 2030. As referenced above, we expect that import distribution centres and export facilities will become ever larger and more efficient and make

optimal use of changing technologies and, therefore, slightly reduce land demand per container throughout the next few decades.

The table can be understood as follows:

- The first row under each scenario ('Operating Efficiency') reflects the increasing efficiency of Metro Vancouver's distribution and logistics infrastructure over time with new technologies, larger facilities and more efficient design and operation. The ratio is based (and adjusted from) actual data measured in 2011. It is valuable and accurate if applied consistently and properly in the same way that it was originally measured and calculated.
- The second row under each scenario ('Building Space Demand') describes the total (cumulative) demand for large-scale logistics buildings in square feet. It is estimated by combining PMV's container throughput forecasts with estimated 'operating efficiency' ratios.
- The third row under each scenario ('Logistics Facility Land Area Demand') describes the total (cumulative) demand for large-scale logistics facility land area in acres. These numbers translate large-scale logistics building demand to land area demand using a floor space ratio (FSR) of 0.4 per gross acre of industrial land. New logistics buildings are ever more efficient and are, sometimes, achieving FSR's slightly higher than 0.4.

The efficiency of Metro Vancouver's import and export container processing infrastructure will continue to improve with higher volumes and new DC development over time as reflected in the 'operating efficiency' ratio estimates.

Container industry supported large-scale logistical/industrial space demand in Metro Vancouver is shown to average well over 100 acres per year over the next decade under the assumption that the Deltaport Intermodal Yard and Terminal 2 are completed and operational in 2017 and 2020 respectively. Without these projects, capacity limitations will be reached at Roberts Bank and lower related logistics space demand regionally (but only after 2017 or 2020) as shown in the above table.

It is important to recognize that the above demand forecasts are for new, large (>100,000 square feet) logistics facility space within the Metro Vancouver region.

Variations in the growth of land demand will result, in part, from the expected increase in the occupancy and utilization of existing space. Over the next two decades, the demand for container logistics and related facilities within Metro Vancouver is expected to be very significant and continue to grow.

The low scenario would resemble growth if RBT2 is not approved. There is still ample new demand more than sufficient to absorb the existing vacant industrial land base.



## CONTAINER ASSOCIATED LARGE-SCALE LOGISTICS FACILITY LAND DEMAND FORECASTS 2020-2025-2030 - INDUSTRIAL LAND ABSORPTION

	2020	2025	2030
<b>LOW FORECAST SCENARIO (1)</b>			
(No Capacity Constraints)(Exisiting PMV Capacity)			
- Operating Efficiency Ratio (Square Feet per TEU)	20.7	19.2	17.6
- Large Logistics Building Space Demand (Total) (Million Sq. Feet)	78.6	86.8	89.4
- Large Logistics Facility Land Area Demand (Total)(Acres)(FSR=0.4)	4,509	4,981	5,130
- <b>Cumulative Total New Land Demand From 2011 (Acres)</b>	<b>992</b>	<b>1,464</b>	<b>1,614</b>
- Annual Land Demand From 2011 (Acres per Year)	110	105	85
- <b>Annual Land Demand Over 5-Year Period (Acres per Year)</b>	<b>110</b>	<b>94</b>	<b>30</b>
<b>BASE FORECAST SCENARIO (2)</b>			
(No Capacity Constraints)(Exisiting PMV Capacity + DPIY)			
- Operating Efficiency Ratio (Square Feet per TEU)	20.7	18.7	16.7
- Large Logistics Building Space Demand (Total) (Million Sq. Feet)	86.9	99.3	103.8
- Large Logistics Facility Land Area Demand (Total)(Acres)(FSR=0.4)	4,987	5,699	5,955
- <b>Cumulative Total New Land Demand From 2011 (Acres)</b>	<b>1,471</b>	<b>2,182</b>	<b>2,439</b>
- Annual Land Demand From 2011 (Acres per Year)	163	156	128
- <b>Annual Land Demand Over 5-Year Period (Acres per Year)</b>	<b>163</b>	<b>142</b>	<b>51</b>
<b>HIGH FORECAST SCENARIO (3)</b>			
(No Capacity Constraints)(Exisiting PMV Capacity + DPIY + T2)			
- Operating Efficiency Ratio (Square Feet per TEU)	20.7	18.3	15.8
- Large Logistics Building Space Demand (Total) (Million Sq. Feet)	94.7	113.4	121.2
- Large Logistics Facility Land Area Demand (Total)(Acres)(FSR=0.4)	5,436	6,506	6,956
- <b>Cumulative Total New Land Demand From 2011 (Acres)</b>	<b>1,920</b>	<b>2,990</b>	<b>3,440</b>
- Annual Land Demand From 2011 (Acres per Year)	213	213	181
- <b>Annual Land Demand Over 5-Year Period (Acres per Year)</b>	<b>213</b>	<b>214</b>	<b>90</b>

## 7. POSSIBLE NEW SUPPLIES OF INDUSTRIAL LANDS

### 7.1 FUTURE POTENTIAL INDUSTRIAL LAND SUPPLY

There is very little well located industrial land left in the Metro Vancouver region, as all of the well-located industrial lands have been developed. The inventory of vacant industrial lands tends to be remote and not well suited for the transportation industry.

There are several ways which land can be added to the industrial supply:

**Land Reclamation:** Opportunities to create land with an emphasis on process, timing and cost. It should be noted that this is extremely expensive, time consuming, and difficult. RBT2 is expected to be the most significant example of this in Metro Vancouver and it is not a common or recommended way to add significant amounts of land to the inventory. In addition to cost and time is the difficulty associated with environmental regulations.

**First Nation Partnerships:** Opportunities to work with First Nations to create industrial land offers strong potential but a limited scale. TFN added a significant amount of critically important new logistics orientated land as part of an ALR exclusion but there have been few other examples. The First Nations in Port Coquitlam have indicated that they may be able to provide a small area of industrial land to the market. As this would be on a land lease it is expected that this could become logistics orientated development. The vast majority of FN lands are not available due to their location and this is not expected to result in much more than perhaps 100 new acres of new land.

**Agricultural Land Reserve:** There is the theoretical potential for lands currently located with the ALR to be re-designated to industrial in order to ensure a strong local economy.

### 7.2 LANDS OUTSIDE METRO VANCOUVER

There are, potentially, lands located outside the Metro Vancouver area which could prove beneficial to Port Metro Vancouver and the container industry it serves. These include inland container terminal operations in strategically located centres such as Ashcroft and Calgary. The potential for inland terminals entails risk and it is expected that the private sector has sufficient well-priced and well-located lands to ensure that this aspect of the market does not need to be supported by Port investment.

The availability of large tracts of lands in Calgary, which can be made available to trade related-logistics activity, will ensure that port throughput will not be significantly constrained by the lack of industrial land in Metro Vancouver. Development in Squamish and Calgary is reviewed below.

#### **Squamish Terminals**

Squamish Terminals Ltd. is a deep-water, break-bulk terminal located in Squamish, BC, 32 nautical miles north of Port Metro Vancouver. Squamish Terminals is a wholly owned subsidiary of Grieg Star Shipping AS (based in Bergen, Norway). Development of the terminal was undertaken in response to the northward extension of BC Rail service and growth in the pulp sector. The terminal began operations in 1972.

The facility handles breakbulk cargo, including forest products (primarily pulp), steel imports and project cargo. It has two berths which handle common size Panamax vessels and three warehouses occupying approximately 47,400 square meters (510,000 square feet). Rail service is provided by CN since the transfer of BC Rail operations to CN in 2004. Steel imports are also trucked to the Lower Mainland. Squamish Terminals could provide additional breakbulk capacity in the event Port Metro Vancouver breakbulk capacity is unable to accommodate growth in traffic. However, based on PMV forecasts this is unlikely to occur.

### **Large Logistics Buildings in Calgary**

It would be logical to conclude that large buildings are still being constructed to meet container driven demand, however, due to the Metro Vancouver industrial land shortage and high cost of land, a large share of these buildings are now being developed in Calgary. While it is not as attractive a location as Metro Vancouver it is still suitable and sufficient for at least some users. It is insufficient for transload and many other users whose focus is not necessarily Alberta. There are dozens of anecdotal examples of major retailers such as Costco and Target choosing Calgary over Metro Vancouver due simply to the lack of available land. It is reasonable to infer that the scale of the large logistics buildings locating in Calgary rather than Metro Vancouver, due to the land shortage, would be at least 500,000 sq. ft. per year and likely higher.

Calgary has a large and growing transportation and goods handling sector which is evidenced by the large number of logistics buildings being developed. Calgary has an excellent location with easy rail and highway access both east and west. Just one example of the rapid growth of logistics in the city is the new CN Conrich facility. It is a 680-acre logistics hub located at Conrich, which is 20 km north-east of downtown Calgary and 10 km from Calgary International Airport. The \$200 million project was completed in 2013. The logistics park has space to accommodate more than 2.5 million square feet of warehouse distribution facilities, and includes a rail-to-truck transload operation and a new CN Autoport facility to serve the regional finished vehicles market.

The Calgary Logistics Park appears to have been developed primarily to improve CN's competitiveness for intermodal traffic in the southern Alberta market, rather than as an inland terminal for the container industry. CN noted that the new facility will provide "Alberta businesses ample capacity for consumer goods and industrial materials and effective export routes for forest products, plastics and agri-products."

### **Inland Terminal Calgary**

- Estimate 50 acres of trade related logistics developments locate in Calgary and this will soon double to 100 acres per year, due to the local land shortage.
- Metro Vancouver is expected to lose approximately 2,000 acres of industrial development to Calgary by 2035, as it takes over growth.
- Calgary is an excellent and fast growing inland terminal and regional logistics hub. Despite this, it is not as efficient as Metro Vancouver, where more international containers should be emptied, close to Port Metro Vancouver.

### **Inland Terminal Ashcroft**

- Ashcroft is a growing inland terminal well suited to loading Canadian exports into containers for efficient westward transfer through PMV.

- Ashcroft is not suitable as an import inland terminal with distribution centres as these facilities are typically located in a large Metro Area for which a substantial portion of imported goods are consumed.

Based on the preceding analysis, it is clear that the development of logistics/distribution facilities outside Metro Vancouver is welcomed and beneficial to accommodate growing demand. Despite this, inland terminals and locations remote from Port Metro Vancouver cannot be relied upon to meet the full range of facilities needed. Metro Vancouver is a major marine transportation hub and it requires the focussed presence of most logistics businesses in order to expand and enhance its role and services. More logistics firms ensure a better and more efficient gateway which will be able to evolve to meet changing demands.

## 8. ECONOMIC IMPACT

### 8.1 INTRODUCTION

This section of the report explains and summarizes the overall economic impact of a typical block of industrial land development and use upon full operation. It provides estimates of the overall direct and secondary economic benefits. One of the most important considerations is the potential employment creation and general economic impacts for the region.

This summary economic impact assessment provides a preliminary estimate of regional economic benefits from an example 100 acre industrial site. The results of the analysis provide sufficient information for the developer and approving authorities to make informed decisions on the wider economic value of a project. This section lists some of the main issues, describes economic impacts and applies conservative economic multipliers within the model. All references to monetary values are in current Canadian dollars.

### 8.2 PROJECT DEVELOPMENT SCALE AND VALUES

The following describes the estimated order of magnitude expenditures and investment associated with land development and construction for a theoretical 100 acre industrial development.

Based on available information, this project has a total potential size of 2.0 million sq. ft. of industrial floor space on 100 net acres, with a total development cost of approximately \$204 million. These cost estimates are based on industry standards and will be refined once the project design and budget are finalized.

The project information provided, which forms the basis for this valuation, is as follows:

#### Project Details

- Net size = 100 acres
- Approximately 2.0 million sq. ft. of industrial/business floor space
- Development / absorption period = 8 years

#### Estimated Values

- Servicing / DCC total costs per net industrial land acre = \$300,000 (average)
- Building construction costs (hard and soft) per sq. ft. = \$65 (average)
- Value of finished project per sq. ft. of building = \$167 (average)
- Total Servicing / Construction / Soft Cost Spending = \$204 Million
- Final Project Value = \$327 Million (including land)
- Annual Property Taxes / Levies Upon Completion = \$6 Million

### 8.3 PROJECT CONSTRUCTION: ECONOMIC IMPACT RESULTS

The regional economic benefits expected to occur from the industrial park are outlined in the following sections.

Municipal and regional Development Cost Charges (DCCs) are payable at the time of development. DCCs may be used by the local government to fund off-site improvements which would generate economic and employment activity in the region. These costs do not generally include the very significant on and off site

servicing costs which enable the project to proceed and which would be directly paid for by the developers. These costs have been summed in the analysis to determine the total project development costs and the ensuing economic and employment impacts.

It is a widely used industry assumption that approximately half of such construction spending occurs for local labour. Past research has consistently shown industrial jobs pay much more than service jobs. At an average annual salary of \$60,000 per person, this equates to about 1700 direct jobs per year over the 8 year development period. The readily available construction employment multiplier information indicates a multiplier ratio of somewhere between 1.2 (direct only) and 1.6 (considering migration). Assuming a 1.4 multiplier for the approximately 1700 direct construction jobs, this provides for an additional 680 secondary jobs per year associated with the development.

The construction project would generate approximately 1700 person-years of direct employment and 680 person-years of secondary employment (or a total of 2380 person-years of employment) over the 8 year development period from site preparation and building construction alone.

#### Economic and Employment Impact Model

<b>Project Development Costs</b>	<b>Total</b>
Building Construction	\$ 129,373,200
Land Servicing Costs (both on-site and off-site)	\$ 25,000,000
Soft Costs	\$ 49,580,736
<b>Total Servicing/Construction Costs</b>	<b>\$ 203,953,936</b>
<b>Project Development Local Labour Component</b>	
Percent of Costs as Local Labour	50%
<b>Total Local Labour Expenditure</b>	<b>\$ 101,976,968</b>
Duration of Project Construction (years)	8
Average Local Labour Expenditure per Year	\$ 12,747,121
Average Annual Salary per Employee	\$ 60,000
<b>Local Development Direct and Indirect Employment</b>	
Total Number of Direct Jobs per Year	212
<b>Total Number of Direct Employment Years for Development</b>	<b>1,700</b>
<i>Employment Multiplier</i>	<i>1.40</i>
Total Number of Indirect Jobs per Year	85
<b>Total Number of Indirect Employment Years for Development</b>	<b>680</b>
Total Number of Direct and Indirect Jobs per Year	297
<b>Total Number of Direct and Indirect Employment Years for Development</b>	<b>2,379</b>

## 8.4 PROJECT COMPLETION: ECONOMIC IMPACT RESULTS

### Property Value and Taxes

Based on market conditions, the finished value of the project is expected to be in the order of \$327 million (current dollars), including both land and buildings (plus additional significant investments for machines and equipment).



Using a typical industrial mill rate, this provides for annual property taxation/levies of approximately \$6 million. At a 7% discount rate, the Net Present Value of this future flow of taxation revenue upon completion of the project would be \$89 million, after the first year of construction.

Approximately half of the property tax / levies would be allocated to the host municipality exclusively, and the balance to other taxing authorities. The property taxes were calculated in the traditional manner of the property value divided by 1,000 times the property tax rate.

### Permanent Employment

The businesses which locate in area because of this new industrial project will generate ongoing jobs and economic benefits for the municipality and region. Once the development is fully developed or 'sold out', direct employment associated with these business operations will total in the range of 2,000 new permanent full-time jobs annually. Using an average salary of \$60,000, ongoing expenditures on wages and salaries will total in the range of \$117 million annually (in 2015 \$). The very large majority of this economic benefit will accrue to municipal and regional residents who work for businesses located in the industrial park. This estimate is conservative as the square foot per employee could change and the number of new permanent jobs 30% higher than estimated depending on the ratio of large warehouses to smaller premises.

To determine the number of permanent jobs, a floor space area per employee value is applied. The market standard for industrial uses, based on the larger area typically required for warehouse operations, is 1,000 sq. ft. of building floor area per employee, 800 sq. ft. for multi-tenant industrial buildings, and 600 sq. ft. for corporate flex / office space. This study uses an average of 1000 sq. ft. per employee.

Finished Project Value	Building Sq Ft	Value / Sq Ft	Project Value
Project Final Value - Industrial	1,960,200	\$ 167.00	\$ 327,353,400
<b>Total Project Value</b>			<b>\$ 327,353,400</b>

Ongoing Annual Total Property Taxes/Levies	Total Value	Mill Tax Rate	Annual Taxes
Annual Property Taxes - Industrial	\$ 327,353,400	19.19	\$ 6,281,912
<b>Total Annual Property Taxes</b>			<b>\$ 6,281,912</b>

Ongoing Employment of Complete Project	sq ft per Job	Est. # Jobs	Avg. Income	Annual Salaries
Industrial	1,000	1,960	\$ 60,000	\$ 117,612,000
<b>Total Ongoing Employment</b>				<b>\$ 117,612,000</b>

### Permanent Annual Economic Contribution

The businesses which locate in the proposed new industrial park will purchase a wide variety of goods and services locally, regionally and further afield. Expenditures on these goods and services represent valuable economic benefits to those local and regional companies who supply the goods and services needed.

As new businesses locate in the area, their ongoing business operations will generate economic benefits for Metro Vancouver in three primary areas as follows:

- Employment creation and the resulting expenditures on wages and salaries;
- Ongoing purchases of goods and services for corporate operations; and

- The payment of taxes and other charges during the development of the subject lands and ongoing company operations.

These expenditures are estimated to generate substantial economic benefits regionally over the years. Preliminary estimates of the magnitude of these expenditures have been made for purposes of this overview economic analysis. As with all other economic impact estimates, substantially more detailed analyses would be required to refine these estimates as the project moves forward.

## 8.5 SECONDARY ECONOMIC BENEFITS

Secondary (indirect and induced) economic impacts are realized regionally in proportion to the direct impacts summarized above. These are real and noticeable results of the economic activity and spending which occurs from the project's development and ongoing operation.

Economic impacts are best described in current dollars as a Net Present Value, or what they would be worth today if the benefits all accrued at once. Because of the magnitude of the proposed project and the ongoing employment and business operations it will generate, total economic benefits expected to be realized regionally are considerable.

To determine "direct economic impacts" in the Lower Mainland which are associated with these expenditures, it has been assumed that 20% of the total investment above leaks directly out of the region to suppliers located elsewhere in BC, Canada and/or the United States. Once this estimated 'leakage' is taken into account, the NPV of the direct economic impacts on the Lower Mainland arising from this investment over the years of industrial park construction (i.e. the period of industrial lot absorption) plus the long term use are estimated.

These direct economic impacts are very substantial and, accordingly, they warrant a more detailed evaluation than the scope of this study permits. The economic and employment impacts within the orders of magnitude estimated are realistic given the scope of the development proposed and the land absorption projections described in the previous section.

## 8.6 ECONOMIC MULTIPLIERS

Secondary economic impacts will occur in the Lower Mainland as a result of the proposed development. A detailed evaluation of appropriate multipliers is required to provide an accurate estimate of the magnitude of these induced and indirect economic benefits (which comprise the secondary impacts). These multipliers provided by BC Stats, are estimated to derive total impacts (i.e. direct + secondary impacts) from direct impacts. Effectively, therefore, they indicate that secondary impacts account for 30% to 40% of direct impacts.

Upon project completion and full occupation, the annual property taxes and annual employee payroll is estimated to be approximately \$124 million. All cash flows must be subject to a discount rate reflecting their lesser value in the future. (The discount rate for an investment by a utility or typical government ministry is on the order of 7-8%. The discount rate for a private sector corporate investment is typically on the order of 12-15%. The industry standard for a large, complex real estate development is typically set at 10%.) Using an industry standard 10% discount rate, this economic activity stream provides for a net present value of approximately \$1.3 billion. In addition, the initial construction/development expenditures are estimated at \$200 million. Assuming an economic impact multiplier of 1.30, this provides for an additional secondary impact

(indirect induced effects) of approximately \$600 million. This provides for a net present value for the total estimated economic impact of approximately \$1.9 billion.

## ECONOMIC MULTIPLIERS

<b>Ongoing Annual Property Taxes/Levies</b>		
Annual Property Taxes	\$	6,281,912
Discount Rate		7.0%
<b>NPV of Perpetual Revenue Stream</b>	<b>\$</b>	<b>89,741,596</b>
<b>Ongoing Employment of Complete Project</b>		
Jobs Salaries	\$	117,612,000
Discount Rate		10.0%
<b>NPV of Perpetual Revenue Stream</b>	<b>\$</b>	<b>1,176,120,000</b>
<b>NPV of Direct Economic Effects</b>	<b>\$</b>	<b>1,265,861,596</b>
<b>Total Initial Development/Servicing/Construction Costs</b>	<b>\$</b>	<b>203,953,936</b>
<b>Total Initial Costs and NPV of Direct Economic Effects</b>	<b>\$</b>	<b>1,469,815,533</b>
<b>Economic Multiplier / NPV Secondary Economic Effects</b>	<b>1.30</b>	<b>\$ 440,944,660</b>
<b>NPV of all Direct and Secondary Economic Effects</b>	<b>\$</b>	<b>1,910,760,192</b>

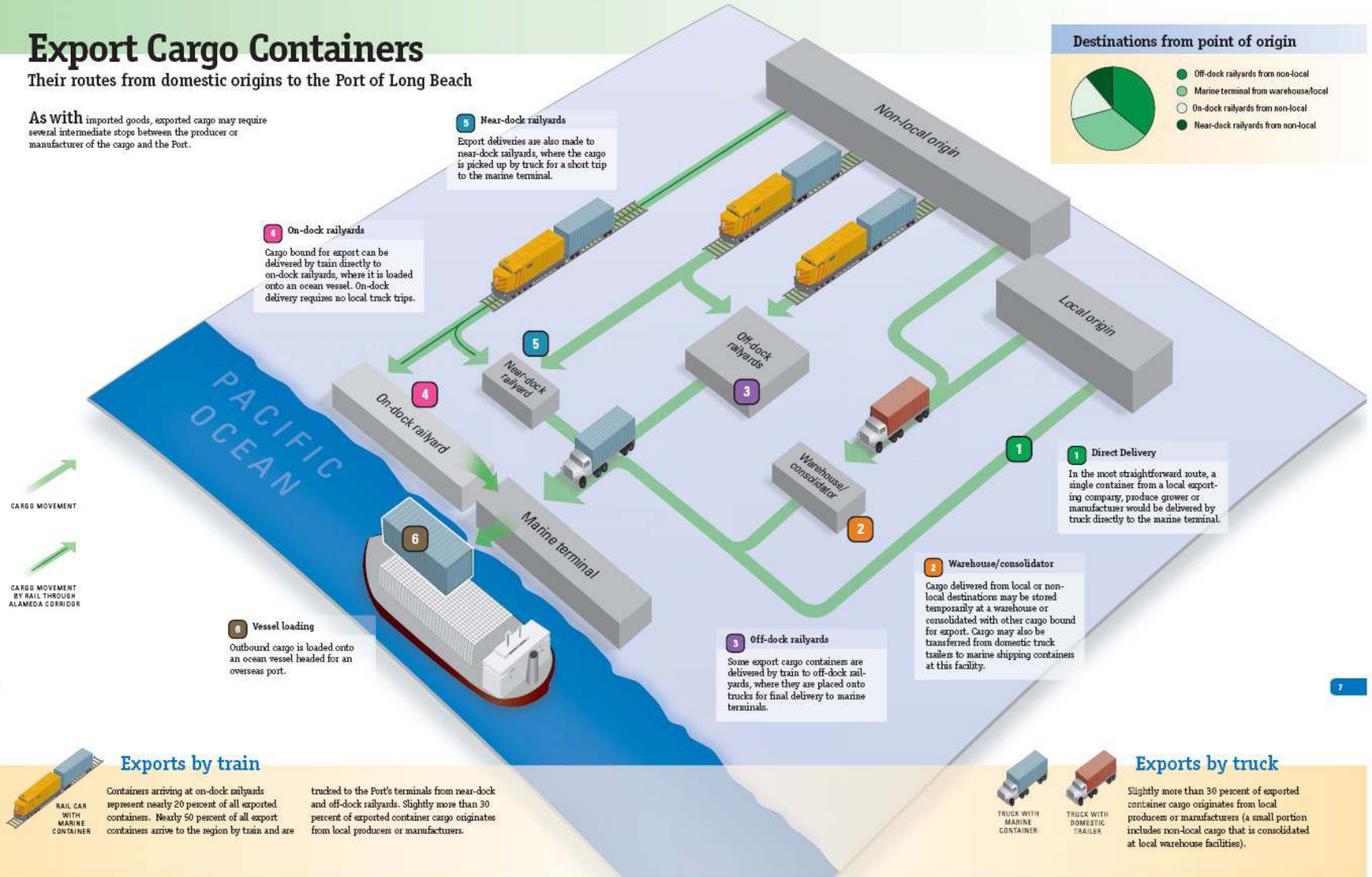
For the example 100 acre industrial development, the total estimated net present value of the direct and secondary economic impacts associated with the development and occupation of the project is conservatively estimated at approximately \$1.9 billion. In summary, the project will make a significant contribution to the employment and economic base of the region, both during initial construction and ongoing operations of the businesses that locate there.

## 9. APPENDIX – PORT / TRADE GRAPHICS

### Export Cargo Containers

Their routes from domestic origins to the Port of Long Beach

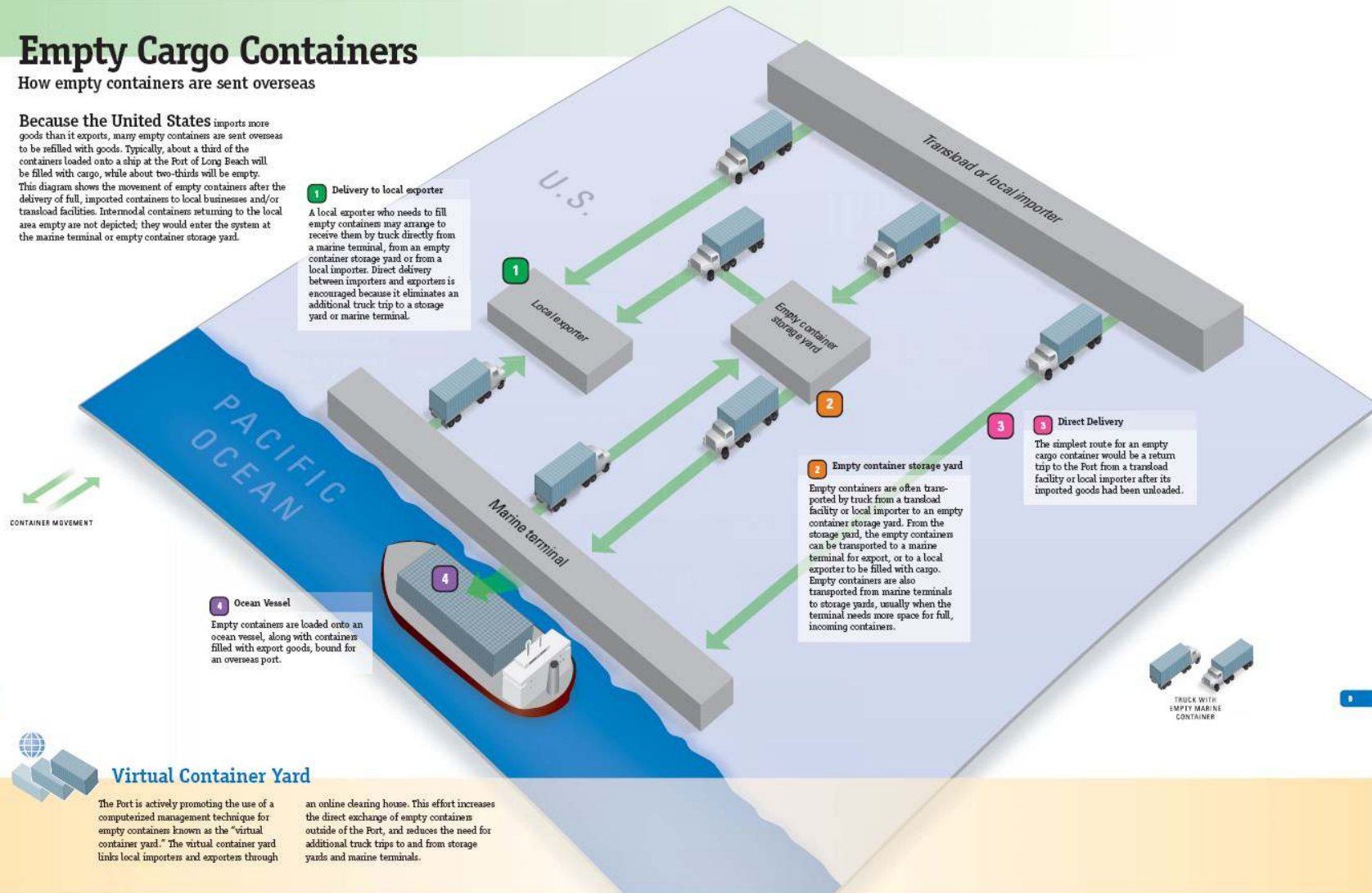
As with imported goods, exported cargo may require several intermediate stops between the producer or manufacturer of the cargo and the Port.



# Empty Cargo Containers

How empty containers are sent overseas

Because the United States imports more goods than it exports, many empty containers are sent overseas to be refilled with goods. Typically, about a third of the containers loaded onto a ship at the Port of Long Beach will be filled with cargo, while about two-thirds will be empty. This diagram shows the movement of empty containers after the delivery of full, imported containers to local businesses and/or transload facilities. Intermodal containers returning to the local area empty are not depicted; they would enter the system at the marine terminal or empty container storage yard.





# Import Cargo Containers

Where they go once they arrive at the Port of Long Beach

From the Port of Long Beach, containers are either transported by train or by truck to their final destination, or to one of several intermediate destinations such as a railyard, warehouse, distribution center, or "transload" facility (a sorting, routing and short-term storage building). A container's final destination will determine exactly what path it will take once it leaves the dock.

## 2 Freight forwarder

A container's movements are determined by the cargo's owner, or an industry professional known as a freight forwarder or "logistics provider." The freight forwarder will provide directions to the marine terminal operators and contact a trucking company or train operator to move the container out of the Port.

## 3 On-dock railyard

Cargo can be placed directly onto trains at the marine terminals' "on-dock" railyards. On-dock railyards are operated by marine terminals. This method of transportation is the most environmentally friendly, as it reduces truck traffic and air pollution generated by goods movement.

## 1 Unloading the ship

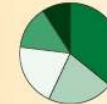
When a ship arrives at the Port, the marine terminal operator will arrange for unionized longshore workers to unload the vessel. The terminal operator directs the longshore workers to place the cargo containers where they belong: on trains, trucks or on terminal property for temporary storage.

## 4 Near-dock railyards

Cargo is often transported by truck to larger "near-dock" railyards close to the Port. This requires a shorter local truck trip than "off-dock" railyards or long-distance truck trips. Near-dock railyards serve multiple marine terminals.

Non-local destination

## Final destinations



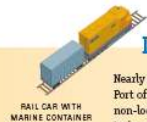
- Local via transload/warehouse and direct delivery
- Non-local via near-dock railyards
- Non-local via transload/warehouse
- Non-local via off-dock railyards
- Non-local via near-dock railyards

CARGO MOVEMENT

CARGO MOVEMENT BY RAIL THROUGH ALAMEDA CORRIDOR

4

## Imports by train



RAIL CAR WITH MARINE CONTAINER

Nearly half of all imported containers at the Port of Long Beach are transported directly to non-local destinations by train. Half of that train cargo begins at on-dock railyards,

requiring no local truck trips. The remaining half of train cargo is first moved by truck to near-dock or off-dock rail facilities.

U.S.

PACIFIC OCEAN

5 Transload or storage yard  
Shipping containers are often moved initially to a "transload" facility where workers unload the cargo from the marine container, sort it and repackage it into larger-sized truck trailers. The larger trailers are used to transport the cargo from the transload facility to regional distribution centers, local stores or off-dock railyards.

## 6 Off-dock railyards

Off-dock railyards are used to coordinate rail deliveries to non-local destinations. Containers are delivered here by truck, then sorted and grouped by final destination. These railyards handle Port cargo as well as domestic cargo from other sources.

## 7 Direct delivery

In the simplest transportation plan, a single container imported by a company for its own use would be delivered by truck directly from the marine terminal to a local store or factory.

## Imports by truck



TRUCK WITH MARINE CONTAINER



TRUCK WITH DOMESTIC TRAILER

Slightly more than half of all imported containers at the Port of Long Beach are transported by truck to a local warehouse, transload facility, or importer. The majority of

this locally-delivered cargo is consumed locally. The remainder is delivered by truck, sorted and delivered to non-local destinations.

5



# Overseas Container Transport

The journey across the Pacific Ocean and into the U.S.

**Imported cargo** generally starts at an overseas manufacturer, supplier or consolidation facility, where items are boxed and placed inside a metal shipping container. The U.S. buyer may contact an industry professional known as a "freight forwarder," or logistics company, to coordinate transportation of the cargo. The container will then be transported to a foreign port, assessed for possible security risks and placed aboard a giant container ship that will deliver it to the Port of Long Beach.

## 1 Product ordered

A typical import transaction starts when a U.S. wholesaler, retailer or other buyer orders products from an overseas manufacturer. These products may be packaged into a container at the manufacturer and shipped directly to port, or sent to a warehouse or consolidation facility where they are packaged with other products destined for the same overseas port.

LOCATION SHOWN



## 2 To port

Once the product has been ordered and packaged, the buyer or freight forwarder will arrange for a local trucking company to move the container to seaport, and then for a ship to transport the container overseas.

## 5 Coast Guard review

The U.S. Coast Guard reviews crew and cargo manifest information, which must be delivered at least three days before any ship arrives at U.S. shores. Coast Guard "boarding teams," with bomb-sniffing dogs, are authorized to board any ship at sea for any reason, even if the captain or crew objects.

## 4 All aboard

When the container is cleared by security it will be placed on a ship along with as many as 8,000 TEU (twenty-foot equivalent) containers. It takes a container ship about two weeks to cross the Pacific Ocean.

## 3 Security checks

A U.S. Customs official based at the port receives information from a U.S.-based command center about which containers may be a security risk. If a container is flagged as high-risk, U.S. Customs officials and local port security will conduct physical inspections.

## 7 Unloading the ship

As the ship is arriving, the terminal operator will contact the local union hall and arrange for unionized longshore workers to unload the container (using a giant, electric gantry crane) and place it onto a truck, a rail car or temporary storage area on the terminal property. Unloading an 8,000 TEU ship takes about three days.

## 9 Radiation detection

As a final security safeguard, containers pass through large portals that detect radiation. The slightest level of radiation will trigger an alarm and appropriate security procedures.

## 6 Security Checks

U.S. Customs officials conduct further analysis and determine which containers warrant further inspection. If no additional inspections are warranted, the container is cleared to leave the Port.

## 8 Vessel docked

As the ship nears the harbor it will be boarded by a port pilot, maritime specialists with expert knowledge of the harbor waters. The port pilot will work with tugboat operators and the ship's crew to steer the ship into the marine terminal.

## Cargo Security

### Manifest submitted

All shippers must submit a manifest to U.S. Customs authorities, at least 24 hours before any cargo leaves a foreign port, with detailed information on a container's contents and everyone who has been involved in its packaging and transport.

### Risk level assigned

Customs agents relay container information to a centralized U.S. government command center in Northern Virginia, where authorities use security intelligence and computer databases to assign a risk level to all containers bound for the U.S.

### Inspections

U.S. Customs agents work with overseas port security officials to inspect any containers deemed suspicious or high-risk, first with radiation detectors and X-ray machines. If necessary they will open the container for further inspections.

### Coast Guard watch

While a ship is at sea the Coast Guard reviews manifest information on crew and cargo; the Coast Guard can board any ship at sea for any reason.

### Upon arrival

Once the ship has arrived at U.S. shores, U.S. Customs conducts further analysis and physical container inspection, if necessary. Before any crew members can leave a ship, they must be cleared by U.S. immigration authorities.

### Multi-layered security

Multiple agencies, including the U.S. Customs & Border Protection, U.S. Coast Guard, federal and state Homeland Security offices, Long Beach Police and the Port Harbor Patrol work together to secure all inbound and outbound cargo as well as port facilities.

## 10. APPENDIX - SUPPLY CHAIN PARTICIPANTS AND DRIVERS

The process of shipping containerized goods from origin to destination involves a number of actions fulfilled by a mix of participants and their respective roles. These participants and their roles were identified by way of a series of interviews in the supply chain. Principal interviewees included importers, 3PLs, shipping lines, railways, an inter-modal equipment supplier, port representatives and municipal planning representatives. The interviews yielded a snapshot of the supply chain that reflects the perspective of each stakeholder. The stakeholders and the roles they play are similar in the US and Canada.

Each participant in the supply chain has a set of objectives and strategies with which to achieve those objectives. The motivation behind each is referred to as a driver. Summarized below are the drivers of the key participants of the supply chain.

**Importer:** The drivers throughout the supply chain tend to all lead back to the importer. Competitive rates are arrived at, ultimately, through negotiations with the importer who is the ultimate customer. There are constant back-and-forth communications between the importer and other participants in an effort to arrive at acceptable terms and conditions. We were told, repeatedly, that there is no single formula that will satisfy all criteria with regard to the needs of each importer. It is also evident that no single set of ratios applies for desirable DC dimensions and characteristics within the broad range of requirements for importers and the markets they serve. Rather, different types of importers have different needs as reflected in their cost and profit structures and business models. These differences manifest themselves in the types of transportation and warehousing options they select. Each importer works to maximize its profit as do other members of the supply chain. However, big-box importers with market power (and the leverage it generates) are in a better position to dictate the terms of relationships as well as to place the onus of cutting costs and providing improved services on the shoulders of the transportation providers.

**3PL:** The 3PL's primary objective is that of meeting the needs and requirements of its customer, the importer. In order to secure the importer's business and retain it over the long-term, the logistics provider must offer timely and reliable services in a market where competition is constantly driving down the price of their services. This presses the 3PL to trim costs in every way possible and to maintain access to a flexible and competitively priced labour pool. The 3PL wants the business of the big-box importer but, in order to do so, must continuously add to the scope of the functions it provides (e.g. IT services that update the importer's inventory and tracking databases) while keeping its price low.

**Ocean Carriers:** There are two different types of ocean carriers with similar and yet different drivers. Both are sensitive to the needs of their customers, the importers. They are in constant communication with their customers to track changes and movement in demand with a view to keeping the importer's business. The carriers are fearful of losing importers with significant market power as it would represent a loss of market share to a competitor. To maintain that market share, the carriers may resort to pricing their service at, or below, cost as a defensive competitive measure in anticipation of competitors offering the same or similar service at lower price levels.

The top tier carriers have significant investments in ships as well as land-based infrastructure. They are driven to amortize their investment in each of those investments. Their business model differs from that of other carriers. The ship is the primary investment that facilitates the utilization of other less important assets such as marine terminals, rail infrastructure, superstructures and equipment. Some carriers are divesting their non marine assets.

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The second tier of carriers have much invested in ships but not in land-based infrastructure. These shipping lines are driven to maximizing the utilization of their floating capacity as well as that of their containers that must be repositioned from North America back to Asia. This type of carrier improves its yield when calling at ports where there is an opportunity to keep their containers near Port Metro Vancouver, thus reducing repositioning costs.

**Rail Carriers:** The rail carriers are directed by the importer as to where and when to pick-up and deliver their cargo. The importers insist on certain levels of quality and reliability and these factors are important drivers for the rail carriers. The rail carrier is generally responsible for the repositioning of domestic containers to a port district and a shortage of equipment could result in a rail carrier (and port) losing an importer's business as it shifts it to a region with a more reliable supply of that equipment.

**Truck Operators:** The truck operator's customer is, directly or indirectly, the importer who may make trucking arrangements through its agent (i.e. 3PL or freight forwarder). The trucking company receives direction from the importer or its agent. In the case of the dray from Port Metro Vancouver, it is often the 3PL who directs the truck to pick up the container from the terminal. Trucking companies operate with very low margins in an extremely competitive environment. Poor performance will lead to a customer giving its business to any one of the other truck operators in Port Metro Vancouver region.

**Ports:** As public authorities in the US and Canada, ports are considered the stewards of the public interest. They are also charged with generating revenue with which to fund and finance investments designed to enhance the capacity and throughput of Port Metro Vancouver. That increased throughput is linked to the improved well-being of their constituency, either the local community or a broader regional, provincial or state constituency. To achieve increased capacity, Port Metro Vancouver looks toward DC development as a means by which it may add footloose demand to its terminals, thus ensuring a steady flow of terminal revenues.

**Terminal Operator:** Public operators, such as those in Savannah and Virginia, are not generally charged with being profit driven as they are expected to act in the interests of the public. Their actions are guided by state and municipal planning objectives. Private terminal operators on the west coast tend to operate in a manner that maximizes their operators' profits. The drivers for private terminal operators are maintaining high service levels for their customers (ocean carriers, truck operators and rail carriers) and maximizing profit levels. Their objectives are not necessarily aligned with those of Port Metro Vancouver's constituency and the terminal operator's obligation to the public usually ends when lease and throughput payments have been made to the landlord.

**Municipalities and Agencies:** Local and state governments in the US generally have the objective of economic development in mind when undertaking port-related investments and development. The drivers for these institutions are building and broadening support among existing or new constituencies while ensuring a certain level of tax revenue generation with which to solidify that support. When port-related investments must compete with other public investment alternatives, municipal leaders and planners are driven to demonstrate that development does not unfairly burden the existing tax base and, if anything, diminishes that burden. It diminishes burden either by exporting that burden in the form of a sales tax to out-of-state purchasers or by bringing new investment into the community and reducing the per capita burden of each household. Municipalities in Canada, on the other hand, are not directly involved in port-related investments and development. They do benefit significantly from an economic perspective, however, through the payment of taxes and grants in lieu of taxes as well as employment generation.

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**Land Developers:** In most cases developers have been private and have purchased and built on speculation. Naturally, the ability to buy inexpensive and unimproved land and sell again at a premium is desired by the developer. Where the public becomes involved in such developments, a supply side approach has been taken with the philosophy ... “build it and they will come.”

While the point of departure for this study had, as its focus, the interaction between shipper and port, we found that many of the essential ingredients for these successful relationships lay not only in incentives offered importers, but in the presence of a range of ancillary services, equipment, labour force characteristics, local demand characteristics and other factors. Even the nature of the incentives offered by ports and their constituencies varies by region and the structure of the regional economies and their tax bases.

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## 11. APPENDIX - SHORT SEA SHIPPING REPORTS

### **'Greater Vancouver Short-Sea Container Shipping Study – Pre-Feasibility Report', Novacorp International & JWD Group, 2005 – Executive Summary Conclusions**

The results of the work were revealing and provide reliable and practical guidance and direction for those private and public sector organizations who may wish to pursue the opportunity. A summary of the principal conclusions reached by the Consulting Team is included below:

- Intra-regional short-sea container shipping in Greater Vancouver offers promising, commercially viable, private sector opportunities in the short to medium-term for several short-sea container terminals on the Fraser River ... specifically in the Fraser Surrey area, the Tilbury Island area and the Coast 2000 area .... if route volume can be secured in the range of 200 containers per round trip or greater (i.e. a minimum of 20,000 to 40,000 containers annually).
  - It is critical for short-sea container terminals to be strategically located close to (or have sufficient land to establish) a variety of container industry facilities and businesses and to have, on-site or nearby, rail inter-modal capability.
  - The target market (i.e. intra-regional container transfer) share required to support commercially viable short-sea operations is quite small (i.e. 4½% to 9% of current - 2004 - demand and 2% to 4% of demand in 2010). It is expected that short-sea operators will need to secure 45% to 60% of the current container transfer business located close-by in the Fraser Surrey, Tilbury or Coast 2000 areas (and/or 20% to 30% of the same local area market in 2010) to maximize their opportunity for commercial success.
  - Given the likely competitive positioning of short-sea shipping, it is expected that the levels of market share described in the previous paragraph are achievable for the locations specified.
  - Short-sea container shipping, on selected routes with sufficient volume, can offer price competitiveness with trucking and some competitive advantages, which will likely expand dramatically over time, in the areas of delivery time and delivery time reliability.
  - It will be critical for short-sea service investors and proponents to invest the capital and make the long-term commitment necessary to establish reliability and confidence in the market place.
  - It will be critical for the short-sea operator to secure sufficient base, container transfer volume commitments from nearby importers, exporters, agents and/or logistics companies to approach the annual volume 'threshold' levels required for commercial success. These levels are relatively low and can likely be achieved in the Fraser Surrey, Tilbury Island and/or Coast 2000 areas over the next year or two.
  - Expected increases in environmental emissions from the intra-regional transfer of containers by truck will be moderated to the extent that short-sea operations absorb some of the future growth. This is particularly true of the key greenhouse gas emission (CO<sub>2</sub>) as well as VOC emissions.
  - More detailed work is required before investors can be expected to commit to the opportunity, but the promotion of, and transfer to, the private sector can likely be achieved within six months. There is genuine private sector interest in this opportunity.
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**'Opportunities for Shortsea Shipping of Containers In British Columbia's Lower Mainland - Review and Critical Analysis', IBI Group, 2007 – Conclusions and Recommendations**

Based on current estimates of the barge and terminal costs for shortsea shipping of containers, it is more expensive than drayage. If capital investments are required for the development of terminal capacity on the river, or if drayage is required at either end of the trip, shortsea shipping is further disadvantaged. This limits the short term market potential to sites in close proximity to the river which can handle containers with minimal additional infrastructure requirements.

The cost estimates are based on assumptions regarding the charges which would be levied by service providers. For example, estimated terminal costs at the Inner Harbour terminals are based on the assumption that a throughput credit which would place containers delivered by barge on an equal footing with those delivered by rail or truck. The actual levels of these charges will depend on commercial negotiations among the parties so the possibility exists that costs might be reduced from the levels estimated in this study.

While in the short term it appears that shortsea shipping is more expensive than drayage, shippers are still motivated to examine it as an alternative due to perceptions of unreliability in the drayage sector. Several potential service providers are actively exploring development of a service for shortsea shipping of containers by barge.

There are several challenges to be overcome in realizing these ambitions. The first is access to the on-dock container terminals, which will require either finding suitable berth windows for handling barges with the quay cranes, or construction of alternative means of handling barge traffic. The second is ensuring a level of service which is compatible with shipper requirements. This is made more difficult by the increasingly stringent requirements for just-in-time delivery of containers to the on-dock terminals. The third is concentrating sufficient traffic in sites accessible to the river to eliminate the need for drayage.

From the public perspective, shortsea provides potential benefits in reducing air emissions associated with regional goods movement, and in the longer term through reductions in traffic congestion. In the short term, demonstration of a commitment to shortsea shipping as a means of mitigating local congestion and emissions impacts in affected communities may be a positive means of enhancing public support for expansion of port activities.

Based on these conclusions, our recommendations are as follows:

1. The focus for demonstrating the viability of a shortsea container barge service should be on the existing concentrations of export transload/empty storage capacity, Fraser Surrey or Fraser Richmond, to avoid drayage costs. The capital infrastructure required to demonstrate the concept is already in place, in the form of quay cranes at FSD and the on-dock terminals; Fraser Richmond (Coast 2000 would require equipment for loading barges). However, under the throughput rates applicable to deep-sea movements using FSD as a river terminal would be prohibitively expensive. A local firm is building barges suitable for this service, which can be operated relatively infrequently (a minimum of once a week) and still offer relatively low transit costs.
  2. The key requirement for initiation of a service is access to the on-dock container terminals, and development of business and operating processes by the terminal operator to accommodate the traffic. Compliance with the on-dock terminal requirements (ERD's, etc.) requires close coordination between shippers, transload warehouses, and shipping lines. For this reason a viable pilot would require
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participation by members of each of these groups to a level which would aggregate a sufficient level of traffic to enable the trial.

3. The potential environmental and congestion reduction benefits are significant enough to justify financial assistance for a pilot by government agencies and the Port Authorities. The most effective means would be some form of subsidization of operations for a defined period. Investment in capital assets would be premature until the pilot has demonstrated the viability of the concept (and most particularly the compatibility of the service with efficient operations at the on-dock terminals).
4. Further research to identify innovative methods of handling containers shipped by barge should be undertaken, since high terminal costs are a major impediment to competitiveness for shortsea service.

**'The Fraser River As A Commercial Highway Issues: Implications and Opportunities', BCIT Centre of Excellence Sustainability, Infrastructure & Transportation Economics, 2007 - Conclusions**

In examining these factors, the logical conclusion with respect to the Fraser River as an inland waterway is that bulk and break-bulk shipments are the best candidates for shipments on the Lower Fraser River. The proviso is that such shipments originate within the Lower Fraser River basin, rather than far in British Columbia's hinterland or in eastern provinces.

Bulk commodity transport by towed barge – wood products, aggregates, etc. – from the lower Fraser River Basin is already a fact of life. Trans-shipment of long-haul rail transported commodities such as coal, sulphur, potash, and grain, is likely to not be feasible, considering the added cost associated with off/on-loading and barging under a multi-modal approach.

Trans-shipment of containers is a possibility, provided the IWT haulage costs from the deep-sea port to the node port are not excessive relative to direct rail/truck from the tidewater port, and provided the additional transit time is acceptable to shipping customers.

An intermodal Fraser River transport 'solution' to container shipping would provide a number of environmental benefits to Lower Mainland residents. Most notable would be reductions in:

- Truck traffic on road arteries, resulting from the transport of Lower Mainland destined containers to inland node ports, and truck traffic associated with the inbound truck transport of bulk cargo and containers.
  - Rail traffic on rail lines between the deep-sea and node ports.
  - Lower Mainland air (and noise) pollution, attributable to reduced truck traffic on BC roads and reduced rail traffic on the sector between the deep-sea and node ports.
  - Accidents involving trucks (and passenger vehicles) on BC roads.
  - Considering the Lower Mainland's relatively small population and industrial base, riverbased freight transport will likely play a relatively small role in the overall freight transportation system without an intermodal container shipment component.
  - Before a decision could be made with respect to the establishment of an intermodal container transportation system which includes an IWT element, a number of factors would need to be in place, including:
    - A willingness and commitment on the part of the various public sector agencies, notably the Provincial and Federal Ministries and Departments, to seriously consider and examine the issue.
    - Support, from the Lower Mainland port authorities, in the form of a willingness to consider an alternative to the current way of 'doing business'.
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- Adequate funding to conduct a feasibility study which examines the economic, environmental and social costs and benefits associated with an inland intermodal freight transport system.
  - The establishment of a multi-stakeholder transportation industry body to direct the research, and ultimately 'drive' the implementation of a viable transportation alternative.
  - The 'up-front' involvement of various key stakeholders, such as the Fraser River Estuary Management Program (FREMP), the municipalities, and key environmental oversight groups.
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## 12. APPENDIX - DISTRIBUTION CENTRES

Regional Distribution Centres (DC) sorts, stores and then distributes the goods to their final destination, typically specific store outlets. The entire Western Canadian market is typically served by DC's located in Calgary and Toronto. For the majority of companies, Metro Vancouver is deemed to be too small and too expensive to serve as a major regional DC. Calgary is a popular location for regional distribution centers because of its lower land costs, labour costs and taxes as well as its efficient and low cost transportation links with Vancouver and other western Canadian markets.

There is however clear and obvious demand for new "Inter-regional DC's". These facilities, as they operate in Canada today, typically function as trans-load facilities with customs clearance services. Their value in the supply chain depends primarily on the cost savings achieved from transporting freight in higher volume domestic containers after trans-loading from smaller ISO marine containers. Unlike their San Pedro Bay counterparts, inter-regional distribution centers in the Vancouver area generally do not involve 'value added' activities to the merchandise (such as pricing and packaging) but forward domestic containers to regional DC's elsewhere.

The analysis of demand is already established by previous studies, notably in VPA's "Container Market Study" undertaken by Ocean Shipping Consultants Limited (OSCL). These market forecasts are represented and built upon in this report. The analysis of industrial floor space supply is straight forward, although it is made difficult by the flexibility of large industrial buildings that have multiple uses. A large warehouse can become a DC or be put to other uses very easily. In many instances tenants are moving frequently and tend to sign short-term leases.

The objective of the report, to contrast supply and demand, is achieved. One key result is a clear and reliable projection of new DC floor space demand in Port Metro Vancouver (PMV) over the study period to 2020, assuming the distribution role of the POV remains the same (i.e. a "status quo" situation). The critical issue and assumptions include DC floor space required (square feet) per container handled and the future volume of containers handled at area DC's. A large part of the work focussed on the assessment, confirmation and analysis of these issues. In addition, a major share of the analysis was devoted to determining how the "status quo" growth scenario could be supplemented thereby expanding the role of the POV as an import distribution center. This can be accomplished through the aggressive and coordinated marketing efforts by the PVA, freight forwarders, 3PL's and DC operators to attract new DC business, primarily by diverting a portion of those import laden containers destined to both Canadian and US importers through Lower Mainland DC's which would otherwise be transferred directly to rail from ship at the container terminal.

As ports like Vancouver now contemplate increasingly expensive investments in infrastructure, they do so in an environment in which cargoes are less port-specific and are increasingly port-blind (i.e. the final destination does not dictate the port of entry or exit). For ports with a relatively high proportion of port-blind cargo, there is greater potential for lost market share and, consequently, lost revenue streams upon which to finance investments.

For some hub ports, market share is not as great a concern as it is for others. Some have the advantage of large local markets (e.g. LA/Long Beach) that ensure a high level of non-discretionary flows to that port. They may also possess other characteristics deemed favourable to importers who are responsible for a high proportion

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of flows. Ports compete for these discretionary flows with the hope of making them less footloose. The distribution center turns otherwise port-blind discretionary cargo into a captured local market.

In response to the increasingly non-committal nature of certain demand flows, ports (and, by implication, their constituencies at the state and local levels in the US) have developed strategies by which they may lock-in a certain portion of that traffic and introduce a greater degree of certainty into their cargo and revenue projections.

Some ports have employed a strategy of directly promoting and supporting DC warehousing by investing resources in both of these areas. This is generally done with a view to tying customers and their cargoes to Port Metro Vancouver in order to generate the revenues and to capture the economic benefits associated with those flows. Other ports, in the United States, have received significant support from their constituency base in the form of tax and debt instruments used to attract new businesses that bring some portion of footloose cargo with them. The duration of these efforts spans years and in one case, decades.

Throughput at North American west coast ports has boomed as trade between the continent and Asia has grown rapidly. This, in large part, is due to major shifts in manufacturing with many company's relocating their manufacturing base to lower cost regions such as Greater China and Southeast Asia.

US importers have, traditionally, had several US west coast ports to choose from through which to receive their containerized goods. The main entry points include the Ports of Los Angeles and Long Beach (POLA and POLB, respectively), the Port of Oakland and the Ports of Seattle and Tacoma. However, the vast majority have chosen POLA and POLB. By choosing either of these two ports, importers have invariably made use of the rail 'land bridge' to move containerized cargoes to the US Midwest and US East Coast. The large majority of Canadian destined containerized cargo from the Pacific Rim transits POV's container terminals. For similar reasons, and because the POV has recaptured Canadian traffic once moving through US ports, container throughput in Port Metro Vancouver has grown significantly over the past fifteen years.

In the earlier decades of containerization, containers arrived and were delivered, generally, directly to inland market destinations and their contents warehoused for relatively long periods of time. Advances in technology, as well as the development and adoption of "just-in-time" and "flexible pipeline" delivery philosophies among importers, created a demand for a different way of handling imported goods arriving in forty-foot ISO marine containers. The improved ability of importers to track the movement of their goods at each point in the supply chain, as well as the associated costs of each segment, has increased the incentive to improve supply chain economies and to redirect imported merchandise once it reaches the North American port.

The success of the DC warehousing function in support of cargo flows through ports such as Los Angeles and Long Beach has revolutionized the way in which participants in the freight supply chain think about their own roles and the nature of their businesses. The value of a port to its users is no longer simply based on the number of cranes and berths available, but what lies beyond its gates.

Other ports are faced with a different mix of the elements found in the LA and Long Beach region. Where needed, each has pursued or encouraged DC development to different degrees with a range of policy tools. These initiatives have resulted in a range of experiences and lessons learned.

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While throughput via POLA/LB has continued to grow, importers have been forced to re-evaluate their options for the ports-of-entry. This re-evaluation is due to periodic labor strife, highway congestion, local political opposition to port-related activities, the growing costs of an inland dray (truck haul) and the increasing desire by inland counties to diversify their economic base. The options under consideration by importers include an all water service to the US East Coast and a west coast alternative to POLA/POLB.

The market segment that is “up for grabs” is that which currently enters the US west coast and has destinations in the Pacific Northwest, the US Midwest and the US East Coast. A part of the redirected cargoes will be taken by all water services via the Suez Canal and the Panama Canal to serve US East Coast demand. Containerized freight destined to the US Pacific Northwest and the US Midwest is, to some extent, available to enter North America through container terminals in Seattle, Tacoma and/or Vancouver. Therein lies an important opportunity for Port Metro Vancouver and the Pacific Gateway.

The investigation into the feasibility of developing a DC complex in the vicinity of the POV took into account similar roles undertaken by other North American port authorities. Typically, these roles at US ports have taken place in the context of municipal, state and federal support. Public sector support in the US has come in several forms including direct subsidies or policies which created a more fertile environment for distribution activities to take hold and flourish. The assessment of DC development opportunities in Vancouver also considered the criteria for the successful establishment and operation of these facilities. POV’s assets and resources were assessed and Port Metro Vancouver’s issues and constraints were identified to determine if it can reasonably become a major contender in the competitive environment to capture a portion of the aforementioned and other market segments. The result of these assessments and the overall market and logistical analyses are generally positive and reflect the “gateway” aspect of Port Metro Vancouver.

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## 13. APPENDIX - DISTRIBUTION CENTER FUNCTIONS AND ROLES

The following figure illustrates the flow of merchandise through the key links in the supply chain connecting foreign manufacturing and North American retailers. The example is based on a typical move from a PRC manufacturing plant via the Port of Shanghai to a hypothetical west coast port, to a set of inland delivery options, including to a “near-dock” trans-loading facility and, then, on domestically to an IPI or local destination.

Prior to the move, the owners of the merchandise or their representatives (3PL’s) will have stipulated the form in which the merchandise is to be packaged and how it is to be stowed in the container. Further, the owner, or its representative, will design a supply chain best suited to its needs, which typically includes the ability to do the following:

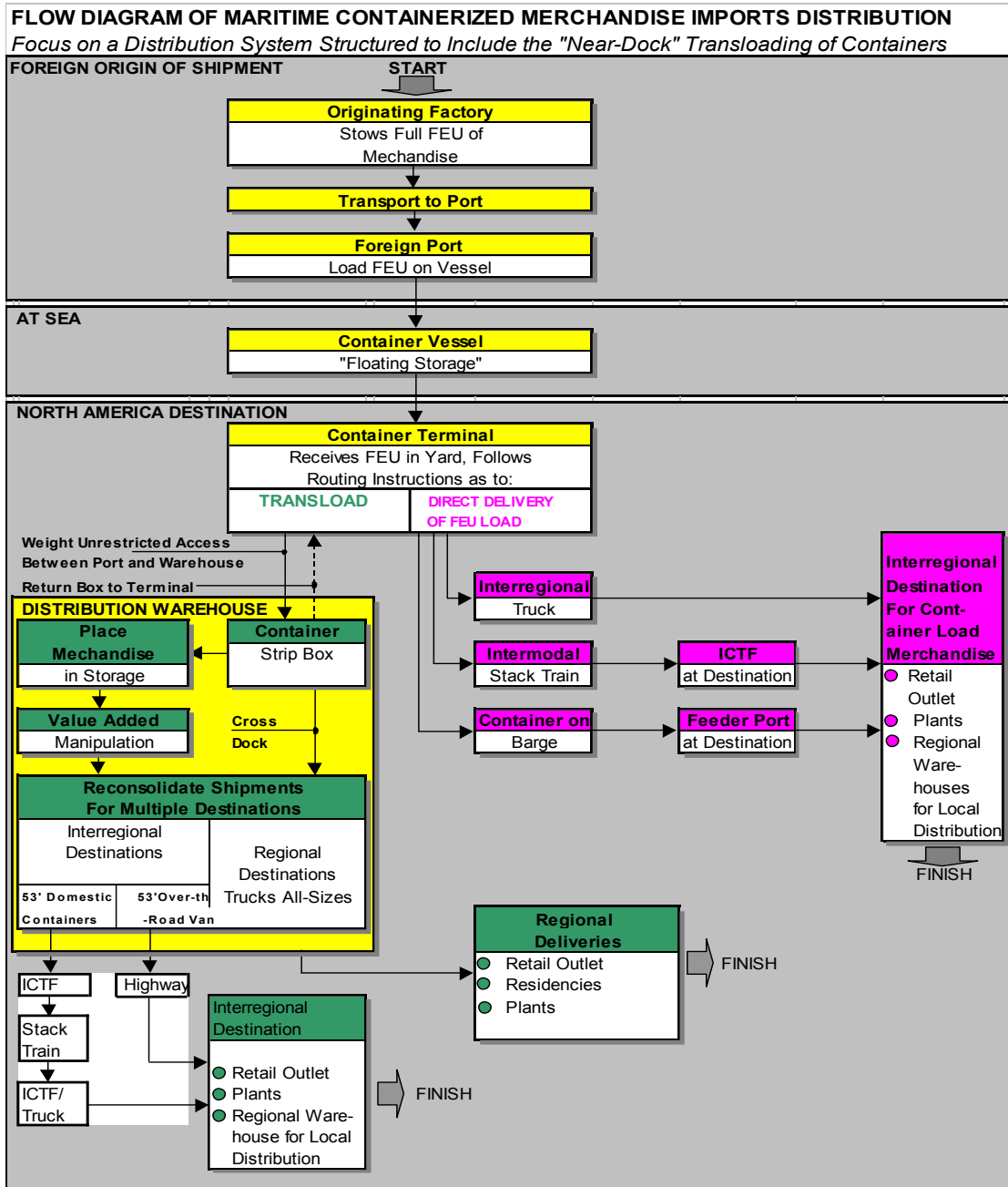
- move full container loads of merchandise stowed at the factory where they were produced;
- reconsolidate the container contents into shipments conforming to the specifics of point-of-sales demand as these become known 5 to 3 days prior to sale;
- place merchandise not in immediate demand into storage at a location with direct recall;
- manipulate and treat merchandise to increase its value to the owner (e.g. “pick & pack”, bar coding and scanning, labelling, etc.);
- track the position of each shipment wherever it is in the “variable pipeline”;
- provide on-time delivery service reliability within a context of flexible pipeline service; and
- provide all the above at the lowest cost possible.

For flows destined for trans-loading, the shipping service contract will identify the international destination as a specific distribution warehouse. If the merchandise does not clear customs at the origin or at the import port-of-call, then it could do so upon opening the container at the distribution warehouse. This and the other supply chain options available are shown in the following Figure.

Once an agreed upon supply chain is formulated, the goods are stuffed into the container, moved to the foreign port, and then loaded and stowed aboard ship. As noted in the figure, reference to the voyage as “floating storage” is in reference to the possibility that the only time the goods must rest for a lengthy duration (say, 2 weeks) is while they are at sea aboard ship. This duration of storage, particularly on the trans-Pacific move, is one of the main drivers in the design of the supply chain.

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The container vessel reaches port and is berthed at a terminal. The instructions as to the location of the container aboard ship, its placement in the container yard and its deployment thereafter have preceded the ship electronically. In this example, the key instruction to the container terminal operator is whether or not the box will ultimately be trans-loaded or discharged from the terminal in the form received. If the latter is the case, three options are possible: by truck or by intermodal stack train, or even possibly by feeder barge. All of these modes have in common the major issue of repositioning the empty container. It is noted that these options may well deliver the box to an inland warehouse serving a particular region, where many of the value-added functions may also be carried out. In the case of boxes destined for trans-loading, after a local dray to the warehouse, the box will be immediately stripped and the empty returned to the terminal or to an intermediate off-dock empty storage facility. As noted elsewhere, the dray from the terminal to the warehouse constitutes a critical cost within the supply chain whose minimization constitutes a significant advantage.

Once the container has reached the port (and cleared customs), the distribution warehouse operator will be notified. Picking up the box at the terminal and delivering it to the warehouse dock may, in fact, be part of the service of the operator. Warehouse operations may be carried out by one of the following:

- the owner of the merchandise;
- a contract representative (3PL); or
- an independent warehouse operator and cartage services provider.

Depending on the operator's instructions, once the merchandise is discharged from the container and placed on the warehouse (or DC) dock, it may be reconsolidated across the dock for immediate shipment to alternative retail outlets or assembly plants from the regional distribution center. Such a case, called "cross-docking", takes place without the storage function and is generally used to serve destinations located within the immediate region. Of course, some value merchandise added activities and/or storage make also take place within the regional DC.

The other path available, which is best suited for inter-regional destinations, involves placement of the merchandise in storage, value added activities (e.g. pricing, packaging, assembly, etc.) and/or its direct cross-docking and reconsolidation into shipments for multiple destinations. These functions often take place in an inter-regional DC with distribution frequently to a regional DC elsewhere. The following two choices are available at this juncture for outbound merchandise from the inter-regional DC:

- shipment in a 53' (or smaller) domestic container; or
- shipment in an inter-regional truck.

As shown on the diagram, the domestic container is drayed to an ICTF (intermodal facility) and moved via stack train (and local truck drayage) to its final destination. The inter-regional truck moves directly to the final destination.

The DC is a manifestation of many quantitative and qualitative factors and forces represented by decisions made by both public and private sector stakeholders. Their decisions are driven by a host of macro and microeconomic issues as well as formal and informal relationships developed between businesses. The policies of public entities, coupled with the profit and service drivers of the private sector, result in the creation of a DC operation.

The DC function, as it has evolved over time, has increased the number of functions performed under one roof in an effort to add value and reduce costs to importers. Importers have sought to reduce inventories, to effectively utilize the container ship as a floating warehouse in the manner described above, and to determine the final destination of the goods only when they arrive in North America (or, ultimately, as close to the final sale as is possible). Additionally, importers have tended to divest themselves of their direct involvement in functions that are not necessarily part of their core business activity.

Trans-loading provides savings to importers in particular when goods are trans-loaded into domestic containers, especially larger (53-foot) domestic containers. This is particularly important when the goods are 'cube-out' commodities. A further benefit of trans-loading to a larger container is the opportunity to return the 40-foot marine container to the port-of-entry, thus increasing the yield achieved by carriers serving the port. This enhances the ability of the carriers to offer competitive rates to that port-of-entry. Return trip loads in domestic

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containers are more competitive in terms of price than in ISO 40-foot containers. Domestic containers are larger than marine containers, especially 53-foot units, thus generating efficiencies which bring transportation costs down.

The significance of this trans-loading process is in the new opportunity it presents for importers, and ports, to manipulate cargo and redirect it to a final destination in amounts that reflect more accurately real-time levels of demand. Without that step, imprecise levels of supply may be shipped to an importer's facility resulting in higher levels of inventory or an additional cost of repositioning goods to facilities where demand is greater.

## 14. APPENDIX - REGIONAL & INTER-REGIONAL DISTRIBUTION CENTERS

There are two broad categories of distribution centers: the regional DC and the inter-regional DC.

A Regional Distribution Center serves demand derived by a specific region. The regional facility, as described above, can include a wide range of functions ... the most basic of which involves the unloading of marine containers arriving in the port and the immediate (or almost immediate) trans-loading of the merchandise into domestic containers or trucks for furtherance by road or rail transport. Because the regional DC is serving a regional market area, many more functions and 'value-added' activities (e.g. packaging, pricing, assembly, etc.) can and do take place which prepare the merchandise for delivery to its destinations, including the importer's retail stores or warehouses.

An Inter-Regional Distribution Center distributes merchandise to multiple regional DC's located across regions. When trans-load operations are able to ship volumes equal to the specific need of a regional DC or retail unit, the DC may be bypassed altogether. Because the inter-regional DC frequently functions to move merchandise to regional DC's, it almost always incorporates the trans-loading of merchandise from marine containers to domestic containers. This basic function necessarily includes customs clearance of the merchandise. At this level, many DC operators undertake some packaging, assembly and/or pricing activities for specific customers and regions as it is usually the point at which containers from various foreign origins arrive and their contents are stripped and mixed with components arriving from other origins.

The development of the DC is credited with spurring tremendous growth around ports such as POLA/POLB as well as at points inland. The growth of DC districts in these areas has been generally recognized by their host municipalities as responsible for enormous economic benefits accruing to both host and neighbouring communities that supply either labour or capital, or both.

The other manifestation of these changes in approach is that of the "flexible pipeline" whereby merchandise in transit can be logistically redirected as required by the importer. Within the supply chain, importers have considerable flexibility to alter ports of entry, inland transport modes and the manner by which goods are routed while they are in transit. This provides retailers and wholesalers with an important business tool to respond effectively to market demand shifts.

The development of the flexible pipeline of goods has created an environment of increasingly port-blind cargoes. Port of entry or exit has been increasingly dictated by the economies of scale and scope 3PL's have been able to achieve for the importer, their customer. This change in the management of goods has presented ports with both opportunities and risks. Opportunities include greater cargo flows upon which to base port-related investments. Risks include the increasing fickleness amongst those who make the decision regarding through which port goods should enter as a response to their own internal cost and profit structures. For ports with largely discretionary cargo flows, the latter poses some threat to their ability to maintain and increase market share among competing ports while paying for high levels of fixed costs and assets. Ports, heavily laden with high investment in fixed assets, and high levels of sunk costs, have attempted to anchor businesses with far less invested in fixed assets and infrastructure.

Currently, data on the levels of trans-loading occurring are not systematically collected by private or public entities. However, anecdotal evidence gathered by the consulting team over the last three to four years suggests that approximately 20 to 25 percent of the volume handled by POLA/LB is trans-loaded for delivery inland while another 25 to 30 percent goes direct to inland destinations via stack trains across the land bridge. The remainder (50%) is delivered to "local, regional" importers. In summary, it is estimated that up to 50

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percent of the import laden containers arriving in the ports of Los Angeles and Long Beach with merchandise destined to inland markets transit DC facilities in the area before being moved onwards. This is an important ratio which is referred to later in the report.

With its significant container throughput volume, and the dramatic growth in this throughput over the past decade, the POV has evolved naturally, to some degree, as a distribution center. The extent to which the port currently serves as a DC, and the extent to which it can expand this role, is and will be determined, in part, by its location, logistical assets and constraints, the facilities and services provided and the market areas it can economically serve.

DC facilities in Canada are concentrated in Toronto, Calgary and Vancouver. At Port Metro Vancouver, containers are dealt with in the following ways:

- Most inbound laden containers arrive by deep-sea vessel, are transferred directly to rail and leave the region with the merchandise untouched. This is the largest and fastest growing segment of the market. To the extent that direct 'ship-to-rail' container throughput growth is experienced, this market will have, essentially, no impact on DC real estate demand.
- Some inbound laden containers are trans-loaded into domestic containers and sent inland to regional DC's. In general, Vancouver serves as an import or inter-regional DC which acts to supply the regional DC's. There is limited storage or merchandise manipulation within this type of DC and the goods are typically shipped in domestic containers via rail to a distant DC located closer to major consumer markets.
- Some inbound laden containers are destuffed in Vancouver with the merchandise being deconsolidated, stored and manipulated in a regional DC. This merchandise leaves by truck or rail to its final destination. To-date, there has only been a limited demand for this type of DC in the POV since it depends, in large part, on the size of the local, regional and other hinterland markets.

For purposes of this study, it is reasonably assumed that rail costs between Vancouver and eastern Canada will remain low relative to road transport. It will remain easy and cost effective for most firms to move merchandise across large distances by rail. Regional DC's in Calgary and Toronto will, therefore, continue to play an important role within the Canadian supply chain with Vancouver's growth in this area being predominantly as an inter-regional distribution center.

The POV currently functions, through its importers, freight forwarders and 3PL's, as both a regional and an inter-regional DC.

As a regional distribution center, Port Metro Vancouver serves its immediate market area including Vancouver, the rest of British Columbia and, to some extent, Alberta and the Pacific Northwest. Relative to other market areas in North America such as LA, this regional market is quite small. The size of the local market is the key reason why the regional DC business is moderate. It is, nevertheless, significant to the PMV and as a result the logistics providers have evolved naturally and effectively to provide the services required by both shippers and importers.

As an inter-regional distribution center, the PMV has so far evolved to a limited extent in the consolidation and distribution of inbound containerized merchandise to importer facilities and DC's in other major market areas of North America, particularly Toronto, Montreal, Calgary and, to a much more limited extent, Seattle and the U.S. Midwest. It is as an inter-regional DC that the opportunities for Port Metro Vancouver to expand its role

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are focused. This is of special significance as the growth expectations for inbound container throughput are largely expected to be destined to the large Canadian markets and to large U.S. markets in the Midwest.



## 15. APPENDIX – ECONOMIC IMPACT MODEL

### Economic Impact Evaluation Approach, Terminology and Model

The purpose of the economic impact assessment is as follows:

- To develop a simple economic model which effectively assesses the development and operational impacts of generic development of the subject lands; and
- To use the model and preliminary multiplier estimates to prepare an overview economic impact assessment which estimates direct and secondary economic effects;

Standard industry density factors have been used to approximate the scale of development under the different land use development scenario. Industry databases have been accessed to determine realistic employment levels for the proposed land uses. The analysis uses of a variety of assumptions, industry standards, development standards and multiplier estimates. While extensive original research was not carried out, the factors and parameters used provide a realistic and practical estimate of the scope of impact associated with the potential development.

### Economic Impact Terminology

Standard economic impact terminology is used throughout this section and the most noteworthy terms are described below:

- “Impact analysis” estimates the impact of dollars from outside the region (i.e. “new dollars”) on the region’s economy;
- “Direct effects” are the changes in economic activity during the first round of spending and include spending associated with both the development/construction phase as well as the operational phase over time;
- “Secondary effects” are the changes in economic activity from subsequent rounds of re-spending in the regional economy and are comprised of “indirect effects” and “induced effects”;
- “Indirect effects” are the changes in sales, income or employment within the region in backward-linked industries supplying goods and services for infrastructure construction (e.g. land and fixed link development) and to the new businesses which are developed (i.e. the industrial and commercial companies which will locate on the site);
- “Induced effects” are the increased sales within the region from household spending of the income earned by employees in the new businesses which are developed;
- “Total effects” are the sum of direct, indirect and induced effects; and
- “Multipliers” capture the size of the secondary effects in a given region, generally as a ratio of the total change in economic activity in the region relative to the direct change.

Multipliers may be expressed as ratios of sales, income or employment or as ratios of total income or employment changes relative to direct sales. They express the degree of interdependency between sectors in a region’s economy and, therefore, vary considerably across regions and sectors.

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## Overview of the Model

A simplistic model has been developed using a spreadsheet format to identify and describe the key economic factors of interest for the development. The following is an overview of a theoretical model to estimate both the development (i.e. construction, equipment acquisition, etc.) and operational considerations of the project (long term stream of economic activity associated with the project upon completion). It considers both the direct and secondary (indirect and induced) impact of the project, which equal the total effect. This enables relative benefits to be expressed in terms of current dollars through the use of net present value analysis.

The model provides the means for a practical assessment of regional direct and secondary impacts for the following key business expenditure categories:

- Development capital investment to create the project;
- Operational expenditures on wages and salaries for long term business employees;
- Operational expenditures on goods and services by companies for their ongoing business operations; and
- Municipal property taxes and charges.

The approach used for this analysis includes several steps for each of the economic benefit generating categories listed above. These are as follows:

- An estimate of total expenditures under each category (i.e. Either development or operational and their timing);
- An estimate of extra-regional leakage (i.e. That portion of direct spending which “leaks” out of the regional economy to employees and companies located outside the wider region);
- A calculation of the direct regional economic impact (i.e. Total expenditures less leakage);
- An estimate of the multiplier for each category which may be applicable (pending further research) to the region to account for secondary economic impacts;
- A calculation of the total regional economic impact under each category; and
- A calculation of the ‘net present value’, in current dollars, of the total impacts and the secondary impacts on the regional economy from the development and operation.

Many of the estimates used are approximate, generic and/or based on available standards and research given the limited scope of the work. The total direct and secondary impacts will require more detailed analysis as the development application and evaluation processes take place.

The anticipated economic impact should be compared against the existing economic activity on the site. The proposed change in use would drastically increase the amount and value of economic and employment activity associated with the site and benefits to the region.

## New Business Operations Impact Summary

As new businesses, their ongoing business operations will generate economic benefits for the region in three primary areas as follows:

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- Employment creation and the resulting expenditures on wages and salaries;
- Ongoing purchases of goods and services for corporate operations; and
- The payment of taxes and other charges during the development of the subject lands and ongoing company operations.

Preliminary estimates of the magnitude of these expenditures have been made for purposes of this overview economic analysis. As with all other economic impact estimates, more detailed analyses will be required to refine these estimates as the project moves forward.

The business expenditures have been estimated based on a number of key factors in the financial model and several additional assumptions which are summarized below:

- Employment generation is based on the calculations in the financial model (in the previous section) which, in turn, are based on the building absorption projections and standard employment ratios per square foot for industrial, commercial, office space;
- Wage and salary expenditures are based on the employment projections and an average remuneration per employee;
- A reasonable generic profile was assumed for a typical industrial company for purposes of estimating, consistently, key expenditure items which included the following ratios on the expense portion of its income statement:

• Wages and Salaries:	30%
• Goods & Services:	45%
• <u>Miscellaneous:</u>	<u>25%</u>
• <u>Pre-Tax Cash Flow (EBITDA):</u>	<u>100%</u>

- Conservatively, goods and services expenditures were estimated to total one and a half times estimated wage and salary expenditures; and
- Municipal taxes and charges include “property taxes on vacant land”, “development cost charges” (“DCC’s”), “property taxes on buildings” and “other taxes on buildings” as described in the financial model.

To determine “direct economic impacts” in the region which are associated with these expenditures, have assumed the following factors for leakage directly out of the region to employees or suppliers located elsewhere in B.C., Canada and/or the United States:

- |  |     |
|--|-----|
| • Wage and salary expenditure leakage:       | 10% |
| • Goods and services expenditure leakage:    | 35% |
| • Municipal tax and DCC expenditure leakage: | 0%  |

The 35% leakage for goods and services expenditures may be somewhat high but is included to be conservative. Some companies will source up to 90% of their goods and services outside the region (e.g. manufacturers who bring in raw materials or big box retailers who source virtually all goods offshore) while others may spend up

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to 70% or 80% of this expense item regionally. There is expected to be no leakage of municipal taxes or DCCs as these are exclusively local.

Once this estimated 'leakage' is taken into account, the direct economic impacts on the region arising from these expenditure categories of operation are estimated to have a net present value (NPV). These direct economic impacts are very substantial and, accordingly, they warrant a more detailed evaluation than the scope of this study permitted. It can be stated with confidence that direct impacts within the orders of magnitude estimated are realistic given the scope of the development proposed.

**Estimate of Secondary Economic Impacts**

Secondary economic impacts will occur in the region as a result of the subject site development. A detailed evaluation of appropriate multipliers is required to provide an accurate estimate of the magnitude of these induced and indirect economic benefits (which comprise the secondary impacts).

Several very preliminary economic multipliers have been incorporated into the economic model. These are as follows:

- Development expense multiplier for land and business development impacts: 1.25
- Development expense multiplier for infrastructure construction impacts: 1.25
- Multiplier for wage and salary expenditure impacts: 1.35
- Multiplier for goods and services expenditure impacts: 1.25
- Multiplier for municipal taxation / charges impacts: 1.35

These multipliers are estimated to derive total impacts (i.e. direct + secondary impacts) from direct impacts. Effectively, therefore, they indicate that secondary impacts account for 25% to 35% of direct impacts. For these calculations, the multipliers used are considered to be conservative, and an average multiplier of 1.30 has been used.

The following is an overview of a theoretical model to estimate both the development (i.e. land preparation and servicing and building construction) and operational considerations of the project (the long term stream of economic activity associated with the project upon completion). It considers both the direct and secondary (indirect and induced) economic impacts of the project which, together, equal the total effect. This enables relative benefits to be expressed in terms of current dollars through the use of net present value analysis. More details on the model are provided in the Appendix.

The model provides the means for a practical assessment of regional direct and secondary impacts for the following key business expenditure categories:

- Development capital investment to create the project;
  - Operational expenditures on wages and salaries for long term business employees;
  - Operational expenditures on goods and services by companies for their ongoing business operations; and
  - Municipal property taxes and levies.
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<b>= Direct Regional Business Impact</b>	\$	\$	\$	\$	\$	\$	.....	\$
X Goods & Services Expense	Factor	Factor	Factor	Factor	Factor	Factor	.....	Factor
<b>= Total Regional Business Impact</b>	\$	\$	\$	\$	\$	\$	.....	\$
<b>New Property Taxes &amp; Levies</b>	\$	\$	\$	\$	\$	\$	.....	\$
Less: Extra-Regional Leakage	%	%	%	%	%	%	.....	%
<b>= Direct Regional Taxation Impact</b>	\$	\$	\$	\$	\$	\$	.....	\$
X Taxation Expense Multiplier	Factor	Factor	Factor	Factor	Factor	Factor	.....	Factor
<b>= Total Regional Taxation Impact</b>	\$	\$	\$	\$	\$	\$	.....	\$
<b>NPV of Total Rezoning Impact =</b>	\$							
<b>NPV of Multiplier Impact =</b>	\$							

The overall economic impact analysis does not assume any economic costs associated with industrial development which is diverted from other areas. While this assumption could be debated, the industrial land supply, demand and absorption analysis described earlier in this study identifies the shortage of industrial land and provides a build-out strategy for the site which is reasonable and would not significantly impact other areas. The primary issue is that the location would generally assist industrial businesses in the region by providing a high value location and keeping land costs lower. The proposed development would also add to Metro Vancouver's capabilities and keep a larger share of industrial development within the Metro Vancouver area rather than outside of BC. The positive impact of this project on the host municipality specifically would be considerable given the increased taxes and additional employment.

Additionally, there is the (limited) economic impact value and possible social and recreational benefits associated with the use of the un-developed lands which have not been included in this analysis. The anticipated economic impact of the proposed project should be compared with the economic value of current activities on the site. The land is currently unused, with virtually no associated economic or employment activity. The proposed change in use would drastically increase the amount and value of economic and employment activity associated with the site and the resultant benefits accruing to the municipality and region.



## 16. APPENDIX – ASSUMPTIONS & LIMITING CONDITIONS

This market, economic, land use or development report / study has been prepared at the request of the client for the purpose of providing an estimate of economic feasibility or impact, development strategy or range of possible market values. It is not reasonable for any person other than the person or those to whom this report is addressed to rely upon this without first obtaining written authorization from the client and the author of this report. This report has been prepared on the assumption that no other person will rely on it for any other purpose and all liability to all such persons is denied.

This report has been prepared at the request of the client, and for the exclusive (and confidential) use of the recipient as named herein and for the specific purpose and function as stated herein. The client has provided much of the site information and has represented that such material, such as ownership, rents, size, etc. is reliable. All copyright is reserved to the author and this report is considered confidential by the author and the client. Possession of this report, or a copy thereof, does not carry with it the right to reproduction or publication in any manner, in whole or in part, nor may it be disclosed, quoted from or referred to in any manner, in whole or in part, without the prior written consent and approval of the author as to the purpose, form and content of any such disclosure, quotation or reference.

Without limiting the generality of the foregoing, neither all nor any part of the contents of this report shall be disseminated or otherwise conveyed to the public in any manner whatsoever or through any media whatsoever or disclosed, quoted from or referred to in any report, financial statement, prospectus, or offering memorandum of the client, or in any documents filed with any governmental agency without the prior written consent and approval of the author as to the purpose, form and content of such dissemination, disclosure, quotation or reference.

If an estimate of economic, market or financial value of the real property / subject site which is assessed in this report is provided then it pertains to the approximate and general range of possible values of the freehold or fee simple, or leasehold or leased fee estate in the real property, based on vacant possession or subject to terms and conditions of the existing tenancy as described in this report. The property rights exclude mineral rights, if any.

An estimate of economic, market or financial value, if any, contained in this report is founded upon a thorough and diligent examination and analysis of information gathered and obtained from numerous sources. Certain information has been accepted at face value, especially if there was no reason to doubt its accuracy. Other empirical data required interpretive analysis pursuant to the objective of this report. Certain inquiries were outside the scope of this mandate. In addition, any economic or financial estimates in this report are approximations only and may vary from final and actual market values. For these reasons, the analyses, opinions, and conclusions contained in this report are subject to the following contingent and limiting conditions.

The property has been assessed on the basis that title to the real property is good and marketable.

The author of this report cannot accept responsibility for legal matters, questions of survey, opinions of title, hidden or unapparent conditions of the property, toxic wastes or contaminated materials, soil or sub-soil conditions, environmental, engineering or other technical matters which might render this property more or

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less valuable than as stated herein. If it came to our attention as the result of our investigation and analysis that certain problems may exist, a cautionary note has been entered in the body of the report.

The legal description of the property and the area of the site was obtained from sources which are deemed to be reliable. Further, the plans and sketches contained in this report are included solely to aid the recipient in visualizing the location of the property, the configuration, and boundaries of the site and the relative position of the improvements on the said lands.

The property, if any, has been described on the basis that the real property is free and clear of all value influencing encumbrances, encroachments, restrictions or covenants except as any be noted in this report and that there are no pledges, charges, lien or social assessments outstanding against the property other than as stated and described herein.

The property if any, has been described on the basis that there are no outstanding liabilities except as expressly noted herein, pursuant to any agreement with a municipal or other government authority, pursuant to any contract or agreement pertaining to the ownership and operation of the real estate or pursuant to any lease or agreement to lease, which may affect the stated value or saleability of the subject property or any portion thereof.

The interpretation of any leases and other contractual agreements, pertaining to the operation and ownership of the property, as expressed herein, is solely the opinion of the author, and should not be construed as a legal interpretation. Further, any summaries of these contractual agreements, which may appear in the Addenda, are presented for the sole purpose of giving the reader an overview of the salient facts thereof.

The property, if any, has been described on the basis that the real property complies in all material respects with any restrictive covenants affecting the site and has been built and is occupied and being operated, in all material respects, in full compliance with all requirements of law, including all zoning, land use classification, building, planning, fire and health by-laws, rules, regulations, orders and codes of all federal, provincial, regional and municipal governmental authorities having jurisdiction with respect thereto. (It is recognized there may be work orders or other notices of violation of law outstanding with respect to the real estate and that there may be certain requirements of law preventing occupancy of the real estate as described in this report. However, such possible circumstances have not been accounted for in the reporting process.)

Investigations have been undertaken in respect of matters that regulate the use of land. However, no inquiries have been placed with the fire department, the building inspector, the health department, or any other government regulatory agency, unless such investigations are expressly represented to have been made in this report. The subject property must comply with such regulations and, if it does not comply, its non-compliance may affect the market value of this property. To be certain of such compliance, further investigations may be necessary.

The property, if any, has been assessed and possibly valued in a general analysis on the basis that all rents referred to in this report are being paid in full and when due and payable under the terms and conditions of the attendant leases, agreements to lease or other contractual agreements. Further, it is assumed that all rents referred to in this report represent the rental arrangements stipulated in the leases, agreements to lease or other contractual agreements pertaining to the tenants' occupancy, to the extent that such rents have not been prepaid, abated, or inflated to reflect extraordinary circumstances, and are fully enforceable notwithstanding

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that such documentation may not be fully executed by the parties thereto as at the date of this reporting, unless such conditions have been identified and noted in this report.

The data and statistical information contained herein were gathered from reliable sources and are believed to be correct. However, these data are not guaranteed for accuracy, even though every attempt has been made to verify the authenticity of this information as much as possible.

Any estimated economic or market or financial value does not necessarily represent the value of the underlying shares, if the asset is so held, as the value of the shares could be affected by other considerations. Further, the estimated market value if any does not include consideration of any extraordinary market value of the property, unless the effects of such special conditions, and the extent of any special value that may arise therefrom, have been described and measured in this report.

Should title to the real estate presently be held (or changed to a holding) by a partnership, in a joint venture, through a co-tenancy arrangement or by any other form of divisional ownership, the value of any fractional interest associated therewith may be more or less than the percentage of ownership appearing in the contractual agreement pertaining to the structure of such divisional ownership.

In the event of syndication, the aggregate value of the limited partnership interests may be greater than the value of the freehold or fee simple interest or leasehold interest in the real property, by reason of the possible contributory value of non-realty interests or benefits such as provision for tax shelter, potential for capital appreciation, special investment privileges, particular occupancy and income guarantees, special financing or extraordinary agreements for management services.

Should the author of this report be required to give testimony or appear in court or at any administrative proceeding relating to this report, prior arrangements shall be made therefore, including provisions for additional compensation to permit adequate time for preparation and for any appearances that may be required. However, neither this nor any other of these contingent and limiting conditions is an attempt to limit the use that might be made of this report should it properly become evidence in a judicial proceeding. In such a case, it is acknowledged that it is the judicial body which will decide the use of this report which best serves the administration of justice.

Because market conditions, including economic, social and political factors, change rapidly and, on occasion, without notice or warning, the estimate of market value expressed herein, as of the effective date of this report, cannot necessarily be relied upon as any other date without the subsequent advice of the author of this report. All macro economic data has been obtained from reliable sources however major changes in the economy are possible which could move entire markets and a reported value, if any, would move up or down with that market. The report typically assumes stable background economic conditions.

If any economic, market or financial value or measure has been expressed herein it is in Canadian dollars.

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## 17. APPENDIX – PROFESSIONAL RESUME

**SITE ECONOMICS LTD.**

***Richard Wozny, Principal***

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### **Company Overview**

Site Economics Ltd. provides real estate development consulting services to developers, land owners, investors and the public sector. We have completed over 1,000 major projects with a cumulative value of well over \$100 billion. Our extensive experience in large scale commercial, industrial, residential and institutional land development projects allows us to provide our clients with the following services.

### **Strategic Real Estate Services**

- Market Analysis and Feasibility
- Impact Analysis
- Financial Analysis and Site Valuation
- Highest and Best Use Studies
- Absorption and Demand Assessment
- Development Strategies
- Project Optimization
- Market Input for Land Use Planning
- Transit Oriented Development (T.O.D.)
- Property Acquisition and Disposition Strategies
- Strategic Review of Redevelopment Options
- Shopping Centre / Downtown Revitalization
- Employment Land Strategies
- Site Selection and Location Assessment

### **Richard Wozny, Principal**

Richard has conducted hundreds of development and financial studies of shopping centres and commercial districts. He has worked on the development of thousands of acres of industrial buildings, including complex logistics parks. He has also worked on many thousands of acres of residential sub divisions and hundreds of high density residential buildings and office towers. Richard has also conducted hundreds of store location and feasibility studies for retailers and financial institutions.

Richard's past work experience includes: Vice President and Manager of Advisory Services, Cushman & Wakefield Inc., Manager of Retail Development for Western Canada, Marathon Realty Company Ltd. and Consultant for Thomas Consultants Inc. Richard completed a Master's Degree in Regional Science at the University of Pennsylvania, a Master's Degree in Religion at Temple University, and a Bachelor's Degree in Philosophy at the University of British Columbia.

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