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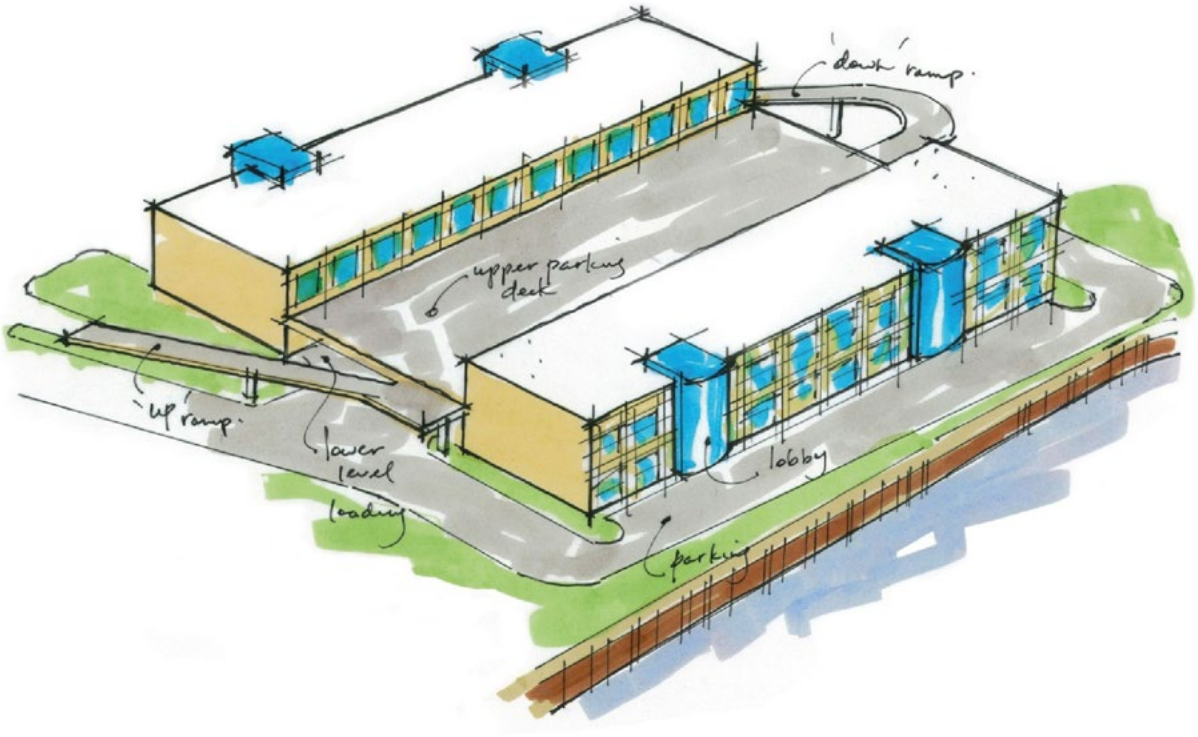

Sketched rendering of a higher density and multi-level urban and industrial building
Source: Site Economics Ltd. and Omicron.

Industrial Lands Densification and Intensification

Profiling Planning Policies and Development Projects in Metro Vancouver

Eric Aderneck

Keywords: Multi-level industrial lands, industrial intensification, industrial densification, evolving land uses and forms

Abstract

Building on past research and publications by the author, this article provides a current synopsis of industrial lands densification/intensification trends. The focus is on the Metro Vancouver region of British Columbia, which has Canada's largest port, a rapidly growing population, and a limited land base, leading to increasing interest in innovative high-density forms of industrial development. These industrial development trends are driving new opportunities for densification and intensification while challenging traditional planning regulations. This article provides a context of industrial lands issues in Metro Vancouver, commentary on regional strategies and municipal plans, overview of market factors, a profile of two example development projects, and a discussion of associated building and policy opportunities and challenges.

Eric Aderneck is a Senior Planner with Metro Vancouver Regional District, and an industrial lands planning consultant in other jurisdictions. His experience includes working for the public and private sectors in the Metro Vancouver region through a number of different capacities including planning policy, real estate development, consultant, and instructor.

Initial industrial insights

Industrial lands contain businesses and activities that serve the wider economy and community, yet don't often receive much attention. And like the well-known affordable housing crisis in the Metro Vancouver region, industrial accommodations are now also at such a critical point. In response to strong demand for industrial space and limited land supply in some cities and regions, planners and developers are increasingly exploring options for industrial densification and intensification. The resulting new buildings aim to offer more floor space and activity on a given amount of land, using a valuable resource more efficiently.

Although not (yet) widespread in North America, there are notable examples where industrial densification trends have started in urban locations, on high value sites. These two to five storey structures typically contain light industrial uses on the ground floor, additional light industrial, office or other employment space on the upper floors, underground parking, and rooftop amenities, connected via freight elevators.

With no more industrial land being created in the Metro Vancouver region, the profiled projects situated close to the Vancouver city centre demonstrate possibilities for creating more industrial space through multi-level buildings, where the right policy and market conditions exist. This article explores how industrial trends are driving new opportunities for building densification while challenging traditional planning definitions.

Defining industrial lands and uses

The term *industrial* represents a wide spectrum of uses and intensities, which do not all fit into conventional definitions of *heavy* or *light*, or *traditional* and *modern*. An industrial use can include everything from large transportation, distribution, and manufacturing facilities to small local-serving producers and suppliers as well as new sectors like advanced technology, media/design, bio-tech, and e-commerce.

> Different types of industrial businesses need different types of industrial spaces and buildings.

Modern high-density industrial properties are not the traditional single-storey buildings typical of the suburbs. New forms of industrial densification provide more space for companies to expand within urban communities. Multi-level industrial structures have existed in some East Asian cities for decades, accommodating small-scale production and local distribution, with circular ramps providing access for compact trucks. More recently, new forms of industrial facilities have arrived in certain European and North American cities.

New light, low impact industrial uses, often with a high proportion of commercial uses, do not need the same types of accommodations as heavy and noxious operations, and associated separation of uses and building setbacks. While some industrial sectors continue to be land-intensive, multi-level buildings can provide more space for sectors that can function on upper levels, be it industrial or other forms of employment uses.

These are some of the considerations for industrial multi-level intensification or densification, sometimes called *vertical* or *stacked* buildings to accommodate growing urban economies. The policy matter is how regulations should permit such new types of industrial business practices, without allowing too wide a range of commercial uses on these important industrial lands.

Describing measures of industrial utilization

Industrial development is the essence of form follows function — the land and building are often designed around the operational requirements of the business tenant. There are two ways to define industrial land uses, and associated measures of utilization (Aderneck 2012):

- *Intensity/intensification* refers to the amount of activity - measured as jobs per building or land area, or the volume of goods produced or processed.
- *Density/densification* refers to the dimensions of a building - measured as floor area ratio, site coverage or building heights/volumes.

Higher intensities are often associated with higher densities, but this is not always the case. Exceptions are land-intensive industrial uses with activity that does not require a building, such as a lumber mill or shipping terminal. These activities need land for equipment, truck loading, vehicle parking, and outdoor storage. Beyond the building floor area and number of jobs, there are more nuanced and complex ways to measure utilization, if the data is available (Gilmore 2015).

While employment is important, the number of jobs on a site should not be the primary or only measure of success for industrial uses and utilization. Some industrial functions are inherently equipment-intensive and thus do not require many employees or are being made more efficient through automation. On the other hand, an office building can have many more employees, but is not an industrial use.

Metro Vancouver regional context

Metro Vancouver provides the regional context for the case studies profiled in this article. The region is experiencing extremely strong demand for industrial space while also suffering from a severe shortage of industrial land supply. This is one challenge for the region, which is home to the largest port in Canada and population of 2.8 million, where over a quarter of the jobs are located on industrial lands. The consequences are high land prices, low vacancy rates, and rising rental rates - amongst the tightest markets in North America. Administratively, the regional district is home to some 22 member municipalities, and a diverse and growing population and economy. Together, both regional and municipal administrations confront issues pertinent for industrial lands.

Constraints

This challenging reality has been known for some time, acutely experienced by industrial tenants, having very few options to find accommodations. According to Metro Vancouver (2022c), the regional authority, challenges with the worsening industrial land shortage include:

- A less competitive regional profile for industrial and trade related growth;
- Reduced attractiveness of the transportation gateway for new and expanding industrial development with corresponding investment and jobs;
- A loss of future economies of scale that benefit large concentrations of similar businesses;
- Longer truck trips for moving containers to less than ideal industrial sites across the region alongside lengthened and delayed drayage times;
- Increased traffic and energy use from transportation, with the associated greenhouse gas and pollution impacts;
- High land prices, low vacancy rates, and increased operating costs for industrial businesses; and
- Increasing conflicts due to noise, emissions, and other negative impacts as more people live closer to industrial operations, including the port, rail yards, and airport.

The inventory of industrial lands is limited and can also experience declines. As some industrial lands are redeveloped for residential, commercial or other land uses, industrial activities and goods movement can be displaced and forced further away from gateway transportation infrastructure.

Metro Vancouver regional government and industrial strategies

The Metro Vancouver Regional District has been exploring industrial land use issues for decades. The regional growth strategy (Metro Vancouver 2022a, Metro Vancouver 2023) includes an *Industrial* land use designation and associated policies in place since 2011, which is in part implemented through local municipal plans, regulations, and actions (Metro Vancouver 2022a). Beyond protecting the industrial land base, the strategic focus advances industrial intensification and densification of the limited available lands.

More particularly, responding to these industrial issues and the need for a coordinated approach, Metro Vancouver completed a Regional Industrial Lands Strategy in 2020 to advance policy solutions, including industrial intensification and densification (Metro Vancouver 2022b). The Strategy was informed through significant research and engagement, in close collaboration with the region's member municipalities and other sector stakeholders. It establishes a vision for the future of industrial lands across the region and provides a set of recommendations to guide a broad range of stakeholder actions to achieve that vision (Metro Vancouver 2022b).

The Strategy identifies 10 priority actions and 34 recommendations including 4 main challenges facing Metro Vancouver's industrial lands (Metro Vancouver 2022b):

1. A constrained land supply;
2. Pressures on industrial lands;
3. Site and adjacency issues;
4. A complex jurisdictional environment.

As part of the industrial lands program, Metro Vancouver's Regional Planning division studies and collaborates with regional partners on intensification and densification, market trends, and other topic matters, conducts a comprehensive regional industrial lands inventory every five years, and updates and implements the regional growth strategy to enhance policies that protect and utilize industrial lands with associated performance measures. Implementation requires continuous collaboration and a long-term commitment by all parties.

Unique industrial lands – trade oriented overlay

Some land use decisions aim to maximize the number of employees per hectare and the property tax generated, which tends to discourage some lower density industrial uses in favour of higher value, denser, and commercially oriented development. This approach does not fully consider the need for trade and transportation activities which serve an important function for the regional, provincial, and national economies, nor the higher wage rates that often come with these jobs.

Protecting industrial lands for trade-oriented uses can assist in coordinating infrastructure investments to enhance the capacity of these lands. Noting that the specific type of use varies, and that utilization can be measured in different ways depending on the sector, policy efforts should accordingly be directed to the types of lands with opportunities to increase utilization and efficiency (Metro Vancouver 2013).

Municipal initiatives – City of Vancouver

Most of the new forms of industrial densification, in combination with non-industrial uses, have been focused in the City of Vancouver, the largest city of the region. The City of Vancouver completed an Employment Lands and Economy Review in 2020 (City of Vancouver 2019b). The associated reports include analysis of the characteristics of Vancouver's economy, change over time, and projections for the future including the City's capacity to accommodate job growth under existing policy and zoning (City of Vancouver 2020).

Developed in close collaboration with stakeholders and aligned with the four big moves outlined in the Metro Vancouver Regional Industrial Lands Strategy, are four directions for the future of Vancouver's Industrial Areas (City of Vancouver 2020):

1. *Protect Industrial Lands for Employment Use* to avoid overall net loss of industrial space.
2. *Enable Balanced Industrial Intensification* by modernizing zoning to encourage multi-storey industrial.
3. *Facilitate the Right Users in the Right Spaces* by enabling more flexibility in industrial uses.
4. *Monitor, Report and Coordinate Industrial Change* to identify impacts of policy changes and inform future work.

In addition to providing space for key city-serving uses (City of Vancouver 2019a), industrial lands host a wide range of businesses. Many of these city-serving functions support the health and resilience of the overall economy by providing goods and services to both residents and other businesses. Examples include light industrial uses such as food manufacturing, auto & equipment repair services, and distribution centres. City-serving industrial also takes place in the form of comparatively heavier or dirtier industrial uses such as recycling and waste processing.

Industrial densification and intensification from planning and development perspectives

In North America, there are relatively few multi-level industrial buildings (aside from ones built over a century ago, in port cities and factory towns). However, some are now being built, with notable new projects in places with very high land values, such as in Vancouver. To some effect, cities are following in the footsteps of some East Asian cities like Hong Kong, Tokyo, and Singapore, where multi-level industrial buildings exist. Because of a lack of land, developers build up to meet spatial and operational needs.

Soaring prices for land are a response to its scarcity and the stimulus for its more efficient use. In these geographies with limited land supply and a strong market demand, firms are faced with the dilemma of either building up (multi-level) or moving out (further away) to find more suitable accommodations.

Industrial land demand has been particularly accelerated during and due to COVID-19 pandemic, because of the rapid growth of e-commerce, with millions of consumers seeking home deliveries. To fulfil these requests for rapid deliveries, distribution centres need to be near the population centres, causing further demand for urban space, as well as curb-side and congestion challenges.

Understanding densification from a long-range planning perspective

There are numerous benefits of industrial densification to developers, businesses, and the community:

- More efficient use of industrial land and reduced development pressures on other lands in the region through possible conversions, such as on as agricultural and natural areas.
- More industrial space and capacity in areas with a constrained land base.
- More space to accommodate employment and economic growth.
- By means of the spatial accommodations, densification also enables the intensification of land use through:
- A more efficient transportation system - drayage trucks do not have to travel as far and better transit service for workers.
- Co-locating and clustering of activities and operations can support eco-industrial networks and circular economy systems
- Tighter coordination or programming of activities can allow companies to use each other's by-products (material loops), share resources (peer-to-peer lending) and develop economies of scale.

Building requirements for business tenants

Multi-level developments typically have industrial uses at grade, with a mezzanine, one or two floors of underground parking, and multiple floors of light industrial uses or offices above. Functional features for industrial tenants include loading bays, cargo elevators, wide corridors, high ceilings, adequate column spacing and floor load-bearing capacity. Unit sizes are small by industrial standards (for example 2,000 to 5,000 square feet), with a higher percentage of mezzanine space. To address all these requirements, the buildings are considerably more complex to design and expensive to build than conventional single-level structures.

A disadvantage is that multi-level buildings introduce inefficiencies that reduce net usable areas, as some space is required for hallways, elevators and stairs. Additionally, spaces and operations are affected by size and spacing of load bearing columns to support the upper levels. As such, achievable density may be limited by a combination of regulatory and functional requirements, varying depending on the zone and attributes of the site.

Development challenges

There is a substantive list of challenges for multi-level industrial buildings, including approvals, land costs, construction, designs, and structural requirements. Sites with a slope, undesirable for conventional industrial development, offer the opportunity to take advantage of the grade to access a building's lower level from one side and the upper level from another side, eliminating the need for ramps or elevators. Construction costs on a multi-level industrial building are approximately 2.5 times higher than traditional industrial development. In some cases, longer application approval timelines due to the unique

building components elevate the project risk and financing profile. Furthermore, vertical buildings cannot be phased over time to meet market demand like horizontal developments can. Higher rents are required to support these additional development costs. In many cases, the building's upper levels that are office space can cross-subsidize the cost of the industrial part of the building.

Strata tenure

To reduce the market risk, some developers will pre-sell strata (condo or commonhold) tenure units before commencing construction. Ownership can be financially advantageous to buyers due to property appreciation, and control over their business space through security of tenure. Strata industrial tenure and urban industrial uses are often associated, with units being generally smaller, and with a higher proportion of office and mezzanine spaces. These units can accommodate some types of industrial tenants, however, are not appropriate for all sizes, forms, and types of users. As stated in a 2018 report (Aderneck 2018), there are both reasons and concerns about this strata trend (which may now be shifting due in part to increasing mortgage rates).

Although strata industrial provides needed accommodations for new and growing businesses, redevelopment of industrial lands can in some cases displace existing businesses, the latter being more traditional forms of industry. Yet, at the same time, strata industrial units are often a more intensive use of the lands, although in some cases with a larger proportion of accessory and non-industrial uses. In the longer term, increasing stratification of industrial lands may limit or challenge the future redevelopment potential of the lands when the functional lives of the buildings are at their end, and diminish the amount of industrial land available for larger format industrial and logistics users (Aderneck 2018).

These projects are marketed with promotional materials profiling the building's features and the area's amenities that are desirable to workers. However, other factors affect the extent of this trend, such as the availability of sites, government approvals, efficient designs, construction costs, and rent levels.

Typical types of businesses

Industrial zones permit some accessory and commercial activities that are supportive of the primary industrial use. These include limited office, retail, and recreational uses, that are often able to pay higher rents. However, excessive office or retail space may lead to concerning consequences. Substantial commercial can displace industrial uses by increasing land values, property taxes or rental rates, and introduce land use conflicts from externalities such as noise, odour and traffic. Accordingly, municipal plans should consider the local context and community objectives, not only development interests.

Some office tenants are attracted to the space in the upper levels of these buildings. These light industrial districts typically have a non-corporate feel and culture compared with office towers in the downtown, and the buildings can provide features that are not commonly available in conventional office buildings such as laboratories, testing, and

prototyping facilities. These urban areas are also closer to transit, workers, amenities, and often contain local breweries, popular with tech sector workers. Modern firms tend to seek desirable workplace locations and accommodations to attract and retain a skilled workforce.

Tensions

These modern buildings incorporate sustainability provisions such as insulated walls, LED lighting with motion sensors, and electric vehicle charging stations. These can be features for tenants, but also increase already high construction costs. Providing parking for workers and fleet vehicles is also a challenge. Underground parking facilities are costly and financially possible only for high value sites and are not physically possible in some areas with poor soil conditions. On the other hand, urban locations close to transit may require less on-site employee parking.

For larger or more suburban industrial buildings, light vehicle parking may be provided on the roofs, requiring ramp access and additional structural support. Some developers have explored large format industrial buildings with two or three levels, accessible via a large truck ramp. Parking standards should be reviewed as needed. A future with greater reliance on automation will mean fewer employees, which may reduce the need for on-site parking. While other facilities may be more employee-intensive and include a need for vehicle parking, which could possibly be addressed through shared parking facilities.

Zoning considerations and profile projects

There are a growing number of new multi-level industrial developments in the Metro Vancouver region, mostly in Vancouver's historic industrial districts. Tenants increasingly want urban locations and building amenities to help attract employees, although some developments include considerable commercial components (Aderneck 2020a). In the Mount Pleasant area, located close to the downtown core and rapid transit, the I-1 zoning allows up to 3.0 floor area ratio (FAR), requiring the ground floor and mezzanine be designed for 1.0 FAR of industrial space, with office and other employment uses on upper floors.

The I-1 zone states its intent is to permit light industrial uses that are generally compatible with one another and with adjoining residential or commercial districts. It is also the intent to permit advanced technology industry, and industry with a significant amount of research and development activity. Commercial uses, including office and retail uses, which are compatible with or complementary to light industrial uses, are also permitted, subject to the limitations in the zone (City of Vancouver 2022).

Recent experiences show that these bylaw provisions and strong market demand for office space triggered a rush of interest in multi-level buildings with a mix of light industrial at grade and tech type office above. Overlapping the Mount Pleasant area, the Broadway

Plan, approved in 2022 associated with a rapid transit line extension, resulted in policies to further intensify the area, increasing overall Floor Area Ratio while keeping the ratio of industrial at 33%. In the False Creek Flats area, located further east of the downtown core and closer to the region's major road network, the I-2 zoning allows up to 3.0 floor area ratio, with a mixture of uses such as manufacturing, wholesale, and laboratories, as well as office.

The I-2 zone states its intent is to permit industrial and other uses that are generally incompatible with residential land use but are beneficial in that they provide industrial and service employment opportunities or serve a useful or necessary function in the city. It is not the intent, however, to permit uses that are potentially dangerous or environmentally incompatible when situated near residential districts (City of Vancouver 2021). The City's 2017 False Creek Flats Plan retained large parts of I-2 zoning, while defining some areas for essential *back of house activities* that support and serve the rest of the City.

Two notable projects are profiled below, designed with light industrial units at grade with medical office and bio-tech space on the upper levels as the latest examples of such innovative multi-level buildings.

I-1 Zone: HOUSS

Conwest Group (2022) built a four-level, 52,700 square feet building (HOUSS) on a 17,000 square feet site, achieving additional density, 3.1 FAR, by incorporating the renovation of an onsite heritage house. Truck access from the rear lane is through the parking access level, with loading bays and freight elevators. The industrial units each have a mezzanine, with three floors of office space above mostly used by medical related tenants, and two floors of underground parking below.

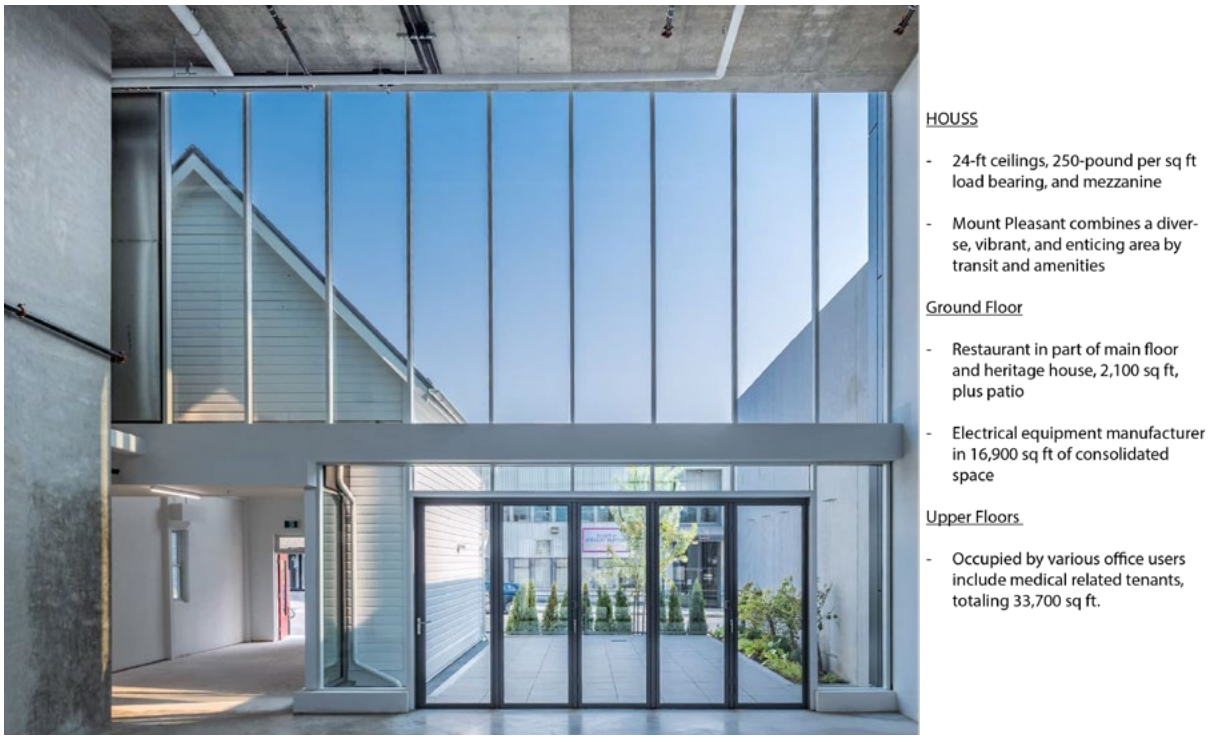

Figure 1: Interior view of HOUSS. Source: Conwest Group 2022.

The building, completed in mid-2022, is strata tenure. Multiple industrial units were purchased and consolidated by a single company that designs and builds electrical equipment.

I-2 Zone: Evolution Block

The Evolution Block has 105,000 square feet of floor area over four levels on a 35,000 square feet site, occupying an entire city block, with a density of 3.0 FAR (PC Urban Properties 2022). Built by PC Urban in partnership with Nicola Wealth Real Estate, this project was completed in late 2022. It includes flexible light industrial, commercial, production, laboratory, and office spaces, along with an outdoor patio deck on the roof and two levels of underground parking.

Dock and grade loading doors are served by a high-speed freight elevator system to provide access throughout the building. The project is strata tenure, with the entire ground floor taken by a high-end auto collision repair facility, and occupying the entirety of the upper three floors is an expanding biotech/health sciences firm.

Figure 2: Internal Rendering of Evolution Project. Source: PC Urban 2022.

Lessons learned

Industrial development trends toward densification and intensification can provide much-needed industrial capacity in tight, land-constrained markets. Horizontal development with thoughtful intensification and integration of activities can offer benefits such as more space for jobs, economic growth, and an enhanced tax base.

More cities are recognizing the evolving nature of business and work. In response, they are adopting strategies that advance new opportunities and remove barriers to innovative building designs. A primary policy consideration is how municipal industrial, economic, and employment plans should permit or encourage these new types of industries and business models, while still protecting the intended purpose of the industrial lands.

Municipal plans can "guide market forces in ways that respond to industrial needs while considering other community objectives" (Aderneck 2020a). These policies need to balance "industrial trends, development viability, business needs, responsive regulations, and other community interests moving forward" while aiming to remove outdated barriers to densification/intensification by considering (Aderneck 2020a):

- *Permitted industrial uses:* Add new industrial uses that may not appear in existing industrial zoning bylaws, such as e-commerce, last-mile delivery and integrated workspaces.
- *Non-industrial uses:* Restrict non-industrial uses to an accessory scale that supports the primary industrial functions.
- *Density limits:* Adjust density caps such as building setbacks and height limits, as well as floor area ratio and site coverage maximums.
- *Parking requirements:* Reduce minimum parking in urban locations and areas located near mass-transit options.

Finally, to secure the industrial use of premises beyond zoning definitions, municipalities can enforce occupancy permitting and business licensing to assuage concerns that buildings might not be used for their intended purposes.

Issues and opportunities to improve the process and results

The two profiled projects were built under existing industrial zoning in the City of Vancouver. Thus, no site rezoning process was required (the zone provisions are amended by the City from time to time). Development Permits and Building Permits were required, as is the case for virtually all developments. That said, the I-1 and I-2 zoning regulations are very detailed, containing specific provisions for allowable uses and measures of densities (and combinations thereof). The zoning bylaws have both *Outright Approval Uses and Conditional Approval Uses.* Under the latter, the Director of Planning may approve designs and densities if the project otherwise satisfies the intent of the zone. Supplementing the zoning bylaw, the City has an Administrative Bulletin (City of Vancouver 2017) to ensure that the building is adequately designed for sustainable and continuous functional use, such as requirements for ceiling heights, load spaces, freight elevators, and mezzanines. Noting that financial and market viability of a development project may be impacted by the permitted uses, especially the allowance of higher value non-industrial uses, clear definitions of allowable uses is an important point.

Ultimately, a sophisticated and flexible design solution – especially for tight sites – is a means to achieve functional and code requirements, while creating spaces that are marketable for developers and desirable by tenants and keeping an eye on construction costs. Usually, a quick development schedule is not the result.

In other areas and cities, industrial development may be allowed under existing industrial zones, but require a Development Variance Permit to accommodate a larger building. This might be through increases in allowable heights or reducing setbacks. Where this is a common occurrence, a text amendment to the municipal zoning bylaw may be a more efficient solution to process these projects and readily allow higher densities.

The Metro Vancouver region has a sophisticated development industry, with leading architects pursuing designs that maximize the potential of sites. But sometimes they are pushing against restrictive and inflexible municipal policies that are complex and limiting. Here lies the tension between developers wanting the maximum flexibility for buildings versus planners wanting to ensure the long-term protection of the lands for industrial uses.

Regulatory modernization

The findings and recommendations for industrial densification and intensification in this article focus on refining municipal policies and regulations to better facilitate new innovative multi-level industrial buildings and uses.

Industry is an important part of a complete economy and community with well-paying jobs. The challenge and opportunity is to densify and intensify industrial uses without compromising the industrial intent of the lands. While accommodating new industrial activities, there will continue to be a need to accommodate the more traditional forms of manufacturing, processing, and distribution needed in modern cities. Thus, the way we define and measure industrial uses needs to evolve and be synchronised with plans for development that accommodate both old and new industrial functions.

> To encourage and ease the approval and permitting processes for higher density industrial development, municipalities should consider updating planning policies and zoning provisions.

This *regulatory modernization* may mean adjusting density limiters, such as building heights, site coverage maximums, parking standard minimums, and permitting both traditional and new industrial uses, while continuing to prohibit non-industrial, non-supportive uses. This does not mean that cities discard historic forms of industry, rather that they carefully re-think, according to their local contexts, "how regulations permit various types of industrial business models without allowing too wide a range of employment and commercial uses" (Aderneck 2020b).

The nuance here is in recognising and responding to the diversity of industrial sectors, some of which will continue to be land-intensive, while others can be in multi-level buildings. The unique experiences and lessons of Metro Vancouver should be considered as industrial densification and intensification becomes more common elsewhere. Policies and practices should be coordinated and supportive, and can include incentives, such as waiving development charges/fees for industrial floor space on upper levels, bringing-to-market strategies such as addressing land assembly, infrastructure servicing, and soil remediation issues. Plans could target older properties that could be redeveloped into higher-density industrial uses.On a limited amount of industrial land, the way to increase industrial capacity for a growing and evolving economy and workforce is through sensitive approaches to building up.

References

Aderneck, Eric (2012): Best Practices for Intensive Use of Industrial Land Report. Burnaby.

Aderneck, Eric (2018): White Paper: Stratification of Industrial Land in Metro Vancouver. Burnaby. http://www.metrovancouver.org/services/regional-planning/PlanningPublications/StratificationofIndustrialLandinMetroVancouver-Sep2018.pdf, accessed 08.03.2023

Aderneck, Eric (2020a): From Horizontal to Vertical: Industrial Intensification Grows Up. https://www.naiop.org/research-and-publications/magazine/2020/spring-2020/development-ownership/from-horizontal-to-vertical-industrial-intensification-grows-up/, accessed 08.03.2023.

Aderneck, Eric (2020b): Planning Considerations for Multi-Level Industrial Development in Vancouver. In: Plan Canada 60 (3), 36–39.

City of Vancouver (2017): M and I Districts - Development Criteria for Functional Industrial Space. Vancouver: City of Vancouver. https://bylaws.vancouver.ca/bulletin/bulletin-m-i-districts-functional-industrial-space.pdf, accessed 08.03.2023.

City of Vancouver (2019a): Employment Lands and Economy Review - Update on Phase 1 and Next Steps. Vancouver: City of Vancouver.

City of Vancouver (2019b): Employment Lands and Economy Review. https://vancouver.ca/home-property-development/vancouver-employment-lands-and-economy-review.aspx, accessed 07.10.2019.

City of Vancouver (2020): Employment Lands and Economy Review Phase 2 Report: Emerging Directions for Consideration Through Vancouver Plan. https://vancouver.ca/files/cov/employment-lands-economy-review-phase-2-report.pdf, accessed 08.03.2023.

City of Vancouver (2021): I-2 District Schedule. Zoning and Development By-laws. Vancouver. https://bylaws.vancouver.ca/zoning/zoning-by-law-district-schedule-i-2.pdf, accessed 08.03.2023.

City of Vancouver (2022): I-1 District Schedule. Zoning and Development By-laws. Vancouver. https://bylaws.vancouver.ca/zoning/zoning-by-law-district-schedule-i-1.pdf, accessed 08.03.2023.

Conwest Group (2022): HOUSS. https://conwest.com/featured-projects/houss, accessed 06.03.2023.

Gilmore, Ryan (2015): Industrial land intensification: what is it and how can it be measured. Manitoba, University of Manitoba.

Metro Vancouver (2013): Opportunities for the Intensive Use of Industrial Land. Burnaby. http://www.metrovancouver.org/services/regional-planning/PlanningPublications/OpportunitiesForIndustrialLandsIntensification-Feb2013RevisedFinalTitle.pdf, accessed 08.03.2023.

Metro Vancouver (2022a): About Metro 2040. Burnaby.

Metro Vancouver (2022b): Industrial Lands and Employment. Burnaby. http://www.metrovancouver.org/services/regional-planning/planning-priorities/industrial-lands-employment/Pages/default.aspx, accessed 08.03.2023.

Metro Vancouver (2022c): Regional Planning Committee Agenda Package: September 2, 2022. Burnaby: Metro Vancouver Regional District: 118.

Metro Vancouver (2023): About Metro 2050. Burnaby. http://www.metrovancouver.org/services/regional-planning/metro-vancouver-2050/about-metro-2050/Pages/default.aspx, accessed 08.03.2023.

PC Urban Properties (2022): Evolution Block. Vancouver. https://www.pcurban.ca/project/evolution-block/, accessed 06.03.2023.