RE-IMAGINING A PETROCHEMICAL LANDSCAPE IN DARTMOUTH NOVA SCOTIA

by

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ABSTRACT

This thesis addresses the vast petrochemical landscape of the Imperial Oil Refinery situated within the urban context of Dartmouth, Nova Scotia, Canada. The recent decommissioning of the refinery has reduced it to an arcane landscape of weathered steel towers, pipes and storage tanks. This thesis defends the inherent value of the refinery as a device of imagination and memory of the past energy era, both historically through the infrastructure of industry and the residual landscape that it is defined by. Architectural interventions act to reveal the potential of existing site infrastructure and are introduced through a phased strategy, providing thresholds and view that engage with this powerful residual landscape. Through this engagement both the experiential and imaginative capacity of the landscape is revealed, creating a sense of place through time, connecting memory and the community to this once forbidden site.

ACKNOWLEDGEMENTS

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CHAPTER 1: INTRODUCTION

Era of Oil

Oil has been described as the single largest material influence on power, culture and technology, a product that has the potential to make or break nations (Maugeri 2006, 1). The economic power of this resource has led to a rapid expansion of the industry and the corresponding denaturalization and transformation of landscapes. Canada's economy is largely based on energy and resource extraction, with billions of dollars invested in infrastructure to engage in a world-wide network of energy transfer and trade.

Since the early twentieth century oil has heavily influenced technology and the development of our cities (Chapman 2001, 192). The development of the combustion engine and subsequent automobile changed the face of urbanity; it enabled intercity travel and the extended commute, rationalized the suburb and decentralized urban planning. This "era of oil" continues to influence our development and societal structures, creating a disparity of wealth and significant environmental concerns (Maugeri 2006, 1). The era of oil will be framed as an industrial age, and similar to industrial periods past it will contribute to humanity's understanding and historical record.

Petrochemical Landscapes

The petrochemical industry transforms landscapes at unprecedented scales. There are over 1 million producing oil wells, 2 million kilometres of pipeline, and more than 700 crude oil refineries worldwide (Mostafavi and Doherty 2010, 421). This infrastructure along with supporting industries and networks create landscapes that are revealing of humanity's deleterious mark on the natural world.

This energy infrastructure often impacts urban space, creating disconnected places in and around our cities exclusive to industry. These landscapes are beyond the experiential limits of the city, yet find themselves rooted on our waterfronts, neighbours to our homes, and embedded in the urban fabric of our cities. In creating these off-limit spaces, citizens are left to develop their own understandings of these landscapes, visualizing and imagining an experiential capacity of the landscape from the outside looking in.

Future Ruin

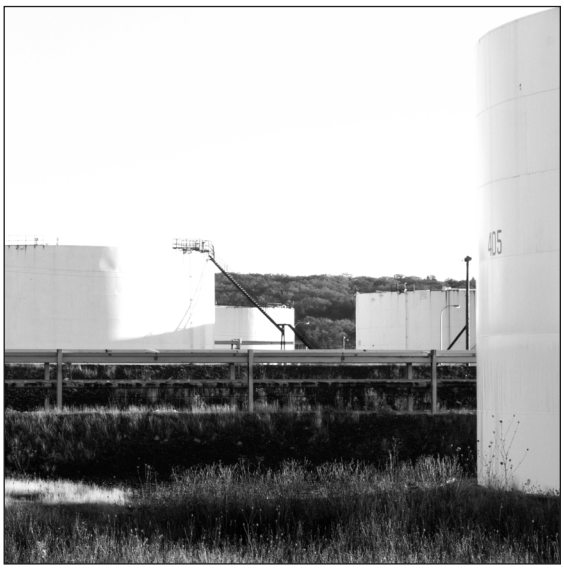
Hydrocarbons are a fuel source with a finite lifespan, resulting in an uncertain energy future, and as such the petrochemical industry has a “built-in obsolescence” (Mostafavi and Doherty 2010, 424). Derelict refinery sites and obsolete oil infrastructure are becoming contemporary ruins, creating residual spaces within our cities. Similar to cultures and industrial ages past, we should be prepared to build on the ruins of this industrial era and re-integrate these spaces into our cities.

The Imperial Oil Refinery in Dartmouth Nova Scotia is a petrochemical landscape that has become a victim to this same condition, and now sits a ruin of an industrial past. This landscape is currently separated from the community by a fence, which perpetuates the divide between the citizens of Dartmouth and this idle giant in their midst. It is therefore the next phase of this site that will have relevant issues for the citizens of Dartmouth, with questions being raised as to the future of this landscape and petrochemical infrastructure ruins.

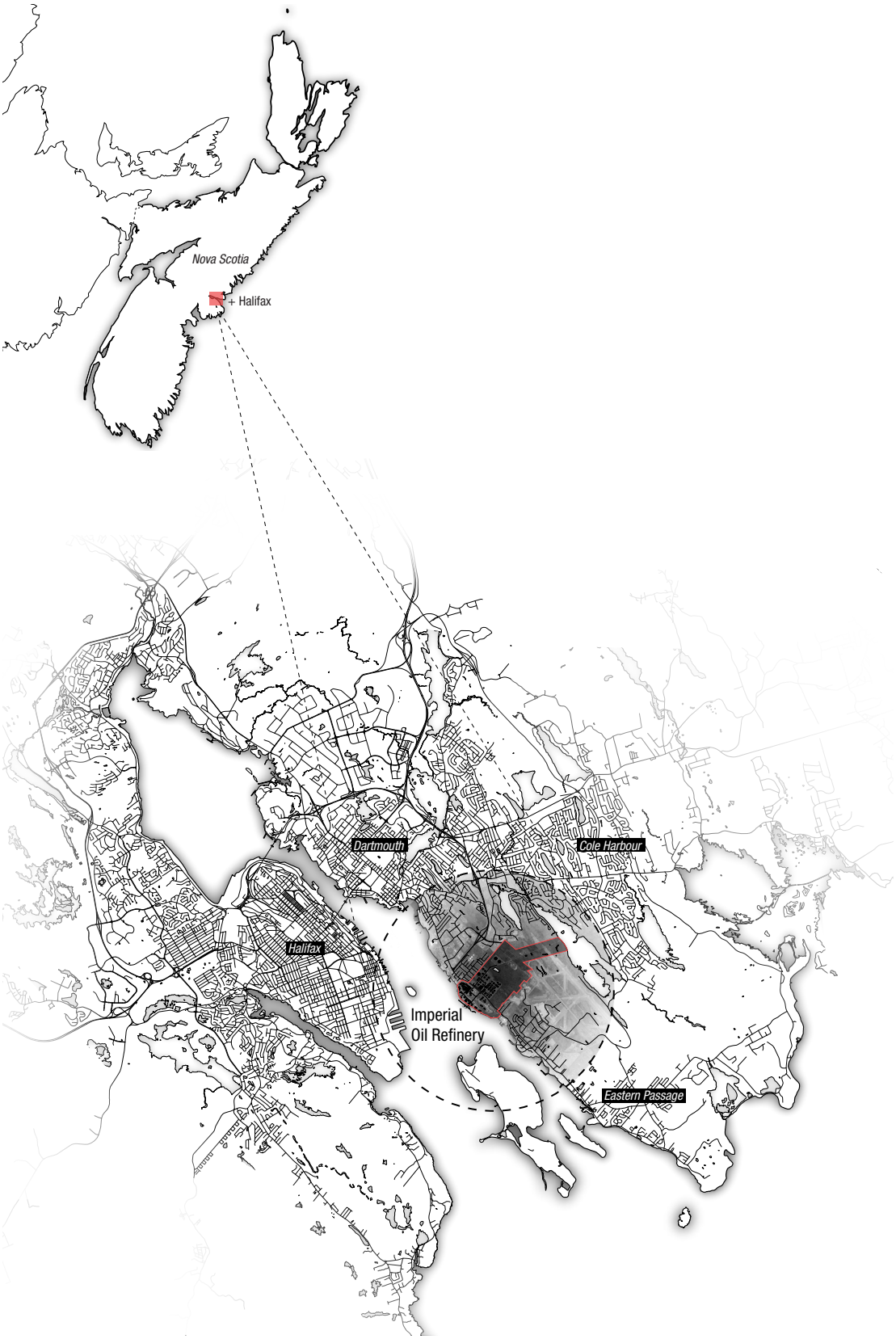
Thesis Question

How can architecture redefine the relationship of the petrochemical landscape of the Dartmouth Imperial Oil Refinery to the surrounding community and greater Halifax Regional Municipality?

Pleasant Street, Dartmouth – 2015.



Refinery Tank Farm – 2015.



Halifax Regional Municipality location plan.
(Halifax Regional Municipality Geo-database 2012)

CHAPTER 2: HISTORY, DEVELOPMENT, CONTEXT

Early History

The Halifax harbour and surrounding landscape is the result of ancient glacial processes. The retreating glaciers deposited glacial till in distinct oval-shaped forms, referred to as *drumlins*. These drumlins created the islands within the harbour, and as well the large tapered hills in the surrounding landscape (Boileau 2007, 21).

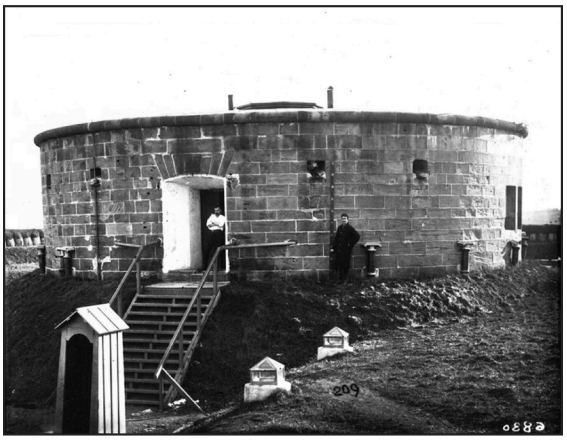
The Mi'kmaq people were the first inhabitants of the Chebucto Bay (Halifax) area. The Mi'kmaq referred to the region as the "place of many pines" in relation to the large trees that enveloped the landscape (Raddall 2010, 1). The protected nature of the harbour and coastal climate made for an ideal place to summer and multiple camps were setup along the Dartmouth shores extending along the harbour edge towards Eastern Passage (Chapman 2001, 16). The Mi'kmaq peoples inhabited the landscape without interruption until expeditions of European explorers discovered the new lands and sparked European interest in this "new world" (Chapman 2001, 18). This was perhaps the first sign of the change the landscape would endure as the upcoming European conquests would forever change the Chebucto Bay.

Developing City

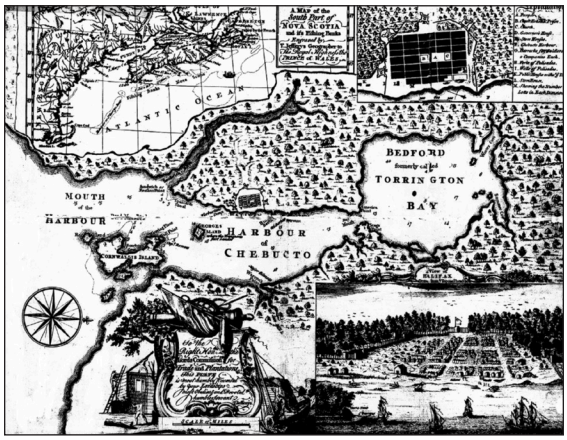
Urban Settlement

The incoming European colonial ambitions and settlements recognized the Chebucto harbour as a vital strategic position. The deep and ice free harbour enabled the protection of large ships, and the landforms of the harbour mouth were ideal for defensive fortifications. The development of Halifax by the British as a strategic defensive military post would define its early settlement patterns (Chapman 2001, 26). Built as a series of fortifications protecting the harbour entrance and anchored by the Citadel fortress on the hill, the city developed the reputation of being impenetrable. One such outpost was constructed over looking the northern side of McNabs Island from the Dartmouth Shores, known as Fort Clarence (located on the present day refinery site). These fortifications and early settlement quickly stripped the surrounding drumlins of their trees, beginning the change of the landscape to an urban environment. The harbour and defensive capability of the city

would prove crucial for not only its settlement, but also the establishment of the refinery in its future.



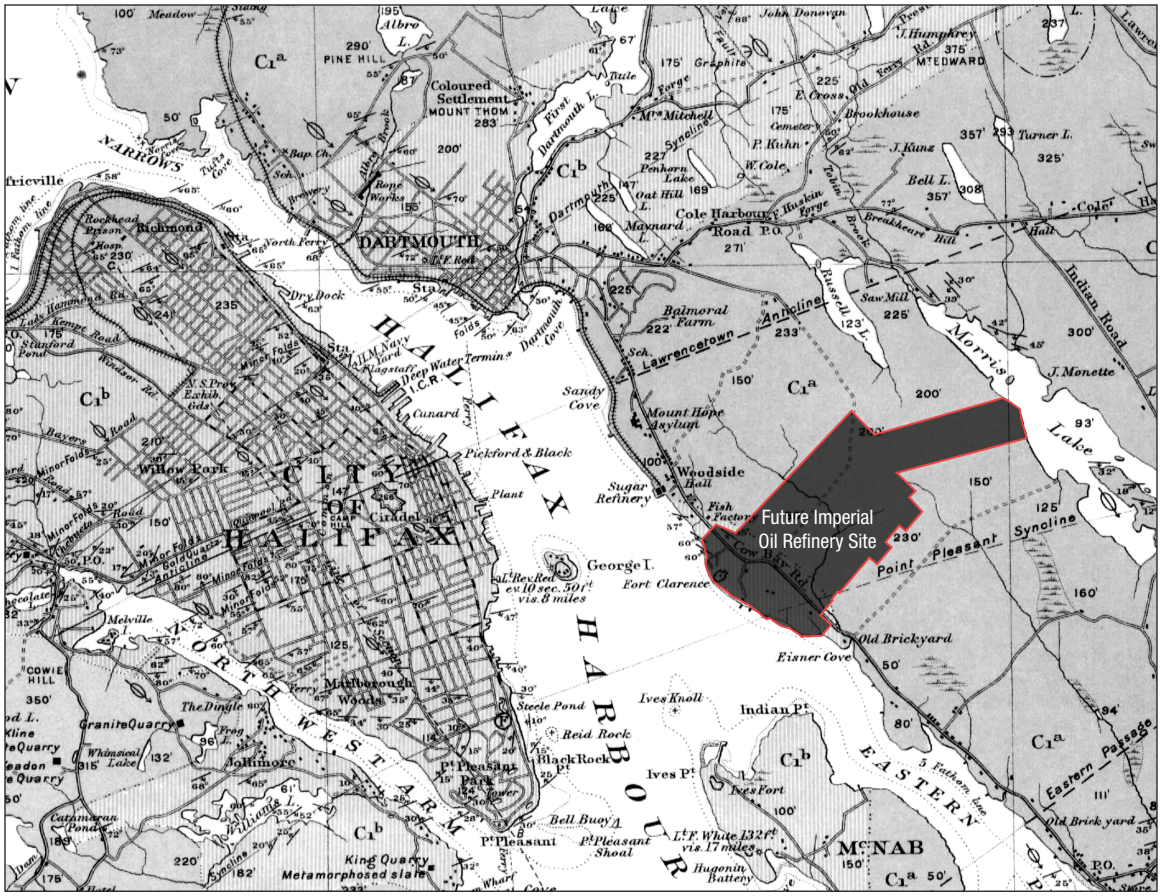
Fort Clarence Martello Tower – 1878 (Nova Scotia Archives 2015).



"A View of Halifax from ye Topmasthead" –1750 (Nova Scotia Archives 2015).

Industrial Beginnings

In the early stages of settlement Halifax was the primary site of development in the area. Dartmouth began its development as an outpost, first supplying Halifax with wood from sawmills, before being settled in 1750 by immigrants sailing on the ship Alderney (Chapman 2001, 24). Dartmouth had a small population, until a boost to 960 residents came from the construction of the Shubenacadie Canal in 1827 (Chapman 2001, 78). The largest increase in population in Dartmouth occurred during the era of industrialization (beginning in 1830), during which time many industries were developed, providing ample employment and allowing the new city to prosper (Chapman 2001, 99). By 1860 Dartmouth was home to a well-founded industrial presence, including a "chocolate factory, foundries, tanneries, gristmills, nail factory, shipyards, machines shops, textiles, distilleries, and a rope factory" (Chapman 2001, 118). Dartmouth continued to be bolstered when a new rail link connecting it to neighbouring Bedford and beyond to the rest of the country was constructed in 1885 (Chapman 2001, 143). The outbreak of war in Europe further drove industrial development as the city formed a crucial part of the supply lines. This industrial base, coupled with harbour access and rail connectivity would set the stage for Dartmouth's industrial future and the construction of the refinery.



Map of Halifax and Dartmouth – 1908 (Natural Resources Canada 2016).

Energy Landscape

Imperial Oil in Dartmouth

Nova Scotia was primarily powered by coal before the arrival of petroleum to the province began to transform its energy landscape. The earliest sales of Kerosene were distributed by the Shatford brothers in 1885 (Chapman 2001, 191). Imperial Oil partnered with Shatford Ltd. and Eastern Oil Company to service the maritime region under one name (Chapman 2001, 191). With the initial purchase of 600 acres of land by Imperial Oil, construction began in December of 1916 for a terminal and storage depot to respond to the drastically increasing demand for petrochemicals resulting from World War 1 (Chapman 2001, 192). The initial plan was to build a storage depot to support the Montreal oil refinery networks, but part way through construction plans were changed to build a refinery due to the drastically increased capacity required to supply the first world war efforts (Chapman 2001, 193; Hartley 2010, 17). The refinery was built quickly with construction being completed in February 1918 (Imperial Oil Limited 1974, 4). It was soon operating and supporting the

war effort, supplying fuel and petrochemical products to the allied ships, becoming a key asset of the Battle of the Atlantic.

Dartmouth offered several advantages for situating the oil terminal and refinery, both in its security and access to the sea. The harbour is deep and free of ice throughout the entire year, allowing uninterrupted access for even the largest vessels to reach the terminal. The harbour was defensible from existing fortifications, allowing the facility to be placed within a protected harbour. From a more local perspective, the refinery required a large amount of land for the industrial development, and the site provided ample space within relative proximity to a labour supply, hub of technical expertise, and a market for products. The construction of the refinery provided a large increase to the industrial capacity of Dartmouth and spurred further growth of the city (Radall 1965, 243).

The refinery construction quickly altered the landscape of the area, clearing trees, filling in wetlands, and levelling the earth. Oil storage tanks were set in the newly formed fields, and processing towers and pipes erupted across the site. This was more than just a development in the area, this was a new technology and industrial presence that brought an unintelligible and foreign landscape to the doorstep of the community.

Community of Imperoyal

> Prior to the coming of this industry here in 1916, the whole stretch of the country to the lower passage appeared to be a mass of trees. Towards the end of World War 1, the aspect of the Eastern Passage commenced to change. There had been only scattered houses and farms along the main road from South Woodside before the construction of the Oil Works. Then out of the forces an entire community arose, mushrooming around the vicinity of the new plant. (Hartley 2010, 17)

Imperoyal is the name of the community surrounding the Imperial Oil Refinery. It is rumoured to have been either a play on the name Imperial, or named after a ship in the Imperial Oil tanker fleet (Hartley 2010, 37). There was little development in the area prior to the refinery construction. It became a catalyst for development, requiring housing for workers and a roadway to connect it to the Dartmouth townsite. A temporary ferry connected the site to the Halifax peninsula, allowing crossing of men and goods for the construction (Chapman 2001, 215). The refinery development was so crucial to the development of Dartmouth, that Pleasant Street was the first paved road in the province of Nova Scotia (Chapman 2001, 214). To accommodate the workers during construction, a

temporary camp was built on the southern end of the refinery site. Once the construction was complete Imperial Oil built the company town of Imperoyal to support the workforce. The community included twenty-one houses, a school, and recreation areas for residents (Hartley 2010, 27). In 1961 the community was demolished to make way for the expansion of the refinery (Hartley 2010, 18). This community remains only a memory, as no traces are left of the original townsite. This company town was one of the first developments on the periphery of the refinery site, however commercial and residential developments were drawn to the area as the economic potential increased with the establishment of the refinery.

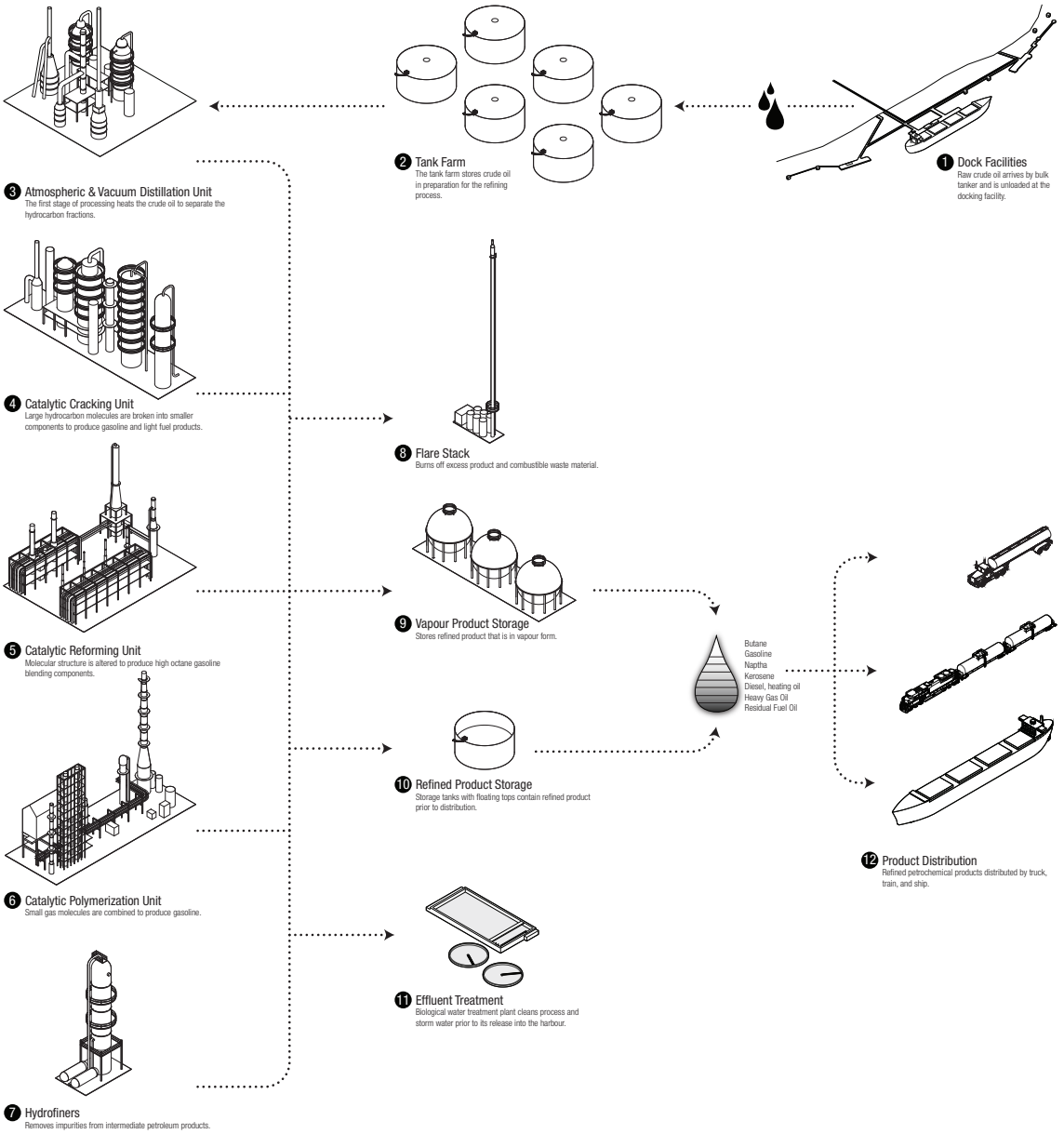
Imperoyal Village – 1931 (Imperial Oil Limited Photographs).

Machine in the Landscape

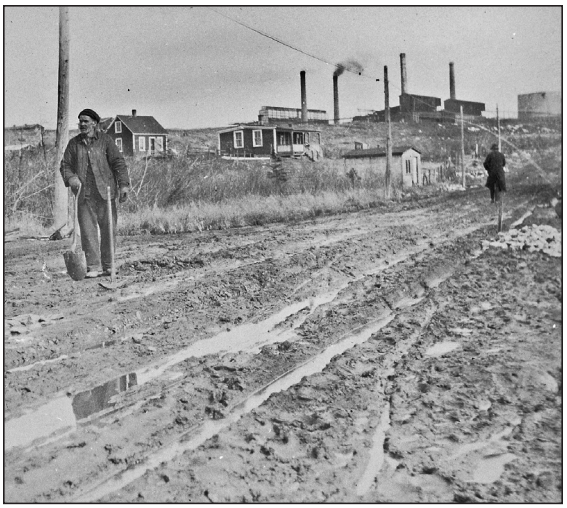
The refinery landscape grew to cover 840 acres, from the harbour's edge to Morris lake (Imperial Oil Limited 1990). The refinery has undergone several improvement and modernization phases. Its capacity was increased substantially during World War Two, with Fort Clarence being demolished to support added tank storage capacity for allied refueling requirements for the Battle of the Atlantic. A major upgrade and modernization was completed in 1955, updating much of the infrastructure (Imperial Oil Limited 1990). Traces of the original infrastructure and layout are still evident today to the careful observer.

The refinery began with an operating capacity of 2 200 barrels of crude oil processed per day (bpd) , and reached a maximum capacity of 85 000 bpd in 2013 before being decom-

missioned (Imperial Oil Limited 1974; Chronicle Herald 2016). In processing the crude oil stock delivered by ship, it is “cracked” and refined into a variety of different petrochemical products. The products are separated by density, from bunker fuel for ships, gasoline for cars, to propane and a variety of products in between. The process uses a lot of energy and fresh water, creates air pollution and produces effluent as by-products from the process. The nearby Morris Lake is used for supplying fresh water for supply, and the harbour water is used for cooling and release of treated effluent. The refinery also must be capable of storing crude both prior to and after refining, hence the large storage tank farm on site.

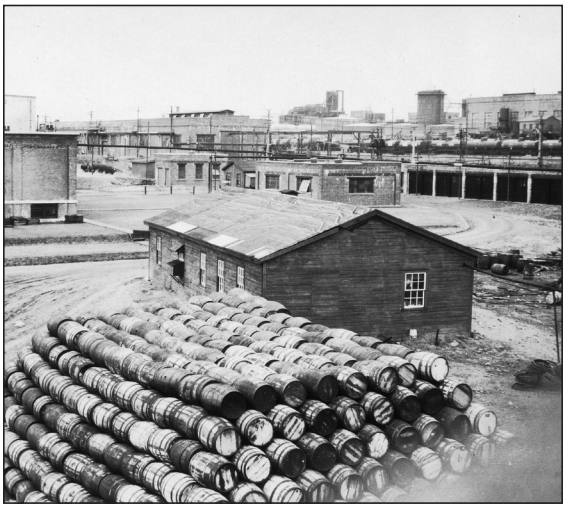


Refinery infrastructure and process (Imperial Oil Limited 1990).

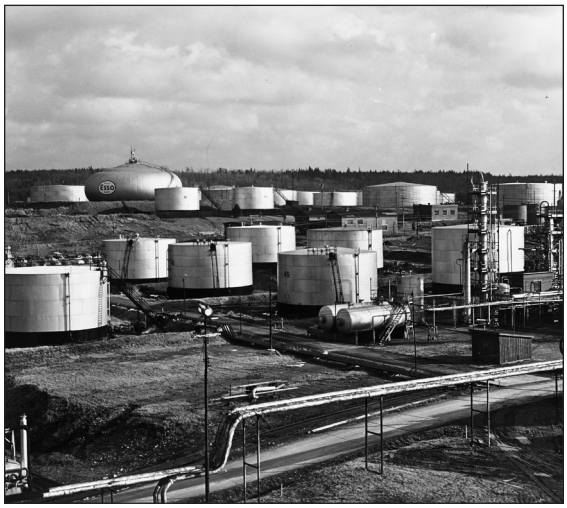


Pleasant Street – 1920
(Imperial Oil Limited Photographs).

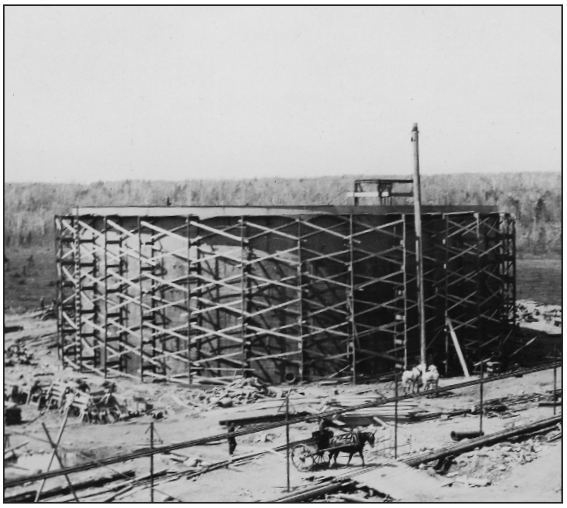
Imperial Oil Production – 1925
(Imperial Oil Limited Photographs).



Imperial Oil Refinery Grounds – 1925
(Imperial Oil Limited Photographs).



Imperial Oil Refinery Tank Farm – 1930s
(Imperial Oil Limited Photographs).



Storage Tank Construction – 1917
(Imperoyal Historical Photographs).

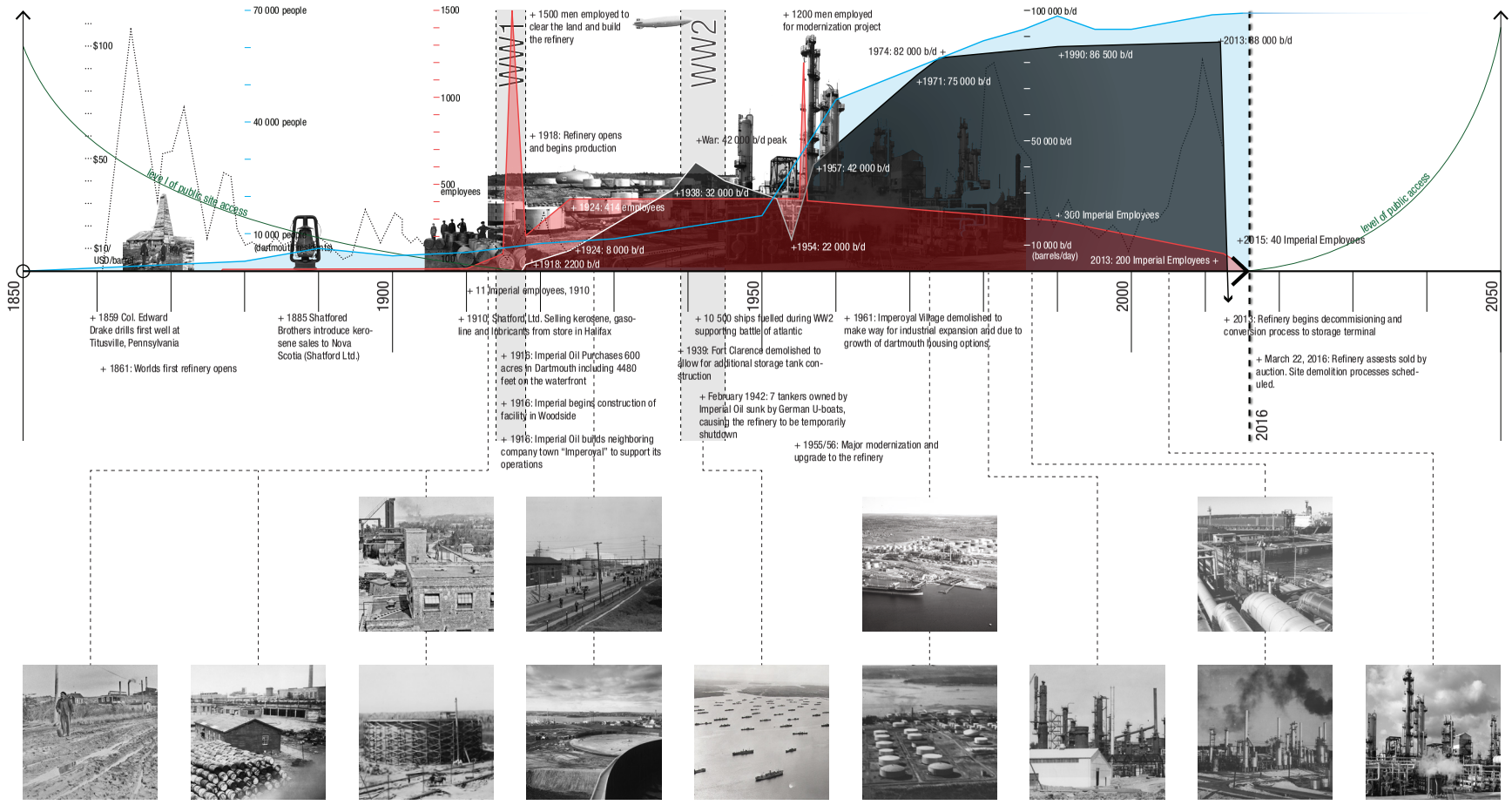
Aerial View of Imperial Oil Refinery – 1930s
(Imperial Oil Limited Photographs).

Surrounding Development

The refinery brought a wealth of employment to Dartmouth which significantly contributed to its urban development. The initial clearing of land and construction phases brought peaks of employment of up to 1500 workers, eventually stabilizing at around 300 for most of its operational lifetime (Imperial Oil Limited 1974). The relationship between the number of employees, crude processing capacity, and population of Dartmouth is graphed in the timeline on page 12; a correlation is evident between the three, theorizing the relationship between the growth of Dartmouth and the refinery.

As the refinery developed so to did the neighboring communities of Imperoyal and Woodside. The refinery was once a catalyst for the development of these communities, but eventually became a source of disconnection as the borders to the refinery were established, splintering urban connectivity and development in this area of the city. The refinery site is fenced and its expanse occupies from the harbour edge, eastward to Morris Lake, pierced only by the public thoroughfare of Pleasant Street and a commercial railway line.

Initially the refinery was a desirable neighbor, attracting wealth and employment to the community. This once prosperous neighborhood has now suffered the effects of the loss of the industry that helped establish it. Today the area is characterized by shuttered businesses, and a residential neighborhood in need of revitalization.



Imperial Oil Dartmouth development timeline (Imperial Oil Ltd., Hartley, Halifax Regional Municipality).

Aerial image of the Imperial Oil Dartmouth Refinery – 1964 (Imperial Oil Limited Photographs).

Urban Context of Oil Refining

Oil City?

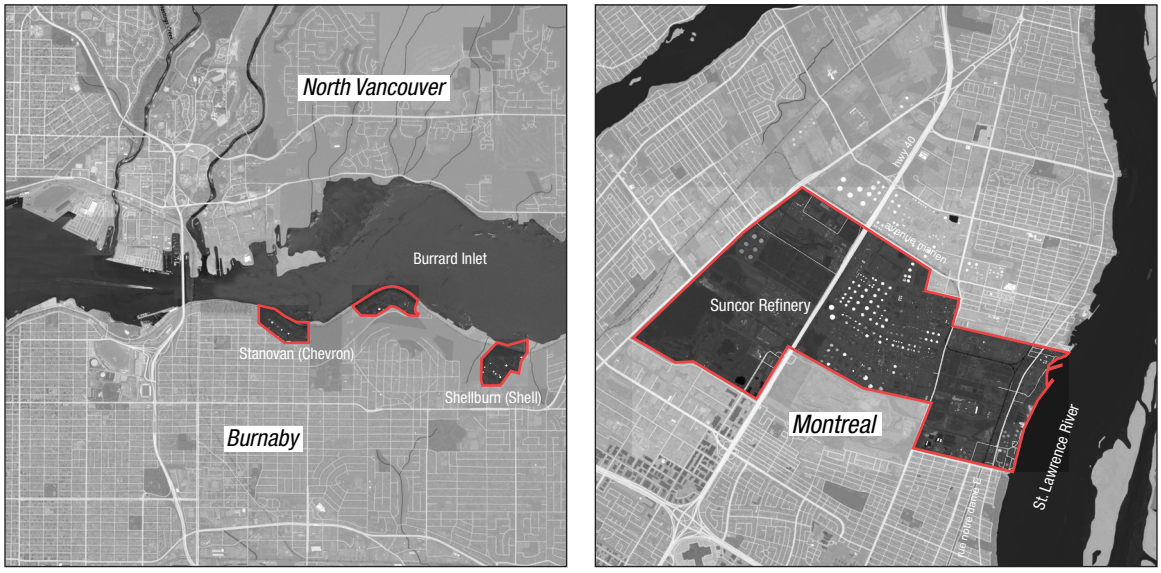
> Geographic location, combined with political stability and corporate interest, can elevate select ports and cities to key roles in the global petroleumscape, even if they don't have access to the physical resource. (Bhatia and Casper 2013, 444)

While not typically known as an "oil city", Halifax has played an important role in the history of Imperial Oil and its operations. The typology of the oil city is typically characterized as either oil producing (Houston, Fort McMurray), hubs of corporate power (Calgary, Stavangar Norway, Singapore), or purely products of oil wealth (Dubai) (Mostafavi and Doherty 2010, 420). Halifax does not fall into any of these typologies, instead forming its oil identity as a product of war and proximity to the transatlantic shipping lanes.

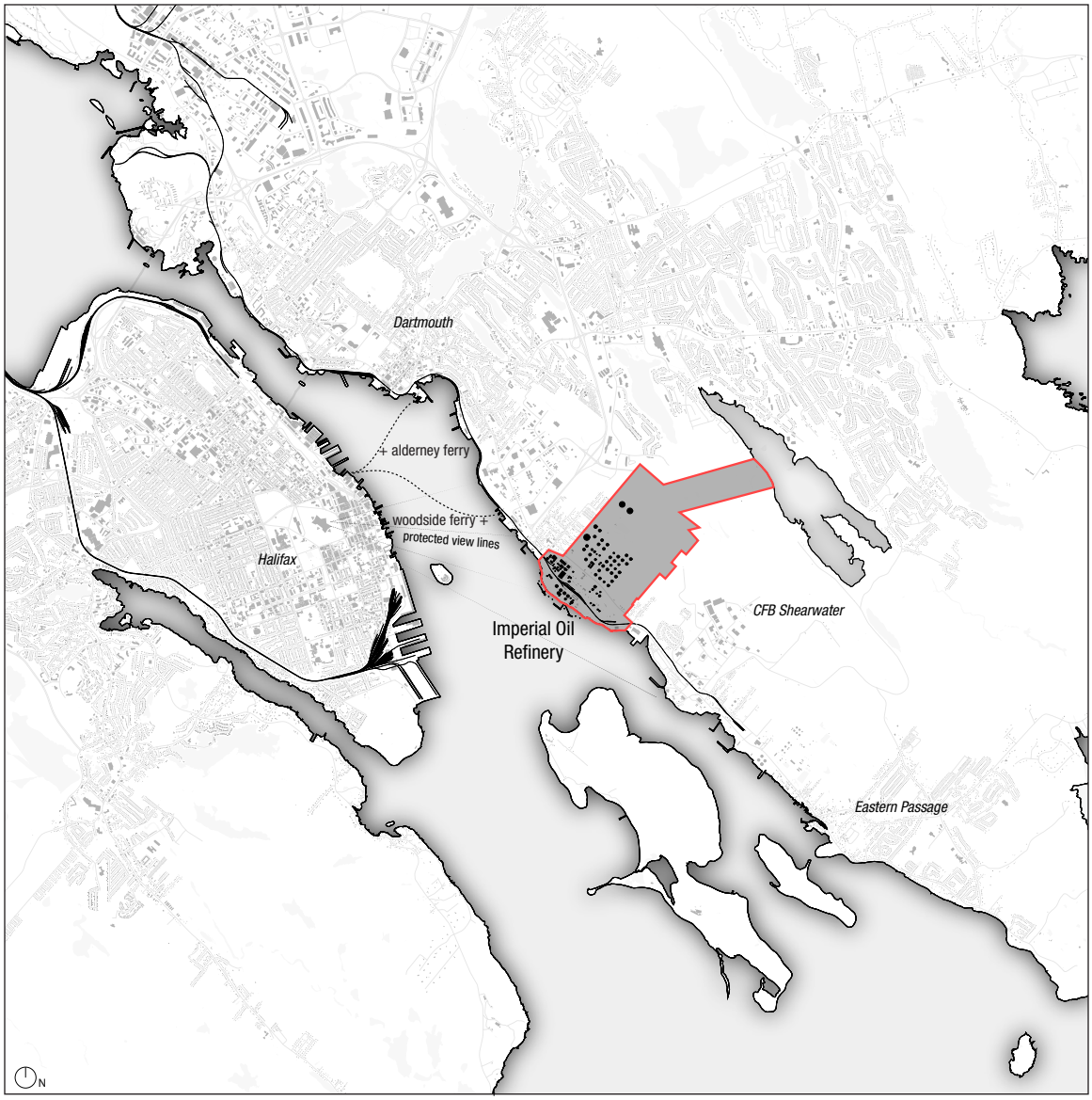
Refining and the City

> Port cities are the quintessential petroleumscapes, where the physical presence of oil infrastructure — storage tanks, pipelines, shipping facilities - overlaps with oil-related administrative and cultural functions. (Bhatia and Casper 2013, 437)

Refining operations are typically located in or around urban centres, due to the required proximity to labour, markets, and transportation accessibility. These industrial operations have become embedded in the urban fabric of not only Dartmouth, but as well many Canadian cities, expanding the context in exploring the future of these landscapes. Refinery operations require water for process supply, cooling, effluent expulsion, and bulk transportation, which results in their location typically being located on the waterfront of cities.



Vancouver & Montreal urban refining operations (Earthstar Geographics 2009).



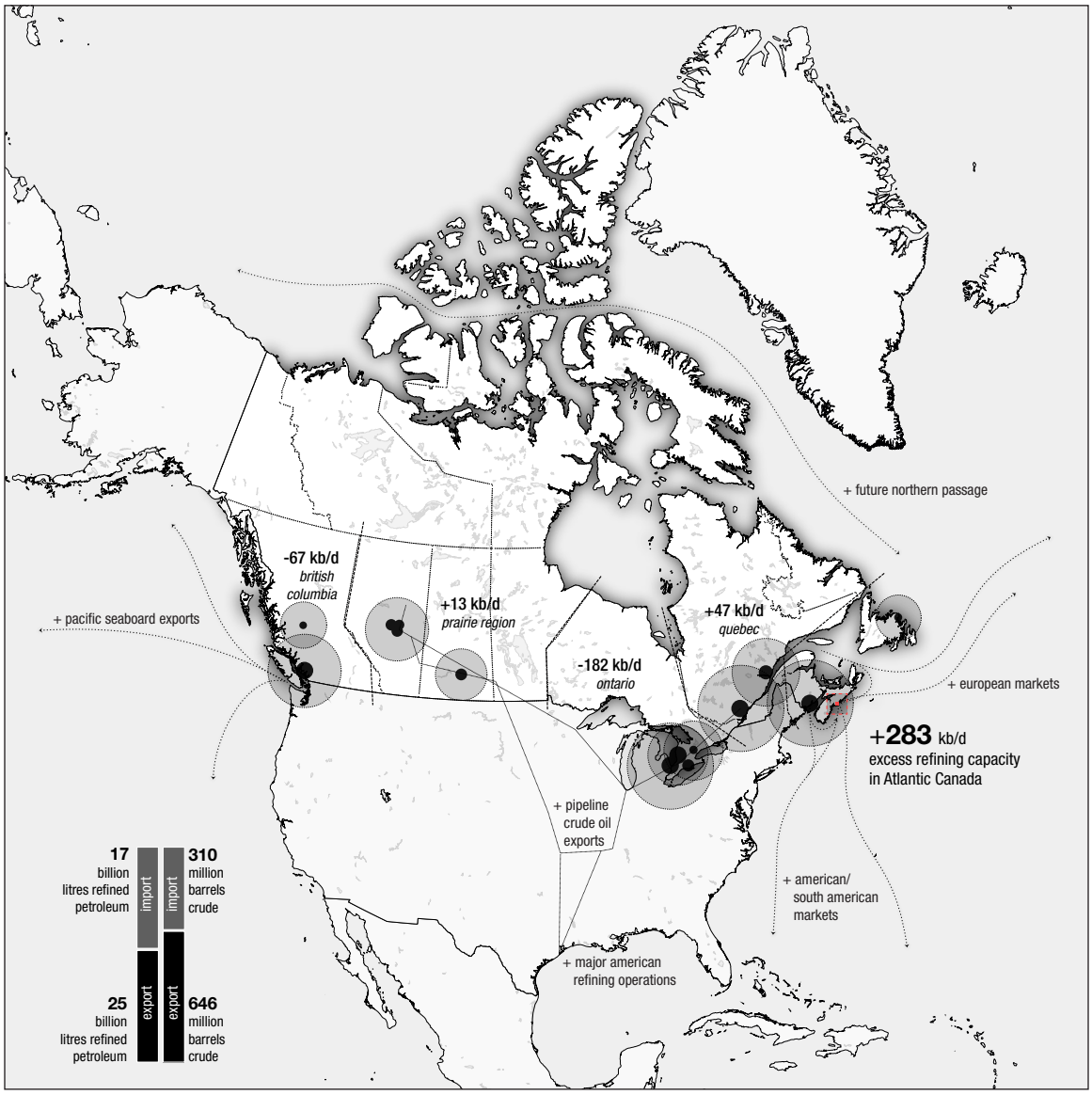
Imperial Oil Refinery urban condition.
(Halifax Regional Municipality Geo-database 2012)

Network Relationship

Imperial Oil Dartmouth is only one part of a network of refiners in Canada. Due to changing supply and demand conditions, Canada has dropped from having 59 refineries in the 1970s to 18 presently (Environment Canada 2015). In considering the refinery as part of a larger system, these facilities would be compared to a node on the network plan, both receiving and distributing product.

This network relationship has in part caused Imperial Oil to decommission the site. The refinery network in Atlantic Canada is highly competitive, and also has an excess capacity

(Environment Canada 2015). The nearby Irving Oil refinery in St. John New Brunswick is much larger and more modern, making it difficult for the aged and relatively small Dartmouth facility to compete. This coupled with changing demand for petrochemical products has resulted in Imperial Oil's decision to cease refining operations in Dartmouth (Chronicle Herald 2016).



Canadian refining network.
(Environment Canada 2015 and Canadian Fuels Association 2016)

Atlantic basin refining network.
(Environment Canada 2015 and Canadian Fuels Association 2016)

Contemporary State of the Refinery

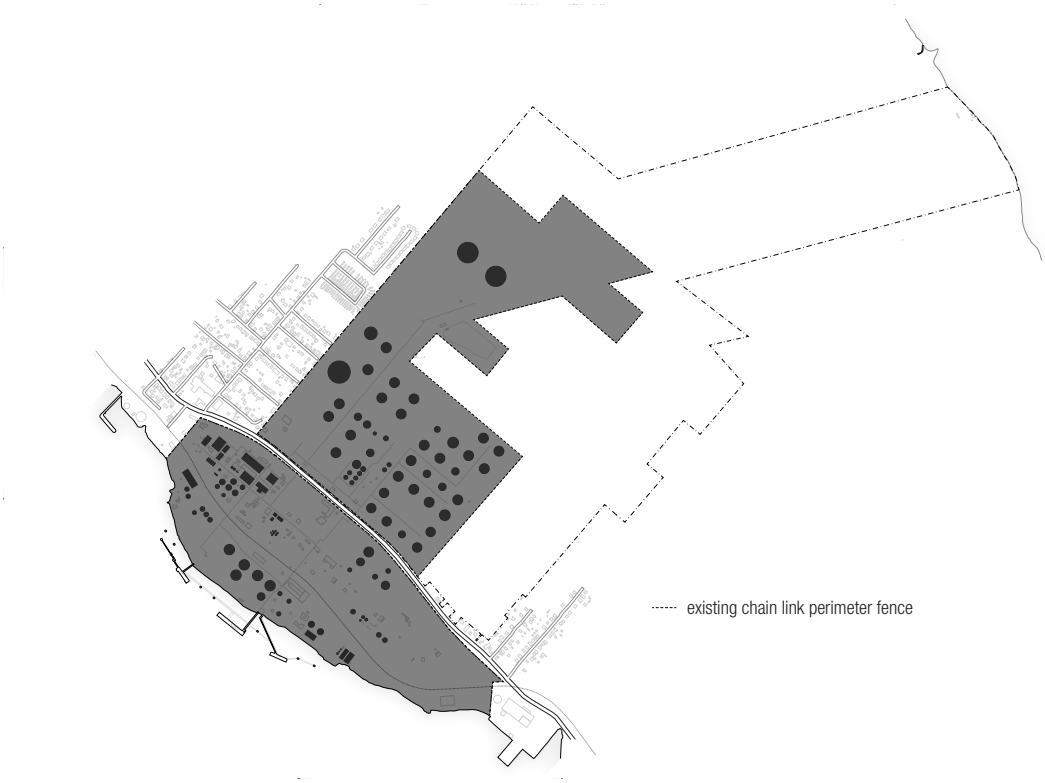
Today the refinery sits largely idle. Imperial Oil attempted to market and sell the refinery, but was unsuccessful, instead choosing to convert a part of the facility to a fuel storage and distribution terminal (Imperial Oil Limited 2013). Only around forty employees and security personnel remain to operate and guard the site, a fraction of the original work force (Chronicle Herald 2016).

The tanks and equipment are displaying the effects of time and limited maintenance. The

work of nature is beginning to be evermore evident, as weathering processes begin to reclaim the steel and begin the processes of re-growth on the land. While its operational years are a recent memory for the community and city, the site has entered a state of ruination, shrouding its layered history.

Despite its decommissioning, the refinery remains anchored in place along the shoreline of the harbour, ingrained in the image of the city, yet beyond its fenced limits. The bright lights that once beaconed are now dark, and the light of the flares have been extinguished.

Image of the refinery during peak operation – 2012 (Kevin Lane Photography).



Existing fenced areas of the refinery landscape.

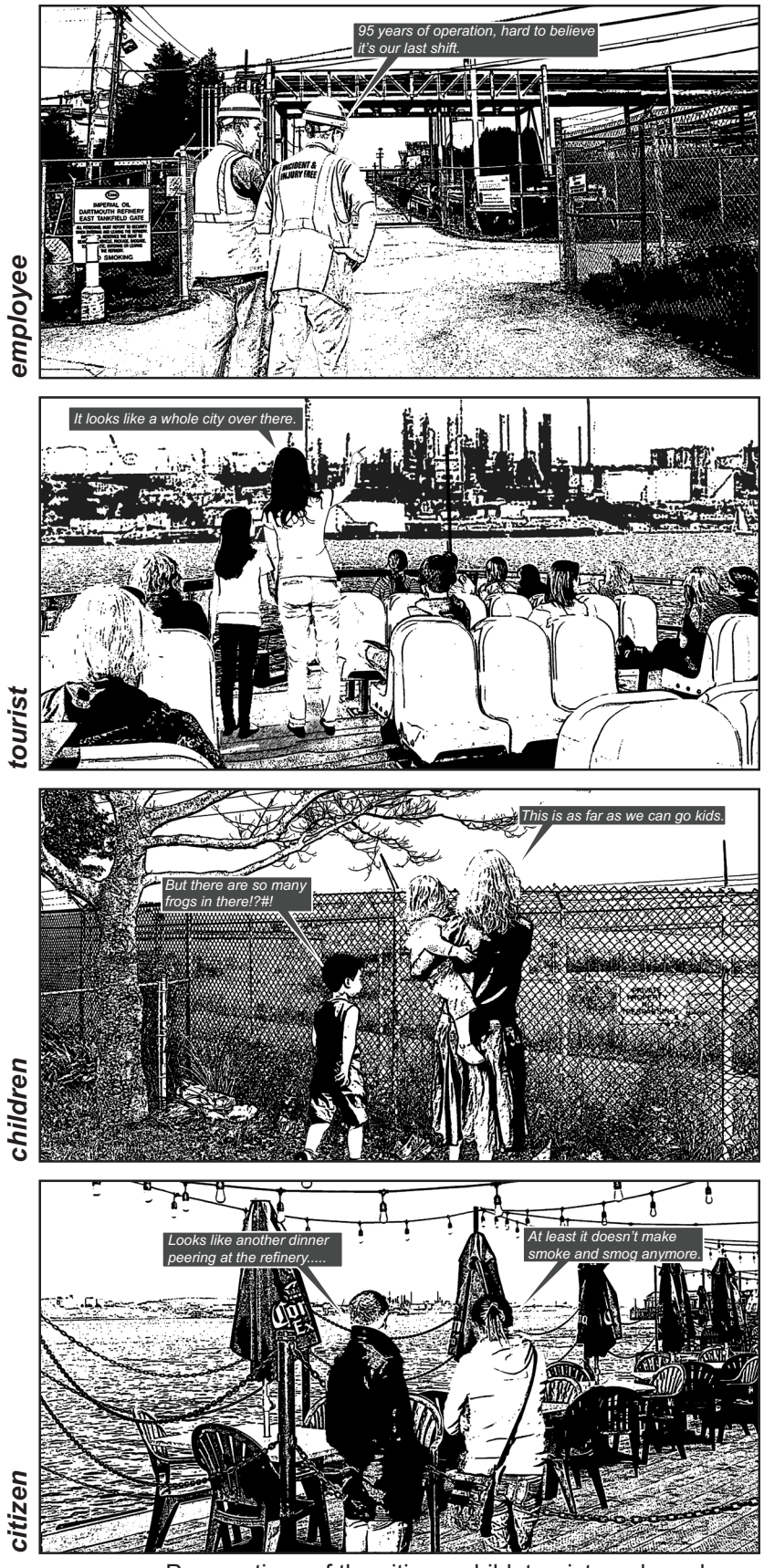
CHAPTER 3: OPPORTUNITY, STRATEGY, ANALYSIS

> For although we are accustomed to separate nature and human perception into two realms, they are, in fact, indivisible. Before it can ever be a repose for the senses, landscape is the work of the mind. Its scenery is built up as much from strata of memory, as from layers of rock. (Schama 1995, 7)

Spatial Framework for a Collective Memory

The refinery was constructed within an international and regional network context, but has now become a part of the identity and collective memory of the local community and city that formed around it. Due to its size, the refinery has the capacity to represent not only a place in the city, but to be perceived as an entire industrial landscape. The refinery is ingrained in the memory of many groups of people; from the child growing up down the street, former employees, tourists, neighbors, and citizens of the greater municipality each have a unique impression of the refinery and understanding of its imagery and context. The ways in which this memory was formed, how it endures, and its projected future encompass a study of the concepts of memory and learned landscapes.

Collage that reflects on the relationship between industrial landscapes and our imagination.



Perspectives of the citizen, child, tourist, and employee.

Imagination and the Developing Perspective

The effect of landscape on a child creates a collection of memories, experiences and desires that can be formative in development. A child raised beside an industrial complex creates an internal paradigm between an industrial architecture that has the capacity to be visualized and imagined, but not experienced. This separation from a place evokes mystery, intrigue, and the depths of curiosity. There is a fascination in scale, the gigantic, and the symbolism of the unknown relating to experience (Stewart 1984, 23).

Children's play is often mimetic in nature. Influenced by the surrounding world, children visualize and enact what they perceive as social constructs. Walter Benjamin describes the "mimetic faculty" of children as most often exhibited in play. He suggests that play is not limited to the imitation of people, but also as easily objects such as a "windmill or a train" (Benjamin 1997, 161). This capacity of imitation and imagination is important to consider in analyzing the effect of being raised or attending school beside an industrial complex. Even in the relationship or juxtaposition of this image of the play structure at the South Woodside School and the oil refinery in the background, we connect even if mo-

Image of the South Woodside School playground – 2015.

mentarily ideas of play and these industrial relics. Walter Benjamin describes the role of childhood as being “to bring the new world into symbolic place” (Benjamin 2002, 390). He refers to the unique ability of the child to recognize what is new, and the inability for adults to revise the symbolic character of technology and objects. In further considering the image of the playground, perhaps children have the ability to visualize the petroleumscape beyond as an extension of the playground, and as part of the social constructs of the city. The curiosity and imagination of children is further referenced by Benjamin in his discussion of children’s affinity for construction sites, “in waste products the face that the world of things turns directly and solely to them.” He compares the ability of children to see beyond the artefact, and the ability of children to find a new “intuitive relationship” with materials, creating “their own small world of things within a greater one” (Benjamin 1997, 52).

As children learn and grow they begin to reach an understanding of the world around them and the social constructs of place. What was once fantastical becomes place as one achieves an understanding of the imagery that surrounds ones self, and its role in the city and world beyond (Boyer 1994, 205). However, I would argue that symbolism and imaginative potentials remain within us, even as one begins to understand the context and reality of place. The fantastical and imaginative nature of the refinery imagery is an asset, and the re-imagination of this landscape has the potential to harness this and placate internal longings for exploration and imagination. This asset may not appear as tangible as the raw steel of the landscape, however the imagery and imaginative potential of the refinery is significant and should be respected in future development plans.

Cultural Memory & Artifact

> .....every collective memory unfolds within a spatial framework. Now space is a reality that endures: since our impressions rush by one after another, and leave nothing behind in the mind, we can understand how we recapture the past only by understanding how it is, in effect, preserved by our physical surroundings. (Halbwachs 1980, 140)

The collective memory of a society is temporal and is lost unless specific interventions are in place to allow memory to endure beyond single generations. The experience of memory is blurred with time, apart from records of facts, drawings, and photographs, all of which risk manipulation and lack of clarity. In considering the collective memory of Dartmouth, and how the landscape shapes the sense of identity of the community, how would memory endure without preservation of the physical surroundings?

Aldo Rossi's theory on urban artifacts in *The Architecture of the City* provides a framework of exploration into how the refinery landscape may be interpreted as an artifact in the context of monuments in the city. In considering the refinery landscape as an urban artifact, one can test the value of its permanence against Rossi's monument typologies and ideas of what constitutes an urban artifact. The permanent or "persistent artifacts" in the city become monuments, be it a positive entity or not. Rossi describes artifacts as having either a catalytic or pathological impact on the growth of a city, and as such each artifact is evaluated for its value (Rossi 1982, 6). In its current state the refinery is having what Rossi would describe as a "pathological" effect, limiting growth and causing inaction. Though it has been decommissioned, the refinery continues to obstruct either redevelopment or public inhabitation of this landscape, hindering new uses or re-imaginations for future development. This thesis proposes strategies to shift the refinery from a pathological entity to a catalytic monument, inspiring development and a public interface within the petrochemical landscape.

The threshold of place transforming from the realm of history to memory is characterized by Rossi as specifically relating to form and function. Peter Eisenman summarizes Rossi's theory as, "history exists so long as an object is in use; that is, so long as a form relates to its original function. However, when form and function are severed, and only form remains vital, history shifts into the realm of memory" (Rossi 1982, 7). The relationship between history, memory, place and form is described: "history comes to be known through the relationship between a collective memory of events, the singularity of place, and the sign of the place as expressed in form (Rossi 1982, 7)." This places emphasis on form and place as a vital link to memory, and contributes to the argument that memory can be preserved with alternative function. This theory is noted in relation to precedent projects such as Landschaftspark by Latz and Partners (Appendix). The industrial infrastructure ruins form the basis of interventions to form public space, however the sense of place and collective memory of the site is maintained. A similar strategy can be considered for the refinery by engaging the landscape with an alternative public function, while maintaining the infrastructure ruins as a tangible link to the history and culture of Dartmouth, and greater collective memory of the energy era.

Memory and the Cityscape

> The demands and pressures of social reality constantly affect the material order of the city, yet it remains the theater of our memory. Its collective forms and private realms tell us of the changes that are taking place; they remind us as well of the traditions that set this city apart from others. It is in these physical artifacts and traces that our city memories lie buried, for the past is carried forward to the present though these sites. (Boyer 1994, 31)

French theorist Marcel Poete argued, “across historical periods there exists a certain constancy of themes discernible in a city’s monuments, pattern of streets, and fragments of the original plan that persist over time” (Boyer 1994, 17). He argued these elements give “meaning to and constitute our memory of a city.” Without the enduring marks of history the city’s past is lost. Development and the city plan move forward with little recollection of where the city came from, and what forces resolved it. Poete argued for the “totality” of the urban image, forming a record of the marks that form a “historical city”, and one that “gives meaning to and constitute our memory of a city” (Boyer 1994, 17). The history and image of a city is authentic when the traces of time and monument are curated, and respected for their original place and intention. The elimination of the refinery landscape would result in a loss of authenticity of the city, and the history that has shaped it. By preserving this landscape and re-imagining its relationship to the city, the city is authentic to itself and the context of its historical development.

Urban Exploration & Tourism

> Formerly hubs of dense activity within the city from and through which flows of people, matter and energy coursed from far and near, such ruins might appears quiescent and useless by comparison to their former state. Yet despite this re-designation of formerly industrial sites as spaces of waste, ruins are the site of numerous activities and very quickly become enmeshed within new social contexts, whether as part of the neighborhood to which they belong or as sites that draw people from further afield. (Edensor 2005, 21)

Tourism

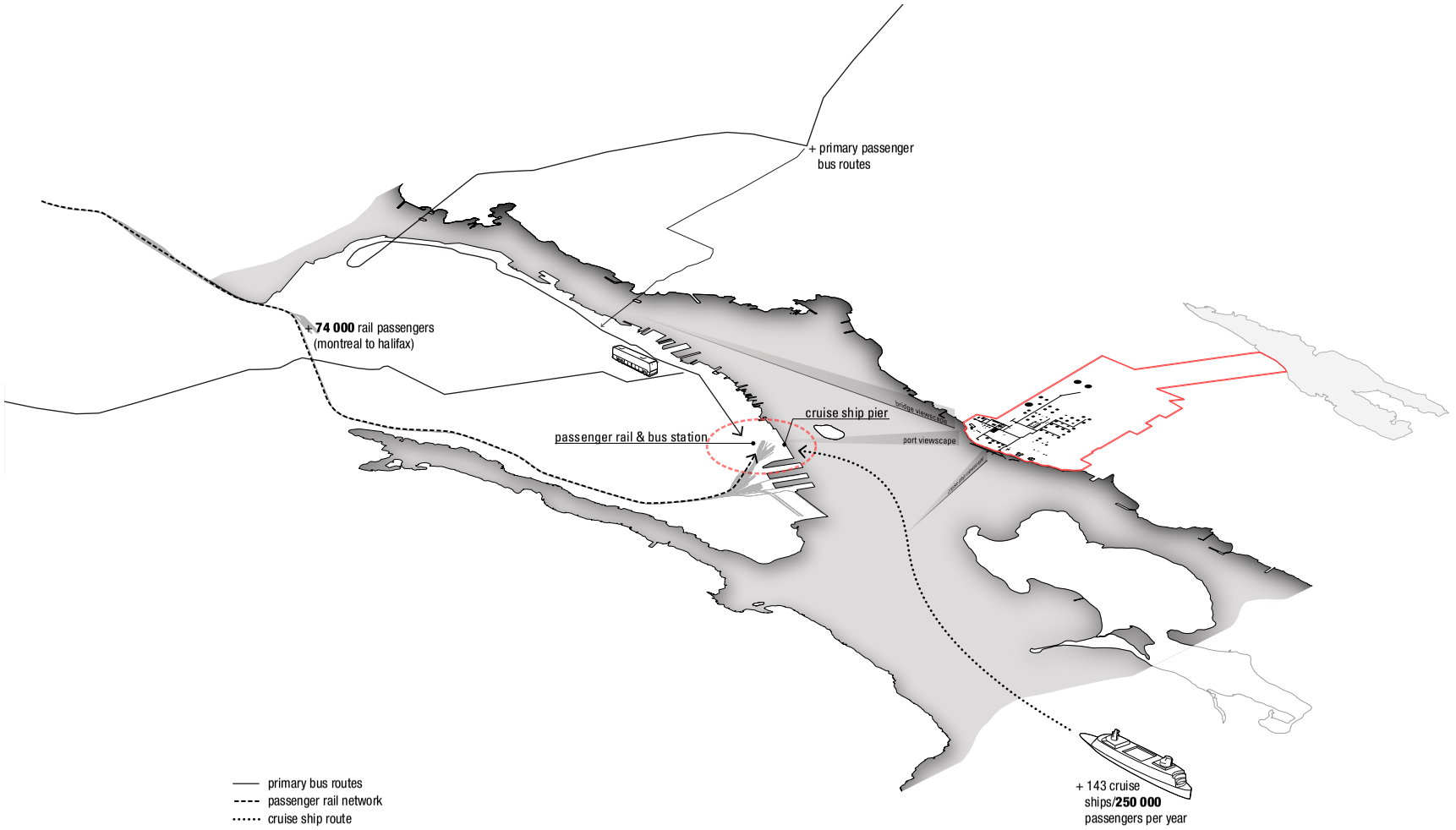
Halifax has a long standing economic interest in tourism and markets itself as a destination to attract visitors to various historical spaces and the maritime city. The rich history of the city has created this opportunity, and as a result Halifax has been steadily increasing the number of visitors from cruise visits, recording a record 143 ships and 250 000 visitors this past year (Port of Halifax, 2015). The refinery site is situated directly across the harbour from the cruise pier within the picturesque landscape of the inner harbour islands, in direct view of hundreds-of-thousands of tourists. Along with the cruise pier, the passenger

Halifax cruise ship tourism statistics (data from Halifax Port Authority 2015).

rail terminal and bus depot are also nearby, presenting a unique visual connection to this landscape. This provides an opportunity to engage with the tourist visitation of the city, capitalizing on this view relationship, creating a commodity from history itself through visitation (Stewart 1984, xiii). In considering the relationship of tourism to memory, the visitor may not be immediately drawn to explore a former oil refinery. However, each individual has experienced a place in the life that we have desired to explore that lies beyond the limits, is uninhabitable, or forbidden. This attraction to place draws from memory the subconscious desire to explore beyond the normative experiential limits, and relates us to these past experiences of life.

The nature of tourism is changing and is trending towards people visiting spaces as a means of learning and exploration (Otgaar 2010, 6). This is exemplified by recent trends in Europe and Japan, where there is a greater interest in the industrial tourism industry. Specifically, there are refinery sites in Kawasaki Japan attracting tourists for tours and information as they become decommissioned or offline (Travel Kawasaki 2015). Post-industrial sites in the Ruhr Valley region of Germany have been attracting around 700 000 visitors annually to re-purposed coal and ironworks sites, creating a new identity for the region (Kelly 2013, 47). There is great interest in the spectacle of the machine and experiencing an unfamiliar landscape.

Urban historian Christine Boyer describes the imagery of the city as being categorized as having a “binary differentiation.” The viewing of imagery is categorized as either “symbolic and wondrous” or “designating the index of the thing itself” (Boyer 1994, 205). One may consider the fantastical nature of the foreign landscape to the newcomer, whereas the



Tourism procession and viewscapes (Halifax Regional Municipality Geo-database 2012).

others may see this landscape as purely utility in nature. This shift occurs through the continual intake of new knowledge and understanding, and the dissolution of place into the everyday milieu. These concepts are related by Boyer to travel and exploration, and the difference in perspective from a resident and tourist.

Increased visitation to the Halifax Regional Municipality would contribute greatly to urban renewal. The increased levels of tourism spending would help bolster the economics of the city and many businesses. The increase in visitors to the Imperoyal area would create the potential for nearby businesses to re-open and be supported by the renewed activity and interest in the site. The increase of tourism opportunities would help fill the void of industry, and create subsidiary employment in supporting fields. Nova Scotia has set a goal of doubling tourism by 2024, and a re-imagined refinery landscape could play a part in achieving this (Tourism Nova Scotia 2016).

Urban Exploration

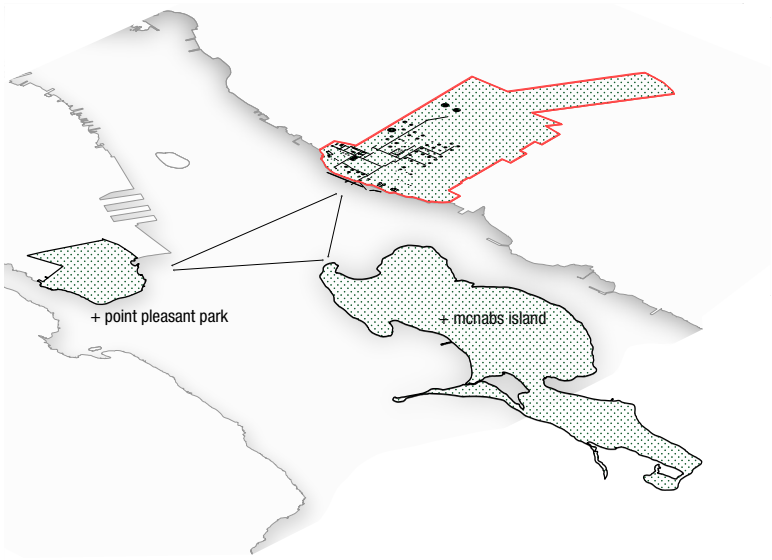
> Ruins confound the normative spacings of things, practices and people. They open up possibilities for regulated urban bodies to escape their shackles in expressive pursuits and sensual experience, foreground alternative aesthetics about where and how things should be situated, and transgress boundaries between outside and inside, and between human and non-human spaces. (Edensor 2005, 18)

The urban ruin is more than a monument or time capsule. New uses may capture the imagination of visitors whilst providing a means of learning and understanding through a physical presence in the landscape. The refinery is defined as a residual urban landscape, a space beyond the normative experiential limits of the city. The desire to experience residual spaces can be compared to the definition of “longing” as written by author Susan Stewart. In considering the longing for place, one may be subconsciously desiring a “future-past” (Stewart 1984, x). The imagination of a new narrative layered on the history of place. As quoted, “the point where narrative begins/ends, both engendering and transcending the relation between materiality and meaning” (Stewart 1984, x).

Urban Connectivity

Urban Park Spaces

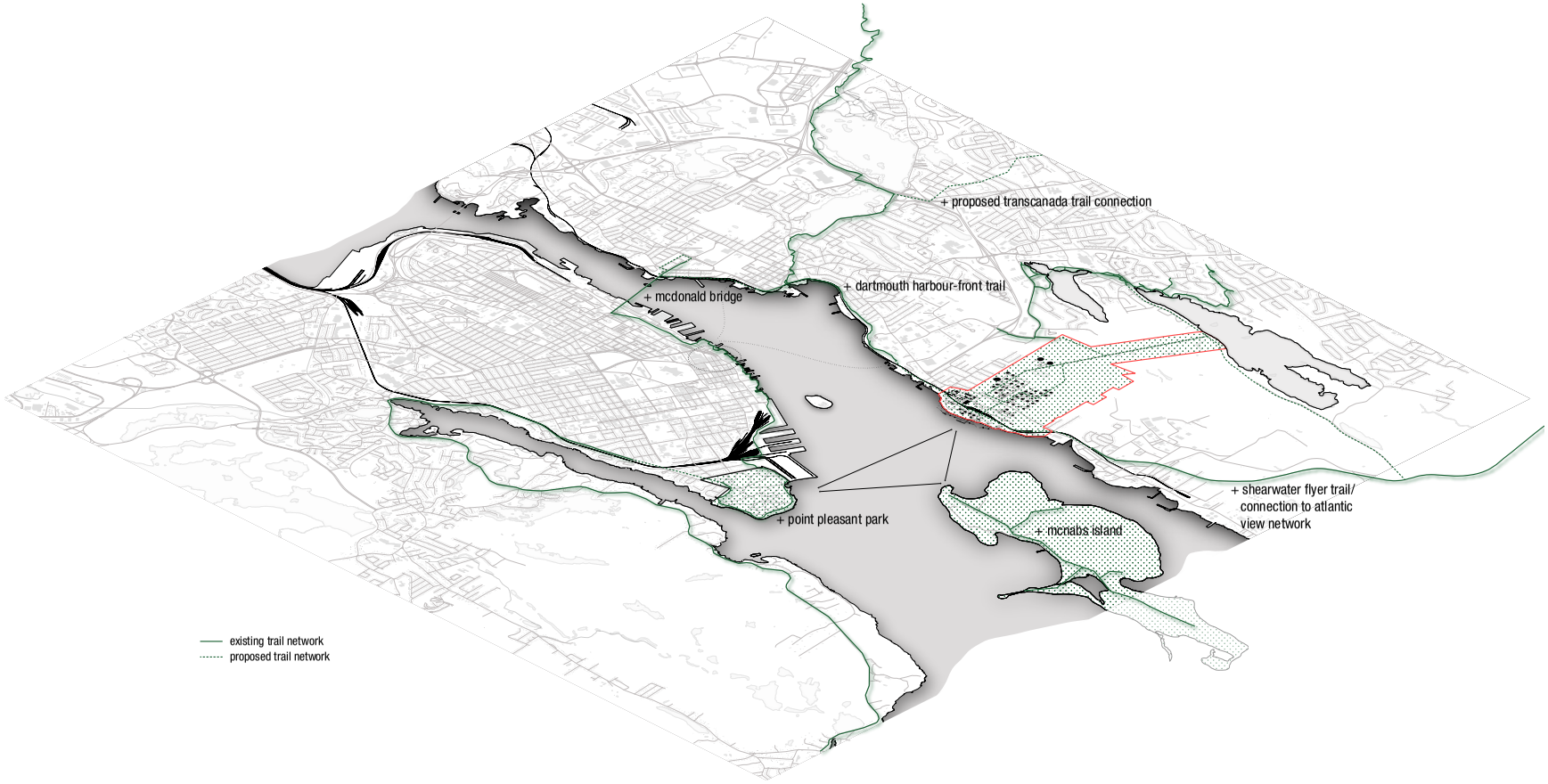
The Halifax Regional Municipality has a tradition of large park spaces and outdoor recreation areas. The typology of existing spaces includes urban wildlands, preserved historic military forts, active/sporting spaces and garden parks. Halifax does not have an existing post-industrial park space, and as such there is opportunity to introduce one. The largest urban park-spaces include Point Pleasant Park, and McNabs Island, each across the harbour from the refinery, and in a sense the refinery site has the potential to complete relationship between the three. While these spaces maintain an important role in the city, there is room for the development of an alternative typology of park space to complement the existing.



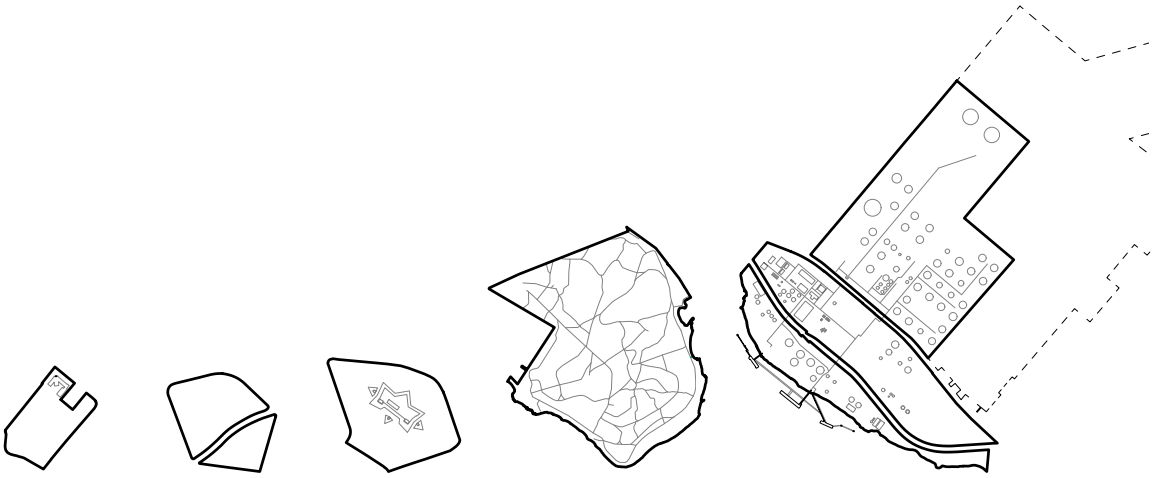
Park relationship (Halifax Regional Municipality Geo-database 2012).

Green-way Trail Networks

The refinery site is located on a proposed green-way corridor connecting the city to the Atlantic View and Trans-Canada trail network. The closed refinery lands currently extend from the harbour edge all the way to Morris Lake, creating a large urban divide. Public connections are only available through the busy thoroughfare of Pleasant Street. In proposing a new urban strategy, the refinery could become a connective element within the city, allowing cycling and walking trail connectivity, along with waterfront access.



Urban connectivity strategy (Halifax Regional Municipality Geo-database 2012).



Comparative scale of the proposed Imperoyal Park.
(Halifax Regional Municipality Geo-database 2012)

Economic Basis

The refinery lands are undoubtedly contaminated from over one hundred years of operations, providing a roadblock for any redevelopment plans due to the high cost of environmental remediation. There are a variety of remediation options to consider, each having a different economic viability. Development on contaminated lands (brownfield sites) and remediation efforts are driven by considerations of cost, liability, and public policy, each forming a key factor in determining project viability (Russ 2000, 2).

Urban Isolation of Contaminated Sites

Presently in North America there is a trend towards fencing and securing contaminated sites rather than remediating them. This is due to the extremely high costs of traditional remediation work, and the ability to secure lands rather than clean them. As Imperial Oil Dartmouth will undoubtedly be expensive to decommission, demolish, and remediate, there is potential that the landscape will continue in its current state of being guarded rather than remediated. In speculating on the cost benefit analysis, it may be significantly cheaper to hold the land for many years and maintain security rather than remediate, limiting development and progress for the community of Dartmouth and surrounding neighborhoods.

Investment Trends

While no specific figures are available for reference, it is observed that the petrochemical industry continues to invest heavily in development and comparatively little in decommissioning and remediation work. The sale of contaminated lands is a significant public issue, as many investors are unwilling to accept responsibility for past environmental impacts and seek to limit their liability, leaving many sites unmarketable. As the “era of oil” comes to a close, the economic power of oil producers and refiners will subside, limiting their ability to fund remediation programs and the resolution of post-oil sites. In speculating on future economics, there is a possibility that sites such as the refinery will be turned over to the public if oil corporations become insolvent. Should the land become a part of the public domain the cost of remediation will continue to be prohibitive, perpetuating the closed landscape and fenced condition of the refinery site.

Public Economic Viability

This project speculates on the idea of designing a future for public access to the site, either through the land becoming part of the public trust, or opened for alternative developments by its ownership. Natural bioremediation practices, and preservation of the infrastructure could offer a way for the public to re-inhabit this landscape without significant economic limitations. It is anticipated that with an initial public investment to develop the refinery landscape, it could become a catalyst for future development and would become economically sustainable.

Bioremediation

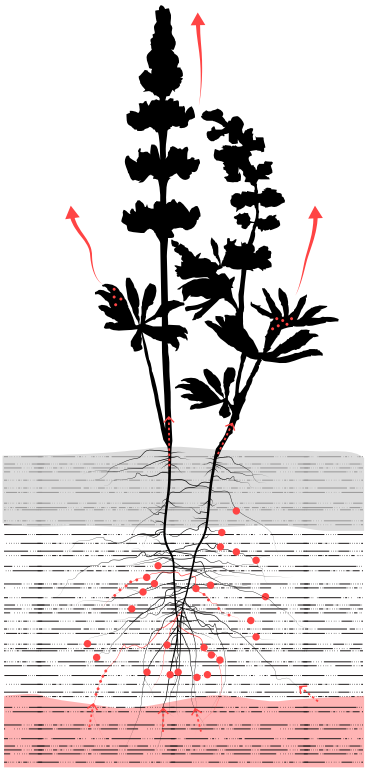
> So while we acknowledge (as we must) that the impact of humanity of the earth’s ecology has not been an unmixed blessing, neither has the long relationship between nature and culture been an unrelieved and predetermined calamity. At the very least, it seems right to acknowledge that it is our shaping perception that makes the difference between raw matter and landscape. (Schama 1995 ,10)

The refinery operations have introduced a variety of contaminants to the site and a strategy will need to be in place to remediate the landscape prior to public inhabitation. Traditionally the process would involve the removal of hydrocarbons from equipment before its removal, sale or recycling. The land would then be extensively excavated to remove contaminated soils. This process is extremely cost prohibitive, and potentially more expensive

than the real estate value of the land. Alternative remediation techniques exist that are less invasive and based on natural biological and chemical processes. The proposed means of phyto-remediation and regenerative wetlands offer a viable means of restoring ecological health to the site, and provide a less invasive and cost prohibitive means of remediation.

Phyto-remediation

Phyto-remediation involves the selective use of plant and tree species that have the capability to absorb or degrade contaminants from soil or water (Todd 2013, 5). While the ability of plants and trees to clean the air is well known, their regenerative potential to clean soil and water is less well known and an on-going field of study (Todd 2013, 5). A significant planting plan is proposed for the site to engage these biological and chemical processes, however a detailed site assessment would be required to determine the species and extents of the phyto-remediation design. Phyto-remediation can treat a high volume of soils, however it is a slow process and many growing seasons may be required to adequately decontaminate a site (Russ 2000, 179).

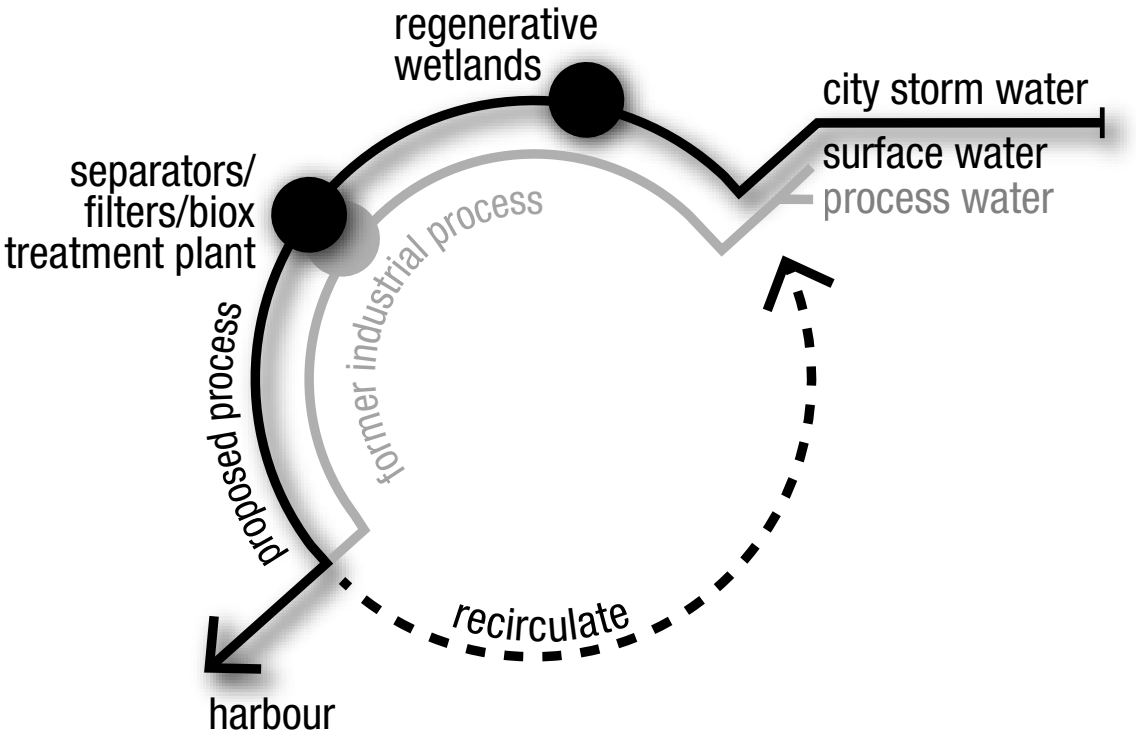


Phytodegradation: Metabolic process breaks down contaminants and incorporates them into own tissue.
Phytostabilization: Contaminants collected from soil and water immobilized in root system .
Rhizofilteration: Root systems adsorbs contaminants and filters/purifies water.
Rhizodegradation: Internal root system microbes break down contaminants into other molecules.
Phytohydraulics: Uptake of water prevents contamination spread in soil and water.
Phytovolatilization: Metabolism processes release contaminants to atmosphere in gas form.
Phytoextraction: Uptake of contaminants and store in leaves and stems.

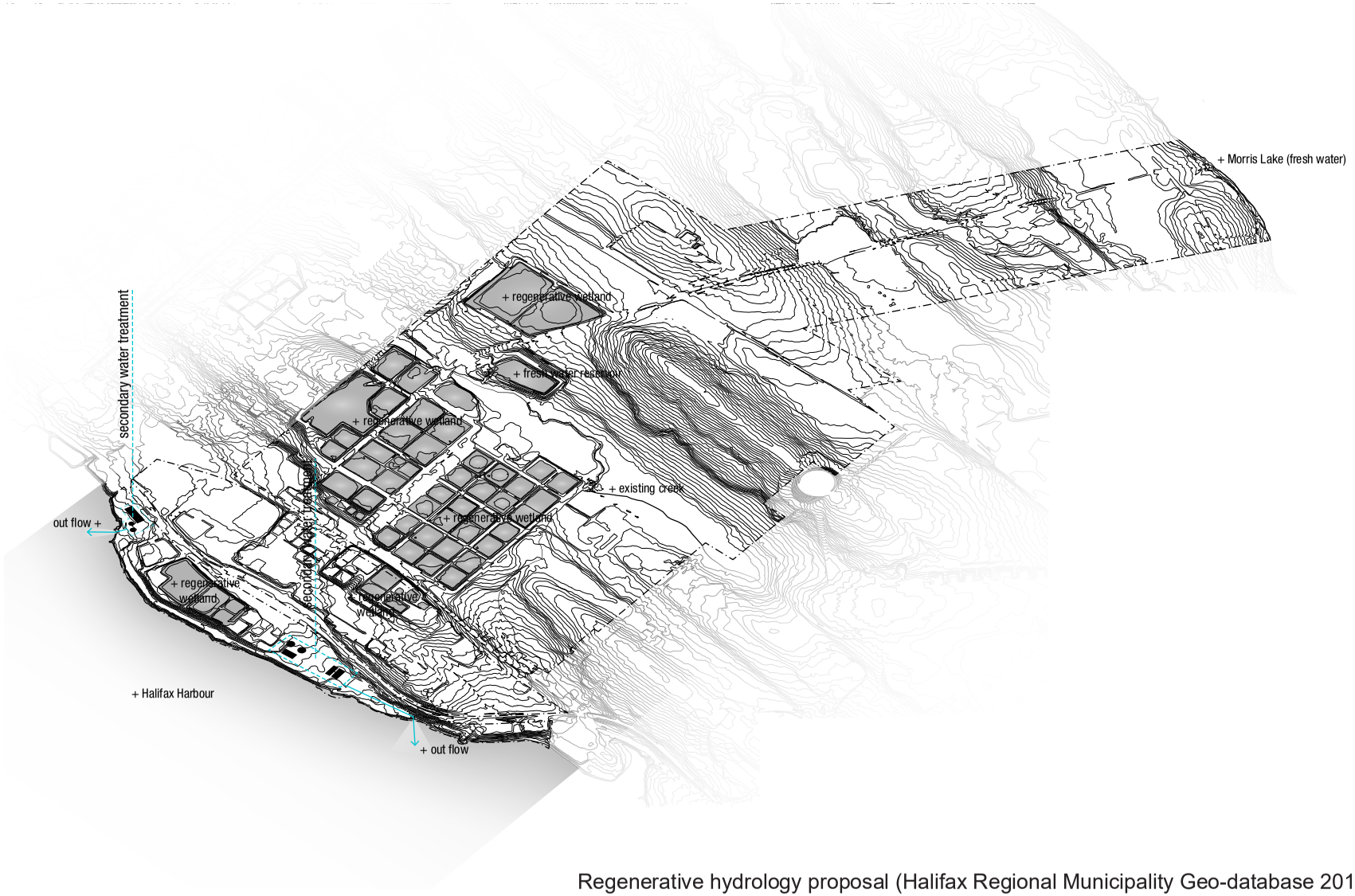
Phyto-remediation mechanisms (Todd 2013, 6).

Regenerating Through Hydrology

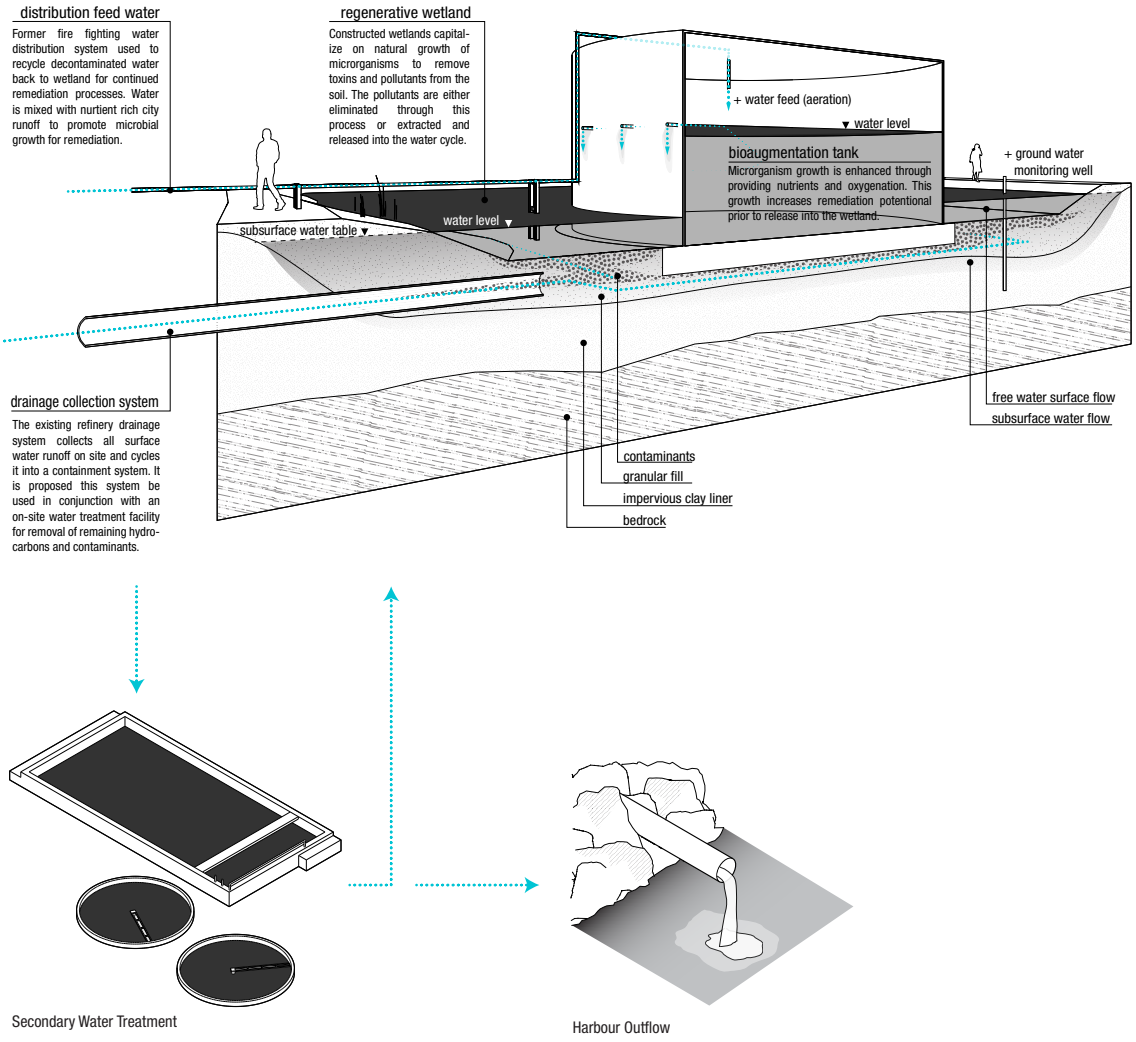
By activating the water cycle and existing infrastructure on site, significant remediation can be completed through constructed regenerative wetlands. The refinery was required to contain all storm water on site due to the contaminated nature of the lands. By using the existing contours of the tank farm berms, and drainage systems on site this contained water can be scrubbed and wetland remediation processes activated. The wetlands processes work through microorganisms processing hydrocarbons and heavy metals and breaking them down or releasing them insitu. The wetlands could be filtered through an existing biological process treatment plant, and clean water recharged into the system. This would create a landscape of wetlands around the storage tanks until the soil and water is cleaned, at which time people could be permitted access to the land itself.



Hydrological strategy.



Regenerative hydrology proposal (Halifax Regional Municipality Geo-database 2012).



Regenerative Hydrology Proposal.

University Research

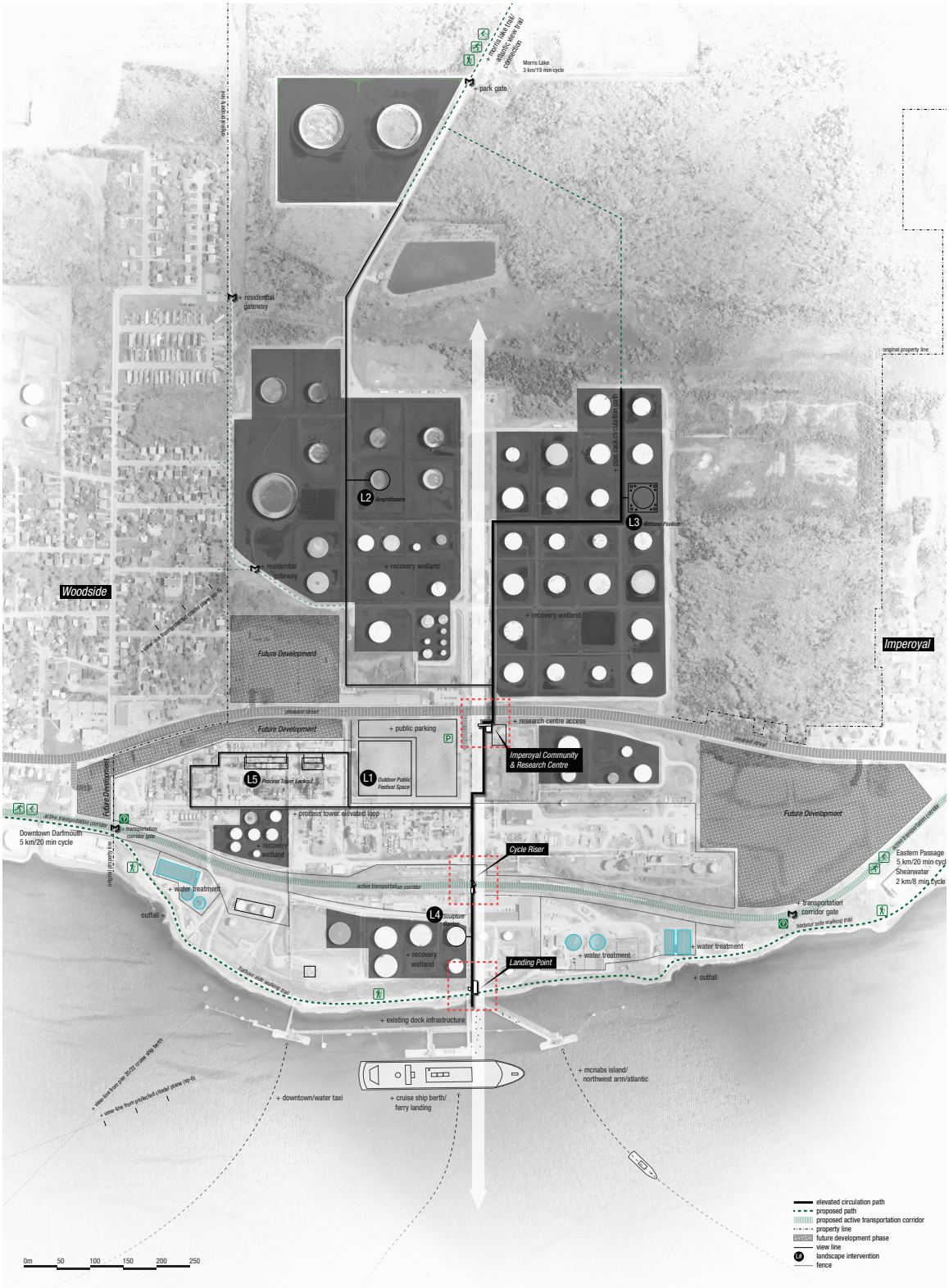
Halifax has a large number of university and research institutions, including Dalhousie, Saint Mary's, Kings College, Mount Saint Vincent, and the Nova Scotia Community College. These institutions provide a wealth of academic knowledge and talent, creating a community of scholars within the city. There is potential for university research to engage in the remediation and ecological regeneration of the refinery landscape. By utilizing this network of knowledge the refinery landscape could be connected to the city through academia, perhaps contributing knowledge to not only this site but many others in the future.

CHAPTER 4: DESIGN

In developing a strategy for the re-imagination of this former industrial landscape, design is explored as a medium from which to engage with and make accessible this residual space. By providing a framework for the exploration and inhabitation of the landscape, the normative experiential limits of the city are expanded and the imaginative capacity of the landscape is revealed. Through a renewed life as a post-industrial park space, the landscape is once again activated and is re-engaged within the urban environment. Architecture is explored as a means of bridging access to the landscape and juxtaposing various industrial elements with public use interventions. The connective elements of the design begin the process of reconnecting the neighboring communities to the site and greater city beyond. Economic renewal is generated through the strategic development of the site as an industrial tourism attraction with public spaces drawing both tourists and residents to the site. In respecting the site as a monument to an industrial and energy era past, place can be given to a collective memory and history, paired with educational and leisure programming elements.

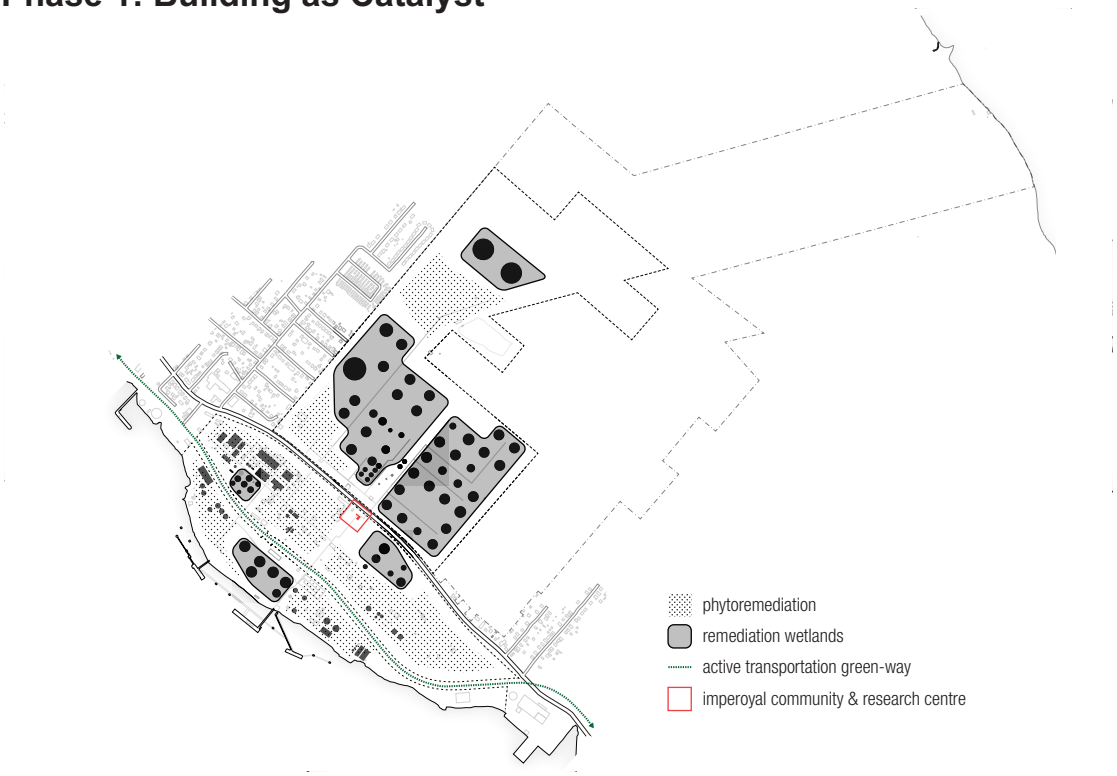
The development of the site as a public space requires consideration of the temporal nature of bioremediation, suggesting incremental construction of interventions and phased access to the site. Bioremediation provides an opportunity to remediate the site through a cost effective means, however it is a long term process and public inhabitation would need to be phased to match this timeline. The infrastructural element of the raised pipe rack is intended to be used as a means of transitional access to the site. By converting it to a walkway the public can first access the site in a controlled means, journeying to interventions and threshold points connecting to the city. Ultimately this pipe rack will be converted to allow access to the landscape below once remediation is complete (phase 4).

There are two primary elements of the proposed design. The first being a series of three architectural interventions acting as a threshold points to engage three separate transportation modes across the site. The second being outdoor public space interventions activating the existing infrastructure components on site by defining new public uses for each.



Imperoyal site development plan.

Phase 1: Building as Catalyst

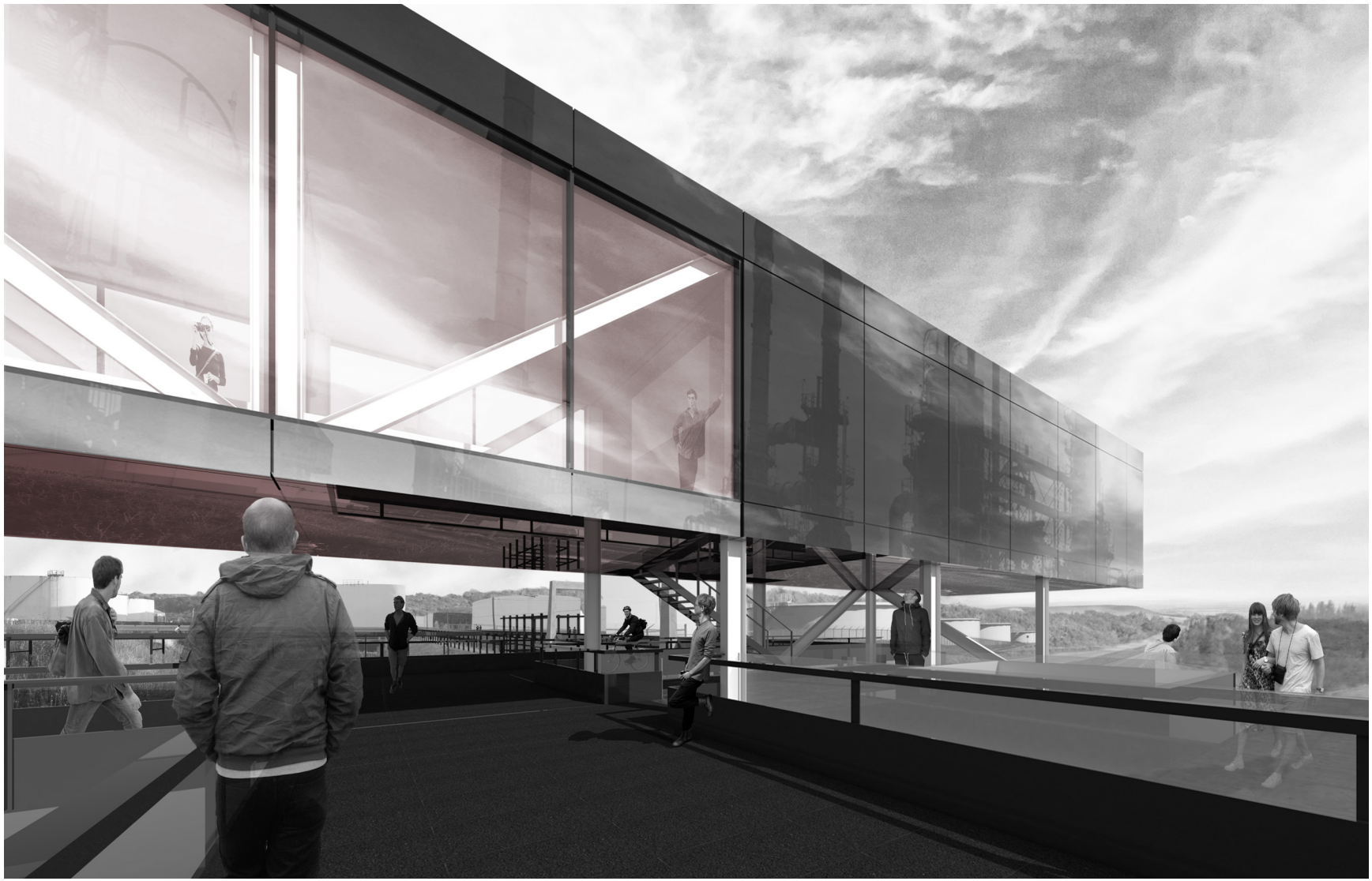


Phase 1 (+5 years) site drawing.

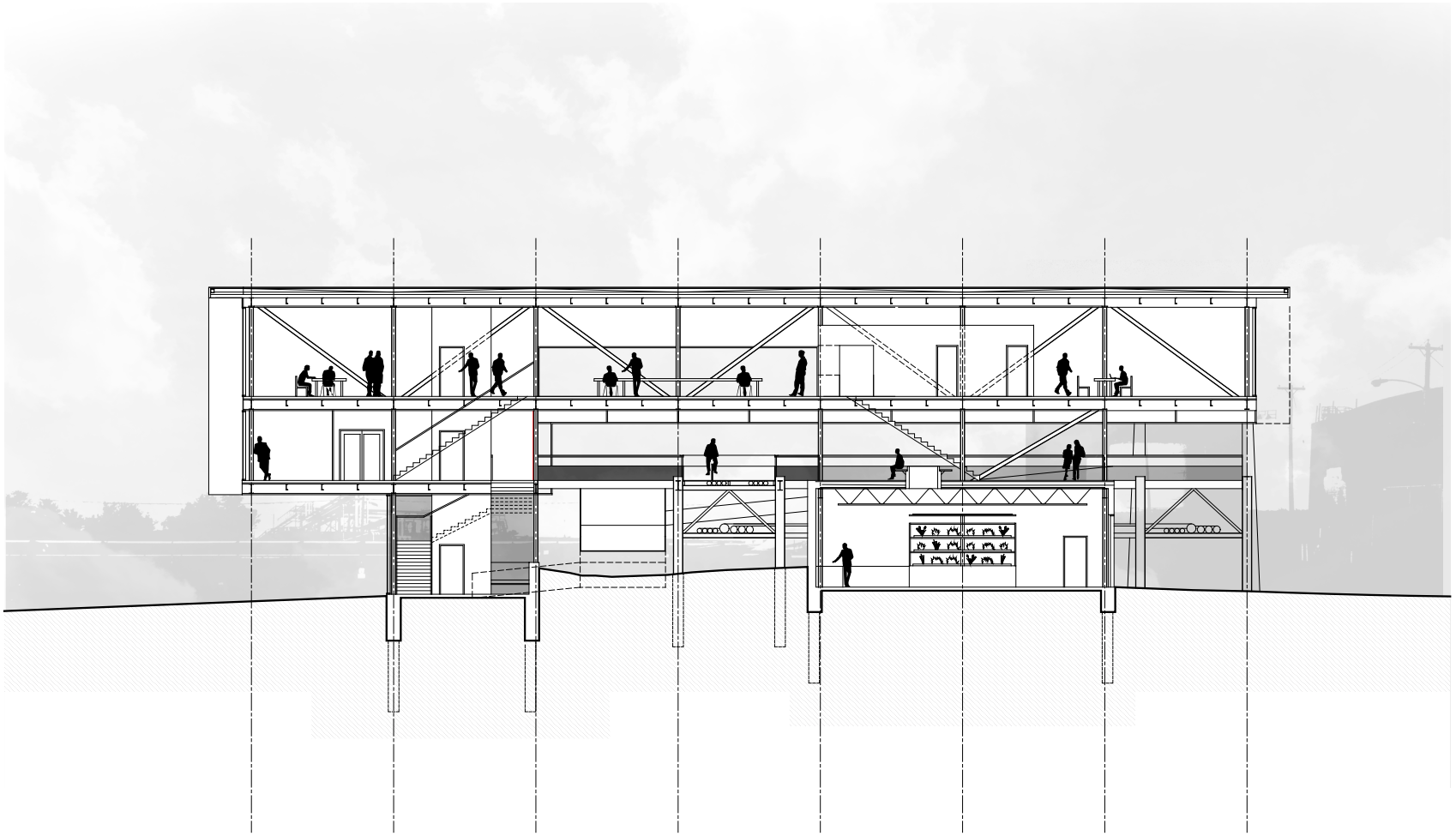
Phase 1 initializes the development on site. The first of three public interventions is constructed, a public active transportation green-way is established and bioremediation procedures are initiated.

Imperoyal Community & Research Centre

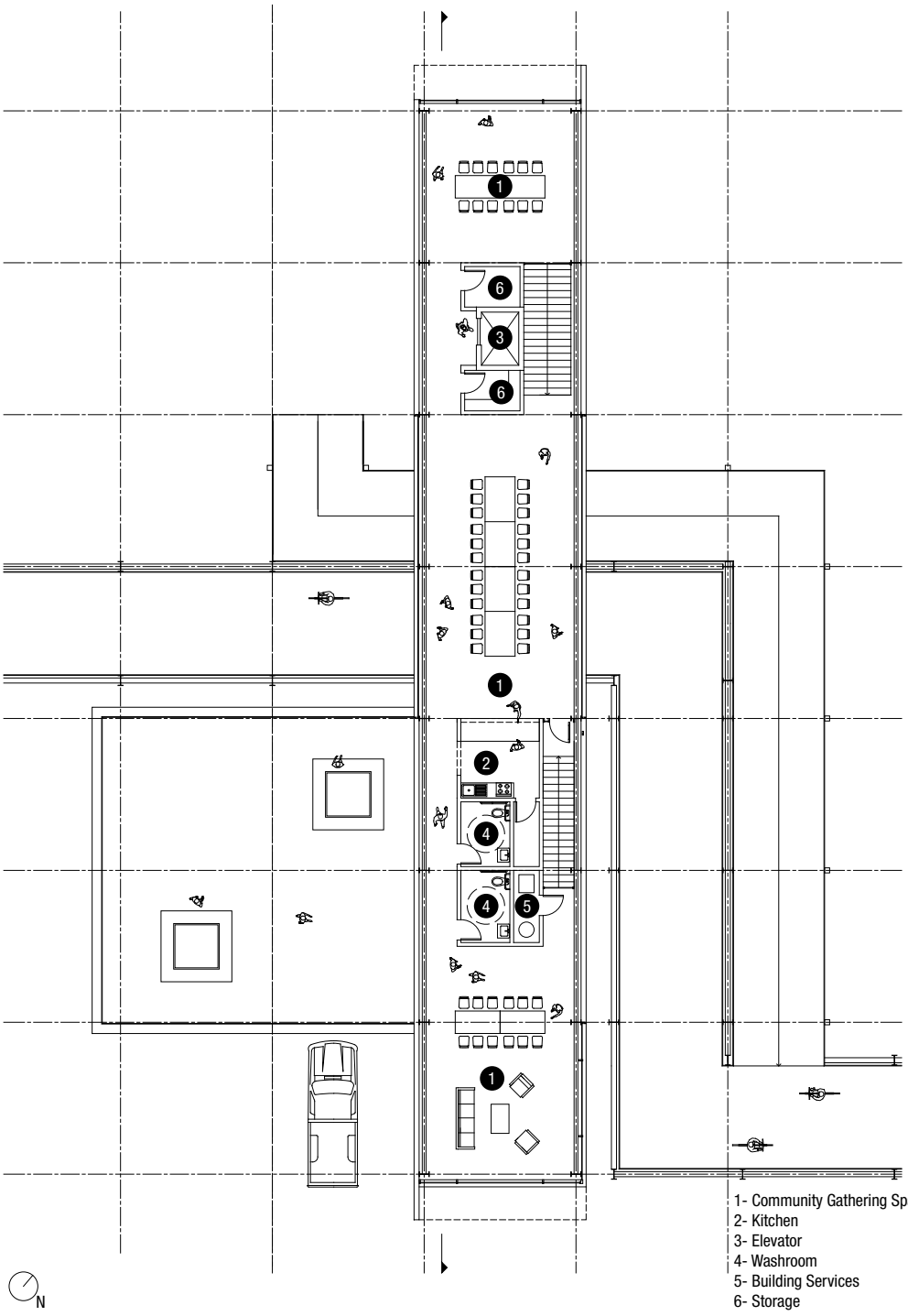
To begin the public interventions on site, it is proposed that a community centre paired with a research and teaching laboratory is developed. It is intended that this building would be the first step of community reintegration on the site, and the research centre a catalyst for site remediation efforts. The research lab enables continued study and development of the remediation processes on site, potentially connecting to the university teaching and research institutions of the city. A roof top public space allows the public to look down through glazed light wells to view the research space below. The community centre has strategic views towards the tank farm landscape, and as well is glazed at each end, intended to be a beacon to vehicles passing by on the parallel Pleasant Street. The building will serve as a vertical connection to a future elevated path network, acting as a looming gateway presence as one passes beneath it.



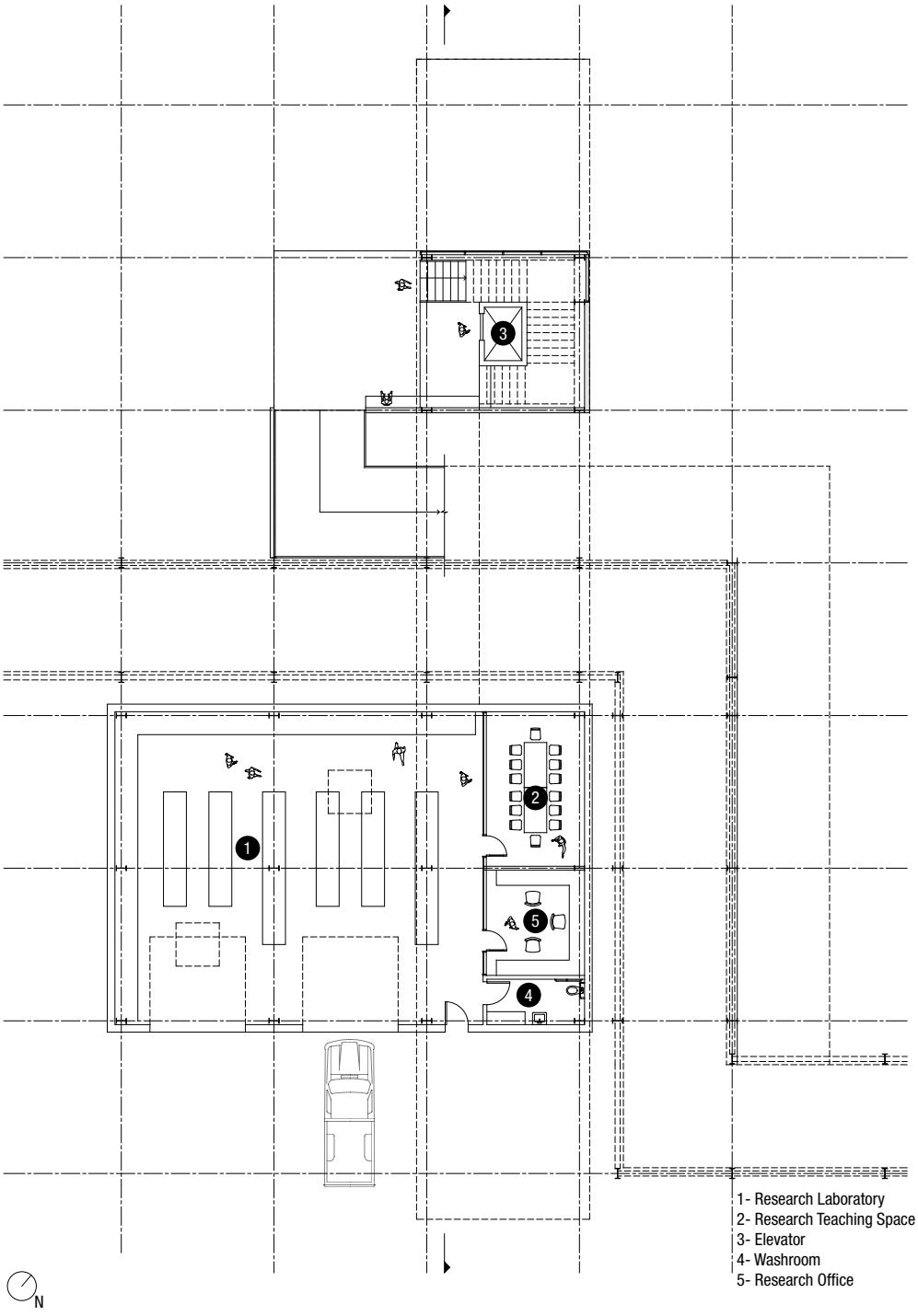
“Imperoyal Community & Research Centre” rendered image.



“Imperoyal Community & Research Centre” section drawing.



“Imperoyal Community & Research Centre” third floor plan drawing.



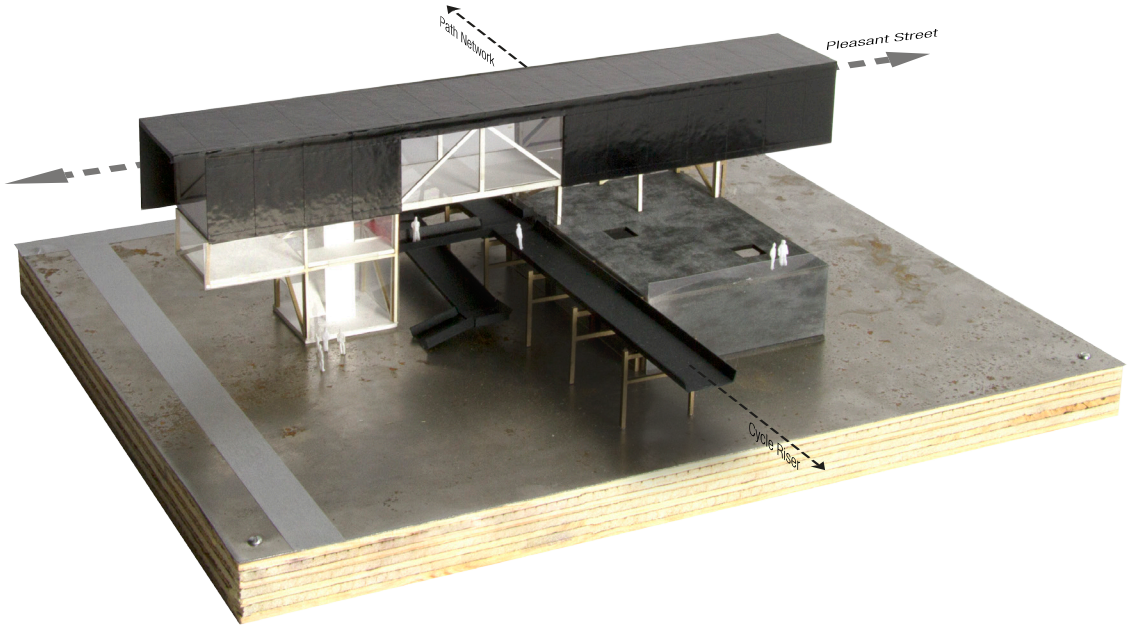
“Imperoyal Community & Research Centre” main floor plan drawing.

Active Transportation Corridor

In response to the active transportation strategy developed by the city, a green-way trail corridor is proposed along the existing rail line (Halifax Regional Municipality 2016). This railway line lends itself to the conversion as it has an existing foundation base for the path, and the grading is suitable for cycling. This corridor is the first step in re-establishing connectivity to the site, connecting the public to the landscape and the greater networks of the city and beyond. The creation of this corridor will help complete the regional component of the Trans-Canada trail network. This greenway trail will begin to re-weave connections between the neighboring communities, creating further means of access between them.

Bioremediation

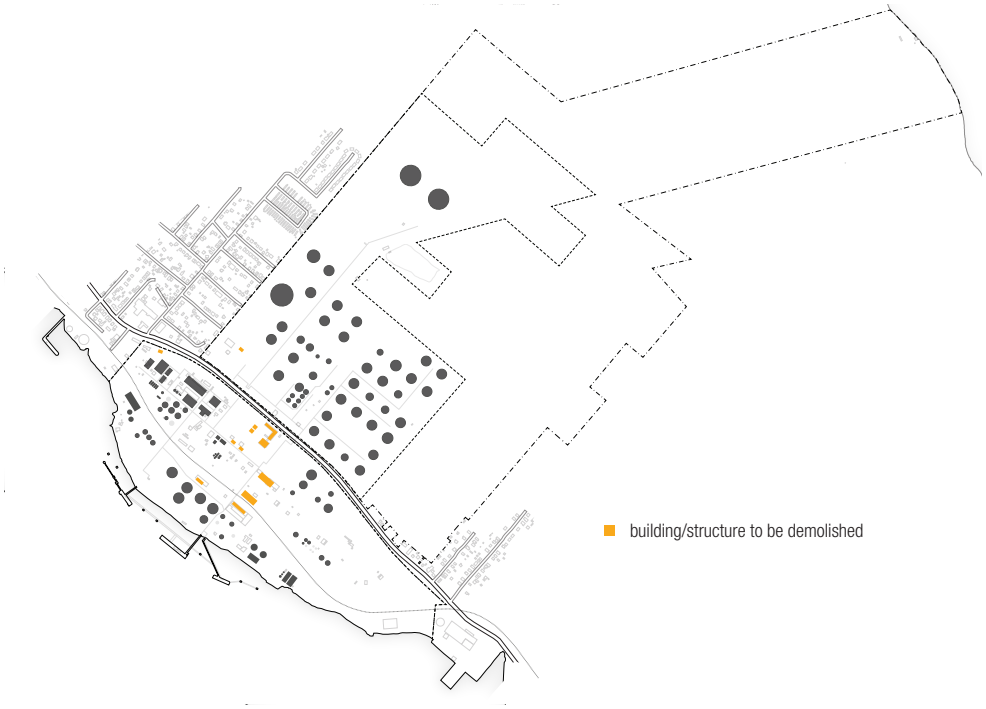
The bioremediation program includes the development of the regenerative wetlands and phyto-remediation program on site. These bioremediation procedures will provide a cost effective means of remediation, while allowing a phased re-integration of the public into the landscape as the landscape is slowly decontaminated.



“Imperoyal Community & Research Centre” model.

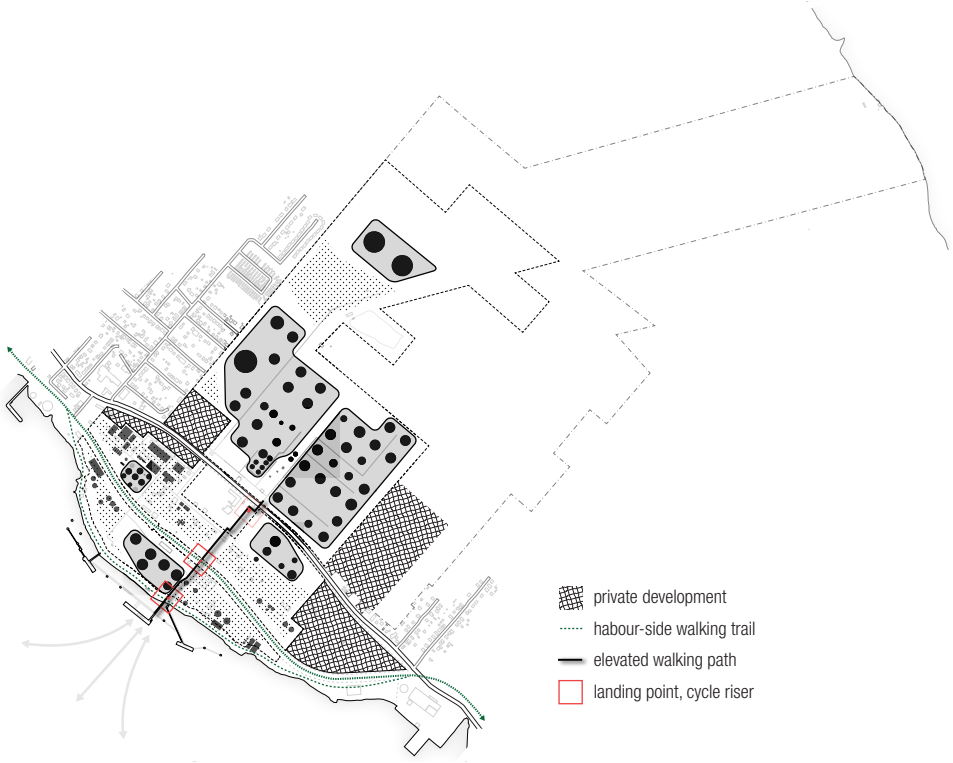
Selectively Preserving the Landscape

In considering the refinery as an artifact or ruin, some of the existing structures are suggested for demolition based on their limited heritage conservation value. Elements need to be evaluated on the basis of their contribution to an authentic understanding of the landscape and the spirit of place. A preliminary review of the site structures suggests that buildings such as late 20th century office buildings, and control and maintenance facilities are not integral to the landscape, and are not worth preservation measures. These buildings are suggested for demolition in the initial phases of the project.



Proposed site demolition plan.

Phase 2: Building as Connection

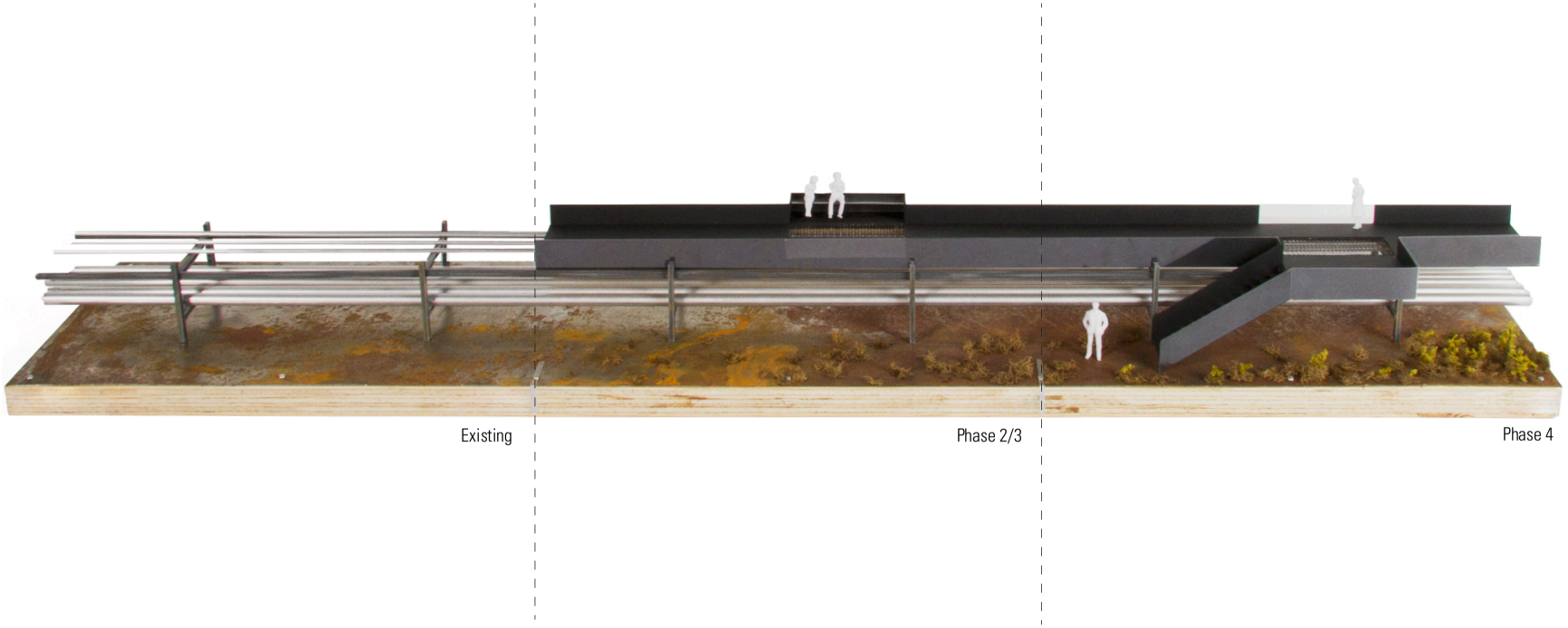


Phase 2 (+10 years) site drawing.

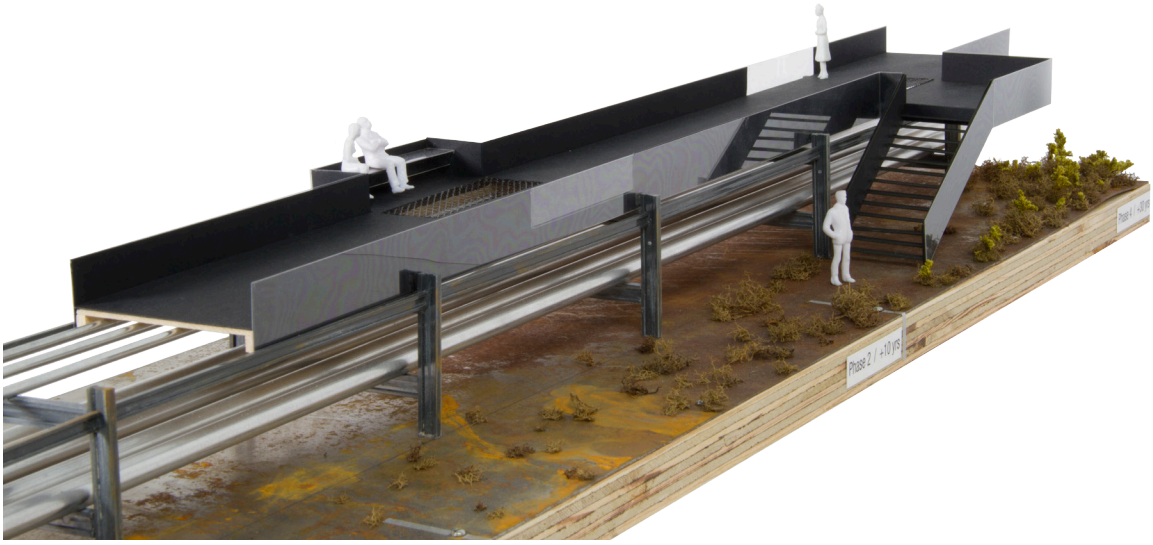
Phase two includes the addition of two public interventions and an elevated walkway connecting between them from Pleasant Street to the waterfront. Portions of the site are released for private development once the remediation processes are complete.

Elevated Walkway

In order to transport crude oil and refined product throughout the site a network of elevated pipe racks was utilized in the refinery operations. The second phase of the project proposes to convert part of this existing network to elevated walkways for public use. The raised nature of the walkway allows the safe passage of people into the landscape during bioremediation procedures, as a separation is maintained from the contaminants at grade. The initial proposed pipe rack conversion connects the site on a primary axis from the waterfront to Pleasant Street. What once circulated oil on the site can become the basis for public circulation and path networks, becoming a key element in the re-inhabitation of people on the site, and forming a bridge into the landscape.



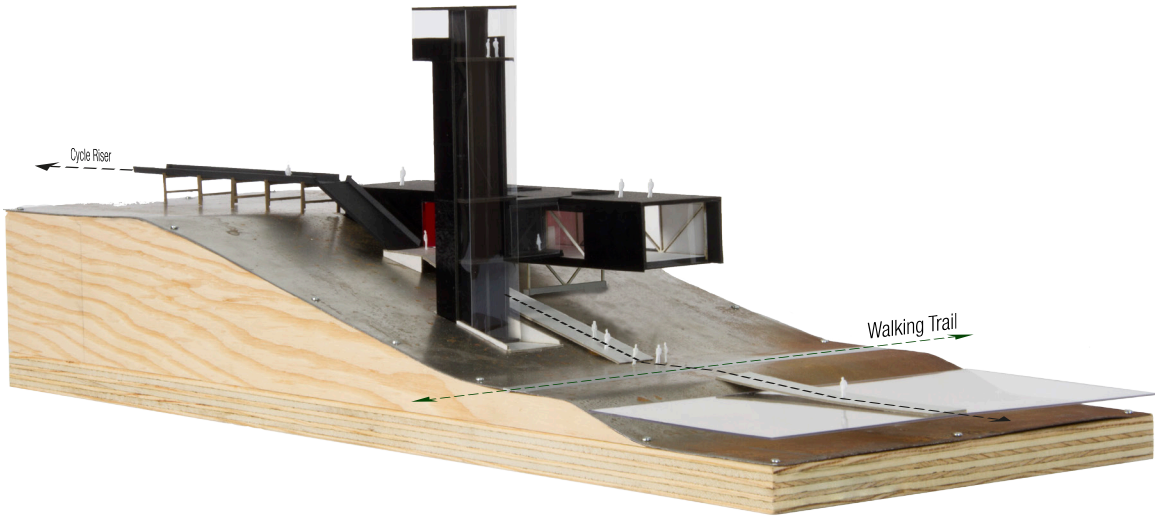
Elevated walkway (pipe rack) model.



Elevated walkway (pipe rack) model.

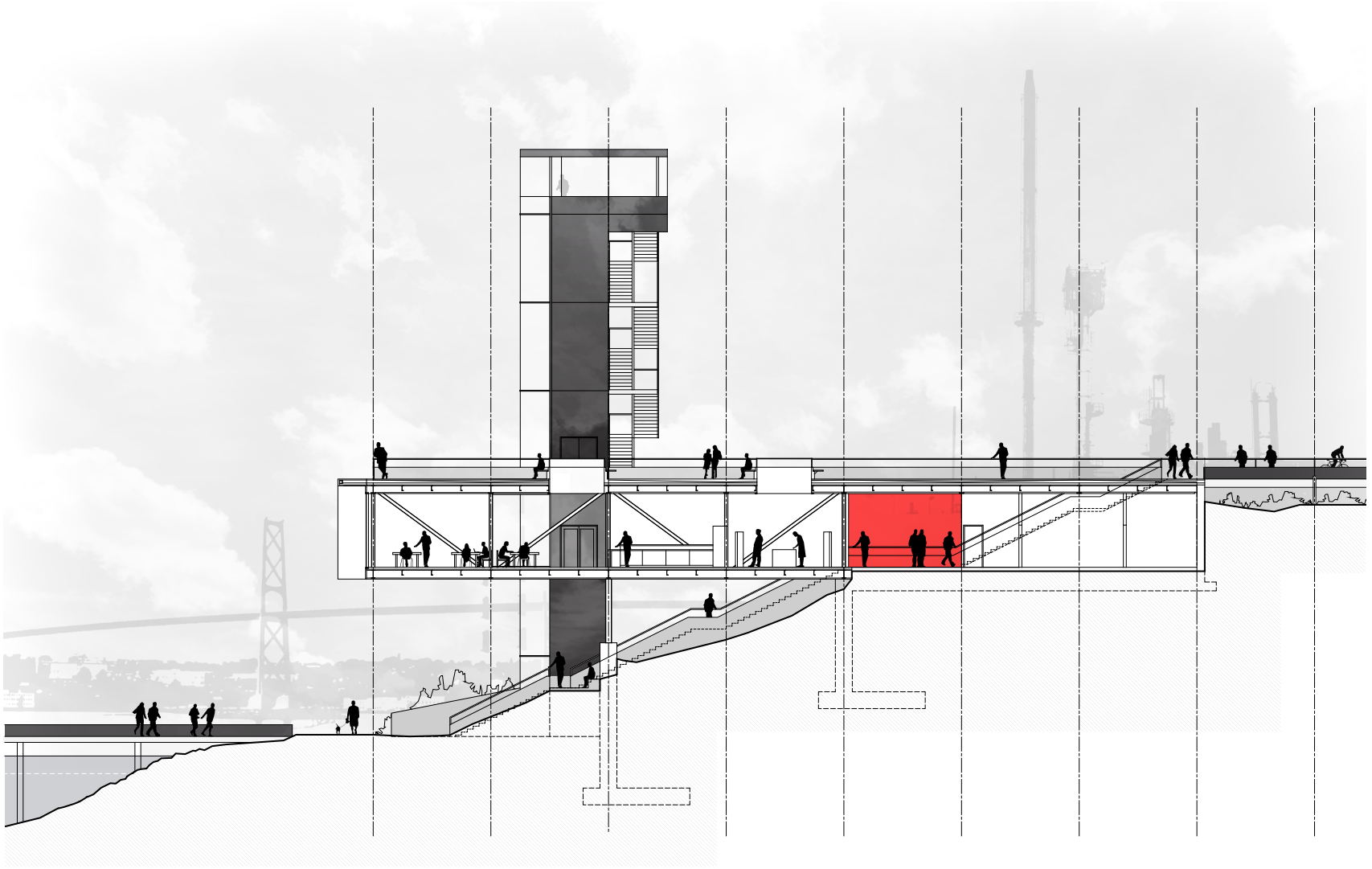
Landing Point: Waterfront Connection

It is proposed that the elevated walkway be connected to the waterfront and existing dock infrastructure by a public landing building. This building provides a first point of contact for visitors arriving by water or harbour side walking trail. Acting as an urban elevator, it provides a beacon and lookout tower for visitors to engage with views of the city and the forthcoming refinery landscape. The beacon acts as a glowing element at night, re-lighting what is otherwise an extinguished landscape. It provides an outdoor deck space, cafe, tourism information, and an accessible beacon tower on the waters edge. It is intended to act as a gateway building, and a threshold as one approaches the beginning of the elevated path network.

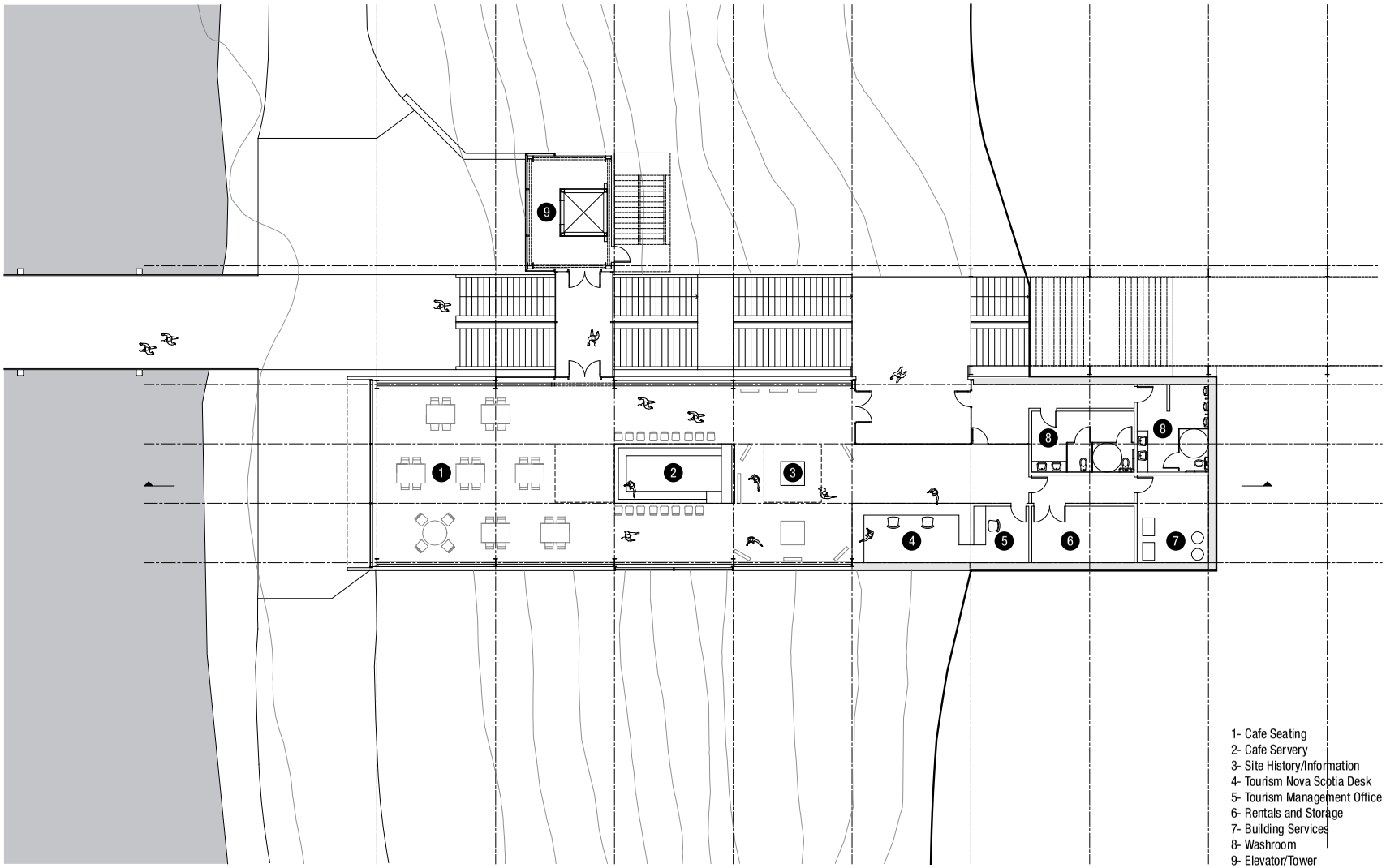


“Landing Point” model.

Rendered image of “Landing Point” from harbour approach.



“Landing Point” section drawing.

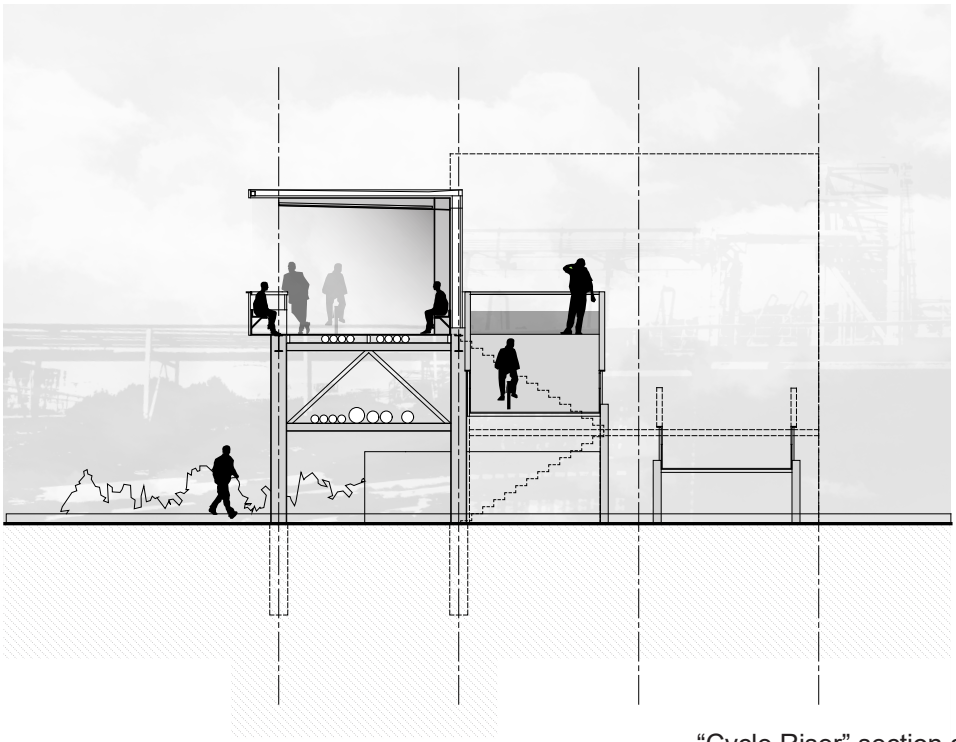


"Landing Point" plan drawing.

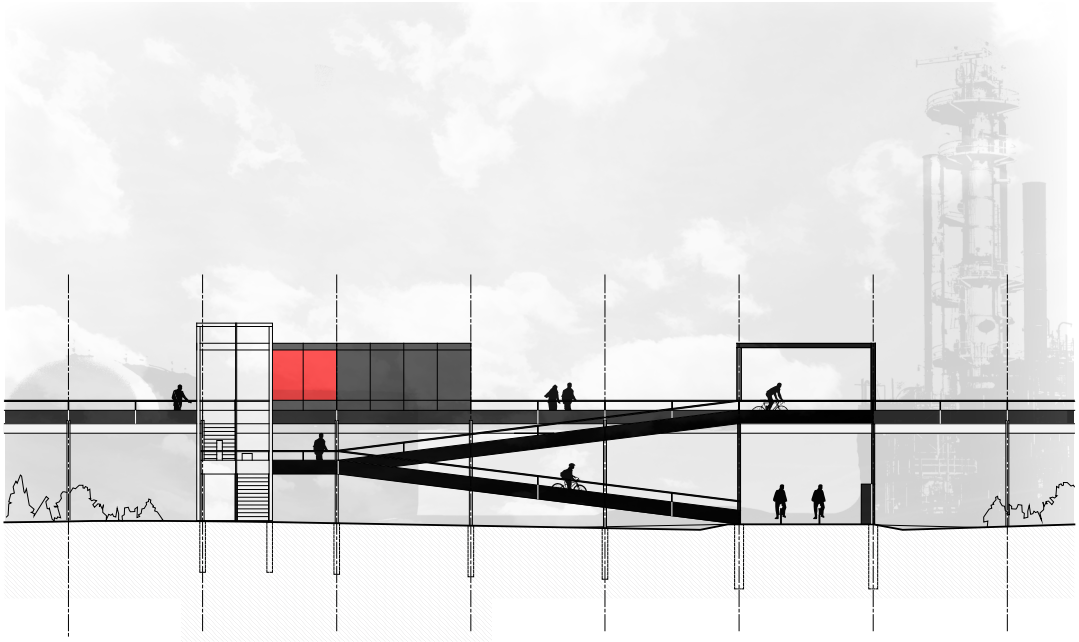
Cycle Riser: Connecting Networks

This intervention provides a means of connecting the active transportation green-way corridor with the elevated walkway (converted pipe rack) network. It offers a repair stand for bikes, a water fill station, and a shady place to pause on the journey. A ramp connects the greenway below to the walkway above for cyclists, and as well a stair for pedestrians. The building acts as a threshold and a primary point of entry to the elevated walkway network and connected landscape beyond.

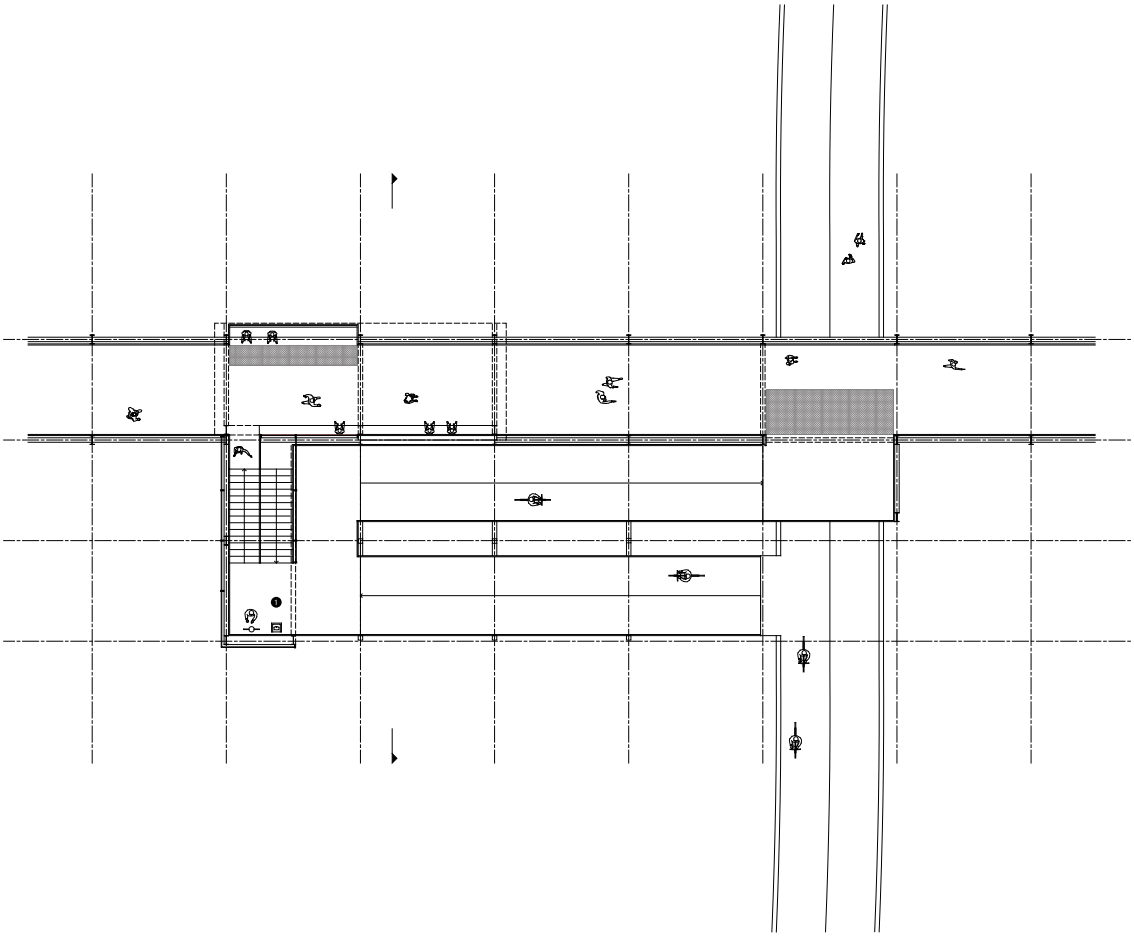
"Cycle Riser" model.



"Cycle Riser" section drawing.



“Cycle Riser” elevation drawing.

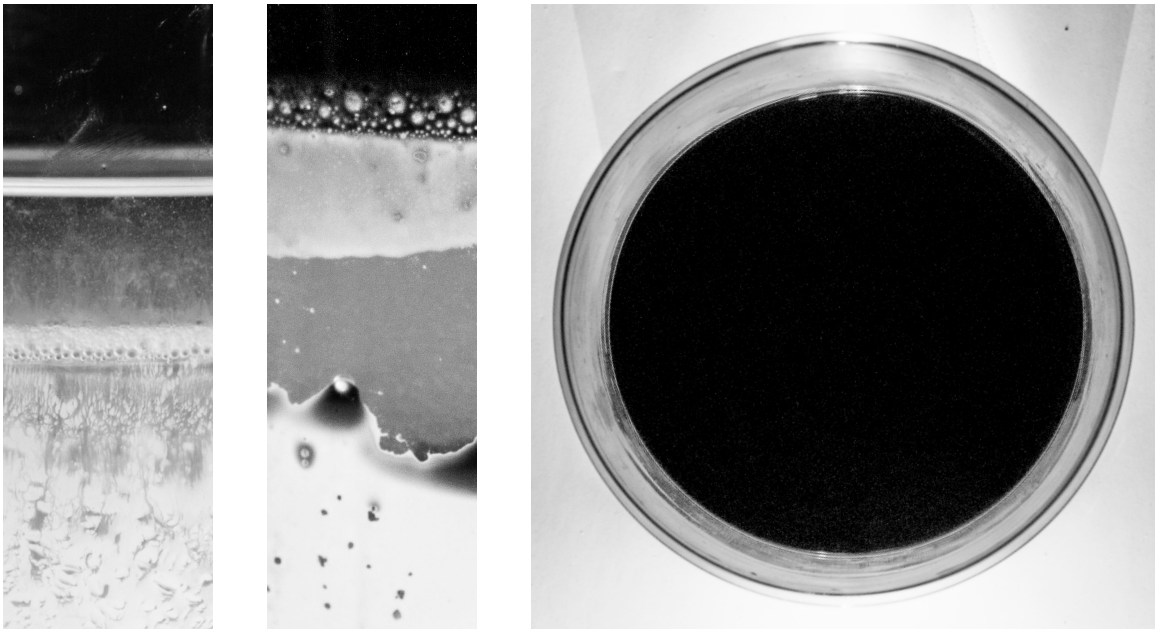


“Cycle Riser” plan drawing.

Rendered image of the “Cycle Riser” from the proposed active transportation green-way corridor.

Materiality

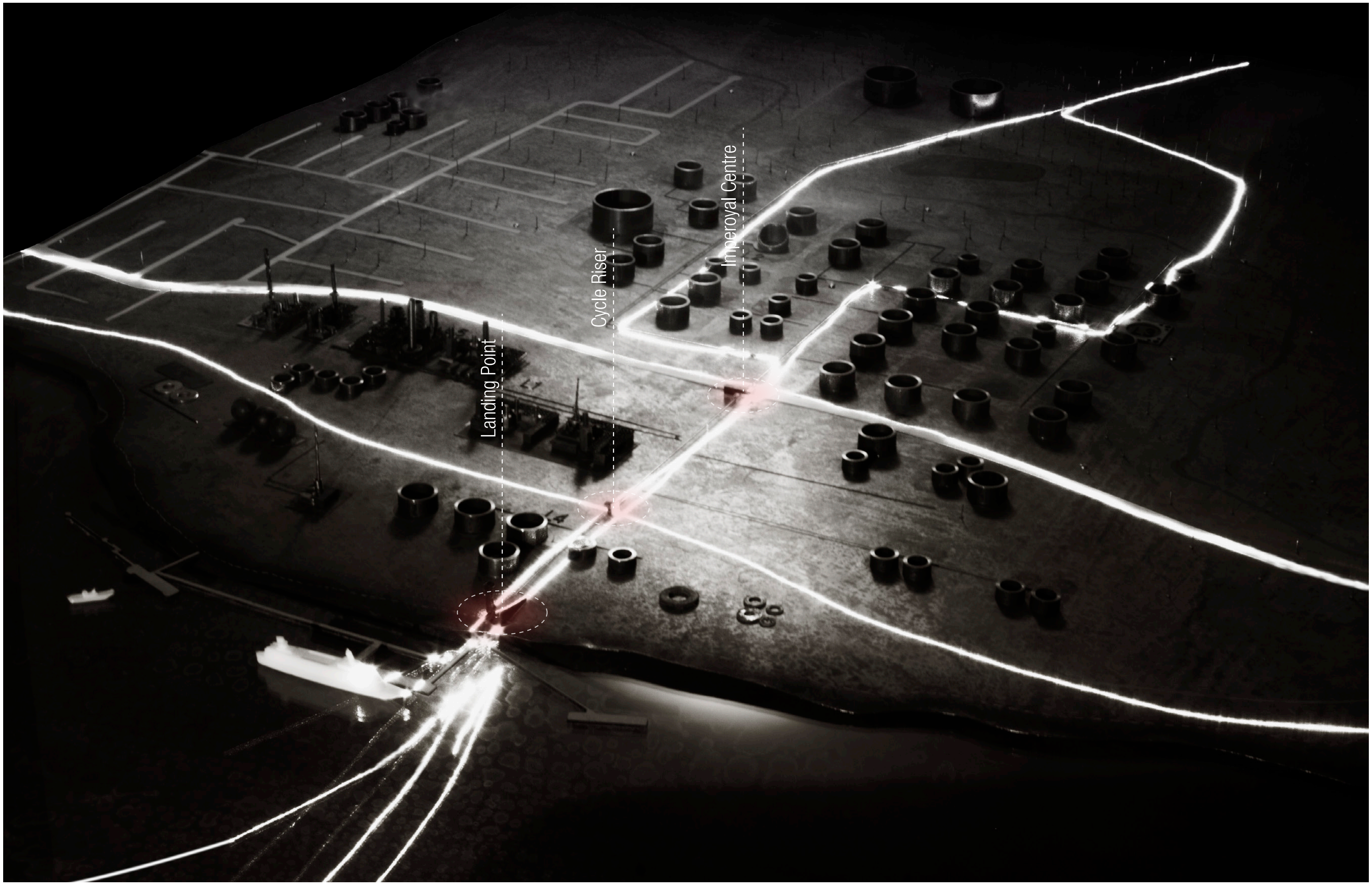
In developing a materiality strategy for the architectural interventions the history of oil processing and the qualities of this product were studied. These unique properties of oil were observed: it is highly reflective, has a sheen, gradient, emulsive nature, and a seemingly limitless depth. By choosing a facade that emulates this, and reflects the landscape around it, the building becomes a part of the landscape itself and not central to it. At strategic moments the buildings offer fully reflective elements that enable the user to see themselves and their scale within the landscape. A red coloured glazing is used to denote entry thresholds into each of the buildings, offering a moment of altered perception of the landscape as one passes through. As well the coloured light from the glazing glows onto the pathways beside the interventions, providing an indication of their presence.



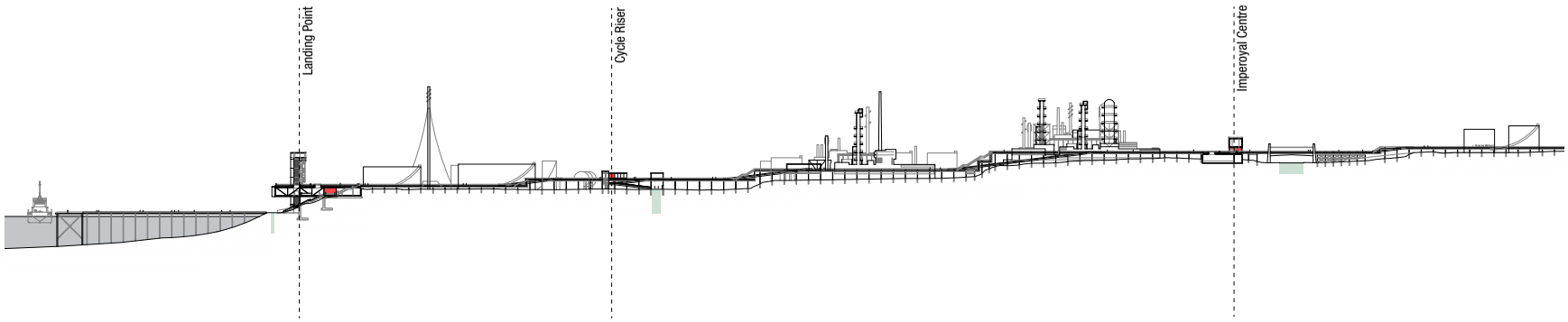
Images of oil material study.

Structure

The building interventions are based around the use of steel structures utilizing vierendeel type trusses. The truss provides a means of elevating and cantilevering the buildings in an efficient manner, allowing the structures to have presence over head as one experiences them as elevated thresholds. By engaging the local steel ship building skill and work force, skilled labour is readily available and the community is benefitted from the project.

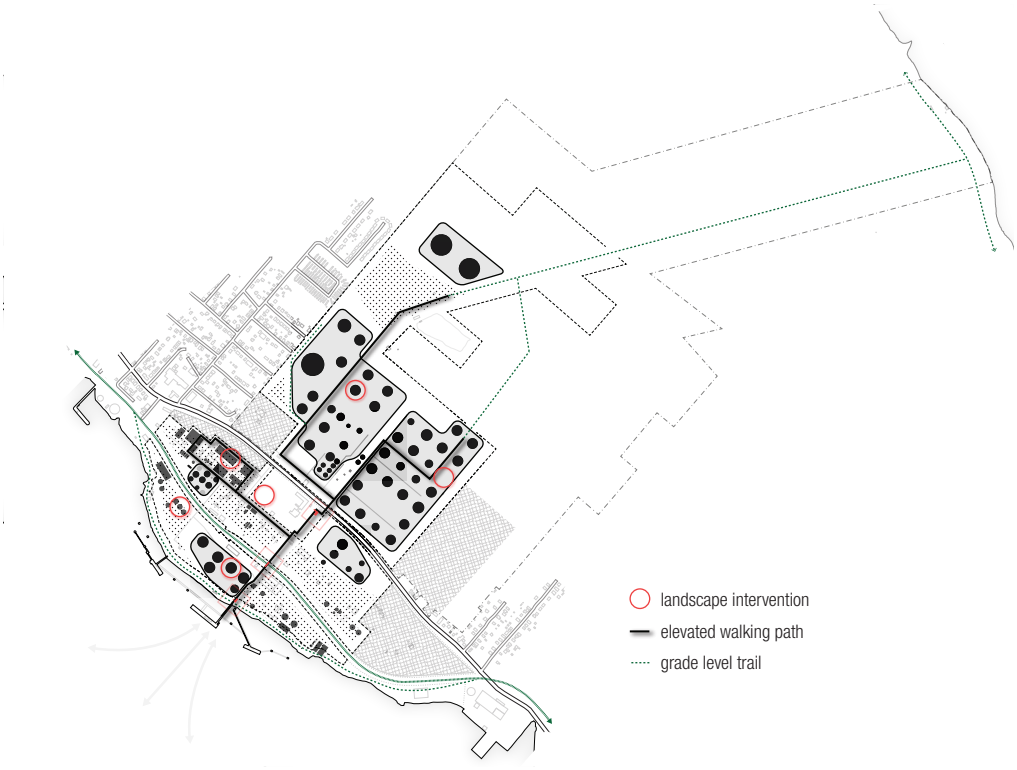


Imperoyal site model and intervention locations.



Site section drawing.

Phase 3: Engaging the Landscape

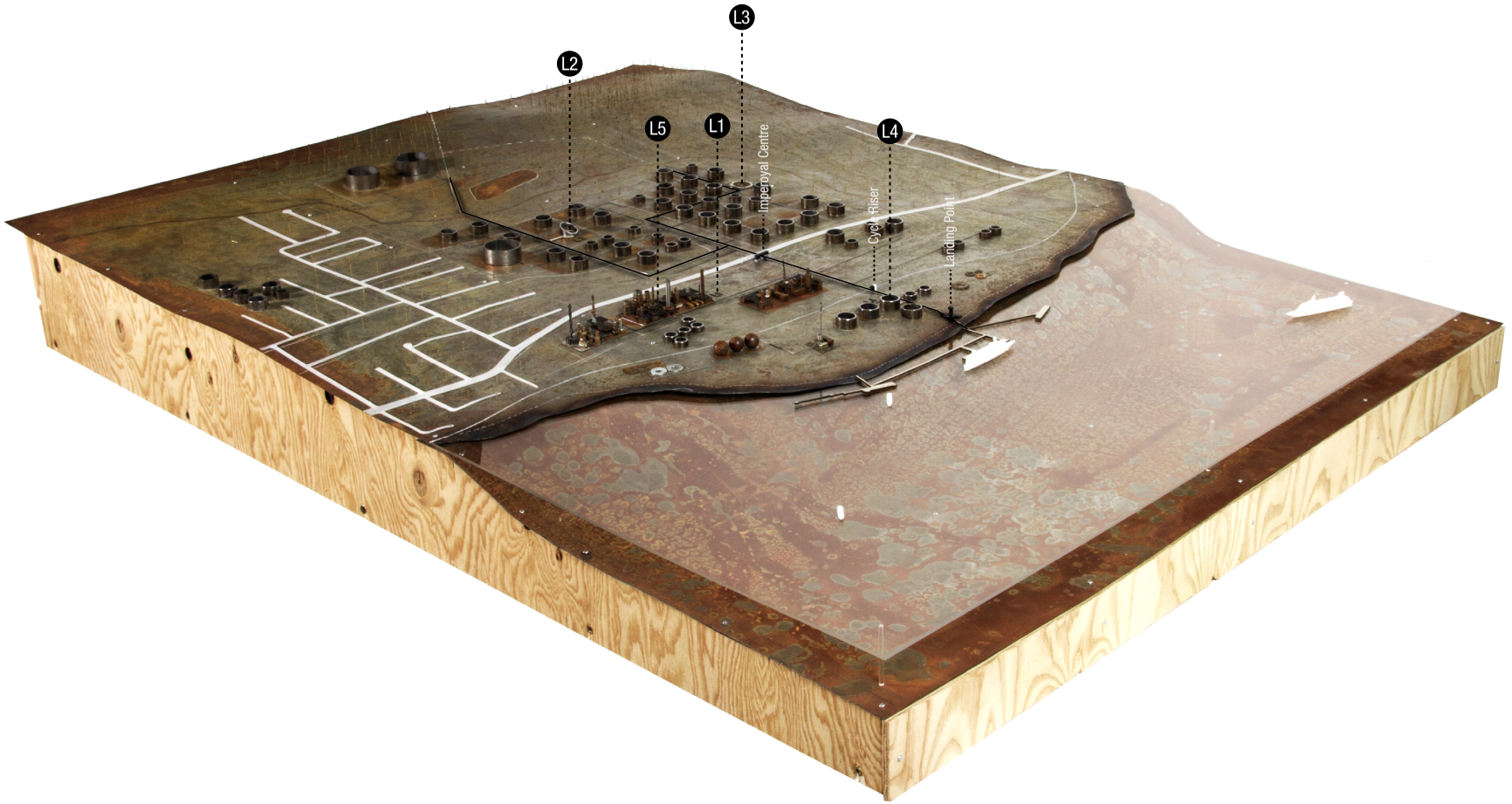


Phase 3 (+15 years) site drawing.

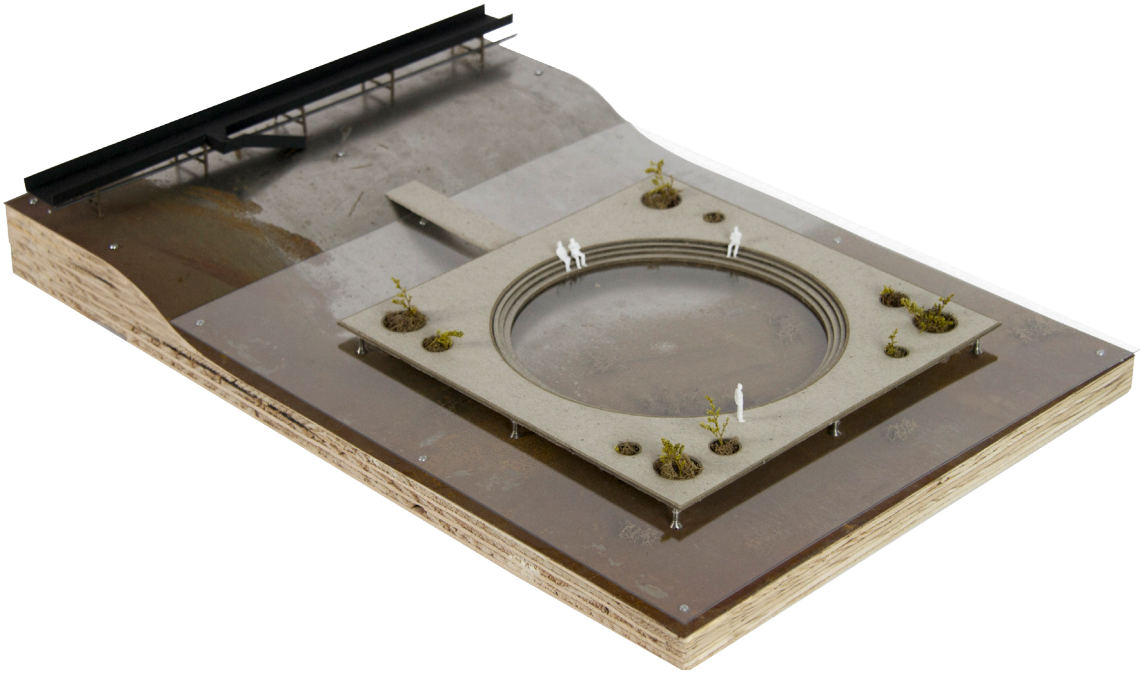
The third phase of the project includes the expansion of the elevated walkway network, and the development of multiple landscape interventions to engage the existing site infrastructure.

Landscape Interventions

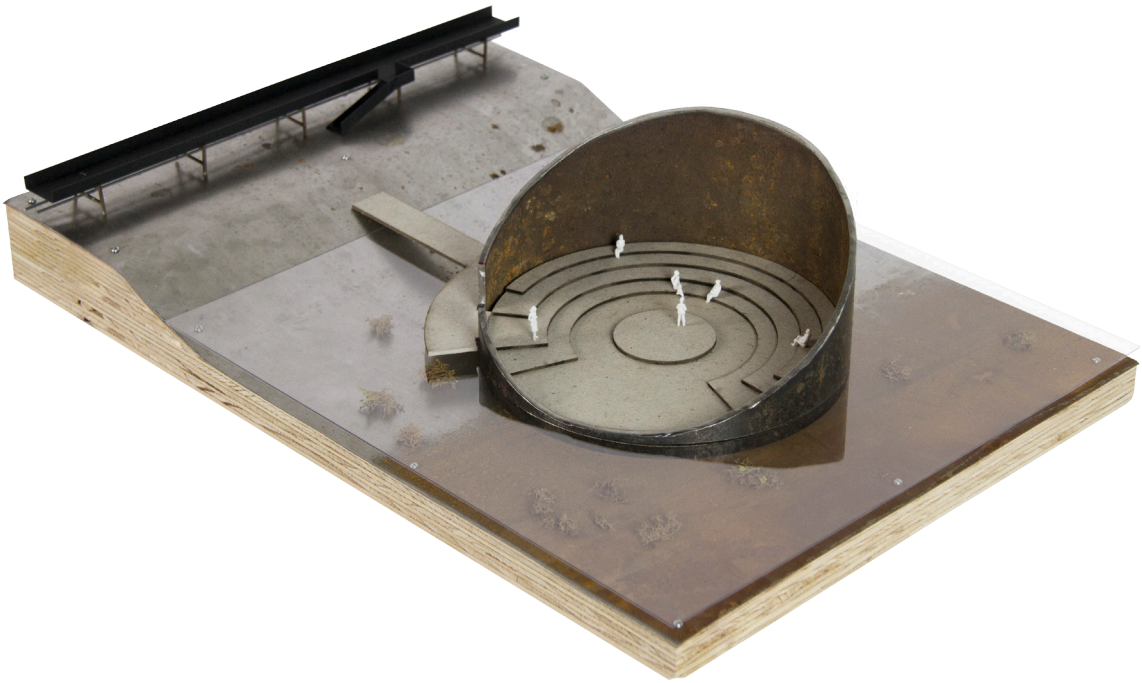
The expansion of the elevated path network allows for further access into the landscape beyond and the existing infrastructure throughout. By bridging access into the landscape and the infrastructure there is opportunity to create public interventions within this area of the site. These interventions are intended to engage the existing infrastructure, and allow an experience of the imaginative and symbolic capacity of the landscape. Located along the path network, five landscape interventions are currently proposed. It is intended that these designs are a part of a large number of future interventions, fully activating the landscape. The expanded walkway network also connects to proposed trails around Morris Lake, further connecting the site to the neighboring communities and city beyond.



Imperoyal landscape model.



Proposed intervention utilizes a void space in the storage tank grid, tracing the foundation of a demolished tank with a reflecting pool in the regenerative wetland (L3).



Proposed modification of an oil storage tank to become a public amphitheatre space (L2).

Proposed modification of an oil storage tank to become a sculpture garden (L4) containing unique refinery parts or equipment, providing a chance for these to be exhibited and interacted with by the public.

Oil storage tank sculpture garden.

Proposed outdoor festival grounds (L1) activating the refinery processing towers with lights to form a venue backdrop.

Proposed walkway and lookout tower (L5) on existing process tower equipment creating a walkway in the sky, providing a chance to exist amongst the towers and a vertical perspective on the landscape below.

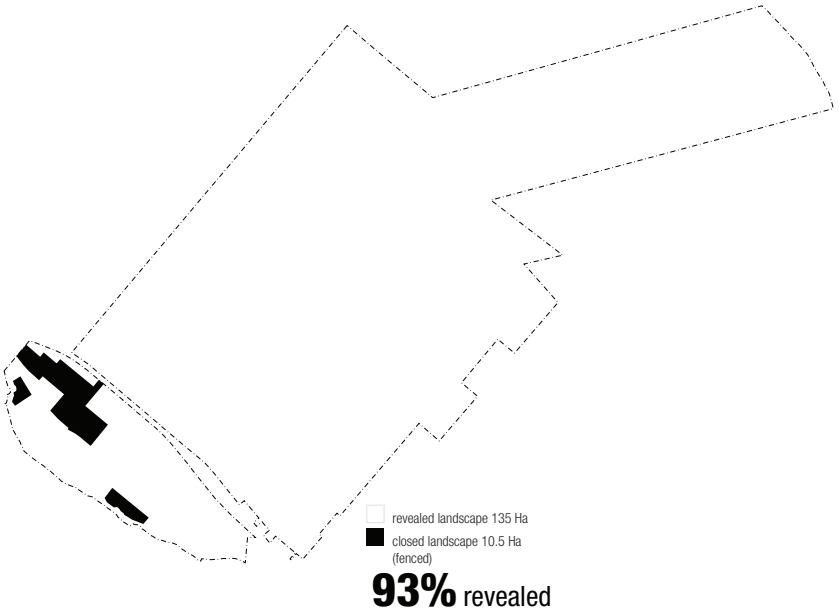
Phase 4: Reintegration

Phase 4 (+30 years) site drawing.

Bioremediation procedures are complete, restrictions on the site are released and access granted to additional areas of the landscape and ground surface.

Urban Reintegration

All of the proposed developments take place during bioremediation procedures while enabling concurrent public access on the elevated walkways and interventions. Eventually the landscape remediation processes will be completed, and access can be granted to the grounds of the site. This will be the final phase of re-connecting the site to its urban context, making additional areas of the landscape available for further development. Specific areas of the site will always need to maintain controlled access, such as the processing equipment and areas dangerous for unsupervised access. While these areas are still accessible by proposed elevated paths, they will need to remain fenced at the ground level. The following diagram illustrates the extent of the remaining fenced areas, noting that the landscape will be 93% accessible following the completion of the remediation program and landscape developments.



Landscape accessibility drawing.

Thresholds as Connection

As the site develops to have multiple entry points, a gateway concept is proposed as a wayfinding element and to denote the entry thresholds to the landscape. These are intended to light the points of entry, display information, and provide a memory of the former fence locations that restricted access to the site.

Proposed gateway/threshold model.

CHAPTER 5: CONCLUSION

There were many forces that shaped this petroleum landscape and its changing relationship to the community of Dartmouth and the greater city. The decommissioning of this refinery is a challenge that will not only be unique to Dartmouth, but one that many other cities in the future will face as energy landscapes continue to shift. There lies an opportunity in this site to set a precedent for the re-imagination of residual industrial spaces and to consider the importance that these landscapes have in an urban identity. This site embodies the “era of oil”, and would be an important entity to preserve to give an understanding of this energy era for future generations and a tangible link to the history and culture of Dartmouth.

This space is ingrained in the imagery, imagination and collective memory of the city, and forms a part of its authenticity of place. Further to its proposed preservation, this petrochemical landscape could have a renewed life, by engaging both the citizen and tourist, through memory and imagination by alternate use of the industrial ruins. By breaching the borders of the experiential threshold of the city, this space that was once off limits can become realized as a monument to an era past and a public amenity within the city.

There has been little information made available in regards to the future of this site. There is an opportunity for the citizens of Dartmouth and Halifax to begin the conversation and to help envision its future. As shown in precedents such as Landschaftspark, the final phase of this landscape does not need to call for its demolition, and instead an alternate redevelopment vision of Imperoyal is possible. In this alternate vision there is an opportunity to reveal this landscape through designed interventions, creating a sense of place through time, connecting memory and the community to this once forbidden site.

APPENDIX: CASE STUDIES

Landschaftspark

This park is one site within the Ruhrgebeit post-industrial landscape, part of the Emscher Park system in Germany (Kelly 2013, 7). This park features over 120 interventions at a former ironworks plant. The intervention strategies engage the public directly with the industrial relics, whilst using remediation strategies that are regenerating the damaged ecology of the region. The public spaces include gardens, pavilions, and active recreational activities. The project excels at exploring the re-use of the infrastructure by examining each component and learning what it “wants-to-be.” Greenway cycling and hiking networks connect this space to the community and other public development sites. Designed by Latz and partners, this project has become an important precedent for post-industrial re-use and remediation projects.

(Landzine 2016)

(Landzine 2016)

Gasworks Park

The Gas Works Park in Seattle was an early precedent for post-industrial landscape reclamation projects. First opening in 1975, this park space challenged the perception of the relationship of the public to post-industrial spaces (Jorgensen and Keenan 2012, 3). This park was designed by landscape architect Richard Haag to redevelop the polluted lands around Brown’s Point in Seattle (Way 2015). This was one of the first examples of the redevelopment of a post-industrial landscape into a public space while keeping much of the existing infrastructures intact. In understanding the public relationship to this site, many

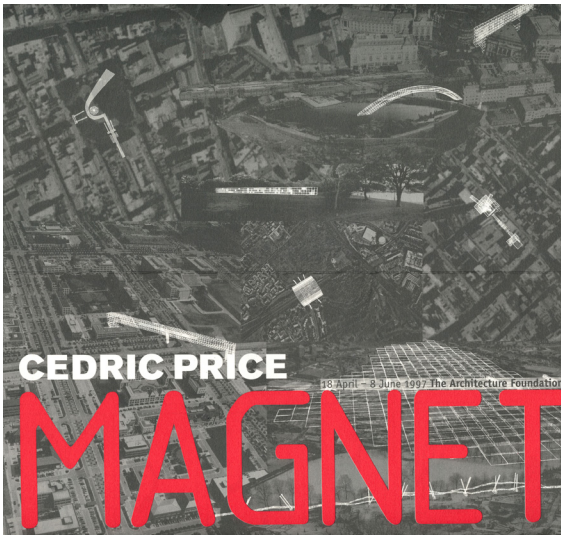
of the existing structures are fenced from the public, and thus the relics are not able to be directly interacted with.

Gas Works Park (Way 2015)

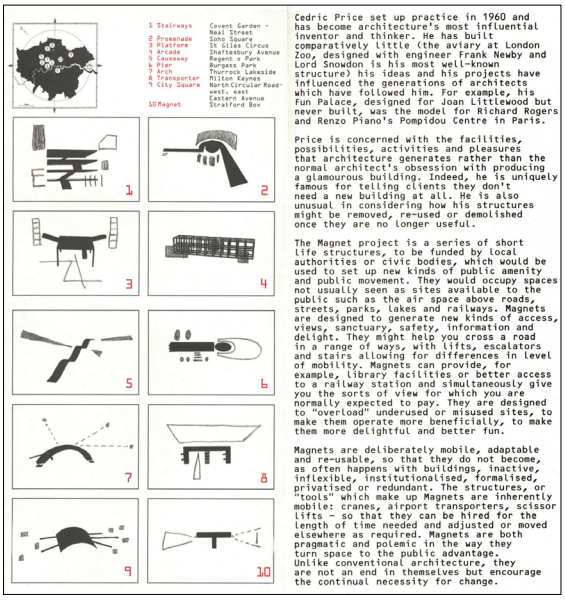
Gas Works Park (Way 2015)

Cedric Price - Magnets

The Magnets project proposal by Cedric Price used various forms of architectural intervention to allow access to unexpected public spaces. There was a focus on the unexpected, temporary and mobile nature of the work. The work has been described as anticipatory in the way that it was able to predict and bring life to spaces previously considered unsuitable or unknown for public access (Architecture Foundation 1997). Of note was the anticipatory was that the spaces were activated, places that were otherwise vacant or desolate.



Cedric Price Magnets Project (Aalam 2016)



Cedric Price Magnets Project (Aalam 2016)

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