Forward Moving Growth:
Dartmouth as a Candidate for Transit Oriented Development

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Abstract

Urban sprawl is becoming an increasingly serious problem faced by the Halifax Regional Municipality. It is an unsustainable form of growth whose consequences include traffic congestion and the elimination of open space and local resources. In response to this issue, many scholars have argued the merits of Transit Oriented Development (TOD), which can be defined as dense, mixed-use, walkable development within close proximity to transit stations. They are often built in urban areas as infill, and they attempt to increase transit use by reducing the need for the car.

This study explores the potential for TOD implementation in the area within 800 meters of the Bridge Terminal in Dartmouth, Nova Scotia. It begins by investigating the benefits and limitations of TOD in general, and includes a bus-based TOD case study in the comparable suburb of Westboro, Ontario. It then develops a 'best practice' framework to help define the scale and scope of development that is needed to increase transit use. The study area is divided into 6 land use categories for individual assessment: (1) Low-Density Residential, (2) Park and Institutional Zones, (3) Vacant Lots, (4) Land with Intensification Potential, (5) the Brightwood Golf and Country Club, and (6) Harbour-Oriented Industrial Zones. Finally, each land use category is assessed based on its ability to contribute to TOD, as outlined in the framework and comparable case study. To determine suitability of the area, the study identifies the challenges and opportunities with TOD implementation under each land use category.

This study has determined that TOD potential is widely varied among land use categories. The land use category with the greatest short term potential was determined to be 'Vacant Lots'. The most prominent challenges with TOD implementation among all categories include political resistance to development, and current policy restrictions. To mitigate these issues, this study recommends that HRM re-evaluate several restrictive regulations under the Dartmouth Land Use By-Law, including zoning and view plane requirements. Municipal support is vital to TOD success. To deal with community resistance, it recommends that each potential

development be taken on a case-by-case basis, with consistent community engagement sessions sponsored throughout the process.

While this study is location specific, its implications traverse the boundaries of its study area. The framework can be used, and the methods replicated, in order to assess other areas with potential for TOD implementation.

Introduction

Overview of Problem

In the late 19th century, Halifax witnessed the start of residential dispersion away from the urban core and into suburban areas, with the establishment of several west-end streetcar suburbs. This trend continued with the establishment of wartime housing in Chappell, Russell, and Symonds in Dartmouth, and with increasingly auto-oriented suburbs like Albro Lake in the 1960s and 70s. Today, HRM is one of the largest, least densely populated municipalities in North America. Reflective of this statistic are the incredibly high municipal servicing costs of HRM's lengthy roadway networks and water/wastewater infrastructure that are spread throughout an extensive network of urban, suburban, and rural areas (Stantec, 2013).

According to the 2013 Stantec report entitled "Quantifying the Costs and Benefits of HRM, Residents, and the Environment of Alternative Growth Scenarios", HRM would stand to save approximately $3 billion over the next 18 years, if it focused up to 50% of new development in urban areas (Stantec, 2013). This is due to the vast economic strain that suburban and fringe infrastructure and service costs place upon the municipality. Additionally, Stantec notes that a development concentration in urban areas would reduce locally generated greenhouse gas emissions, encourage use of existing public transit services, and improve the general health and well-being of residents (Stantec, 2013).

In creating solutions for the economic, environmental, and health costs bolstered by urban sprawl, HRM has recognized the importance of Transit Oriented Development (TOD) in future planning processes. This is evident in HRMs Regional Plan 5-Year Review, which states that "policy will support transit oriented development by integrating transit facilities within communities, by providing active transportation infrastructure, and by measures such as bus lanes, queue jump lanes, and transit priority at traffic lights." (RP+5, 2013, pg. 12). The city also recognizes the importance of urban infill, and attracting residents and businesses to the regional center, in order to mitigate the cost of municipal infrastructure and services (RP+5, 2013).

However, even though supportive policy is becoming more prevalent, and more effective land use strategies appear to be a priority to the municipality, many areas within the regional center remain with vastly underutilized potential. One of these low density, yet highly transit accessible areas, is the area surrounding the Dartmouth Bridge Terminal (figure 1.1). This will serve as my study area, and will be defined as all land within 800 meters of the Terminal. The rationale behind an 800-meter buffer zone will be described in further detail in section 3.1.1.

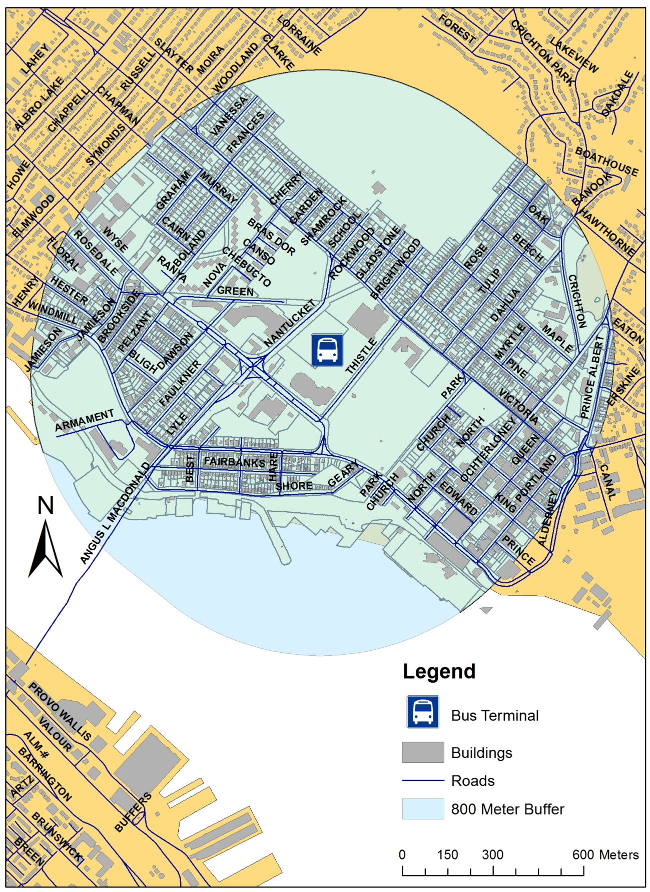

Figure 1.1 Study Area

TOD, Smart Growth, and Sustainability

Sprawl can be defined as low-density, auto-oriented growth that is often channeled along highways, away from compact urban centers. It offers several negative impacts including increased traffic congestion (and the air pollution that is a direct byproduct), and the elimination of open space and local resources (Handy, 2005). In response to the challenges posed by urban sprawl, the smart growth movement is based on concepts of sustainable urban design. Its objective is to focus new development into existing urban areas so as to increase the viability of public transit, and decrease the viability of the car (Handy, 2005). The American Planning Association also recognizes TOD's adherence to smart growth principles by stating the following in a 2002 report: "Compact, transit accessible, pedestrian-oriented, mixed use development patterns and land reuse epitomize the application of the principles of smart growth" (APA, 2002, pg. 2).

The smart growth theory suggests that land use and transportation are linked in two fundamental ways: (1) private investment and policy support influence development patterns, and (2) development patterns influence transportation patterns (Handy, 2005). Firstly, investment in transportation infrastructure like highways will lead to low-density suburban development along those highways. However, although infrastructure and policy can contribute to sprawl, it can also help to eliminate sprawl, via policy support for and investment in urban infill developments and public transit infrastructure (Handy, 2005). Second, typical suburban development patterns such as low-density housing and separation of land uses (residential subdivisions, retail districts, business parks), contribute to transportation patterns by making walking/biking inconvenient, and driving necessary. However, development patterns can also contribute to an increase in transit use through the creation of dense, mixed use, walkable neighborhoods that are within close proximity to transit stations (Handy, 2005).

Robert Cervero would likely argue the importance of these sustainable growth strategies. In a 1995 report, he argued that transportation and development investments and policies “strongly affect land use patterns, urban densities, and housing prices” (Cervero, 1995, pg. 3), and concluded that sustainable land use initiatives are essential in mitigating the negative impacts of sprawl. HRM can undoubtedly benefit from smart growth principles by implementing policy that is supportive of smart growth, and thereby increasing transit use and improving the sustainability of the municipality.

Why Dartmouth? An Historical Context

Founded in 1750, Dartmouth was initially developed as an industrial suburb. Early industrial presence included the Starr Manufacturing Company, which was established in 1860, and employed approximately 150 workers. Other important employers included The Motts Candy factory, near present day Hazelhurst Street, which employed 100 workers, and Consumer Cordage on Wyse Road, which employed over 300. The initial industrial success of Dartmouth led to the development of its first urban subdivisions, including Westphal, Woodlawn, and Woodside.

To support the transit needs of a rapidly growing population, the Dartmouth Ferry was established in 1752, and is the oldest, continuous, salt-water ferry system in North America. At one point, the Dartmouth Ferry was operated by horses turning a wheel, and was capable of transporting vehicles to Halifax. (HRM, 2012).

In 1873, Dartmouth was incorporated as a town, and after the construction of a town hall the same year, it continued to bolster its already well-established transit infrastructure. In 1885, a railway station was built along the waterfront, with branches running to Windsor Junction and the Eastern Shore by 1904 (HRM, 2012). With the ferry terminal, the railway solidified Dartmouth’s early position as a dense, transit-rich, mixed use community.

The establishment of the Angus L. MacDonald Bridge in 1955 catalyzed rapid Post-war development. A direct car linkage provided convenience for suburban commuters, and contributed to the Dartmouth urban sprawl (HRM, 2012). Today, Dartmouth remains rich with public transit (ferry terminal, bridge terminal), yet lacks residential density, mixed use, and walkability. Thus, Dartmouth serves as a beacon of underutilized potential, and a site that is well suited to the investigation of an alternative growth strategy.

Purpose of the Study

The purpose of this study is to answer the following research question:

To what extent is the bridge terminal area in Dartmouth a suitable location for the establishment of a successful Transit Oriented Development (TOD)?

Any dense, residential development in the urban core will limit opportunity for urban sprawl and lower municipal expenditure by adhering to smart growth principles. For the purposes of this project, a successful TOD will be defined as one which contains the necessary components to potentially increase transit use, as determined by a literature review and a comparable bus-based TOD case study. A 'suitable' location will be defined as one with the ability to support the necessary components of the model, as outlined in the established framework.

The study aims to develop an understanding of the TOD model, along with its potential benefits and pitfalls. It will ultimately assess various land use categories within the study area based on their ability to contribute to the TOD model. The study's purpose is to define the challenges and opportunities facing TOD implementation on each land use category, and to use these conclusions to determine the suitability of the Dartmouth Bridge Terminal to support such a model of sustainable urban design.

Research Objectives

To develop a response to the research question, this study has the following research objectives.

1) Conduct a literature review to determine the benefits and limitations of TOD in theory
2) Develop a framework of best practice in TOD
3) Apply the framework to 6 land use categories within the 800 meter buffer zone of the Dartmouth Bridge Terminal
4) Assess the opportunities and challenges of implementing TOD (as defined in the framework) among each land use category (assessment will be based on current zoning policy, land use history, current land use, political response, etc.)
5) Draw conclusions regarding the short-term potential of TOD among each land use category

Significance of the Study

The study hopes to facilitate discussion around land use and redevelopment in the urban core. In identifying challenges and opportunities with the physical and policy environment, sustainable development options for Dartmouth will become much more tangible, and policy solutions will become much clearer.

Literature Review

What is Transit Oriented Development (TOD)?

TODs have many definitions, but the literature generally describes areas of demographic diversity, high density, mixed uses, inviting and frequented public space, and easily accessible transit systems (Dittmar, 2003). Bernick and Cervero have described the model as a compact, mixed-use community, centered around a transit station that is designed to encourage residents, workers, and shoppers to reduce their dependency on cars, while inviting them to ride mass transit more often (Bernick and Cervero, 1997). These definitions are represented visually in the following infographic (Figure 2.1).

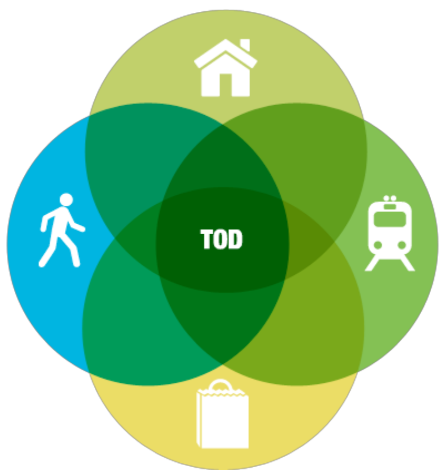

Figure 2.1 TOD Infographic

The word 'convenience' is often used to describe TOD goals. Residents should be able to walk or bike to schools, parks, and shopping districts in a safe and inviting pedestrian environment. Additionally, TODs should be places where people can choose to take a train or bus to their destinations easily and conveniently (Dittmar, 2003). Definitions of TOD also differ greatly between local contexts. For example, a development that would be considered dense in a small city in Atlantic Canada would be viewed very differently in Toronto.

It is also important to distinguish between TOD and Transit Adjacent Development (TAD). While TADs feature a close proximity to transit stations, they are often built without any connectivity, or any adherence to smart growth principles. Most often they are defined by their low-density, conventional single-use development patterns with an abundance of surface parking. Therefore, despite being within walking distance to transit, they act to contribute little to an inviting pedestrian environment or reduced car dependency for residents (Cervero, 2004).

Many municipal definitions of TOD include principles of smart growth and sustainable community design. For example, the definition put forth by Orlando's 'Central Florida Regional Transportation Authority' refers to a sustainable, livable, and economically viable community, which includes a balanced transportation system where walking, biking, and transit are valued above the car (Cervero, 2004). Most municipal definitions however, focus on goals like increased transit ridership and vibrancy, and characteristics like mixed uses, pedestrian friendly infrastructure, and higher density. It is also noteworthy that many definitions aim to make the point that TOD is not "anti-car", stressing instead that TOD creates an active, friendly pedestrian environment without excluding the automobile (Cervero, 2004).

Bus Based TOD

Much of the available literature defining, analyzing, and evaluating TOD is based around rail transit systems in cities of over 500,000 inhabitants. However, some scholars have argued the merits of TOD established around bus terminals. This form of development is known as Bus Transit Oriented Development (BTOD). Despite the conclusion of various scholars that rail transit attracts more intense development and greater return on investment, BTODs are growing in number, demonstrating the viability of the TOD model in smaller cities (Currie, 2004). In 2004, approximately 8% of TOD initiatives in the United States were BTODs. The majority of these developments have since demonstrated economic viability to developers as well as municipalities, and satisfaction among residents (TCRP, 2004).

In addition to proving its success as a viable TOD alternative for smaller cities without access to rail transit, BTOD also has several other benefits. The benefits of the model in comparison to traditional TOD include: (1) flexibility (there is an ability to modify services in response to future demand change), (2) cost effectiveness, and (3) service frequencies (buses often run at higher frequencies than rail, thus increasing convenience) (Currie, 2004).

Often hailed in the literature as an example of successful BTOD implementation is Ottawa's Metropole project. The project's developer, Minto Developments, has reported a return on investment that is beyond initial expectation. Additionally, both the residents of the project and of the surrounding neighborhood report high levels of satisfaction with the quality and design of the development, and the City of Ottawa has experienced both short-term (development fees), and expected long-term (achievement of smart growth planning objectives) benefits. To aid in BTOD implementation, Ottawa's transit supportive policies include combining integration of land use and transport planning with an emphasis on public transit development over road construction. Ultimately, Ottawa has proven that increased transit ridership is inextricably associated with densification of development (Currie, 2004).

BTOD Case Study: Ottawa's Metropole Project

Figure 2.2 Residential and Public Spaces at Metropole Ottawa

Metropole is a ‘rapid bus’- based TOD in Ottawa’s Westboro neighborhood, which is located about 6 km west of downtown. Comprised of a single, 32-story mixed-use condo tower and 68 townhomes, it is located about 200 m from the Westboro bus terminal. Metropole’s residential tower takes advantage of the view of the Ottawa River, and is also within walking distance of several parks and public spaces, and a well-established commercial corridor. It was built on a vacant lot in a neighborhood that remains mostly comprised of low density, single-family residential dwellings (CMHC, 2007).

Figure 2.3 Metropole Site Plan

Metropole has increased the density of the area, without impacting the residential character or historic fabric of the existing neighborhood. It has made this effort by focusing on already vacant land, along the edge of lower density neighborhoods, and by using a design that strengthens the development’s relationship with the existing neighborhood, by focusing on street-level retail and investing in pedestrian-oriented infrastructure to encourage walkability (CMHC, 2007). Metropole has also acted as a catalyst for similar sustainable development projects in Westboro. Since its completion in 2004, additional dense, mixed-use developments have left few opportunity sites for any further large-scale development in the area (CMHC, 2007).

There were several factors that contributed to Minto Developments final selection of the Westboro site for Metropole. Perhaps the most important factor was that the site was very marketable: it offered views of the river and downtown Ottawa, and it was close to amenities like parks, schools, transit, and a walkable retail district. The economic success of the project demonstrated the demand for housing of high quality in the high-amenity neighborhood of Westboro (CMHC, 2007).

Along with private investment, the project also received significant support from the municipality. This is because Ottawa's official plan, established in 2003, was aimed at reducing low-density suburban sprawl outside of the greenbelt. For example, the plan imposes higher development charges outside of the greenbelt, while supporting density around transit stations by reducing parking requirements and making height allowances (CMHC,2007). In the case of Metropole, the municipality made a zoning change to allow a 32-story tower on a lot zoned for a maximum of 12 stories. They also assisted the developer in public consultations, traffic impact research, and shadowing effect research (CMHC, 2007). Ultimately, the project was beneficial to the developer, in terms of quick sales, the neighborhood, in terms of being a catalyst for growth and revitalization, and the municipality, in terms of generating over $1.4 million in development fees and helping to achieve smart growth objectives (CMHC, 2007).

The similarities between Westboro and the Bridge Terminal area in Dartmouth are striking, and speak to the Dartmouth's vast potential for successful TOD implementation. In the study area, there are many several vacant lots, including a 17247 sq. m lot bordering Wyse Road, Dawson Street, and Faulkner Street. Like the Metropole lot, this particular lot offers incredible views (of the Halifax Harbour, the iconic MacDonald Bridge, and Downtown), is within less than 100 meters of the Bridge terminal, is within close proximity to several parks (including the Dartmouth Commons), schools (including Dartmouth High School and Bicentennial Junior High), and a walkable shopping district (Alderney Drive/Downtown Dartmouth). The similarities between Westboro and Dartmouth offer insight into the potential benefits of TOD in the area, as well as sustainable growth strategies and supportive policy that HRM could employ.

Benefits of TOD

Reduced Urban Sprawl

Urban sprawl is a significant issue in HRM. As Stantec has recommended, the city would benefit immensely by encouraging denser, more compact urban infill developments. This is because sprawl-like development uses 10-40% more land than infill development (TCRP, 2004). TODs can reduce pressure to convert suburban land to low density, auto-oriented development by rechanneling public and private sector development funding and permits. In addition, aside from saving land and money, reducing sprawl can improve water quality through reducing impermeable surface runoff, and can improve biodiversity by reducing destruction of natural habitat (TCRP, 2004).

Reduced Infrastructure Costs

Some of the highest environmental and fiscal costs of traditional forms of low-density suburban growth include outlays for roads, water, and wastewater line extensions. TODs have been found to decrease these costs by an average of 25% (TCRP, 2004). Naturally, some of these savings would be offset by increased transit, fire protection, and other servicing costs. However, according TCRP Report 74, the United States could stand to save over $10 billion in annual public infrastructure expenditure by effectively facilitating TOD in urban centers (TCRP, 2004).

Increased Transit Ridership

The primary benefit of TOD is an increase in public transit ridership, an inherently more sustainable form of transportation. This is because TODs focus on higher density, higher diversity of use, walkability, and proximity to transit;

development traits that have been proven to have a significant bearing on transit use. For example, a doubling of density is associated with a near 60% increase in transit use; ridership in a mixed-used development is 5%-10% higher on average; pedestrian friendly design has been associated with ridership increases of 20%; and those living within 800 meters of transit are 4 to 5 times more likely to use it than those who live further (TCRP, 2004). The importance of transit ridership increases to the HRM cannot be understated. Transit ridership produces economic benefits in terms of fare increases, and helps to decrease negative transportation externalities like pollution, congestion and lost time (TCRP, 2004).

Reduced Traffic congestion/pollution

Directly stemming from increased transit ridership is the benefit of reduced single-occupant automobile travel, and the subsequent relief of traffic congestion, air pollution, and high fuel consumption. Traffic congestion costs the United States approximately $68 billion in time delay and extra fuel consumption per year (TCRP, 2004). While there is no evidence that implies a direct causal relationship between TOD and reduced traffic congestion, TODs have been reported to lower total Vehicle Miles Travelled (VMT) among residents. A recent California study determined that TODs can lower annual driving rates by 20%-40% for those living and working within the development (TCRP, 2004).

Traditional Obstacles

Common barriers to TOD implementation fall within three categories: fiscal, organizational, and political (Cervero, 2002). The high cost of supporting infrastructure, including increasing water/wastewater capacity, improved lighting, sidewalks, and streetscape beautification, can form significant fiscal barriers to TODs.

Higher construction costs, development fees, and risks associated with increased densities are typical of transit rich areas. Arguably the most challenging fiscal barrier, however, includes the building of TODs in neighborhoods that are economically stagnant (Cervero, 2002). The problem often lies not with the residential portion of a TOD, but with the commercial portion necessary to providing the development with a more sustainable mixed use (Cervero, 2002). Oftentimes, developers will struggle to find a commercial anchor tenant that will agree to a TOD plan, thus fostering an inability to obtain development financing. Without an anchor tenant, the project becomes riskier, and therefore, banks are generally unwilling to provide loans. Such was the case in San Diego's Barrio Logan TOD (Ohland, 2001).

Political barriers often include NIMBY opposition to TOD projects. Many residents view higher densities negatively, and see only the consequences of increased congestion, crowding at local schools, and high infrastructure costs (Cervero, 2002). Such attitudes have incited protest in cities like Oakland and Miami that have ultimately been successful in resisting the TOD model (Webber, 1976). Additionally, the transformation of several expansive park-and-ride parking lots (similar to the one near the bridge terminal) to TODs has been met with disdain from automobile commuters. As a result, laws have been established that are inconsistent with the sustainable urban landscape and smart growth that TODs aim to achieve. Such unsupportive policies include San Francisco's, which require that TODs replace any park-and-ride parking that may have been removed to provide room for infill, one-to-one (Cervero, 2002).

Lastly, organizational barriers include structural obstacles that are ingrained in the institutional fabric of governments and transit agencies. In many cities, transit agencies have made deals with savvy developers that ultimately proved unbeneficial to them. As a result, many protective policies have been put in place to make TOD less desirable to developers. Such barriers include rent guarantees (even if the developer goes bankrupt), and increased rent as property values increase (Cervero, 2002).

Methods

The study to establish the suitability of Dartmouth as a potential TOD location will involve a three-part approach.

1) Creating a framework of 'best practice' in TOD
2) Classifying land within the study area into 6 categories
3) Assessing Each category based on its ability to contribute to essential TOD components, as determined by the framework

The first part will involve determining a framework of best practice in TOD. This framework will include four categories: proximity to transit, density, mixed use, and walkability. The framework will be based on the literature review and the Metropole Ottawa case study, and will determine the scope and scale of a TOD that is capable of bolstering transit ridership and contributing to smart growth principles.

The second part will involve dividing all land within 800 m of the Dartmouth Bridge Terminal into 6 land use categories with potential for the implementation of the model. The 6 land use categories are: (1) Low-Density Residential, (2) Park and Institutional Zones, (3) Vacant Land, (4) Land with Intensification Potential (Lots with greater than 15000 sq. m of open space), (5) Brightwood Golf and Country Club, and (6) Harbour-Oriented Industrial Zones (see Figure 3.1). This division of land uses will be accomplished through the use of Geographic Information Systems (GIS) mapping, and 2011 HRM land use data.

Finally, the locations will be assessed based on their ability to contribute to a successful TOD, as determined by the established framework. Analysis will be undertaken to identify the strengths, weaknesses, opportunities, and challenges, of each site in terms of its ability to support the necessary components of a successful TOD. When determining the opportunities and challenges of each land use category, key documents will include the Dartmouth Land Use By Law (for an understanding of current zoning requirements), the Dartmouth Secondary Planning Strategy, and HRM by Design to determine any policy-based challenges and opportunities. The research will also include: the development history of land use categories such as Brightwood Golf Club to determine previous challenges with development, analysis of the HRM Centre Plan community engagement data to determine resident perspectives, a look at development agreements in other parts of HRM (specifically the former Halifax West site), and a review of literature to determine environmental challenges, property ownership challenges, and opportunities associated with retrofitting versus infill development in general.

This three-part approach will establish opportunities and challenges with TOD implementation that are specific to varying land-uses, rather than the study area as a whole. In doing so, the study will develop an understanding of the suitability of Dartmouth as a TOD location. It will also be able to identify which land use category has the greatest short-term potential for implementation, along with which categories have the greatest obstacles to overcome.

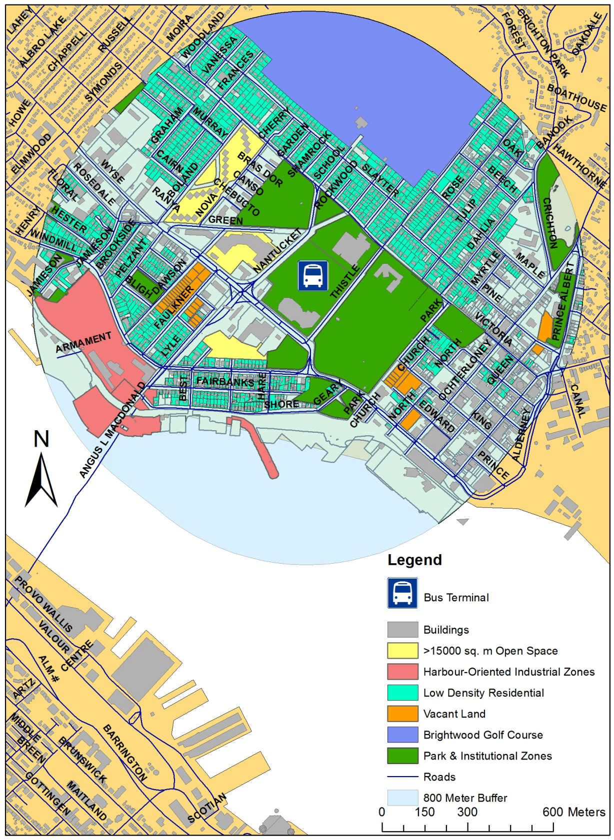

Figure 3.1 Map of land use categories within study area

Geographic Information Systems (GIS)

Decision-Making in terms of sustainable community design is becoming increasingly difficult due to the complex relationship between stakeholders, public policy, and existing infrastructure. Fortunately, tools like Geographic Information Systems (GIS) can be used to synthesize diverse sets of data. GIS involves the collection, storage, management, analysis, modeling, and display of spatial data. Because its capabilities are so diverse, it has been used for research purposes in a wide range of disciplines from land use and infrastructure planning, to wildlife management, environmental monitoring, and various socio-economic applications (UNEP, 2002). GIS mapping will be incredibly useful to this project because of its unique ability to synthesize various data sets, which will include zoning, view planes, and various development restrictions under the Dartmouth Land Use By Law. Ultimately, I have produced several GIS maps for the purpose of identifying 6 land use categories with potential for TOD development.

Creating a Framework: Best Practices in TOD

Proximity to Transit

The general consensus among literature is that in order to increase public transit, TOD residents must be within a short walking distance to a transit station. The exact distance however, has been subject to plenty of scholarly debate. According to *The Next American Metropolis,* Peter Calthorpe has established an appropriate walking distance to bolster transit to be 800 meters, or a roughly 10 minute walk (Calthorpe, 1993). However, this estimate is based on rail transit systems, and in fact, many scholars have criticized it as being too conservative. An Australian study analyzing transit use patterns in Perth, determined that over 55% of urban transit users had regularly walked over 1 km to their station (Kerr & Ginn, 2003). However, these estimates are not completely applicable to Dartmouth, due to significant differences in climate, and quality of transit system (light rail versus bus). For bus transit, a generally recommended distance is 400-800 meters (Canepa, 2007). Thus, for the purposes of this study, only areas within 800 meters of the Bridge Terminal will be considered for potential TOD implementation.

Density

When all other factors are equal, density is a significant component in increasing transit ridership and discouraging drive-alone automobile traffic (Cervero, 2003). This is because higher densities are generally able to support greater levels of transit service, as there are more potential riders in a smaller area. In addition, density has been proven to bring origins and destinations closer together for a shorter average trip length. However, density without alternative modes of transportation to accommodate population will result in only increased congestion. Thus, there is a symbiotic relationship between mass transit and density (Chen et al., 2008). In 1996, Messenger and Ewing produced a study that incorporated socio-demographic, land use, and transit service variables. They concluded that in order to support a transit service frequency of 15 minutes, a minimum of 27 to 48 units per hectare is required (Messenger & Ewing, 1996). Since the purpose of this study is to increase, and not merely support transit service via TOD, the bus based case study of Metropole in Ottawa will be used to provide best practice in density. The site was an infill development, in a suburb of comparable size to Dartmouth. It succeeded in increasing transit use with densities of 32 unites/acre, (153 apartments and 68 townhomes on 27000 sq. m. lot) (CMHC, 2007). This case provides insight into the scale required for a successful TOD.

Mixed Use

Mixed land use involves the establishment of complementary shops, offices, residential housing, and services within a given area. It can involve vertical mixing (mixed uses within the same building), horizontal mixing (mixed single use buildings), or a mix of uses within a wider area. Mixed use works well with transit nodes, as it allows the destination to attract as many potential residents and visitors as possible. A 2008 study in Portland concluded that mixed use zoning at a place of residence decreased drive-alone automobile use. Another found that “mixing land uses tends to discourage the generation of auto trips and facilitate the use of transit and non-motorized modes” (Cao et al, 2009, pg. 555) These studies demonstrate the necessity of mixed use development in encouraging smart growth and increasing transit use.

Walkability

An area that has suffered particularly in the bridge terminal region of Dartmouth, is urban design and walkability. During 2012 HRM Centre Plan community engagement sessions, it was determined that the Wyse Road area was not pedestrian friendly, and that residents wanted to see sidewalk widening, more trees, a more human scale of neighbourhood design, bike paths, and street redesign (HRM, 2012). The benefits of these sentiments are reflected in a 2007 study, where it was found that people will walk longer distances in areas of better urban design and higher density. It generally involves investment in attractive, and visually interesting buildings and streetscapes, wider yards, green space, trees, and public amenities (Canepa, 2007). This component of TOD is essential in discouraging automobile use among TOD residents.

Findings

Low-Density Residential

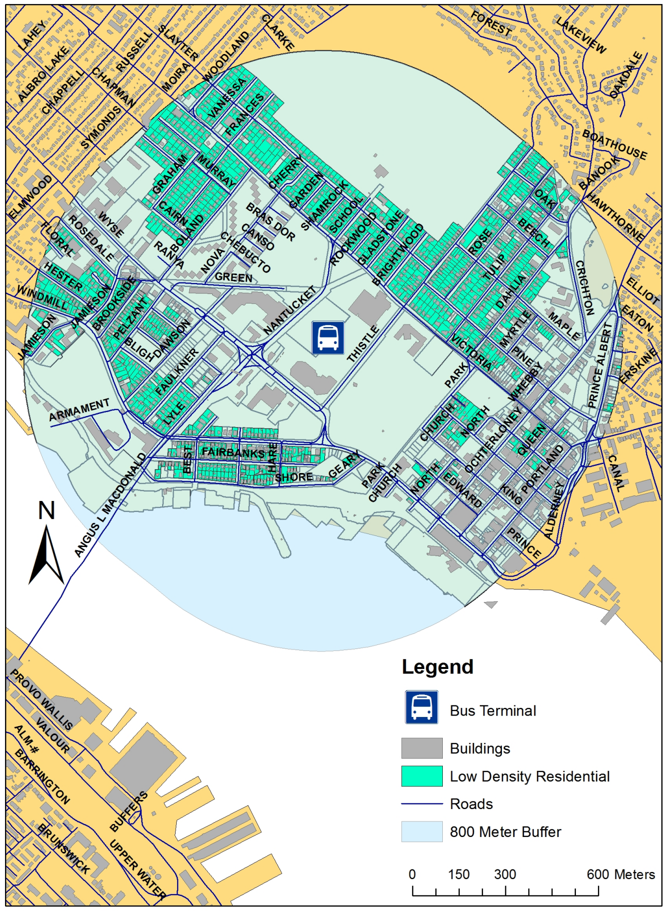

Figure 4.1 Low-Density Residential Land Use within Study Area

In searching for low density residential land use, my search criteria included any HRM land parcel that was zoned R1 (Single Family Residential). While there may only be limited potential here to contribute to a TOD as it is traditionally defined, there are several opportunities. Within the 800m buffer zone, there are 1194 R1 zoned parcels, which account for roughly 20% of the total land area, or 496148 sq. m. Policy amendments that allow for only modest changes to the lots could lead to potential densification, with relatively little impact to the current scale or character of the neighborhood. To make this happen, HRM could consider policy amendments that either change land parcels currently zoned R1 to R1-M/R1-A, or that change R1 regulations to make them more favorable to densification.

Under the Dartmouth Land Use bylaw, a parcel zoned R1 has several requirements that may restrict the opportunities for implementation of a TOD as described by the preceding 'best practice' framework. Specifically, these include (a) usage requirements, (b) frontage requirements, (c) maximum lot coverage requirements, and (d) height restrictions.

Usage Requirements

Perhaps the most challenging regulation to the density and mixed use components of TOD are the lot usage requirements under the By-Law. Currently, the By-Law requires that any parcel zoned R1 contain only a single dwelling unit, and no home businesses. While an alternative solution could include subdividing larger R1 lots, there are policy restrictions (lot frontage, maximum lot coverage) that make that option challenging as well. A solution that would allow small-scale densification could include changing all parcels zoned R1 to R1-M (Single Family [Modified] Residential Zone). This zone permits daycare facilities and other home businesses, if they occupy less than 50% of the home's floor space. Another zone that would be more supportive to TOD-style development is R1-A (Auxiliary Dwelling Unit Zone). This zone allows for the establishment of an additional dwelling unit within the home, as long as the auxiliary unit occupies less than 40% of the floor space, and the exterior of the home maintains the appearance of a single dwelling unit. These zone changes would allow an increase in density and mixed use, without changing the scale or character of the neighborhood.

Frontage Requirements

Another challenge to TOD under the current regulations is that the Land Use By Law restricts the subdivision of larger R1 lots. An example of such restrictive regulation is lot frontage requirements. Lot frontage is the portion of a land parcel that faces the street. Currently, HRM requires a lot frontage of 35 feet, or roughly 11 meters for any parcel that is zoned R1. This eliminates the possibly of subdividing a long parcel with a small lot frontage. Easing of the 35 foot restriction could mean the implementation of ‘flag lots’ (see figure 4.2). If all other restrictions were in place, flag lots could effectively double the density of lots that are large enough to be subdivided.

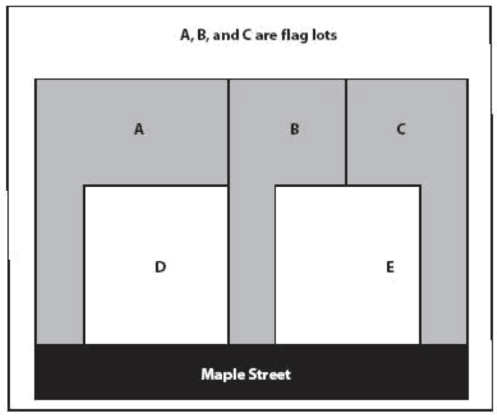

Figure 4.2 Flag Lots

Height Restrictions

The Land Use By-Law also requires that a house in an R1 zone be a maximum of 35 feet tall, or approximately 3 stories. While this is yet another challenge to the essential density component of TOD, too much height in this land use category would likely garner significant political resistance. Therefore, alternative solutions that are respectful of the current scale of the neighborhood should be explored.

Lot Coverage Requirements

Another regulation that is unconducive to densification is the maximum lot coverage requirement of 35%. This regulation means that 65% of a land parcel is required to be open space. Implementing flag lots is contingent on an amendment to this regulation as well. While maximum lot coverage requirements were initially intended to preserve open space and limit densification, the justification conflicts with the sustainable design principles as outlined in the RP+5, and should be reevaluated by HRM accordingly.

Park and Institutional Zones

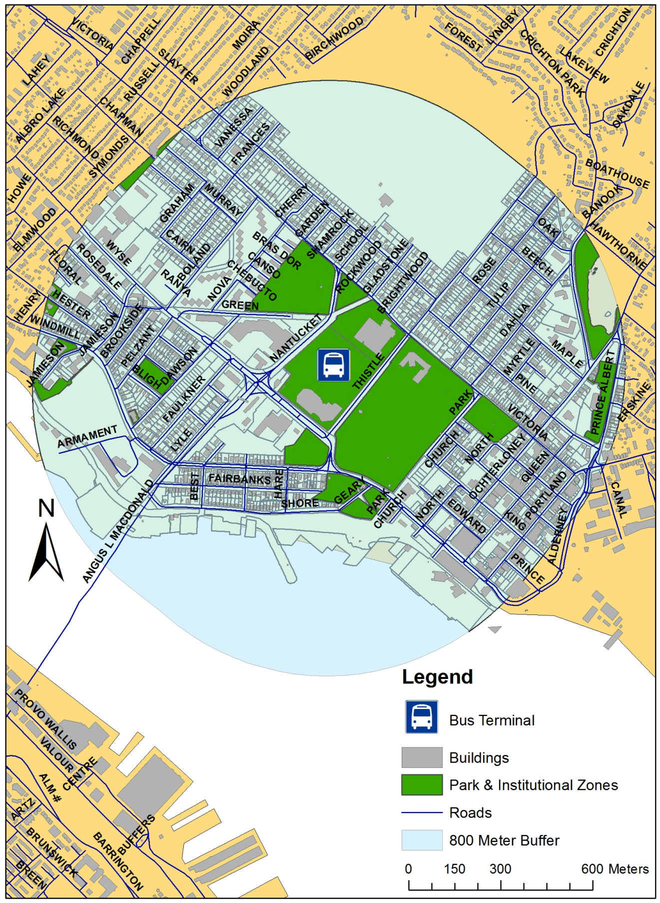

Figure 4.3 Park and Institutional Zones within Study Area

In determining land parcels to include in this category, my criteria included any HRM land parcel that was zoned P (Park) or S (Institutional). All highlighted parcels are P zones, with the exception of the Dartmouth High School site, which is the parcel just north of the bus terminal, bordering Nantucket, Victoria, and Thistle streets, and the Bicentennial School site, which is the building just across Thistle Street.

Usage Requirements

Likely the greatest obstacle to TOD on any of these parcels is the usage requirements. Under the Dartmouth Land Use By-Law, P zones can only be used to develop public parks, recreational facilities (such as the Dartmouth Sportsplex), recreational fields, golf courses, or cemeteries. S zones can be used to develop community purpose buildings, hospitals, health clinics, places of worship, schools, universities, colleges, libraries, museums, or any other institutions of similar nature.

Political Resistance

Another challenge with implementing TOD on P or S zones is political resistance. During a series of public engagement sessions to inform the HRM Centre Plan, Wyse Road community members voiced several concerns. While they wanted the Centre Plan to encourage densification closer to the bridge, create more walkable mixed-use neighborhoods, and strengthen the connection between transit hubs and large-scale residential development, they were almost unanimously unwilling to compromise any existing park space. Furthermore, despite the fact that Park and Institutional zones within the 800 meter buffer already account for 368894 sq. m, or roughly 15% of the total land area, residents wanted to see an increase in park space.

Because the current allowable uses of P and S are unsupportive of TOD, and because there is significant community resistance to changing existing P zoned parcels to more development-supportive zones, it can be deduced that there is limited TOD potential for these parcels.

Opportunity: Rezoning Institutional

However, a potential opportunity for long-term development could exist in the Dartmouth High School site. Built in 1959, Dartmouth High is currently the oldest operating high school in HRM. Assuming that the Halifax Regional School Board (HRSB) will invest in either a new school or an extensive building renovation in the near future, it is not outside the realm of possibility for a zoning change. Similar zoning changes have occurred in the past, specifically after the demolition of the old Halifax West High School. The Dutch Village Road site was rezoned to C2, and sold to the local development company United Gulf Developments Limited. Currently, the former high school site has been approved for the development of 2 seven-story residential towers, a six-story office tower with a one-story retail podium, and a three-story retail and commercial annex (figure 4.4). Because of the proximity of the Dartmouth High School site to the bus terminal, there is opportunity to create a similar development with a meaningful relationship to transit. This could include infrastructure to increase the connectivity between the two buildings (walkways, pedways, etc.).

Figure 4.4: Rendering of Halifax West High School Redevelopment

Vacant Lots

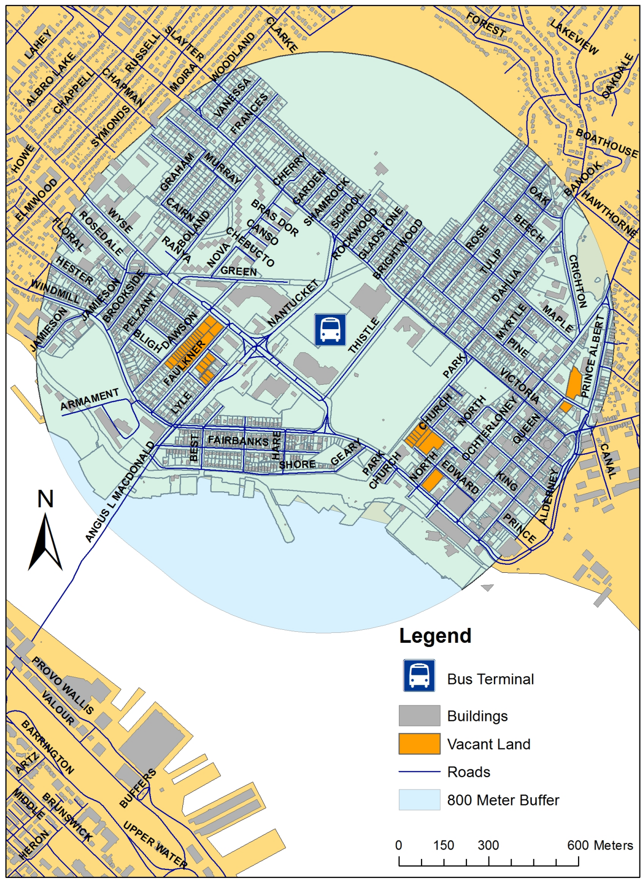

Figure 4.5 Vacant Lots within Study Area

When choosing vacant lots, my search criteria included land use parcels without any existing infrastructure. A neighborhood walkthrough was performed to confirm that vacant lots according to 2011 HRM land use data, were still vacant.

Vacant Lots have perhaps the greatest short-term potential to contribute to TOD in the study area. Because they are blank slates, they also have potential to contribute to TOD as it is traditionally defined, with all components of the framework present. Depending on the current zoning restrictions, vacant lots are generally susceptible to a larger scale of development as well, with the primary actors being professional real estate developers. This is in contrast to the primary actors of low density residential densification, who would likely be homeowners, or Park and Institutional zones, who would likely be a combination of HRM and private developers.

Opportunity: Supportive Zoning

The largest vacant lot is also the one with the closest proximity to the transit terminal. At 17247 sq. m, it is located between Dawson Street, Wyse Road, and Faulkner Street. Under the Dartmouth Land Use By-Law, the Northern half of the lot, facing Wyse Road, is zoned C2. A C2 zone is extremely supportive of TOD. It allows for commercial uses such as local or public office space, retail outlets, and food outlets/restaurants. Additionally, it allows any residential development that complies with R1, R2, or R3 regulations. This means that medium density, mixed-use apartment buildings are allowed under the current C2 zoning regulations. However, the Southern half of the lot may be more problematic for the components of TOD. Under an R2 zone, the lot currently allows for single-family detached homes, basement apartments, semi-detached homes, or duplexes.

Brightwood View Plane

One challenge facing the implementation of TOD on the other vacant lots in the study area, specifically those bordering North Street, Edward Street, and King Street, is the Brightwood view plane (figure 4.6). The view plane currently limits buildings to 30 feet if a building is within 100 feet of the Harbour, or 45 feet if a building is a greater distance from the Harbour. It is often argued by community groups that the benefits of density should not come at the cost of obstructing view planes, as view planes improve the walkability and attractiveness of community spaces. However, the Brightwood view plane acts to protect the private property of the golf course rather than any public community space. Feedback received through public consultation supports the removal of the Brightwood view plane with over 75 percent of respondents disagreeing with the municipal government's protection of it (HRM, 2011). In January 2011, city staff recommended that the view plane not be protected. The agreement between municipal employees and residents regarding the consequences of the Brightwood view plane should speak to the need for

Council to amend it. However, there are pitfalls to amending it as well. The view plane was implemented initially to protect the Park designation of the land. Removing the Park zone will allow the Brightwood owners an enormous increase in land value after paying minimum taxes for decades. This would represent an incredible injustice to taxpayers.

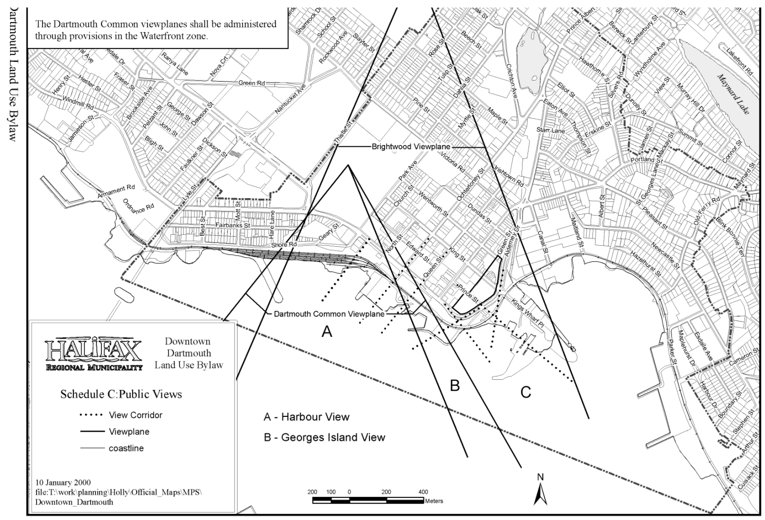

Figure 4.6 The Brightwood View Plane (C)

Restrictive Zoning

Even if the view plane were removed, there are still challenges with implementing TOD on the vacant lots in question. This is because they are currently zoned DN (Downtown Neighborhood Zone). The DN zoning restrictions are similar to those of R1, with the exception of allowing two-unit dwellings, townhouses, and home business uses. They also offer a variety of guidelines that are restrictive to TOD principles, including a maximum height allowance of 35 feet, or approximately 3 stories, and a maximum lot coverage requirement of 40%. Furthermore, the goal of the DN zone, as stated in the Land Use By-Law, is to "protect the integrity and character of existing residential neighborhoods by limiting the type, scale and design of new development" (HRM, 2013, pg. 29). Thus, while additional uses may be considered by development agreement, the municipality is unlikely to approve any proposal whose scale is significant enough to bolster transit use and contribute to TOD principles, as it would undermine the stated goals of the DN zone.

Land with Intensification Potential

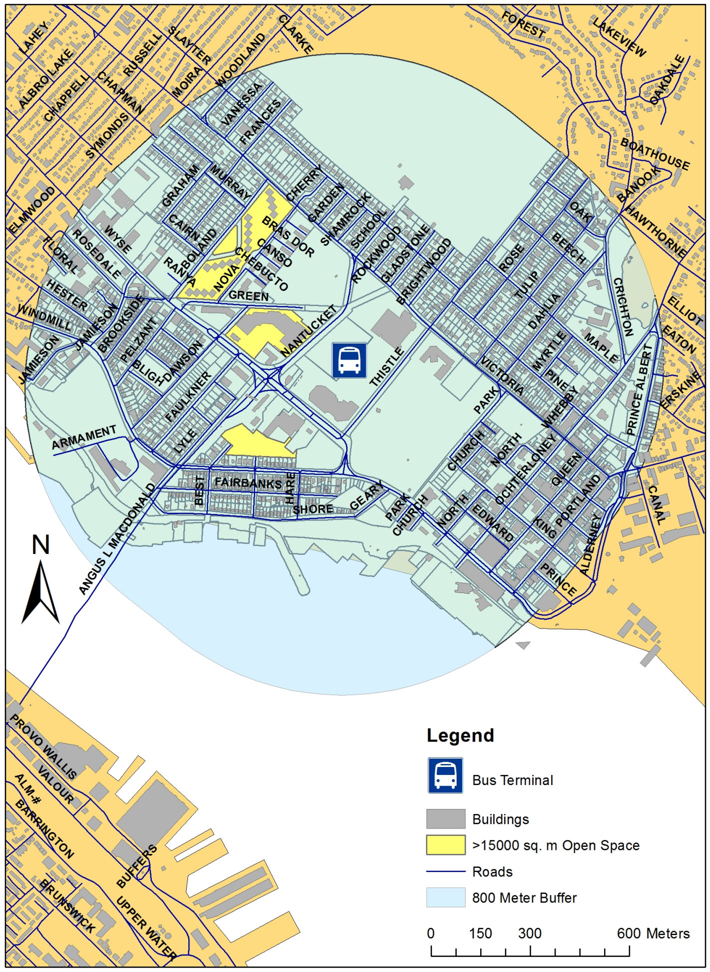

Figure 4.7 Land with Intensification Potential within Study Area

Criteria for selecting lots in this category included any land use parcel with greater than 15000 sq. m of open space. Open space can be defined as land without buildings, but not necessarily without infrastructure. This means that parcels with a large area of 'open space' can refer to land parcels with a high percentage of surface parking, private green space, or overgrown/unmaintained vacant land. These criteria resulted in three large parcels within the study area. The first is the Victoria Gardens Apartments lot, owned by Killam Properties, bordered by Victoria Road, Boland Road, and Green Road. The available open space on this lot is a mixture of surface parking and private green space. The second is the Wyse Road Plaza/Dartmouth Shopping Centre parcel, which is bordered by Wyse Road, Green Road, and Nantucket Avenue. The open space on this parcel consists of surface parking. The third and final parcel is entirely comprised of surface parking which serves the 99 Wyse Road office complex, as well as the Holiday Inn Harbourview. It is located between Wyse Road and Windmill Road.

Retrofitting Versus Infill Development

The bridge terminal area in Dartmouth suffers from an extensively suburbanized cityscape within the established boundaries of the HRM urban core. Ellen Dunham-Jones would likely argue that the area is therefore better suited to TOD supportive retrofitting, as opposed to traditional infill development. This is because in a denser urban environment, infill can augment positive attributes, such as increasing demand for services like transit and retail. On the other hand, in a suburbanized space, large-scale infill development can act to increase traffic, stress social infrastructure (schools, etc.), and can reduce valued open space (Dunham-Jones, 2005). Thus, the concerns showcased at local community engagement sessions, can likely be attributed to the fact that these infill developments detract from some of the neighborhood's most desirable qualities. TOD-style retrofitting would involve the transformation of unused open space in the area to improve the sustainability of the community as a whole. Such projects offer a good chance for neighborhoods to overcome entrenched attitudes, by encouraging change beyond property lines (Dunham-Jones, 2005).

Structured Parking and Economic Viability

One of the primary tenets of the 'retrofitting suburbia' theory is the essential transformation of 'underperforming asphalt'. This term refers to any large, unused surplus of surface parking. Perhaps the greatest challenge to TOD retrofitting in this area is that while the three selected land parcels have a sizable area of open space including surface parking, none can be characterized as having 'underperforming asphalt'. In order for the open space to be converted to a denser, more sustainable use, the original surface parking would have to be replaced with structured parking.

This is further enforced by the Dartmouth Land Use By-Law, which requires the one-to-one replacement of any lost parking due to new development, as well as an additional 1.25 parking spaces per unit if the development is residential.

This is problematic for a developer because high-density, structured parking is at least 15 times more expensive than surface parking (Miller et al., 2011). While dense, residential developments are typically able to absorb some of the costs of a parking structure through advanced unit sales, the economics do not support high density parking for commercial/retail developments (Miller et al., 2011). This is because, in order to recoup initial building costs, a developer or property owner will have to charge patrons for parking. This would act to drastically decrease the marketability of the new mixed-use development, while also decreasing the attractiveness of an existing retail plaza as a convenient shopping destination. Furthermore, this would be an unattractive option for 99 Wyse Road Office Complex, as employers would likely have to pay for their employees to park. According to a 2011 study of US priced-parking, this cost would likely be average $85 per employee, per month (Miller et al., 2011). For these reasons, a development of this nature is unlikely, as it represents a risky investment, to both the developer and the property owners of Victoria Gardens, the Wyse Road Plaza, and the 99 Wyse Road Office Complex.

There may be opportunity in the future to retrofit the parking lots, once the existing properties begin to decline. However, in the short-term, HRM could develop financing tools that support investment in structured parking. These could include tax-based incentives, government subsidies, or public-private partnerships.

Brightwood Golf and Country Club

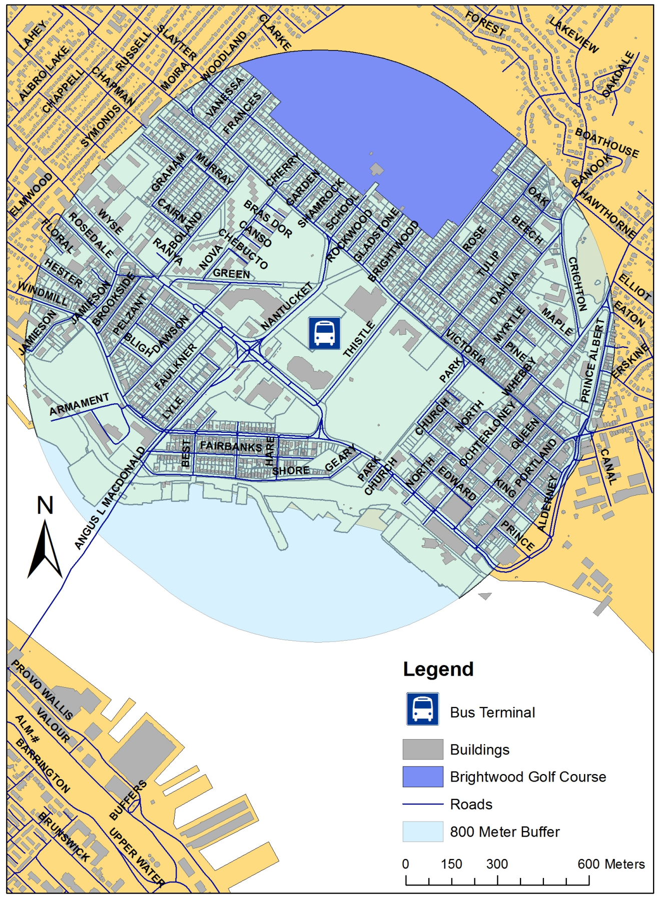

Figure 4.8 Brightwood Golf and Country Club

Brightwood is a privately owned golf-course that is roughly bordered by Slayter Street, Thistle Street, and Woodland Avenue. It is surrounded on all sides by low density residential land use. While it is not entirely within the 800 meter buffer zone, it represents a significant portion of the available land area at 419280 sq. m. It is currently zoned P under the Dartmouth Land Use By-Law. This represents a significant obstacle to the short-term development of the site, as the property owners would not only have to sell the land, but the land would have to undergo a zoning change as well.

Opportunities: Willingness to Sell

While these may appear to be insurmountable obstacles, the first step has come fairly close to fruition. On October 5, 2005, board members of Brightwood Golf and Country Club voted to sell their Dartmouth land to Clayton Developments. The sale was contingent on Brightwood receiving the required planning and development approvals from HRM (HRM, 2006).

Clayton's initial development proposal was consistent with TOD principles as outlined in the established framework. The proposal included the construction of 900 units, in buildings of varying densities, as well as public park space, and a village centre featuring higher density residential towers with ground floor retail and institutional uses. In the proposal, Clayton described its commitment to housing diversity, mixed use development, walkability, green space, and transit connectivity (HRM, 2006). However, this type of development was not permitted under Brightwood's Park Zone, and therefore, the two parties (Brightwood and Clayton), filed an application to change the zone to a Comprehensive Development District (CDD) (HRM, 2006). This would have enabled the land to be developed by development agreement.

Political Challenges

The greatest challenge with the proposal moving forward was the political response. Both the community and HRM city councilors were unwilling to see the project move past the proposal stage. A community group named Citizens for Brightwood Society formed to oppose the project. They published and presented a report to council, where the key highlights were as follows: If the Brightwood Golf course is to proceed with the sale/transfer of its lands, (1) HRM should consider purchasing the lands, (2) alternative use of this land should be in the interest of the community rather than a large-scale residential development, and (3) welcome uses could include a municipal park, trails, a new Dartmouth High School, or a community center (HRM, 2005). Councilors mirrored this sentiment. They ultimately denied the application for a zoning change, expressing several concerns with the project. These concerns included (1) how development will affect existing view planes, (2) the proposal does not consider community concerns, (3) the proposal is not compatible with current housing types in the surrounding area, (4) development may have an adverse effect on the property values of the surrounding neighborhood, and (5) development would increase traffic congestion (HRM, 2006).

While Brightwood's willingness to sell the land may reflect long-term opportunities for the site, should they decide to revisit a development proposal, community and municipal opposition represent the greatest challenges to short-term development.

Harbour-Oriented Industrial Zones

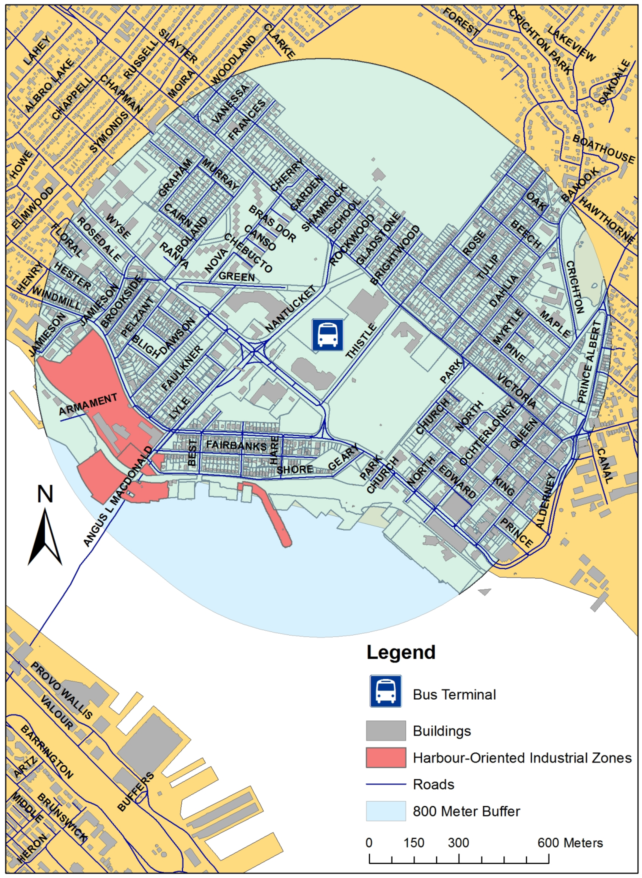

Figure 4.9 Harbour-Oriented Industrial Zones within Study Area

When selecting land use parcels for this category, I chose all lots zoned Harbour-Oriented Industrial (I-3), either vacant or with greater than 15000 sq. m of open space. These criteria resulted in 3 large land parcels along the Dartmouth waterfront that border Windmill Road, and Shore Road. There are 3 primary opportunities to TOD implementation on these sites. Firstly, they are large enough to support a scale of development capable of increasing transit ridership. Second, they are within 500 meters of the transit station, allowing for modest pedestrian infrastructure investment to increase transit connectivity. Lastly, the sites are highly marketable from a development perspective. They are away from the heavy traffic corridor while still being within walking distance to several amenities such as parks, schools, shopping, and transit. The sites also offer unobstructed views of the harbor, and views were a key factor in attracting residents to Metropole in Ottawa.

One challenge facing TOD implementation in Harbour-Oriented Industrial Zones (I-3) is zoning restrictions. Currently, under the Land Use By-Law, the only permitted uses on I-3 zones are as follows: (1) industrial uses requiring direct access to salt water, (2) Construction, maintenance, and repair of marine vessels, (3) marine research, and (4) handling and storage of bulk container and general cargo. In addition to undergoing zoning changes, the large lot bordering Windmill Road would have to be subdivided before it is built upon. This is because an operating industrial facility occupies a small portion of the parcel. However, even though the lot is large, maximum coverage requirements may make subdivision difficult.

Another challenge with building on waterfront land parcels is environmental. In the design and site selection process, it is becoming increasingly important to consider the potential long-term impacts of climate change. Natural hazards such as storms, storm surges, sea-level rise, and shoreline erosion have been increasing in both frequency and intensity. In response to these issues, HRM has created measures that include minimum ground elevation for new development, and additional land use and development regulations for flood prone areas. In addition to these costs, a developer would likely have to burden the cost of an environmental impact assessment as well, to ensure that any development does not significantly disrupt or pollute any coastal or marine ecosystem.

A third challenge with TOD implementation on these sites involves property ownership. Currently, the lands are partially owned by CN Rail, and partially by the federal government (Crown Lands). According to the Nova Scotia government policy for the sale of Crown Lands, land will be sold first and foremost, to a municipality, agency, non-profit group, or community organization when a public benefit can be demonstrated. Crown Lands will only be sold to private investors "when all other reasonable alternatives have been canvassed by the applicant" (DNR, 2014, pg. 1). In addition, it also takes significantly longer to purchase land from the government, as the process includes an application, aboriginal consultation, land appraisal, environmental impact assessment, and land survey among other components. Also, CN Rail offers a number of restrictions for developments built within close proximity of the railway. These guidelines include: (1) all residential uses must be 30 m away from the rail line, (2) developments must include a 2 m safety berm with an acoustic fence, and (3) a clause must be inserted into all purchase agreements for each dwelling unit within 300 m of the rail line, advising the property owners of the potential adverse impacts of rail operations.

It can be determined that I-3 sites have limited potential for short-term development. Although they are large, and marketable for developers, additional costs, time, and regulations associated with buying Crown or CN land, along with environmental implications, effectively reduce the economic viability of the site from a private sector perspective.

Summary of Findings

Category	**Opportunities**	**Challenges**	**Short-Term Potential**
Low Density Residential	Small-Scale Densification, quantity of parcels, Potential for significant densification with little impact on neighborhood scale.	Zoning Challenges, Parcel subdivision, Political Resistance, No guarantee that residents will take advantage of Supportive Zoning changes	Moderate
Park and Institutional Zones	Redevelopment of School Site	Zoning Challenges, Political Resistance	Moderate
Vacant Lots	Large Lots, capable of supporting large-scale development, Supportive Zoning (C2)	Brightwood View Plane, Zoning Challenges (DN), Development Red Tape, Desirability of Location	Significant
>15000 sq. m Open Space	Supportive Zoning, Proximity to Transit, Benefits of Retrofitting vs Infill	Economic Viability of parking structures	Limited
Brightwood Golf Club	Size, Proximity to Transit, Willingness to Sell, Willingness to Develop with TOD principles	Municipal Resistance, Community Resistance, Zoning Challenges	Limited
Harbour-Oriented Industrial Zones	Desirability/ Marketability of Development (View), Size of Lots, Proximity to Transit	Property Ownership (CN, Government), Bureaucracy, Environmental Concerns, Zoning Changes, Parcel subdivision	Limited

Discussion and Conclusions

This study has produced a detailed investigation of the potential for TOD implementation on one of the municipality's most promising sites for redevelopment, the area surrounding the Dartmouth Bridge Terminal. This investigation was conducted by dividing the land use parcels within 800 meters of the Bridge Terminal into six categories: Low Density Residential, Park and Institutional, Vacant Lots, Lots with Intensification Potential, the Brightwood Golf Club, and Harbor Oriented Industrial. This division was necessary to organize the findings, and to distinguish the challenges and opportunities of TOD implementation among various land uses. After comparing each site to the established framework of TOD 'best practice' principles, two challenges stood out as the most prominent obstacles to implementation. These challenges include (1) current zoning restrictions, and (2) political resistance.

1. **Current Policy Restrictions.** Several land use categories were negatively affected by current policy restrictions. For example, the vacant lot bordering North St, Edward St, and King St was significantly restricted in its ability to contribute to TOD principles due to the Brightwood View Plane, and its provision as a DN zone. Another zone that is not conducive to TOD is R1. This single use, low-density zone covers the majority of the study area. Even if HRM made moderate concessions, such as allowing an auxiliary unit or home-based business, the neighborhood could greatly benefit from increased density without increased scale. Perhaps the worst example of policy that hinders TOD potential involves the P zone of the Brightwood Golf Club. This zoning restriction eliminates the possibility of TOD even if the owners decide to sell.
2. **Political Resistance.** Another prominent challenge to TOD implementation in the Bridge terminal area is the significant community resistance to essential components of the model such as density and

> mixed use. This challenge was especially apparent during the 2005 sale of the Brightwood Golf Club, where a community group named 'Citizens for Brightwood Society' formed in fierce opposition to the TOD-style proposal. Other political resistance to development was present during several HRM by Design community engagement sessions, where residents emphasized the need for new development to match the existing scale of the community. This challenge speaks to the presence of a greater issue with the future of TOD in the area. If the local community is not supportive of a certain development style, should the municipality really use high-minded academic rhetoric to justify its support for said style? Or should the voice of the community outweigh any potential long-term benefits that TOD may have?

However, despite the many challenges facing the model, there are also several opportunities. Not surprisingly, 'Vacant Lots' offer the most potential for TOD implementation. The lot bordered by Wyse Road is particularly suited to development because of its density/mixed use supportive zoning (C2), its proximity to transit, and its panoramic harbor views. The site is attractive to developers, and TOD implementation would benefit the municipality by fulfilling its goals of infill and Transit-Oriented growth, as outlined in the RP+5. While Low-Density residential land parcels are not able to contribute to the scale of development as outlined in the framework, there is potential for policy change that could lead to modest, yet short term-densification. Thus, this study has concluded that while there are several drawbacks to the suitability of Dartmouth as a location of a successful TOD, there are also several opportunity sites. Additionally, opportunities are likely to expand after municipal provisions are put in place to mitigate the most prominent challenges.

According to a 2007 Canadian Mortgage and Housing Corporation Study of 9 TODs in Canada, municipal support was essential to the success of a project, and mitigating obstacles (CMHC, 2007). In many cases, the municipalities recognized the benefits of TOD, and provided flexibility on parking and zoning requirements. In some cases, municipalities provided marketing of the development, and cost sharing of infrastructure and amenities. In the case of Metropole, the City of Ottawa provided height allowances, and reduced parking requirements to 1 space per unit, rather than the typical 1.25 (CMHC, 2007).

Municipalities and developers also had to overcome neighborhood opposition similar to that in Dartmouth. The CMHC report determined that extensive public consultation was vital to mitigating this challenges (CMHC, 2007). The study emphasized the importance of developers and municipalities in working collaboratively with residents, making moderate concessions if need be (lower height, providing community space, affordable housing, etc.). Metropole was originally designed to include two residential towers. After significant political opposition, the developer changed the design to one tower and 68 town homes, and did shading and traffic impact studies to mitigate neighborhood concern (CMHC, 2007). These strategies have been incredibly successful in other cities, and should be explored further in mitigating challenges faced by TOD implementation in Dartmouth.

This study has several implications for the future of TOD discussion within the context of the HRM. It has succeeded in developing a model of site analysis that can be applied to other transit hubs across the municipality. For example, the framework and land use categories can be used as a model to examine the TOD potential for the area surrounding the new Lacewood Terminal in Clayton Park. Furthermore, by identifying various challenges with the implementation of TOD, the research can be used for additional investigation and perhaps even policy change.

One of the primary benefits of this study is that it fills a noticeable gap in the literature. While there is an enormous amount of research touting the benefits of TOD in theory, relatively few studies examine it in practice. There are fewer still that offer a comprehensive location-specific analysis, to determine not only the opportunities, but also the challenges with implementing the model. This study attempts to bridge the gap between theory and practice by taking a specific case study, and moving beyond theory to discuss the reality behind implementing TOD. In determining the suitability of Dartmouth as a potential TOD location, it hopes to further discussion and even catalyze action regarding sustainable urban development in HRM.

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Appendix A – Photographs of Study Area

Low Density Residential

Park and Institutional Zones

Vacant Lots

Harbour-Oriented Industrial

Land with Intensification Potential






Brightwood Golf and Country Club

Dartmouth Bridge Terminal