



## Halifax Commuter Rail Feasibility Study

## The team is led by CPCS:

**A global management consulting firm  
(formerly the consulting arm of the Canadian Pacific Railway)**

- A recognized leader in passenger and freight rail analytics, feasibility studies, and economic analysis
- Interdisciplinary team with:
  - local sub-contractors **Dillon Consulting** and **Ekistics Plan + Design**, who bring significant prior experience on rail and transportation projects in Nova Scotia
  - commuter rail expert **Michael Schabas** of **FCP World**

# Study Team

CPCS has completed over **1,000 assignments** in more than **90 countries (shaded)**, including close to **200 assignments in Canada** and over a dozen projects in **Nova Scotia**



# Study Purpose and Goals

*To produce a comprehensive feasibility study that accurately reflects the **costs** and **benefits** of implementing and operating commuter rail*

- The study includes an analysis of financial, regulatory, and organizational issues associated with building, implementing, operating, and maintaining the project
- We are working to develop **affordable** configurations for commuter rail service on the Halifax-Elmsdale and Halifax-Beaver Bank Corridors

# Study Approach

**Phase 1:** Assessment of Existing Conditions

**Phase 2:** Evaluation and Recommendations

**Phase 3:** Public Engagement and Implementation Planning

We are here!

Draft Report

Final Report

- We have conducted an assessment of the existing conditions and developed and evaluated several operating concepts
- The results presented are preliminary and any updates will be reflected in the final report

# Related Studies in Halifax

## Moving Forward Together Plan

- A comprehensive planning process to develop an *improved, simplified, and more user-friendly* bus network
- Part of Halifax Transit's five-year strategic planning cycle
- Involves redesign into a “transfer-based” bus network
  - Implementing a commuter rail line would also involve bus network adjustments incorporating bus-rail transfers
- A draft network design was released in **February 2015**

Source: Halifax, <http://www.halifax.ca/movingforwardtogether/>

## RP+5 – 2014 Regional Plan

- *Establishes long-range, region-wide planning policies outlining where, when, and how future growth and development should take place in the municipality . . . to 2031*
- **Key goal:** *Support and reinforce growth areas by an appropriately designed transit service...*
- A revision of the 2006 Regional Plan, which has since been repealed
- Approved by Regional Council **June 2014** and in effect as of **October 2014**

Source: Halifax Transit, <http://www.halifax.ca/regionalplanning/FinalRegPlan.php>

# Commuter Rail Definition

Passenger rail service between the city centre and the surrounding metropolitan region

Trains typically share tracks with freight and intercity passenger rail services

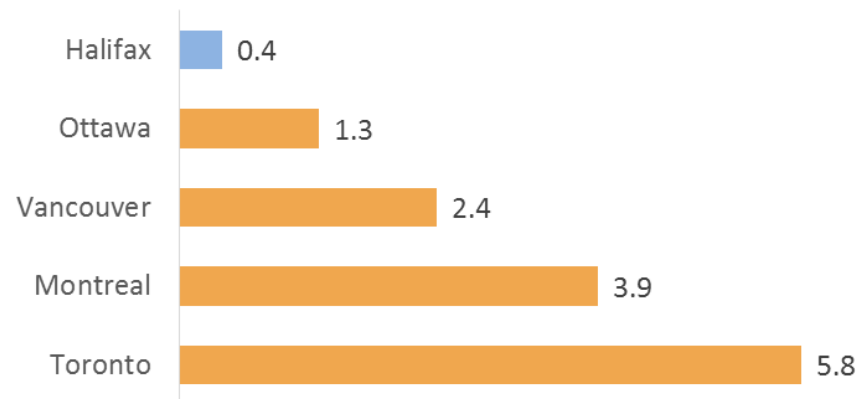


Source: iStock

# Existing Canadian Commuter Rail Systems

- There are **four** existing commuter rail systems in Canada
  - Ottawa's system is often called a “light-rail” system
    - it operates over a short lightly-used freight rail corridor using European-designed vehicles
- Existing commuter rail systems are located in larger metropolitan areas than Halifax
  - **Halifax's population is 400,000**

Halifax, and Existing Metropolitan Areas with Commuter Rail Systems in Canada



Metropolitan Area Population, 2011 (millions)



# Similar-Sized Cities in Canada

- Currently, Canadian metropolitan areas with **less than 1 million people** do not have rail transit service
  - However, Kitchener-Cambridge-Waterloo, Ontario (pop. 490,000) is currently building a light-rail transit (LRT) system
    - The LRT vehicles do not run on freight rail tracks

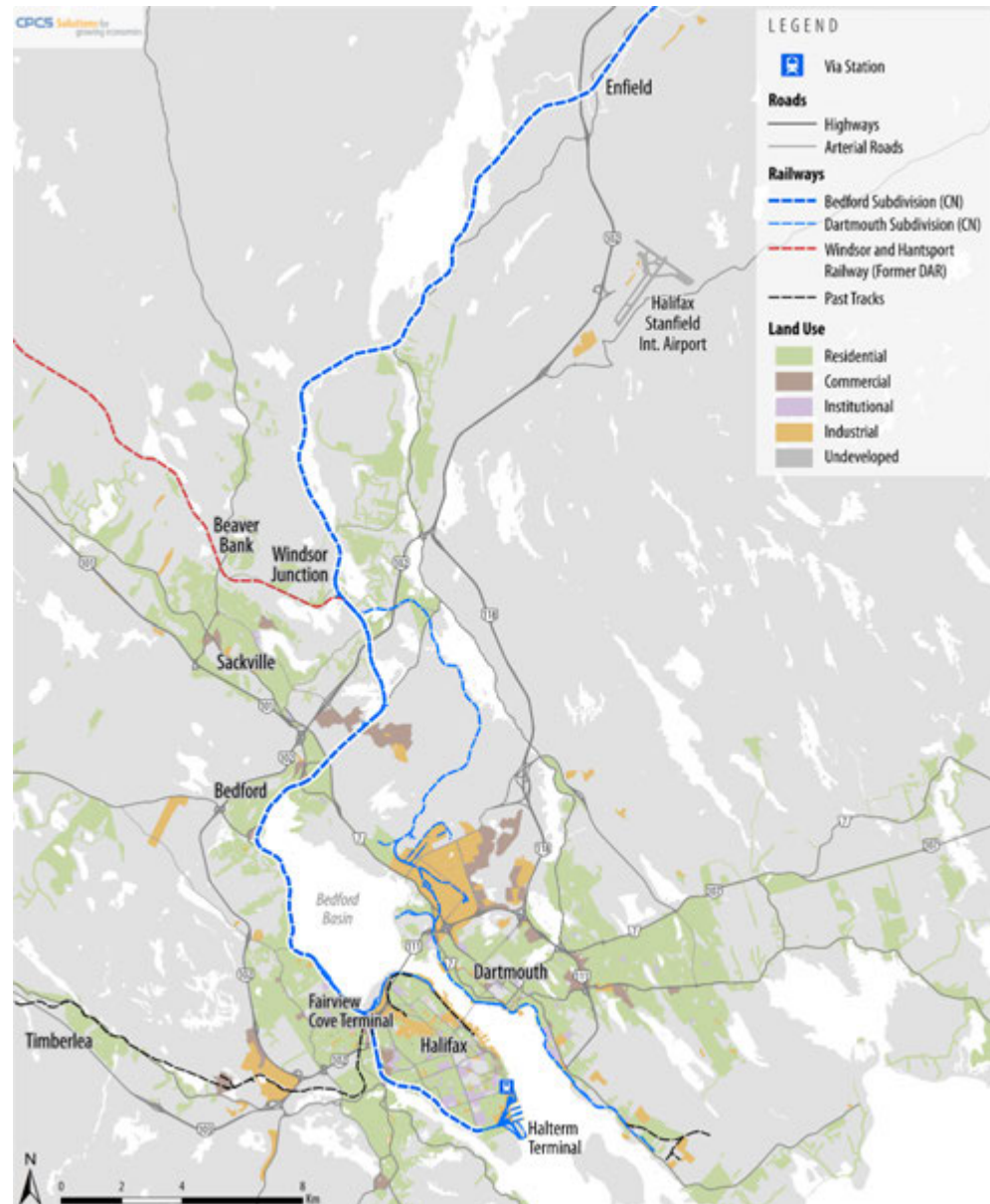
Region of Waterloo Light-Rail Vehicle



Source: Region of Waterloo

# Study Area

- The proposed system would primarily use the **Bedford Subdivision**, CN's mainline
  - We have considered service as far as **Elmsdale**
- We have also considered extending service along the **Windsor & Hantsport Railway (WHR)**, a shortline, which meets the Bedford Subdivision at Windsor Junction
  - The WHR has not operated in Halifax since 2011
  - We have considered service as far as **Beaver Bank**
- We have not considered service on the CN Dartmouth Subdivision, which meets the Bedford Subdivision at Windsor Junction



# Rail Capacity

- Existing infrastructure and operations determines the available capacity to run commuter rail trains
  - In particular, there must be sufficient capacity during the peak-periods
    - 6:00-9:00am and 3:00-6:00pm
- Two approaches can be used to increase capacity
  - Sidings and double-track allow trains to pass one another
  - Signalized track allows trains to operate more efficiently

## Trains Passing at a Siding



Source: Wikipedia.org

## Typical Signals



Source: Wikipedia.org

# Existing Rail Infrastructure and Operations

CN near Bedford



Source: Rob Leblanc, Ekistics

- The existing Bedford Subdivision is mostly **single track**
  - Existing grade for double track exists along most of the segment from Halifax to Windsor Junction, which allows new sidings to be installed relatively easily
- Most of the Bedford Subdivision is **signalized** and **dispatched** remotely
  - A segment from Halifax to Fairview Cove Terminal is not currently signalized

- The WHR corridor is a single track with light-duty rail
  - It is not connected with the CN Bedford Subdivision
  - It is not signalized

WHR at Beaver Bank



Source: Rob Leblanc, Ekistics

# Potential Station Locations: Selection Criteria

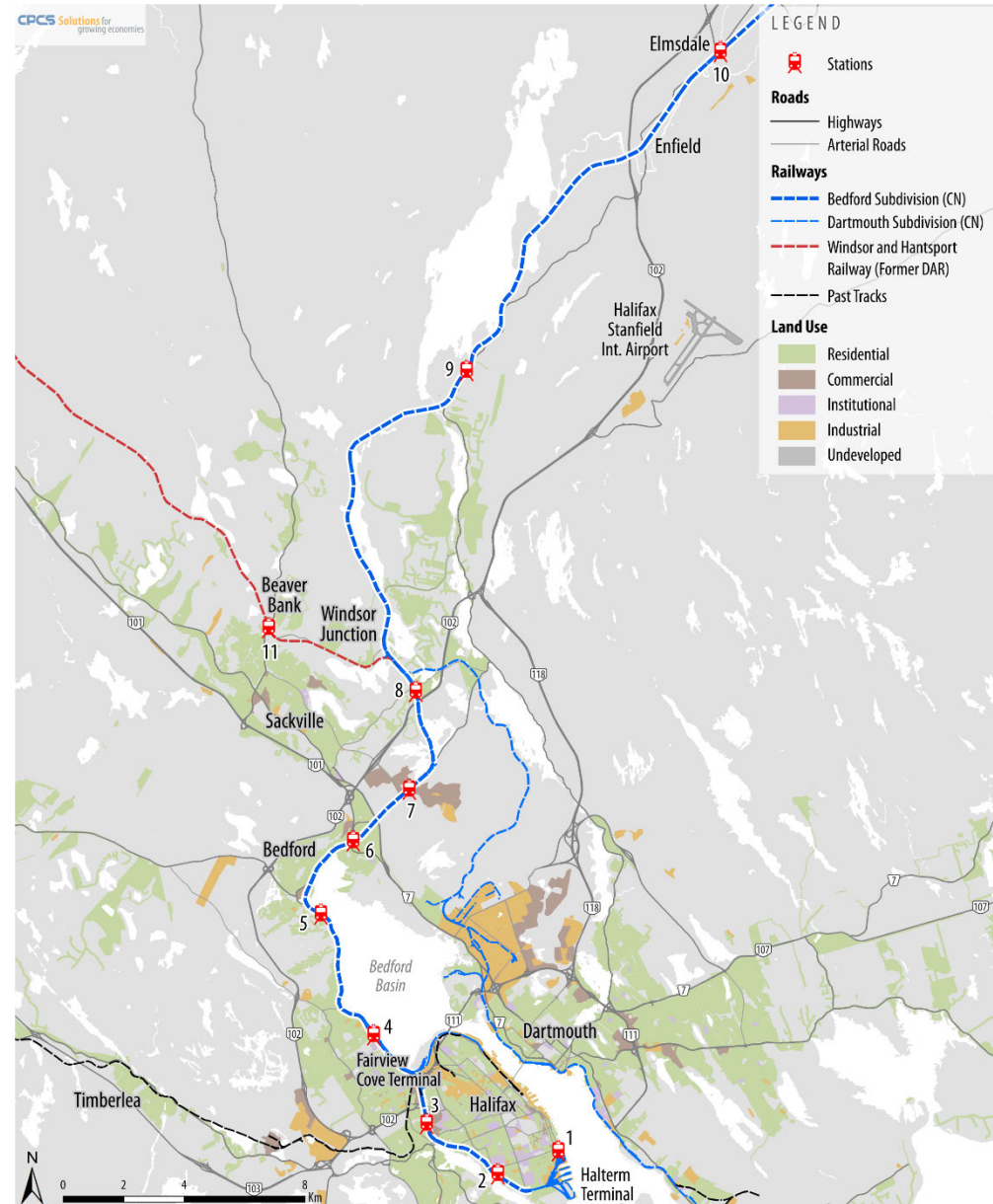
- Grade separation from the station to the surrounding area
- Potential surrounding land use impacts
  - additional noise, safety, pedestrian traffic impacts, changes to street traffic congestion, etc.
- Accessibility by **active transportation** modes, including existing or planned sidewalks and bike lanes
- Future intensification opportunities within the catchment area of the station.
- Proximity to existing connecting **Halifax Transit** bus stops/terminals
- **Availability of land** to accommodate:
  - terminal platforms and bus staging areas (near key destinations)
  - terminal platforms and park-and-ride facilities (for rural and suburban stations)
- For rural and suburban stations only:
  - Population within the catchment area of the station
  - Accessibility and distance from **arterial and highway networks**



# Potential Station Locations

- We have studied potential stations in the following areas:

1. VIA Rail
2. South End
3. West End
4. Rockingham
5. Mill Cove
6. Sunnyside
7. Bedford Common
8. Cobequid
9. Wellington
10. Elmsdale
11. Beaver Bank



# Operating Concepts

The Team developed **three** operating concepts:

- Service to **Cobequid**:
  - A station near Cobequid Road would be the last station
- Service to **Elmsdale**:
  - A station in Elmsdale would be the last station
- Service to **Beaver Bank**:
  - A station in Beaver Bank would be the last station
- **All concepts** originate/end at the Halifax **VIA Rail Station**
- With all three concepts, we have/will consider:
  - All-day service:
    - every 30 minutes in the weekday peak-periods,
    - every 60 minutes in the off-peak and on weekends
  - Peak-period only service (with a mid-day trip)

Halifax VIA Rail Station



Source: Rob LeBlanc, Ekistics

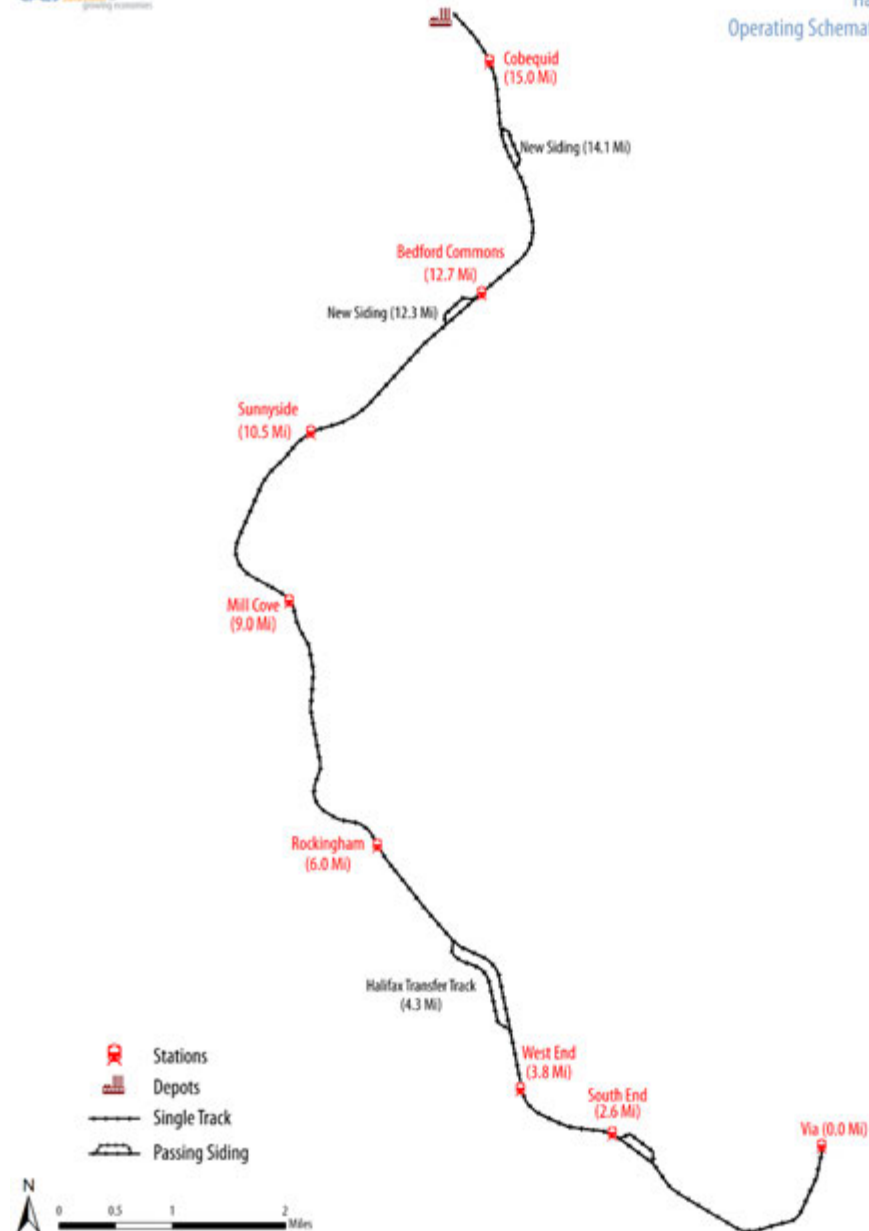
# Approximate Trip Times

	No.	Potential Stations	arrive (min)	depart (min)
Halifax-Cobequid, Halifax-Elmsdale, and Halifax- Beaver Bank Service	1	VIA		0
	2	South End	4	5
	3	West End	7	9
	4	Rockingham	12	14
	5	Mill Cove	18	20
	6	Sunnyside	22	23
	7	Bedford Common	27	28
	8	Cobequid	32	33
Halifax-Elmsdale Only	9	Wellington	45	47
	10	Elmsdale	58	
Halifax-Beaver Bank Only	11	Beaver Bank	41	



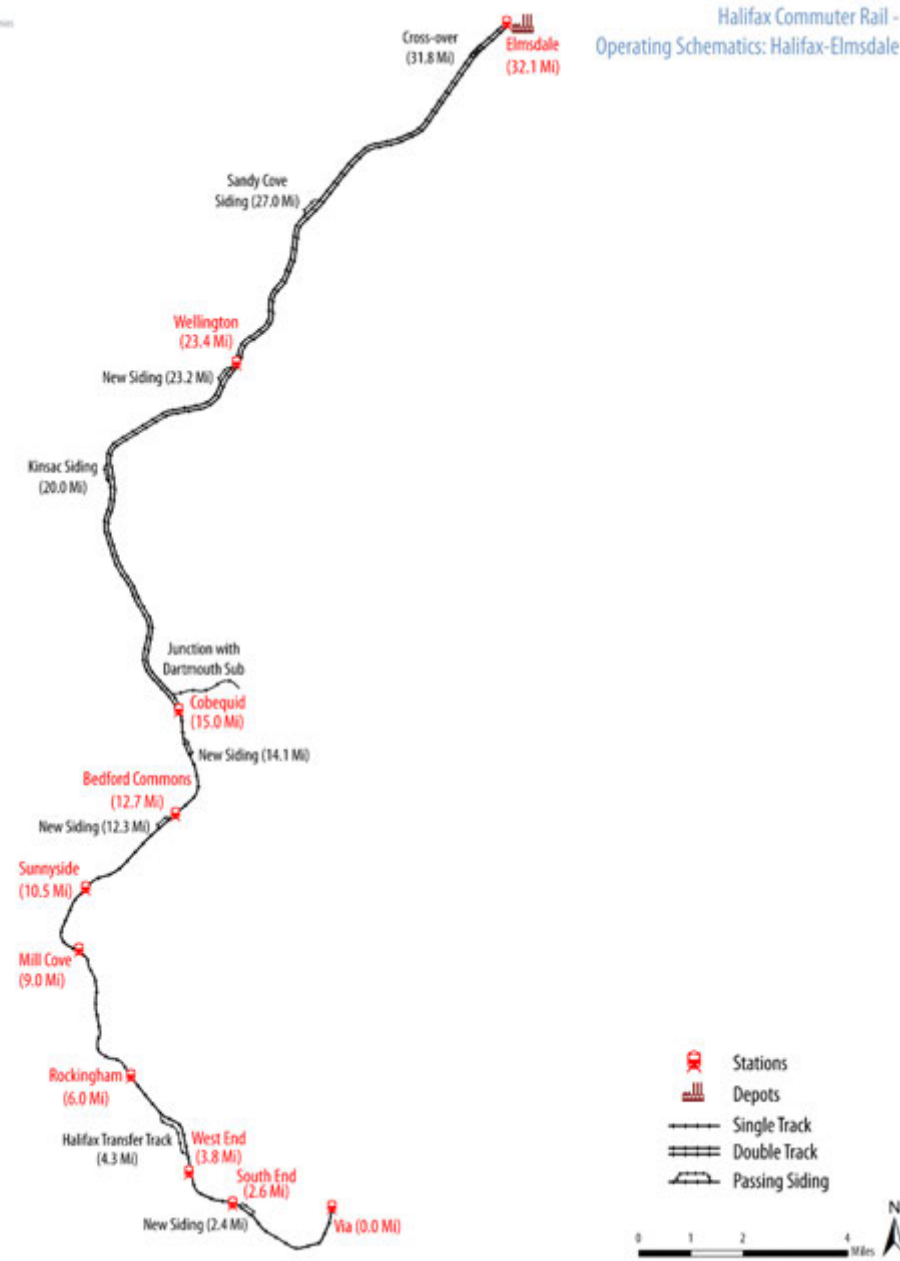
# Service to Cobequid

- There is relatively light existing rail traffic from the VIA Rail Station to Cobequid
- Service along this segment could be provided with additional short sidings to allow commuter rail trains to pass one another



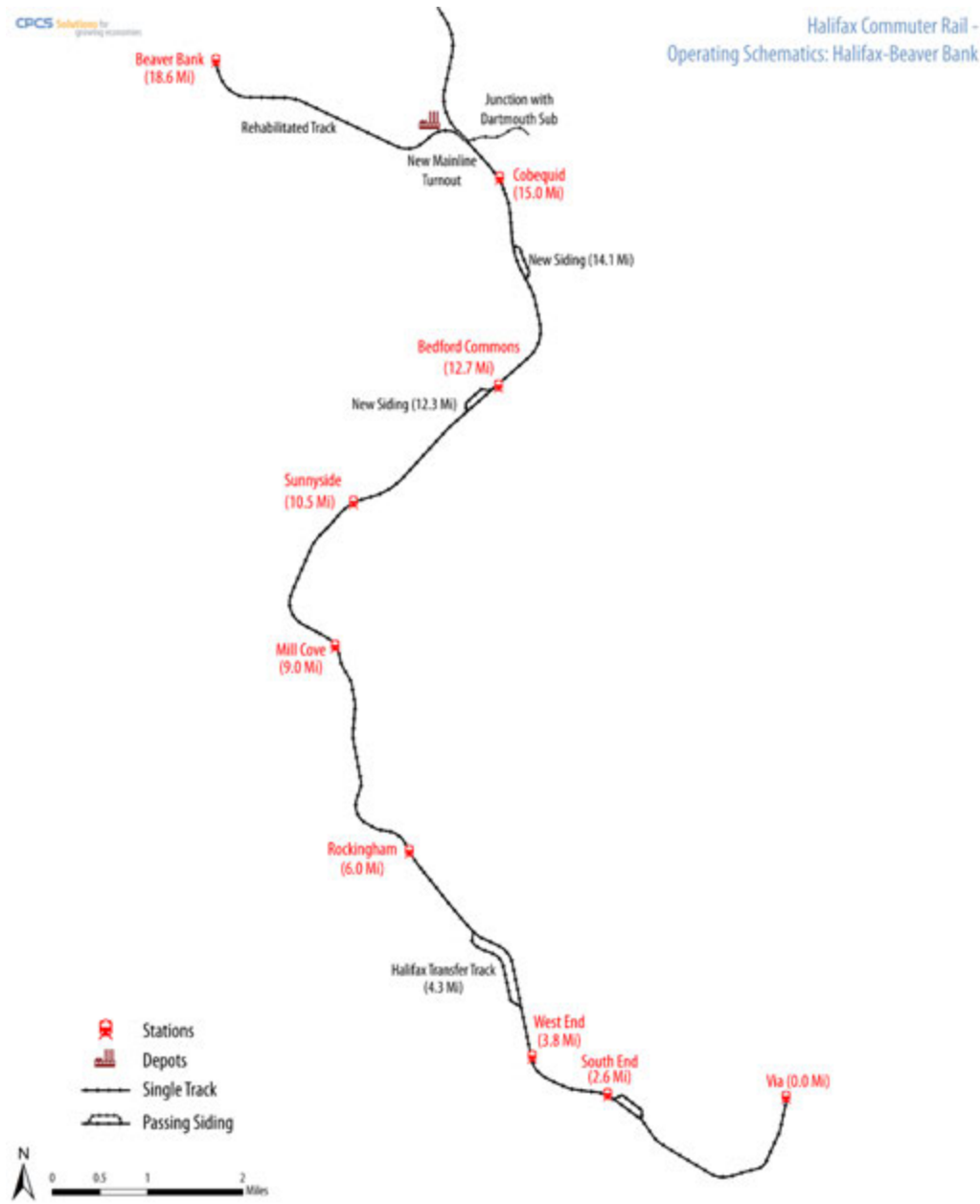
# Service to Elmsdale

- There is relatively heavy existing rail traffic from Cobequid Station to Elmsdale
- To provide regular and reliable commuter rail service, an additional track would be required along the entire length



# Service to Beaver Bank

- Currently, there are no train operations from Windsor Junction to Beaver Bank
- In addition to the requirements of the Cobequid concept, track rehabilitation will be required from Windsor Junction to Beaver Bank



# Potential Rolling Stock / Vehicles

- We considered **six rolling stock alternatives** for the proposed commuter rail system, including
  - diesel-electric locomotive-hauled trains
  - diesel-multiple units (DMUs)
    - DMUs are passenger cars with integrated engines
  - **New** and **rehabilitated** alternatives
- We considered the following alternative for further analysis:

## Rehabilitated

### Budd Rail Diesel Car (RDC)

- Built in the 1950s and 1960s
- Stainless steel construction
  - can be rehabilitated into good condition
- Can operate as trains of up to six cars
- Several are available in Moncton



# Other Alternatives Considered: Locomotive-Hauled

## New Push-Pull Diesel-Electric Locomotive-Hauled Train

A new locomotive-hauled push-pull train set with bi-level cars



Source: [www.blogto.com](http://www.blogto.com)

## Rehabilitated Push-Pull Diesel-Electric Locomotive-Hauled Train

A rehabilitated locomotive-hauled push-pull set with single-level cars



Source: [Photoblair.ca](http://Photoblair.ca)



# Other Alternatives Considered: DMUs

## New High-Floor DMU

A new high-floor DMU. It would be compliant with Transport Canada rules for use on track shared with freight traffic.



Source: Metrolinx

## New or Rehabilitated European-designed Low-Floor DMU

A new or rehabilitated low-floor DMU as currently operated on many routes in Europe and on the Ottawa O-Train.

- These alternatives cannot be typically used on track shared with freight trains, unless additional risk mitigation strategies are undertaken.



Source: Wikipedia

# Ridership Forecasting Methodology (1)

- The Team developed **three** demand scenarios (low, medium, high) for each of the **three** operating concepts
  - a total of **nine** scenarios.

## Low Demand Scenario

- The **minimum level of infrastructure investment** required to begin operating the rail service

## Medium Demand Scenario

- Increased investment to provide improved connectivity between the urban rail stations and major activity nodes:
  - Potential park-and-ride lots at Mill Cove, Elmsdale, Wellington, Cobequid and Bedford Common Stations
  - Direct shuttle service between:
    - VIA Station and downtown Halifax; and
    - South End Station and Dalhousie and St. Mary's universities

# Ridership Forecasting Methodology (2)

## High Demand Scenario

- In addition to changes made in the Medium Demand Scenario:
  - Four new transit shuttle services connecting various neighbourhoods to the Cobequid and Elmsdale Stations;
  - The optimization of existing transit routes to increase commuter rail ridership; and
  - Elimination or modification of competing Halifax Transit express routes and other park and ride areas.

The medium and high scenarios include shuttle buses to connect neighbourhoods and key destinations to commuter rail stations

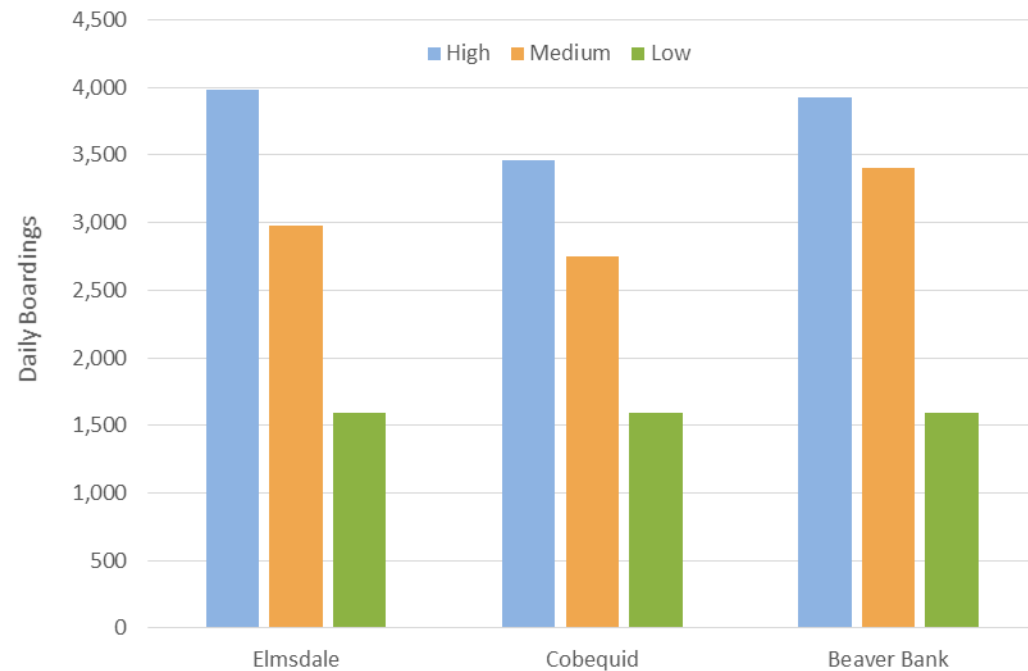


Source: Government of Nova Scotia, Twitter



# Forecasted Ridership: Total

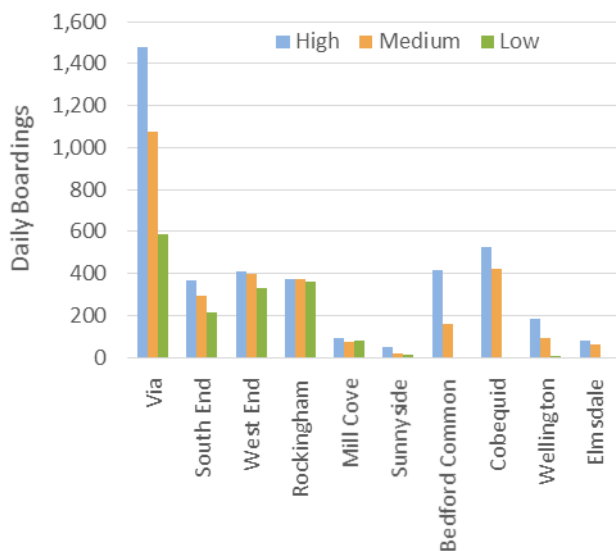
- We estimate that there would be between 1,600 and 4,000 weekday boardings on commuter rail
  - Forecasts are based on peak-period service with one additional mid-day trip
  - Total weekday ridership on Halifax Transit is 98,000 per day



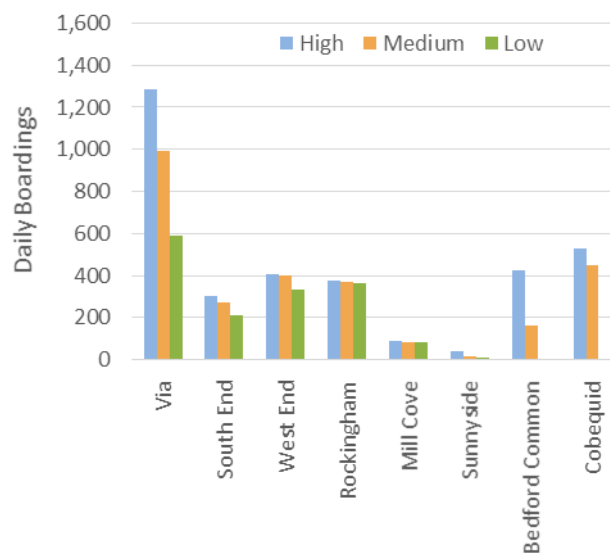
# Forecasted Ridership: By Station

- Most trips are between urban stations on the Halifax Peninsula and suburban stations
  - In the AM peak these trips are predominantly from suburban areas to downtown, and vice-versa in the PM peak

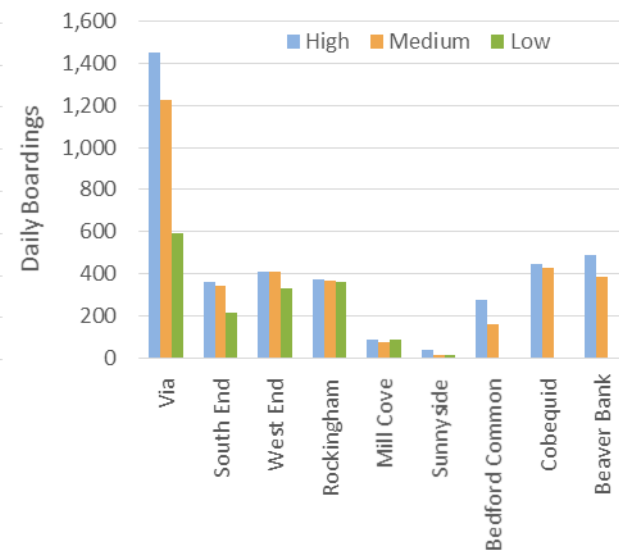
Daily Boardings Halifax-Elmsdale



Daily Boardings Halifax-Cobequid



Daily Boardings Halifax-Beaver Bank

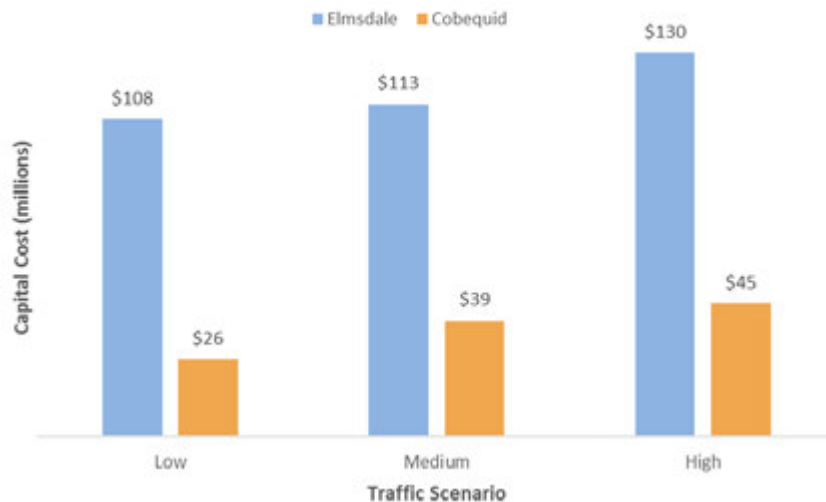


Source: CPCS from Dillon analysis. Based on peak-period and one mid-day trip service.

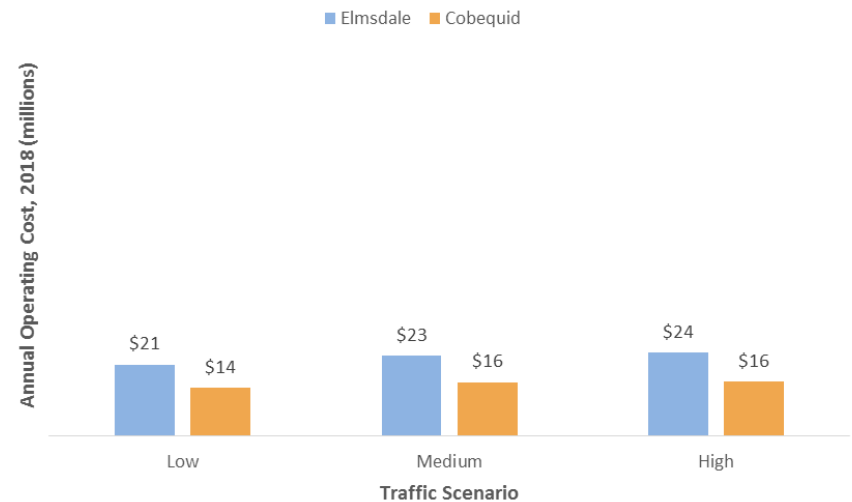
# Estimated Costs

- The following costs are based on all-day and weekend service
- Providing service as far as **Cobequid** is a **lower cost** concept in terms of capital and operating costs
  - Service as far as Beaver Bank would cost more than the Cobequid concept, but less than the Elmsdale concept

## Expected Capital Cost



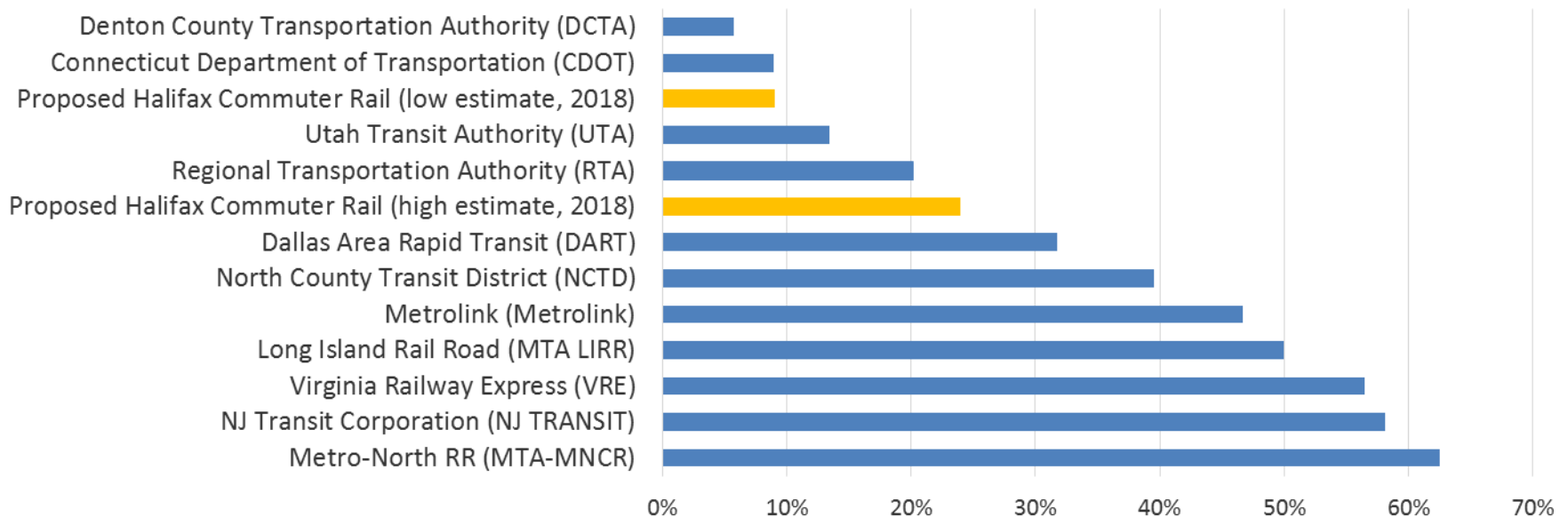
## Expected Operating Cost (2018)



# Recovery Ratio

- **All** commuter rail systems in North America do not recover all of their operating expenses through fares
  - That is, they have a “recovery ratio” – revenues divided by costs -- less than one
- If a Halifax commuter rail system opens in 2018, it would have an initial recovery ratio of between **9%** and **24%** depending on the traffic scenario

## Select\* US Commuter Rail Systems and Passenger Fare Recovery (2011) and Proposed Halifax (2018)



# Other Social Benefits and Costs

- **Travel time savings**
  - Travelers benefit from decreased travel time
- **Automobile operating cost reductions**
  - Savings to travelers from not having to pay for the cost of driving because they take transit instead
- **Carbon dioxide (CO<sub>2</sub>) emissions reductions**
  - CO<sub>2</sub> emissions, produced through the combustion of fossil fuels, are known to cause climate change through the greenhouse effect
  - There is increasing recognition that there is a social cost from the economic damages caused by climate change
    - Impacts to net agricultural productivity, human health, and property damages from increased flood risk
  - These economic impacts can be monetized and included in the economic analysis

Source: US EPA. The Social Cost of Carbon.  
<http://www.epa.gov/climatechange/EPAactivities/economics/scc.html>

# Closing

- Thank you for coming to learn about our work on this project so far!
- If you have any questions, please seek out a member of the **CPCS Team**



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