# City of Port Moody
## Report/Recommendation to Council

Date: June 29, 2022
Submitted by: Engineering and Operations Department – Infrastructure Engineering Services Division
Subject: Cumulative Development Transportation Model – Update

## Purpose
To provide Council with a progress update on the Cumulative Development Transportation Model project.

## Recommended Resolution(s)

**THAT the report dated June 29, 2022 from the Engineering and Operations Department – Infrastructure Engineering Services Division regarding Cumulative Development Transportation Model – Update be received for information.**

## Background
On May 4, 2021, Council passed multiple motions regarding growth principles, including the following motion:

> *RC21/278*
> *Development decisions will minimize big traffic impacts. Direct staff to develop a model and assumptions for projection of cumulative traffic impacts under various growth scenarios. Also, recommend maximum cumulative traffic congestion/average trip time targets during peak am and pm rush hour periods on key roadways crossing our city centre.*

Staff recommended in an August 5, 2021 report to incorporate the work to develop the model into the Master Transportation Plan (MTP) Update, which was in active procurement at the time. A project proposal was developed (**Attachment 1**) and Mott MacDonald was awarded the work. It is hoped the model will inform development of the "Big Moves" in the MTP Update and reflect the City's strategic objectives to shift vehicular traffic to sustainable modes.

## Discussion
There are two types of transportation models that are generally in use: "macroscopic" models and "microscopic" models. Macroscopic models are generally more strategic in nature and enable an understanding of large-scale questions such as regional transportation demand, propensity to use different travel modes, and the network effects of new transportation facilities

or services. Macroscopic models are governed by socio-economic factors such as population, employment, age, and income. By contrast, microscopic models are generally more tactical in nature and enable an understanding of local operational questions such as vehicle delays at intersections and how they might be affected by changes in traffic signal timing or lane geometry. Microscopic models generally analyze local traffic count data or processed traffic demand output from macroscopic models.

TransLink maintains the Regional Transportation Model (RTM), a macroscopic model of regional transportation demand that incorporates socio-economic data from Metro Vancouver. The RTM is appropriate for many of the questions concerning TransLink in developing regional policies such as the recently approved Transport 2050, including the need for new public transit lines, the potential benefits of other public transit investments, and impacts on regional roads in the Major Road Network. As a regional model, RTM necessarily abstracts local detail: for example, Port Moody is represented by 25 traffic analysis zones that aggregate all transportation behaviour within relatively large areas. Consequently, several Lower Mainland municipalities, such as City of Vancouver, City of Surrey, and City of Coquitlam, maintain "sub-area" models based on RTM that provide more local detail.

Project Objectives

Staff discussed the Cumulative Development Transportation Model (CDTM) project with Mott MacDonald and devised the following objectives for the project:

- Develop a model that requires fewer resources and less complexity than TransLink's Regional Transportation Model (RTM), such that it is not an RTM sub-area model.
- Avoid purely static approaches that are too limited, and instead pursue an approach that can assess transportation demand and behavioural changes dynamically and over time.
- Provide local analysis output (such as need for turning bays, queue lengths, traffic signal timing updates and optimizations) while enabling strategic level transportation demand redistribution (such as trip departure time, mode, or route shifts).
- Recommend potential average trip time targets during peak AM and PM periods on key streets, and other metrics related to an inclusive and healthy transportation system that align with the MTP Update directions.
- Potentially support the MTP Update and the development of "Big Moves" within that planning process.
- Provide output beyond traffic metrics to be inclusive of all main modes.
- Determine a model/software purchase and maintenance strategy.

The above objectives are intended to satisfy the desire to understand cumulative development impacts while also enabling staff to understand localized effects and inform the ongoing MTP Update project.

Mott MacDonald reviewed and documented the structure of the RTM, which would form the basis of Port Moody's CDTM. Following completion of the review, various existing software packages were reviewed for their ability to integrate with RTM and meet the project objectives. A number of microscopic modelling software tools were examined, but these were ultimately not recommended because their static nature would not enable the City to analyze the effects of potential traffic redistribution without laboriously re-entering input data.

Draft Model

The recommended modelling tool is a macroscopic modelling package, Visum SBA, that conducts "simulation-based assignment" to enable an understanding of individual simulated vehicles while also enabling the model to be dynamic. This is an evolving area of modelling practice, called "mesoscopic modelling", which seeks to combine the advantages of macroscopic and microscopic models. As shown in **Attachment 2**, the model incorporates most significant roads within Port Moody in its network, but also simulates individual vehicles at an intersection level. Despite an initial objective to avoid creating a local sub-area model based on RTM, which was viewed as being too complex for the project scope, CDTM is essentially a local sub-area model that is limited to modelling car traffic during the morning peak hour.

Some potential output indicators were also reviewed, including travel time, travel time reliability, and a "congestion index" that would compare travel times in free flow conditions (typically at night) against peak hour travel times. Travel time was recommended as the preferred output indicator, as it is easy to understand and communicate, requires the lowest level of effort to obtain, and can most easily be monitored. The indicator could also easily be extended to consider other travel modes and cross-referenced against other data sources.

A draft baseline model is now developed and functional, however, as of the date of writing this report, it has been identified that further calibration is required to better replicate existing conditions. While this calibration work is underway, detailed model output is not currently available.

Other Potential Additional Modelling Approaches

Mott MacDonald also reviewed alternative land use and transportation modelling approaches that could be considered in addition to the CDTM: walkability analysis and accessibility analysis.

Walkability analysis was first developed by UBC's Health and Community Design Lab and provides a model of "walkability" throughout the region, informed by five factors that relate to land use intensity and the transportation network. **Attachment 3** shows sample output from the walkability analysis tool for 2011 and 2016, and in principle can be used to help understand future walkability based on land use decisions. However, as some of the factors are unlikely to be known in advance, the tool is better used as a performance indicator rather than a forecasting tool.

Accessibility analysis is increasingly being used in contemporary transportation planning practise to reflect the underlying reason why people travel: to access opportunities such as jobs, services, recreation, etc. Access to opportunities can be improved through improvements to transportation networks, such as roads, more efficient public transit, cycling facilities, and so on, but also through land use changes that create more diverse destinations. **Attachment 4** shows a sample map displaying access to employment by transit within 40 minutes, in 2016 prior to the opening of the Evergreen Line. Informed by Census data, this also enables estimation of a relationship between destination accessibility and sustainable trip making. As a key goal of the MTP Update is to increase Port Moody's sustainable transportation mode share, Mott MacDonald has recommended consideration of accessibility analysis to complement the CDTM and better align transportation system metrics with the City's strategic transportation goals.

Model Maintenance Options

The City has options for how it may choose to maintain and use the CDTM going forward, which essentially would involve variations of maintaining the model in-house or using external custodial arrangements with qualified consultants. While internal maintenance would result in more day-to-day control over the model, this would also entail higher costs because the City would have to retain licenses for specialized software and staff time (a new service, utilizing part or most of the capacity of a technical position) would have to be devoted towards model maintenance and updating. On the other hand, an external custodial arrangement would entail some loss of day-to-day use of the model, but costs would likely be lower as model maintenance and software licensing costs would be borne by the consultants. Development applications may be able to be leveraged to fund updates related to their projects as well.

Staff will make a recommendation as further CDTM model scenarios are developed and reviewed via the MTP Update project, but an external custodial arrangement is likely to be preferred given anticipated need to use the CDTM.

## Other Option(s)

Not applicable.

## Financial Implications

There are currently no financial implications from this project.

## Communications and Civic Engagement Initiatives

Development of the CDTM is an internal project with no planned engagement activities. However, as it is planned to be used to support the MTP Update, output from the CDTM may appear in future MTP Update engagement materials.

## Council Strategic Plan Objectives

Development of the CDTM aligns with the Community Evolution strategic priority by helping to ensure future community growth is carefully considered and strategically managed consistent with the targets approved in the City's Official Community Plan.

## Attachment(s)

1. Council Strategic Plan Project Proposal – Cumulative Development Traffic Model for MTP Update
2. Model Network and Intersection Simulation
3. Walkability in 2011 and 2016
4. Accessibility Analysis

## Report Author

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**Report Approval Details**

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|---|---|
| Document Title: | Cumulative Development Transportation Model – Update.docx |
| Attachments: | - Attachment 1 – Council Strategic Plan Project Proposal – Cumulative Development Traffic Model for MTP Update.pdf<br>- Attachment 2 - Model network and intersection simulation.pdf<br>- Attachment 3 - Walkability in 2011 and 2016.pdf<br>- Attachment 4 - Accessibility Analysis.pdf |
| Final Approval Date: | Jul 19, 2022 |

This report and all of its attachments were approved and signed as outlined below:

Devon Brownlee for Stephen Judd, Manager of Infrastructure Engineering Services - Jul 13, 2022 - 1:56 PM

Jeff Moi, General Manager of Engineering and Operations - Jul 13, 2022 - 2:36 PM

Lindsay Todd for Rosemary Lodge, Manager of Communications and Engagement - Jul 14, 2022 - 9:29 AM

Paul Rockwood, General Manager of Finance and Technology - Jul 14, 2022 - 9:52 AM

Tim Savoie, City Manager - Jul 19, 2022 - 10:47 AM