

# Stargazing Park Traffic Impact Statement

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Prepared for  
Stargaze Nova Scotia





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Prepared by  
Jeff R. LeBlanc, P.Eng., PMP

# 1 Introduction

## 1.1 Background

Stargaze Nova Scotia is working on a proposal to develop their approximately 26-acre property that is currently designed to support an observatory as a multi-use Stargazing Park. Exhibit 1.1 shows the site in red in the context of the surrounding area.

Exhibit 1.1 – Proposed Stargazing Park in Big Lake, Nova Scotia



Source: Google Earth

Stargaze Nova Scotia has proposed to develop their property through a development agreement that is being prepared for HRM and the proposed Stargazing Park will include provisions for a visitor's centre, cabins, walk in tent sites and a café along with parking for approximately 100 vehicles.

Access to the property will be from an existing connection to Prospect Road (Nova Scotia Highway 333) and a proposed second entrance/existing just south of Big Lake. Refer to Exhibit 1.2 for a proposed site plan for the development as prepared by Charles Freeman Architect and Exhibit 1.3 for images from the property as captured on the Stargazing Nova Scotia website.

Exhibit 1.2 – Proposed Stargazing Park in Big Lake, Nova Scotia



Exhibit 1.3 – Stargazing Images from the property in Big Lake, Nova Scotia



Facing Northwest, with the glow of St. Margaret's Bay in the distance.



Facing south, where seasonal constellations rise the highest.



Venus (bright object) and Jupiter (below Venus, near the tree) just after sunset.

JRL consulting was retained by Stargaze Nova Scotia to prepare a Traffic Impact Statement (TIS) to assess the potential traffic impacts of the proposed Stargazing Park in Big Lake, Nova Scotia.

The purpose of a Traffic Impact Statement is to provide a high level overview of a proposed development including estimates of site-generated traffic along with an initial review of existing traffic counts in the general area of the proposed development. We are pleased to submit this report which summarizes our findings.

## 2 Existing Traffic Conditions

### 2.1 Description

The principal route affected by this development is Prospect Road (Highway 333). Exhibit 2.1 summarizes HRM’s Characteristics of Street Classes from HRM’s Municipal Service Systems Design Guidelines and we have also included Transportation Association of Canada’s (TAC) Characteristics of Urban Roads in Exhibit 2.2

Exhibit 2.1 – HRM’s Characteristics of Street Classes

Characteristic	Arterial Street	Major Collector	Minor Collector	Local Industrial	Local Street
1. Traffic Service Function	First Consideration	Traffic movement primary consideration, land access secondary consideration, some parking	Traffic movement of equal importance with land access, parking permitted	Traffic movement secondary consideration with land access primary consideration, parking permitted	Traffic movement secondary consideration with land access primary consideration, parking permitted
2. Land Access Function	Limited Access with no parking				
3. Range of design traffic average daily volume	More than 20,000	12,000 to 20,000 or more	Up to 12,000	Less than 3,000	Less than 3,000
4. Characteristics of traffic flow	Uninterrupted flow except at signals; w/ pedestrian overpass	Uninterrupted flow except at signals and crosswalks	Interrupted flow	Interrupted flow	Interrupted flow
5. Average running speed in off-peak conditions	50-70 km/hr	40-60 km/hr	30-50 km/hr	15-30 km/hr	15-30 km/hr
6. Vehicle types	All types	All types but trucks may be limited	All types with truck limitation	All types	Passenger and service vehicles, transit buses; large vehicles restricted
7. Connects to	Expressways, arterials, major collectors, minor collectors	Expressways, arterials, major collectors, minor collectors, some locals	Arterials, major collectors, minor collectors, locals	Some major collectors, minor collectors, locals	Some major collectors, minor collectors, locals

Prospect Road is a major route (Nova Scotia Highway 333) that extends from Halifax at Route 3 to St Margarets Bay and provides access to dozens of communities including Peggy’s Cove. It’s a two lane facility throughout with some auxiliary turning lanes and it provides access to residential and commercial properties. The posted speed limit varies and is listed at 80km/hr in the study area near the proposed Stargazing Park. Prospect Road is constructed with a gravel shoulder and ditches and there are no pedestrian sidewalks or walkways. It is controlled and maintained by Nova Scotia Public Works (NSPW)

Exhibit 2.2 – Transportation Association of Canada Characteristics of Urban Roads

	Public Lanes		Locals		Collectors		Arterials		Expressways	Freeways
	Residential	Commercial	Residential	Indust./Comm.	Residential	Indust./Comm.	Minor	Major		
traffic service function	traffic movement not a consideration		traffic movement secondary consideration		traffic movement and land access of equal importance		traffic movement major consideration	traffic movement primary consideration	traffic movement primary consideration	optimum mobility
land service / access	land access only function		land access primary function		traffic movement and land access of equal importance		some access control	rigid access control	no access	no access
traffic volume (veh/day) (typical)	<500	<1000	<1000	<3000	<8000	1000 – 12 000	5000 – 20 000	10 000 – 30 000	>10 000	>20 000
flow characteristics	interrupted flow		interrupted flow		interrupted flow		uninterrupted flow except at signals and crosswalks		uninterrupted flow except at signals	free-flow (grade separated)
design speed (km/h)	30 - 40		30 - 50		50 - 80		50 - 70	60 - 100	80 - 110	80 - 120
average running speeds (km/h) (off-peak)	20- 30		20 - 40		30 - 70		40 - 60	50 - 90	60 - 90	70 - 110
vehicle type	passenger and service vehicles	all types	passenger and service vehicles	all types	passenger and service vehicles	all types	all types	all types up to 20% trucks	all types up to 20% trucks	all types up to 20% trucks
desirable connections	public lanes, locals		public lanes, locals, collectors		locals, collectors, arterials		collectors, arterials, expressways, freeways		arterials, expressways, freeways	arterials, expressways, freeways
transit service	not permitted		generally avoided		permitted		express and local buses permitted		express buses only	express buses only
accommodation of cyclists	no restrictions or special facilities		no restrictions or special facilities		no restrictions or special facilities		lane widening or separate facilities desirable		prohibited	prohibited
accommodation of pedestrians	pedestrians permitted, no special facilities		sidewalks normally on one or both sides	sidewalks provided where required	sidewalks provided both sides	sidewalks provided where required	sidewalks may be provided, separation for traffic lanes preferred		pedestrians prohibited	pedestrians prohibited
parking (typically)	some restrictions		no restrictions or restrictions one side only		few restrictions other than peak hour		peak hour restrictions	prohibited or peak hour restrictions	prohibited	prohibited
min. intersection spacing <sup>1</sup> (m)	as needed		60		60		200	400	800	1600 (between interchanges)
right-of-way width (m) (typically)	6 - 10		15 - 22		20 - 24		20 <sup>2</sup> - 45 <sup>3</sup>		>45 <sup>3</sup>	>60 <sup>3</sup>

Refer to Exhibit 2.3 for photos of the Study Area around the proposed Stargazing Park development in Big Lake, Nova Scotia

Exhibit 2.3 – Study Area Photos



Existing Entrance to Stargazing property in Big Lake, Nova Scotia looking west



Prospect Road at Existing Driveway on left looking north



Prospect Road at Existing Driveway on right looking south



Existing Driveway to Prospect Road looking east





Existing parking area on property



Prospect Road looking north with northern end of property on left



Recommend speed on Prospect Road curve south of the existing entrance

## 2.2 Existing Traffic Volumes

We reached out to Nova Scotia Public Works for recent counts in the area and they completed 24-hour counts in June 2022 on Prospect Road approximately 1.3 km east of Big Lake Drive

Average Daily Traffic (ADT) at this location was 1,613 vehicles which is two-way traffic. The ADT at a particular location will vary due to seasonal and other influences and NSPW published appropriate factors to estimate Average Annual Daily Traffic (AADT). Prospect Road is classified as a "C" group road so a factor of 0.936 was applied to determine Average Annual Daily Traffic (AADT) of 1510 vehicles at this location on Prospect Road.

These counts didn't specify directional traffic volumes. We did calculate the 2022 two-way AM peak hour volumes at 67 vehicles and the two-way PM peak hour volumes at 138 vehicles so existing traffic at this location is relatively light.

## 2.3 Trip Distribution

NSPW traffic counts in 2022 didn't provide an indication of trip distribution in the area as they were two-way volumes but we did review their counts completed at the same location in 2021. In the AM peak hour 72% of vehicles are heading eastbound towards Halifax with the balance of 28% travelling westbound towards Peggy's Cove. In the PM peak hour traffic is split 50/50 eastbound and westbound.

Traffic generated by the proposed Stargazing Park will likely attract most of its traffic from the east on Prospect Road as that is a shorter distance to the Halifax Peninsula and heavily populated areas of HRM.

## 2.4 Transit and Pedestrians

There are no transit services in the area near the proposed development, however, the St. Margaret's Bay Community Transportation Society, operating as BayRides program is a community-based transportation service that offers accessible, reliable, affordable door-to-door transportation in the St Margarets Bay area although this service's eastern boundary is in West Dover so it doesn't actually cover the area of the proposed development on Big Lake Drive.

## 2.5 Stopping Site Distance

As per the Transportation of Canada Geometric Design Guide for Canadian Roads, adequate stopping site distance *"is essential for safe operation that the vehicle operator be able to see far enough ahead to stop if necessary. Conditions that would force a vehicle operator to stop are for example, an object on the roadway, a culvert washout or other fault in the roadway. Adequate stopping site distance is required throughout the length of the roadway. Minimum stopping site distance is the sum of two distances namely:*

- *Brake reaction distance*

*The distance travelled during the brake reaction time, that is the time that elapses from the instant an object, for which the driver decides to stop, comes into view to the instant the driver takes remedial action (contacts brake pedal).*

- *Braking distance*

*The distance travelled from the time that braking begins to the time the vehicle comes to a stop.”*

The posted speed on Prospect Road at Big Lake Drive is 80 km/hr and this speed requires a stopping site distance of 140 m. A design speed of 90 km/hr requires a minimum stopping distance of 170 m.

We completed a Stopping Site Distance (SSD) review on April 14, 2024 on Prospect Road at the existing entrance to the property. Field measurements were recorded using an object height of 0.6 m and a driver eye height of 1.05 m. Refer to Exhibit 2.4.

Exhibit 2.4 – Pylon used for Stopping Site Distance Field Measurements



Visibility on Prospect Road for northbound and southbound drivers exceeds TAC requirements of 170 m for a design speed of 90 km/hr and available SSD is approximately 185 m for northbound drivers due to a horizontal curve on Prospect Road where vegetation appears to have encroached on the western portion of the right of way and approximately 200 m for southbound drivers due to a combination of existing horizontal and vertical curves on Prospect Road.

Refer to Exhibit 2.5 for a summary of Stopping Site Distance on Prospect Road at the existing entrance to the Stargazing property as well Exhibits 2.6 through 2.9 for photos from our field assessment.

Exhibit 2.5 – Stopping Site Distance for on Prospect Road at Existing Property Entrance

Location	Direction	Minimum SSD	Available SSD
Stargazing Driveway at Prospect Road	Northbound	170 m	~ 185 m
	Southbound	170 m	~ 200 m

Exhibit 2.6 – Northbound Driver View on Prospect Road to Existing Driveway at 140 m



Exhibit 2.7 – Northbound Driver View on Prospect Road to Existing Driveway at 170 m



Exhibit 2.8 – Southbound Driver View on Prospect Road to Existing Driveway at 140 m



Exhibit 2.9 – Southbound Driver View on Prospect Road to Existing Driveway at 170 m



The proposed site plan for the Stargazing Park shows a second entrance/exit approximately 100 meters north of the existing driveway. The developer has received a permit for this 2<sup>nd</sup> access point from Nova Scotia Public Works and they did validate available stopping sight distance at this location of 140 meters to the north and 150 meters to the south through field measurements.

## 3 Site Generated Traffic

### 3.1 Trip Generation

The proposed Stargazing Park will include a number of key features as summarized below:

- Stargazers Lodge (13,000 SF) with a gift shop/museum/multi-use space as well as a planetarium that seats 50 people
- Abbey Ridge Observatory which will hold 50 people
- Café (2,500 SF)
- Single Unit Dwelling (1)
- Rental Cabins (12)
- Walk in Tent Sites (15)
- Bunk House Observatory (12)

The developer has estimated that up to 40 vehicles and 2 busses might be on site during the day at any given time for visits ranging from 40 minutes to 2 hours. For evening programming there would be a limited of 50 people in the Abbey Ridge Observatory or 50 people in in the Planetarium as two sessions per evening are not likely possible. The developer also advised that evening sessions would start after dark so they would be earlier in the winter and later in the summer. Existing traffic on Prospect Road in this area would be significantly less during the winter as tourists travelling to Peggy's Cove would be much less than in the summer months.

We expect that the accommodations portion of development (rental cabins, walk in tent sites and bunk hour observatories) will operate in a similar way to a commercial campground with some guests staying for a week or more and others staying for a weekend or a single night. We don't expect the peak hour(s) of site generated traffic to align to the AM and PM peak hours of the surrounding transportation network due to check in and check out times of a type development like this.

We expect that the café will likely serve customers who are staying on site or who are accessing the Stargazers Lodge or Abbey Ridge Observatory as opposed to a standalone destination but we have estimated trips for that land use as a High Turnover Restaurant to present a worst-case scenario.

For the Stargazers Lodge/Abbey Ridge Observatory we have used a worst case-scenario of 42 vehicles as described above during the PM peak hour of adjacent traffic on Prospect Road and we have assumed that these buildings wouldn't be open during the AM peak hour of adjacent traffic on Prospect Road so we have not estimated AM peak hour vehicle trips.

We completed trip generation estimates using equations provided in Institute for Transportation Engineer's Trip Generation Manual 11th Edition for the existing and proposed land uses with the following Land Use Codes:

- ITE Land Use 146 Campground/Recreational Vehicle Park

"A campground/recreational vehicle park is a recreational site that accommodates campers, trailers, tents, and recreational vehicles on a transient basis. They are found in a variety of locations and provide a variety of facilities, often including restrooms with showers and recreational facilities, such as a swimming pool, convenience store, and laundromat." The unit of measurement for average vehicle trip ends is occupied campsites.

- ITE Land Use 210 Single Family Detached Housing

"Single-family detached housing includes all single-family detached homes on individual lots. A typical site surveyed is a suburban subdivision." The unit of measurement for average vehicle trip ends is dwelling units.

- ITE Land Use 932 High-Turnover (Sit-Down) Restaurant

"This land use consists of sit-down, full-service eating establishments with a typical duration of stay of 60 minutes or less. This type of restaurant is usually moderately priced, frequently belongs to a restaurant chain, and is commonly referred to as casual dining. Generally, these restaurants serve lunch and dinner; they may also be open for breakfast and are sometimes open 24 hours a day. These restaurants typically do not accept reservations. A patron commonly waits to be seated, is served by wait staff, orders from a menu, and pays after the meal. Some facilities offer carry-out for a small proportion of its customers. Some facilities within this land use may also contain a bar area for serving food and alcoholic drinks" The unit of measurement for average vehicle trip ends is 1000 Sq. Ft. Gross Floor Area.

Exhibit 3.1 – Estimated Future Site Generated Traffic Volumes

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Campground ITE Land Use 416	39	8	36%	64%	11	65%	35%
			3	5		7	4
Single Family ITE Land Use 210	1	1	26%	74%	1	63%	37%
			0	1		1	0
Cafe ITE Land Use 932	2,500 SF	24	55%	45%	23	63%	37%
			13	11		14	9
Stargazers Lodge Local Rate	13,000 SF				42	65%	35%
						27	15
<b>TOTAL</b>		<b>33</b>	<b>16</b>	<b>17</b>	<b>77</b>	<b>49</b>	<b>28</b>

We estimate that the proposed development will generate additional net new traffic volumes of **33** vehicles in the AM peak hour and **77** vehicles in the PM peak hour.

## 4 Conclusions and Recommendations

- This Traffic Impact Statement has provided a high level overview of the proposed development of a Stargazing Park that will include a Stargazers Lodge, Observatory, Café along with rental cabins, walk in tent sites and observatory bunk houses.
- It includes an estimate of new site generated trips and an analysis of existing traffic volumes in the surrounding area.
- Based on ITE Trip Generation Rates, we estimate that the proposed development will generate **33** new vehicle trips in the AM Peak Hour and **76** new vehicles in the PM Peak Hour as a worst-case scenario. We note that the timing of site generated traffic for planned evening activities at the Planetarium and Observatory will vary throughout the year based on sunsets. As such we expect site generated traffic to have a lesser impact on PM Peak Hour traffic on Prospect Road in the summer where traffic is much higher than the winter due to tourist traffic related to Peggy's Cove.
- Site generated traffic will most likely follow existing trip distribution patterns along Prospect Road in the AM and PM peak hours, however, we do expect that most of the traffic generated by the proposed development to originate from the east from the more heavily populated area of Halifax Regional Municipality.
- Stopping Site Distance on Prospect Road exceeds TAC requirements of 170 m for a design speed of 90 km/hr at the existing entrance to the Stargazing Park for northbound and southbound drivers and available SSD is approximately 200 m for southbound drivers and approximately 185 m for northbound drivers.
- Stopping Sight Distance at the proposed second access point to Prospect Road on the northern portion of the property is 140 meters to the north and 150 meters to the south which satisfies TAC requirements for SSD for a posted speed of 80 km/hr.
- Vegetation should be removed in the right of way on the west side of Prospect Road on the property to ensure maximum visibility for vehicles exiting and for northbound vehicles approaching the existing entrance to the Stargazing Park.
- We recommend that the site plan be designed and constructed as local streets per Transportation Association of Canada (TAC) and Halifax Regional Municipality (HRM) geometric design guidelines. The final site plan and proposed internal road network should be reviewed to ensure that emergency vehicles and larger service vehicles can be accommodated.
- Stop signs will be required at any access points from the proposed Stargazing Park to Prospect Road All required signs should be installed per TAC's Manual of Uniform Control Devices for Canada (MUTCDC).
- The traffic that will be generated by this proposed development is relatively minor and so is traffic on Prospect Road so we don't expect any significant impacts on the surrounding transportation network in Big Lake.