

Lehigh Hanson Materials Limited

Scott Property – Traffic Analysis

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Date: June 2020

Project #: 60610856

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Ms. Valerie Haaf
Project Manager
Lehigh Hanson Materials Limited
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June 17, 2020

Project #
60610856

Dear Ms. Haaf:

Subject: Scott Property – Traffic Analysis

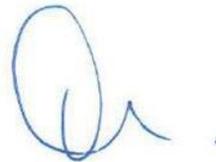
AECOM Canada Ltd. is pleased to provide Lehigh Hanson Materials Limited with our Traffic Analysis for the Scott Property Project.

We trust that this report and the information presented herein are consistent with expectations. Please contact the undersigned if you have any questions.

Sincerely,
AECOM Canada Ltd.



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Manager, Transportation Planning & Operations
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Authors

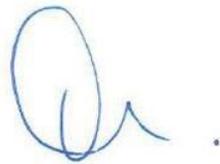
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<p>PERMIT TO PRACTICE AECOM CANADA LTD.</p>	
Signature	
Date	17-June-2020
<p>PERMIT NUMBER: P 10450</p>	
<p>The Association of Professional Engineer and Geoscientists of Alberta</p>	

Executive Summary

Lehigh Hanson Materials Limited (Lehigh) is proposing to construct and operate the Scott Property Project (the Project), which will be a Class I Aggregate Pit located in Rocky View County (RVC), in the rural community of Bearspaw, Alberta. The Project will occupy the majority of 05-26-02-W5M, with the exception of 33.9 acres located in the southwest corner (the Project Area). The property totals an area of approximately 600 acres (243 hectares [ha]), of which 395 acres (160 ha) are proposed for development as a sand and gravel pit. The Project Footprint refers to the proposed area of disturbance within the Project Area. The Project will be constructed and operated in six phases with an anticipated operational lifespan of 25 to 30 years; each phase will be approximately five years in duration. Project development is planned to commence in 2022, with material extraction starting in 2024.

AECOM Canada Ltd. (AECOM) was retained by Lehigh to perform several environment studies, including a Traffic Analysis, to satisfy the requirements and Servicing Standards (RVC 2013) set by the RVC, as well as applicable provincial legislation (i.e., the *Environmental Protection and Enhancement Act* [GOA 2019] and the *Code of Practice for Pits* [GOA 2004]).

Early discussions over the Traffic Impact Assessment (TIA) commenced with RVC when Lehigh started to plan the use of an off-site conveyor. Through the use of the off-site conveyor, the Project will not generate traffic from haul trucks; therefore, the TIA methodology has been adjusted in recognition of the unique characteristics of the proposed development. The approach has focused on the benefits of use of the proposed conveyor system. Specifically, the proposed movement of aggregate to Spy Hill Operations by conveyor will result in there being no new haul truck traffic on the road network.

This report has been prepared to present a traffic assessment for the Project, focused specifically on:

- estimating the amount of new traffic that the development, once complete, operational and running at design capacity, would be expected to generate on a daily basis; and,
- comparing the estimated Project-related traffic generation with the amount of new traffic generation expected, if the Project lands were to be developed for single-family Country Residential use.

The results of this assessment, applying conservative and worst case assumptions, are summarized in the following table:

Development Scenario	Conservative Assessment			Worst Case Assessment		
	Daily Traffic Generation	Inbound Trips	Outbound Trips	Daily Traffic Generation	Inbound Trips	Outbound Trips
Aggregate Operation w. Conveyor	30 vpd	15 in	15 out	50 vpd	25 in	25 out
Residential Development (160 single-family)	800 vpd	400 in	400 out	1,600 vpd	800 in	800 out

As demonstrated in this assessment, it is expected that development of the subject site for the proposed aggregate extraction operation with the use of an off-site conveyor would generate significantly less new traffic on the road network on a typical daily basis than would development of the property for single-family Country Residential uses.

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1. Introduction

AECOM Canada Ltd. (AECOM) was retained by Lehigh Hanson Materials Limited (Lehigh) to complete environmental studies and reporting for various technical disciplines, including a Traffic Analysis for the proposed Scott Property Project (the Project). This report describes the Project, outlines Project components and Project activities, summarizes regulatory requirements associated with traffic, presents methods and results of the assessments undertaken, and recommends mitigation measures to reduce potential impact of traffic to the local area.

1.1 Project Description

Lehigh is proposing to construct and operate the Project, which will be a Class I Aggregate Pit located in Rocky View County (RVC), in the rural community of Bearspaw, Alberta. The Project will occupy the majority of 05-26-02-W5M with the exception of 33.9 acres located in the southwest corner (the Project Area). The property is bound by 144 Avenue NW (also known as Burma Road) to the south, Range Road 24 to the east, and Range Road 25 (also known as Twelve Mile Coulee Road) to the west (see **Figure 1**).

The property totals an area of approximately 600 acres (243 hectares [ha]), of which 395 acres (160 ha) are proposed for development as a sand and gravel pit, with a maximum open pit area of 60 acres (24 ha) at any given time. The Project Footprint refers to the proposed area of disturbance within the Project Area. The Project will be constructed and operated in six phases with an anticipated operational lifespan of 25 to 30 years; each phase will be approximately five years in duration.

The Project location was selected for development as the lands contain a significant quantity of high quality, close to market aggregate resources. The Project land use is currently pastureland with several wetlands and ephemeral water bodies throughout. Following operation, the Project lands will be reclaimed to an equivalent end land use.

1.1.1 Project Components

The Project will include the following key components. Please refer to the Master Site Development Plan (MSDP) for additional details:

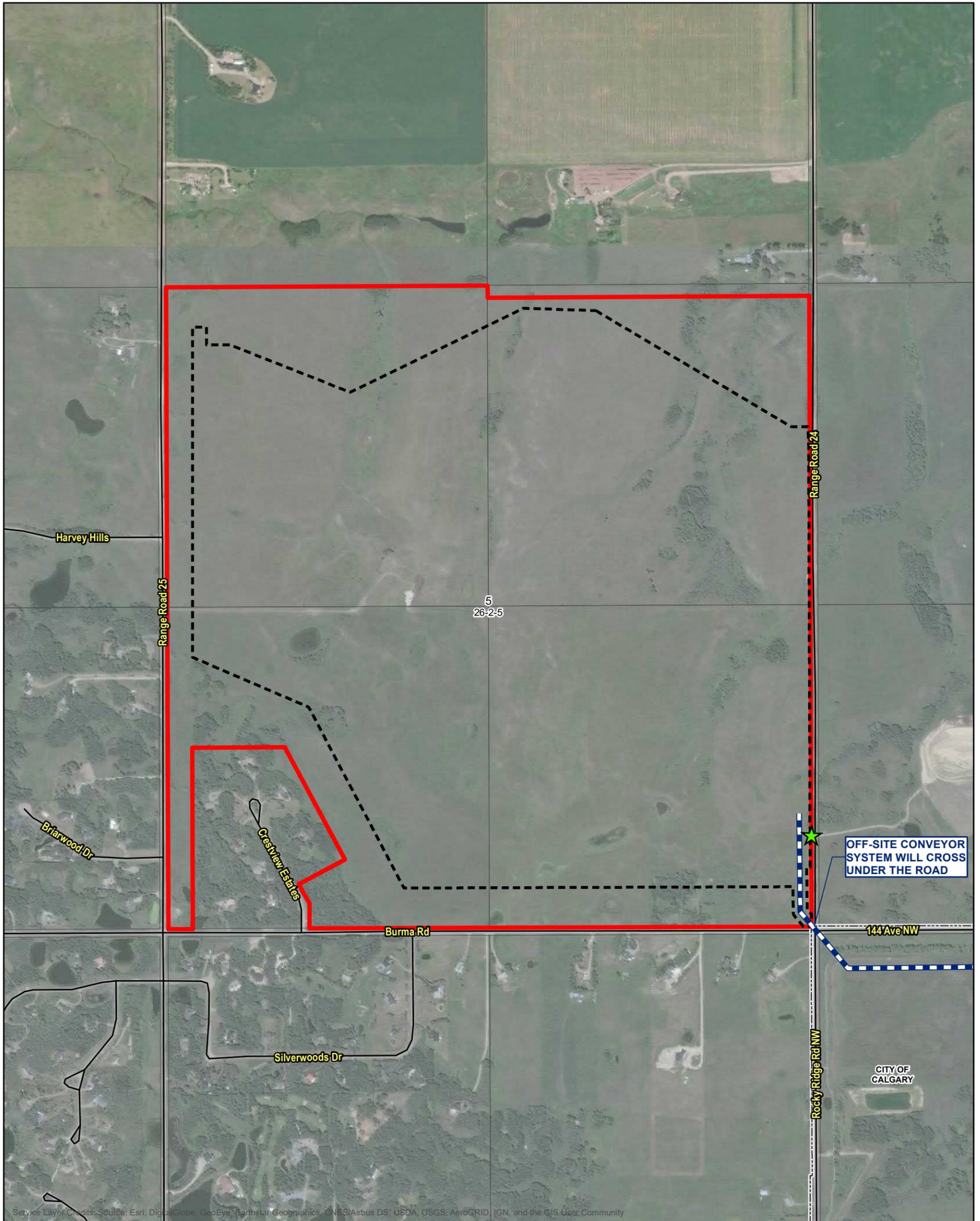
- Crusher with in-pit conveyor
- Access roads
- Off-site conveyor system
- Operation & Maintenance Building
- Perimeter berms
- Site ponds for water management

1.1.2 Project Activities

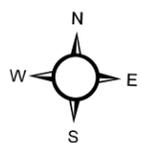
Project activities are described in detail in the MSDP and include the following:

1.1.2.1 Site Preparation

- Initial topsoil, subsoil and overburden stripping and stockpiling for future reclamation.
- Berm construction
- Establishing operating footprint (access roads, crusher, conveyors, buildings, stormwater ponds).



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

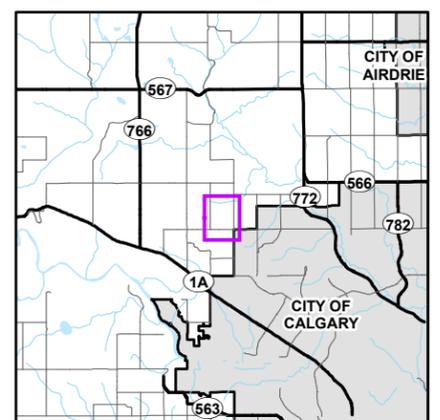


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Legend

- Site Access
- Off-Site Conveyor System
- Property Boundary
- Project Footprint
- City of Calgary Limits
- Road



Key Map

Source: AltaLIS; NRCan

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1.1.2.2 *Operation*

- Material excavation.
- Crushing and screening with use of in-pit conveyors to move material.
- Dust control.
- Conveying material to Inland’s Spy Hill Property using off-site conveyor.
- Topsoil, subsoil and overburden stripping and stockpiling for future reclamation.
- Progressive reclamation.

1.1.2.3 *Final Reclamation*

- Replacing and recontouring reclamation materials.
- De-compaction.
- Removing infrastructure.
- Seeding and weed control.

1.1.3 **Project Schedule**

Pending regulatory approval, Project development is planned to commence in 2022, with material extraction starting in 2024.

The anticipated schedule for each Project activity (as described in Section 1.1.2) is provided below in **Table 1**.

Table 1: Project Schedule

Project Activity	Period
Site Preparation	Commencing in 2022 for an estimated period of 2 years.
Operation (including Progressive Reclamation)	Commencing in 2024 for an estimated period of 25 – 30 years.
Final Reclamation	Commencing following operational activities for an estimated period of 3 years.

2. Regulatory Requirements

2.1 Municipal and Provincial

Developments within RVC require adherence to their Service Standards (RVC 2013). The purpose of a Traffic Impact Assessment (TIA) is to review and evaluate operational conditions within the analyzed area and to assess impact of the proposed development and/or required changes to the transportation network.

Results of the Traffic Analysis will be included in the upcoming provincial application under the *Environmental Protection and Enhancement Act* [GOA 2019a] and the *Code of Practice for Pits* [GOA 2004]).

3. Methods

3.1 Approach to Traffic Analysis at Scott Property

Early discussions over the TIA commenced with RVC when Lehigh started to plan the use of an off-site conveyor (Pers. Comm., RVC 2019). Through the use of the off-site conveyor, the Project will not generate traffic from haul trucks; therefore, the TIA methodology was adjusted in recognition of the unique characteristics of the proposed development. The approach has focused on the benefits of using the proposed conveyor system. Specifically, the proposed movement of aggregate to Spy Hill Operations by conveyor will result in no new haul truck traffic on the road network (see **Figure 2**).

To illustrate the minimal traffic levels associated with the proposed site development, this traffic analysis considers the following traffic generation comparison:

- New daily and peak hour traffic generation estimates for the proposed development, vs.
- Traffic likely to be generated if the site were instead developed to suit 160 single family residential dwellings (comparable density to a number of other residential developments in the area).

With the proposed off-site conveyor system, the estimated traffic generation for the site is expected to be very low, to the point that impacts on the road system could be considered negligible. Site traffic is also expected to be substantially less than would be expected from residential development of the property, based on published trip generation rates.

With the ongoing government recommendations to ‘stay home’ as much as possible during the COVID-19 pandemic, traffic counts were not considered to be indicative of typical usage to establish either baseline traffic on the area roads or a local trip rate for residential uses, as the counts would not reflect ‘normal’ traffic patterns.

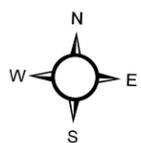
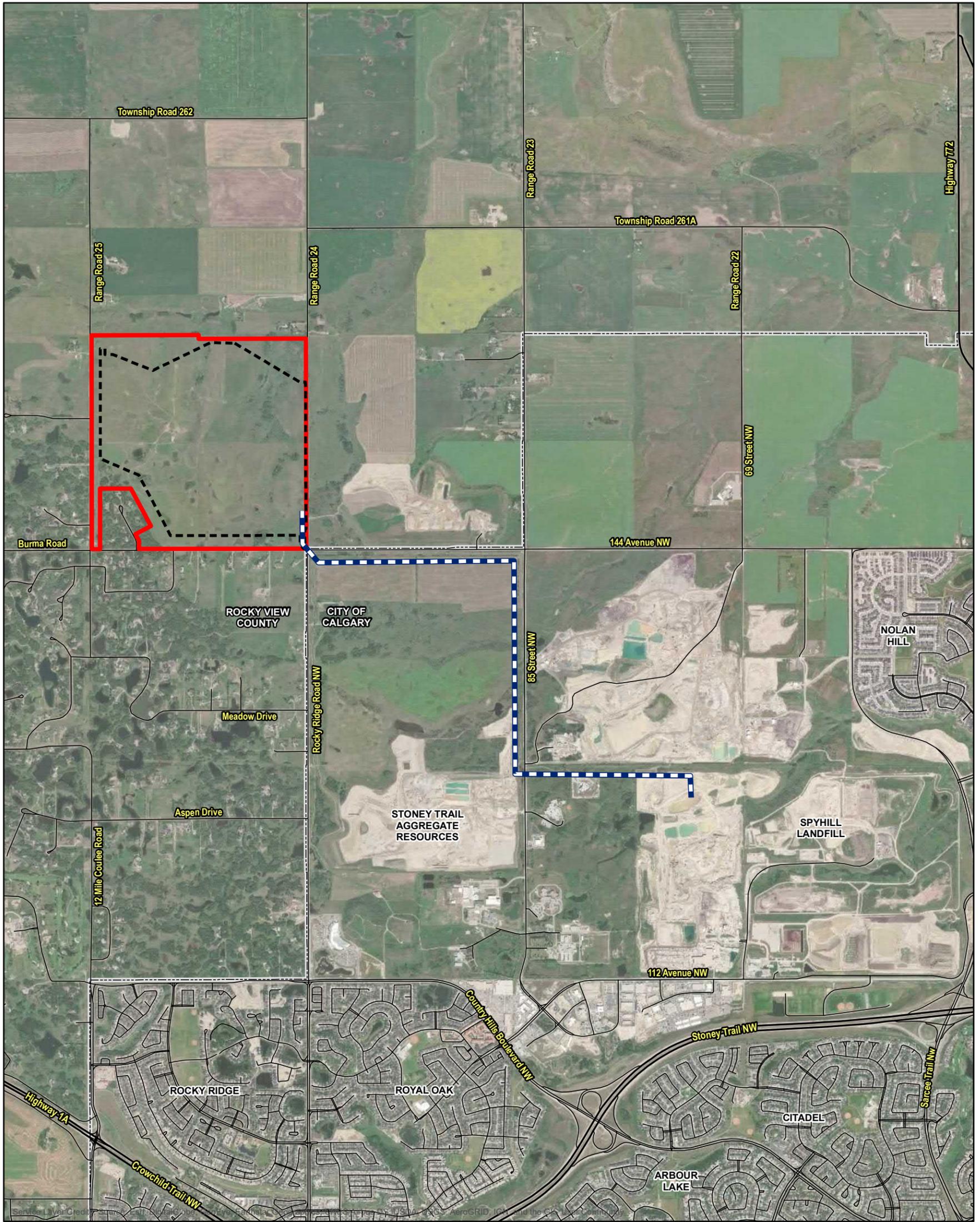
This approach was discussed with, and agreed to by, RVC (Pers. Comm., RVC 2020).

3.2 Alternative Development Potential

This report has been prepared to present a traffic assessment for the proposed development, focused specifically on the following steps:

- Estimating the amount of new traffic that the proposed development, once completely operational and running at its design capacity, would be expected to generate on a daily basis; and,
- Comparing/contrasting the estimated site traffic generation with the amount of new daily traffic generation that would be expected, if the subject lands were to be developed for single-family Country Residential uses.

For comparison purposes, development of the subject lands for single-family Country Residential uses has been considered due to community suggestions of a potential alternative to aggregates, and in keeping with the development of some similar sections of land in the area. The development potential of the Scott site was based on a review of aerial photographs of the area (using Google Earth), counting the number of households in a fully developed section of land near the site and then prorating to match the area of the subject site. Based on this approach we estimate that the property could be developed with approximately 150 to 160 single-family Country Residential dwellings; for the purposes of the trip generation comparison a figure of 160 units was used. This would accommodate a mix of parcels ranging from two to four acres which would be in alignment with the goals for density of country residential development in the Bearspaw Area Structure Plan update (RVC 2020).



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Legend

-  Off-Site Conveyor System
-  Property Boundary
-  Project Footprint
-  City of Calgary Limits
-  Highway
-  Road

Source: AltaLIS; NRCan

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4. Traffic Generation Comparison

4.1 Proposed Aggregate Extraction Operation

A common source of trip generation statistics for land development projects is the *Trip Generation Manual* (ITE, 2012) which provides statistical information for a wide variety of land uses based on a large database of traffic counts conducted for different categories of use. This is a very useful approach for many types of development projects, particularly common mixed-use developments such as shopping centres, office buildings, etc. In these situations, specific individual businesses/tenants are not known at the time of planning for the development, thus application of averaged rates from multiple different existing sites makes sense.

In our experience, establishing estimates of trip generation for a very specific, single-use development/operation such as the proposed Project is best done through a first principles assessment using information provided by Lehigh. Specifically, site-specific information related to numbers of employees by shift times, expected site visitors of different types, and anticipated various maintenance and service vehicle movements will provide more confident estimates than using generic trip generation data.

For the proposed Project at the Scott Property, Lehigh provided the following information regarding the proposed operation of the facility:

- On-site employees (7:00 a.m. to 8:00 p.m. shift): 9
- Visitors:
 - 2 miscellaneous visitors per week
 - 1 management visitor per day
- Contractors / service vehicles:
 - fuel delivery - once per week
 - electrical contractor - once per day
 - mechanical contractor - twice per week

The conversion of this information to estimated daily traffic generation is documented in the table provided in **Appendix A**, and in a comparative summary table in **Section 4.3**.

4.2 Potential Residential Development

An assessment of potential new traffic generation associated with the hypothetical alternative development of the subject lands for single-family Country Residential uses is presented in **Appendix B** and summarized in Section 4.3.

As described in Section 3.2, it is estimated that the subject property could accommodate approximately 160 dwelling units if developed at an overall density similar to other sections of land in the area. The approach to estimating traffic for the residential development scenario was based entirely on using published data from the *Trip Generation Manual*.

Consideration was given to conducting local trip generation counts in the vicinity of the site to determine an area-specific trip generation rate for the type of residential development that has occurred in this area. However, at the time of preparation of this traffic assessment, traffic generation patterns throughout Bearsaw and the Calgary region were believed to be significantly impacted by ongoing restrictions related to the COVID-19 virus pandemic;

traffic counts for the purpose of establishing “typical” trip generation rates would thus likely provide unusual and unusable data not indicative of daily usage.

4.3 Trip Generation Comparison Summary

Table 2 below provides a comparative summary (applying conservative and worst case assumptions) of the typical daily traffic generation levels expected for the proposed aggregate extraction operation (with conveyor-based transport of materials from the site) vs. the hypothetical scenario of developing the property for single-family Country Residential uses. As noted previously, more detailed trip generation calculations for each use are presented in the tables presented in **Appendix A** and **Appendix B**.

Table 2: Trip Generation Comparison

Development Scenario	Conservative Assessment			Worst Case Assessment		
	Daily Traffic Generation	Inbound Trips	Outbound Trips	Daily Traffic Generation	Inbound Trips	Outbound Trips
<i>Aggregate Operation w. Conveyor</i>	30 vpd	15 in	15 out	50 vpd	25 in	25 out
<i>Residential Development (160 single-family)</i>	800 vpd	400 in	400 out	1,600 vpd	800 in	800 out

5. Conclusions

As demonstrated in this assessment, and summarized in the preceding table, it is expected that development of the subject site for the proposed aggregate extraction operation would generate significantly less new traffic on the road network on a typical daily basis than would development of the property for single-family Country Residential uses.

6. References

6.1 Literature

Government of Alberta (GOA), 2019:

Environment Protection and Enhancement Act, Revised Statutes of Alberta 2000, Chapter E-12, as amended. Current as of December 5, 2019. Available online

Government of Alberta (GOA), 2004:

Code of Practice for Pits (*made under the Environmental Protection and Enhancement Act, RSA 2000, cE-12, as amended and Conservation and Reclamation Regulation (AR 115/93), as amended*). Alberta Queen's Printer, Edmonton, Alberta.

Institute of Transportation Engineers (ITE), 2012:

Trip Generation Manual, 9th Edition. Washington, DC.

Rocky View County (RVC), 2013:

County Servicing Standards. Approved by Resolution No. 188-13. Available online at <https://www.rockyview.ca/BuildingPlanning/StandardsSpecifications.aspx>. Accessed May 7, 2020.

Rocky View County (RVC), 2020:

Bearspaw Area Structure Plan, Phase 1 – Background Report. Available online at <https://www.rockyview.ca/Portals/0/Files/BuildingPlanning/Planning/UnderReview/BearspawASP/Bearspaw-ASP-Background-Report.pdf>. Accessed June 17, 2020.

6.2 Personal Communications

Rocky View County (RVC), 2019:

In-person meeting with Valerie Haaf (Lehigh Project Manager), Sophie Mullen (Lehigh Director, Sustainable Resource Development), Al Hoggan (RVC Chief Administrative Officer), and Dominic Kazmierczak (RVC Supervisor Planning [Policy]) in November 2019 regarding the Traffic Impact Assessment for the Project.

Rocky View County (RVC), 2020:

Phone conversation with Valerie Haaf (Lehigh Project Manager) and Milan Patel (RVC Municipal Engineer) in May 2020 regarding Lehigh's approach to the Traffic Impact Assessment.

Appendix **A**

Trip Generation Estimation – Aggregate Operation

Trip Generation Estimation - Aggregate Operation

Aggregate Conveyor Option - "Conservative" Scenario

For a typical weekday during normal operations:

"First Principles" Assessment

on-site employees , by shift	9	07:00 to 19:00	@	2.5	vpd per employee =	23	vpd
visitors ... management	1	per day	@	2	vpd per visitor =	2	vpd
... misc. @ 2 per week	1	per day	@	2	vpd per visitor =	2	vpd
fuel delivery truck @ 1 per week	0	per day	@	2	vpd per delivery =	0	vpd
electrical maintenance @ 1 per day	1	per day	@	2	vpd per contractor =	2	vpd
mechanical maintenance @ 2 per week	0	per day	@	2	vpd per contractor =	0	vpd
TOTAL:						30 vpd	(rounded)
50/50 in/out split:						15 inbound	
						15 outbound	

Aggregate Conveyor Option - "Worst Case" Scenario

For a typical weekday during normal operations:

"First Principles" Assessment

on-site employees , by shift	9	07:00 to 19:00	@	4	vpd per employee =	36	vpd
visitors ... management	1	per day	@	2	vpd per visitor =	2	vpd
... misc. @ 2 per week	2	per day	@	2	vpd per visitor =	4	vpd
fuel delivery truck @ 1 per week	1	per day	@	2	vpd per delivery =	2	vpd
electrical maintenance @ 1 per day	1	per day	@	2	vpd per contractor =	2	vpd
mechanical maintenance @ 2 per week	1	per day	@	2	vpd per contractor =	2	vpd
TOTAL:						50 vpd	(rounded)
50/50 in/out split:						25 inbound	
						25 outbound	

Appendix **B**

Trip Generation Estimation – Alternative Development Comparison

Trip Generation Estimation - Alternative Development Comparison

Residential Development Option - Published Trip Rates

Assume **160** single-family homes

ITE Land Use Code 210 - Single-Family Detached Housing:

ITE's *Trip Generation Manual* (9th Edition) provides two different ways of assessing potential traffic generation:

1. TRIP RATES PER UNIT OF DEVELOPMENT (based on counts of multiple developments):

average trip rate: 9.52 vehicle trips per day (vpd) per dwelling unit (DU)	1,523 vpd	
standard deviation: 3.7	931 vpd	to 2,115 vpd (avg +/- one std. dev'n)
range of counted trip rates: 4.31 - 21.85 vpd per DU	690 vpd	to 3,496 vpd

[for all calculated daily traffic generation levels, expected inbound / outbound split is 50 / 50]

2. FITTED CURVE EQUATION BASED ON FULL DATASET OF COUNTS:

fitted curve: $\ln(T) = 0.92\ln(X) + 2.72$ ($R^2 = 0.95$)	1,618 vpd	[or 10.11 vpd per DU equivalent]
in / out split: 50 / 50	809 inbound	
	809 outbound	

Residential Development Option - "Conservative" Scenario

160 dwelling units @ 5 vehicles per day per unit = 800 vpd	TOTAL: 800 vpd
	50/50 in/out split: 400 inbound 400 outbound

Residential Development Option - "Worst Case" Scenario

160 dwelling units @ 10 vehicles per day per unit = 1600 vpd	TOTAL: 1600 vpd
	50/50 in/out split: 800 inbound 800 outbound

