Master Site Development Plan and Land Use Amendment Application affecting NW & SW 31-26-3-W5M

DRAFT

Public Hearing Presentation

March 2nd, 2021

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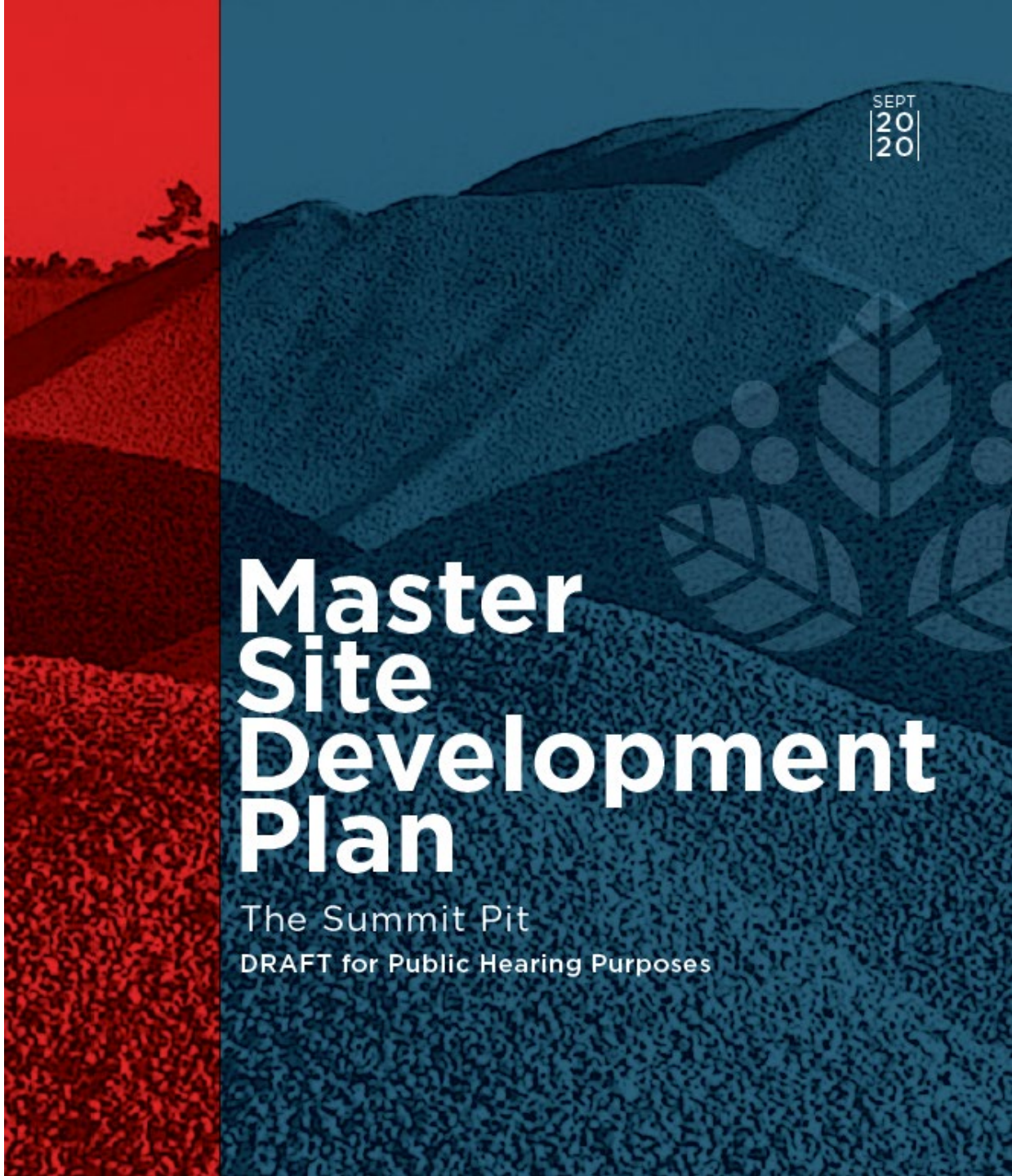
b&a | B&A Planning Group



Mountain Ash Limited Partnership

- **Bruce Waterman**
  Chief Operating Officer
  - Canada's CFO Of The Year in 2008
  - Executive leadership in national and international agriculture, fisheries & natural resource sectors
- **Tige Brady**
  Business Development Manager
  - 20+ years experience in the construction, forestry and aggregate industries
- **Independent & innovative** aggregate producer
- Owned lands for 14+ years
- Instrumental in creating the **Joint Operating Commitments** for the Big Hill Springs Aggregate Producers Group

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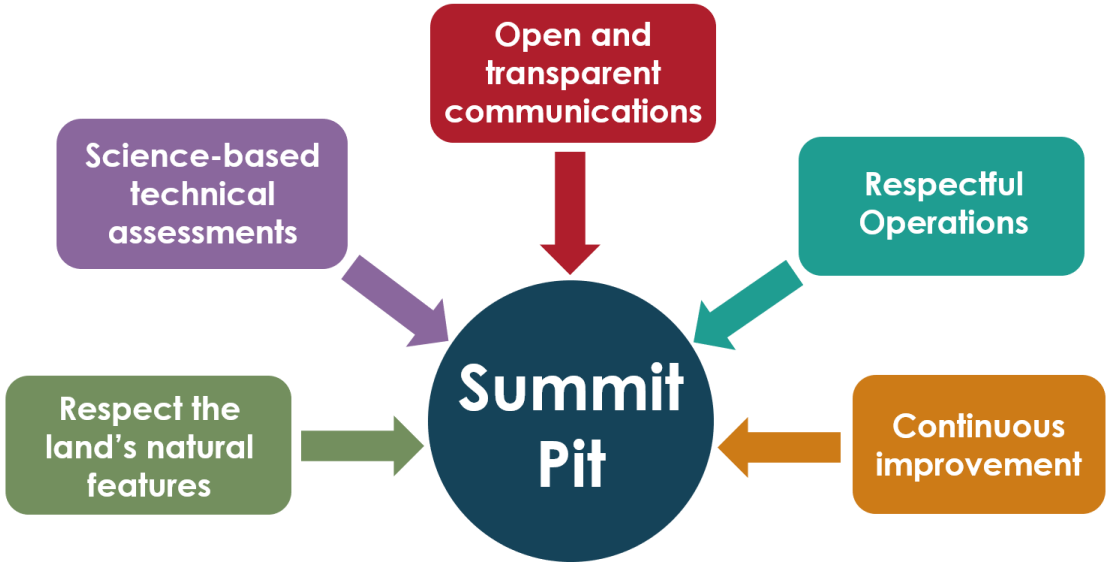
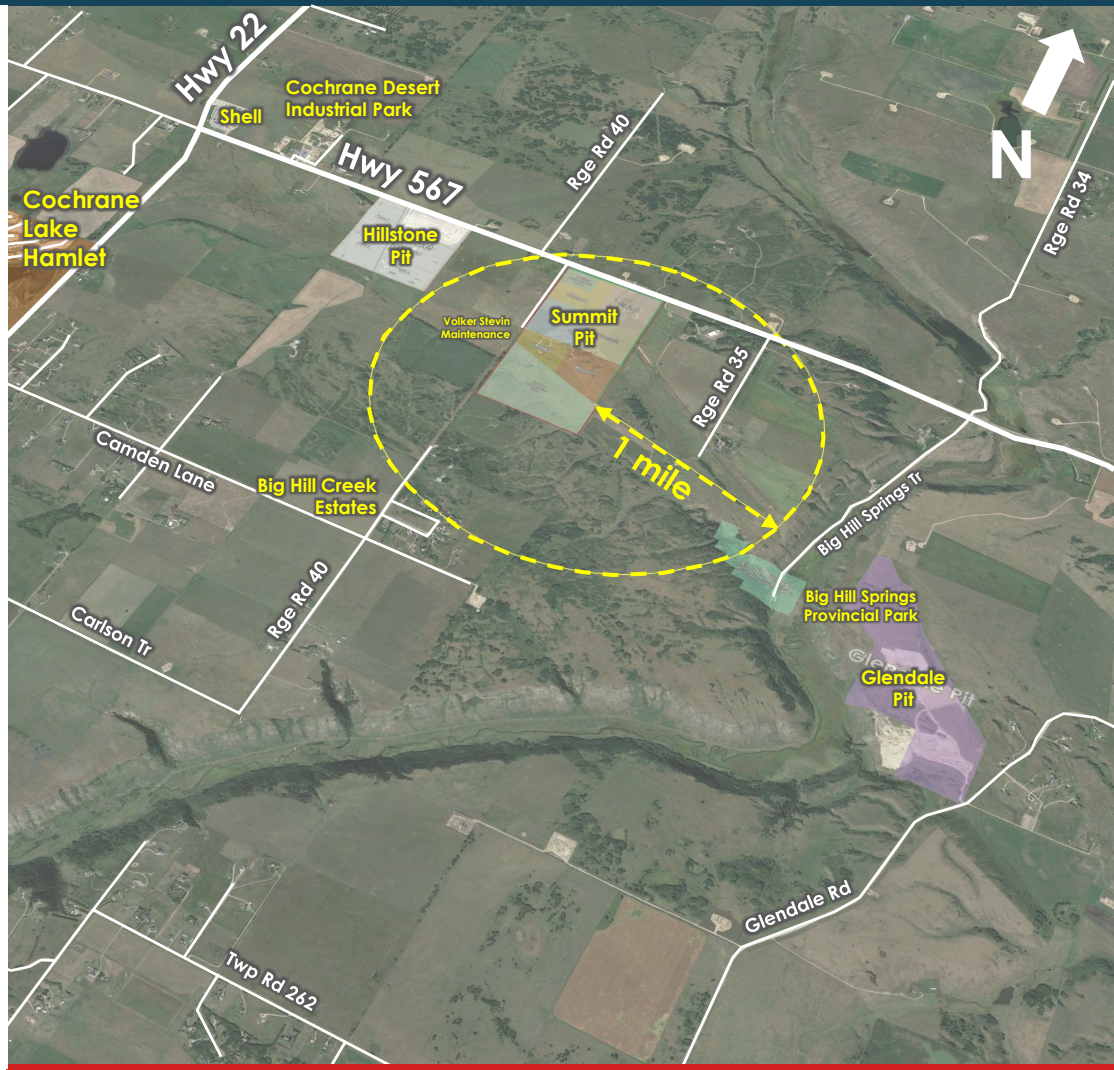


Introduction

- RVC Council has **previously approved this project**, ***twice***
- MALP is very proud of our proposal:
  - The site contain high quality aggregate that should be leveraged to support sustainable growth
  - The **evolving land use/development character** of the surrounding area is appropriate to support the project
  - The recommendations and conclusions of our supporting technical assessments are of the **highest quality**
  - MALP is committed to **operational excellence** and is prepared to be a positive corporate citizen
- MALP **acknowledges the concerns expressed** *(most of which were only made known to us recently)*
- **We respectfully disagree with the opposition**
  - Which we believe is based on ***incorrect assumptions*** relative to our technical reports



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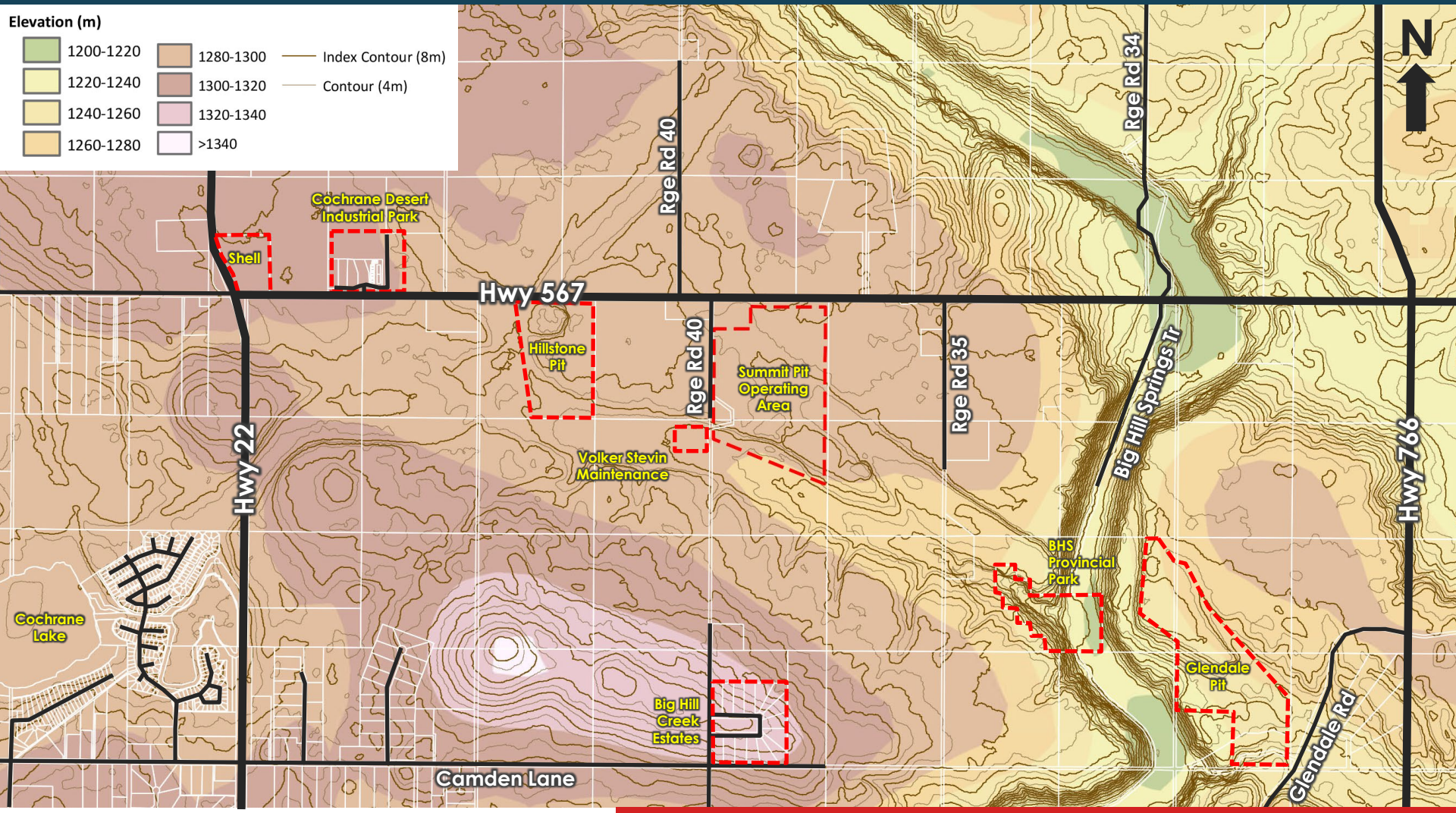
Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Topography



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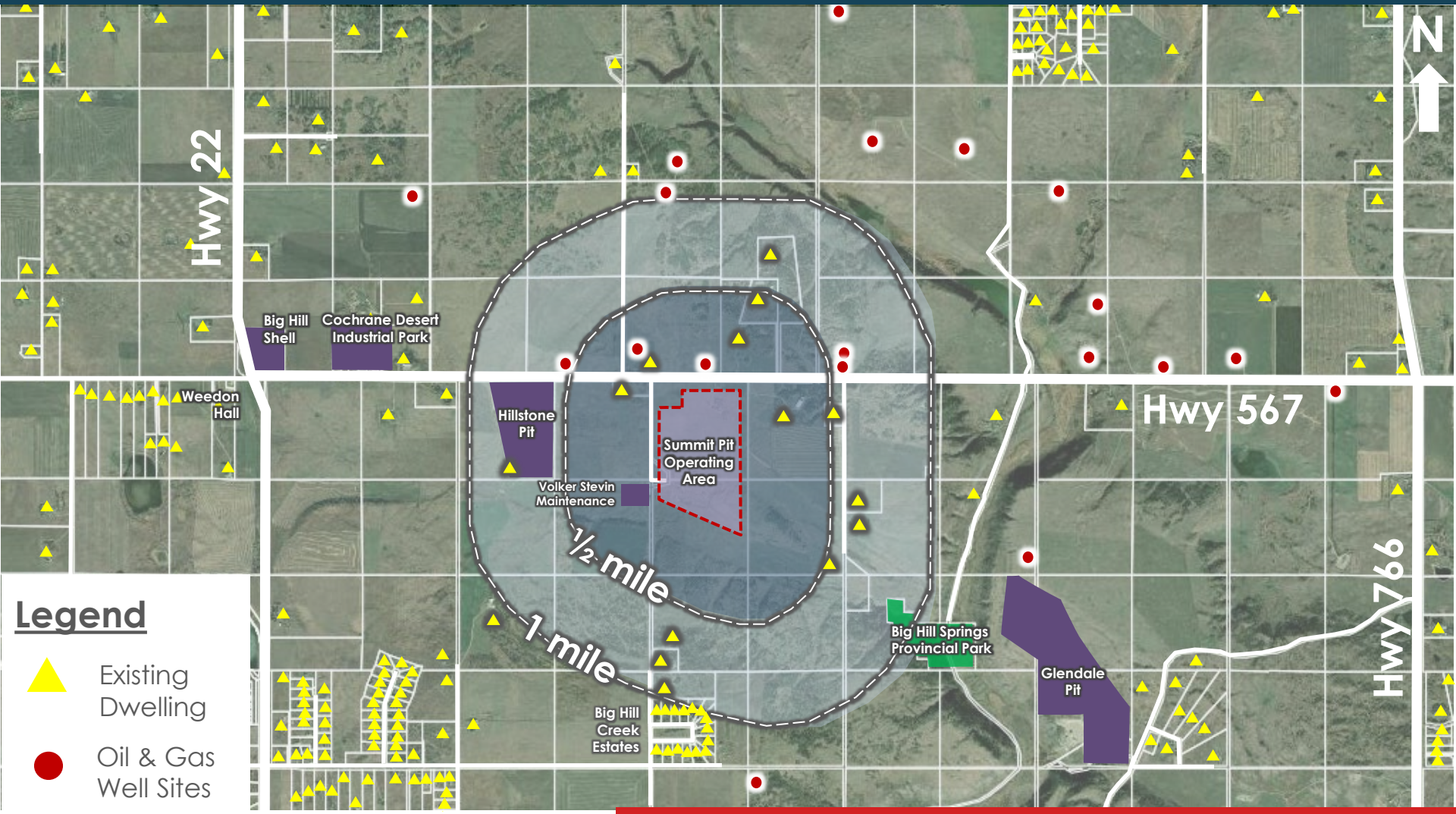
Why a gravel pit here?



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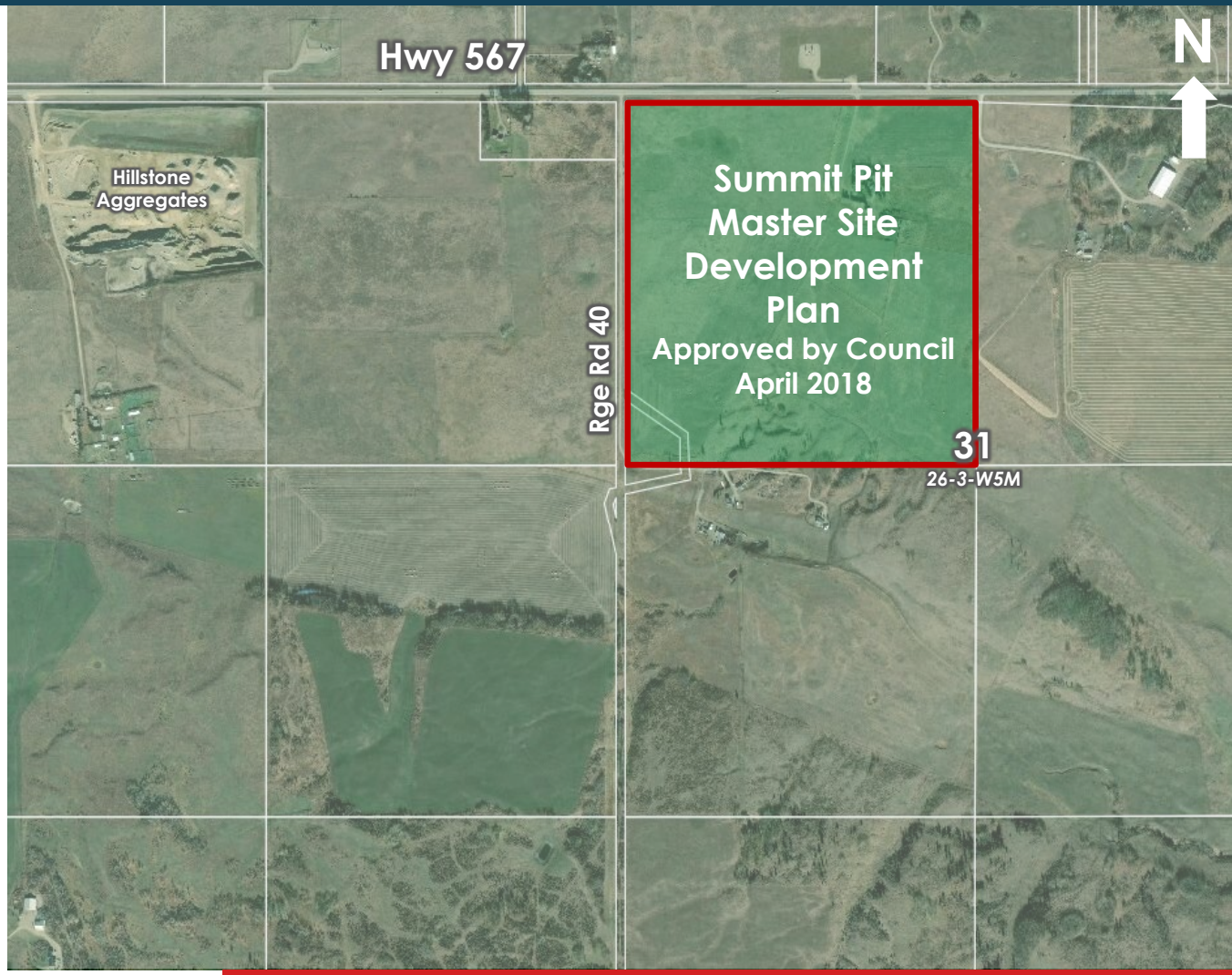
Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Approved Master Site Development Plan

- **Summit Pit MSDP**
  - Approved by Council on April 24, 2018
- Comprehensive **Technical Assessments**
  1. Biophysical Impact Assessment
  2. Hydrogeological Impact Assessment
  3. Noise Impact Assessment
  4. Air Quality Assessment
  5. Conceptual Stormwater Management Report
  6. Transportation Impact Assessment
  7. Cumulative Affects Framework *(Joint Commitments)*



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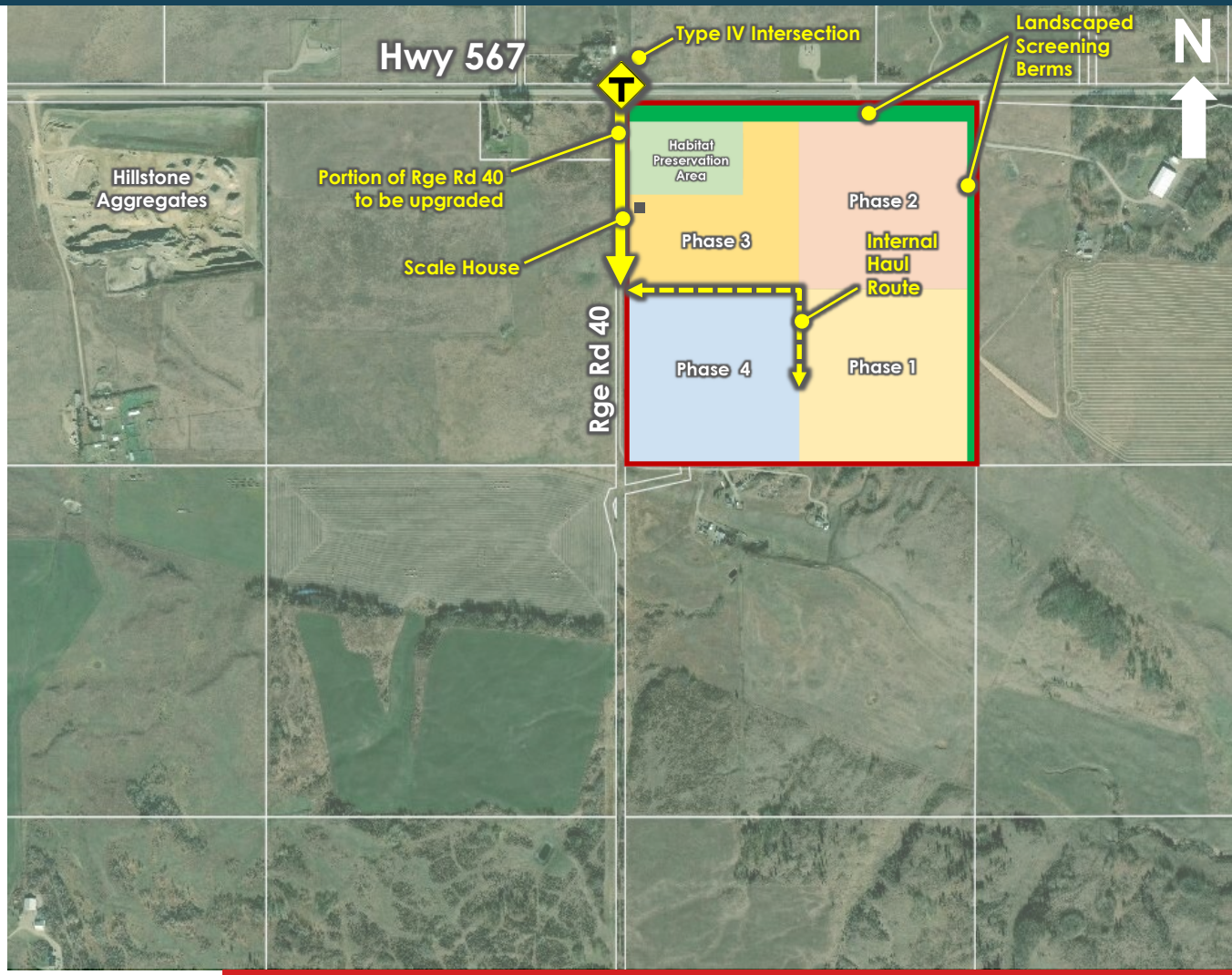
Approved Development Concept 2018

- Four *(4)* phase implementation
  - Temporary **DP's** *(5 yr renewal)*
  - Maximum **40 ac excavation**
  - **Progressive reclamation**
  - **Performance Standards** *(Noise, Air Quality, and Groundwater)*
  - **Type IV Highway intersection** and Rge Rd 40 upgrade
  - Internal haul route
  - Landscaped buffers
  - Habitat preservation area



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Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Proposed Master Site Development Plan

- **Revised Summit Pit MSDP**
- Comprehensive **Technical Assessments** *(updated as required)*
  1) Biophysical Impact Assessment
  2) Hydrogeological Impact Assessment
  3) Noise Impact Assessment
  4) Air Quality Assessment
  5) Conceptual Stormwater Management Report
  6) Transportation Impact Assessment
  7) Cumulative Affects Framework *(Joint Commitments)*

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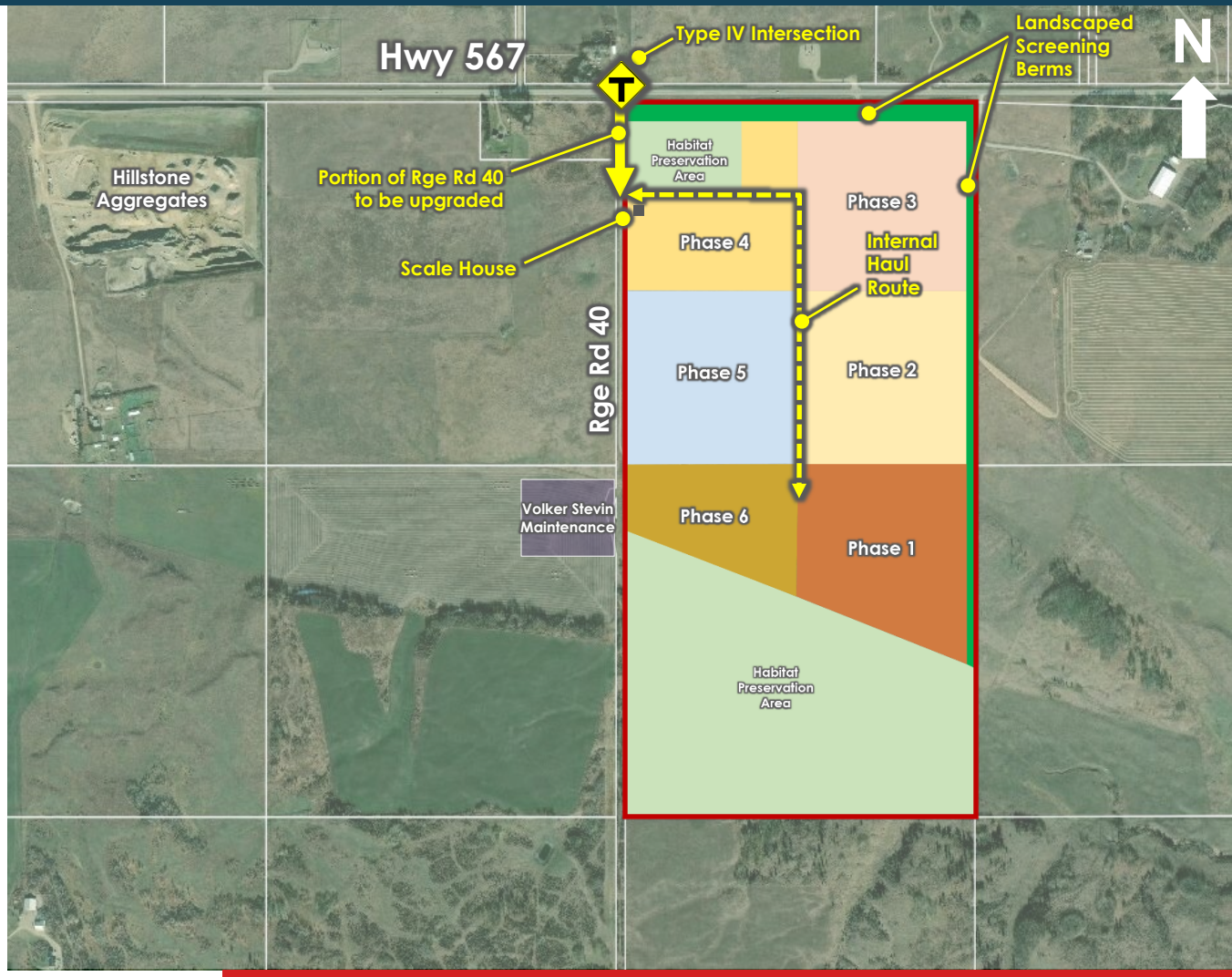
Proposed Development Concept

- Six *(6)* phase implementation
  - Temporary **DP's** *(5 yr renewal)*
  - Maximum **40 ac excavation**
  - **Progressive reclamation**
  - **Performance Standards** *(Noise, Air Quality, and Groundwater)*
  - **Type IV intersection** and partial Rge Rd 40 upgrade
  - Internal haul route
  - Landscaped buffers
  - Habitat preservation area*(s)*



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Why expand the approved MSDP?

- Mining operations in NW 31 to lower existing grades by ± 25 m
  (as per adopted MSDP)
- Halting excavation at boundary of NW 31 creates an *'egg carton'*
- MALP purchased SW 31 to enable excavation to begin at bottom of north facing slope
- The revised phasing program will:
  - Uniformly **lower grades across the site**
  - Utilize the south face of gravel as an **acoustic and visual shield**
  - **Reduce potential impacts** to adjacent building sites

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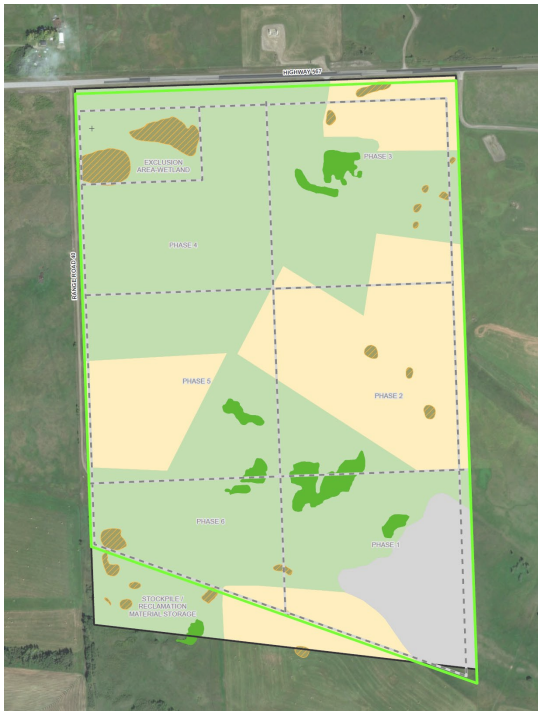
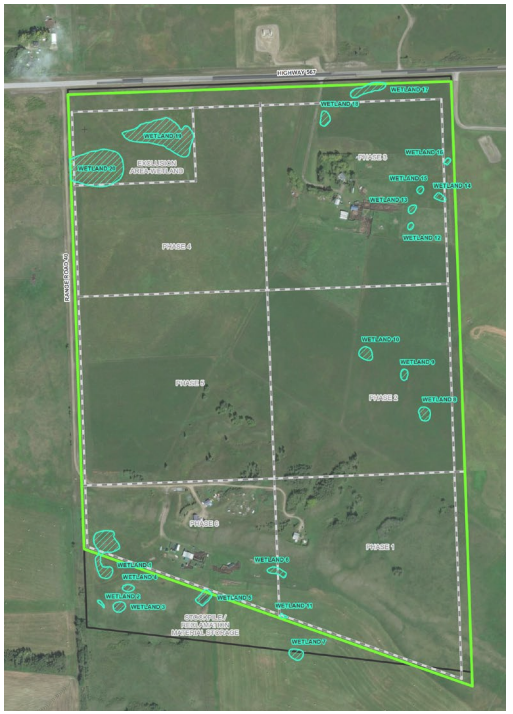
Site Conditions

- **Biophysical Impact Assessment, SLR Consulting, January 2020**
- **Wetland Assessment Impact Report, SLR Consulting, February 2020**
- Habitat conditions within the Plan area are heavily disturbed by agricultural activities
- **No rare plants or species at risk within the site or surrounding area**
- Compensation for wetland disturbances as per Provincial Wetland Policy
- Stripped overburden will be stockpiled and replaced in reclaimed areas
- **Negligible environmental impacts anticipated by the Project**

Vegetation Map



Wetland Map



"Bull Trout and Westslope Cutthroat Trout *do not* occur in the Big Hill Creek System".

SLR Consulting

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Aggregate Operations

- Operating hours:
  - Weekdays: 7 am – 7 pm
  - Sat: 7 am – 5 pm
  - Sun & Stat Holidays: None
- Max. 40 ac excavation area
- Performance Standards
  - Monitoring and reporting programs for noise, air quality and groundwater
  - Communications Program with Complaint Management Protocols
  - Multiple Development Permit approval process *(5 yr renewal)*
- Operational Best Practices
  - Seasonal crushing *(likely spring time only)*
  - 'No Crushing Zone'
  - Spill containment protocol
  - ASGA Truck Registry
  - Dust mitigation
  - Progressive Reclamation

"The Summit Pit will be, first and foremost, an environmentally responsible aggregate operation that respects our land as well as our neighbours use and enjoyment of their properties".

Tige Brady, Business Development Manager, Mountain Ash Limited Partnership

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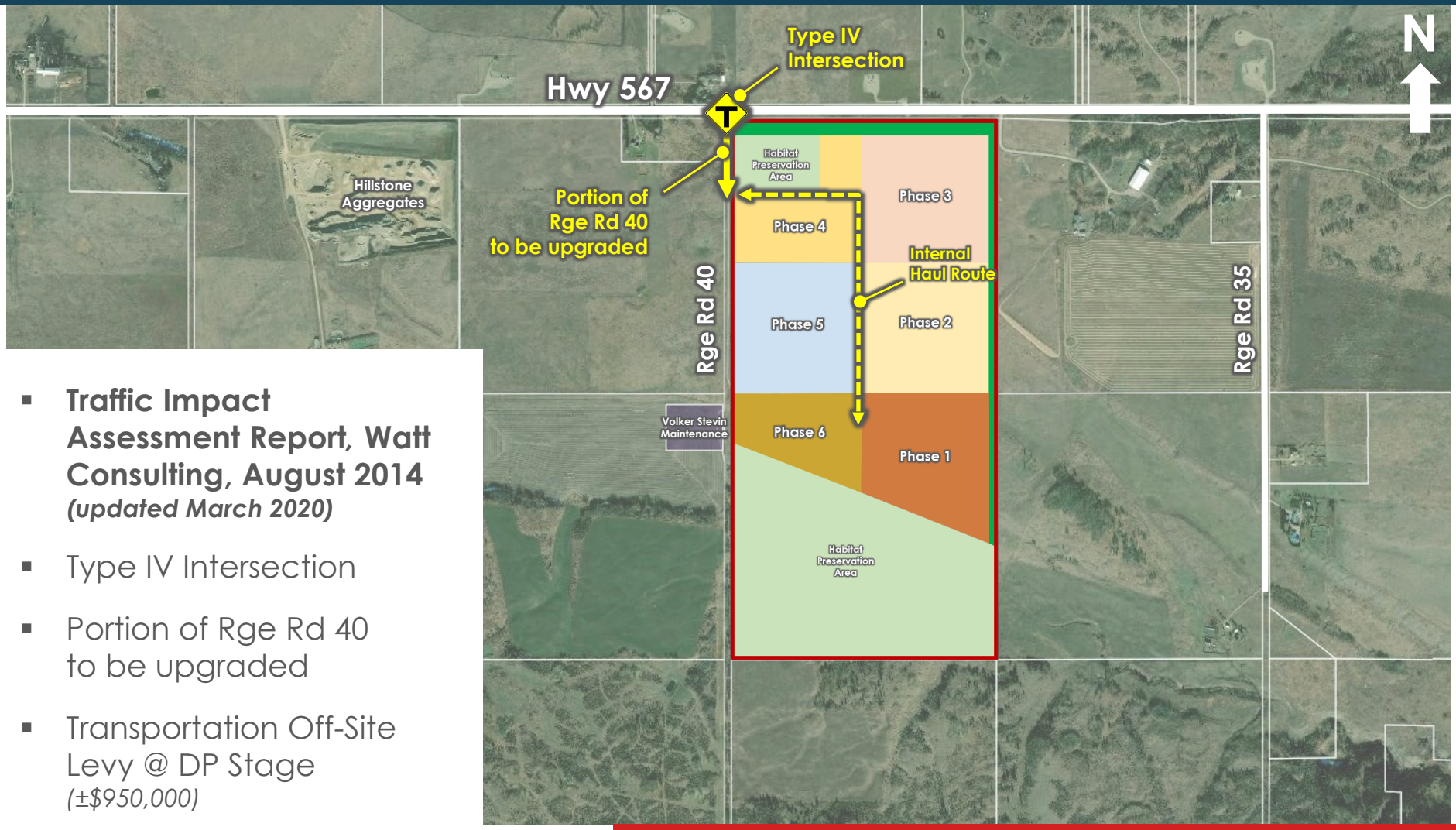
Transportation Mitigation



- **Traffic Impact Assessment Report, Watt Consulting, August 2014** ***(updated March 2020)***
- Type IV Intersection
- Portion of Rge Rd 40 to be upgraded
- Transportation Off-Site Levy @ DP Stage *(±$950,000)*

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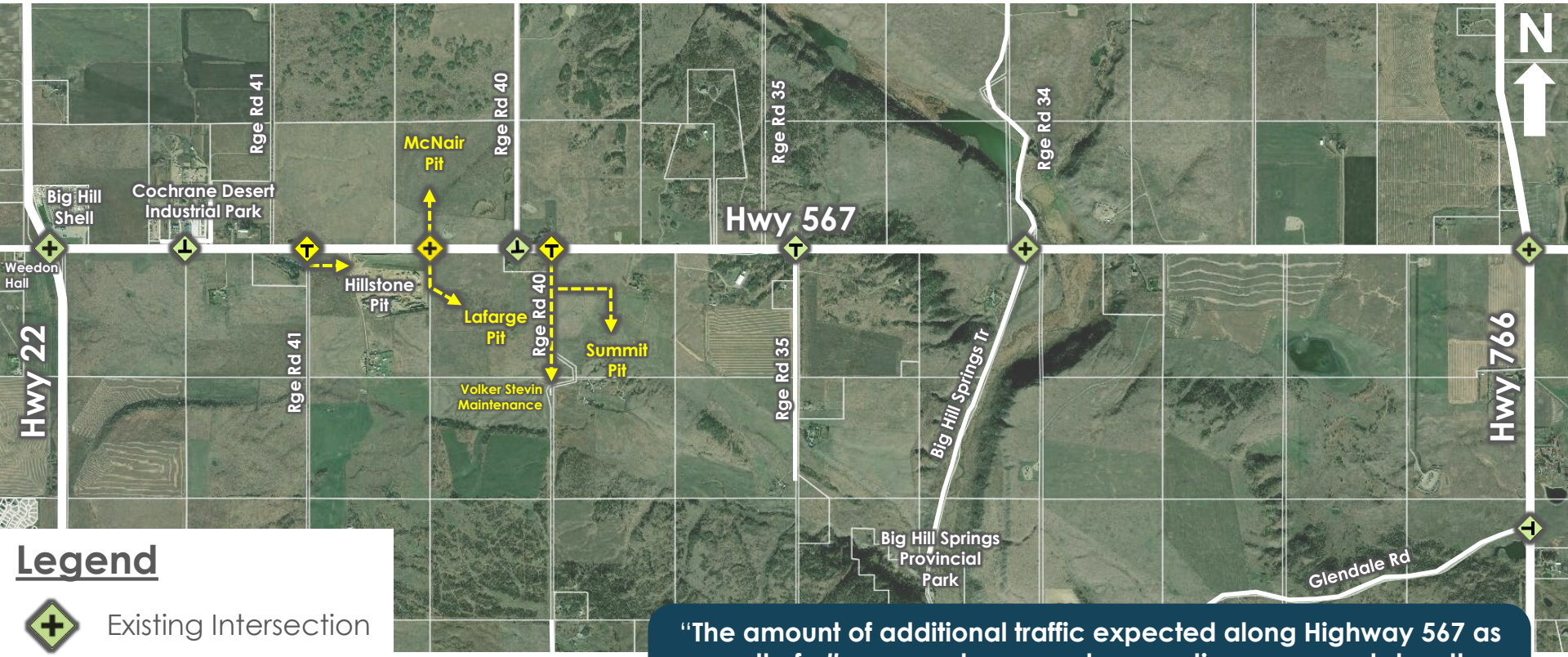
Highway 567 Access Management



Legend

- Existing Intersection
- New Intersection and Local Access

"The amount of additional traffic expected along Highway 567 as a result of *all* proposed aggregate operations represents less than 1% of the current volumes within this corridor".

Big Hill Springs Aggregate Producers Group Global Traffic Impact Assessment, Stantec

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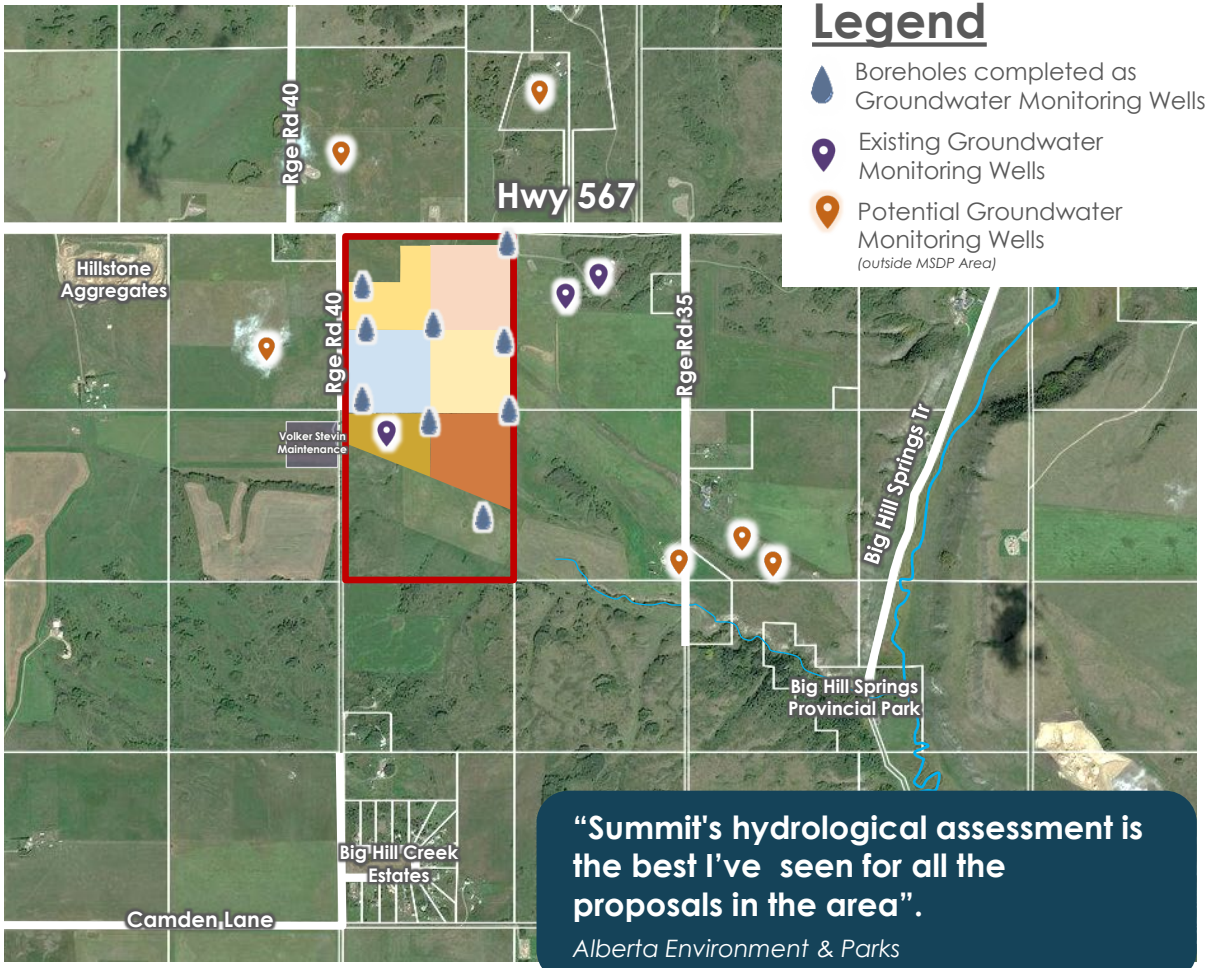
Groundwater Mitigation

- **Hydrogeological Impact Assessment Report, SLR Consulting, January 2020**
- Extensive 6+ year Groundwater Monitoring Program
- Mining operations to respect **minimum 1 m clearance** from *maximum measured* water table
- **<u>No impacts to underlying aquifer – *or the Big Hill Springs*</u>**
- Monitoring and reporting @ DP stage
  - Commitment to monitor and report water quality in the Big Hill Springs Park



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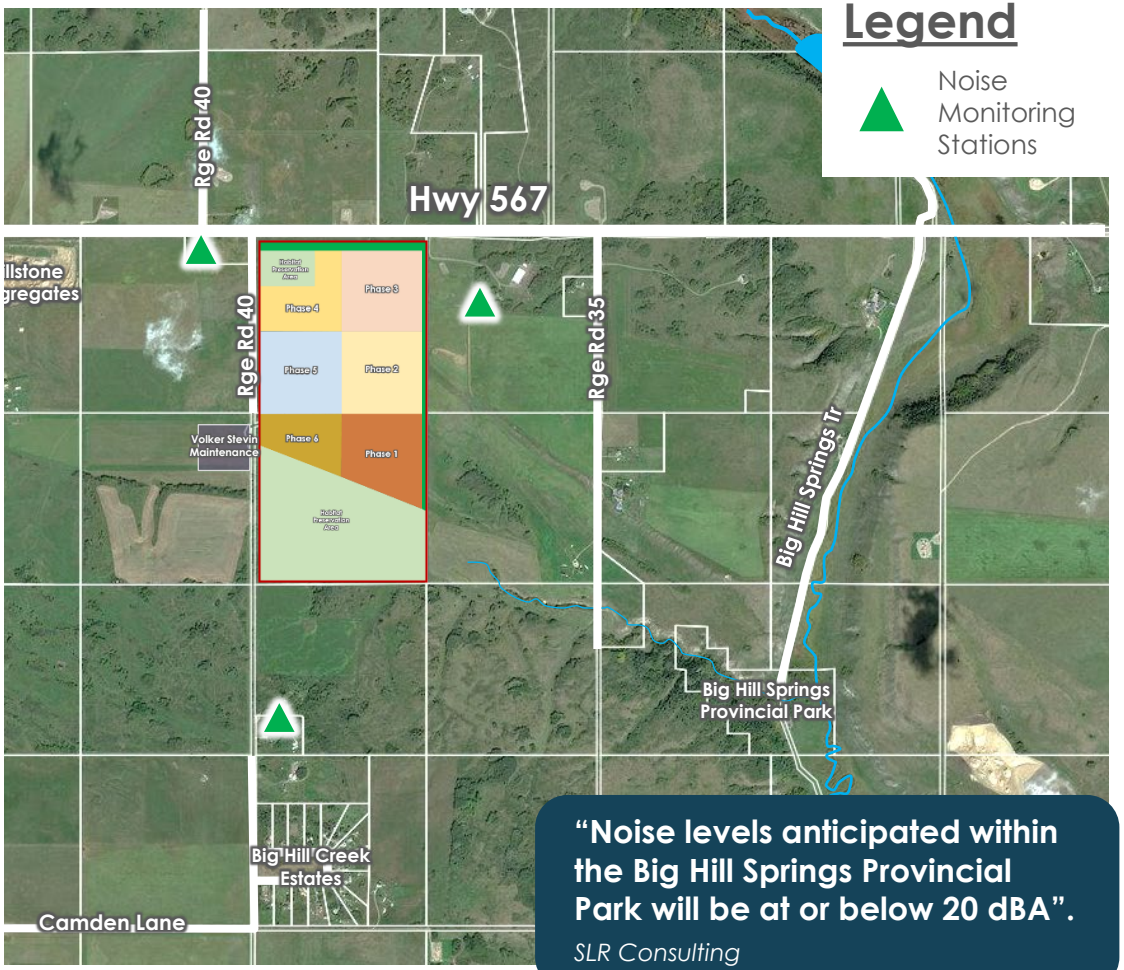
Noise Mitigation

- **Acoustic Assessment, SLR Consulting, May 2020**
- Sound Monitoring Program
  - To establish existing ambient noise levels *(over 24 hr periods)*
- Sound Propagation Model
  - To establish predicted noise levels
- **Noise will be *at or below 55 dBA***
  (measured at the closest receptor)
- Operational Best Practices
  - Reduced operating hours
  - Equipment shrouds
  - Enhanced mufflers
  - Low level broadband back up alarms
  - Anonymous sound monitoring
- Ongoing noise monitoring and reporting @ DP stage



"Noise levels anticipated within the Big Hill Springs Provincial Park will be at or below 20 dBA".
SLR Consulting

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Air Quality Mitigation

- **Air Quality Assessment Report, SLR, May 2020**
- Emission Dispersion Modelling
  - Baseline ambient within 5 km
  - Project + baseline
- Potential impacts to air quality:
  - Overburden stripping
  - Extraction and processing activities
  - Transport of materials *(within and from site)*
  - Engine combustion
- Operational Best Practices:
  - Paving portion of Rge Rd 40
  - Calcium chloride & watering on internal haul routes
  - Equipment shrouds
  - Cessation of operations in high winds
  - Minimum development setbacks for crusher
- Operations will ***meet or exceed*** **the Alberta Ambient Air Quality Objectives *(AAAQO)***

Table 1-1 Alberta Ambient Air Quality Objectives (AAAQOs)

Pollutant	Averaging Period	AAAQOs ($\mu g/m^3$)
SO_2	9th Highest 1-hour	450
	Maximum 24-hour	125
	Maximum 30-day	30
	Annual	20
NO_2	9th Highest 1-hour	300
	Annual	45
CO	9th Highest 1-hour	15,000
	Maximum 8-hour	6,000
$PM_{2.5}$	Maximum 24-hour	29
TSP	Maximum 24-hour	100
	Annual	60

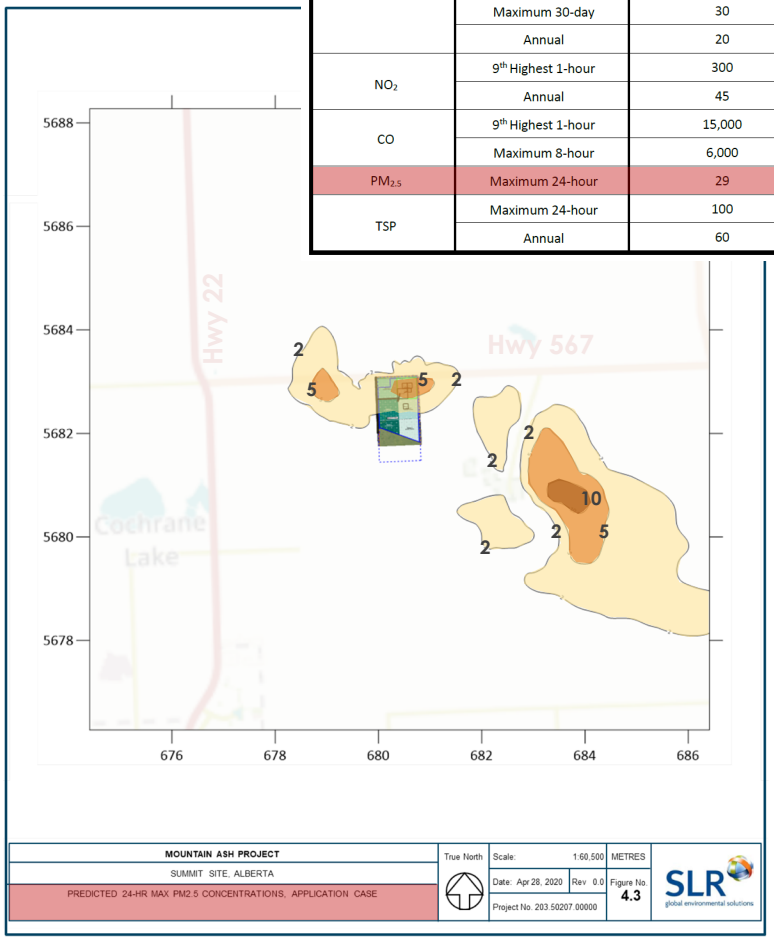

Figure 4-3 Predicted 24-hr MAX $PM_{2.5}$ Concentrations, APPLICATION CASE

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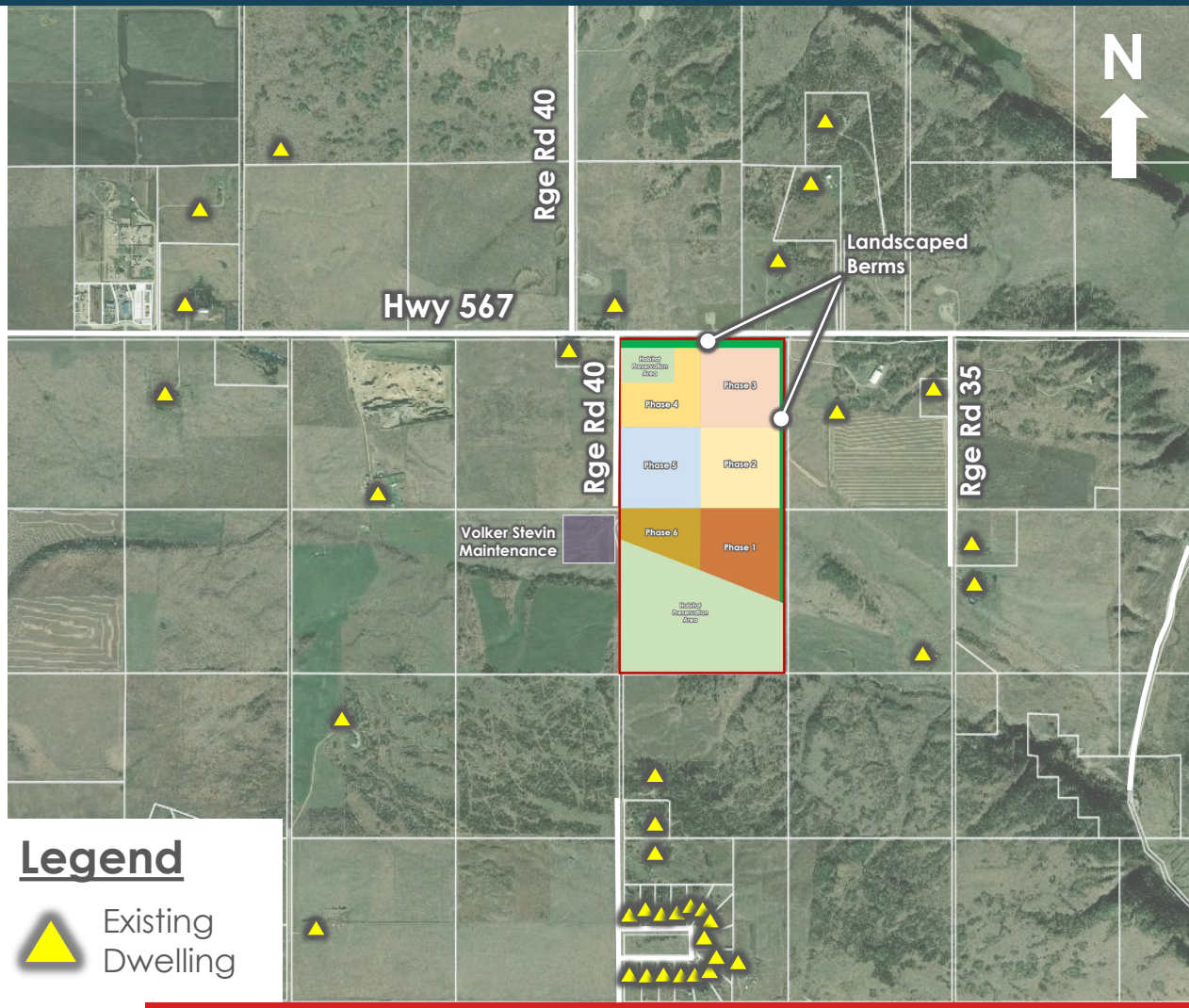
Visual Impact Mitigation

- **Visual Appraisal Report, SLR Consulting, February 2020**
- Landscaped Berms
- Revised phasing program to excavate south slope to create a **visual shield** for building sites to north and northeast
- Building sites to the south are screened by existing vegetation, topographical elevation and distance
  (including Big Hill Creek Estates)
- **No negative visual impacts to surrounding lands**



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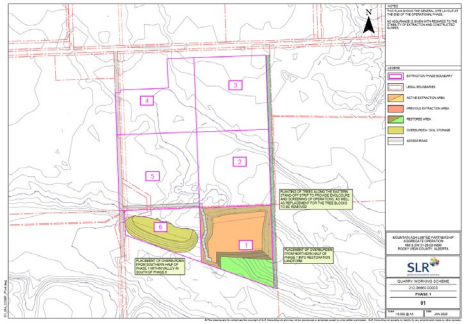
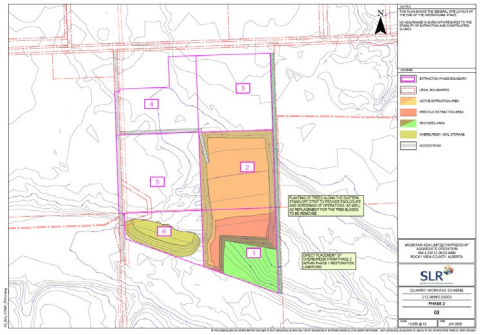
Progressive Reclamation

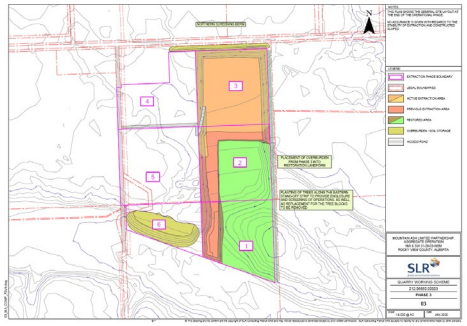
Stage 1



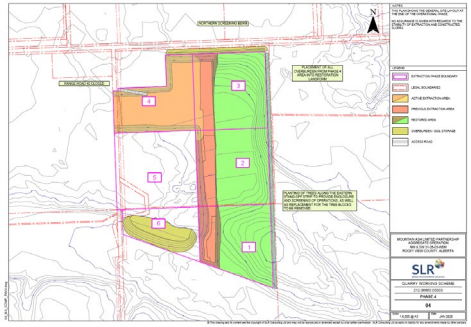
Stage 2



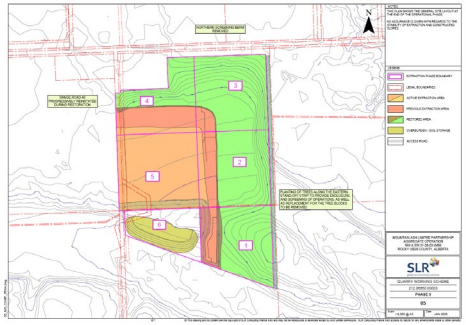
Stage 3



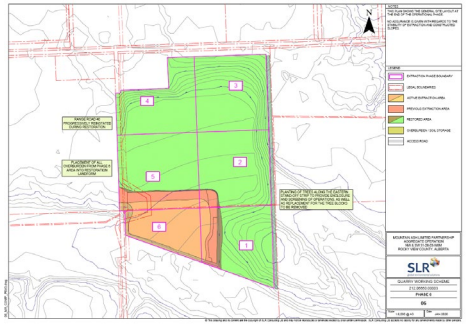
Stage 4



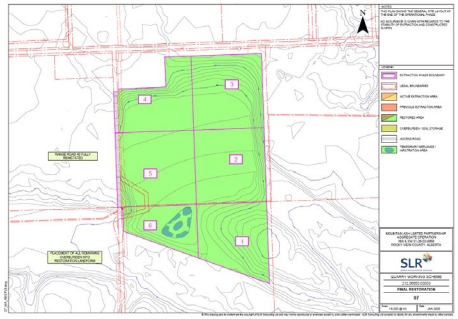
Stage 5



Stage 6



Final Reclamation



- Progressive reclamation through six *(6)* operating phases

Show 4D Video here

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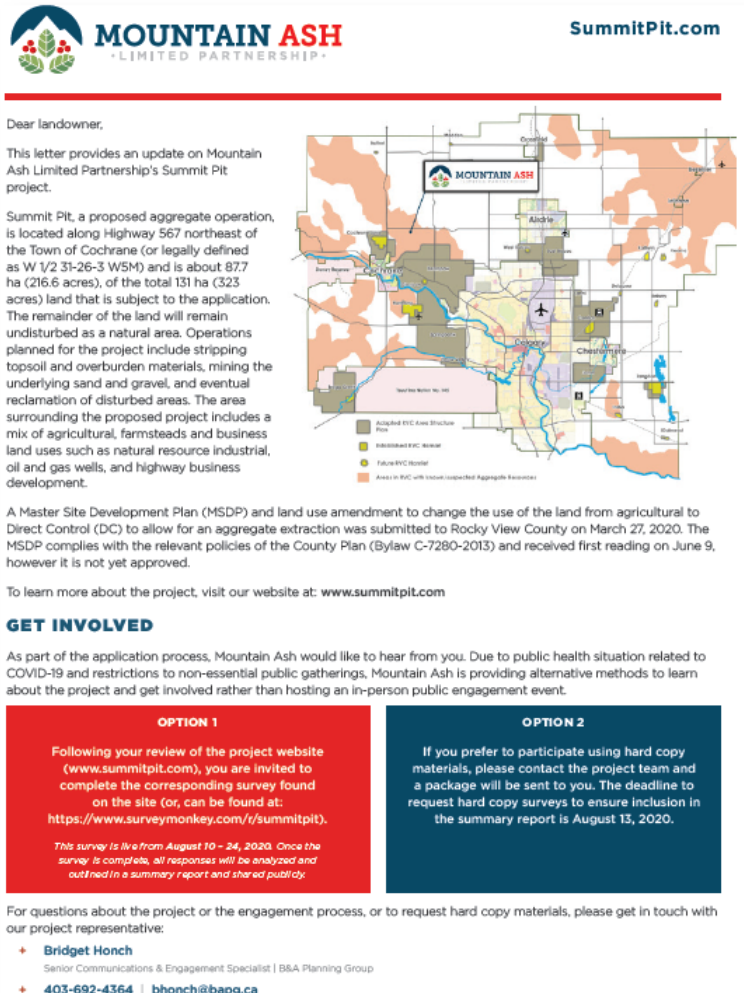
Community Engagement

- MALP committed to a respectful and transparent engagement process
- COVID 19 = Virtual Engagement
- Project Website
- Online Survey *(24 respondents)*
- Summary Report
- Concerns expressed relative to:
  - Traffic
  - Environmental Impacts
  - General opposition to aggregate extraction within the area



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SummitPit.com

Dear landowner,

This letter provides an update on Mountain Ash Limited Partnership's Summit Pit project.

Summit Pit, a proposed aggregate operation, is located along Highway 567 northeast of the Town of Cochrane (or legally defined as W 1/2 31-26-3 W5M) and is about 87.7 ha (216.6 acres), of the total 131 ha (323 acres) land that is subject to the application. The remainder of the land will remain undisturbed as a natural area. Operations planned for the project include stripping topsoil and overburden materials, mining the underlying sand and gravel, and eventual reclamation of disturbed areas. The area surrounding the proposed project includes a mix of agricultural, farmsteads and business land uses such as natural resource industrial, oil and gas wells, and highway business development.

A Master Site Development Plan (MSDP) and land use amendment to change the use of the land from agricultural to Direct Control (DC) to allow for an aggregate extraction was submitted to Rocky View County on March 27, 2020. The MSDP complies with the relevant policies of the County Plan (Bylaw C-7280-2013) and received first reading on June 9, however it is not yet approved.

To learn more about the project, visit our website at: **www.summitpit.com**

GET INVOLVED

As part of the application process, Mountain Ash would like to hear from you. Due to public health situation related to COVID-19 and restrictions to non-essential public gatherings, Mountain Ash is providing alternative methods to learn about the project and get involved rather than hosting an in-person public engagement event.

OPTION 1

Following your review of the project website (www.summitpit.com), you are invited to complete the corresponding survey found on the site (or, can be found at: https://www.surveymonkey.com/r/summitpit).

This survey is live from August 10 – 24, 2020. Once the survey is complete, all responses will be analyzed and outlined in a summary report and shared publicly.

OPTION 2

If you prefer to participate using hard copy materials, please contact the project team and a package will be sent to you. The deadline to request hard copy surveys to ensure inclusion in the summary report is August 13, 2020.

For questions about the project or the engagement process, or to request hard copy materials, please get in touch with our project representative:

Bridget Honch
Senior Communications & Engagement Specialist | B&A Planning Group
403-692-4364 | bhonch@bapg.ca

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Community Engagement

- Technical reports provided to stakeholders on request
- Copies provided to:
  - Janet Ballantyne *(Rocky View Gravel Watch)*
  - Harry Hodgson
  - Gerry Bietz *(Big Hill Springs Preservation Society)*
  - Bette Beswick
  - Jon Fennell *(Friends of the Big Hill Springs Provincial Park and Big Hill Springs Preservation Society)*
- MALP followed up with offers to meet to review/discuss questions or concerns
  - *None accepted offer to meet*
- MALP acknowledges the opposition letters in the Mar 2 Council agenda
  - MALP respectfully disagree with the assertions and claims of the technical reviews
  - ***MALP invites questions of Council to respond to and clarify the concerns raised***

We note our technical reports were *reviewed and endorsed* by AEP, AT, AHS and RVC administration

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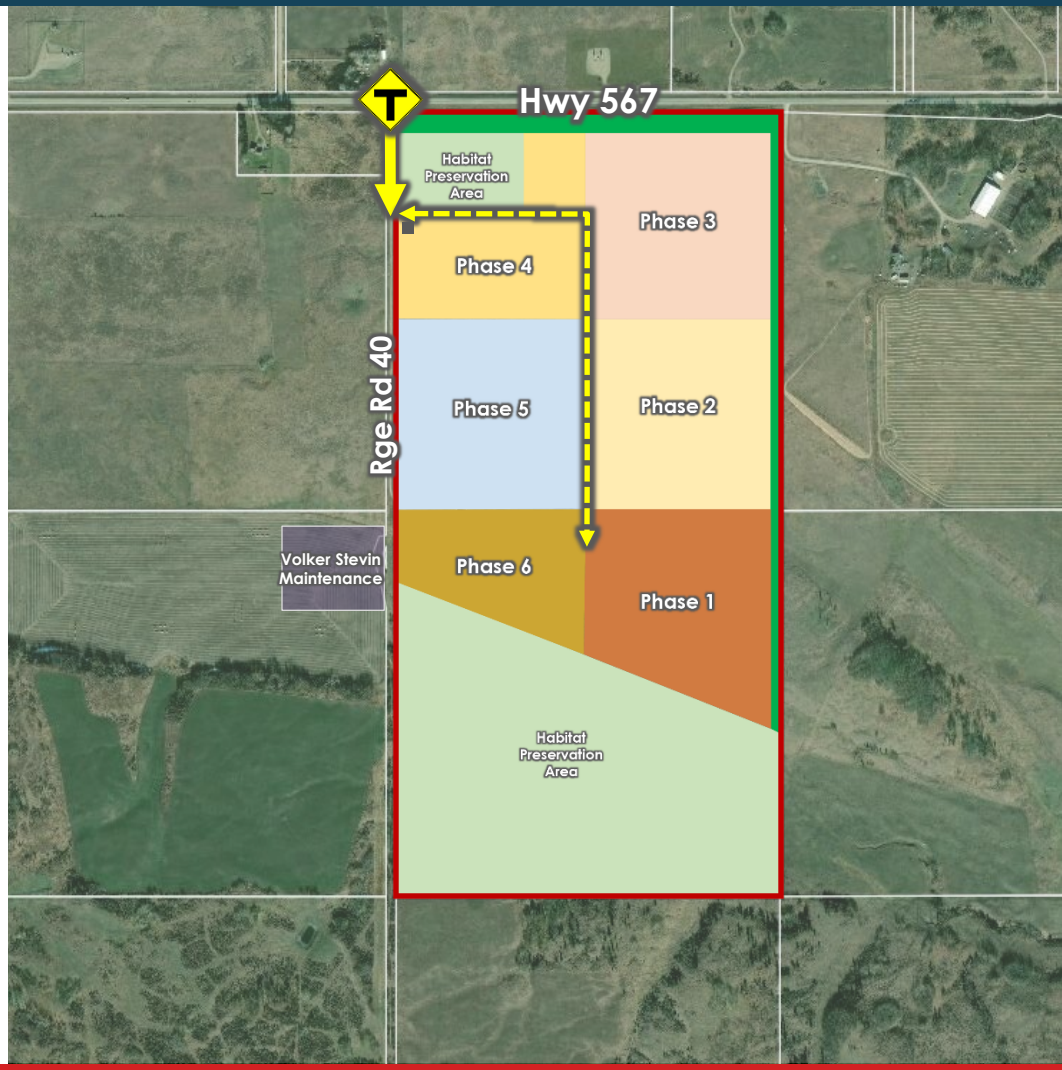
Reasons for Support

1) Activates a high-quality **aggregate supply close to growing markets**
2) Minimal **conflicting land uses**
3) Utilizes and **improves highway and municipal road infrastructure**
4) Sensitive **site design and phasing program** respects natural features and adjacent building sites
5) Comprehensive **technical reports**
6) Progressive **performance standards** to ensure mitigations and compliance
7) DC Bylaw regulated by Council via **multiple development permit processes**
8) Adopted **Cumulative Affects Management** ***(i.e. the Approved Joint Operating Commitments)***
9) Consistent with the **County Plan** and **Provincial Land Use Policies**



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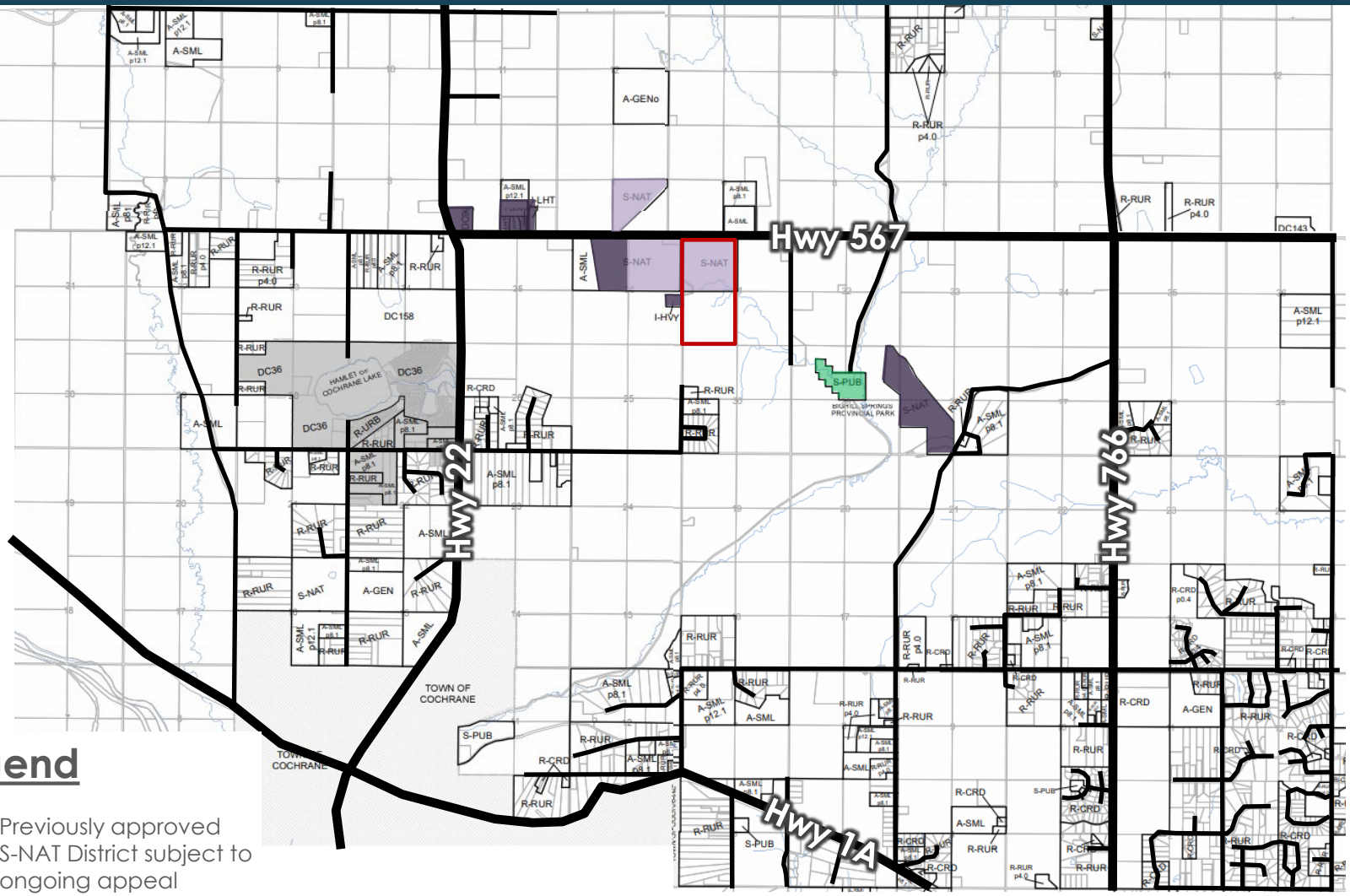
SUPPLEMENTAL SLIDES

Existing Land Use



Legend

Previously approved S-NAT District subject to ongoing appeal

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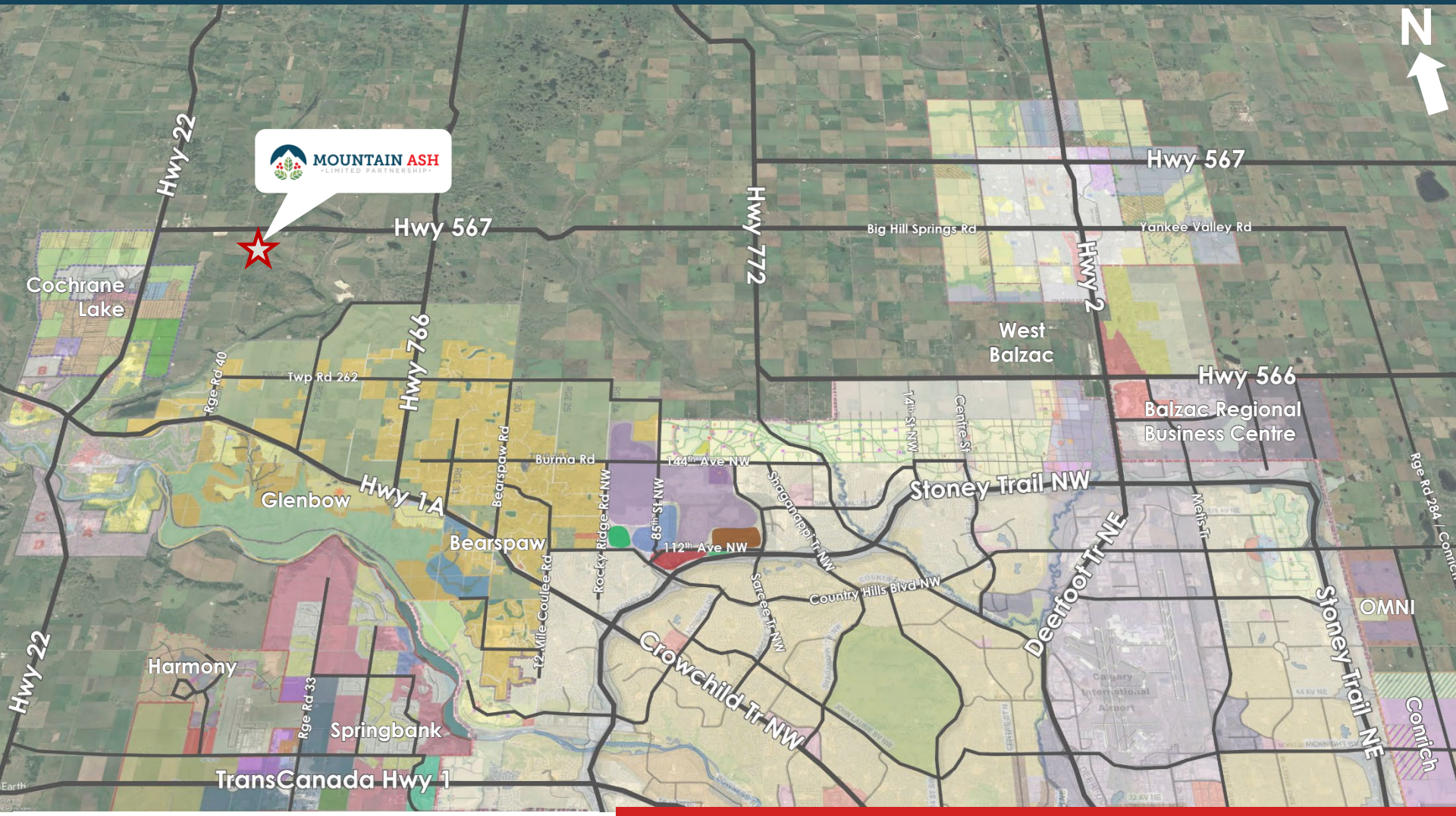
Regional Context



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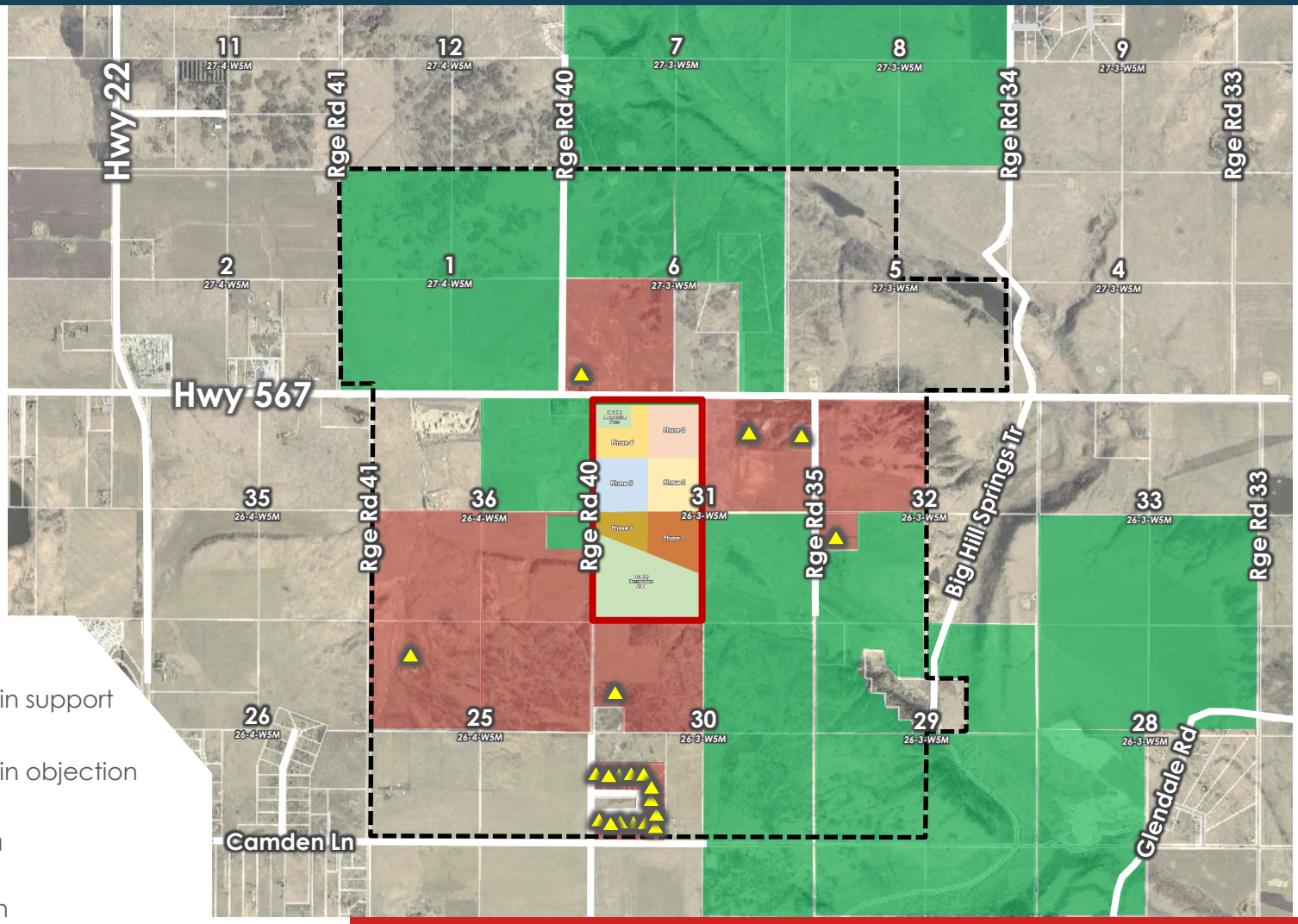
Circulation Map

Based from Administration's March 2, 2021 Reports



Legend

- Subject Lands
- Indicates landowner in support
- Indicates landowner in objection
- RVC Circulation Area
- Dwelling in opposition

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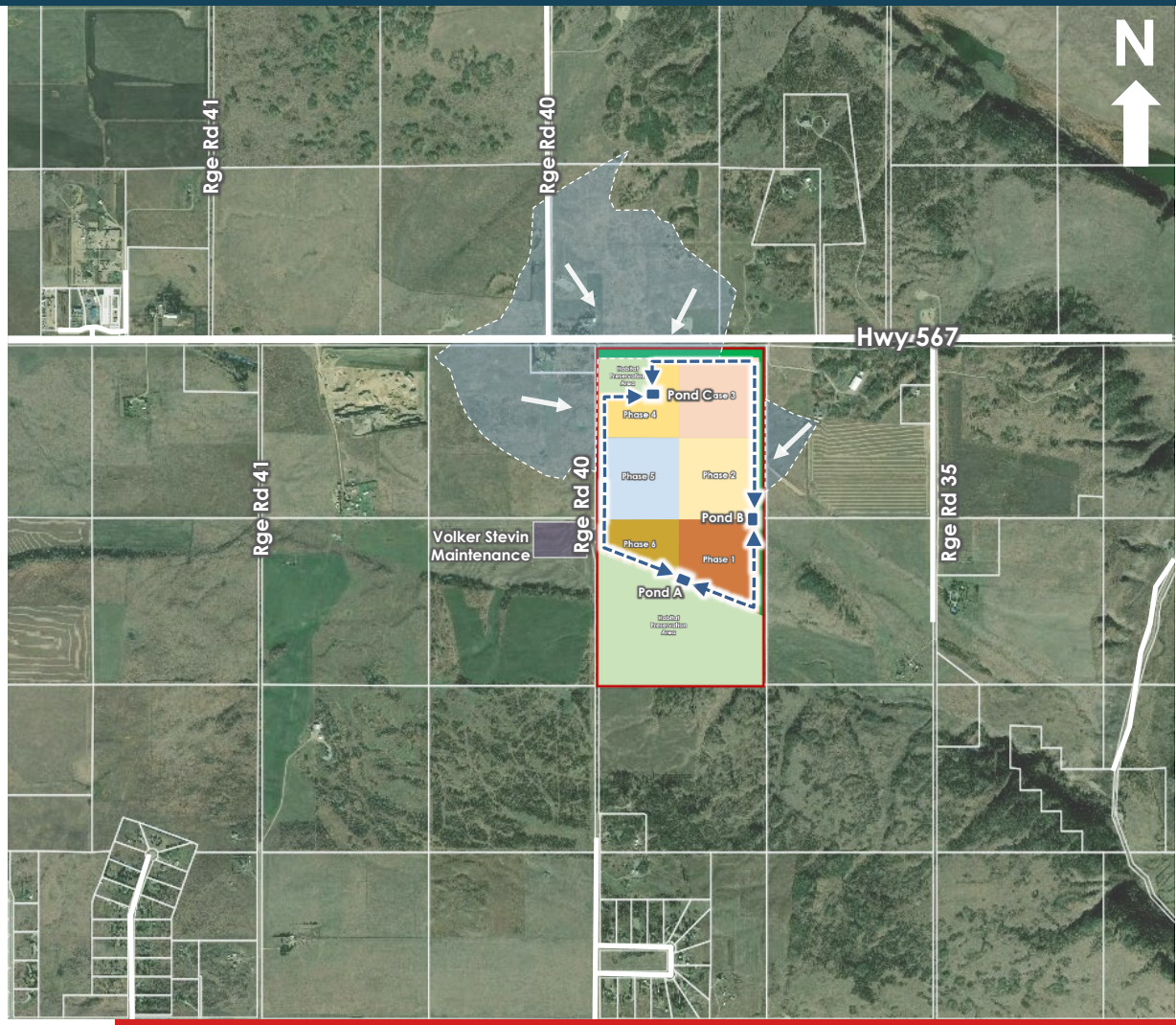
26

Stormwater Mitigation

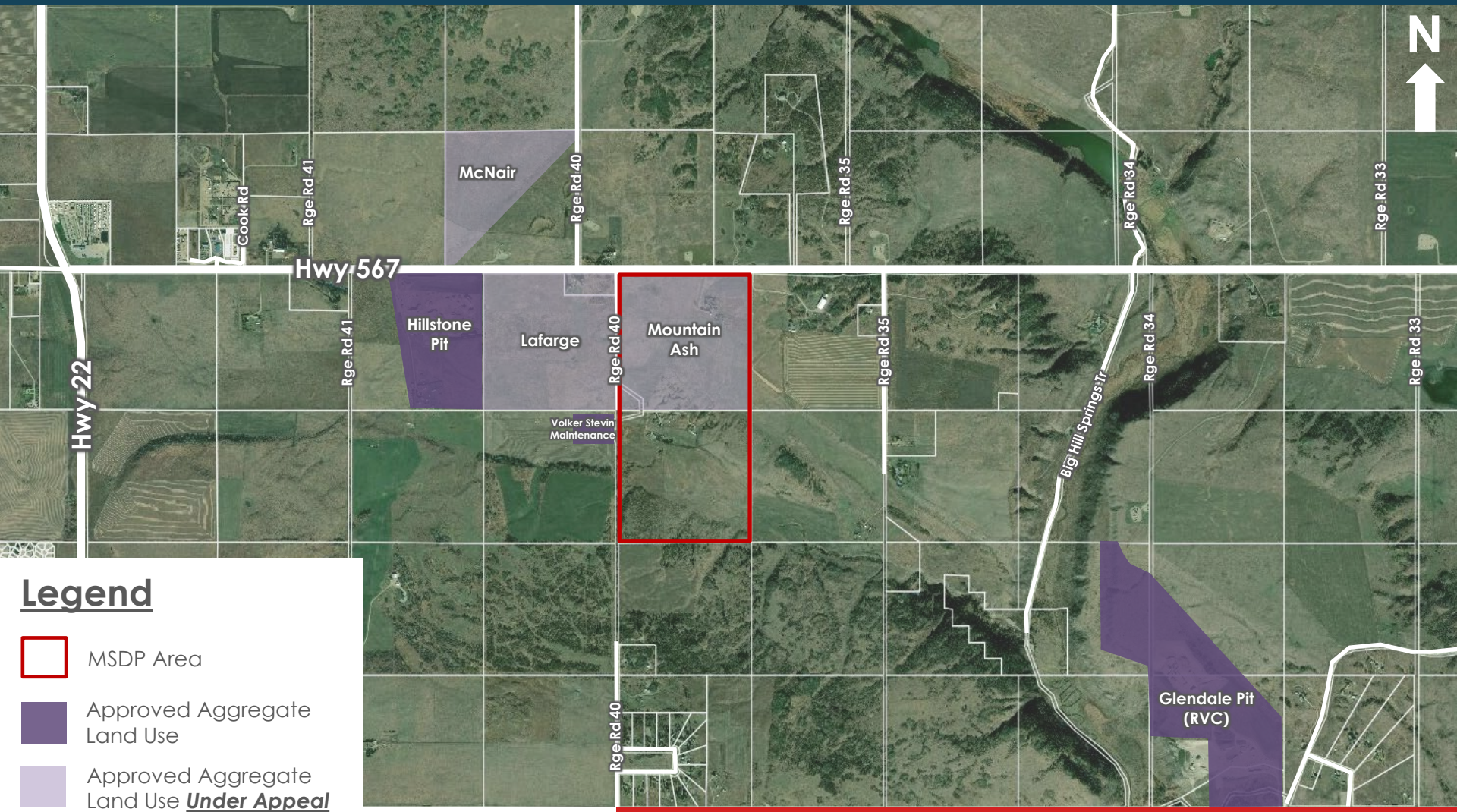
- **Conceptual Level Stormwater Report, SLR Consulting, Jan 2020**
- Stormwater facilities within operating area
- Separation of stormwater runoff in worked and unworked areas
- Phased implementation
  - Site-specific stormwater management plan at DP stage
- **Pre and post surface drainage patterns to remain consistent**



MOUNTAIN ASH
•LIMITED PARTNERSHIP•
THE SUMMIT PIT

Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Cumulative Affects Framework



Legend

- MSDP Area
- Approved Aggregate Land Use
- Approved Aggregate Land Use ***Under Appeal***

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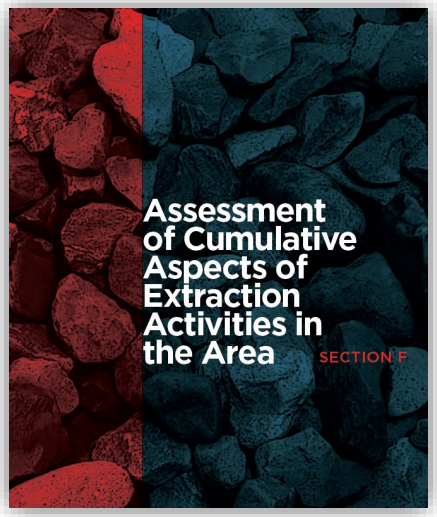
Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Cumulative Affects Framework

- Mountain Ash is committed to implementing the **Joint Operating Commitments** for *existing and future* aggregate producers within the surrounding area to manage cumulative aspects:
  - Coordinate **technical assessments** *(and underlying data)*
  - Construct safe **highway access** points
    (as per Alberta Transportation)
  - Utilize the **ASGA Truck Registry**
  - Adopt common operational best practices:
    - **Hours of operation**
    - **Consistent landscaping & screening** standards
    - **Limit excavation areas to 40 ac**
    - **Progressive reclamation** phase by phase
    - **Consistent monitoring and reporting programs** for air quality, noise & groundwater mitigations
    - **Third party review of noise, air and groundwater monitoring reporting programs**
    - **Communications plans**
    - **Complaint mitigation procedures**



Type IVa intersection

TABLE I

HIGHWAY DESIGNATION	LANE*/SHOULDER WIDTHS (m)	SHOULDER WIDTH "W" AT INTERSECTION (m)
RAU-213.4	3.7/3.0	1.5
RAU-211.8	3.7/2.2	1.5
RAU-210.0	3.5/1.5	1.5
RAU-209.0	3.5/1.0	1.0
RAU-208.0	3.5/0.5	0.5

* AUXILIARY LANE WILL BE 3.5m
BYPASS LANE WIDTH WILL BE THE SAME AS THROUGH LANE.

NOTES
1. DIMENSIONS SHOWN ARE FINISHED SURFACE PAVEMENT WIDTHS. ADDITIONAL SUBGRADE WIDTHS TO BE PROVIDED TO ALLOW FOR DEPTH OF BASE COURSE AND PAVEMENT.
2. THE DESIGNER MUST COMPLETE "INTERSECTION ANALYSIS" PROCEDURE TO JUSTIFY THE TYPE IV TREATMENT.
i.e. exclusive left turn lane must be warranted for the movement shown +

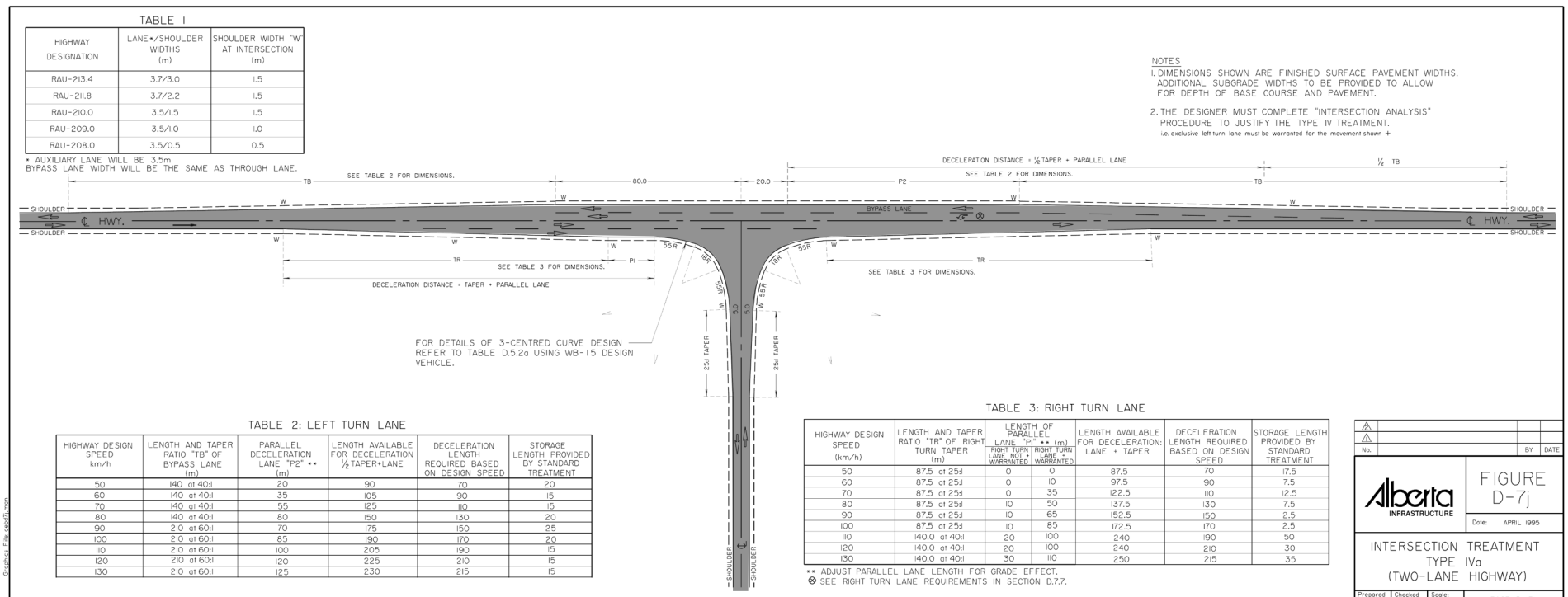


TABLE 2: LEFT TURN LANE

HIGHWAY DESIGN SPEED km/h	LENGTH AND TAPER RATIO "TB" OF BYPASS LANE (m)	PARALLEL DECELERATION LANE "P2" ** (m)	LENGTH AVAILABLE FOR DECELERATION ½ TAPER+LANE	DECELERATION LENGTH REQUIRED BASED ON DESIGN SPEED	STORAGE LENGTH PROVIDED BY STANDARD TREATMENT
50	140 at 40:1	20	90	70	20
60	140 at 40:1	35	105	90	15
70	140 at 40:1	55	125	110	15
80	140 at 40:1	80	150	130	20
90	210 at 60:1	70	175	150	25
100	210 at 60:1	85	190	170	20
110	210 at 60:1	100	205	190	15
120	210 at 60:1	120	225	210	15
130	210 at 60:1	125	230	215	15

TABLE 3: RIGHT TURN LANE

HIGHWAY DESIGN SPEED (km/h)	LENGTH AND TAPER RATIO "TR" OF RIGHT TURN TAPER (m)	LENGTH OF PARALLEL LANE "PI" ** (m) RIGHT TURN LANE NOT + WARRANTED	RIGHT TURN LANE + WARRANTED	LENGTH AVAILABLE FOR DECELERATION: LANE + TAPER	DECELERATION LENGTH REQUIRED BASED ON DESIGN SPEED	STORAGE LENGTH PROVIDED BY STANDARD TREATMENT
50	87.5 at 25:1	0	0	87.5	70	17.5
60	87.5 at 25:1	0	10	97.5	90	7.5
70	87.5 at 25:1	0	35	122.5	110	12.5
80	87.5 at 25:1	10	50	137.5	130	7.5
90	87.5 at 25:1	10	65	152.5	150	2.5
100	87.5 at 25:1	10	85	172.5	170	2.5
110	140.0 at 40:1	20	100	240	190	50
120	140.0 at 40:1	20	100	240	210	30
130	140.0 at 40:1	30	110	250	215	35

** ADJUST PARALLEL LANE LENGTH FOR GRADE EFFECT.
⊗ SEE RIGHT TURN LANE REQUIREMENTS IN SECTION D.7.7.

Alberta INFRASTRUCTURE

FIGURE D-7j

Date: APRIL 1995

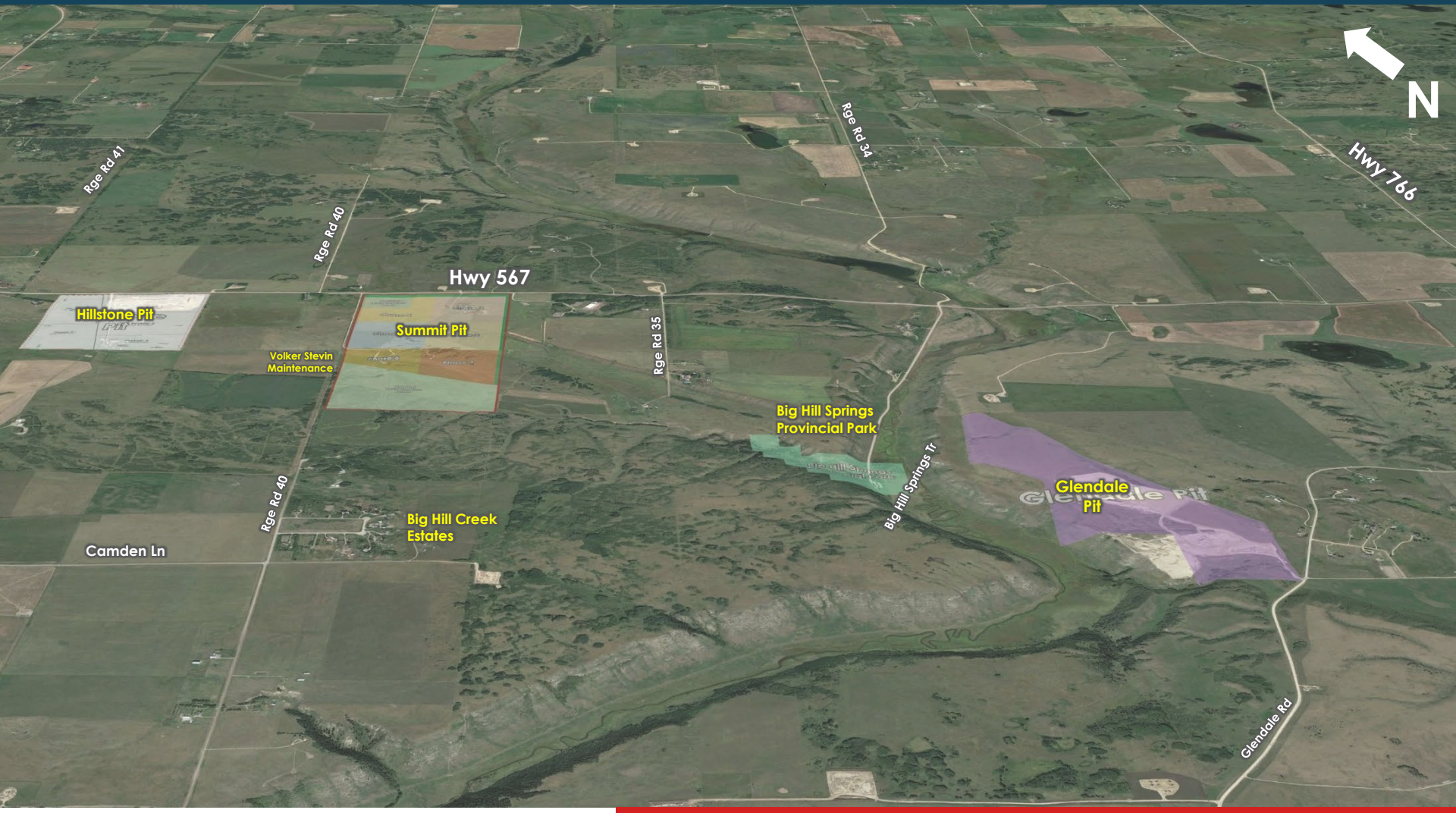
INTERSECTION TREATMENT
TYPE IVa
(TWO-LANE HIGHWAY)

Prepared By: R.T. | Checked By: B.K. | Scale: N.T.S.

PAGE D-131

Graphics File: d9d07.mmm

Aerial Perspective



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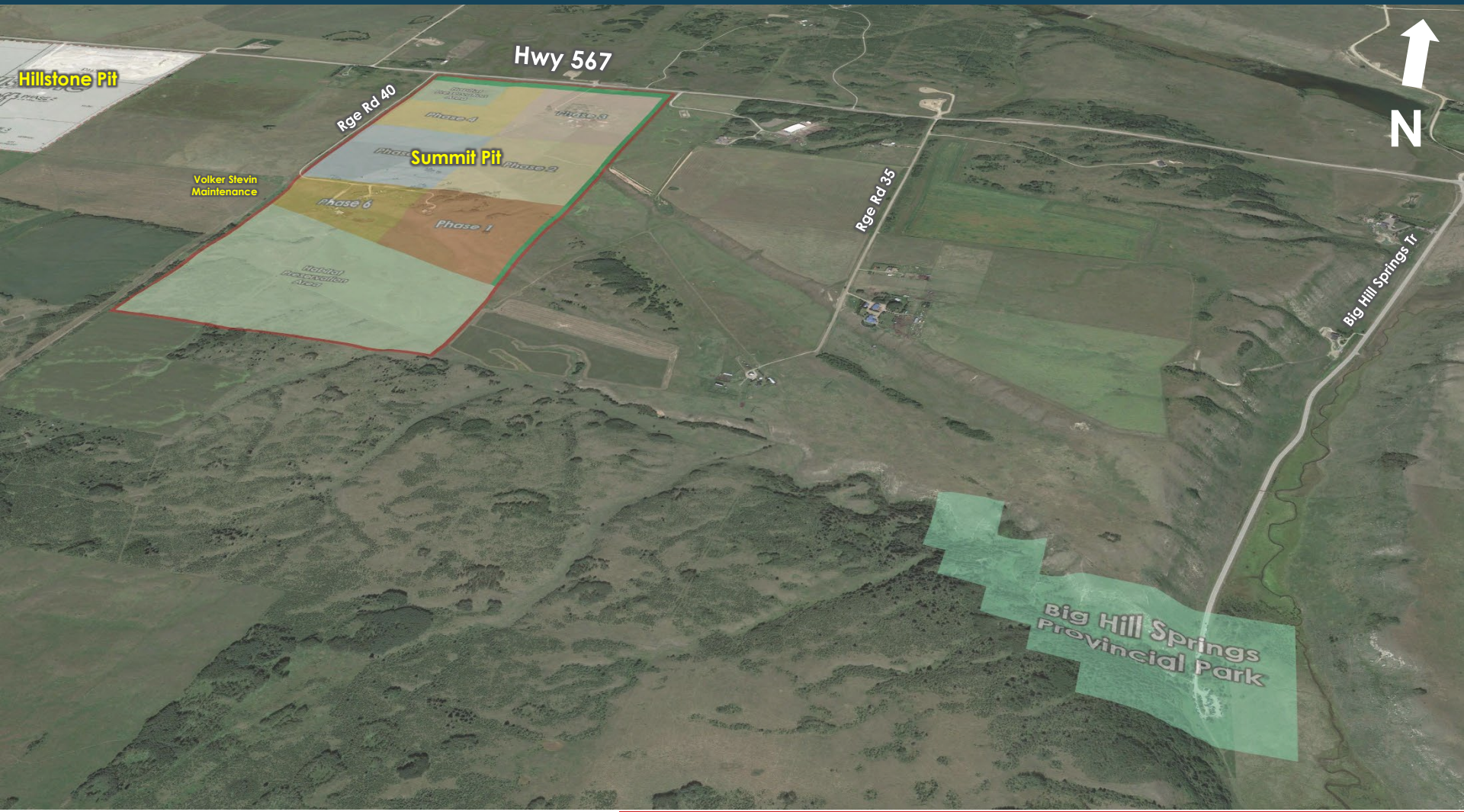
Aerial Perspective



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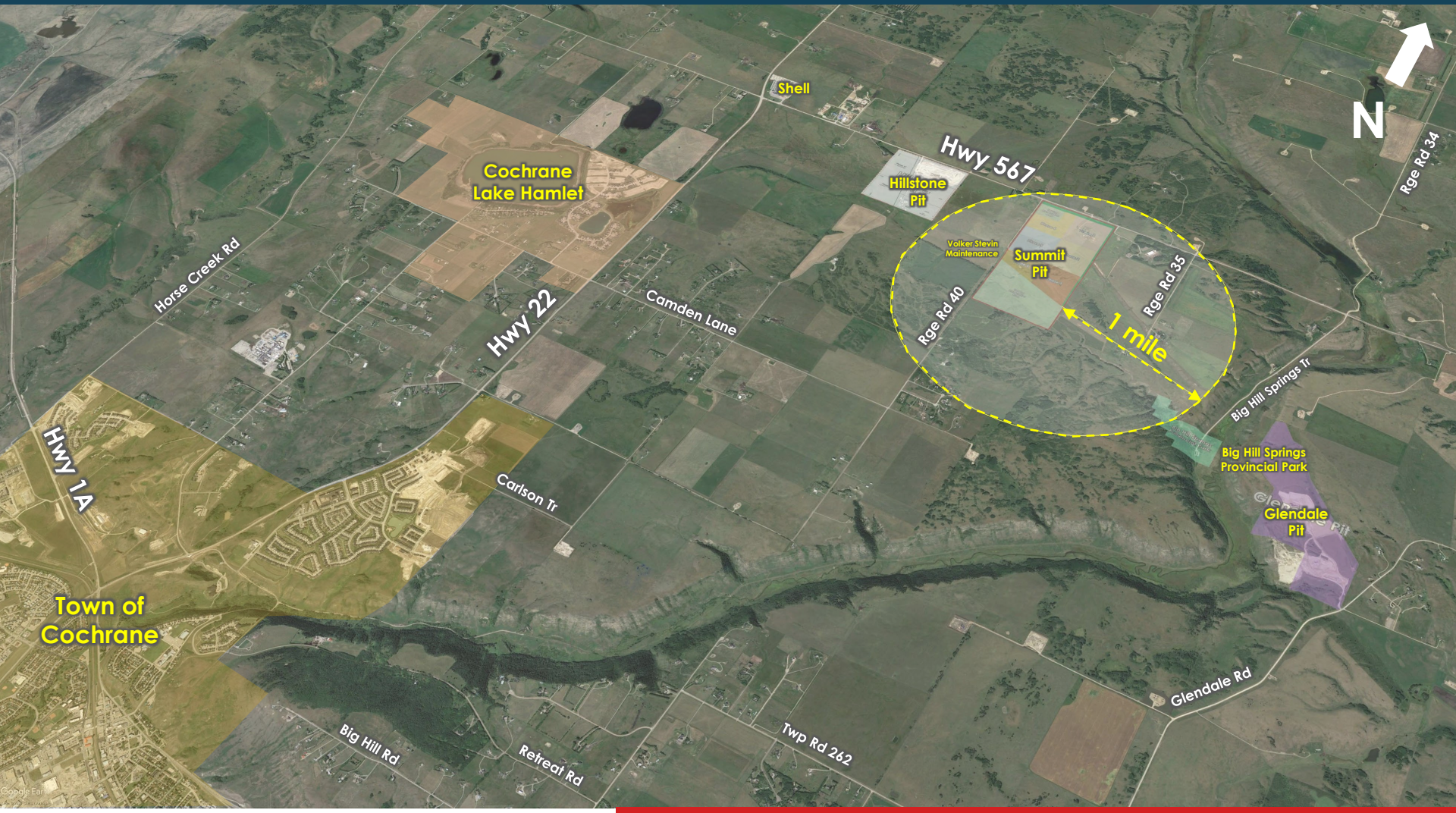

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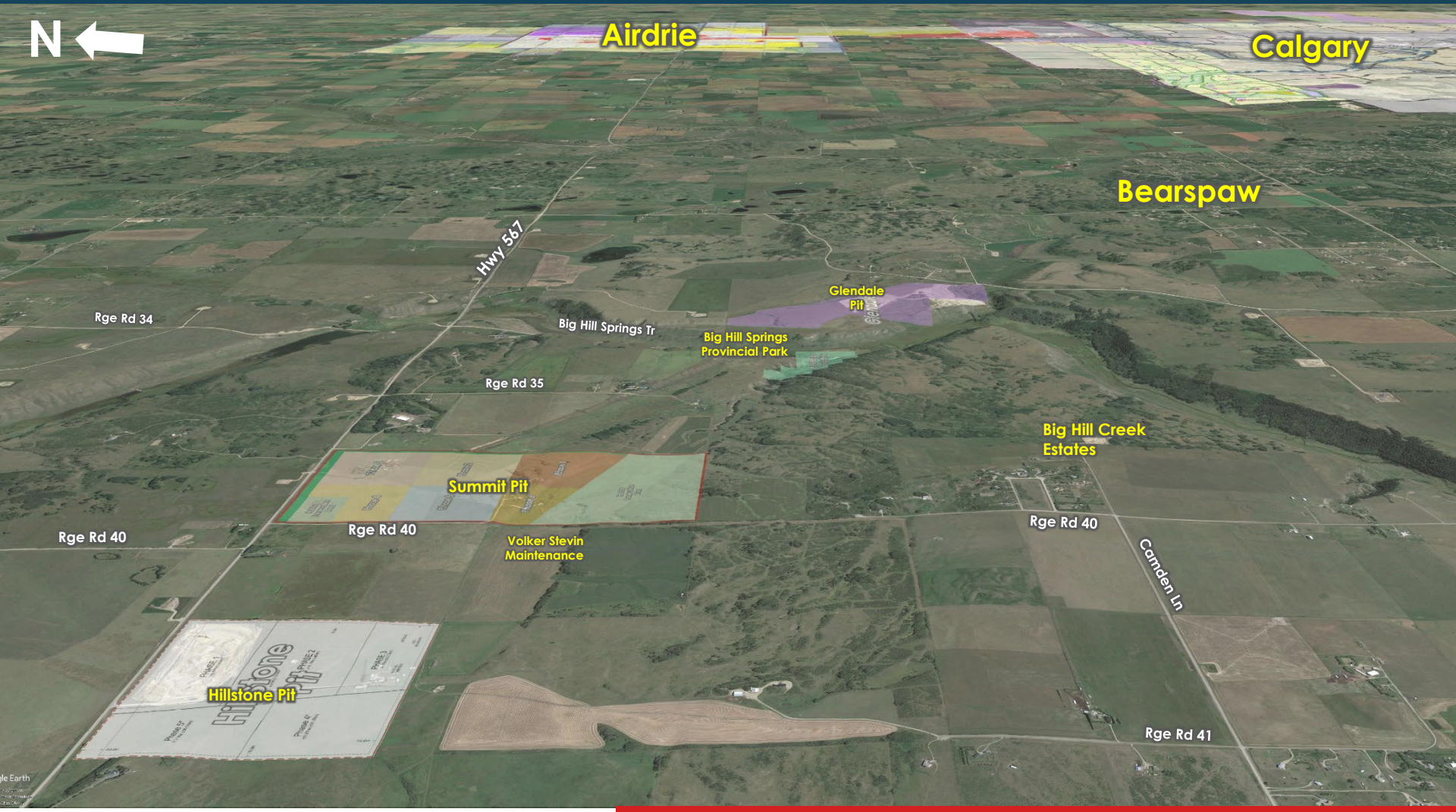

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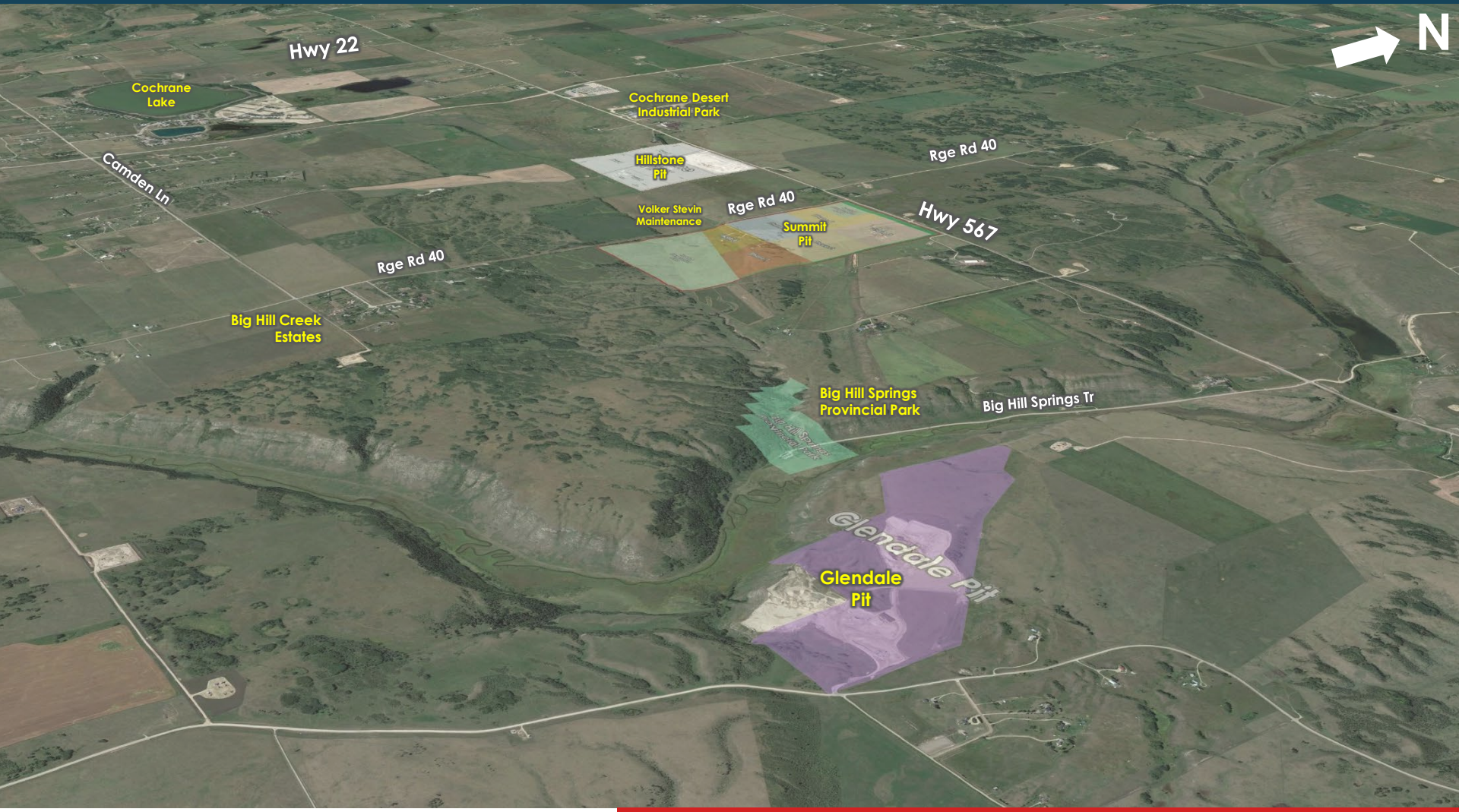
Aerial Perspective



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Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Implementation

- Direct Control District
  (Council as Development Authority)
- 5-year development permit renewal interval
- Phased implementation
  - Each requiring Development Permit
- Max. 40 ac disturbance area
- Progressive reclamation

- Continuous monitoring and reporting programs *(noise, air, groundwater)*
- Disturbance / replacement of wetlands as per the *Water Act* and the Provincial Wetland Policy
- Roadside Development Permit by Alberta Transportation
- Provincial Registration Process under the Alberta Environment & Parks Code of Practice for Pits

Operator's Commitments

	Expressed Landowner Concern	Mountain Ash's Commitments to Address Concerns
1	Habitat & wildlife	Restrict development disturbances within the valley feature situated within SW 31, limit disturbances within the MSDP area during migratory bird nesting season.
2	Groundwater mitigation	Limit excavation to minimum of 1 m above water table, implement ongoing groundwater monitoring.
3	Dust mitigation	Pave portion of Range Rd 40 from Hwy 567 to main site access, apply water and/or calcium chloride on access routes within the site, implement ongoing air quality monitoring & reporting.
4	Noise mitigation	Reduce operating hours, restrict crushing on Sundays & Holidays, implement ongoing noise monitoring & reporting.
5	Landscaping & screening	Install landscaped berms on perimeter of MSDP area as required, implement dark sky lighting.
6	Respectful aggregate operations	Limit open excavation areas to +/- 40 ac per development phase, reduce operating hours, implement aggregate operations via phased development permit processes, implement progressive reclamation throughout the lifespan of the operation.
7	Ongoing communications & community relations	Provide all landowners & residents situated within +/- 1.6 km of the MSDP area with a direct contact for a Mountain Ash representative and establish a project website to provide general & specific updates for interested stakeholders relative to ongoing aggregate operations within the Summit Pit.

Site Conditions

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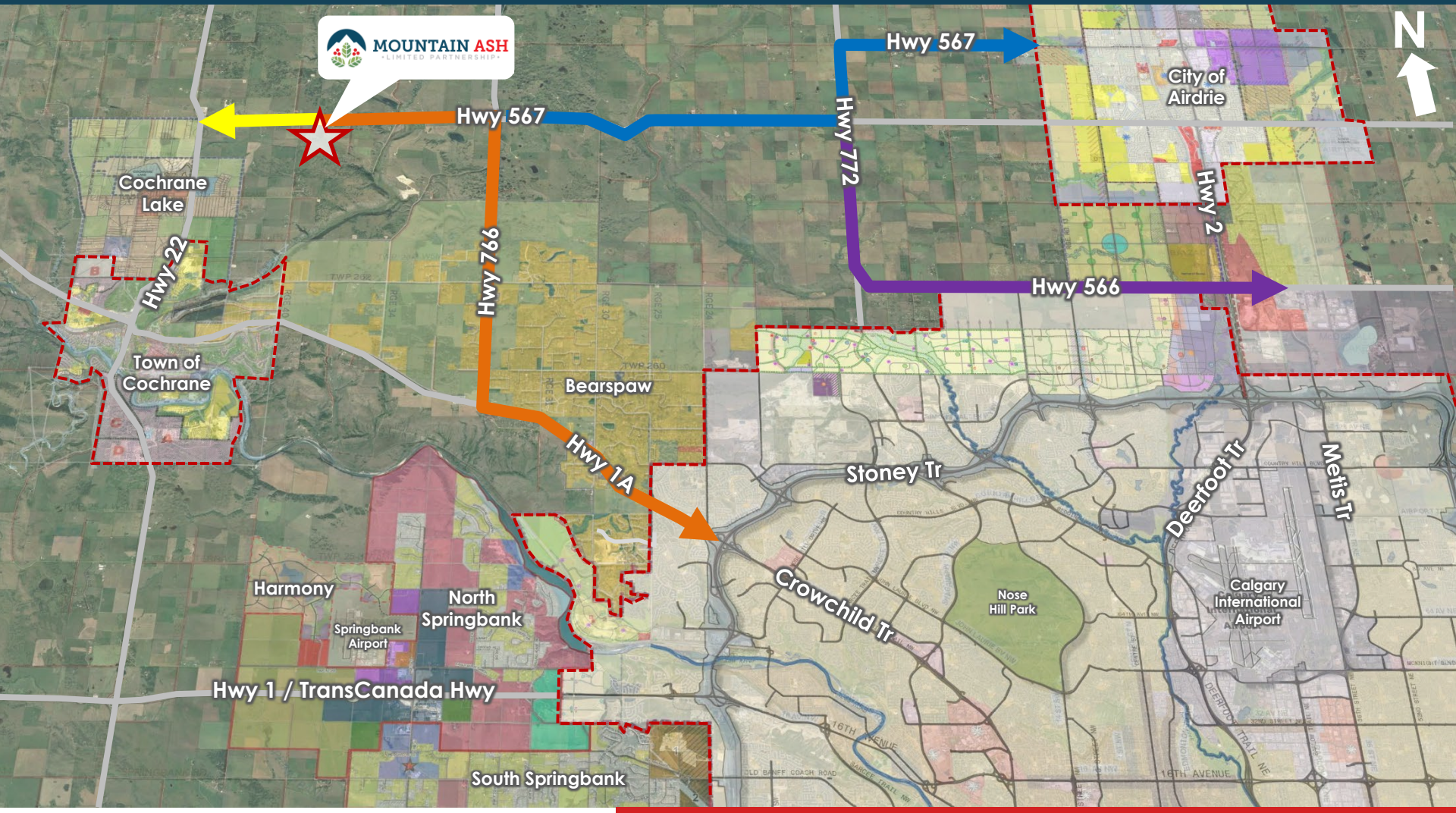
Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Haul Routes



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Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

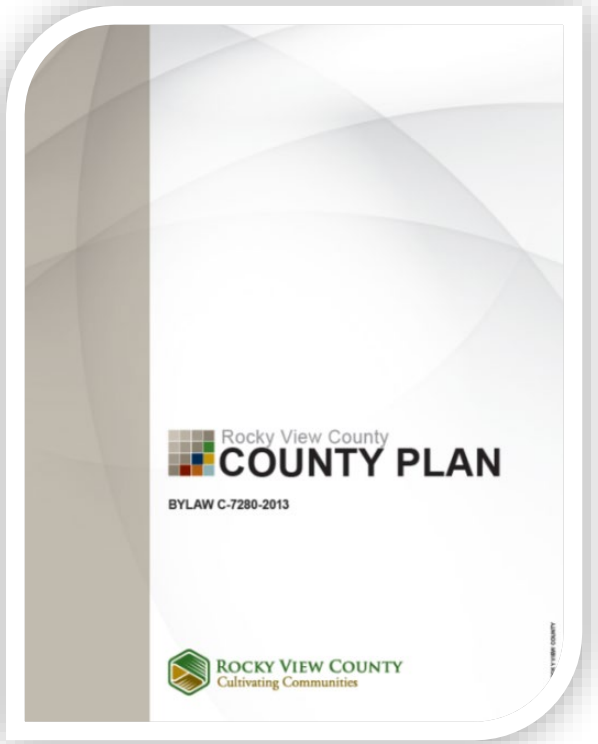
Section 29 MSDP Requirements

1. Introduction
2. Development rationale - including justification for the proposed land use
3. Summary of proposed operations
4. Site development plan with extraction guidelines
5. Phasing plan
6. Development Permit criteria - including monitoring and reporting requirements
7. Reclamation plan
8. Environmental mitigation strategies and initiatives
9. Identification of impacts to surrounding lands and mitigation strategies.
10. Assessment of cumulative aspects of extraction activities in the area
11. Summary of interim and post reclamation land uses
12. A technical summary of the proposal with supporting documentation
13. Summary of required Provincial Approvals
14. Summary of the Applicant's community consultation and results
15. Any other item deemed appropriate by the County

Municipal Policy Considerations

Natural Resource Goals

- To **support the extraction of natural resources** in a manner that **balances the needs of residents, industry and society**
- Support the **environmentally responsible management and extraction of natural resources**



Aggregate Extraction

- **Minimize** adverse impacts
- Encourage **collaboration** between the County, industry and affected residents
- Direct aggregate related traffic to **major haul routes**
- Pending adoption of an aggregate policy, all aggregate extraction applications shall be supported by an adopted **Master Site Development Plan** to address the **technical criteria of Section 29**

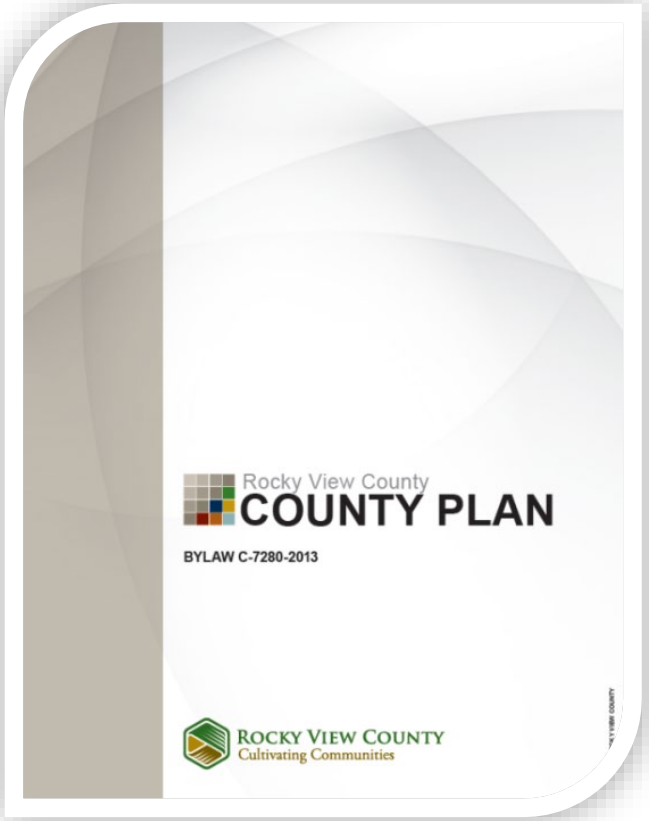
County Plan

Section 29 Technical Submission Requirements

- Summit engaged a **consultant team to prepare technical reports** to demonstrate the lands are suitable for the proposed development

The Summit *(MALP)* Aggregate Pit

- Is **consistent with the County Plan**
- Is **appropriately located to mitigate potential land use conflicts**
- Considers **sensitive design features to respect natural environmental features**
- Includes appropriate **development setbacks** to buffer pit operations from surrounding dwellings
- Mountain Ash is committed to implementing **ongoing monitoring & reporting** and **continuous improvement** measures



Implementation Process

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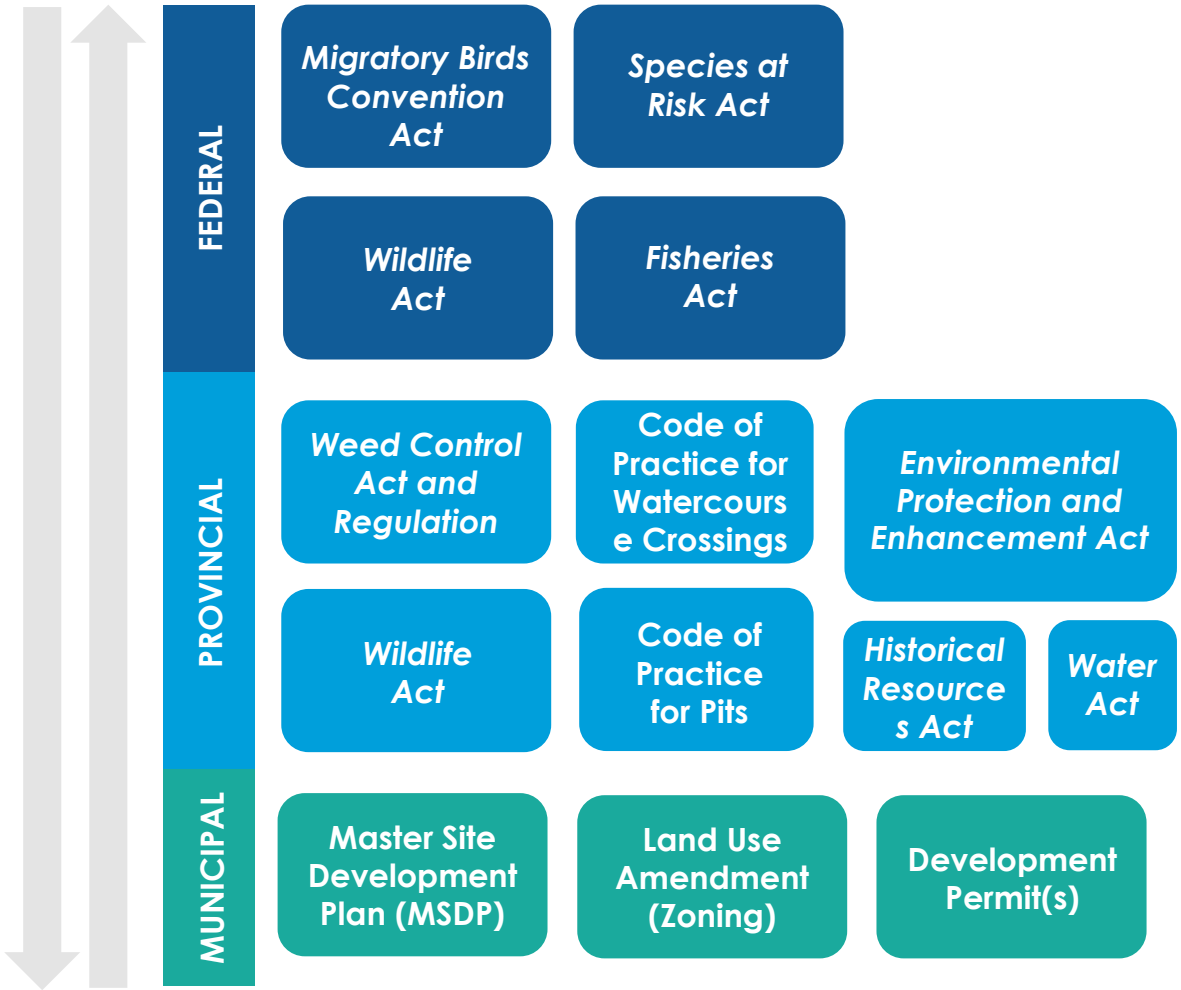
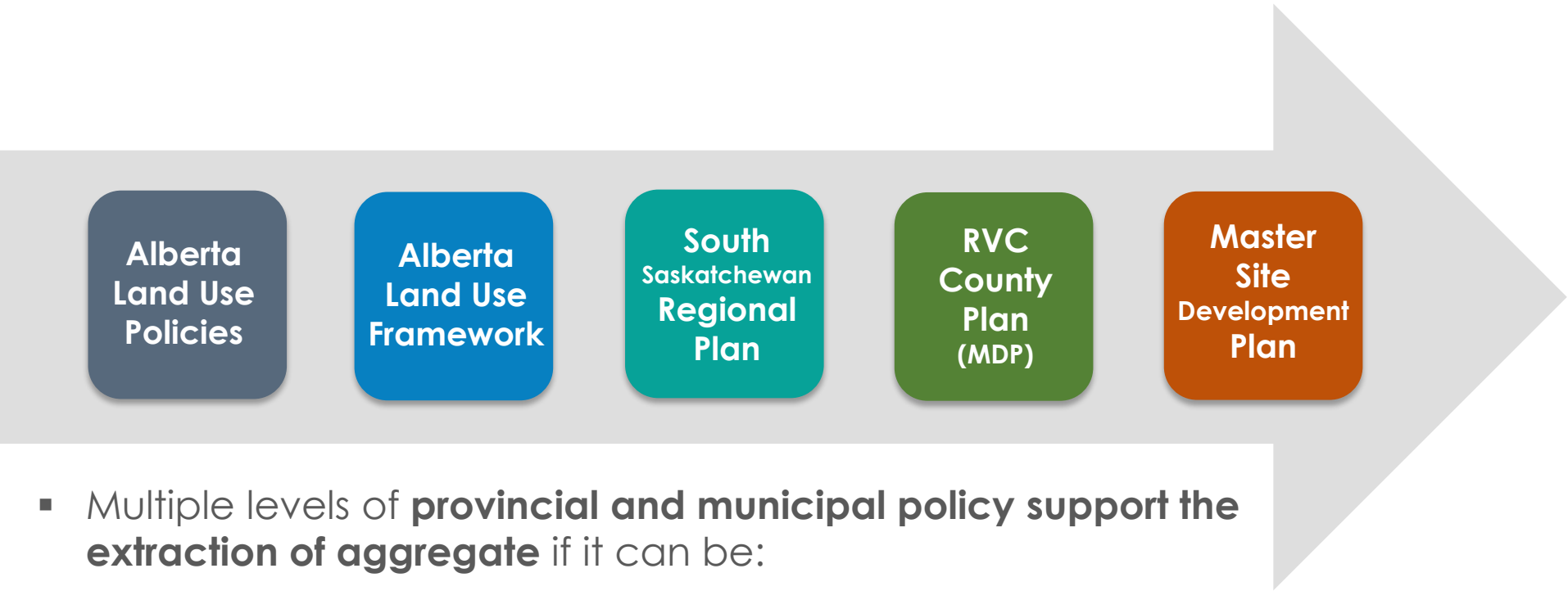
THE SUMMIT PIT

Regulatory Framework

- The Summit Pit will be regulated by a variety of provincial and municipal legislation
- It must also be compliant with federal legislation where applicable

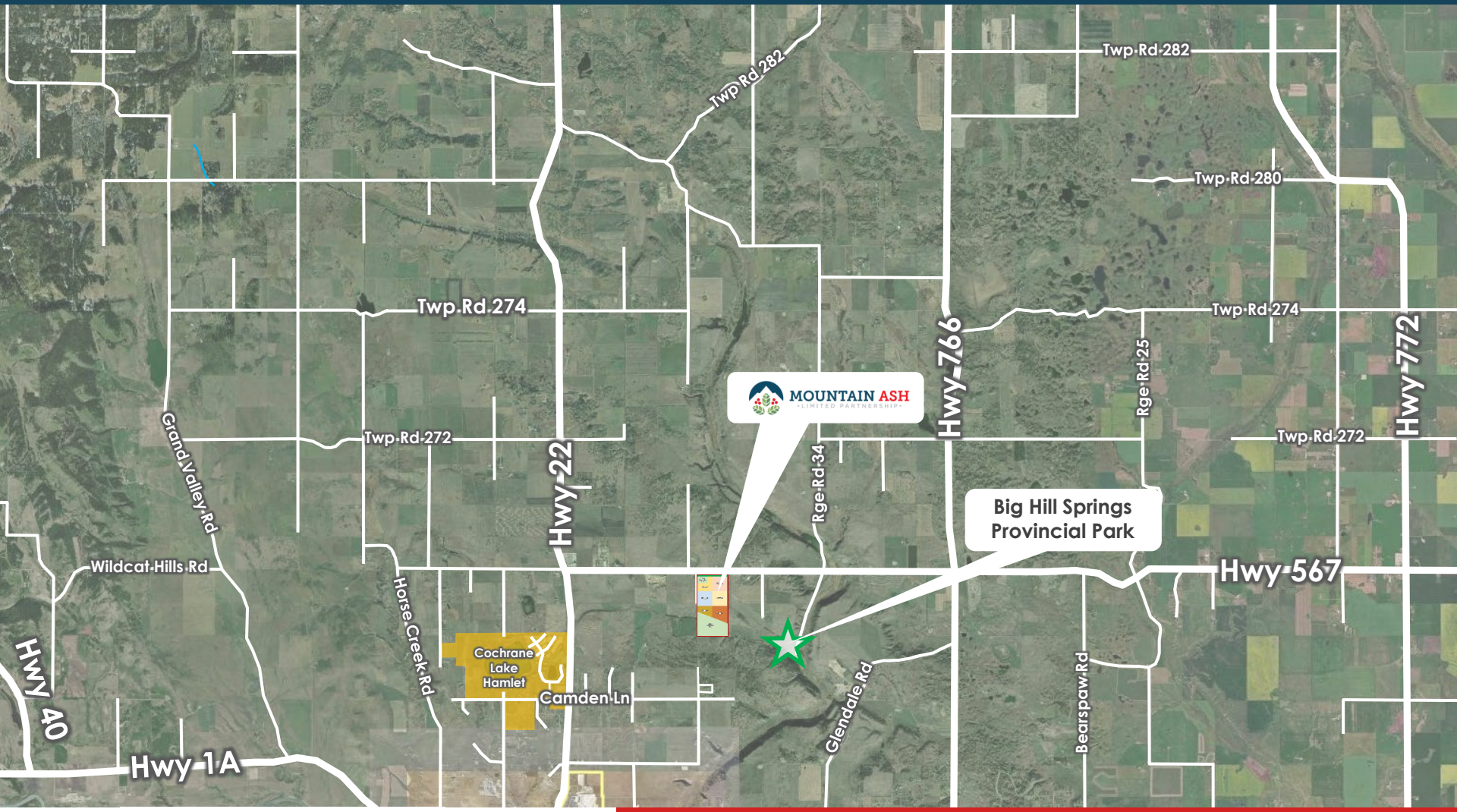


Policy Framework



- Multiple levels of **provincial and municipal policy support the extraction of aggregate** if it can be:
  - Conducted in a manner that **balances the interests of residents & industry and creates benefits for the municipality as a whole**; and
  - Designed and operated in a manner that **appropriately mitigates potential impacts to surrounding lands**

Mountain Ash Limited Partnership



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Master Site Development Plan and Land Use Amendment Application for a proposed aggregate extraction & processing facility in NW & SW 31-26-3-W5M

Aggregate Pits Global TIA

Stantec

Background - Overall

- WATT TIAs conducted for each individual aggregate pit (2017) based on initial assumptions
  - Identified future need for a Type IV intersection at the shared Hillstone / LaFarge / McNair pit
- Concerns raised by John Morrall review of the corridor and area
- Stantec retained to update assumptions, evaluate cumulative transportation impacts and assess concerns raised in Morrall report

Background – Morrall Report

- Key concerns raised by Morrall report:
  - Truck safety: Potential need for climbing / passing lanes along Highway 567 due to grades and speeds
  - Trip generation estimates may require further review
  - Understand impacts to the corridor, beyond the intersection-level impacts

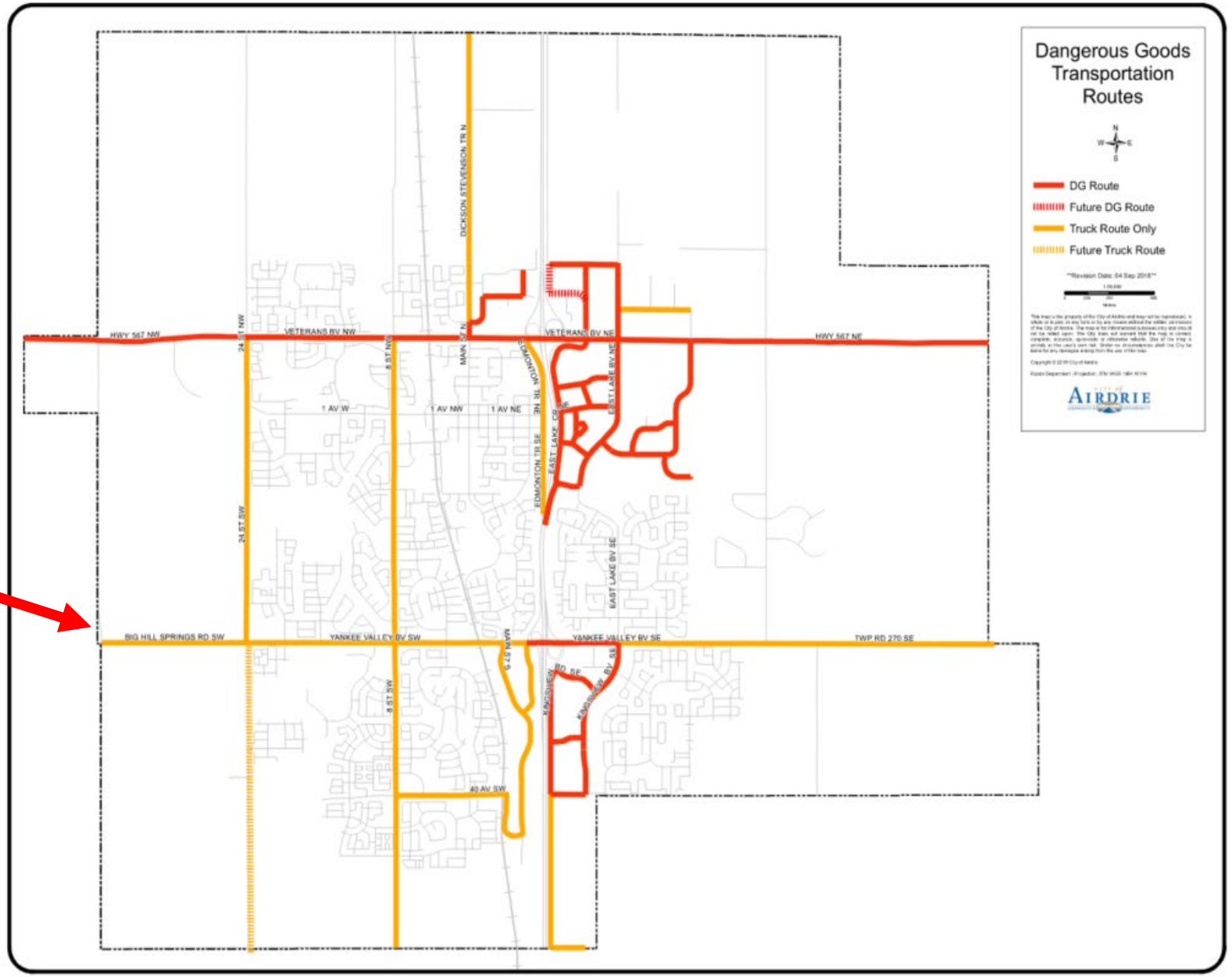
Background

Highway 567 – Additional Information

- Big Hill Springs Road is identified as part of the City of Airdrie's truck route.
- Alberta Transportation identifies the corridor as part of their high load corridor and oversize / overweight corridor network.
- Hwy 567 is classified by Alberta Transportation as a Rural Arterial Undivided.
- Hwy 567 / Big Hill Springs Road is **not** on AT's list of roads with seasonal road bans due to construction, maintenance or seasonal conditions.

Background

Highway 567 – Additional Information



Highway 567 – Additional Information

Background

Alberta Transportation

Functional Classification - Existing Conditions Map

Rural Freeway Divided (RFD)		Urban Freeway Divided (UFD)	
Rural Arterial Divided (RAD)		Urban Arterial Divided (UAD)	
		Urban Expressway Divided (UED)	
Rural Arterial Undivided (RAU)		Urban Arterial Undivided (UAU)	
Rural Collector Undivided (RCU)		Urban Collector Undivided (UCU)	

For Functional Classification - Future Vision refer to the Roadside Management Classification Map

Kilometers
0 30 60 90 120 150
North American Datum 1983, 10° Transverse Mercator

Disclaimer:
Information presented on this map originated from various sources and is for general use only. Please be advised that some information may have been added, amended and deleted since this map was created.

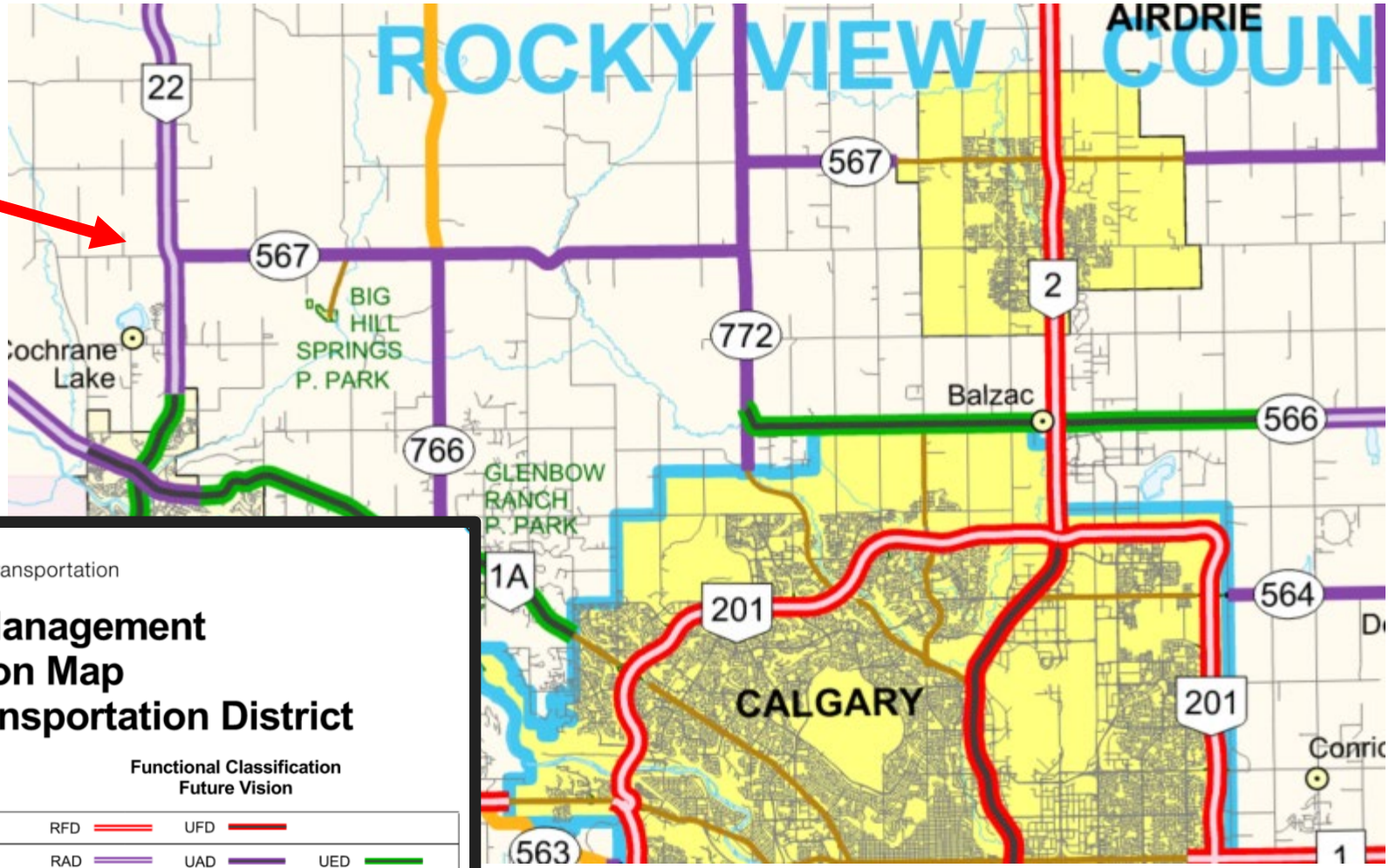
Source Information:
Transportation Infrastructure Management Systems (TIMS) Digital Data, Alberta Transportation
Base map provided by the Government of Alberta under the Open Government Licence.

Date: 7/27/2020
Produced by GIS and Cartography Section
Alberta Transportation

Calgary Area

Highway 567 – Additional Information

Background



Alberta Transportation

Roadside Management Classification Map
Calgary Transportation District

Roadside Management Classification	Functional Classification Future Vision		
Freeway	RFD	UFD	
Multi-Lane	RAD	UAD	UED
Major	RAU	UAU	
Minor	RCU	UCU	
Non Classified	Municipal / Rural Road		
	Potential Freeway		

Highway 567 – Additional Information

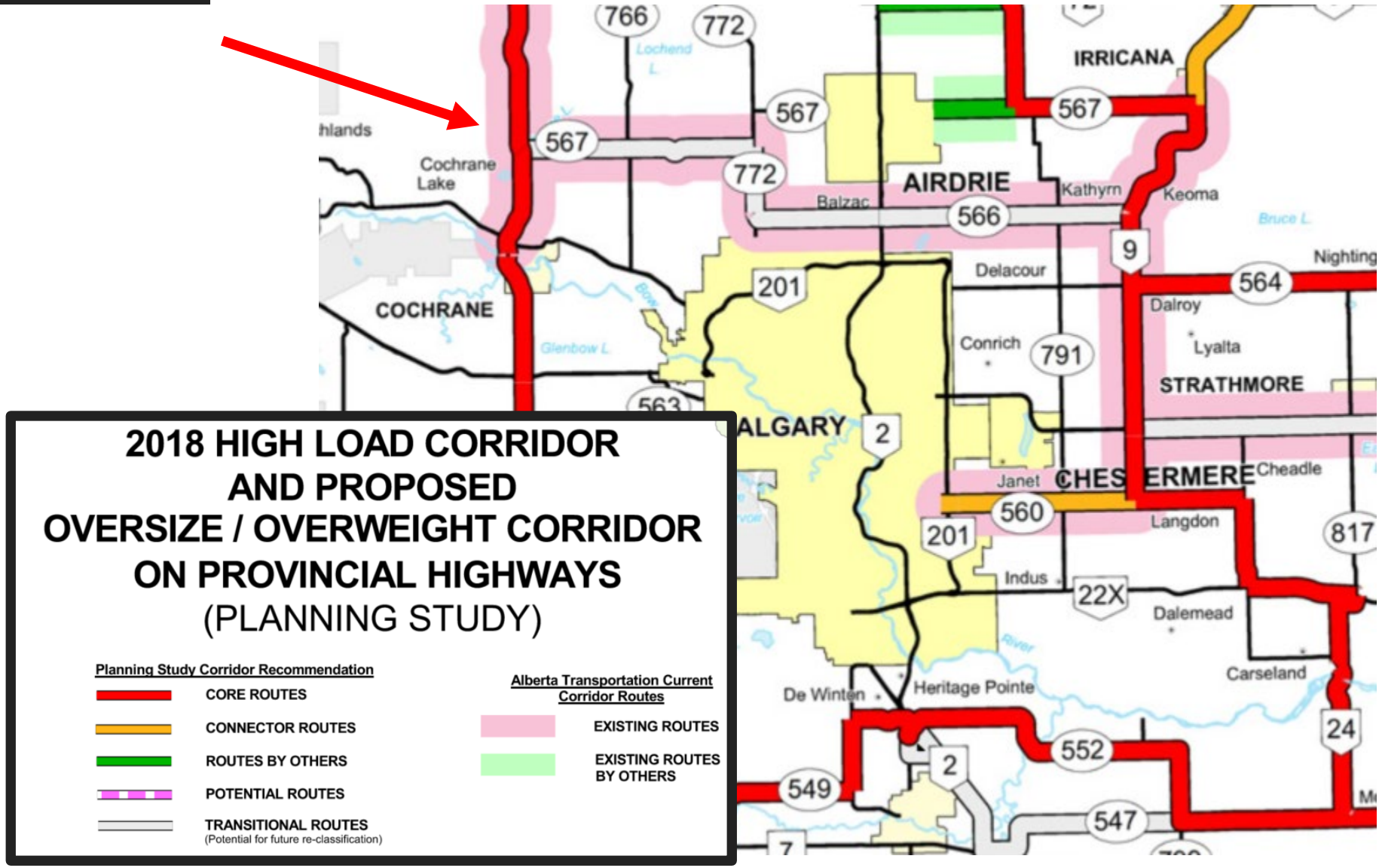
Background

Table A-2-3-2a New Roadway Functional Characteristics

Functional Class Code	Functional Class Description	Core User Function	Flow Characteristics	Connections with	Typical Vehicle Volumes Served (veh/day)	Typical Design Speeds	Number of Basic Lanes	Right-of-Way Width (m)
RFD	Rural Freeway Divided	Mobility is the primary consideration	Uninterrupted Flow	Freeways Arterials Collectors	≥ 10,000	110 – 130	4 – 8	100 – 120
RAD	Rural Arterial Divided	Mobility is the primary consideration	Uninterrupted Flow	Freeways Arterials Collectors Locals	3,000 – 30,000	110 – 120	4 – 6	100
RAU	Rural Arterial Undivided	Mobility is priority with some consideration of Access	Uninterrupted Flow	Freeways Arterials Collectors Locals Driveways	500 – 10,000	100 – 110	2	40 – 60

Highway 567 – Additional Information

Background



Highway 567 – Additional Information

Background

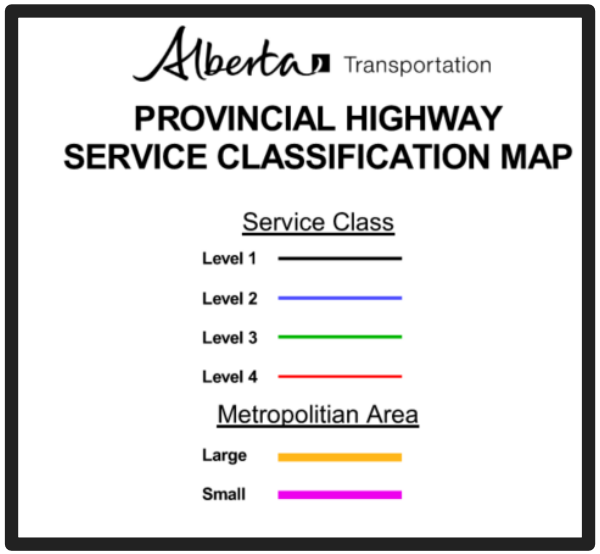
Alberta

HIGH LOAD CORRIDOR on PROVINCIAL HIGHWAYS

- Existing Corridor. Nil Fee (12.8 m Maximum Height)
- Existing Corridor (9.0 m Maximum Height)
- Proposed Routes
- Corridor by others. Nill Fee (9.0 m Maximum Height)

Highway 567 – Additional Information

Background



A.2.2.2 Service Classification Levels

There are currently four Service Classification levels, numbered 1 through 4, with 1 being the most strategically important highways. The four levels are described as follows:

- **Level 1:** These roadways accommodate the movement of people, goods and services inter-**provincially** and **internationally**. They connect Alberta's major population centres (population over 50,000) to key destinations outside the province and typically serve long trip lengths. All Level 1 highways are also core routes in the National Highway System.
- **Level 2:** These roadways are similar to the Level 1 roadways as they accommodate the movement of people, goods, and services but mainly **intra-provincially**. They serve to connect provincially significant areas such as population centres over 5,000 and also typically serve long trips.
- **Level 3:** These roadways typically carry traffic from major generators such as communities and/or resource and developments but with overall shorter travel distances. These roadways provide the connection between Level 4 and Level 2 roadways, and generally serve traffic of an **inter-regional** or inter-municipal nature.
- **Level 4:** These roadways typically serve traffic of an **intra-regional** nature or traffic within a municipality and therefore normally carry short distance trips.

Study Focuses

Stantec Analysis – Key Study Focuses

- Stantec TIA focused on the combined impacts to study intersections and the corridor from all three proposed pits as well as the continued operations of the Hillstone Pit.
- All TIAs require intersection level analysis by practice. Stantec also added a corridor review to our scope as well as a climbing lane / passing lane analysis of Hwy 567.
- Per AT TIA requirements, horizon year (2042) is 20 years beyond opening year (2022)
- Trip generation was separated into several scenarios, generally split into opening year estimates and horizon year estimates
  - Acknowledges extraction increases may occur over time, but opening year will not achieve same outputs as horizon year

Stantec Analysis – Key Study Focuses, cont'd

Opening year (2022) assumptions:

- LaFarge pit: Estimated 100,000 tonnes per year
- McNair pit: Estimated 100,000 tonnes per year
- Mountain Ash pit: Estimated 75,000 tonnes per year

Long-term (horizon year, 2042) assumptions:

- LaFarge pit: Estimated 250,000 tonnes per year
- McNair pit: Estimated 300,000 tonnes per year
- Mountain Ash pit: Estimated 350,000 tonnes per year

Stantec Analysis – Key Study Focuses, cont'd

- Opening Year (2022) Scenarios
  - Scenario 1: 2022 Opening Year, assuming 301 annual working days for McNair and Mountain Ash pits; 237 working days for LaFarge pit
  - Scenario 2: 2022 Opening Year, assuming 240 annual working days for McNair and Mountain Ash pits; 237 working days for LaFarge pit
  - Scenario 3: 2022 Opening Year, assuming 180 annual working days for all three pits
- Through all opening year scenarios, the annual extraction will remain the same. However peak hour and daily trip generation will vary based on the number of working days. Compressed number of working days increases the number of peak hour and daily trips

Stantec Analysis – Key Study Focuses, cont'd

- Horizon Year (2042) Scenarios
  - Scenario 4: 2042 Opening Year, assuming 301 annual working days for McNair and Mountain Ash pits; 237 working days for LaFarge pit
  - Scenario 5: 2042 Opening Year, assuming 240 annual working days for McNair and Mountain Ash pits; 237 working days for LaFarge pit
  - Scenario 6: 2042 Opening Year, assuming 180 annual working days for all three pits

- Through all horizon year scenarios, the annual extraction will remain the same though increased from opening year. However peak hour and daily trip generation will vary based on the number of working days. Compressed number of working days increases the number of peak hour and daily trips

Stantec Analysis – Key Study Focuses, cont'd

Analysis consists of the following intersections:

- Hwy 567 & Hwy 22 (Cowboy Trail)
- Hwy 567 & Cook Road
- Hwy 567 & RR 40 (N)
- Hwy 567 & Mountain Ash Access
- Hwy 567 & Hwy 766
- Hwy 567 & Combined Pits Access

- Through discussions with AT, it was acknowledged that a long-term plan exists to convert Highway 567 & Highway 22 into either a single-lane or two-lane roundabout.
  - Assumed for 2042 horizon, not by 2022 horizon

Stantec Analysis – Key Study Focuses, cont'd

- 2018 and 2019 traffic data obtained by AT's traffic count database, and supplemented with in-field counts conducted in October 2019
- AT's standard provincial average traffic growth rate is 2.5%. A review of AT's ten-year historic traffic growth rates estimates a higher value of 3.6%. Therefore a more conservative analysis was conducted using the higher 3.6% annual growth rate.
  - This was applied to 2018 / 2019 traffic counts to estimate 2022 and 2042 background volumes

Stantec Analysis – Key Findings

Intersection Type Analysis:

- Analysis confirmed a long-term need for a Type IV intersection by the 2042 horizon for the combined pits access, for all scenarios, with added storage lengths to the westbound left turn lane
- Primary driver for the Type IV intersection are the existing volumes along Highway 567 and the application of the 3.6% annual traffic growth rate
- Intersection types and turn lane modifiers are determined by both the peak hour and daily trip generation estimates
- Combined pits are roughly 1% of the total daily volumes of Highway 567 in 2022 and 2042

Stantec Analysis – Key Findings

Table 4.2 - AADT by Horizon

Location	2022			2042		
	301 Days	240 Days	180 Days	301 Days	240 Days	180 Days
Highway 567 (Between Hwy 22 and Combined Pits Access)	4,668	4,669	4,672	9,547	9,551	9,564
Highway 567 (Between RR 40 N and Hwy 766)	4,611	4,616	4,633	9,443	9,467	9,538
Combined Aggregate Pits Access – North Leg	34	38	46	74	88	132
Combined Aggregate Pits Access – South Leg	34	34	40	66	66	83
North Leg – RR 40 N	39	39	39	80	80	80
South Leg – Mountain Ash Site Access	26	28	34	72	86	110

Stantec Analysis – Key Findings, cont'd

Intersection Capacity Analysis:

- Intersection capacity analysis confirms all study intersections to operate acceptably with existing geometry except at:
  - Highway 567 & Highway 22: A single-lane roundabout at Highway 567 & Highway 22 will be required by 2042 due to background traffic volumes
  - Highway 567 & Highway 766: AT has already identified this intersection as requiring upgrades due to safety reasons. Capacity constraints identified by 2042 due to background traffic volumes

Stantec Analysis – Key Findings, cont'd

Climbing Lane / Passing Lane Analysis:

- Potential climbing lanes identified as warranted by nine locations along eastbound Highway 567 and thirteen locations along westbound Highway 567.
- This was determined only using the general criteria used in the warrant procedures per AT standards. Refinements may be required based on more detailed evaluation of each location.
- All were warranted by either existing traffic and / or future background traffic. None are triggered as a result of the traffic generated by the aggregate pits (neither individually or combined)
- Potential opportunities to combine individual locations into larger areas
- Recommendation that AT further evaluate as they are not triggered by proposed pits

Summit Pit

Hydrology Slides

"Summit's hydrological assessment is the best I've seen for all the proposals in the area".

Alberta Environment & Parks

global **environmental** and **advisory** solutions

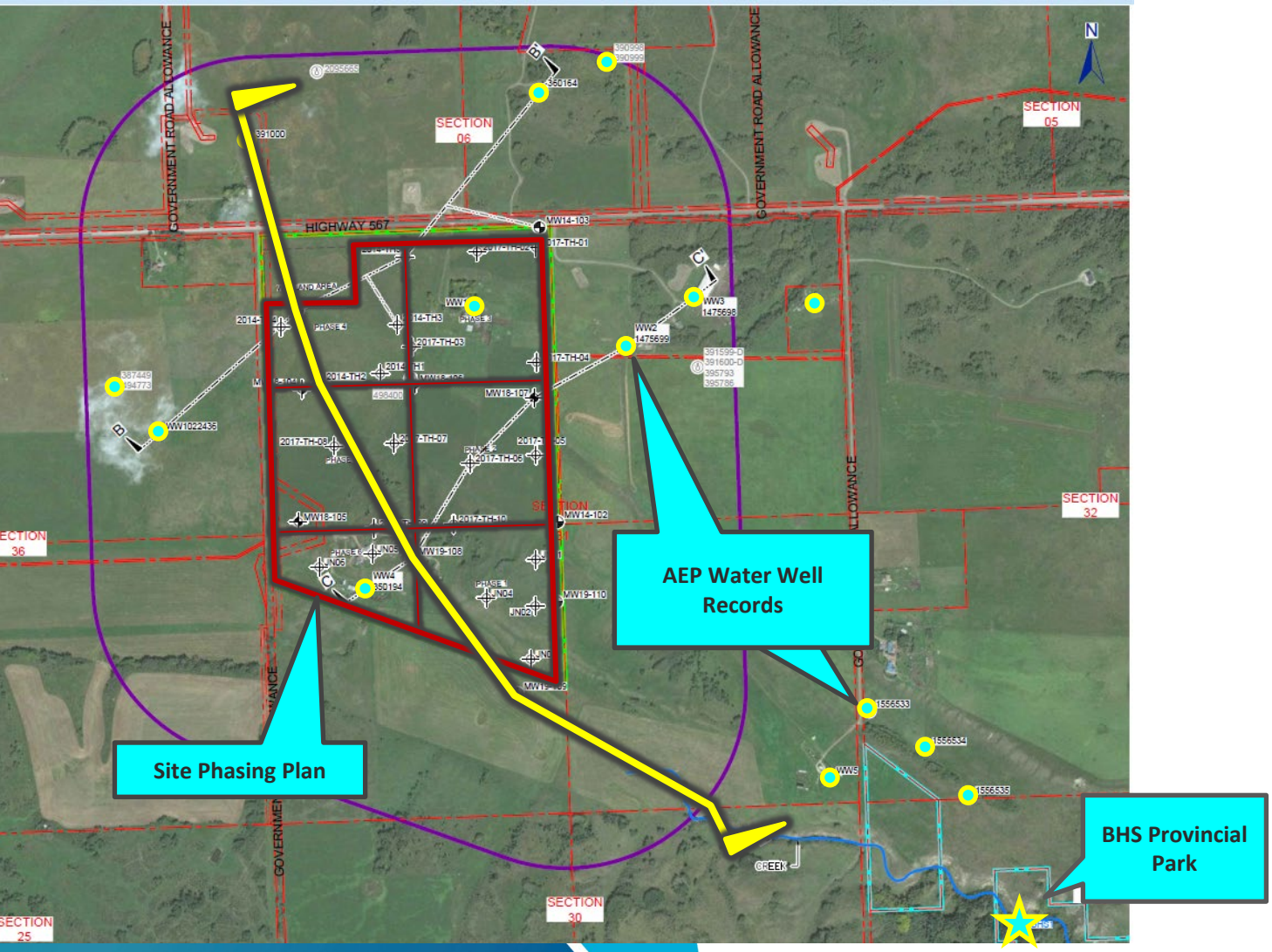
February 17 document by Dr. Jon Fennell

- Unshared report until February 24 (4 business days ago)
- Dr. Fennell indicated on February 1 that he did not have permission from his client to share the document, and that he could not even reveal his client's name or affiliations. Very unusual.
- Report covers geoscience, planning, biology and climate disciplines
- Unsigned, and not sealed as per APEGA regulations
- Conclude it is an advocacy opinion only, which is perfectly acceptable

SLR has shared our work and see there are many important points of agreement

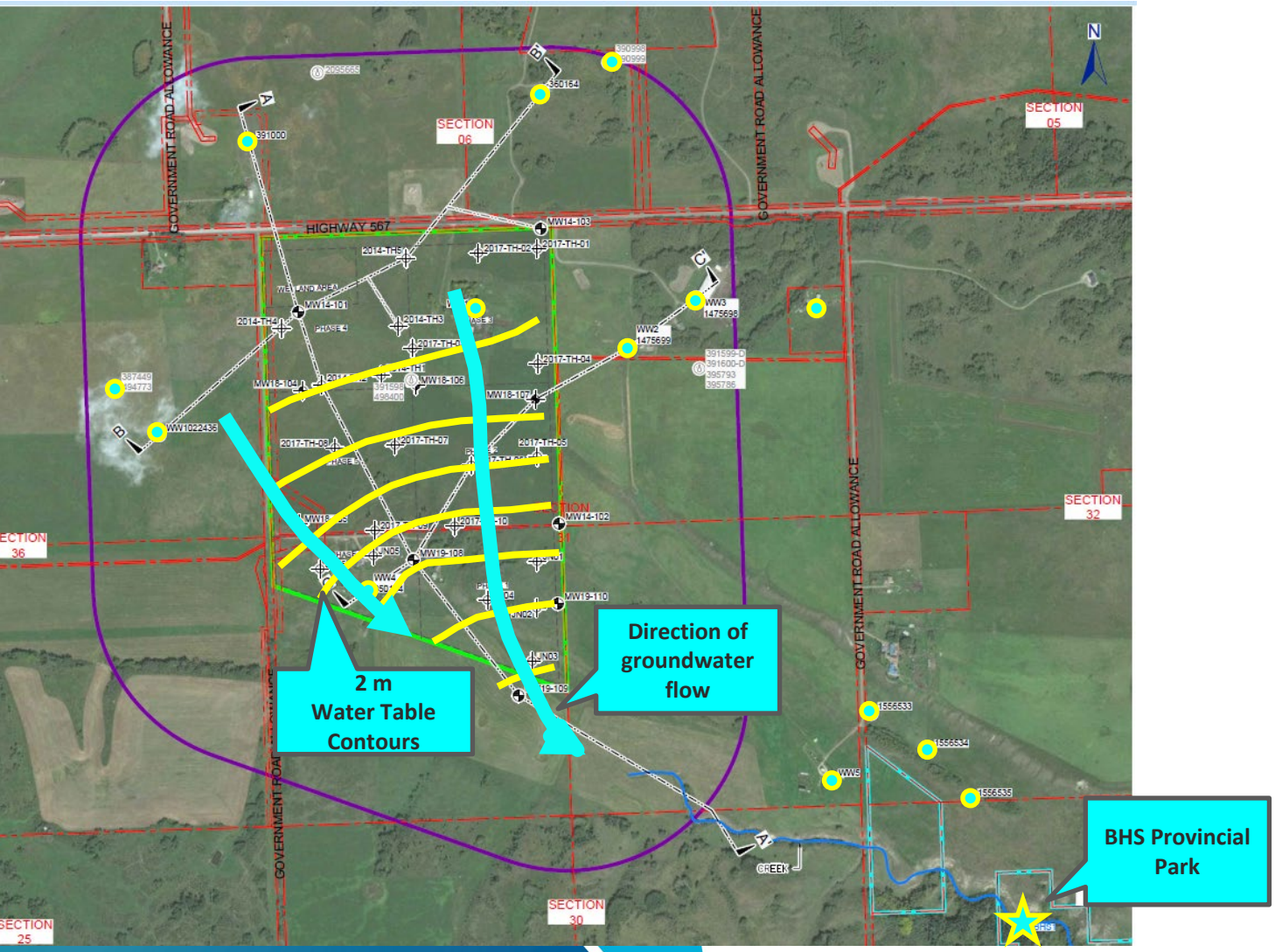
- We agree on the water quality at the site and the springs
- We agree on the groundwater flow patterns towards the springs
- We agree on desirability to protect the Bighill Springs

As described in the following slides, the document however should not be relied upon for decision making purposes



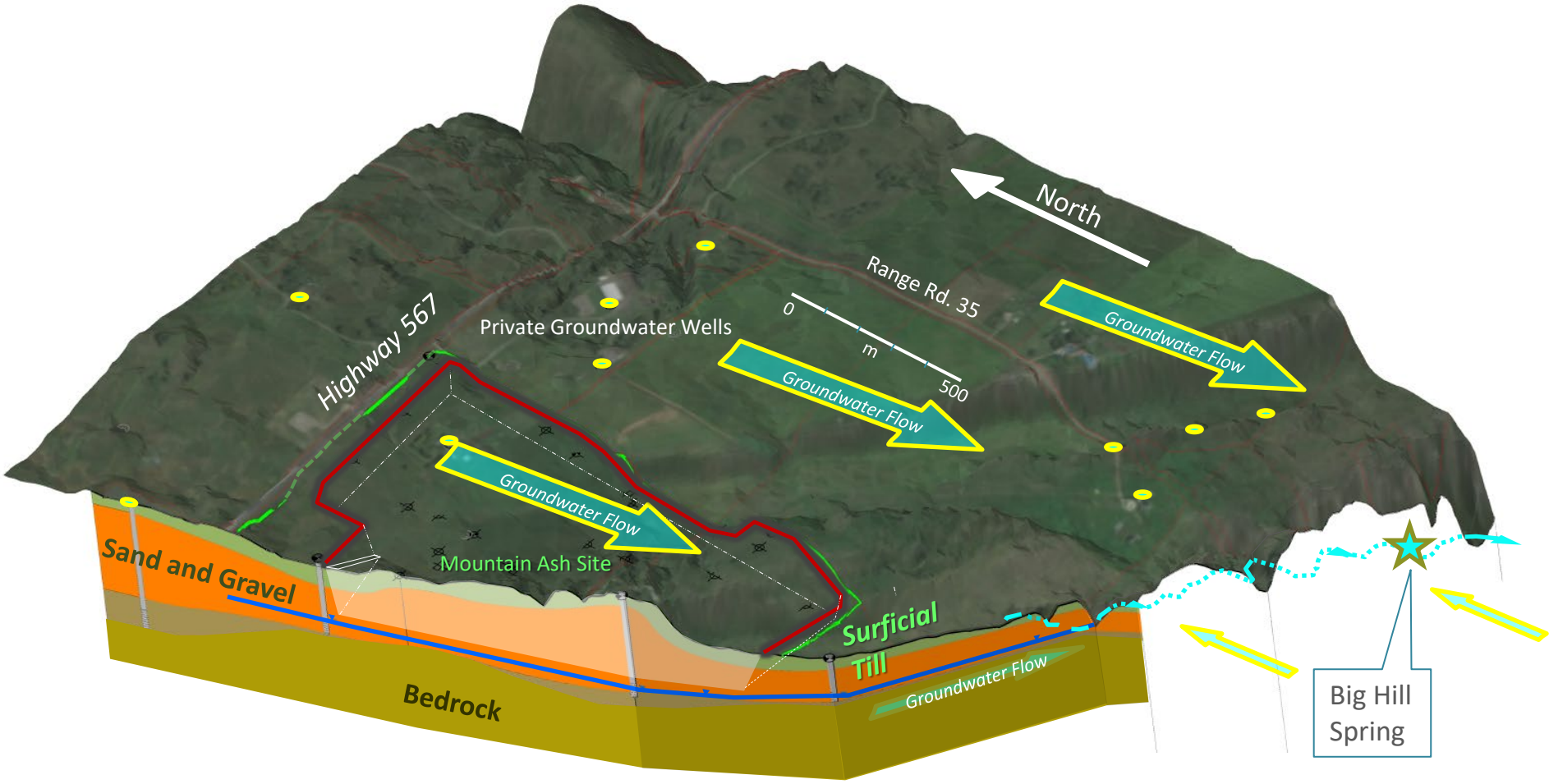
global **environmental** and **advisory** solutions

SLR



global **environmental** and **advisory** solutions

SLR


North
Range Rd. 35
Highway 567
Private Groundwater Wells
0
m
500
Groundwater Flow
Groundwater Flow
Groundwater Flow
Groundwater Flow
Mountain Ash Site
Sand and Gravel
Surficial
Till
Bedrock
Big Hill
Spring

Hydrogeological Assessment

- Drilled 20 boreholes, installed 10 groundwater monitors
- Private well inventory, including residence visits
- Measured water levels, sampled groundwater, sampled Big Hill Spring
- Tested soils for the rate of groundwater movement
- Conducted an impact assessment beyond normal practice, utilizing water budget methods
- Considered wells, watercourses, the Big Hill Spring
- Considered cumulative groundwater effects
- Considered operational effects and recommended mitigation
- Prepared future monitoring program

Key Hydrogeological Findings

- No streams onsite
- Site is about 1/50th of the groundwater catchment area of the Big Hill Spring
- Mineable sand and gravel deposit (20 to 26 m thick) is blanketed with fine grained till (4 to 6 m thick)
- Water table is just above the underlying bedrock of the Paskapoo Formation, which is the local aquifer
- Groundwater flows south to southeast in overburden, towards Big Hill Spring, and southeast also in the bedrock
- Groundwater quality in the sand and gravel is comparable to that in the bedrock and to that at Big Hill Spring
- No dewatering will be undertaken, no changes to the water levels and thus private wells are also protected
- No measurable changes to Big Hill Spring from proposed development

Hydrogeologic Criteria for Mitigation

- Stay above the water table (> 1m above max recorded level)
- No offsite surface water discharge
- Line storm water settlement ponds
- After settlement of fines, reintroduce clear stormwater into the subsurface through infiltration basins
- Minimize open working areas
- Progressively restore site with fine grained overburden and revegetation
- Best management practices for refueling, maintenance and incidental spill response
- Ongoing water quality monitoring program – onsite, residential wells and Big Hill Springs

Hydrogeological Support Slides (as needed)

Main Points Raised by Dr. Fennell

- Loss of Filtration by removal of surface overburden and/or sand and gravel deposit
- Increased weathering of native materials may increase dissolved elements in groundwater
- Possibility that turbidity will rise in groundwater
- Water table rise “will” occur
- Risk of “further contamination” of groundwater
- Inferred Migration of this contamination to Big Hill Springs
- Further migration of this contamination from the springs to Big Hill Creek
- Possible future remediation efforts will be difficult
- Concerns regarding cumulative effects risk
- Proposed 1.6 km setback from Park
- Concern that climate change has not been addressed

11 Speaking Points on the following 12 slides:

1) Loss of Filtration

- It is unclear what filtration they are referring to? Particulate or dissolved components?
- Dissolved constituents are not filtered. But they can be slowed in their movement
- For this reason, the fueling stations and servicing will take place on the upland area where the glacial till soils will remain in place and be supplemented with surface controls to contain inadvertent spills.
- Runoff outside the pit will continue in its normal path. That water near the berms will be collected, sent to sedimentation ponds and the decant water infiltrated to maintain the water balance.
- Runoff inside the pit will be over natural sand and gravel materials and will not have the fines the glacial till has.

- Useful Factoids
  - Sand and Gravel: Water moves vertically very quickly through sand and gravel, in the order of days, and the thickness is inconsequential. It will move through 1 m of sand/gravel in about an hour, and through 26 m in about a day.
  - Glacial Till: 9 to 14 months to cross 4 to 6 m of soil
  - The fines in storm water will be allowed to settle, and only decant water will enter the aquifer.
  - There remains an 800 m flow path to the springs through sand and gravel (2 to 6 years travel time)
  - The same path through the bedrock could take .25 to 300 years based on the range of hydraulic conductivity

2) Increased weathering/dissolution of elements

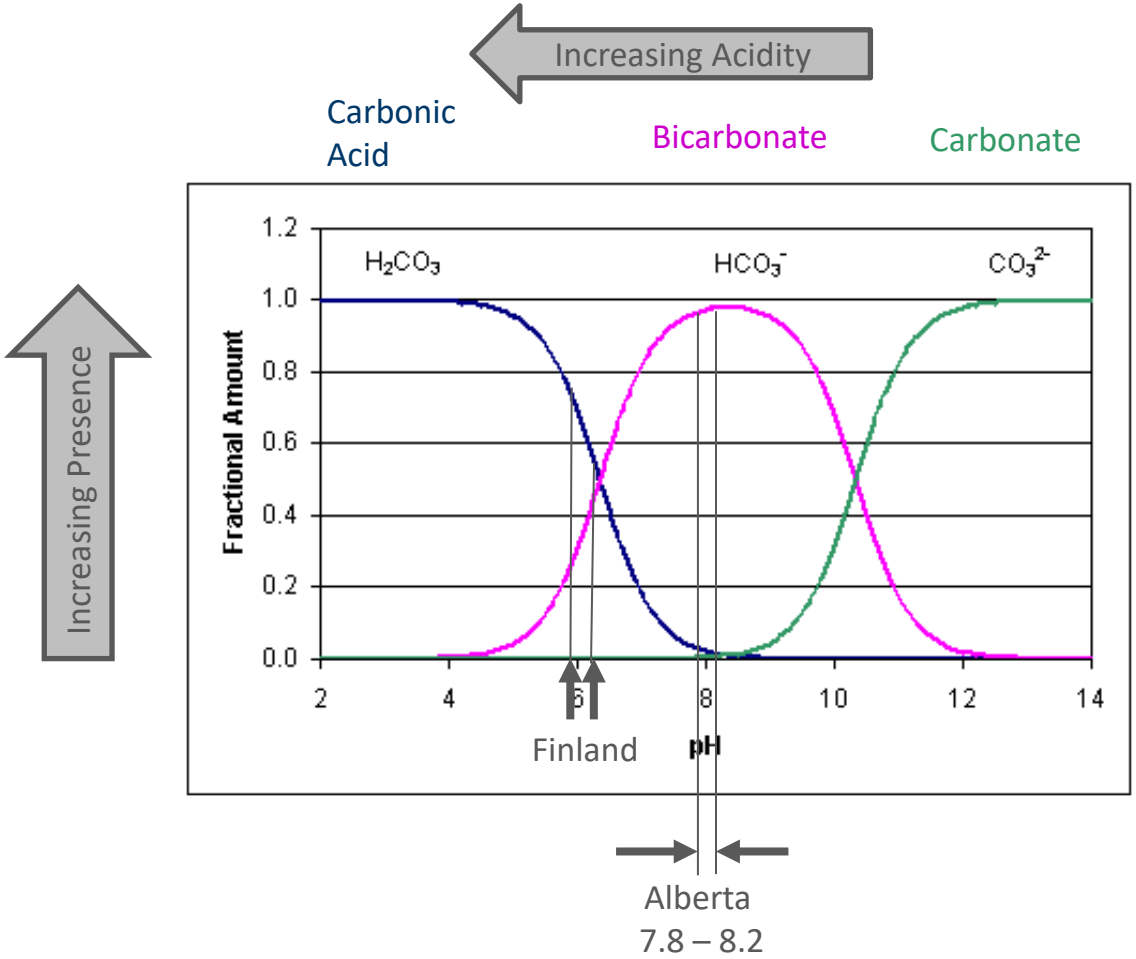
Dr. Fennell relies on a Finnish study to show an increase in dissolved metal concentrations below mined gravel pits there. Concentrations were up to twice natural concentrations.

1. The Finnish study was in a different geologic terrain where Carbolic Acid can form, which caused this dissolution there. Groundwater pH of about 6. This site is in a different setting. Alberta is in a more carbonaceous terrain, groundwater pH of about 8 (less acidic by 100 times). Next slide shows how carbolic acid does not typically form at this pH.

The Finnish study does not apply to this site. Such weathering will not be an issue.

There are further physical conditions not accounted for in Dr. Fennell's dissertation:

1. Mass of soil being removed means there is much less material to dissolve anything from.
2. Concentrations observed at this site and at the spring are very low (parts per billion) and will not increase appreciably. The same water will flow through the same soil.
3. Dilution. The pit is only 1/50th of the groundwater basin, so the relative effect of even doubling concentrations there (which is very unlikely, given the above) would only mean, and even a doubling at the pit would mean a change of just 2% due to dilution by the rest of the water.


Increasing Acidity
Carbonic Acid
Bicarbonate
Carbonate
Increasing Presence
Fractional Amount
1.2
1.0
0.8
0.6
0.4
0.2
0.0
H_2CO_3
HCO_3^-
CO_3^{2-}
2
4
6
8
10
12
14
pH
Finland
Alberta
7.8 – 8.2

3) Possibility that turbidity will rise in groundwater

Dr. Fennell again relies on the Finnish study to give examples of increased turbidity.

- The studies reportedly summarize observations at many pits. No discussion is made on the setting of these pits, how old they are, how new they are, their operational conditions and what use of Best Management Practices are made.

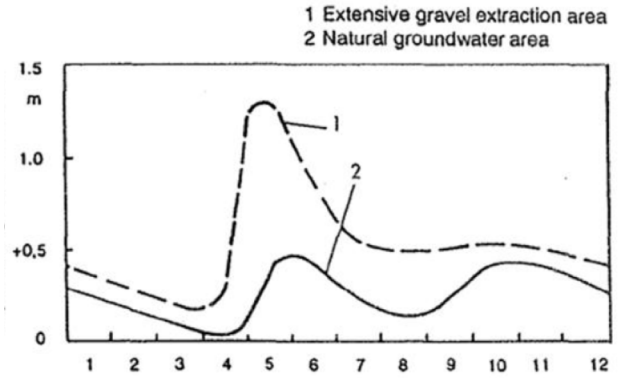
The Finnish study does not apply to this site.

- Based on his experience of working on aggregate pits over the past 40 years, Mr. Usher indicates that he has never witnessed a turbidity problem in the groundwater any significant distance from operations.
- Further to this, the Mountain Ash pit will incorporate many best practices to manage water and reduce/eliminate the factors that create turbidity
  - Settlement ponds collecting runoff water from fine grained soils.
  - Ponds are oversized to exceed standards and provide greater settling distances.
  - Top draw discharge to infiltration ponds to only take clearest water
  - If aggregate washing is needed, a series of lined settling ponds on the pit floor will operate in a similar fashion, a detail typically dealt with at the DP stage. Standard systems that have worked well in Canada.

4) Water Table Rise "Will" Occur

Dr. Fennell again relies on the Finnish study to give examples of water table rise.

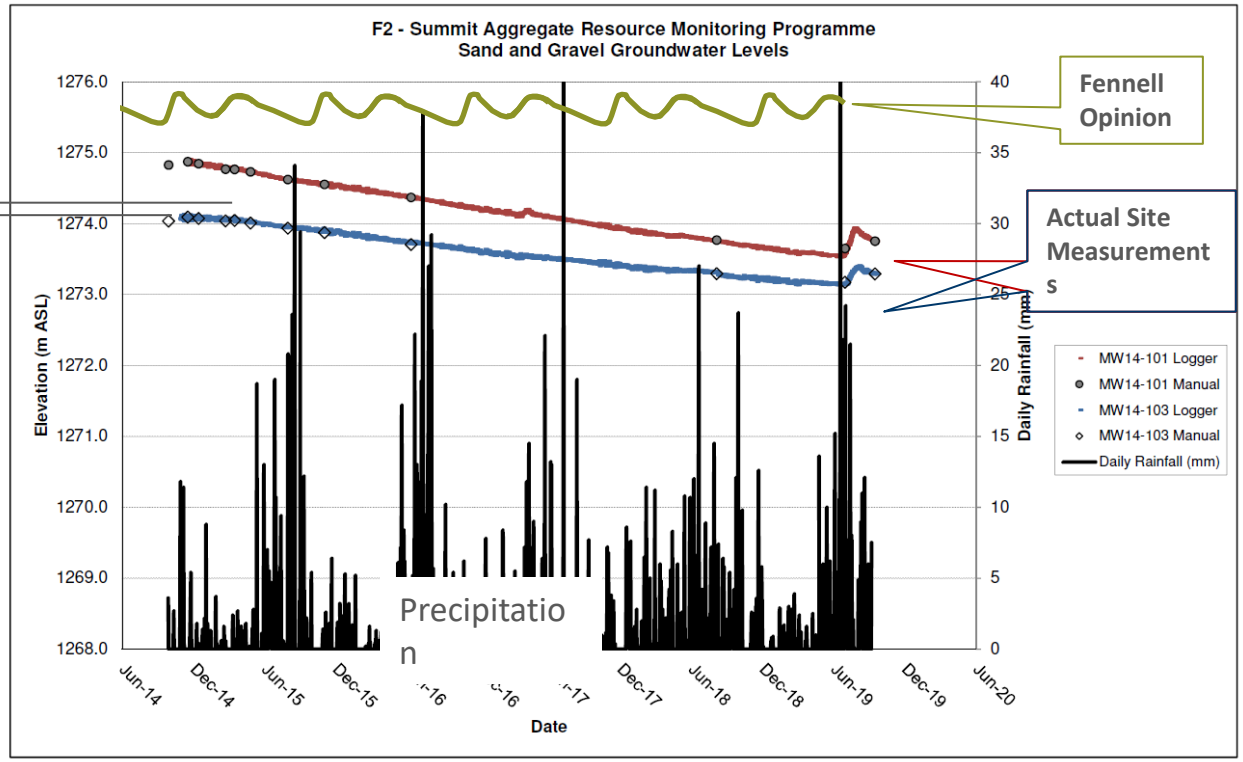
- Study showed a higher fluctuation of water levels in areas of gravel extraction.
- Finnish study was undertaken in a country of temperate weather, unlike the semi-arid region the proposed pit sits in
- Water levels do not fluctuate significantly at the site because of the very permeable sand and gravel that easily dissipates water (the following slide reproduces Figure F2 from SLR (2021) which demonstrates the difference in water table fluctuations.
- The additional water created by the precipitation falling directly on this site amounts to 5 mm per year (SLR, 2021). Assuming a soil porosity of 30% this would be an average rise of 16 mm/yr which is very easily dissipated.



The Finnish study again does not apply to this site.

Site Water Level Fluctuations

16 mm



5) Risk of "Further Contamination" of groundwater

Dr. Fennell asserts that "further contamination" will occur.

- Examination of the water quality results shows groundwater largely in compliance with drinking water limits. There is no "contamination".
- Metals identified by SLR and discussed by Dr. Fennell occasionally exceed these limits but not by much, and are entirely natural
- For the reasons stated previously and listed again here, there is little likelihood of increasing parameter concentrations:
  - Removal of aggregate removes source of elements available for dissolution by 20 times or so
  - Acidity will not change enough to dissolve further elements from remaining material
  - Concentrations are currently very low and consistent with most other places in this physical setting.

6) Migration of inferred contamination to Bighill Springs

Dr. Fennell assumes that there will be an increase in parameter concentrations, and therefore it will move to Big Hill Springs along the groundwater flow path.

- Based on the above there will be no appreciable increase in parameter concentrations. Simply put: the same water is running through the same soils.
- The pit is only 1/50th of the groundwater basin, so whatever is dissolved in the groundwater at the pit would be attenuated by natural dispersion and dilution
- Example: An existing watershed water volume of 50 units
  - The highest arsenic concentration found at the site is about 8 ppb, and the drinking water limit is 10 ppb
  - Multiplying 8 ppb Arsenic by the volume of 50 gives an existing mass of 400 parts
  - Assuming the site arbitrarily doubles the concentration of their portion of water (1 unit) to 16 ppb, meaning the total watershed now has 408 parts
  - 408 divided by 500 yields a concentration of 8.16 ppb at the spring.
  - This is the effect of dilution and is well within the error of measurement and the fluctuation in natural groundwater
- In summary, there is little additional concentration increase that will migrate to Big Hill Springs

7) Migration of this contamination from the springs to Bighill Creek

Dr. Fennell relies on flow measurements made by the Bighill Creek Water Baseline Study.

- He has not tested the veracity of those measurements. The baseline study does not report ambient precipitation conditions that may have occurred prior to their sampling and flow measurement events. It would be imprudent to rely on these flows until one can be sure the measurements were made under baseflow conditions and did not include stormwater runoff.
- Notwithstanding this limitation, it is true that Bighill Springs ultimately discharges to the Bighill Creek, and whatever is in that water will reach the greater stream.
- SLR has demonstrated that there is no "contamination" of the groundwater, and it is our impression that all agree that the current measurements are indicative of natural groundwater concentrations of the measured parameters.
- The above slides have shown that additional elemental concentrations will be very minor at the site, and thus even smaller at the spring discharge, and therefore even smaller when discharged to Bighill Creek (subject to the receiving water concentrations).
    - Dilution, mass removal, no appreciable dissolution

8) Possible future remediation efforts will be difficult

Section 4 of the Fennell report speculates that there will be a contaminant release at the site, and then goes on to speculate on cleanup methods, finally concluding that they cannot possibly work.

- **Contrary to the picture being painted** by individuals opposed to the addition of the additional land to the approved land use designation, **the nature of gravel extraction pits is such that they pose little risk to water quality.**
- There are no large quantities of aggregious materials stored on site.
- As seen above, there is no significant mobilization of native dissolved elements.
- Storm water is handled internally by standard methods that have worked for generations, and there is no direct surface water discharge from the pit.
- SLR 2021 discusses the potential for incidental spills of machine fluids, and point out the volumes are not high, can be handled by the spill kits carried on each machine, and the personnel are trained with this stewardship as part of their jobs. Fuel handling will only occur in controlled areas engineered on the low permeability glacial till soils and not in the pit.
- Simply put, there is no need for elaborate remediation efforts, nor to speculate on how they might perform.

9) Concerns Regarding Cumulative Effects Risk

Section 5 of the Fennell report points out that there could be up to 5 pits ultimately in operation in the area and uses this to set out his planning opinion on setbacks from the Bighill Springs.

- It is not the responsibility of any individual operator to assess the effects of other operations.
- Notwithstanding this, MALP asked SLR to conduct a hydrogeological cumulative effects assessment. This was conceptually undertaken (Section 5.5.1) presented in the SLR hydrogeology report. This analysis is not acknowledged by the Fennell report.
- SLR 2021 concludes that a modest increase in groundwater flow of about 10% should all five pits be operating at the same time. This was conservative since each pit would operate in phases, and if modelled on Mountain Ash, only about 1/6th of the pits would be open during their site lives, which also would not be totally coincident.
- 10% of 44 L/s is 4.4 L/s. One sixth of that is 0.7 L/s. A positive change in springflow by this small amount (0.7 L/s) is well within the variance in spring flow reported by the Bighill Creek Water Baseline Study (22 to 182 L/s)
- On this basis the likely cumulative hydraulic impact by five similar operations will not cause harm, as originally reported by SLR.

10) Planning Advice on Park Setbacks for Aggregate Extraction

Section 5 of the Fennell report goes further to suggest setbacks from the Bighill Springs Park.

- Dr. Fennel suggests a 1.6 km setback, which coincidentally would preclude the MALP site. He suggests "*the sole purpose of this strategy is to maintain the quality of the groundwater sustaining the springs and supporting aquatic habitat reliant on the delivery of good quality water of stable temperature.*"
- The proposed pit is just 800 m away from the watercourse and has been demonstrated here that it will not cause an impact. Water temperature will be maintained, and the water quality will remain the same. We respectfully submit that the stated purpose has been met. Further, it would still likely be met at even shorter distances than 800 m. There is no basis for the suggested 1,600 m setback for the MALP pit or even the cumulative hydraulic effect of all five pits.
- Dr. Fennel goes further and suggests a further 1.6 km setback be considered for any pit mining down to 4 m above the water table. This does not make hydrogeological sense. Based on site conditions water drains downward at about 1 m per hour in the sand and gravel. A 1 m or 4 m distance is of no material consequence, and this criteria is meaningless. We respectfully submit that this additional setback is completely unnecessary.
- We support the use of science in establishing setbacks, and maintain Dr. Fennell's suggestions are extreme and more based on the presence of the MALP property than on science.

11) Concern That Climate Change Has Not Been Addressed

The Fennell report ably summarizes the key effects of climate change.

- With respect to a rise in water table, the SLR report and the above discussion show that the thickness of the aquifer can handle higher water levels. The base of the pit will be 1 m above the high-water table as measured in each phase and can be adapted to current weather effects as they progess.
- With respect to the frequency of storms and subtle shifts in their character, each phase is big enough to adapt with bigger ponds or other changes in design. The exterior ponds are currently oversized. It is in the interest of the operator to be able to work the resource without having to cope with adverse conditions, and therefore attention will be paid to such shifts over the 30-year site life.
- With respect to the intensity of storms, whereby the Fennell report suggests a 1:100 storm may become a 1:50 year storm. The conceptual design of ponds have been based on 69 years of records. At the DP stage the record will be updated and the ponds sized accordingly to the then current 1:100 year storm.

Table 1. Example of difference in natural groundwater and groundwater measured 2.5 m below above watertable gravel extraction areas *(Source: Hatva 1994)*

Parameter		Rainwater n = 12			Natural groundwater areas n = 43-60			Gravel extraction areas n = 76-240		
		Md	min	max	Md	min	max	Md	min	max
Temperature	°C				4.7	1.1	6.8	5.6	0.0	8.8
Acidity	pH	4.5	4.1	6.3	6.4	5.6	7.3	5.9	5.4	7.3
Conductivity	mS m^{-1}	4.0	2.0	9.0	6.0	3.0	9.0	7.0	4.0	19.0
Carbonic acid	mg l^{-1}				11.0	2.0	44.0	24.0	2.0	62.0
Bicarbonate	mg l^{-1}				25.0	15.0	38.0	20.0	8.0	45.0
Chloride	mg l^{-1}	1.0	1.0	3.5	2.0	1.0	7.0	3.0	2.0	37.0
Sulphate	mg l^{-1}	2.0	0.5	3.0	4.0	4.0	12.0	10.0	5.0	16.0
$KMnO_4$-consumption	mg l^{-1}				3.0	0.0	9.0	2.0	0.0	51.0
Hardness	°dH				1.0	0.5	1.5	1.0	0.5	3.0
Nitrate	mg l^{-1}	2.1	1.4	6.7	0.4	0.0	4.0	1.9	0.0	11.5

Note: n = number of samples; Md = median values

Table 1 Composition of rain and groundwater at intact (natural) groundwater areas and adjacent gravel extraction sites where extraction takes place above groundwater table (Hatva *et al.*, 1993; Järvinen & Vänni, 1990).

Parameter		Rainwater n = 12			Natural groundwater areas n = 43-60			Gravel extraction areas n = 76-240		
		Md	min	max	Md	min	max	Md	min	max
Temperature	°C				4.7	1.1	6.8	5.6	0.0	8.8
Acidity	pH	4.5	4.1	6.3	6.4	5.6	7.3	5.9	5.4	7.3
Conductivity	mS m^{-1}	4.0	2.0	9.0	6.0	3.0	9.0	7.0	4.0	19.0
Carbonic acid	mg l^{-1}				11.0	2.0	44.0	24.0	2.0	62.0
Bicarbonate	mg l^{-1}				25.0	15.0	38.0	20.0	8.0	45.0
Chloride	mg l^{-1}	1.0	1.0	3.5	2.0	1.0	7.0	3.0	2.0	37.0
Sulphate	mg l^{-1}	2.0	0.5	3.0	4.0	4.0	12.0	10.0	5.0	16.0
$KMnO_4$-consumption	mg l^{-1}				3.0	0.0	9.0	2.0	0.0	51.0
Hardness	°dH				1.0	0.5	1.5	1.0	0.5	3.0
Nitrate	mg l^{-1}	2.1	1.4	6.7	0.4	0.0	4.0	1.9	0.0	11.5

Hatva, T., Hyyppà, J., Ikàheimo, J. & Sandborg, M. (1993) Soranoton vaikutus pohja veteen. Raportti VI: Pohjavesija soranotto (Effect of gravel extraction on groundwater. Report VI: Groundwater and gravel extraction). Helsinki, Ympdristoministerio, kaavoitus-ja rakennusosasto, 1/1993. Tutkimusraportti, Finnish original with English summary. ISBN 951-47-7155-9, ISSN 0786-5244.

Jàrvinen, O. & Vânni, T. (1990) Sadevedenpitoisuus-ja laskeuma-arvot Suomessa vuonna 1988 (Rainwater quality and deposition values in Finland in year 1988). Helsinki, vesi-jaympâristôhallitus. Vesi- ja ympàristôhallituksen monistesarja 235 in Finnish. ISBN 951-47-3018-6, ISSN 0783-3288

Summit Pit

Biophysical Slides

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Aquatics

-As indicated in the hydrogeology report, impacts on the aquatic system of Bighill Creek is not expected.

-There are no waterbodies or watercourses within the site boundary.

-Bull trout and westslope cutthroat trout (WSCT) **do not** occur in the Bighill Creek system.

-Trout Unlimited conducted a fish inventory for the Bighill Creek Preservation Society within Bighill Creek and Bighill Springs Creek in 2018. No bull trout or westslope cutthroat (WSCT) trout were found.

-There are no bull trout or WSCT in the AEP FWMIS database for either creek

DFO Canada (2020) – "Information for the Identification of Candidate Critical Habitat of Bull Trout, *Salvelinus confluentus* (Saskatchewan-Nelson Rivers Populations)" states:

- "After examining the Hydrological Unit Codes (HUCs) using the developed framework, candidate Critical Habitat was identified within 40 of the 45 HUC 8 (provincial waters) and 81 of the HUC 12 (National Parks) watersheds that encompass the distribution range of Bull Trout in DU 4 (Table 2; see Appendix). **No candidate Critical Habitat was found within Bow River and Bighill Creek (04020801)**, Fish Creek (04021101),…"

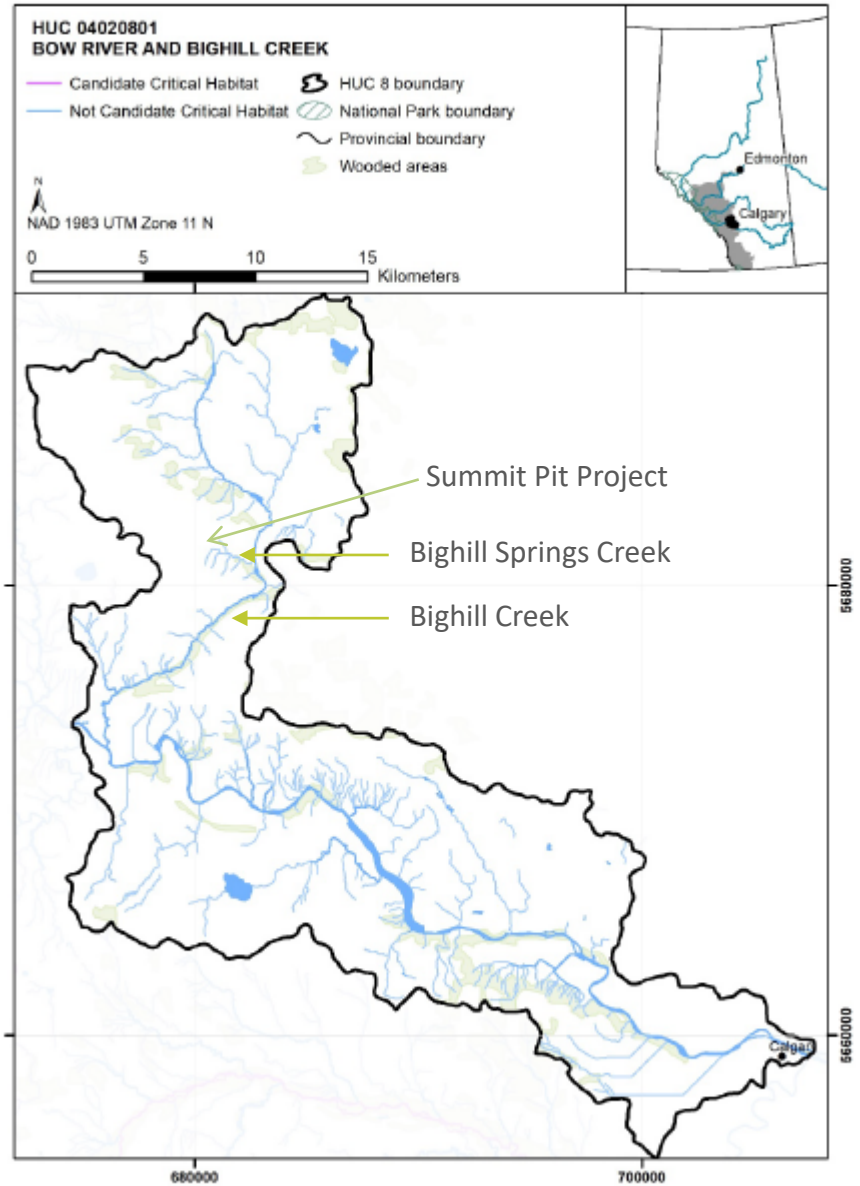
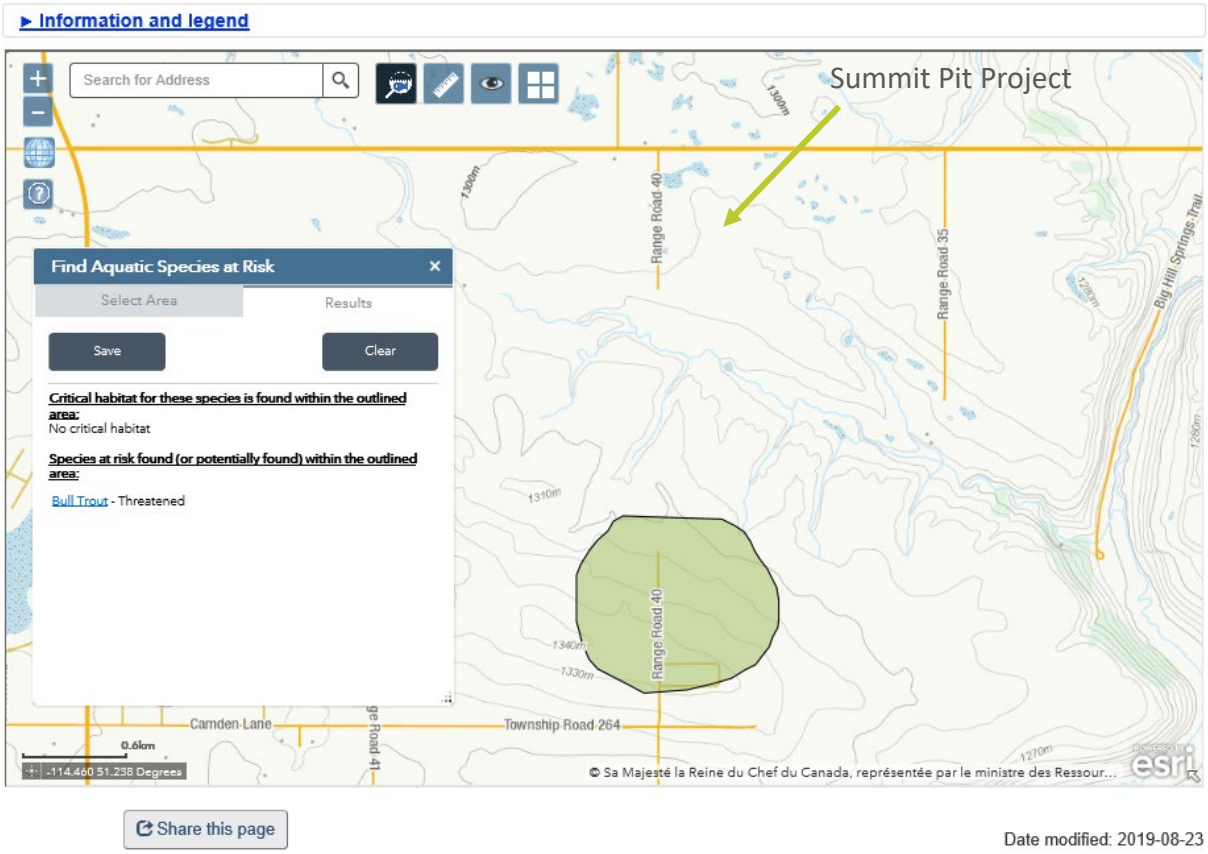
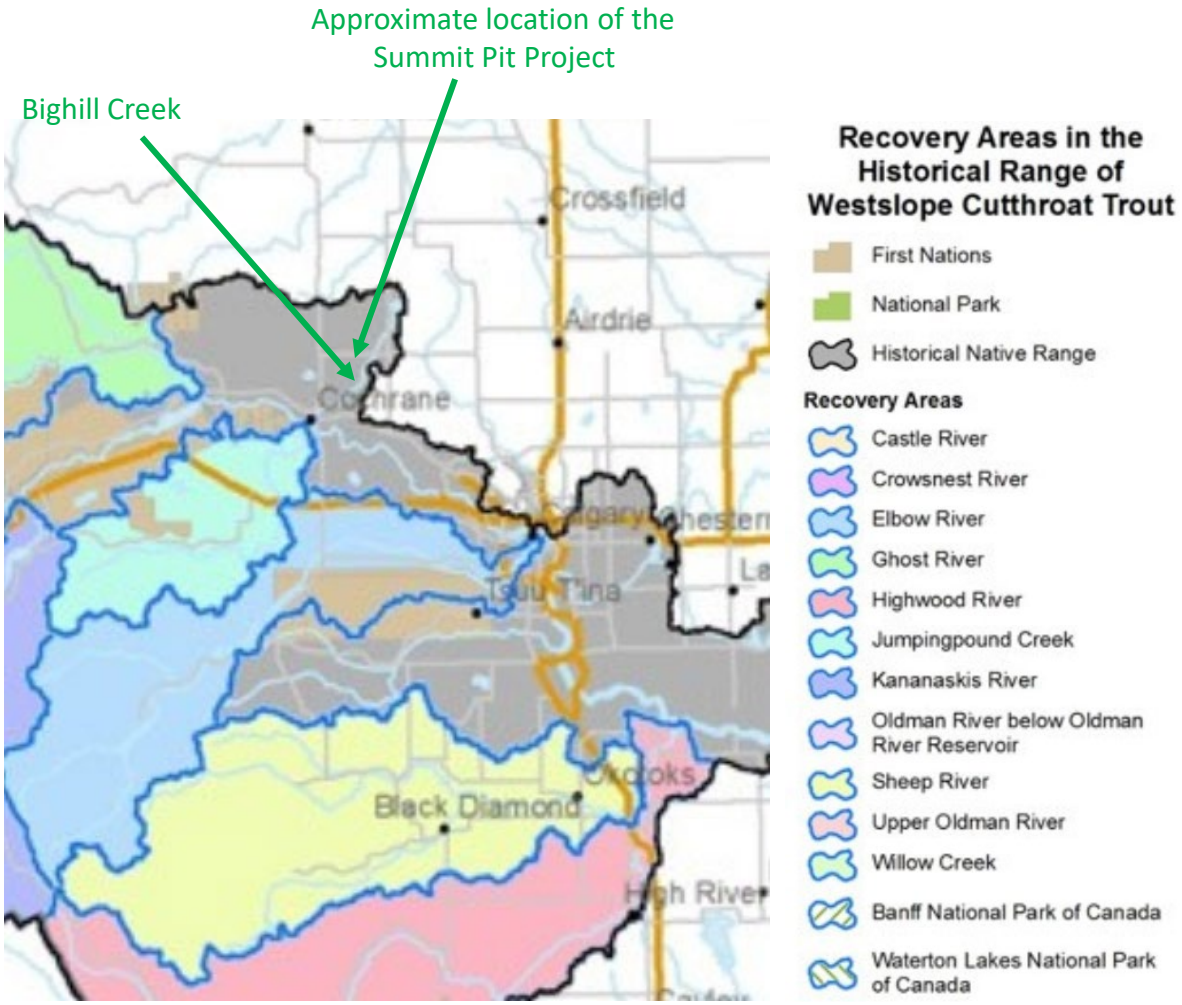


Figure A1.14. Candidate Critical Habitat for Bull Trout (Saskatchewan-Nelson rivers populations) within HUC 8 (04020801) Bow River and Bighill Creek. All first and second order streams are reduced to improve visibility.

- The DFO Species at Risk Mapping Tool was last updated in 2019, Recovery Strategy and critical habitat designations report released in 2020
- The online mapping tool identifies all waterbodies and watercourses within the furthest extent of the bull trout historical range as having or potentially having bull trout despite actual suitability of habitat or historical occurrence.
- To summarize, bull trout are not found in the Bighill Creek system, the system is not being considered for designation as critical habitat and is not being considered for introduction of bull trout.





- Based on the Westslope Cutthroat Trout Recovery Strategy (DFO 2019), WSCT are currently **not found** in the Bighill Creek system and are **not being considered** to be restored, improved or re-established in the creek.

Figure 1 from the "Westslope Cutthroat Trout: Recovery Strategy and Action Plan, 2019 (proposed)":
Recovery areas in which stream and lake populations will be prioritized according to status of threats to determine where populations can be restored, improved or re-established

Soil

- Desktop review and field sampling to determine baseline conditions
- Soils within the site have low wind erosion risk and moderate water erosion risk. No sensitive soils were observed within the Project area during the field investigation.
- Topsoil and upper subsoil will be salvaged and stockpiled separately for reclamation purposes. Native seed banks are retained in stockpiled topsoil.

Vegetation and Wetlands

Methods

- Desktop review and field studies to determine baseline conditions
- Wetland assessment meets requirements set out in the Alberta Wetland Policy (GoA 2013)
- Wetland assessment conducted by two Qualified Wetland Science Practitioners (QWSP)
- Historical air photos reviewed, as required, to determine wetland permanence
- Alberta Wetland Classification System applied to identify wetlands
- Alberta Wetland Rapid Evaluation Tool (ABWRET-A), which is a standardized method, was used to assess the function of the wetlands using on-site observations and off-site spatial data.

Vegetation Results

- Vegetation within the site and in the area is heavily modified by agricultural land use.
- Vegetation communities within the site are primarily non-native hay crop, tame pasture and non-native species associated with residences. There is a native pasture and stands of aspen trees present, and influenced by cattle grazing.
- No rare plants found onsite
- No prohibited or noxious weeds listed under the *Weed Control Act* were present
- A Weed Management Plan will be prepared and implemented and Mountain Ash will comply with the *Weed Control Act*

Results

- No open water wetlands present on site
- No watercourses or obvious drainages were observed during the field assessment that would connect wetlands hydraulically.
- 20 ephemeral wetlands identified onsite including:
  - 1 Class III wetland
  - 5 Class II wetlands
  - 14 Class I wetlands including a dugout

Class I - dry, farmed through, difficult to discern

Class II - dry with vegetation species typical of wetter soils present

Class III – dry, wetland vegetation species present

Wildlife

- Desktop review and wildlife/breeding bird survey to determine baseline conditions.
- The site is within an area dominated by agricultural, residential and industrial activity with some areas of native prairie, primarily restricted to unsuitable crop areas such as Bighill Creek Valley.
- 5 sensitive species recorded within 1,000 m of the project (FWMIS): barn swallow, eastern kingbird, great blue heron (no rookeries), least flycatcher, sora. Only the barn swallow is *SARA* listed. Peregrine falcons not recorded within 6 km according to FWMIS. All but sora recorded at or flying over the site during fieldwork.
- There is limited cover habitat available for large mammal species that may typically occur in the area including deer, moose, elk, bear, cougar. No critical habitat for these species. Deer and elk scat were observed onsite. These species may occasionally pass through or forage on the site.
- 28 species of birds observed on or flying over the site including four sensitive species listed listed above.
- Given low quality and modified nature of habitat at the site and distance (>1,000 m) to Bighill Provincial Park, impacts on wildlife are expected to be negligible.

Summit Pit

Noise Slides

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Noise – Methods & Baseline

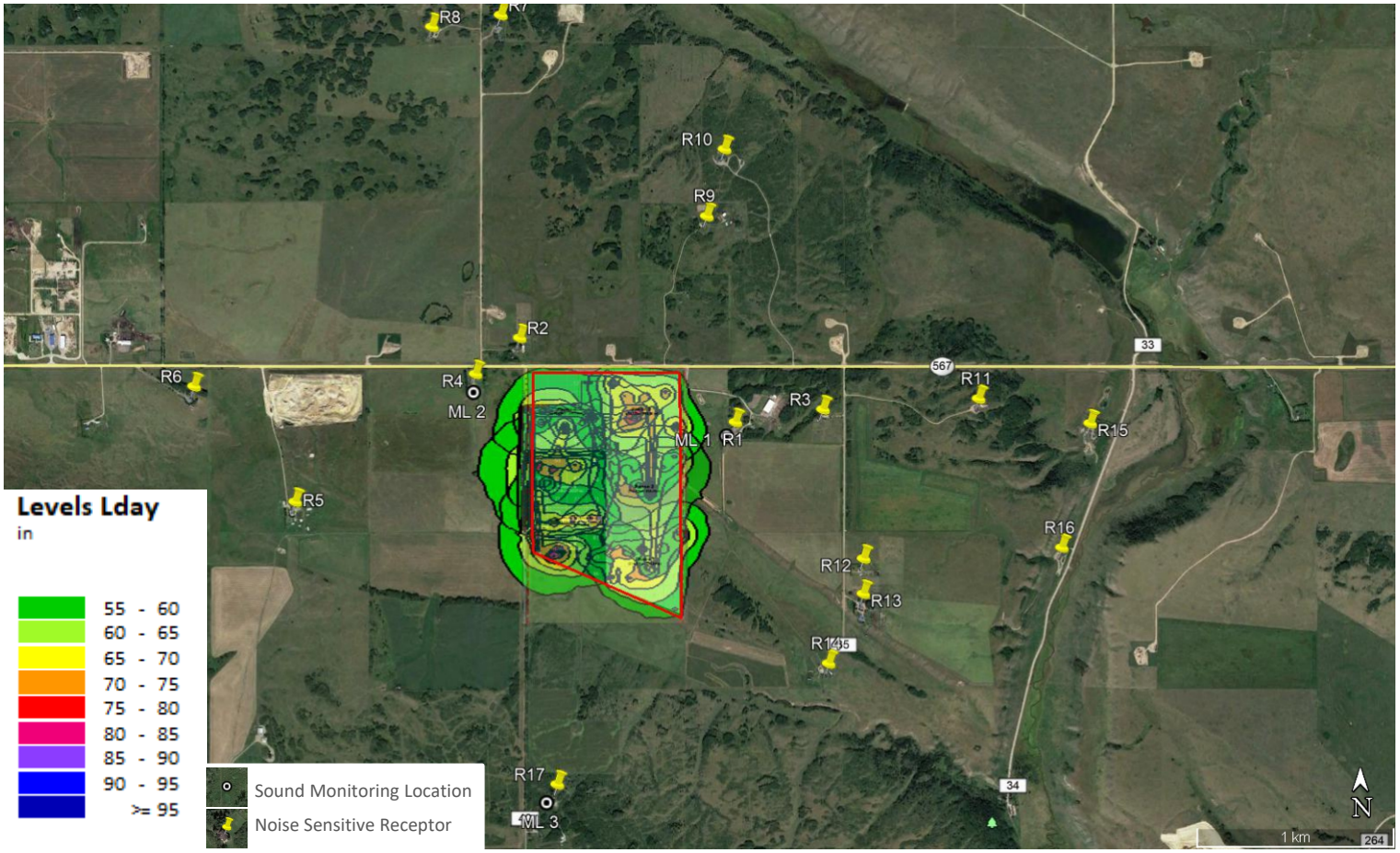
- Assessment methodology was discussed and agreed with RVC.
- Assessment criteria was established based on sound monitoring of existing acoustic environment.
- Baseline sound level data was collected over multiple 24-hour periods including weekend.
- Assessment criteria was based on a very conservative sound measurement parameter, L_{A90}, rather than the typically used L_{Aeq} which is, typically, much less conservative.
- Assessment criteria used is more stringent than those apparent under other regulations such as Directive 038, Rule 012 and for other similar permitted developments in RVC.
- Assessment criterion varied for each receptor between 51 and 54 dB L_{Aeq}.
- Baseline sound levels included existing sound sources such as road traffic, aircraft, agriculture, residential and industrial including aggregate operations to consider the cumulative assessment of existing permitted operations.
- Sound propagation modelling was undertaken for worst case propagation for all sources and receptors.
- All 6 development phases were assessed for full comprehension of sound levels throughout the lifetime of the project rather than just an assumption of worst case.

Noise – Findings & Conclusions

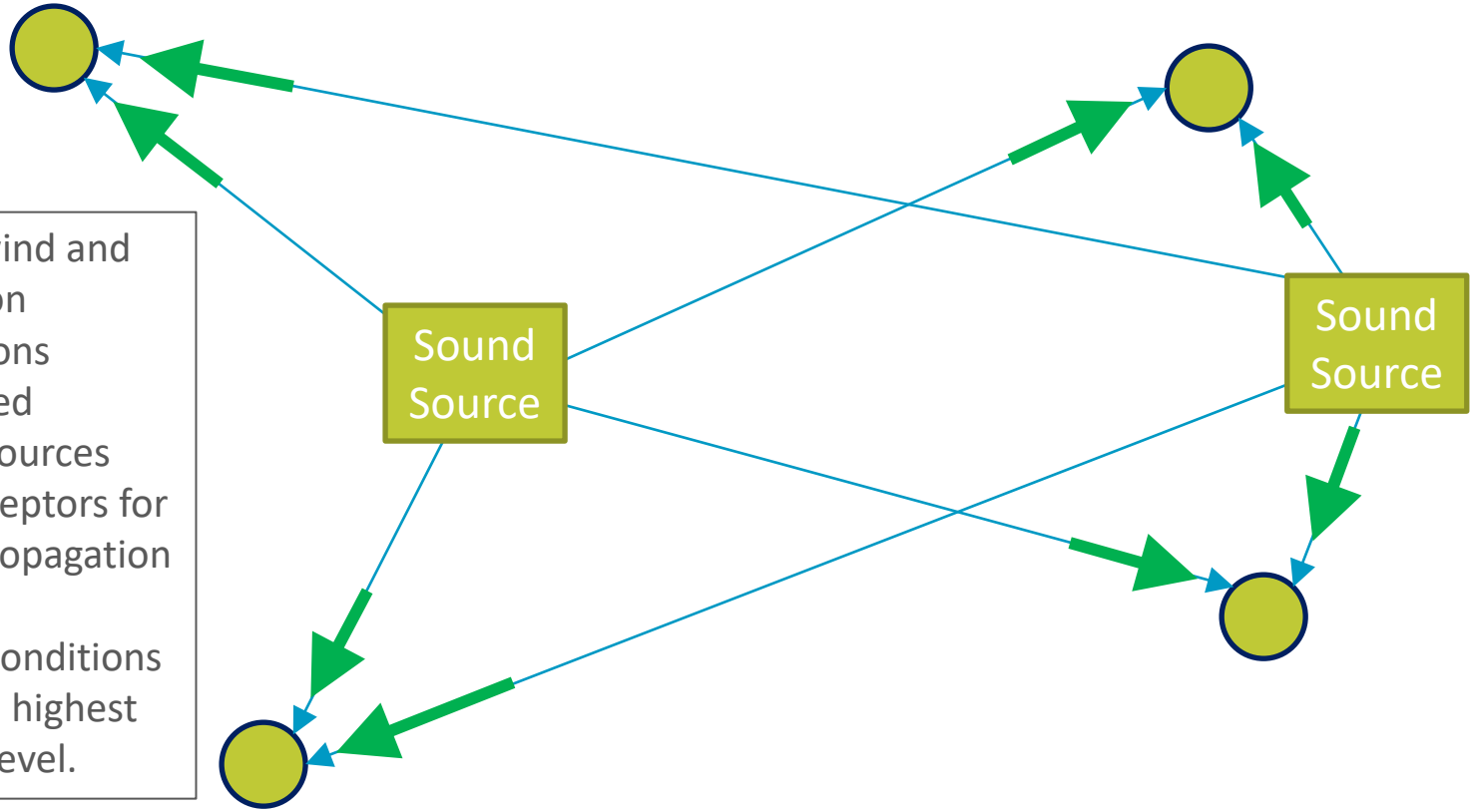
- Control measures will be required to minimize sound from operations at the nearest noise sensitive receptors including,
  - daytime operation
  - mining below grade (22.5 m) and into the face of the aggregate deposit
  - crusher distance offset of 190 from east and 140 from all other boundaries
  - acoustic shroud to be placed on crusher
  - rubber linings chutes and dumpers and minimal drop heights to reduce impact sound
  - low sound level and broadband reverse alarms
  - staff training
  - regular equipment maintenance
  - Regular community engagement
  - regular anonymous sound monitoring
  - variation in traffic routes for vehicles leaving and arriving to site
  - Extraction operations will cease between December 1 and March 1

  all as part of the site noise management plan.
- With these control measures sound levels due to operations will be below the assessment criterion at all receptors and have a low impact to amenity.

Noise – Sound Level Contours above 55 dB



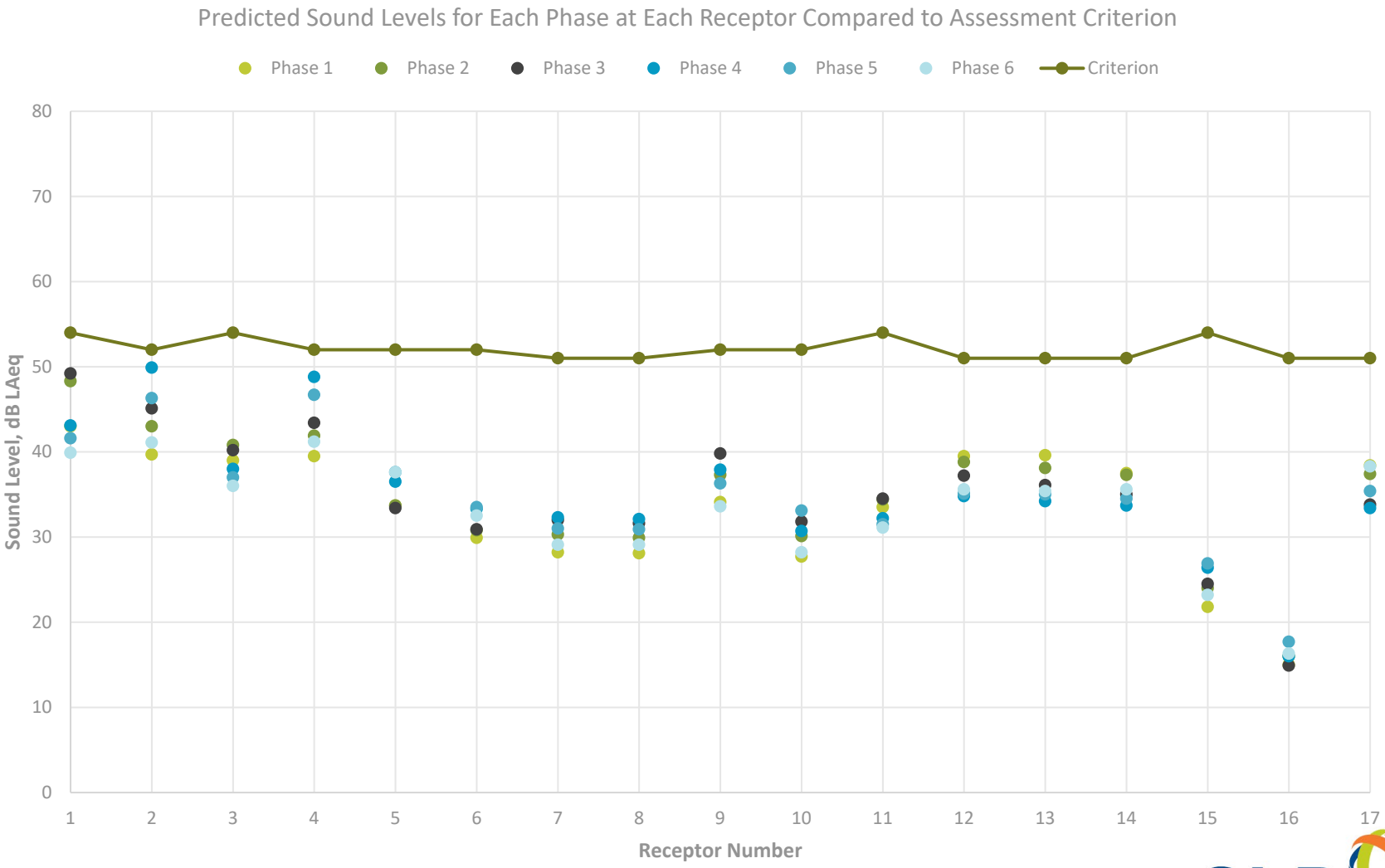
Noise – Downwind Explanation



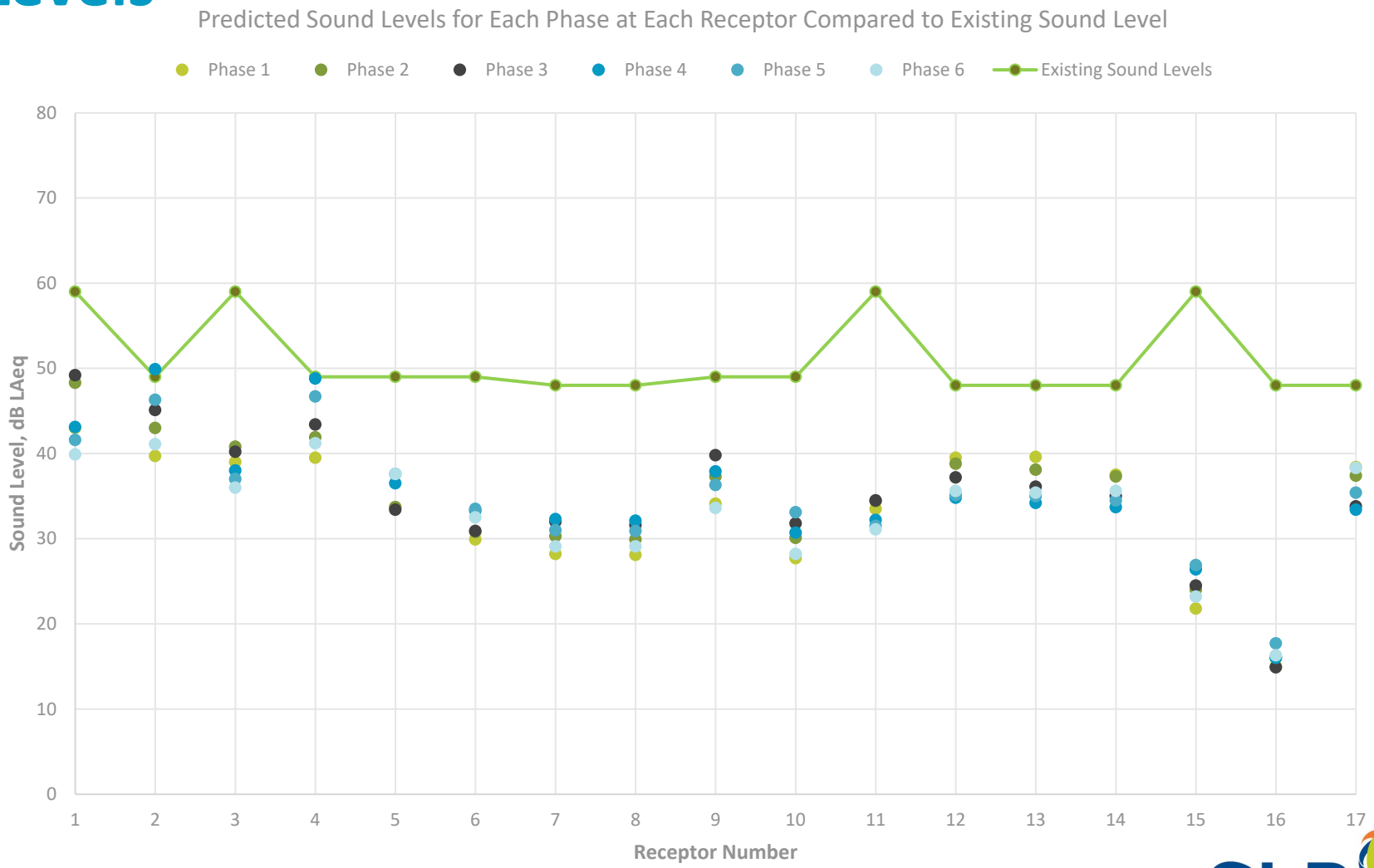
Downwind and inversion conditions modelled for all sources and receptors for each propagation path.
These conditions provide highest sound level.

Sound Propagation Path
Modelled Wind Direction

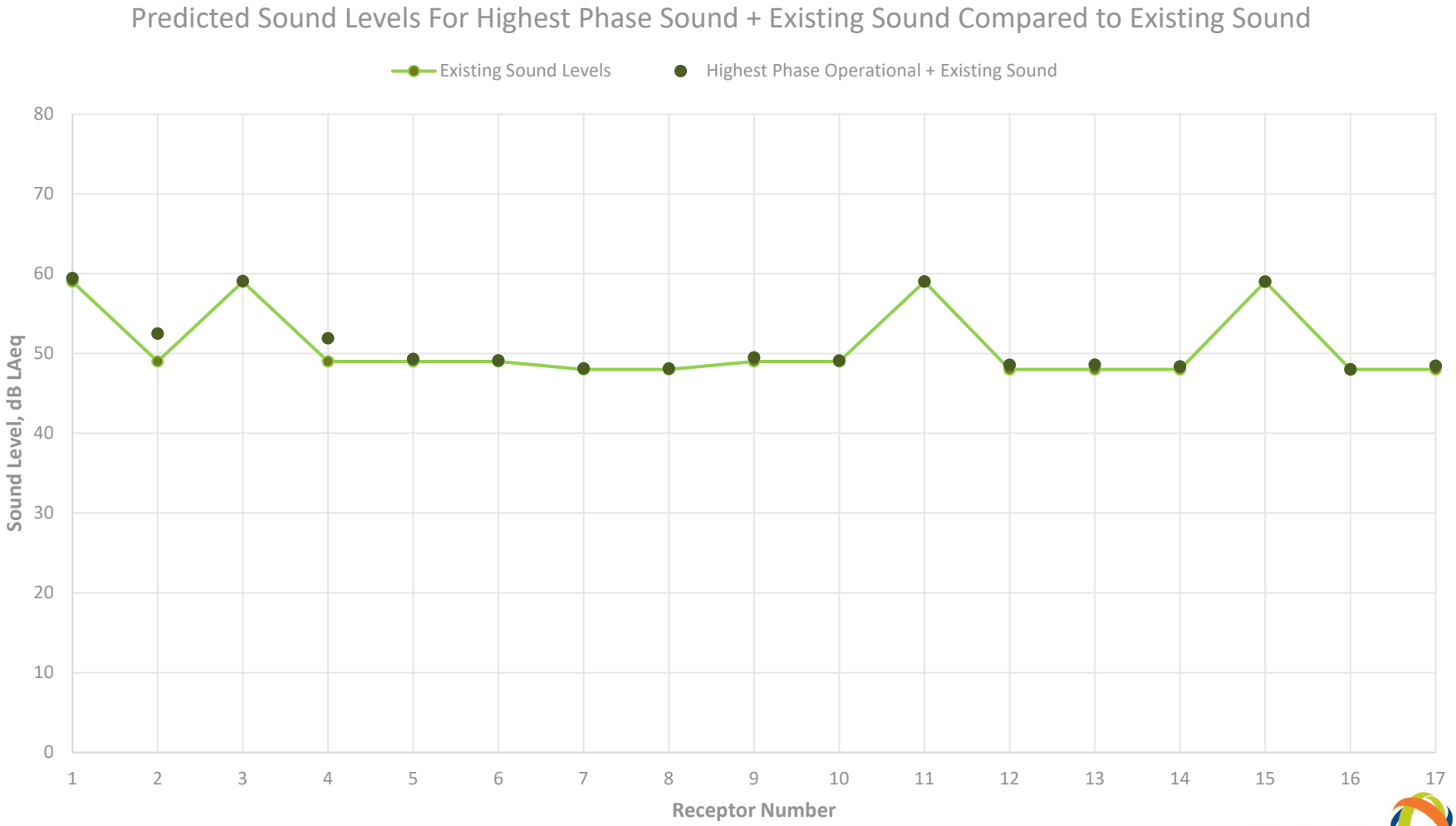
Noise – Predicted Sound Levels to Criterion



Noise – Predicted Sound Levels to Existing Sound Levels



Noise – Highest Sound Phase Plus Ambient Compared to Existing Sound



Additional Question Responses (see notes)

Summit Pit

Air Quality Slides

global **environmental** and **advisory** solutions

Air Quality – Methods & Baseline

- Assessment methodology was designated by the Alberta Air Quality Modelling Guideline (2013)
- Assessment criteria was established based on the Alberta Air Quality Objectives (AAQOs, 2019)
- Baseline air quality levels consisted two parts:
  a) the background air pollution level collected from surrounding air monitoring stations;
  b) modeled ambient levels based on emissions from existing other industrial facilities within the vicinity of 5-km from the Project site
- The Mountain Ash facility was modeled including all emissions sources associated with the Facility's activities
- All 6 development phases were assessed for full comprehension of air quality levels throughout the lifetime of the project
- The worst case was modeled based on 5-year meteorological data provided by AEP
- The final cumulative ambient air quality levels were assessed by adding the Facility contribution to the Baseline levels
- Dust mitigation plan were included in the modelling practice

Air Quality – Findings & Conclusions

- Dust control measures have been required to minimize dust from operations at the nearest sensitive receptors including,
  - The application of Calcium Chloride ($CaCl_2$) on all unpaved roads to suppress dust
  - Watering will be applied on off-road traffic areas including mine surface, crushing, stockpile, stripping and backfill/remediation
  - Windblown emissions are minimized in remediation area by rehabilitating vegetation coverage
  - The crushers will offset 190 m from the east site boundary and 140m from all other boundaries
  - Conveyor to equip rubber shrouds and minimize drop height for dust control
  - The pit will be closed or operated on a minimal basis between December 1 and March 1 each year
- With these control measures dust level due to operations will be below the assessment criterion at all receptors and have a low impact to amenity

Summary

- Air Quality Assessment considered the anticipated emissions caused by the activities and operations of the proposed operation, including diesel combustion products such as sulphur dioxide (SO_2), fine particulate matter, carbon monoxide (CO), oxides of nitrogen (NO_x), and fugitive dust emissions from pit operations including total suspended particulates (TSP).
- Dispersion modelling was also completed, and results showed there were no predicted exceedances of the Alberta Ambient Air Quality Objectives (AAAQOs) for any modelled compounds and any averaging period. The predicted maximum concentrations at the sensitive receptors are all less than the AAAQOs.
- Operating best-practice controls were applied to reduce dust (TSP) emissions: the application of Calcium Chloride ($CaCl_2$) to unpaved roads for dust suppression, adding shrouds to conveyor drops and watering mine surfaces. To avoid TSP exceedances along the property boundary, crushers will be located at least 190 m offset from the east site boundary and 140 m from the other site boundaries.

Alberta's Ambient Air Quality Objectives (AAAQOs)

Pollutant	Averaging Period	AAAQOs ($\mu g/m^3$)
SO_2 Sulfur Dioxide	9th Highest 1-hour	450
	Maximum 24-hour	125
	Maximum 30-day	30
	Annual	20
NO_2 Nitrogen Dioxide	9th Highest 1-hour	300
	Annual	45
CO Carbon Monoxide	9th Highest 1-hour	15,000
	Maximum 8-hour	6,000
$PM_{2.5}$	Maximum 24-hour	29
TSP	Maximum 24-hour	100
	Annual	60

$PM_{2.5}$: Particulate Matter fine- less than 2.5 µ m
TSP: Total suspended particulate matter

Summary of Ground-Level Concentrations at Sensitive Discrete Receptors (Application Case)

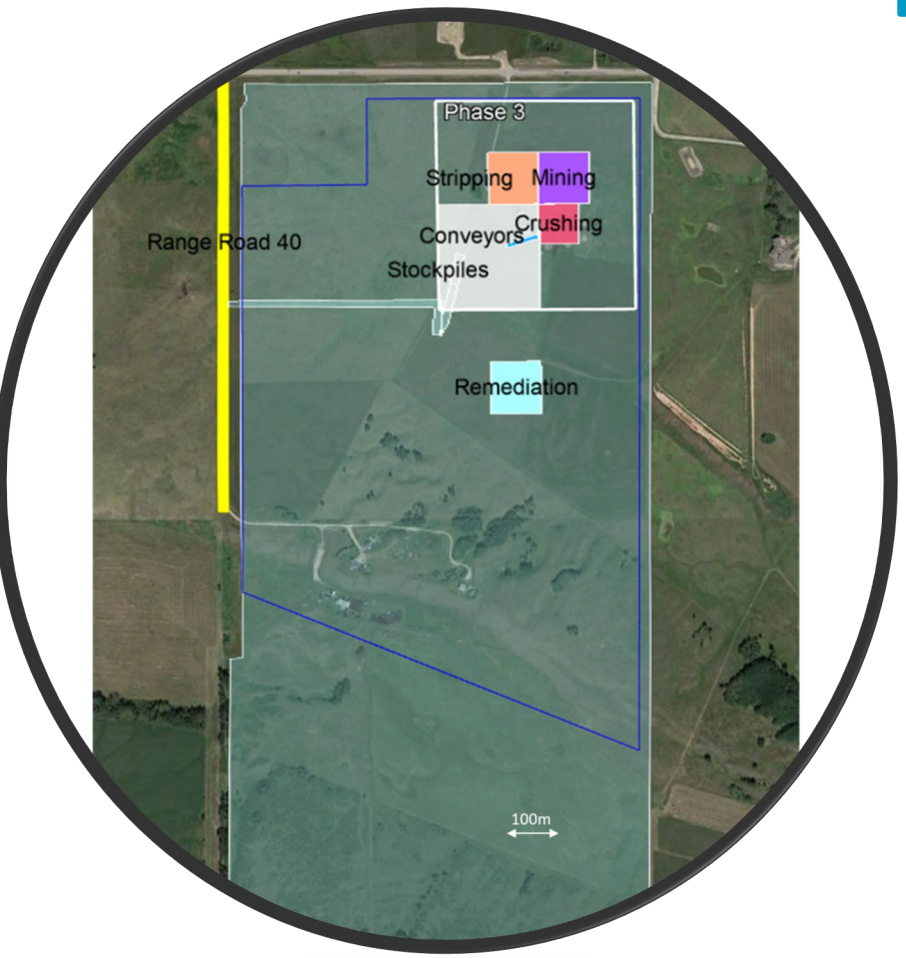
Contaminant	Averaging Period	Project Only	Baseline	Project+Baseline+background		AAAQO
		Prediction (µg/m3)	Prediction (µg/m3)	Prediction (µg/m3)	Percentage of AAQO	(µg/m3)
SO_2	9th Highest 1-hour	0.7	0.3	4.5	1.0%	450
	Maximum 24-hour	0.2	0.1	3.2	2.6%	125
	Maximum 30-day	0.1	0.1	2.5	8.3%	30
	Annual	0.1	0.1	1.4	7.0%	20
NO_2	9th Highest 1-hour	71	73	94	31.3%	300
	Annual	1	3	10.2	22.7%	45
CO	9th Highest 1-hour	747	39	1,107	7.4%	15,000
	Maximum 8-hour	226	26	582	9.7%	6,000
$PM_{2.5}$	Maximum 24-hour	4	2	6.3	21.7%	29
TSP	Maximum 24-hour	29	10	36.8	36.8%	100
	Annual	2.2	1	9.6	16.0%	60

- No exceeding of AAQOs is found over 5-year regulatory modelling
- Assumed the mitigation plan is in place
- PM2.5 and dust (TSP) levels are well below the criteria AAQC.

ADDITIONAL SLIDES

- Not to present
- Only for backup and questions

Emissions by Activities

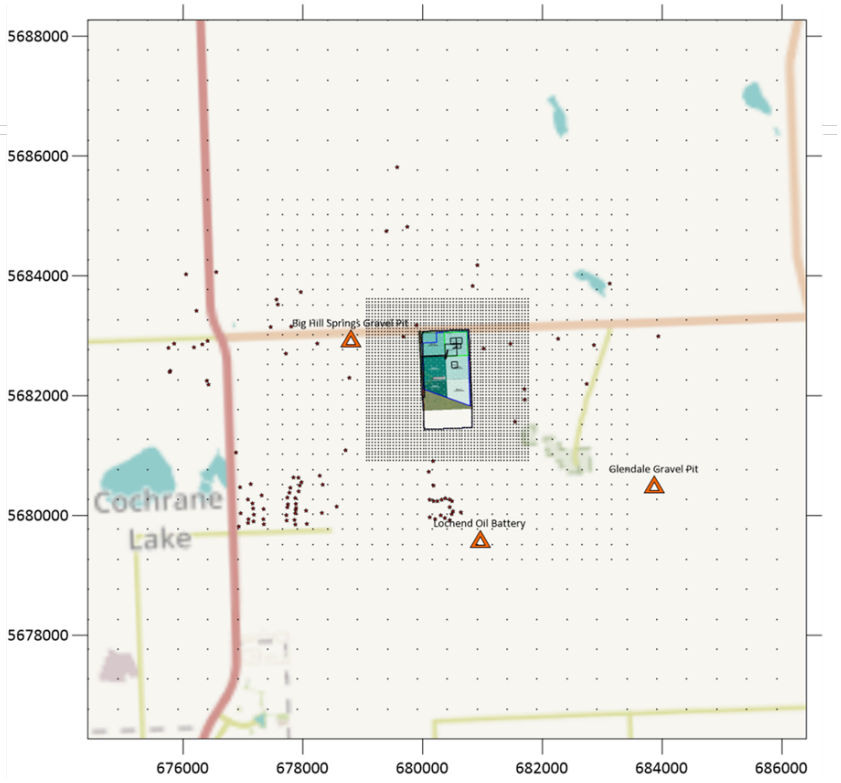


Emission quantification accounts for combustion and fugitive emissions from numerous project related activities, including:

- All combustion emissions,
- aggregate excavating,
- loading and crushing,
- overburden stripping and bulldozing,
- transport of aggregate and overburden within pit,
- scrapers and loaders usage,
- stacking conveyors,
- watering,
- trucking of aggregate offsite, etc., and
- wind-driven dust emissions.

Air Quality Modelling Approach

- Followed Alberta Air Quality Modeling Guideline (AAQMG, 2013)
- The CALMET and CALPUFF models (version 7.1) were used for the air quality assessment
- AEP's five years (2002-2006) MM5 meteorological datasets was used as the standard input to CALMET
- Topographic elevations for the terrain were obtained from the Canadian Digital Elevation Data (CDED, Geobase 2014)
- The CALPUFF gridded receptors are designed based on the AAQMG (2013) guideline
- A group of "sensitive" discrete receptors are purposely singled out to represent human-inhabited areas, sensitive ecosystems, or other important sites that are more susceptible to pollutant
- Considered other facility's emissions for cumulative assessment



Summary of Ground-Level Concentrations at All Grids (the Worst Levels at Application Case)

Contaminant	Averaging Period	Project Only	Baseline	Project+Baseline		AAAQO
		Prediction (µg/m3)	Prediction (µg/m3)	Prediction (µg/m3)	Percentage of AAQO	(µg/m3)
SO_2	9th Highest 1-hour	1.7	1.8	4.9	1.1%	450
	Maximum 24-hour	0.6	0.6	3.6	2.9%	125
	Maximum 30-day	0.2	0.2	2.6	8.7%	30
	Annual	0.1	0.2	1.4	7.0%	20
NO_2	9th Highest 1-hour	82	149	161	53.7%	300
	Annual	3.7	31	37.2	82.7%	45
CO	9th Highest 1-hour	1,432	236	1,787	11.9%	15,000
	Maximum 8-hour	478	157	833	13.9%	6,000
$PM_{2.5}$	Maximum 24-hour	10	14	16.3	56.2%	29
TSP	Maximum 24-hour	86.1	68	90.0	90.0%	100
	Annual	15	19	26	43.3%	60

- No exceeding of AAQOs is found over 5-year regulatory modelling
- The worst cases only occur along the property fence line
- Assumed the mitigation plan is in place