

# **Master Site Development Plan**

## **West Cochrane #2 Gravel Pit**

*NE 15-26-05 W5M (Title # 141P219)  
N/2 14-26-05 W5M (Title # 151 199 374)*

**BURNCO Rock Products Ltd.**

**July 2024**

## Executive Summary

BURNCO Rock Products Ltd. (“BURNCO”) currently operates a gravel pit in NW 13-26-05 W5M which is located 3 miles northwest of the Town of Cochrane, Alberta along Hwy 1A. This site is referred to as the West Cochrane Gravel #1 Pit and is 61 hectares (150.7 acres) in size.

To increase the permitted area of the pit and secure the long-term future of the facility, BURNCO had previously submitted a Master Site Development Plan (“MSDP”) covering 391.10 hectares (966.43 acres) of land. A public hearing related to this MSDP was held on July 6<sup>th</sup>, 2021, and our application was tabled to allow for revisions. BURNCO is now submitting a MSDP addressing 123.6 hectares (305.5 acres) of land. These lands will be operated as the West Cochrane #2 Gravel Pit, once the existing site in NW13 is depleted. This is a significant reduction in the area while providing BURNCO business certainty on a meaningful portion of the original application area.

In addition, there are a number of revisions and updates to the project based on input during the July 6<sup>th</sup>, 2021, hearing as well as follow up engagement with various stakeholders. The following items are noted:

- Application area reduced from 391.1 hectares to 123.6 hectares (remaining lands deferred to a future application);
- Permanent removal of the lands west of Beaupre Creek from project planning;
- Original Groundwater Impact Assessment enhanced with additional baseline data collection;
- 2<sup>nd</sup> Groundwater Impact Assessment completed for the full project footprint;
- Remaining studies updated to reflect changes in application area;
- Cultural Assessment of the project lands initiated with the Stoney Nakoda;
- Outreach to John Fennel and recommendations on water monitoring for neighbor wells;
- Town of Cochrane Committee of the Whole presentation and engagement;
- Discussions with Great Trail leadership;
- Enhancements to proposed screening berm to include for additional tree planting and contouring changes to enhance visual appeal;
- Enhanced noise and air quality commitments including full time monitoring for all phases of the project. Commitment to meet Directive 38 noise levels.
- *Water Act* Approval DAUT0014236 issued by Alberta Environment and Parks for all water related aspects of the project for the entire original project footprint (391 ha);
- Activity Plan amendment confirmed with Alberta Environment and Parks under the Code of Practice for Pits for the entire original project footprint (391 ha);
- Roadside Development Permit secured from Alberta Transportation for entire original project footprint (391 ha), including necessary leases for mining in undeveloped road allowances; and
- Proximity and Crossing Agreement secured from TC Energy for mining activities in proximity to Pipeline NPS 16 1961 (R/W 467 JK).

It is BURNCO’s belief that by following this MSDP for the lands associated within the proposed development, that BURNCO’s West Cochrane #2 Gravel Pit can be operated in a socially and environmentally responsible manner.

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# Master Site Development Plan

## 1.0 Introduction

BURNCO Rock Products Ltd. (BURNCO) is a family-owned Alberta based company that has been in operation since 1912. Today, BURNCO is a fourth-generation construction materials company with over sixty locations in Alberta, British Columbia, Saskatchewan, Colorado and Texas. BURNCO produces high quality aggregates, paving asphalt, and ready-mix concrete.

BURNCO takes great pride in its sites and works every day to ensure they are having the least possible impact on neighbors and the community, while continuing to supply the aggregates needed for local projects.

Sites currently operated in Rocky View County include:

• Irricana Gravel Pit	304 hectares (751 acres)
• Burma Gravel Pit	194 hectares (480 acres)
• Springbank Gravel Pit	246 hectares (608 acres)
• Indus Gravel Pit	553 hectares (1,368 acres)
• West Cochrane Gravel Pit	61 hectares (150.7 acres)

These sites have been successfully operated for decades. In that time, BURNCO has learned effective strategies for impact assessment and control. This includes a commitment to meaningful noise, dust and traffic control measures. These include screening berms, enclosed equipment, road upgrades, and a willingness to engage with neighbors and stakeholders. BURNCO has had great success with such measures and holds all projects to a high standard of performance.

## 1.1 The West Cochrane #2 Gravel Pit

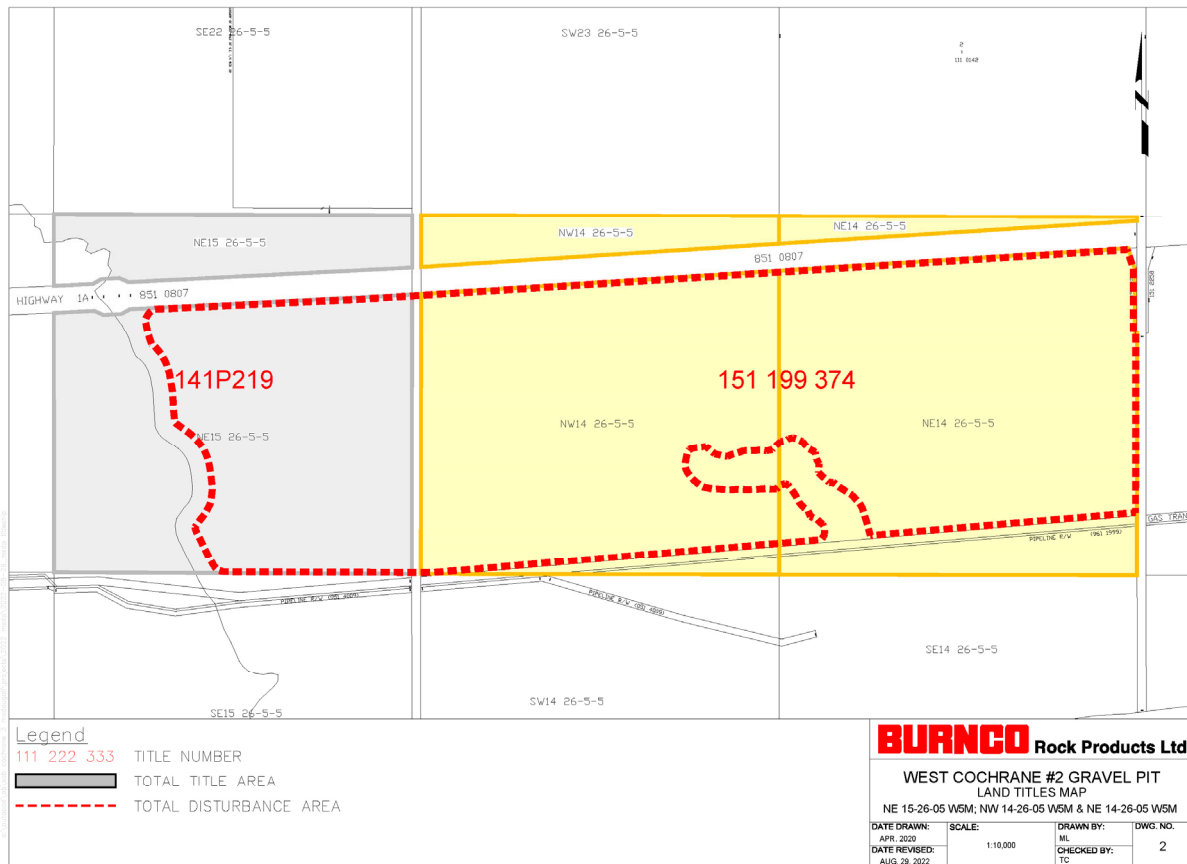
BURNCO currently operates a gravel pit at NW 13-26-05 W5M located northwest of the Town of Cochrane, Alberta. This site is 61 hectares in size. It contains an estimated 2,500,000 tonnes of aggregates and is selling roughly 125,000 tonnes of material annually. Operations include earthmoving, aggregate crushing, and loading trucks. This site was permitted in 2012 with a design capacity of 500,000 tonnes per year. It opened in 2016 after the completion of an intersection upgrade at Range Road 51 in support of the project.

BURNCO is now proposing an MSDP addressing 123.6 hectares (305.5 acres) of land. These lands will be operated as the West Cochrane #2 Gravel Pit once the existing site in NW13 is depleted. These lands contain an estimated 6,500,000 tonnes of aggregate and is expected to operate for 20 to 25 years after commencing operation in approximately 10 years. No change in annual design capacity is being proposed and West Cochrane Gravel Pit #2 will sell 500,000 tonnes per year.

The project would include the following parcels:

- Proposed: NE 15-26-05 W5M (Title # 141P219)
- Proposed: N/2 14-26-05 W5M (Title # 151 199 374)

Figure 1: Project Map – Parcel Locations



Aggregate from this site will be used to supply local projects in Rocky View County and in the Town of Cochrane. Washing capacity at this site will also allow BURNCO to supply premium aggregates to its network of asphalt and concrete plants in the Greater Calgary Area. BURNCO has a number of sites in Rocky View that currently serve this vital role as a supply of premium materials, however they are nearing depletion and BURNCO views the West Cochrane site as a replacement.

In support of this application, BURNCO has spent considerable time and effort planning the West Cochrane #2 Gravel Pit:

- Two open houses held over a period of 24 months,
- Biophysical Assessment,
- Environmental Noise Impact Assessment,
- Air Quality Assessment,
- Groundwater Impact Assessment #1 (Matrix),
- Groundwater Impact Assessment #2 (SLR),
- Visual Resources Assessment,
- Traffic Impact Assessment,
- Historical Resources Impact Assessment,
- Stormwater Management Plan,
- Erosion and Sediment Control (ESC) Plan, and
- Detailed Mining and Reclamation Plans.

This planning has been used to develop a Master Site Development Plan which follows in this document. This document provides summary of the development, operation, and closure plans for this project.

It is BURNCO's belief that by following the Project Activities Plan for the proposed development, that BURNCO's West Cochrane #2 Gravel Pit can continue to operate in a socially and environmentally responsible manner for many years to come.

## 1.2 Location and Ownership

The lands are located along the Bow River in Rocky View County and are directly northwest of the Town of Cochrane. The total proposed development area is 123.6 hectares (305.5 acres). The properties are privately held and BURNCO has entered into a lease agreement with the owner for gravel mining. In addition, there is undeveloped road allowance within the project footprint for which BURNCO has secured an agreement from Alberta Transportation to allow for gravel mining.

Table 1: Land Ownership and Occupancy

Location  Municipal Address or 1/4-Sec-Twp-Rge-Mer	Registered Owners  Name, Address and Phone Number	Occupants  Name, Address and Phone Number
<i>NE 15-26-05 W5M (Title # 141P219) N/2 14-26-05 W5M (Title # 151 199 374)</i>	David H. McDougall Ranch Limited Box 1172, Cochrane, AB T4C 1B2 (David Dutchik) (250) 261-9962	Gravel Pit Tenant: <u>(All Lands)</u> BURNCO Rock Products Ltd.  Farming: <u>(All Lands)</u> David H. McDougall Ranch Limited Box 1172, Cochrane, AB T4C 1B2 (David Dutchik) (250) 261-9962
<i>Road Allowance located between NE15 and NW14</i>	The Crown, represented by Alberta Transportation	Gravel Pit Tenant: BURNCO Rock Products Ltd.

### Policy #1

**Within the project area, BURNCO has secured all necessary leases on the private and crown lands (road allowances) to excavate aggregate. BURNCO will continue to maintain these leases in good standing.**

## 1.3 Current Land Use

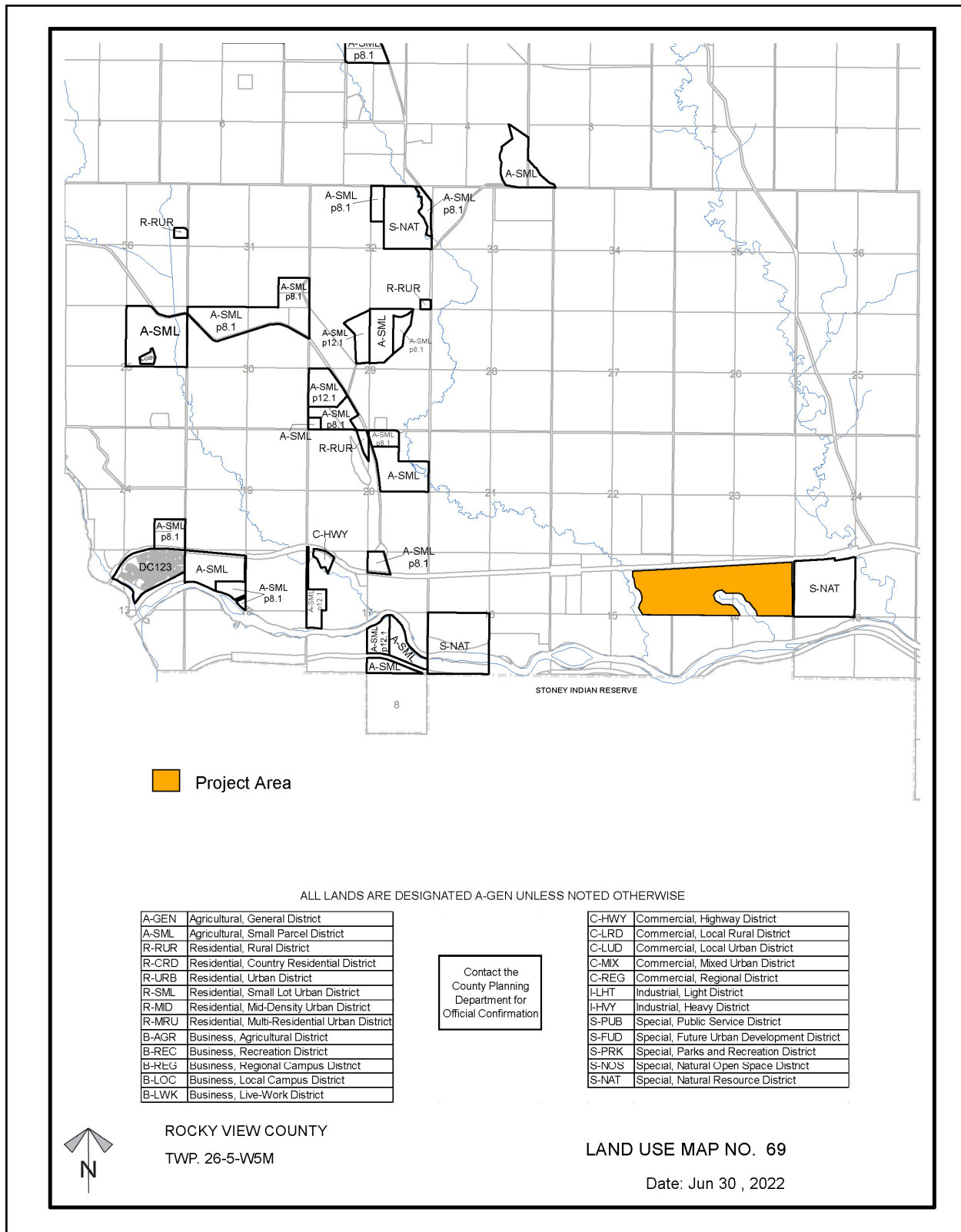
The land in the project area is currently registered as A-GEN (Agricultural – General District). The NE 15-26-05 W5M, NW 14-26-05, and NE 14-26-05 W5M are presently farmed as pasture and cultivated land.

## **1.4 Adjacent Lands**

Range Road 51 borders the project lands on the east side and will service as the access to the project lands from Hwy 1A which borders the lands to the north. Further east, the existing gravel pit (West Cochrane #1 Gravel Pit) is located in NW 13-25-06 W5M. These lands are S-NAT (Special – Natural Resource District). This site has a municipal Development Permit (DP # PRDP20215131), a Provincial Code of Practice Registration (Registration # 254757-00-01), as well as two water licenses (No. 00396954-00-00 and No. 00396952-00-00) for the diversion of water from the Bow River, which will supply water for BURNCO's aggregate washing activities. BURNCO also holds a Water Act approval which allows for excavation of gravel from within the groundwater table as well as a dewatering/recharge approach to any groundwater encountered on site (DAUT0014236). A copy of this authorization is provided as part of BURNCO's Land Use Application.

South of the project area is a vacant acreage and a number of private landowners farming and ranching on lands between the river and the project site. The Stoney Nakoda First Nation reserve is located on lands south of the Bow River. Lands to the west of the project site include a number of acreages. The Wildcat Gas Plant is located one mile to the west of the project site. Lands to the north of Hwy 1A are privately held and are currently being ranched by McKendrick Ranches Ltd.

Figure 2: Rocky View County Land Use Zoning Map



## 1.5 Consultation Process and Results

Significant Public Consultation related to the Project Activities Plan for these lands has been undertaken. Two open houses were held to provide the community with project information and seek public input. A cultural assessment was also launched with the Stoney Nakoda First Nation.

### Open House #1:

#### *Event Details:*

- April 17, 2018, from 4pm to 8pm held at the Cochrane Ranche House Conference Center,
- 32 invitations were mailed to properties located within 1 mile of the project,
- Invitations extended to Rocky View County staff, Rocky View Councilors, and Town of Cochrane staff,
- Event provided preliminary project information to the public and sought input prior to detailed design work and assessment.

#### *Results:*

- 13 attendees on sign in sheet,
- Event displays communicated by email following the event,
- 2 comment sheets received,
- Top concerns were truck traffic, noise, dust, groundwater, and property values.

### Open House #2:

#### *Event Details:*

- March 9, 2020, from 4pm to 8pm held at the Cochrane Ranche House Conference Center,
- 35 invitations were mailed to properties located within 1 mile of the project,
- Invitations extended to Rocky View County staff, Rocky View Councilors, and Town of Cochrane staff,
- Event provided detailed design work and assessment for the project.

#### *Results:*

- 16 attendees on sign in sheet,
- Event displays communicated by email following the event,
- 4 comment sheets received,
- Top concerns were truck traffic, biophysical impacts, erosion and sediment control, groundwater, and property values.

In addition, a number of local residents were engaged during the site assessment process as visits were required to their properties in order to gather data on water wells, and capture images for use in the visual impact assessment. The main concerns voiced by residents included: Nuisances via increase truck traffic and impacted haul routes, impacts on wetlands and local wildlife, ground water impacts, erosion and sediment control, and property values. These concerns have been given consideration and a number of mitigation measures have been detailed as part of this MSDP to address them.

### Cultural Assessment:

In August of 2022, BURNCO provided funding to the Stoney Nakoda First Nation to allow for a Cultural Assessment of the project lands. Site visits were completed on the lands in the fall of 2022 and BURNCO looks forward to receiving the results of this assessment.

## 2.0 Site Analysis

### 2.1 Topography

The project site is located northwest of the Town of Cochrane, north of the Bow River. The area is characterized by level to hummocky surface expression with some steep and terraced areas with slopes ranging from 2% to 30%. The majority of the Project Area contains gently undulating to hummocky surface expression with slopes ranging from 0.5% to 5%. Small portions of the Project Area have rough broken (steep) and terraced (river) surface expressions with slopes between 15% and 30%.

### 2.2 Vegetation and Wildlife

Matrix Solutions Inc. (Matrix) was retained by BURNCO to complete a Biophysical Impact Assessment (BIA) in association with the proposed project area. The BIA is used to guide project development and to minimize the potential negative effects of the Project on biophysical resources during planning, design, construction, operation, and reclamation stages. The BIA is also intended to support applications for municipal and provincial permits and authorizations required for the operation of this development. This assessment was completed in 2019 and then updated in 2022. It is provided as part of BURNCO's Land Use Application.

Desktop assessments and field surveys were conducted to assess the vegetation, wetlands, and wildlife. Information gathered was then integrated within the assessments as appropriate. Summaries on vegetation, wetlands and wildlife from the Matrix report are as follows:

#### 2.2.1 Vegetation

*For the BIA, the vegetation and wetland assessment area (VAA) was defined as the Disturbance Area plus a 100 m buffer. Field surveys were completed in 2018 and 2021. Vegetation, wetland, and rare plant surveys were completed within the VAA (Figure 2) June 19 to 21 and July 24 to 25, 2018. On October 13, 2021, a second wetland field assessment was completed for the two confirmed wetlands to fulfill the requirements for the Water Act Application.*

*Eight vegetation communities were observed within the VAA (Figure 2). The most extensive vegetation community within the VAA is native grassland comprising 101.2 ha (54.1%%; Table 7; Figure 2). Agricultural land, including cropland, comprised 54.6 ha (29.2%). Dominant species for each vegetation community observed are provided in Table 7. During field surveys, 64 vegetation species were observed. Vegetation species observed according to vegetation community are presented in Appendix F.*

*An ACIMS desktop database search was completed before the field surveys. There were 98 tracked plant species and 8 tracked vegetation communities with the potential to occur in the Foothills Parkland (Appendix G; AEP 2017b). Based on the ACIMS desktop search, marsh gentian (*Gentiana fremontii*) was previously recorded within and near the Disturbance Area and may occur within the planned area of disturbance. Marsh gentian was not observed during field surveys.*

*The Disturbance Area is located within AEP wildlife sensitivity ranges for limber pine (*Pinus flexilis*). Limber pine was not observed during field surveys.*

*During the field surveys, no rare plant species or rare plant communities (AEP 2018a; AEP 2017a) were observed within the VAA. No federally-listed rare species (Government*



of Canada 2011) were observed in the VAA.

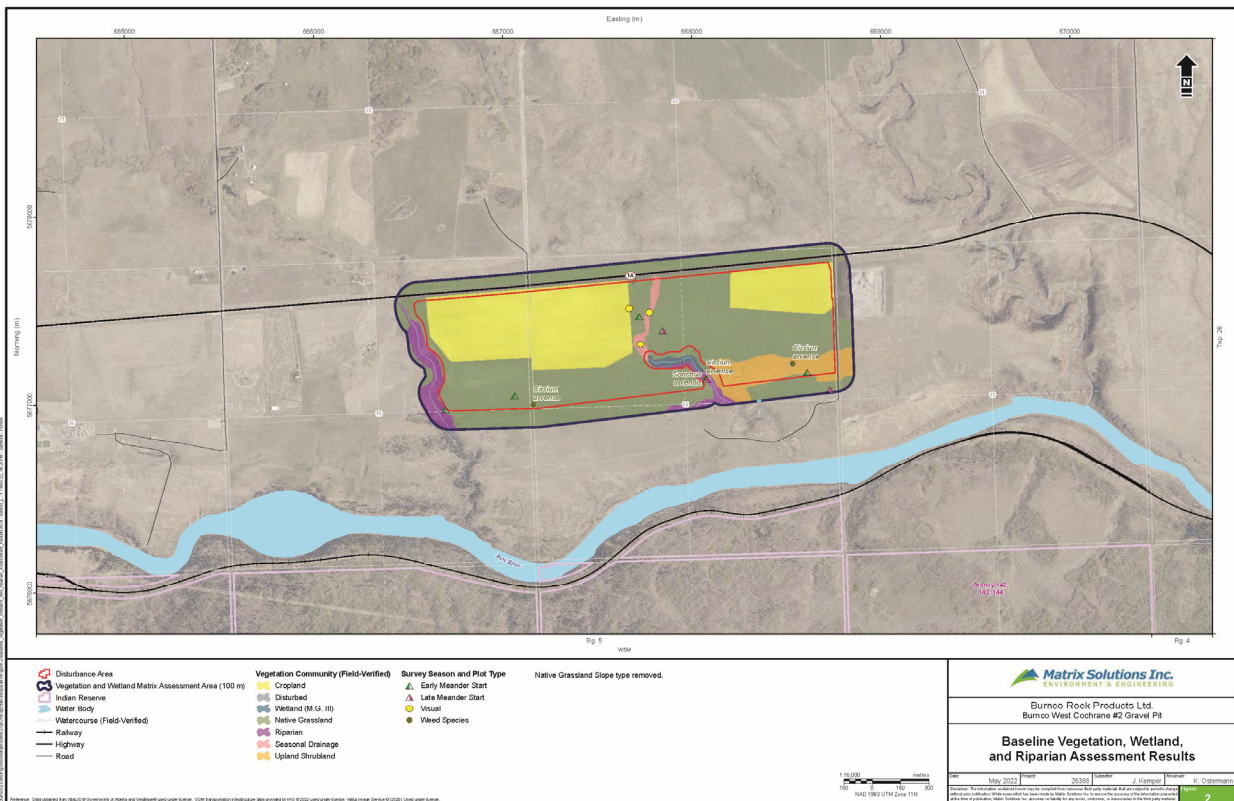
Two noxious weeds were observed in the VAA (Figure 2; Table 8), including creeping/Canada thistle (*Cirsium arvense*) and perennial sow-thistle (*Sonchus arvensis*) according to the Alberta Weed Control Act (Province of Alberta 2017a). These noxious weeds were scattered throughout the native grassland and shrubland areas. No prohibited noxious weeds were observed.

Other non-native and agronomic species observed include smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), and dandelion (*Taraxacum officinale*).

## 2.2.2 Wetlands

One seasonal (III) graminoid marsh was observed immediately outside the central portion of the Disturbance Area. A setback of 6 m has been recommended by Matrix around the marsh; as well, the marsh is within the riparian setback zone. The Project will not directly impact, and the riparian setback limits the risk of indirect impacts to this wetland (Figure 9). Additional mitigation measures are provided in Table 14. The wetland will be avoided, resulting in no residual effects.

Figure 3: Vegetation and Wetlands in the Project Study Area



### 2.2.3 Wildlife

A review of government and scientific research studies and government database queries were conducted to identify wildlife species, including wildlife species at risk (SAR), and sensitive wildlife areas that may occur in the Disturbance Area.

A literature review indicated that 83 wildlife species at risk (SAR) may occur in or near the site, including 3 amphibians, 3 reptiles, 68 birds, and 9 mammals (Appendix H). A review of FWIMT data within approximately 5 km of the Disturbance Area indicated that several wildlife SAR have been historically observed within or adjacent to the Disturbance Area (northern leopard frog, trumpeter swan, bald eagle, prairie falcon, eastern kingbird, western wood-pewee, cougar, grizzly bear; Appendix H; AEP 2018c).

The Project Area passes through three provincially designated wildlife sensitivity zones including:

- sensitive raptor range for bald eagle, golden eagle and prairie falcon
- sharp-tailed grouse survey area
- key wildlife and biodiversity zone (KWBZ) - associated with the Bow River (AEP 2018c)

Wildlife surveys were conducted as per the Sensitive Species Inventory Guidelines (SSIG; GoA 2013a). Surveys were carried out under the appropriate research licences/collection permits provided by Alberta Environment and Parks (AEP).

- sharp-tailed grouse surveys (on 7 May and 8 May 2018);
- raptor stick nest survey (on 23 May 2018); and
- breeding bird survey (23 May and 4 June 2018).

During the sharp-tailed grouse surveys, no sharp-tailed grouse or leks were observed. No other SAR or important wildlife features (e.g., dens, hibernacula) were detected.

During the raptor stick nest survey, a total of 20 raptors of four different species were detected (i.e., American kestrel, bald eagle, red-tailed hawk, Swainson's hawk; Table 9). No other SAR or important wildlife features (e.g., dens, hibernacula) were detected. The raptor survey identified four active raptor nests (i.e., one bald eagle and three red-tailed hawk; Figure 3; Table 9); however, only one of these nests is within the current WAA.

Table 2: Raptors and Raptor Nests Detected During Raptor Stick Nest Survey

Common Name	Scientific Name	AEP Status <sup>1</sup>	COSEWI C Status <sup>2</sup>	SARA Status <sup>3</sup>	Number Observed	Number of Associated Nests Detected	Number of Nests in the WAA
American kestrel	<i>Falco sparverius</i>	Sensitive	-	-	5	0	0
Bald eagle	<i>Haliaeetus leucocephalus</i>	Sensitive	Not at Risk	-	2	1	0
Red-tailed hawk	<i>Buteo jamaicensis</i>	Secure	Not at Risk	-	10	3	1
Swainson's hawk	<i>Buteo swainsoni</i>	Secure	-	-	3	0	0

(1) Alberta Wild Species General Status Listing - 2015 (GoA 2017)

(2) Species at Risk Public Registry (Government of Canada 2011)

(3) SARA (Government of Canada 2018)

*During the breeding bird surveys, a total of 193 individuals of 27 breeding bird species were detected including three SAR (i.e., barn swallow, eastern kingbird, Sprague's pipit; Table I1 of Appendix I; Figure 3). Approximately 54% of the birds detected were located more than 100 m from a survey point. A least flycatcher was detected just outside the WAA.*

*Incidental species observations included one bird SAR (i.e., great blue heron). No other SAR or other important wildlife habitat features (e.g., hibernacula, leks) were detected during the surveys. All wildlife species (incidental and target) detected during all surveys are included as Table I2 of Appendix I.*

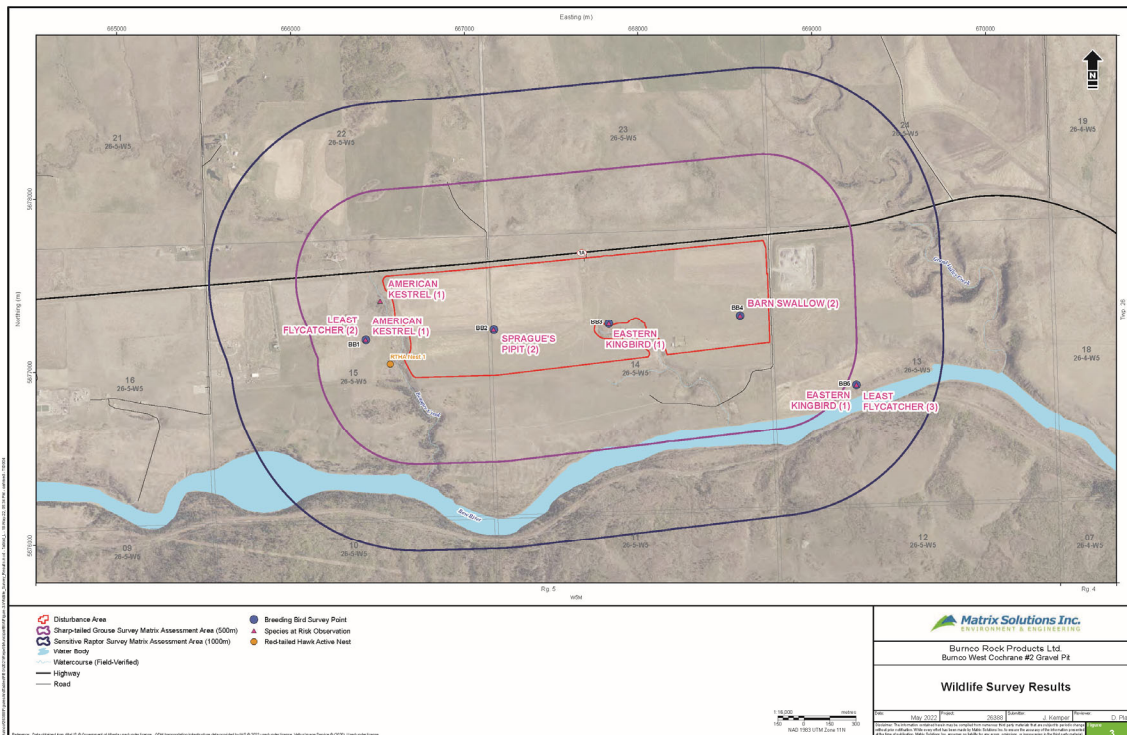
*Just over 50% (63.6 ha) of the Disturbance Area consists of native grassland which may be suitable habitat for sharp-tailed grouse, breeding birds, small mammals (e.g., badger, ground squirrel), and grazing ungulates. The native grassland habitat has been impacted by grazing, with approximately 80% being heavily grazed. A moderate concentration of ground squirrel burrows were observed during the field assessments. In addition to native prairie, the Disturbance Area includes cropland (52.2 ha, 42%) that may provide habitat for breeding birds, but would be impacted during the breeding season by agriculture activities. Land use of the area is summarized in Section 5.1 and Table 3.*

*A variety of habitat types exist along the Bow River, outside of the Disturbance Area. There are cliffs which contain suitable habitat for cliff nesting birds, although no cliff nests were identified during the field assessments.*

*The forested riparian areas, shrubland, and forested banks of the Bow River provide suitable habitat for breeding birds and raptors. They also provide browsing habitat for ungulates, and act as movement corridors for ungulates along the Bow River. However, the site is fenced in areas, creating barriers to movement within the Disturbance Area. Highway 1A also parallels the north boundary of the Project which also is a barrier to movement. Limited ungulate use was identified within the WAA during the field assessments.*

*A small area located immediately outside of the central portion of the Disturbance Area contains potential amphibian habitat; however, this habitat is of low quality. One seasonal wetland was identified during the wetland assessment, associated with the riparian area associated with unnamed watercourse U-WC1 (Figure 2; Figure 8). This wetland was dry at the time of the wildlife field assessments but held pockets of standing water approximately 5 cm deep during the vegetation and wetland field assessments. This wetland was heavily impacted by cattle and is unlikely to be suitable habitat for breeding amphibians. The riparian areas associated within Beaupre Creek and Grande Valley Creek had pockets of standing water during the terrestrial site reconnaissance; however, the areas are significantly sloped and may flood and have high water flow rates during high precipitation events and seasonal run off events; portions of the riparian areas are also impacted by cattle.*

Figure 4: Wildlife Survey Results



## 2.2.4 Fish and Fish Habitat

The fish and fish habitat component of the desktop assessment included a review of relevant information from the Bow River from Ghost Dam to 20 km downstream of the Disturbance Area, and three tributary watercourses on the north side of the Bow River in close proximity to the Disturbance Area. The three watercourses include:

- Beaupre Creek that borders the west side of the Disturbance Area
- Grand Valley Creek situated approximately 1 km east of the Disturbance Area
- a small unnamed tributary (UWC1) originating within an area surrounded by the Disturbance Area

Fish and fish habitat information acquired through the desktop review was used to inform the field component approach for the fish habitat assessment. The fish habitat assessment was conducted by a qualified aquatic environmental specialist on November 8, 2018. Beaupre Creek, Grand Valley Creek, and one unnamed watercourse (U-WC1) was assessed during the site visit. The assessment area was accessed via truck, utilizing existing roads or by foot. The weather was sunny with temperatures below -4°C. Field data was collected to identify and document important fish and fish habitat features within the watercourses, assess the watercourses' sensitivity to the proposed Project activities, and to develop general and site-specific mitigation measures to avoid or mitigate potential impacts to fish and fish habitat.

A review of aerial imagery of Beaupre Creek, Grand Valley Creek, and U-WC1 did not identify any impediments or barriers to fish migration to the confluence with the Bow River. Resident fish species from the Bow River may migrate into the watercourses under suitable flow conditions. If suitable species-specific fish habitat (i.e., spawning, rearing, feeding, or overwintering) exists fish may use these watercourses.

## 2.3 Soil

In support of the Project, Matrix Solutions Inc. (Matrix) was retained to complete a Biophysical Impact Assessment (BIA) for the Project area, which included an assessment of soils. This assessment was completed in 2019 and then updated in 2022. It is provided as part of BURNCO's Land Use Application. The conclusions of the soils assessment from Matrix are as follows:

*A detailed soil survey was conducted within the Disturbance Area on July 24 and 25, 2018, to confirm soils and topography identified in the desktop review. Detailed soil surveys determined soils and their characteristics, identified terrain type, and provided baseline data for determining reclamation success as described in the Code of Practice for Pits (Government of Alberta 2004) and Soil Quality Criteria Relative to Disturbance and Reclamation (Revised) (AAFRD 2004).*

*Soils were classified according to The Canada Soil Information System (CanSIS): Manual for Describing Soils in the Field, 1982 Revised (Expert Committee on Soil Survey 1983), Soil Survey Handbook (Coen 1987), and The Canadian System of Soil Classification (SCWG 1998). The Disturbance Area was accessed by truck and by foot. All soil inspections were conducted with a shovel and hand-held Dutch auger. Soil inspections were conducted to a maximum depth of 100 cm in mineral soils. Each inspection site was described according to topography (slope position, steepness, and aspect), surface expression, parent material, and moisture regime. Soils were assigned a soil subgroup class and a soil series name from the Alberta Soil Names File (Generation 4), Users Handbook (Bock 2016).*

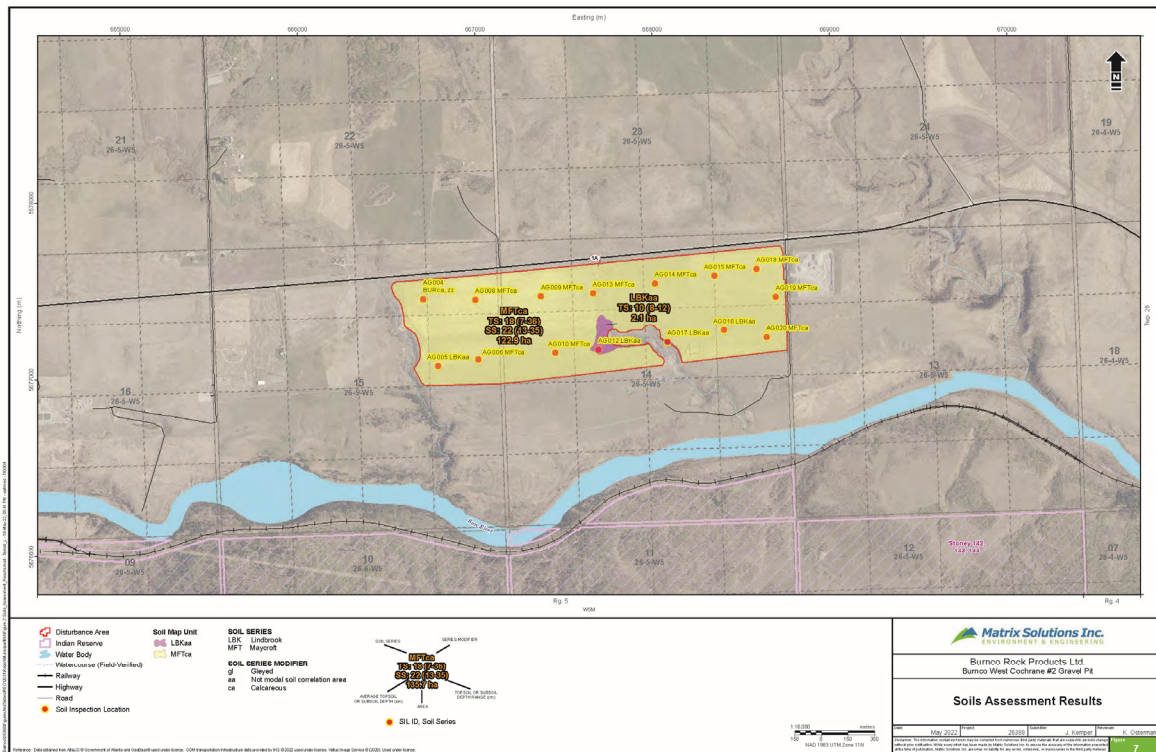
*The following parameters were measured and recorded for each soil horizons:*

- *depth and horizon morphology*
- *colour*
- *texture*
- *structure*
- *consistency*
- *coarse fragments within the profile and surface stoniness*
- *presence/absence of carbonates and visible salts*
- *presence/absence of mottles or gleying*
- *profile drainage*

*A total of 15 soil inspections were completed within the Disturbance Area (Appendix A). A survey inspection level (SIL) of 2 was completed for the Disturbance Area (Table 2; ASAC 1987). There are no specific density requirements outlined in the Code of Practice for Pits (Government of Alberta 2004) and this density was selected based on professional judgement and the uniformity of soils throughout the Disturbance Area.*



Figure 5: Soil Inspection Sites



## 2.4 Resource

In support of the Project, Matrix Solutions Inc. (Matrix) was retained to complete a Biophysical Impact Assessment (BIA) for the Project area, which included an assessment of soil depths. This assessment was completed in 2019 and is provided as part of BURNCO's Land Use Application. As part of this assessment, Matrix completed 37 inspection sites and was used to determine the following soil depths divided into applicable land parcels:

• NE 15 (141P219)	Topsoil: <u>14.6 cm</u>	Subsoil: <u>15.7 cm</u>
• NW 14 (151 199 374)	Topsoil: <u>15.8 cm</u>	Subsoil: <u>16.3 cm</u>
• NE 14 (151 199 374)	Topsoil: <u>16.6 cm</u>	Subsoil: <u>15.7 cm</u>

The site has also been tested by auger drill, hammer drill and excavator to determine the depth, extent, and quality of aggregate. In all 79 test holes/pits were logged across the site for use in assessing horizon C (overburden) and gravel depths:

• NE 15 (141P219)	Overburden (OB): <u>2.4 m</u>	Gravel: <u>6.0 m</u>
• NW 14 (151 199 374)	Overburden (OB): <u>2.2 m</u>	Gravel: <u>3.9 m</u>
• NE 14 (151 199 374)	Overburden (OB): <u>2.5 m</u>	Gravel: <u>5.4 m</u>

Averages for the entire project are:

• Topsoil:	<u>15.7 cm</u>
• Subsoil:	<u>15.9 cm</u>
• Overburden:	<u>2.4 m</u>
• Aggregate:	<u>5.1 m</u>

## 2.5 Storm Water

In support of the Project, Matrix Solutions Inc. (Matrix) was retained to complete a Stormwater Management Plan (SMP) for the Project. A complete copy of the Matrix report can be found as part of BURNCO's Land Use Application. An overview of the results is as follows:

*The project area is located on a large plateau north of the Bow River. The area consists of predominantly pasture and cultivated land. The lands are generally flat to slightly undulating with an overall gradient to the south toward the flood plain of the Bow River. Two watercourses have been identified near West Cochrane #2 Gravel Pit (Disturbance Area) which is to the west of the existing West Cochrane Gravel Pit; Beaupre Creek and one unnamed watercourse. One wetland has also been identified near the Disturbed Area.*

*Catchment boundaries were delineated using LiDAR data for the project site (provided by BURNCO) and additional topographical data upstream of the project site (20K digital elevation model data provided by AltaLIS Ltd.).*

*Highway 1A is located directly north of the Disturbed Area. All offsite drainage originates from areas north of the project site where it crosses the highway, collecting along the highway ditch on the south side of the road prior to entering the project site at various locations. Drainage from these areas flows along the southern highway ditch before entering the Disturbed Area as overland flow at low points along the ditch or via channelized flow through the ditches on either side of existing Range Road 51.*

*Highway 1A is located directly north of the Disturbed Area. All offsite drainage originates from areas north of the project site where it crosses the highway, collecting along the highway ditch on the south side of the road prior to entering the project site at various locations. Drainage from these areas flows along the southern highway ditch before entering the Disturbed Area as overland flow at low points along the ditch or via channelized flow through the ditches on either side of existing Range Road 51.*

*Beaupre Creek has a large upstream catchment area of 3,096 ha, resulting in high flow during flood events. The flow is carried across Highway 1A via a large diameter culvert (approximately 3200 mm) before draining south to the Bow River.*

*The remainder of the offsite drainage entering the site is conveyed across Highway 1A through several 800 mm diameter culverts (note: all culvert sizes and locations are approximate) and cattle crossings.*

*The existing drainage for the contributing catchments is shown on Figure 3. Figure 4 shows existing onsite drainage. The total areas and Highway 1A crossing details are summarized in Table 2.*

Figure 6: Stormwater Management Plan – Existing Upstream Drainage

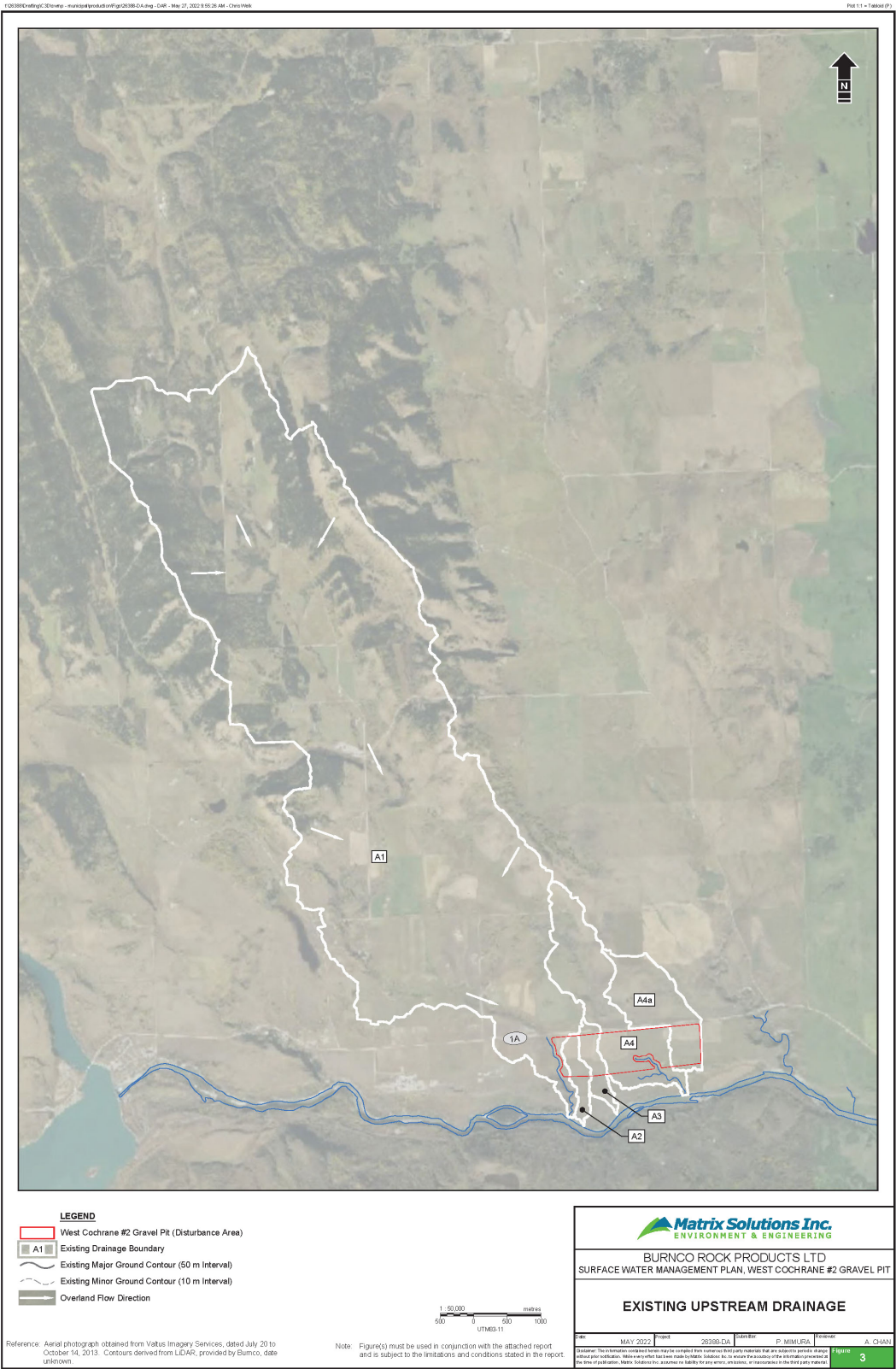




Figure 7: Stormwater Management Plan – Existing On-Site Drainage

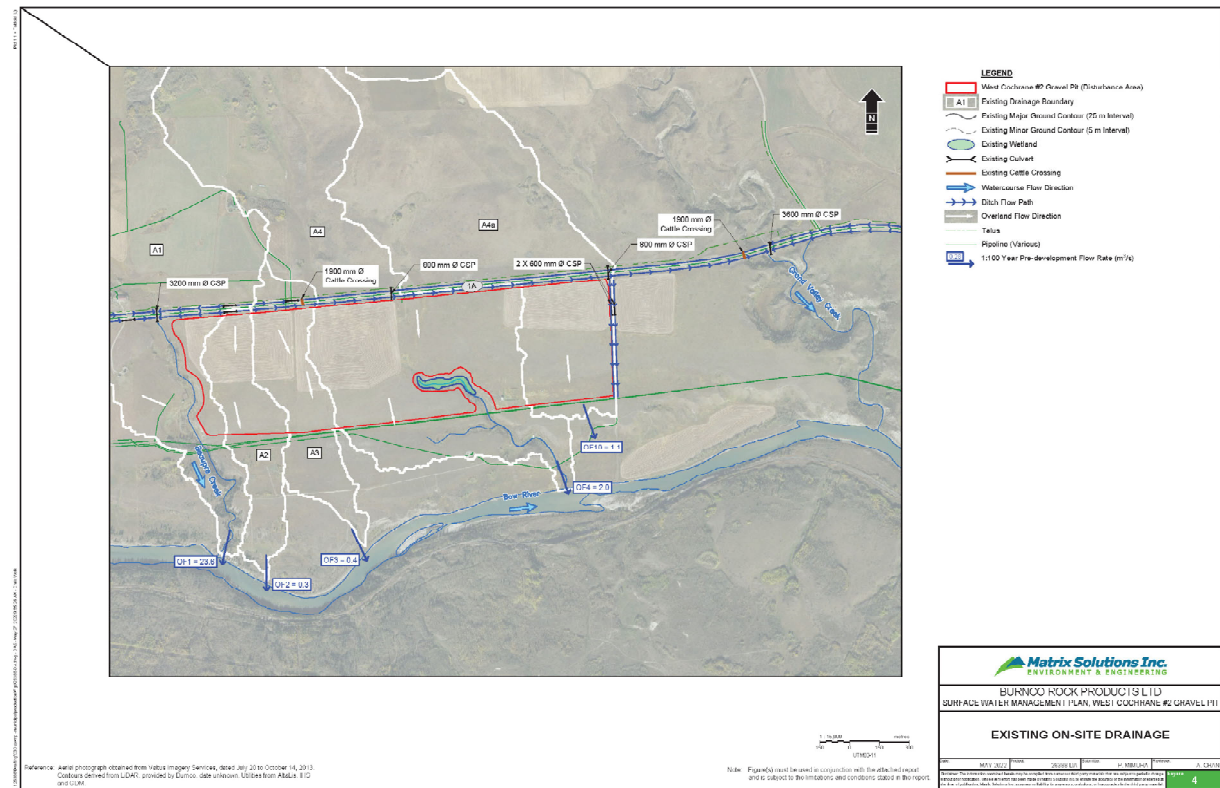


Table 3: Existing Drainage Areas

Drainage Area	Drainage Catchment Area (ha)	Disturbed Area within Drainage Area (ha)	Highway 1A Crossing	Onsite Receiving Water Body
A1	3,145.4	6.43	3200 mm dia. culvert	Beaupre Creek
A2	29.7	15.48	N/A	Overland Flow
A3	34.7	17.56	1900 mm dia. cattle crossing	Overland Flow
A4	227.8	58.64	800 mm dia. culvert	Unnamed Watercourse
A4a	131.4	27.69	800 mm dia. culvert	Overland Flow

## 2.6 Groundwater – Baseline Information

Matrix Solutions Inc. (Matrix) was retained by BURNCO to conduct a Groundwater Impact Assessment of the proposed development. A complete copy of the Matrix report can be found as part of BURNCO's Land Use Application. The objectives of this evaluation were to describe the hydrology and groundwater resources within the Project area and to evaluate the potential effects on groundwater that may be caused by the Project.

BURNCO has collected significant baseline groundwater data for lands within and beyond the current proposal area. This baseline data has been documented here to provide clarity of available information. A site-specific review of groundwater for the project area is provided in Section 2.7.

*Matrix undertook the following tasks in this assessment:*

- *reviewing geological and hydrogeological data to identify and characterize local and regional geology and develop a hydrogeological framework for the site*
- *reviewing all existing water wells data within a 5 km radius of the site*
- *assessing the site hydrogeological conditions including hydraulic conductivity, recharge/discharge conditions, depth to water level, baseline groundwater conditions, and flow direction in the aggregates deposit*
- *assessing potential impact of the gravel mining operations on groundwater resources*
- *assess potential effects from dewatering during operations in accordance with the Alberta Environment Guide to Groundwater Authorization (AENV 2011)*
- *groundwater monitoring and sampling*
- *hydraulic conductivity testing*
- *update the existing conceptual site model*

To date, a significant amount of effort has been undertaken to understanding and documenting the groundwater resources at the site. A robust number of water monitoring locations have been installed for past and ongoing use. Baseline data has been collected and groundwater models have been developed. A brief overview includes:

- 24 water monitoring wells installed onsite in in the surrounding lands (18 to monitor water table within the gravel layer, 6 to monitor bedrock water table)
- Baseline data collected on all 24 water monitoring locations where water was present (many now with numerous sampling events)
- Baseline data collected on 4 additional onsite bedrock water wells
- Baseline data collected on 8 onsite spring locations
- 15 water level hydrographs showing water levels (some with data back to 2012)
- Assessment of nearby water wells
- Assessment of nearby water licences
- Modeling of water table

### 2.6.1 Groundwater Background

*Levelton Consultants Ltd. conducted a groundwater evaluation of the McDougal Ranch Gravel Pit and surrounding area in 2014. The groundwater evaluation included an existing groundwater monitoring well network located in Sections 13, 14, and 15 of 026-05 W5M. Findings from the Levelton evaluation and Matrix 2018 investigation were used to update this groundwater impact assessment. Test hole data outlining overburden, gravel*

*thickness, depth to bedrock, and top of gravel and bottom of gravel surfaces were supplied by BURNCO throughout the project area.*

*Surficial deposits overlie bedrock over most of the assessment area, except where bedrock has been exposed due to erosional processes. A series of boreholes have been installed in the assessment areas, with surficial sediments thicknesses ranging from 2 m more proximal to recent erosional features, up to 16 m in non-eroded areas.*

*The upper most sediments at the site consist of gravel, sand and gravel, clay, silty clay, and clay till. The main surficial depositional processes in the study area include glacial, glaciolacustrine, glaciofluvial, and recent fluvial deposition of the modern-day Bow River (Bayrock and Reimchen 1980; Fisher, T.G. 1999).*

## **2.6.2 Groundwater Monitoring Locations**

### 2010 & 2012

*Three wells (MW10-1, MW10-2 MW10-2) were installed in May 2010 by Sabatini Earth Technologies Inc. An additional ten wells (MW12 series) were completed in March 2012 by Levelton Consultants Ltd.; with drilling by personnel from Beck Drilling.*

*Levelton installed Solinst Levellogger Edge electronic data loggers in eleven of the 13 monitoring wells onsite.*

### 2018

*Matrix installed six monitoring wells (MW18 series) across the property between July 23 and August 30, 2018. Drilling and well installation was completed to top of bedrock using Becker hammer rig and a sonic track rig; the equipment and manpower to drill and complete the monitoring wells were supplied by Earth Drilling Co. Ltd. of Calgary, Alberta. Matrix field personnel examined and recorded lithology at every 1.5 m interval. The wells were completed to depths between 4.6 and 16.5 m below ground surface (bgs) with 51 mm (2 inch) internal diameter PVC casings and slotted screens (0.010 inch) in the wellbore.*

*Groundwater monitoring well MW18-02 (B2) was sampled on August 30, 2018 following purging after drilling. All other wells drilled in 2018 were dry following well installation. The remaining wells were sampled on November 7, 2018. Field-measured parameters (including temperature, pH, and electrical conductivity [EC]) were collected during sampling and are included in Table 2.*

### 2021

*Matrix installed six monitoring wells (MW21 series) across the property between November 22 and November 26, 2021, resulting in a 24 monitoring well network to characterize site geology and hydrogeology. Drilling and well installation was completed using an ODEX rig; the equipment and manpower to drill and complete the monitoring wells were supplied by Earth Drilling of Calgary, Alberta. Matrix field personnel examined and recorded lithology at every 1.5 m interval. The wells were completed to depths between 9.1 and 41.2 m below ground surface (bgs) with 51 mm (2-inch) internal diameter PVC casings and slotted screens (0.010-inch) in the wellbore.*

*The existing well network, including three bedrock wells owned by BURNCO, were sampled on October 25 and 26, 2021. The wells drilled and installed in 2021 were sampled on November 26 and 29, 2021. Field-measured parameters (including temperature, pH,*

*and EC) were collected during sampling and are included in Table 2.*

*Groundwater samples were collected and submitted to Element Materials Technology Canada Inc. in Calgary, Alberta, for routine chemical parameters, dissolved metals, total metals, total suspended solids, and turbidity analyses. Dissolved petroleum hydrocarbons (benzene, toluene, ethylbenzene, and xylenes were obtained from MW21-2a and MW21-2b).*

*Hydraulic conductivity testing was conducted on October 26 and November 26, 2021, at monitoring wells MW18-5 (D2) and MW21-2b. The hydraulic conductivity test was conducted using a slug recovery test (Appendix C). For each test conducted, an unvented pressure transducer was installed in the well. Hydraulic conductivity test analysis to determine hydraulic conductivity was facilitated using the software package AQTESOLV PRO™ 4.5 (HydroSOLVE 2007).*

#### 2022

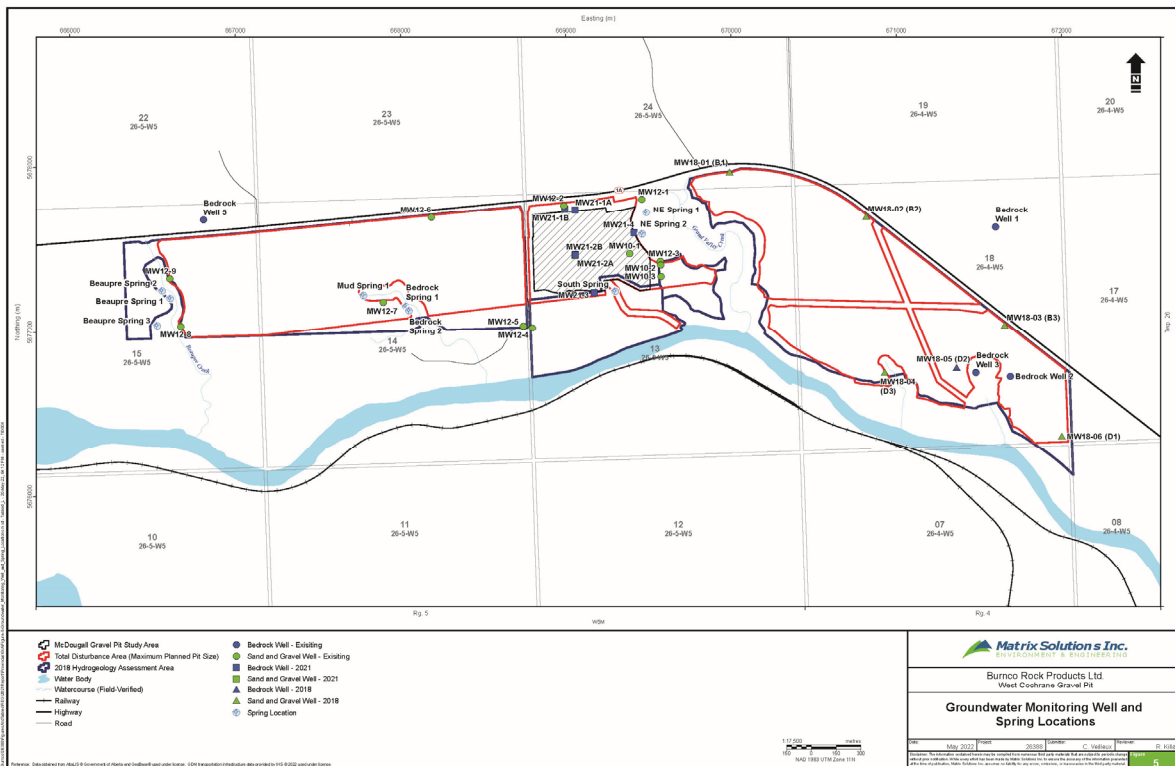
*Bedrock Well 1 was sampled on May 12, 2022, and eight springs were sampled between May 10 and May 12, 2022. Field-measured parameters (including temperature, pH, and EC) were collected during sampling and are included in Table 2.*

*Groundwater samples were collected and submitted to Element Materials Technology Canada Inc. in Calgary, Alberta, for routine chemical parameters, dissolved metals, total metals, total suspended solids, and turbidity analyses.*

*Further conductivity testing was conducted between May 11 and 12, 2022 at monitoring wells MW21-2a and MW21-1b. The hydraulic conductivity test was conducted using a slug recovery test (Appendix C). For each test conducted, an unvented pressure transducer was installed in the well. Hydraulic conductivity test analysis to determine hydraulic conductivity was facilitated using the software package AQTESOLV PRO™ 4.5 (HydroSOLVE 2007).*

*A conventional hydraulic conductivity test was not conducted at MW21-1b. The Waterra tubing installed in the well was removed, resulting in a displacement of the fluid level. The slow recovery during the first 3 days monitoring resulted in an estimated recovery time greater than 20 days resulting in a hydraulic conductivity of less than  $10^{-8}$  m/s (Hvorslev 1951).*

Figure 8: Groundwater Monitoring Well and Spring Locations



### 2.6.3 Baseline Data – Gravel Unit

Between the 2014 Levelton report, and the 2018, 2021 and 2022 Matrix work programs, a significant amount baseline data has been collected for groundwater on the project site. A total of 15 hydrographs (which display water level data) have been developed for the site with some level data going back to 2012. In addition, water quality data has also been documented and summarized. Data has been divided into data related to groundwater within the gravel deposit, and data on groundwater within bedrock.

Table 4: Gravel Units – Groundwater Elevation Data Summary

Well ID	Manual Water Levels Collected	Transducer Data Collected
MW10-1	March 2012, May 2013, November 2018, October 2021	July 2012 to November 2020
MW10-2	March 2012, May 2013, November 2018, October 2021	July 2012 to November 2020
MW10-3	March 2012, May 2013, November 2018, October 2021	None
MW12-1	March 2012, May 2013, November 2018, October 2021	July 2012 to October 2021
MW12-2	March 2012, May 2013, November 2018, October 2021, November 2021	July 2012 to October 2021
MW12-3	March 2012, May 2013, November 2018, October 2021	July 2012 to October 2021
MW12-4	March 2012, May 2013, November 2018, October 2021	None
MW12-5	March 2012, May 2013, November 2018, October 2021	July 2012 to October 2021
MW12-6	March 2012, May 2013, November 2018, October 2021	July 2012 to October 2021
MW12-7	March 2012, May 2013, November 2018, October 2021	July 2012 to November 2018
MW12-8	March 2012, May 2013, November 2018, October 2021	July 2012 to November 2020
MW12-9	March 2012, May 2013, November 2018, October 2021	July 2012 to May 2018
MW18-01 (B1)	Dry	August 2018 to November 2018 <sup>1</sup>
MW18-02 (B2)	November 2018 and October 2022	August 2018 to November 2020
MW18-03 (B3)	Dry	August 2018 to October 2021 <sup>1</sup>
MW18-04 (D3)	Dry	August 2018 to October 2021 <sup>1</sup>
MW18-06 (D1)	November 2018 and October 2022	August 2018 to November 2020
MW21-2A	November 2022	November 2021 to May 2022

Table 5: Gravel Units – Water Quality Parameter Summary

Well ID	Field Parameters	General and Inorganic Parameters	Dissolved Metals	Total Metals	Hydrocarbons
MW10-1	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW10-2	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW10-3	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW12-1	Insufficient volume				N/A
MW12-2	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW12-3	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW12-4 <sup>1</sup>	Insufficient volume				N/A
MW12-5	Insufficient volume	October 2021	Insufficient volume		N/A
MW12-6	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW12-7	November 2018	November 2018	-		N/A



MW12-8	Dry				N/A
MW12-9	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW18-01 (B1)	Dry				N/A
MW18-02 (B2)	August 2018 November 2018 October 2021	August 2018 November 2018 October 2021	August 2018 October 2021	October 2021	August 2018
MW18-03 (B3)	Dry				N/A
MW18-04 (D3)	Dry				N/A
MW18-06 (D1)	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	N/A
MW21-2A	November 2021	November 2021	November 2021	November 2021	November 2021

## 2.6.4 Baseline Data – Bedrock Unit

Baseline data has been collected to date for groundwater within the bedrock has been summarized below.

Table 6: Bedrock Units – Groundwater Elevation Data Summary

Well ID	Manual Water Levels Collected	Transducer Data Collected
MW18-05 (D2)	November 2018 and October 2022	August 2018 to November 2020
MW21-1A	November 2021 and May 2022	None
MW21-1B	November 2021 and May 2022	None
MW21-2B	November 2021 and May 2022	November 2021 to May 2022
MW21-3	November 2021 and May 2022	None
MW21-4	November 2021 and May 2022	None
Bedrock Well 1	November 2021 and May 2022	None
Bedrock Well 2	May 2022	None
Bedrock Well 3	May 2022	None
Bedrock Well 5	May 2022	None

Table 7: Bedrock Units – Water Quality Parameter Summary

Well ID	Field Parameters	General and Inorganic Parameters	Dissolved Metals	Total Metals	Hydrocarbons
MW18-05 (D2)	November 2018 October 2021	November 2018 October 2021	October 2021	October 2021	-
MW21-1A	November 2021	November 2021	November 2021	November 2021	-
MW21-1B	November 2021	November 2021	November 2021	November 2021	-
MW21-2B	November 2021	November 2021	November 2021	November 2021	November 2021
MW21-3	November 2021	November 2021	November 2021	November 2021	-
MW21-4	November 2021	November 2021	November 2021	November 2021	-
Bedrock Well 1	May 2022	May 2022	May 2022	May 2022	-
Bedrock Well 2	October 2021	October 2021	October 2021	October 2021	-
Bedrock Well 3	October 2021	October 2021	October 2021	October 2021	-
Bedrock Well 5	February 2022	February 2022	February 2022	February 2022	-

### 2.6.5 Baseline Data – Springs

Baseline data has been collected to date for groundwater within the onsite springs has been summarized below.

Table 8: Springs – Water Quality Parameter Summary

Spring ID	Field Parameters	General and Inorganic Parameters	Dissolved Metals	Total Metals	Hydrocarbons
Beaupre Spring #1	May 2022	May 2022	May 2022	May 2022	May 2022
Beaupre Spring #3	May 2022	May 2022	May 2022	May 2022	May 2022
Beaupre Spring #3	May 2022	May 2022	May 2022	May 2022	May 2022
Bedrock Spring #1	May 2022	May 2022	May 2022	May 2022	May 2022
Bedrock Spring #2	May 2022	May 2022	May 2022	May 2022	May 2022
NE Spring #1	May 2022	May 2022	May 2022	May 2022	May 2022
NE Spring #2	May 2022	May 2022	May 2022	May 2022	May 2022
South Spring	May 2022	May 2022	May 2022	May 2022	May 2022

## 2.7 Groundwater – Project Area (Matrix)

Beyond the baseline data provided in Section 2.6, Matrix was retained by BURNCO to conduct a Groundwater Impact Assessment of the proposed development. A complete copy of the Matrix report can be found as part of BURNCO's Land Use Application. The objectives of this evaluation were to describe the hydrology and groundwater resources within the Project area and to evaluate the potential effects on groundwater that may be caused by the Project.

### 2.7.1 Nearby Water Users

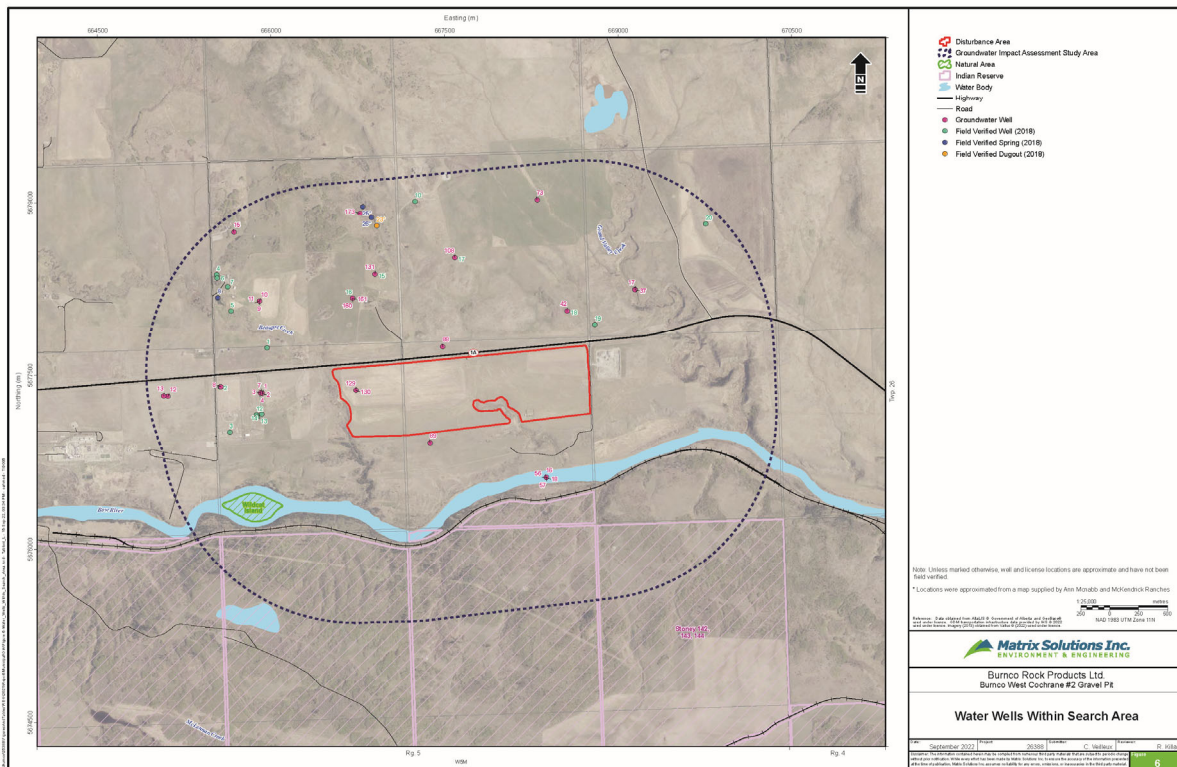
*Matrix conducted a field-verified survey (FVS) was conducted between June 18, 2018, and May 28 to September 16, 2019, to supplement the FVS that was conducted by Levelton in 2014 (Appendix A), and BURNCO in 2016. The FVS aimed to obtain baseline information about local water users and to establish their proximity to the site.*

*A search of well information from AEP water well database (AEP 2022a) was completed on January 27, 2022, and identified 48 records within a 1.6 km radius of the project area (Table 7a, Figure 6). These include 45 water wells and three springs. The wells ranged in depth from 18.29 to 110.00 m bgs and the majority of the wells are listed for domestic and stock use. Based on the listed completion information and associated depth to bedrock for the water wells, 25 out of the 45 wells are interpreted to be completed in the bedrock and 3 wells (GIC 2079054, 386523, 1465045; water well numbers 8, 11, and 173; Table 7a) are interpreted to be completed in sand and gravel.*

*The groundwater wells interpreted to be completed in the sand and gravel are located greater than 850 m to the northeast of the site and are listed as for being used for domestic and stock use (Figure 6). The records for the remaining 17 wells did not include adequate information to determine the depth to bedrock. The water well information suggests that the surficial deposits are generally neither a dependable nor significant water supply aquifer in the area. The presence of three springs in the records and eight springs in the FVS (Matrix 2019) suggest that the site is near or within a groundwater discharge area (Table 7a; Appendix E, Table E1; Figure 6).*



Figure 9: Search Area Water Well Locations

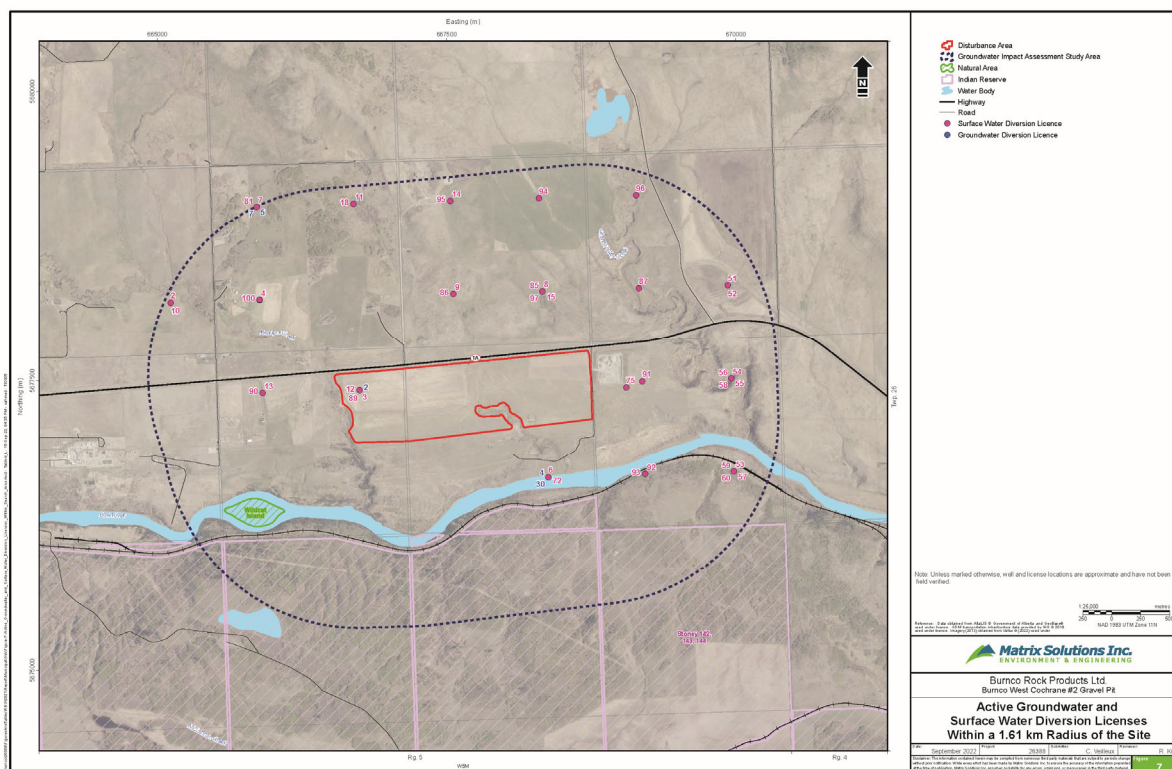


A search of active surface and groundwater licences within a 1.61 km (1 mile) radius of the project site identified 43 diversion licences as of January 28, 2021, (Table 7b, Figure 7). The search identified five active groundwater licences, sourced from unnamed aquifers, while the remaining 38 licences are granted for surface water use. Out of the 38 surface water licences, 14 are sourced from unnamed streams, six are sourced from the Bow River, 12 from Grand Valley Creek, four from Beaupré Creek, and two from surface runoff.

Of the five active groundwater diversion licences, only one is located within the project boundary. This is a registered groundwater diversions (water well) license at this location and is installed within the bedrock. There are two registered water well diversions, proximal to the site boundary, located downgradient, and completed within the bedrock. Two of the registered water well diversions are located upgradient of the site and the remaining two registered water well diversions are located downgradient of the site (Figure 7).

All six diversions on the Bow River are located downstream from the site; 11 of the unnamed streams diversions are located upgradient from the site; 10 Grand Valley Creek diversions are located upgradient from the site all four Beaupré Creek diversions are located upgradient from the site; and one surface runoff diversion is upgradient of the site (Figure 7).

Figure 10: Search Area Water Licenses



### 2.7.2 Groundwater Elevation Mapping

Matrix manually measured depths to groundwater on November 7, 2018, October 25 and 26, 2021, and May 10, 2022, and are included in Table A. A summary of all available groundwater elevation data is provided in Table B. Water levels recorded in pressure transducers installed in the monitoring wells were reviewed and compensated for atmospheric conditions. A total of 12 hydrographs, of which 11 hydrographs are for sand and gravel aquifer monitoring wells, were created based on available and usable data from July 2012 to May 2022 (Appendix F).

*The groundwater levels varied across the study area. Generally, the wells displayed seasonal fluctuations ranging between 0.4 to 0.9 m and water levels were near the base of the gravel. Numerous wells display sudden water level increases, which suggests local rapid recharge likely from spring snow melt and runoff.*

*Groundwater elevations west of Grand Valley Creek, based upon groundwater monitoring well data and test hole data, suggests a groundwater flow to the south to southeast that generally follows topography (Figure 9).*

*A saturated gravel thickness contour map was generated using water elevation data and the base of sand and gravel surface supplied by BURNCO and remains relatively unchanged from 2018. There was a general decrease in water levels within the sand and gravel wells from 2018 to 2021. However, with the addition of the new MW21-2a sand and gravel well, the saturated thickness map was updated (Figure 8) The gravels were moderately saturated ranging from 1 to 2 m in the east corners of the study area, where most of the remaining area had minimal if any water saturated gravels. (Figure 8).*

Figure 11: Groundwater Flow

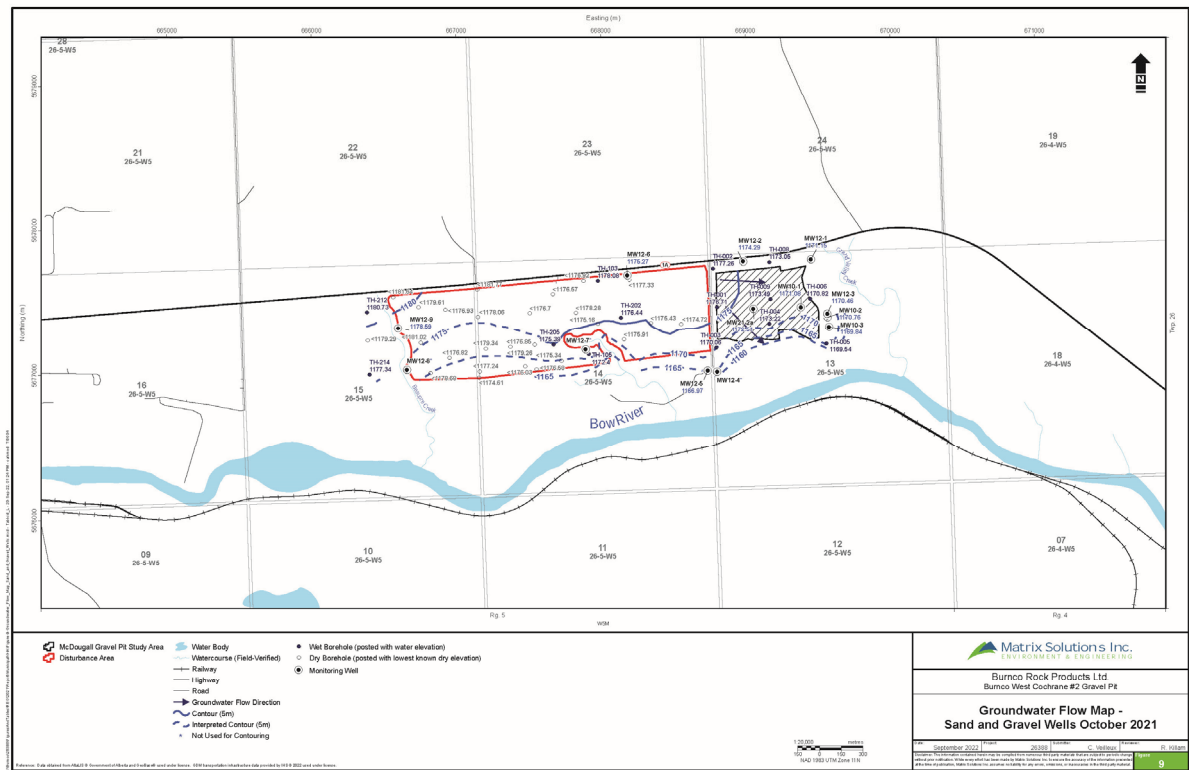
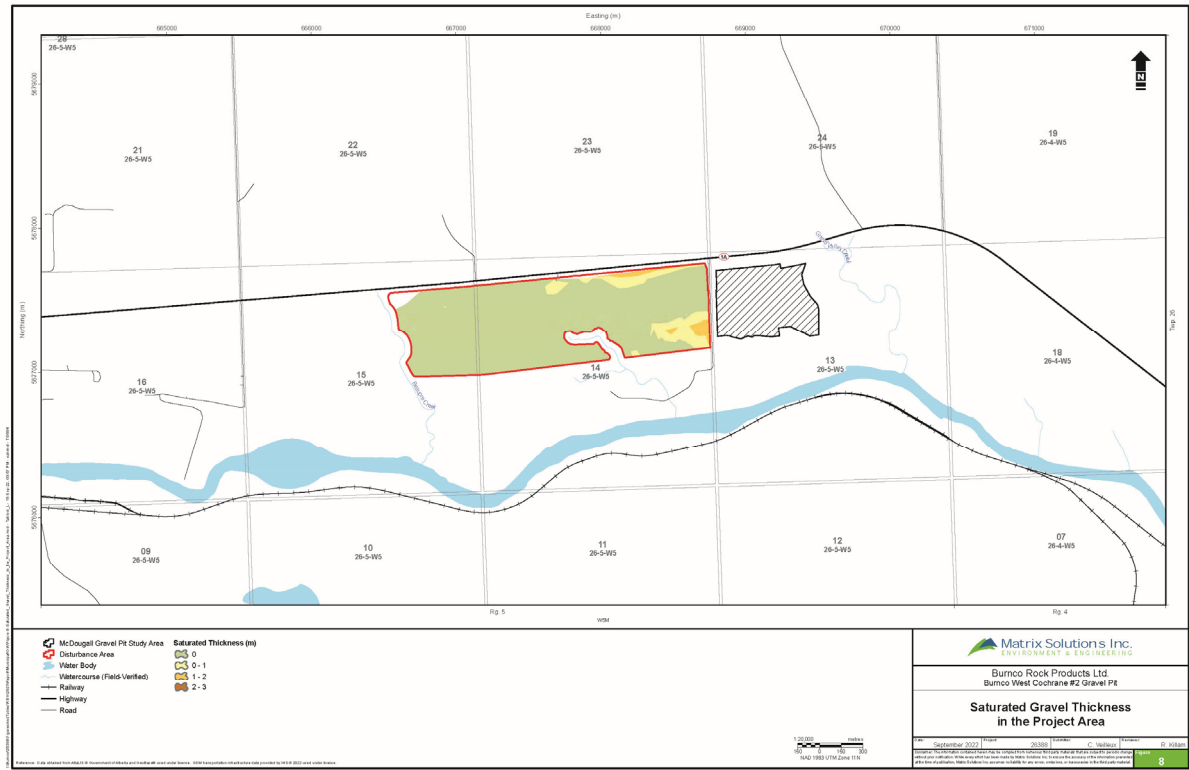


Figure 12: Saturated Gravel Thickness



## **2.8 Groundwater – Project Area (SLR)**

SLR Consulting (Canada) Ltd. (SLR) was retained by BUNRCO Rock Products Ltd. (BURNCO) to conduct a secondary water resource assessment of a proposed aggregate mining expansion in Rocky View County, Alberta. The assessment, review of water chemistry literature, and a description of hydrological conditions in the vicinity of the West Cochrane Gravel Pit are required to address issues raised by intervenors during BURNCO's application process to Rocky View County (County).

### **2.8.1 Background**

*In July 2022, Rocky View County Council (Council) held a public hearing on the application. As part of that public hearing, many submissions were made that raised fears of environmental damage that, while addressed in the technical documentation, may have mitigated enthusiasm for the project. In particular a submission by Dr. Fennell (Fennell, J. 2021) on supposed physical and chemical impacts to water quality downgradient of the pit, and a submission by Mayhood (Mayhood, D.W. 2021), who accepted Dr. Fennell's conclusions and then raised conjectures on impact to fish habitat in the Bow River.*

*The purpose of this report is to assess the true impact of the proposed works by drawing upon existing documentation, known scientific methodologies, reviewing key literature, and the extensive experience of the report author on aggregate extraction and its effects on the natural environment.*

*The objective of the field studies is to provide additional information about the receiving water courses, hydrogeological conditions within the vicinity of the site, and scientific literature to evaluate turbidity and metal concerns raised during BURNCO's application for the expansion of aggregate mining operations. The information was compiled into a risk assessment to evaluate the risk of aggregate mining operation impacts to surface water turbidity, metals, and trace elements.*

### **2.8.2 Groundwater Quality**

*Groundwater samples have been collected from onsite groundwater monitoring wells since March 2012, with a total of six groundwater sampling events in March/April 2012, May 2013, August and November 2018, October/November 2021, and May 2022. Groundwater results are provided in Appendix D, and a brief summary of the data is discussed below.*

*Both lab and field pH values in the sand and gravel are generally in the range of 7.1 to 8.2, and bedrock pH values are generally in the range of 7.5 to 9.7, indicating a neutral to alkaline groundwater. The majority of bedrock pH values are above the Tier 1 maximum of 8.5.*

*Field turbidity measurements are high from standard piezometer designs and may not be representative of actual groundwater turbidity. For example, the turbidity measured in the unfiltered groundwater samples has a large range of 124 to 1,000 Nephelometric Turbidity Units (NTU) in the gravel and 1 to > 1,000 NTU in the bedrock, although it seems to be slightly lower in the bedrock. Laboratory turbidity shows even larger ranges in both the gravel and the bedrock with 6 to 26,800 NTU, and 1 to 59,300 NTU, respectively, due to the sampling methodology used and disturbing sediment remaining in the well after drilling. It is important to note that conventional field methods were used during the collection of groundwater samples in 2021 and no additional steps were taken to reduce*

*the disturbance of residual sediments from drilling in groundwater samples. These field methods may have contributed to concentrations being skewed significantly higher than is representative of the natural groundwater conditions.*

*The majority of dissolved metal concentrations in groundwater within the gravel fall below the Tier 1 guidelines with only aluminum, iron, and manganese exceeding the guidelines. Exceedances were in background / upgradient wells MW18-02 (all three parameters) and MW12-9 (manganese), and downgradient wells MW21-2a (all three parameters), MW10-3 (manganese) and MW10-1 (aluminum). Natural exceedances of the guidelines is common in Alberta and not likely due to the presence of the gravel extraction operation.*

*The majority of dissolved metal concentrations in groundwater within the bedrock fall below the Tier 1 guidelines with only aluminum, antimony, arsenic, copper, manganese, and selenium exceeding the guidelines. Exceedances were in background / upgradient wells MW18-05 (manganese), MW21-1a (aluminum and selenium), MW21-1b (aluminum, antimony, arsenic, copper, and selenium), and Bedrock Well 3 (copper and selenium). Downgradient wells had exceedances of similar parameters with MW21-2b (aluminum, antimony, arsenic, and selenium), MW21-3 (aluminum, arsenic, and selenium) and MW21-4 (antimony, arsenic, and selenium).*

*Based on these results occasional exceedances of certain dissolved metal parameters would occur as part of the natural variability within the groundwater system, as they are intermittently present in wells which cannot be affected by the existing operation.*

### **2.8.3 Hydrology**

*All surface water drainage in the area is to the Bow River, which flows from west to east approximately 150 to 850 m south of the site. Flows at the closest current monitoring station are measured within the Bow River approximately 7 km downstream (Bow River Near Cochrane – 05BH005). The river at this station drains 6,687 square kilometres (km<sup>2</sup>) and reaches well back into the mountains as shown in Drawing 5. The records indicate seasonal variations in flow with the highest flows in the late spring and early summer with flows in the region of 150 to 360 cubic metres per second (m<sup>3</sup>/s). Flow typically declines through the summer, fall, and winter down to lows of around 40 m<sup>3</sup>/sec.*

*At the confluence with Grand Valley Creek beside south of the site, the Bow River drains 5,795 km<sup>2</sup>. It is reasonable to assume that the seasonal flows at this confluence can be estimated by a pro-rata of the watershed. This pro-rata is  $5,795/6,687 = 86.7\%$  of the measured flow at 05BH005. Seasonally, this is 130 to 312 m<sup>3</sup>/s. Winter low flows might drop to 35 m<sup>3</sup>/s.*

*The Grand Valley Creek has a catchment area of about 352 km<sup>2</sup>. This is about 6 % of the Bow River catchment area at the confluence. There is no gauging station on this stream; however, some spot-flow measurements were made by SLR in December 2021 during a period of baseflow (no storm runoff). Based on the potential error of measurement the Grand Valley Creek, discharge was 39 to 66 L/s, which is 0.04 to 0.07 m<sup>3</sup>/s.*

### **2.8.4 Surface Water Quality**

*Surface water samples were collected from upstream and downstream locations along the Bow River and Grand Valley Creek in December 2021. Sampling methodologies are described in Appendix A and the laboratory analysis certificate is provided in Appendix E. Surface water concentrations of all parameters at all Bow River and Grand Valley Creek*



*sample locations were below AEP Tier 1 Guidelines in December 2021. TSS concentrations were below laboratory detection limits, while the pH range of 8.23 to 8.48 was within the background range of values.*

*The Government of Alberta also completed three surface water sampling programs along the Grand Valley Creek between 2003 and 2005 which indicated background TSS concentrations ranging from 3 to 58 mg/L, with median concentration of 11 mg/L (Sosiak 2003 and 2006). The median pH of the creek ranged from 8.2 to 8.4.*

## **2.8 Historical Resources**

Lifeways of Canada Limited (Lifeways) was retained by BURNCO to conduct a historical resources assessment of the proposed development. A complete copy of this report can be found as part of BURNCO's Land Use Application.

In 2018, Lifeways also conducted a Historical Resources Impact Assessment (HRIA) as well as a Historical Resources Impact Assessment for Palaeontology (pHRIA) for all lands beyond NW13.

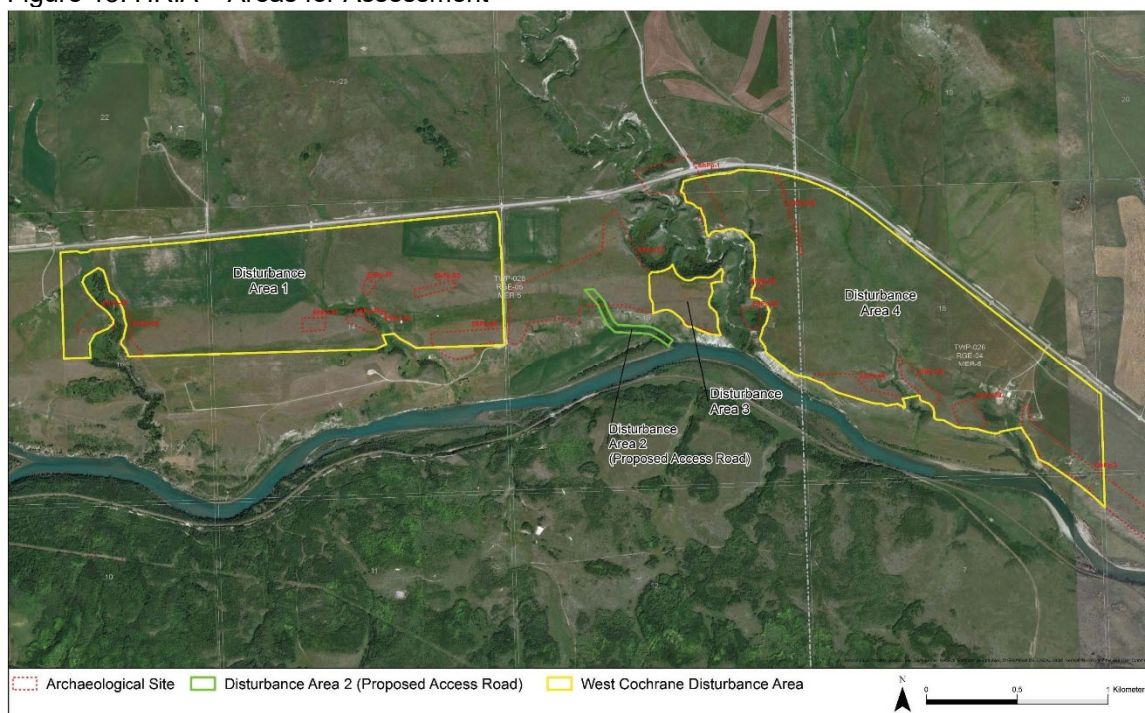
*The HRIA included work in four defined Disturbance Areas. Based on a Historic Resources Application filed on behalf of the proponent on April 30, 2018, the Historic Resources Management Branch (HRMB) issued a Schedule of Requirements for the Project on June 25, 2018. The Schedule specified that the HRIA address all areas of high archaeological potential within the Project area that had not been previously assessed, and that the relationship between the footprint and previously recorded sites EhPp-1, EhPp-3, EhPp-49, EhPp-65, and EhPp-75 be established (portions of EhPp-75 were subject to mitigative excavations in the context of the existing gravel pit operations under Permit 18-059 earlier in the season).*

*A separate palaeontological HRIA was required for a small subset of these lands. This work was undertaken under RTMP Permit 18-062 in August 2018.*

*Seventeen archaeological sites were recorded during the 2018 HRIA program, sixteen of which are directly associated with the Project area. Most are of at least high local archaeological significance and worthy of some level of mitigation prior to impact from the development of the BURNCO West Cochrane Expansion Project or any other proposed development. The HRIA resulted in the rerecording of previously recorded site EhPp-65, the relocation and reassessment of sites EhPp-1, EhPp-3, EhPp-49, EhPh-59, and EhPh-75, and the recording of 8 previously unrecorded Precontact sites with stone features, one Historic Period homestead site, and one site with both Precontact stone features and a Historic homestead. In addition, the historic Morley Trail crosses the Project area and was recorded.*

*Heritage Sites recorded within the Borden designations include HS 107372, 107373, 103374, 103375, and 103376.*

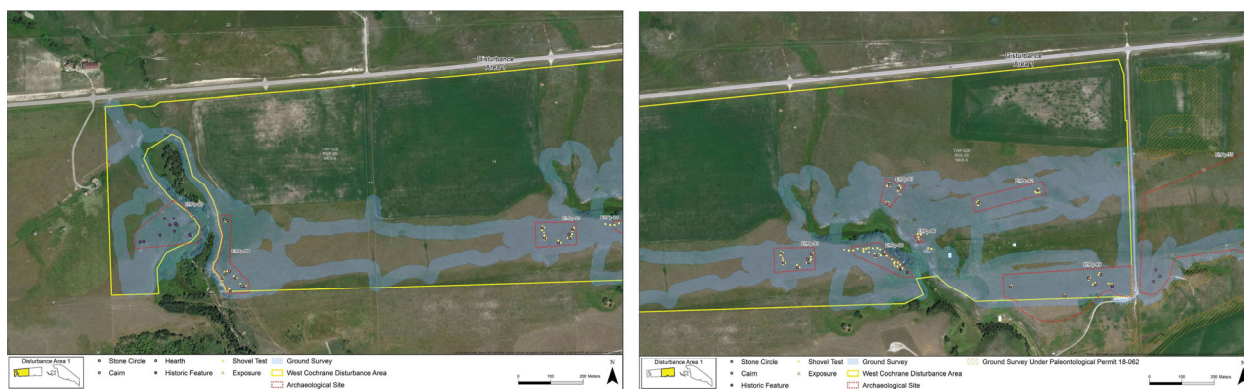
Figure 13: HRIA – Areas for Assessment



#### Project Area (Disturbance Area 1)

*Eight archaeological sites were recorded in association with Disturbance Area 1: EhPp-49, EhPp-86, EhPp-87, EhPp-88, EhPp-89, EhPp-90 (HS 107373, 107374, and 107375), EhPp-91, and EhPp-92. We recommend that additional preimpact mitigation be required on all of these sites or any portions thereof to be impacted by the BURNCO West Cochrane Expansion Project. In addition, we recommend that Historical Resources Act clearance be granted to Project impacts associated with all non-site areas within Disturbance Area 1.*

Figure 14: HRIA Work Undertaken in Disturbance Area 1



Historical Resources Act approval was provided on areas not containing these sites under project file #4650-18-0056-001. A copy of this approval is provided as part of BURNCO's Land Use Application. This means that development areas located outside of mapped archaeological sites

can proceed with no further assessment related to historical resources. For those development areas located within mapped archaeological sites, additional studies and excavation is required prior to any excavation or disturbance.

**Policy #2**

**BURNCO will secure historical resource clearance from Alberta Culture & Tourism before commencing any surface disturbance in any areas not yet cleared and will follow all conditions and requirements of the approval.**



## 3.0 Development / Operating Plan

### 3.1 Overview

BURNCO currently operates a gravel pit at NW 13-26-05 W5M located northwest of the Town of Cochrane, Alberta. This site is 61 hectares in size. It contains an estimated 2,500,000 tonnes of aggregates and is selling roughly 125,000 tonnes of material annually. Operations include earthmoving, aggregate crushing, and loading trucks. This site was permitted in 2012 with a design capacity of 500,000 tonnes per year. It opened in 2016 after the completion of an intersection upgrade at Range Road 51 in support of the project.

BURNCO is now proposing an MSDP addressing 123.6 hectares (305.5 acres) of land. These lands will be operated as West Cochrane #2 Gravel Pit once the existing site in NW13 is depleted. These lands contain an estimated 6,500,000 tonnes of aggregate and is expected to operate for 20 to 25 years after commencing operation in approximately 10 years. No change in annual design capacity is being proposed and West Cochrane Gravel Pit #2 will sell 500,000 tonnes per year. Major activities at the pit will continue to include:

- aggregate crushing
- aggregate washing
- earthworks
- loading and scaling

#### Crushing

Crushing is completed with a portable crushing plant. This plant is comprised of a number of modular components on a wheeled chassis. When assembled, the components work together to crush, screen, and convey aggregate materials in the production of construction materials. The plant is mobilized to the site as required and the length of stay is dependent on the type and amount of materials required for anticipated construction projects. It is expected that the use of a portable crushing plant will continue through all phases of the proposed project. This portable crushing plant will not be set up in a central location, but instead, will be set up in the active mining areas of the pit progresses over time.



### Washing

Washing is completed with a portable washing plant. Like the crusher, this plant is comprised of a number of modular components on wheeled chassis. When assembled, the components work together to wash, screen, and convey aggregate materials in the production of washed construction materials. The plant is mobilized to the site as required and the length of stay is dependent on the type and amount of materials required for anticipated construction projects. It is expected that the use of a portable washing plant will continue through all phases of the proposed project. This portable washing plant is not as easily moved and will be set up in a central location in NE 14. This is illustrated in Section 3.3.



### Earthworks

To extract the gravel (pit-run), topsoil and subsoil must be salvaged, and overburden must be removed to expose the gravel beneath. This work is accomplished with heavy machinery such as scrapers, track hoes, articulating trucks, bulldozers, graders. This process is expected to continue as required through all phases of the proposed project.



### Loading and Scaling

Once aggregate materials have been processed by the portable crusher and portable wash plant, the final step is to load these materials into trucks for transport to construction projects. This work is accomplished with a loader. Trucks are then weighed and ticketed at a portable commercial truck scale and portable scale house. This process is expected to continue as required through all phases of the proposed project.



Aggregate from this site will be used to supply local projects in Rocky View County and in the Town of Cochrane. Washing capacity at this site will also allow BURNCO to supply premium aggregates to its network of asphalt and concrete plants in the Greater Calgary Area. BURNCO has a number of sites in Rocky View that currently serve this vital role as a supply of premium materials, however they are nearing depletion and BURNCO views the West Cochrane site as a replacement.

Before commencing any site operations, BURNCO will secure all necessary permits and authorizations necessary. BURNCO will ensure that such operations comply with the requirements of those permits and authorizations.

#### **Policy #3**

**Before commencing operations, BURNCO will secure a Development Permit from Rocky View County and will follow all conditions and requirements contained therein.**

#### **Policy #4**

**BURNCO will follow all conditions and requirements of the approved Activity Plan (Registration 254757-00-01) from Alberta Environment & Parks under the Code of Practice for Pits.**

#### **Policy #5**

**BURNCO will follow all conditions and requirements of the Water Act authorizations received from Alberta Environment & Parks.**

#### **Policy #6**

**BURNCO will ensure that operations comply with all relevant permits and authorizations.**

### **3.2 Hours of Operation**

BURNCO will continue to follow the operating hours determined by Rocky View County for crushing, washing, earthworks and trucking as part of the development permit process. Current hours at the existing gravel pit are:

- Hours for Operating:
  - 24 Hours a Day; Monday through Friday
  - 7:00am to 5:00pm on Saturday
  - No activities on Sundays or Statutory Holidays
- Hours for Hauling:
  - 6:00 am to 7:00 pm Monday through Saturday
  - No activities on Sundays or Statutory Holidays

#### **Policy #7**

**BURNCO will follow the hours of operation as determined by Rocky View County as part of the Development Permit process.**

### **3.3 Development Phasing**

A detailed phasing plan is provided in Appendix 3. The key development strategies associated with that phasing plan are as follows:

#### **Policy #8**

**BURNCO will follow the development phasing plan as illustrated in the MSDP.**

#### *Phases B8 – B11 (2032 – 2042)*

- “B” portion of screening berm to be constructed prior to any mining activities in phase B8,
- Haul route to remain unchanged (Range Road 51 to Highway 1A),
- Crushing, Earthworks, Loading and Scaling to following mine phasing,
- Washing to commence once sufficient space opened up by mining activities. Wash plant to be located in phase B8.

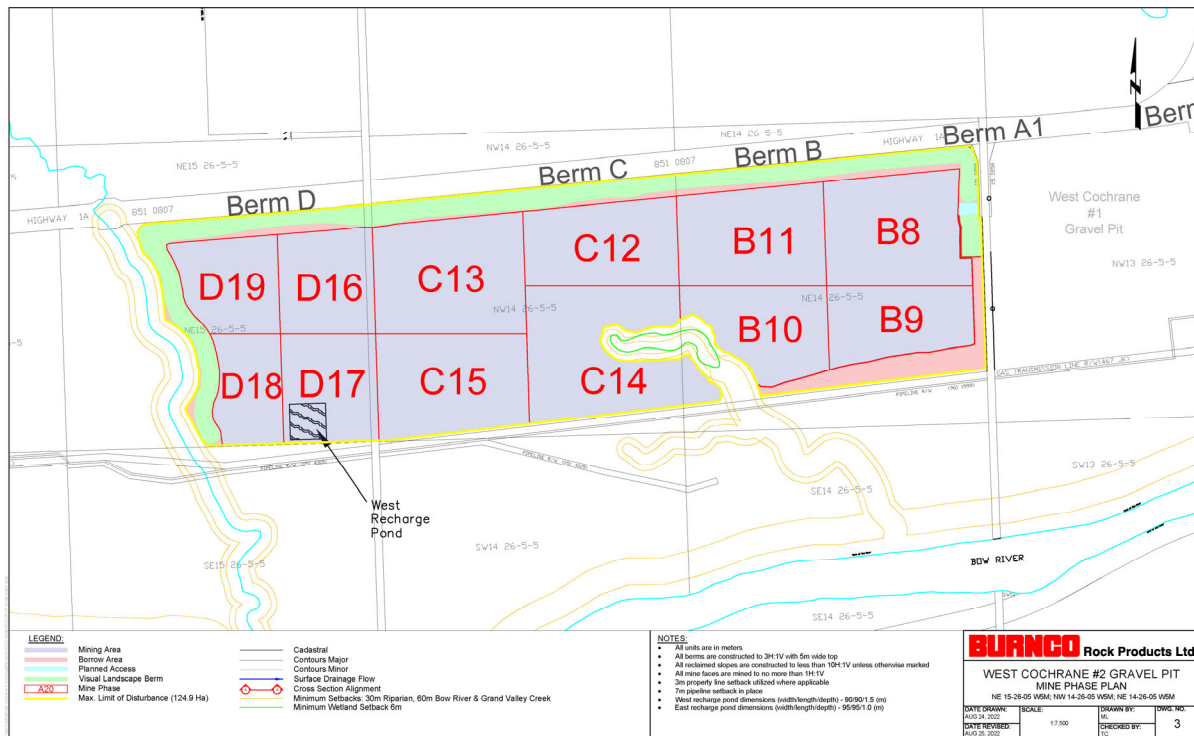
#### *Phases C12 – C15 (2042 – 2050)*

- “C” portion of screening berm to be constructed prior to any mining activities in phase C12,
- Haul route to remain unchanged (Range Road 51 to Highway 1A),
- Crushing, Earthworks, Loading and Scaling to following mine phasing,
- Wash plant to remain in B8.

### Phases D16 – D19 (2050 – 2057)

- “D” portion of screening berm to be constructed prior to any mining activities in phase D16,
- Haul route to remain unchanged (Range Road 51 to Highway 1A),
- Crushing, Earthworks, Loading and Scaling to following mine phasing,
- Wash plant to remain in phase B8.

Figure 15: Mine Phase Plan



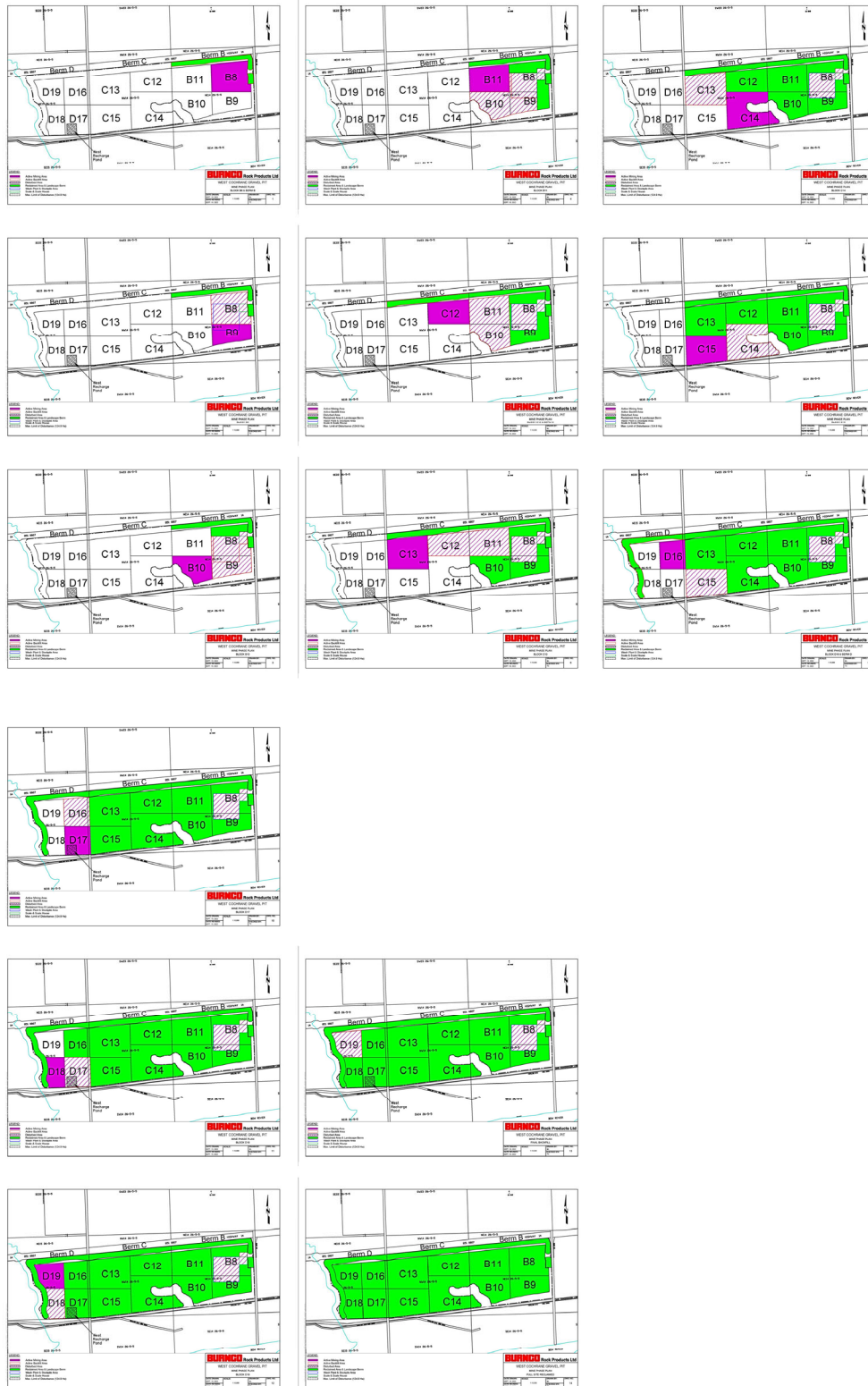
Reclamation of depleted areas is guided by the available reclamation materials from new mining areas (cut) and the amount of material needed to achieve the final grading plan (fill). Figure 20 illustrates the mine phasing planned at the site based on BURNCO's analysis of the cut/fill balances. The maximum planned disturbance area for the project area will be 70 acres at any single time. These areas were the ones used in analysis of project impacts such as air quality.

### **Policy #9**

**The maximum disturbance area will be limited to no more than 70 acres at any given time.**



Figure 16: Mine Phasing Illustration



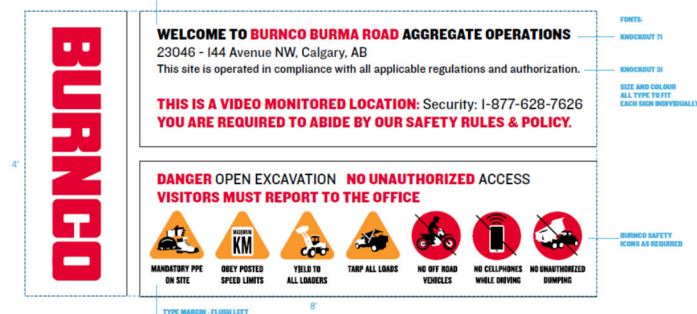
### 3.4 Site Securement, Signage, Buffers

Project lands will continue to be secured on all property boundaries with farm fencing. All access points to the project lands such as farm approaches will be gated.

Upon issuance of a development permit for these lands, “Danger No Trespassing” signs will be posted every 200 meters along all property boundaries to inform the general public about the presence of open excavations and provide basic site information.



The primary access point to the project will have lockable steel gates comprised of two 16-foot gates hung on large steel corner posts. Signage will also be provided to identify the site and provide key information. Signs will be 4 feet by 8 feet and mounted on one or both sides of the approach.





The following minimum setbacks shall be followed:

- 3 meter buffer/setback to adjacent properties when constructing screening berms;
- 60 meter buffer/setback from Highway 1A for all extraction and processing;
- 7 meter buffer/setback from any other property not associated with the project for all extraction and processing;
- 30m buffer/setback from the center line of any riparian areas as mapped in the MSDP and supporting documentation for all extraction and processing; and
- 60 buffer/setback from the edge of the Bow River for all extraction and processing.

#### **Policy #10**

**BURNCO will adhere to the setbacks detailed in the MSDP.**

Proximity setbacks were also reviewed in relation to utilities. In all cases, BURNCO will secure a proximity agreement with the applicable operators before any activities within 30m of any utility Right-Of-Way. TC Energy operates the east-west pipeline across the project (ROW 467JK), and based on consultation, BURNCO will ensure a 7m development setback from the edge of the Right-Of-Way as well as 3:1 reclamation back sloping for any excavations adjacent to the pipeline.

#### **Policy #11**

**BURNCO will install site signage. This will include perimeter signage to discourage trespassing as well as entrance signage as necessary to identify the site and provide key information to the public.**

#### **Policy #12**

**Site signage shall include a 24-hour phone number for neighbors to call in the event of questions or concerns.**

#### **Policy #13**

**BURNCO will ensure a 7m development setback from ROW 467JK as required by the proximity agreement. BURNCO will continue to secure proximity agreements for any applicable utilities or facilities.**

### **3.5 Noise Assessment and Control**

BURNCO intends to minimize the noise of the operation through the following measures:

- The loader back-up alarm systems will be maintained at the minimum dBA levels allowable under Alberta Occupational Health and Safety guidelines. When the equipment is operating during darkness, the noise alarm system is turned off and a strobe light warning system is turned on as an alternative to the warning sounds,
- Access roads will be graded and regularly maintained to reduce traffic noise,
- Each separate main component of the crusher (i.e. the cone, jaw and screen deck) will be enclosed by a sound and dust retarder blanket system. Testing has shown that the sound levels drop significantly from 10-15 dBA with the installation of these blankets,
- Any electrical generating sets will have sound absorbing baffles installed,
- Where feasible highline power will be utilized instead of generators for powering the conveyors, crushers and wash-plant,

- Rubber liners will be used at all conveyor transfer points to reduce the impact noise,
- Where feasible, the use of poly screen decks vs. traditional steel screen decks on the wash-plant to reduce the sound level,
- All equipment associated with the crusher will be regularly maintained to ensure that it is working properly and that no noise other than normal operating noise is emanating from the equipment,
- Use of engine retarder brakes will not be allowed when trucks are in the stockpile area,
- Strategically place product piles to shield the neighboring areas from the operating equipment,
- Construction of screening berms in strategic locations as detailed in this MSDP.

In support of the Project, ACI Acoustical Consultants Inc. (ACI) was retained to complete an Environmental Noise Impact Assessment for the Project. A complete copy of the ACI report is provided as part of BURNCO's Land Use Application.

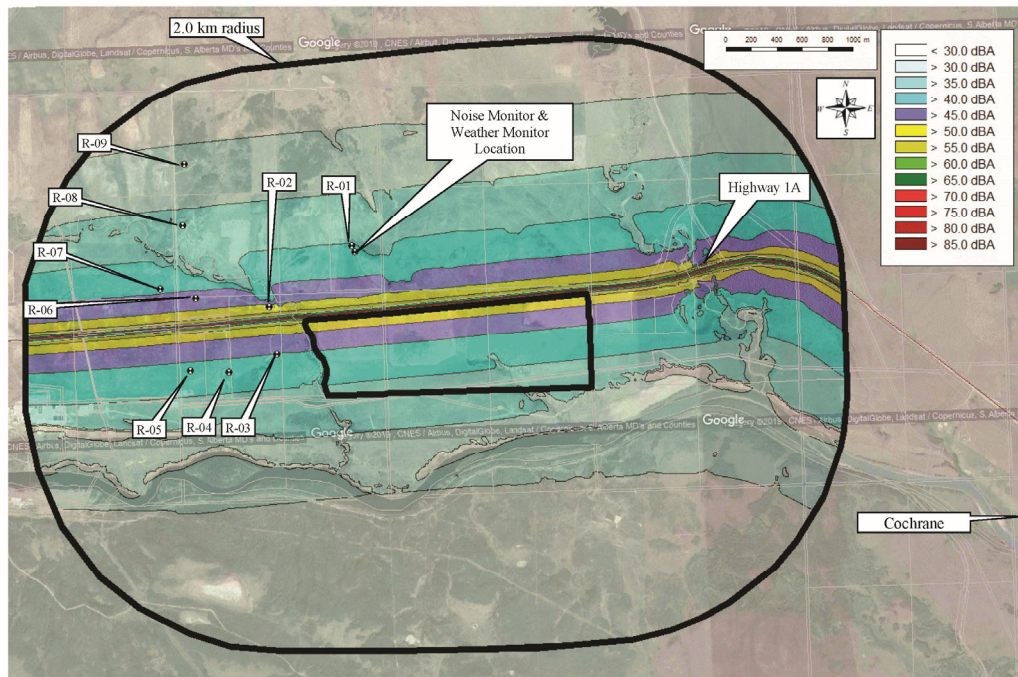
The objectives of this assessment were to evaluate the potential noise impact of the project operations for residential receptors within 2.0km of the project boundaries. As part of the study, noise monitoring was conducted at a receptor location within the study area. In addition, detailed on-site measurements were conducted at an existing BURNCO aggregate site. The information from the noise monitoring, the on-site measurements and detailed operational information provided by BURNCO were used to generate a computer noise model of the study area under existing and future conditions (i.e. with the Project operating). An overview of the results is as follows:

#### Baseline

*As part of the study, a long-term environmental noise monitoring was conducted at a receptor location within the study area. The noise monitoring was conducted over a 16-day period from May 9 – 25, 2018. The noise monitoring was conducted collecting broadband A-weighted and C-weighted as well as 1/3 octave band sound levels. In addition, the noise monitoring was accompanied by a digital audio recording for more detailed post process analysis.*

*The computer noise modeling was conducted using the CADNA/A (Version 2022 MR1, build: 191.5229) software package. CADNA/A allows for the modeling of various noise sources such as road, rail, and various stationary sources. In addition, topographical features such as land contours, vegetation, and bodies of water can be included. Finally, meteorological conditions such as temperature, relative humidity, wind-speed and wind-direction can be included in the calculations.*

Figure 17: Baseline Case Leq24 Sound Levels



The projected noise levels range from 31.4 to 51.3 dBA and as anticipated, the projected existing noise levels of the residential receptor locations decrease as their relative distance to Highway 1A increases. It should be noted however, that the results only include the noise contributions from Highway 1A. It therefore ignores the ambient noise caused by biological activity (e.g. birds, crickets, etc.), farming, etc. Therefore, it is probable that the existing ambient noise levels found in Table 31 are higher for receptors greater than 1 km from Highway 1A.

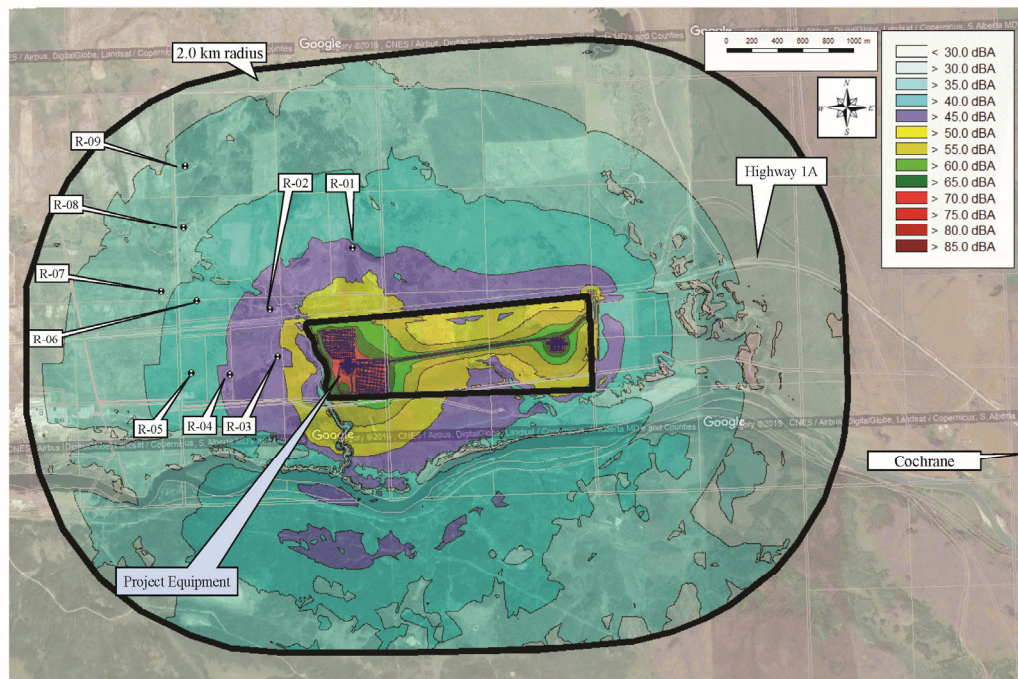
## Project

The modeled Leq24 noise levels from the West Cochrane Gravel Pit #2 operations for R-01 to R-09 range from 36.2 dBA to 49.1 dBA. As anticipated, the highest projected noise levels during the operations are for receptor location R-02 due to its proximity to the site.

The relative impact of the West Cochrane Gravel Pit #2 operations ranges from -4.8 to 5.3 dBA. The variance in the impact can be attributed to the relative distance of the receptors to the Project and to Highway 1A, respectively. Specifically, Receptor R-01 will have the highest increase in noise levels due to its distance to Highway 1A (+510 m) and its relative proximity to the project site (approx. 550 m north of Project equipment). Subsequently, the noise climate of receptors further than 600 m from the Project site and within 400 m of Highway 1A (R-06 & R-07) will be less impacted by the contributions of the Project.

In addition to the broadband A-weighted (dBA) sound levels, the modeling results at the various receptor locations indicated C-weighted (dBC) sound levels will be less than 20 dB above the dBA sound levels, as shown in Table 4. As per industry standards, if the dBC – dBA sound levels are less than 20 dB, the noise is not considered to have a low frequency tonal component.

Figure 18: West Site Operations Leq24 Sound Levels



Based on this modeling, it is BURNCO's belief that the Project will not create an adverse effect related to noise. The noise environment for the area is already heavily influenced by road traffic on Highway 1A. The projected noise increases related to the project are modest.

BURNCO is also committed to monitoring the site as necessary to ensure noise does not become an adverse effect for the area. BURNCO will utilize Directive 038 as the basis for permissible noise created by the project. The Wildcat Gas Plant is located less than 3.2 kms (2 miles) away from this project and would also be subject to Directive 038 in relation to noise. It makes sense that BURNCO's operation would follow the same approach to noise as this existing facility. As such, and based Directive 038, the noise limits as measured at any surrounding dwelling would be limited to:

- Daytime (7am – 10pm) = 55dBA Leq 1 hour;
- Nighttime (10pm – 7am) = 45dBA Leq 1 hour;
- Or 5dBA Leq 1 hour over ambient measurements as applicable.

As required, BURNCO will utilize enhanced mitigation measures. Such enhanced mitigations include:

- Additional noise control,
- Reducing site activities during periods of excessive noise.

With these enhanced mitigation options in place, BURNCO is confident that it will be able to meet the permissible sound limits associated with Directive 038 and that noise will not become a nuisance as a result of this development.



#### **Policy #14**

**BURNCO will follow the noise control measures detailed in the MSDP. In addition, BURNCO will utilize enhanced mitigation measures if necessary, to ensure that noise is reasonably controlled and does not become a nuisance.**

#### **Policy #15**

**Operations at the pit will be complaint with the permissible noise limits determined through the Alberta Energy Regulator's Directive 038 Noise Control Guidelines and as measured at a surrounding dwelling would be:**

- **Daytime (7am – 10pm) = 55dBa Leq 1 hour;**
- **Nighttime (10pm – 7am) = 45dBa Leq 1 hour;**
- **Or 5dBa Leq 1 hour over ambient measurements as applicable.**

### **3.6 Air Quality Assessment and Control**

BURNCO has implemented the following measures to reduce dust generated from the operations:

- A 30km/hour speed limit is enforced in the stockpile area,
- A water truck will be available to water the extraction and processing areas as a means of reducing dust,
- During overburden stripping operations, the dust will be controlled by watering the work area as needed,
- All soil stockpiles will be seeded as soon as possible following construction,
- The disturbance associated with the excavation area will be kept to a minimum by progressively reclaiming mined out cuts thereby reducing the amount of wind borne dust generated from exposed areas,
- Each separate major component of the crusher (i.e., the cone, jaw and screen deck) will be enclosed by a sound and dust retarder blanket system.

In support of the Project, Matrix Solutions Inc. (Matrix) was retained to complete an air quality assessment to identify the potential effects and changes to ambient air quality due to the proposed project. A complete copy of the report is provided as part of BURNCO's Land Use Application. An overview of the results is as follows:

*The objective of this assessment is to assess the potential effects of the proposed Project on the ambient air quality in the region. The Project emissions interact with existing emissions from other sources in the region; therefore, the assessment considers the effect of nitrogen oxides (NOX), fine particulate matter less than 2.5 µm in diameter (PM2.5), total suspended particulates (TSP), and carbon monoxide (CO) emissions as a result of the Project, in combination with other regional sources.*

*The Alberta Ambient Air Quality Objectives (AAAQOs) were developed under the Environmental Protection and Enhancement Act (EPEA, R.S.A. 2000) to protect Alberta's air quality (AEP 2019a). The objectives refer specifically to ambient concentrations expressed in units of micrograms per cubic metre (µg/m3) and parts per billion (ppb). The objectives also represent a range of averaging periods that address potential short-term exposure responses (i.e., 1-hour or 24-hour) and/or long-term chronic exposures (i.e., 30-day or annual). The assessment considers both short- and long-term averaging objectives.*

Table 9: Alberta Ambient Air Quality Objectives (AAAQOs)

Substances	Averaging Period	AAAQO <sup>(a)</sup> ( $\mu\text{g}/\text{m}^3$ )
Nitrogen Dioxide ( $\text{NO}_2$ )	1-hour	300
	Annual	45
Fine Particulate Matter ( $\text{PM}_{2.5}$ )	24-hour	29
Total Suspended Particulates	24-hour	100
	Annual	60 <sup>(b)</sup>
Carbon Monoxide ( $\text{CO}$ )	1-hour	15,000
	8-hour	6,000

Notes:

a. Alberta Ambient Air Quality Objectives, AAAQO (AEP 2019a)

b. Calculated using the arithmetic mean concentration as a conservative approach.

### Background Air Quality

*Background concentrations represent contributions from sources not included in the modelling (such as naturally occurring sources, nearby non-industrial sources, and unidentified distant sources). The background concentrations were estimated using the methodology outlined in the AQMG, using data from two air quality monitoring stations based on the availability of continuous data.*

*The air quality in the Project region is monitored by continuous air quality monitoring stations operated by the Calgary Region Airshed Zone (CRAZ) and the Parkland Airshed Management Zone (PAMZ). The Caroline Station, operated by PAMZ, located 81 km north of the Project, was considered the most representative station for the Project and was used for ambient  $\text{NO}_2$  and  $\text{PM}_{2.5}$  concentrations. The Caroline Station is representative of the Project since it is surrounded by rural land, such as undisturbed land and agricultural land, and has limited anthropogenic emission sources in close proximity.  $\text{CO}$  is not monitored at the Caroline Station; therefore, the monitoring station used to represent  $\text{CO}$  was Calgary Varsity Station, located in the City of Calgary (36 km southeast of the Project) and operated by CRAZ.*

*Recent data were not available in the CRAZ or PAMZ monitoring networks for TSP, so  $\text{PM}_{2.5}$  data were assumed to be representative of this particulate size fraction.*

*The background concentrations were added to the calculated model background concentrations for each averaging period.*

*Air dispersion models provide a scientific means of relating air emissions to ground level pollutant concentrations at receptors by using complex mathematical equations that simulate transportation, dispersion, chemical transformation, and deposition processes.*

*The California Puff Dispersion Model (CALPUFF) is a non-steady-state puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation, and removal. The CALPUFF model is approved by the AQMG for refined assessments with potential long range (>200 km) impacts. For this assessment the CALPUFF model (version 7.2.1) was used in accordance with the AQMG to determine air quality changes for the Baseline Case, Project Case, and Application Case.*



*The assessment considers the contribution of existing and approved industrial sources within the Study Area (23 km × 23 km). These sources include major facilities in the Study Area, as well as smaller facilities and sand/gravel pits. Figure 4 shows the location of major emission sources in the Study Area. A list of existing and approved emission sources within the Study Area and their total NOX, PM2.5, TSP, and CO emissions by operator is presented in Table 3.*

*Emission information for existing and approved sources was obtained from an internal database of known emission sources including AEP and Alberta Energy Regulator licence information, approvals, and permits, and recent air quality assessments undertaken in the region. This database is routinely updated as new applications and licenses become available. Existing and approved sources included in the Study Area were identified by searching this database for facilities within the Study Area. In addition to the Matrix database, the IHS Markit database was also reviewed for additional facilities that are likely to have an impact on cumulative air quality in the Study Area (gas plants and processing facilities, sand/gravel pits, etc.).*

#### Application Case

*The operation of the Project will result in emissions of NOX, PM2.5, TSP, and CO from electrical generators, dirt work, crush plant operations, wash plant operations, gravel mining, and sales activity.*

The following standard BURNCO mitigations were then incorporated into the model:

- Crusher enclosures,
- Water spray bars,
- Dust control on haul roads and at Plant,
- Progressive reclamation,
- Berms and separation of operations from receptors.

*The Project emissions were modelled simultaneously and represent a maximum emission scenario. During an upset, such as an electrical generator malfunction, the emissions from the Project would be lower than those assessed during normal operation.*

The modeled concentrations provided in the report were as follows:

Figure 19: Maximum Predicted 1-hr Average NO<sub>2</sub> Concentration

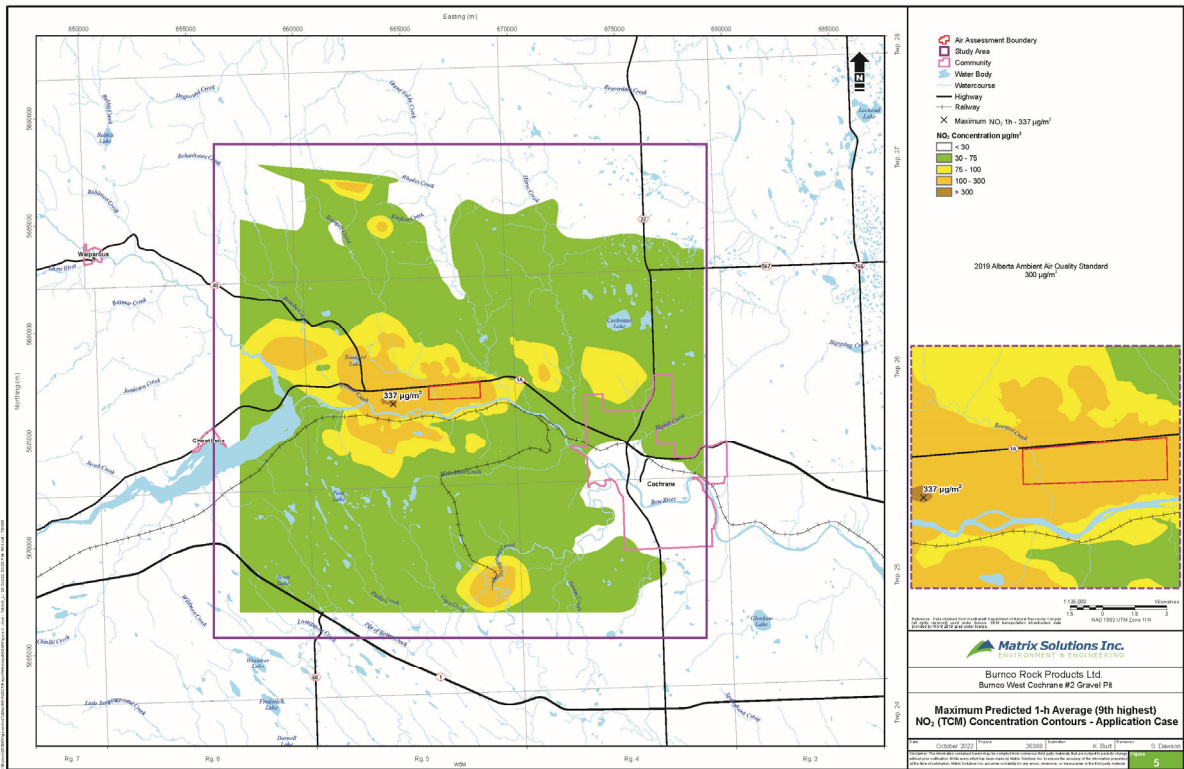


Figure 20: Maximum Predicted 24-hr PM<sub>2.5</sub> Concentration

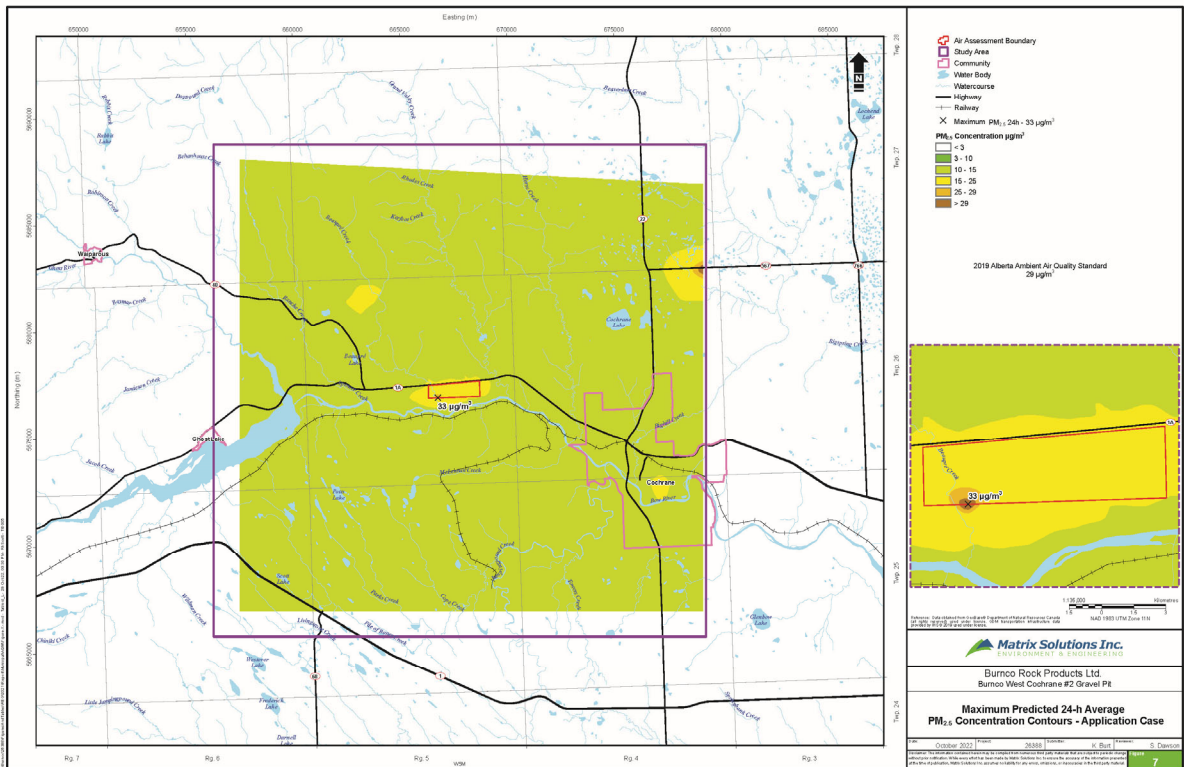


Figure 21: Maximum Predicted 24-hr TSP Concentration

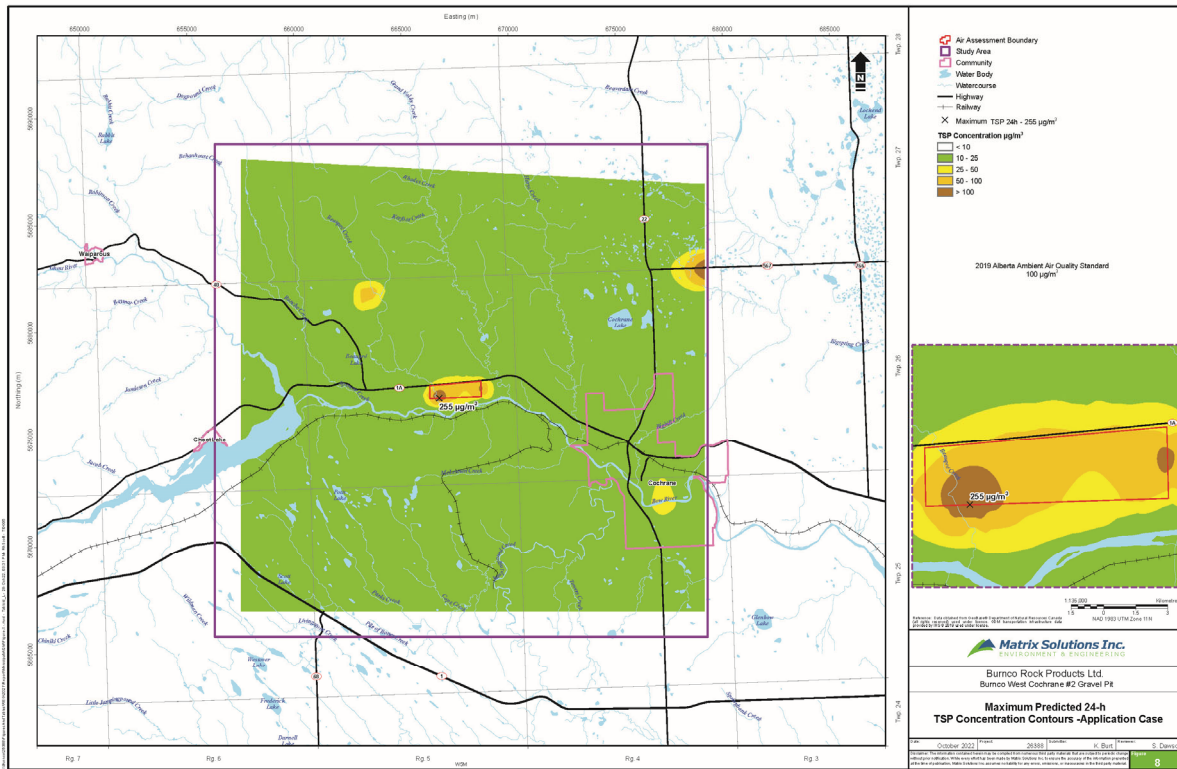
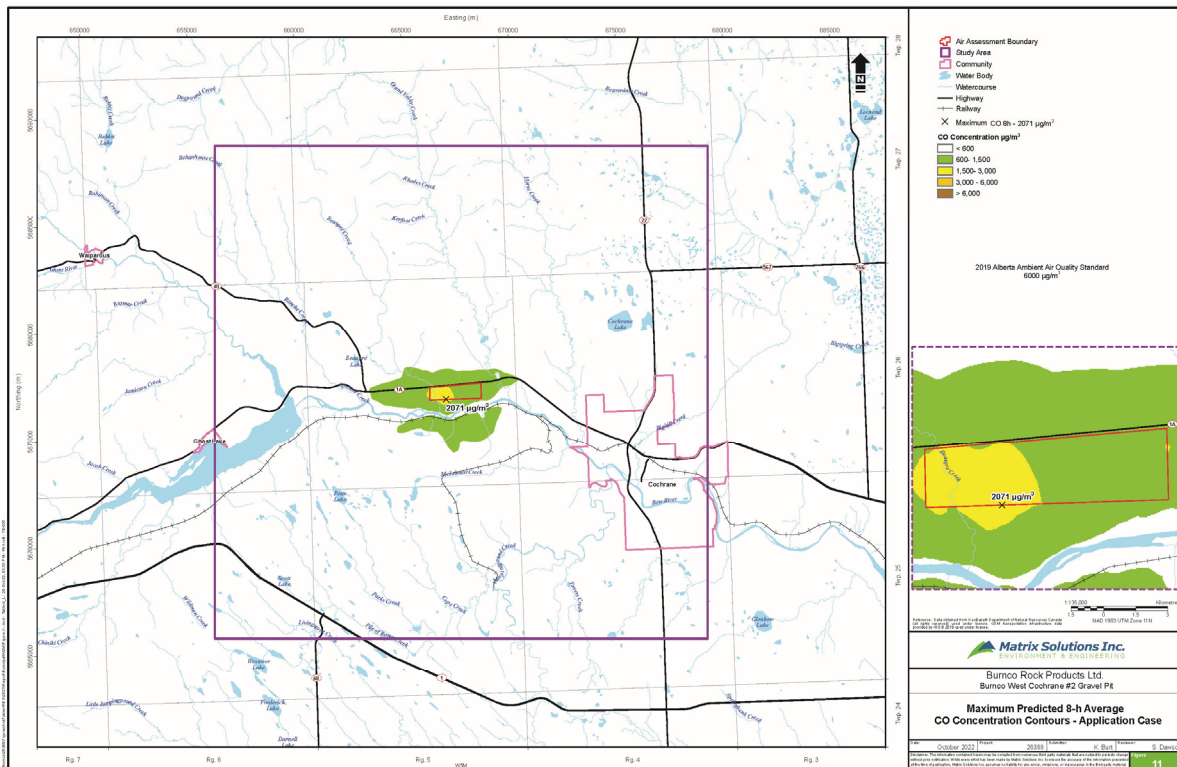


Figure 22: Maximum Predicted 8-hr Average CO Concentration



The report concluded as follows:

*An air quality assessment was conducted to identify the potential effects and changes to ambient air quality due to the proposed BURNCO expansion Project near Cochrane, Alberta. The assessment considered the Project emissions in combination with regional existing and approved emission sources of NO<sub>2</sub>, PM<sub>2.5</sub>, TSP, and CO. The air quality assessment considered worst-case emissions from the Project Area, following methodology consistent with the AQMG and using the CALPUFF dispersion model. Data from background air monitoring stations from PAMZ (Caroline) and CRAZ (Calgary Varsity) were used to represent ambient conditions.*

*The air assessment identified that emissions of NO<sub>2</sub>, PM<sub>2.5</sub>, TSP, and CO will be emitted from the Project site. Predicted results of the dispersion modelling show that maximum ground level NO<sub>2</sub>, PM<sub>2.5</sub>, annual TSP, and CO concentrations due to the Project Case will be below the applicable AAAQOs at the Air Assessment Boundary and beyond. In addition, the results from the Application and Baseline Cases also show that the maximum ground level concentrations of annual NO<sub>2</sub>, annual TSP, and CO will be below the applicable AAAQOs. While the results predict exceedances of 1-hour NO<sub>2</sub> and PM<sub>2.5</sub> in the Application and Baseline Cases, the maximum values are attributed to existing emission sources and not the Project.*

*Predicted maximum ground level concentrations of 1-hour TSP from the Project, Baseline, and Application Cases are above the applicable objectives. The actual impacts are expected to be below these predictions given the highly conservative assumptions used in the modelling, such as using 24 hours per day operations, and assuming the entire area of each Assessment Area will be excavated at one time. These conservative assumptions are primarily affecting emissions of particulate matter which have impacts to air quality that are local, short-term (will cease when operations are not occurring), and reversible when operations end. Impacts due to operations are considered very intermittent and conservative estimates were applied to operations and emissions which ultimately over-predicted worst-case potential of particulate impacts.*

*There is higher confidence in emissions estimated from combustion sources, such as the generators and vehicle emissions, as the combustion product emissions associated with fuel are well understood. There are higher uncertainties for emissions associated with dust generation such as earth movement, transport of materials, processing, and stock piling. As such, the probability of predictions at the boundary is higher for short-term durations, not as high for annual averages, and not for the entire duration of operations, whereas during most of the operations, mitigated measures will be monitored and used to reduce the surface dust generated.*

*Given the results of the modelling, and the conservative assumptions used, the operations for the BURNCO west operations are not expected to compromise the far field air quality in the area.*

Based on this modeling, it is BURNCO's belief that the Project will not create an adverse effect related to air quality. BURNCO is also committed to monitoring the site as necessary to ensure air for the area is not adversely affected. As required to meet Alberta ambient air quality objectives, BURNCO will utilize enhanced mitigation measures.

Such enhanced mitigations include:

- Additional dust control (sprinklers, more frequent water truck use, and dust suppressants),
- Reducing site activities during periods of poor air quality,
- Paving of the access road up to and including the scale facility,
- Additional vegetation planting around receptors.

With these enhanced mitigation options in place, BURNCO is confident that the site can be successfully operated to ensure compliance with Alberta ambient air quality objectives.

**Policy #16**

**BURNCO will follow the dust control measures detailed in the MSDP. In addition, BURNCO will utilize enhanced mitigation measure if necessary, to ensure that dust is reasonably controlled and does not become a nuisance.**

**Policy #17**

**Operations at the pit will be compliant with the Alberta Ambient Air Quality Objectives (AAAQO).**

### **3.7 Environmental Noise and Dust Monitoring**

At the present time, the existing gravel pit in NW13 is more than 1,700m from the nearest occupied residence. This will be the case for many years to come. Despite this, BURNCO will employ a full time noise and air quality monitoring station immediately upon commencing operations associated with this site. This station will monitor noise and air quality 24 hours per day and 365 days per year. It will be utilized for the life of the project. The placement of this full time monitoring station will be as determined by Rocky View County as part of the Development Permit process.

**Policy #18**

**BURNCO will provide full time noise and air quality monitoring at this site.**

At all times, the following protocol shall be employed in the case of noise or dust complaints received by BURNCO from nearby residents:

- BURNCO will investigate the complaint,
- BURNCO will make reasonable steps to address the complaint if it is determined that the site is the source of the complaint,
- In all instances, BURNCO will respond to the complainant within 24 hrs. This response will include the results of BURNCO's investigation, and any actions taken. This response will be provided in writing.

**Policy #19**

**BURNCO will follow the complaint response protocol provided in the MSDP related to noise and dust complaints.**

### **3.8 Groundwater Assessment and Security**

#### **3.8.1 Existing Water Licenses & Approvals**

BURNCO currently holds two water licenses to allow for gravel washing. These utilize water diverted from the Bow River. The diversion for these licenses will be located in SE

13-26-5 W5M and will provide a source of water for gravel washing and dust control. BURNCO also holds an approval for aggregate extraction below the water table at the existing gravel pit in NW13. Finally, BURNCO has received an approval to address all other water related items for the current, proposed, and future phases of the pit. This includes changes to site drainage, excavation into the groundwater table, and the potential for indirect impacts to wetlands. Copies of the existing authorizations and the application have been provided as part of BURNCO's Land Use Application.

- License No. 00396954-00-00 Aggregate Washing - 44 acre-feet (55,507 m<sup>3</sup>)
- License No. 00396952-00-00 Aggregate Washing - 67 acre-feet (83,260 m<sup>3</sup>)
- Approval No. 00430788-00-00 Aggregate Extraction Below Water Table (bailing)
- Approval DAUT0014236 Dewatering + All Aspects

### 3.8.2 Dewatering Activities

BURNCO is proposing excavation of sand and gravel from within an unconfined groundwater aquifer. Some of the gravel onsite is below the water table. In order to recover these resources, BURNCO will dewater these zones to allow for mining. The thickness of saturated gravel has been mapped across the project site using water elevation data and modeling of the gravel deposit as was detailed in Section 2.7 of this report. Depth of saturated gravels are expected to range from 0 to 2 m.

In support of this requirement, Matrix examined the volume of water necessary for dewatering the zones of saturated gravel.

*The overall drainage strategy for the site during mining is to capture stormwater runoff from mining areas (contact water) in the dewatering excavation pits and pump this stormwater to a dedicated recharge pond. Groundwater inflows to mining areas will also be collected in the dewatering excavation pits and pumped to the recharge pond. The recharge pond will be sized to accommodate stormwater runoff volumes from a 1:10 year, 24-hour design storm event plus pit water that would be pumped from the dewatering pit. No direct discharge of contact water is planned. Overland flows from upstream sources (non-contact water) will be directed around active mining operations using interceptor ditches and/or berms.*

*West Cochrane #2 Gravel Pit assumes a contributing runoff area of 25 ha (equivalent to the size of the two largest two adjoining phases on the west side + 10%) and a maximum saturated depth of 2 m (equivalent to the highest saturated depth in any mine phase on the west side of Grand Valley Creek and therefore the highest possible groundwater inflow rate in the western portion of the site). This scenario was analyzed using PCSWMM with one 150-mm (6-inch) pump (maximum rate of 0.032 m<sup>3</sup>/s, giving a maximum daily diversion rate of 2,765 m<sup>3</sup>/day).*

*These results provide the expected maximum diversion rates assuming that the initial dewatering as well as six months of ongoing dewatering would occur in the same year, based on the expected maximum groundwater inflow rates.*

Table 10: Maximum Annual Groundwater Diversion Volume



Pond	Maximum Annual Groundwater Diversion Volume (m <sup>3</sup> )		
	During Initial Dewatering Phase	During Ongoing Mining (Assuming 6 months of dewatering)	Total
West Recharge Pond	244,486	123,100	367,586

*The model indicates that a recharge pond with a base area of 8,100 m<sup>2</sup> (assuming 4:1 (H:V) side slopes) would be sufficient to handle both pumped groundwater inflows and runoff from the 1:10 year, 24-hour storm on the west side of Grand Valley Creek.*

*The recommended minimum recharge pond size, based on the modelling scenario outlined above, is summarized below.*

Table 11: Recharge Pond Design

Depth (m)	Area (m <sup>2</sup> )	Volume (m <sup>3</sup> )	Notes
West Recharge Pond - 90 m × 90 m bottom; Sideslope (H:1V): 4			
0	8,100	0	Bottom
0.5	8,836	4,234	
1.0	9,604	8,844	Design Depth
1.5	10,404	13,846	Freeboard

### 3.8.3 Impact Assessment (Matrix)

Section 2.6, 2.7 and 2.8 addressed existing site conditions and the available baseline data collected in relation to the project. The Matrix assessment also included a review of potential impacts of aggregate mining operations on surrounding groundwater sources and surface water.

The majority of the site is expected to have little or no groundwater. Many of the drill holes completed by BURNCO were dry. The saturated gravel thickness map shows that areas with groundwater are limited. Further, that these areas are expected to be a significant distance from nearby water users. The evaluations by Matrix concluded as follows:

*Turbid (high TSS and turbidity) surface water, as a result of gravel pit operations, entering the groundwater flow system will be naturally filtered by the sand and gravel deposits, and therefore, have limited impact on groundwater quality. Although possible but very unlikely, turbid surface water in the mining area if directly in contact with highly fractured permeable zones within the bedrock could potentially impact groundwater. However, given the lack of evidence of these highly fractured bedrock zones, groundwater flow velocity, travel distance from mine operations to surface water bodies, and adherence to the code of practise for gravel pit operations, the risk of turbid surface water to adversely impact groundwater quality any appreciable distance (100 m) or nearby natural surface water bodies is low. Groundwater monitoring at spring locations and groundwater wells will be conducted in the operational areas to confirm groundwater quality.*

*Due to the generally low saturation and shallow water table (near the base of the gravel), dewatering at site may be limited. Water well records also indicate that the wells in the vicinity of the site are completed in bedrock aquifers at various depths. Dewatering of the saturated gravels at site is not expected to impact users in the area. A bailing strategy for resource removal will likely result in higher total suspended solids compared to dewatering. Potential environmental impacts can be eliminated or minimized with engineering controls implemented at construction and as part of ongoing operations.*

*Potential impacts of future aggregate operations on nearby groundwater and surface water diversions are expected to be minimal with best management practices.*

### **3.8.4 Impact Assessment (SLR)**

Sections 2.6, 2.7 and 2.8 addressed existing site conditions. In addition to the assessment completed by Matrix, SLR was retained to conduct a secondary water resource assessment. This assessment was done to address issues raised by intervenors during BURNCO's application process.

*The natural groundwater quality in and around the pit is typical of groundwater quality in this part of Alberta. Some parameters are naturally elevated. No real pattern of elevated concentrations is seen downgradient of the pit. Turbidity is high in the groundwater monitors, but that appears to be related to monitor construction and sampling techniques which agitate the water. Appendix G provides an assessment of how turbidity would migrate in the groundwater from an active pit that is in contact with the water table. The assessment considers the settlement of fines and the rate of groundwater flow as determined for this site and concludes that the average migration distance would be about 40 m, based on the smallest silt size particle.*

*Turbidity has been measured in groundwater samples taken from various groundwater monitors surrounding this site. Measured values are high both upgradient of the site (that is, in areas unaffected by the presence of the pit) and downgradient of the site. This is largely due to the design of these groundwater monitors, which allow the egress of fines into them, coupled with the agitation created by sampling. Thus, they are not representative of actual turbidity in the ground water and can be misleading to the casual observer. Part of the proof lies in the water chemistry determined in the springs downhill from the pit. Matrix reports that the turbidity at the NE springs along Grand Valley Creek was 0.04 to 0.5 NTU on May 10, 2022.*

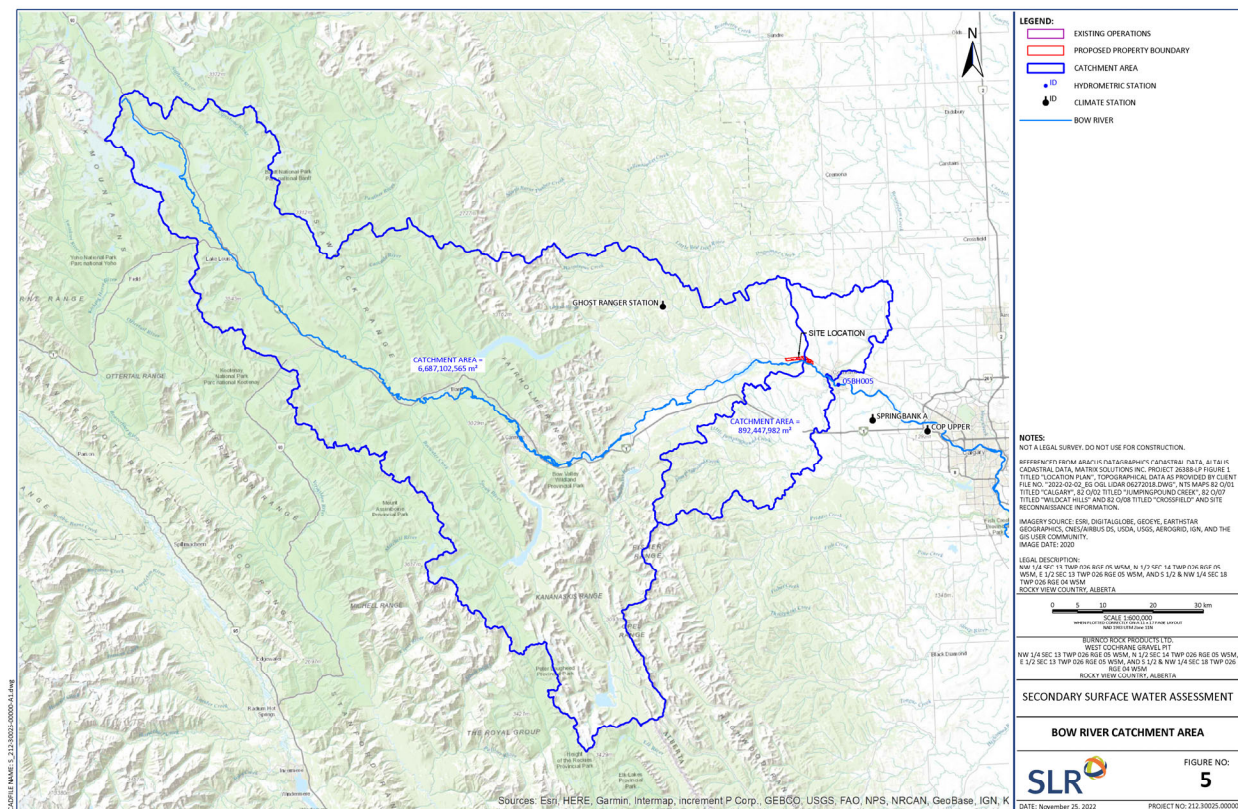
*It is useful to examine the implications of any potential impacts to groundwater receptors. Around the existing pit, groundwater travels laterally either to the Grand Valley Creek or to the Bow River. These water courses are permanently flowing streams and derive their own water quality from the kilometres the water has traversed to reach the area of the BURNCO property. A simple calculation of groundwater flow volumes, calibrated against groundwater recharge informs the relatively small contribution this site has. Based on the measured hydraulic conductivity (K) of 5.2 m/day measured in the area at monitor MW12-2, a gradient (i) of 0.009 m/m, and a cross-sectional area (A), the overburden groundwater flow (Q) to the Grand Valley Creek may be determined. Assuming a saturated thickness*

of 1 m and a breadth of flow of 120 m from the groundwater divide to the north site boundary, the cross-sectional area is 120 m<sup>2</sup>. Applying Darcy's Principle,  $Q = KiA$ , a flow of  $5.2 \times .009 \times 120 = 5.6$  m<sup>3</sup>/day can be calculated. This is about 0.065 L/s, which is only 0.1% of the average baseflow in the creek measured in December 2021 (55 L/s, Section 3.4).

To test this theoretical estimate, one can estimate the recharge in the pit area, as to how much water the site is contributing, and to calibrate the estimated flow. Based on **Error! Reference source not found.** in Section 4.2.2, the average annual recharge rate through the silt and clay cap is 8 mm/yr. This, however, only happens over 120 days of the year (Figure B, Section 4.2), so the rate works out to 0.067 mm/day for that period. A contributing recharge volume may be calculated by multiplying the recharge by the 36,000 m<sup>2</sup> site area west of the eastern property line (and north of the groundwater divide). This yields 2.4 m<sup>3</sup>/day, which is just under 0.03 L/s, and although low, it is comparable to the 0.065 L/s determined above. We conclude from this simple calculation that the site contributes a very small amount to the flow in the Grand Valley Creek, which has a catchment area (and therefore groundwater recharge area) of over 350 km<sup>2</sup>.

Finally, one has to consider that once the pit is open the recharge rate increases to 28 mm/day from 8 mm/day, and thus the site contribution temporarily rises from 0.03 L/s to 0.11 L/s. Nonetheless this suggests a dilution factor of about 500 times.

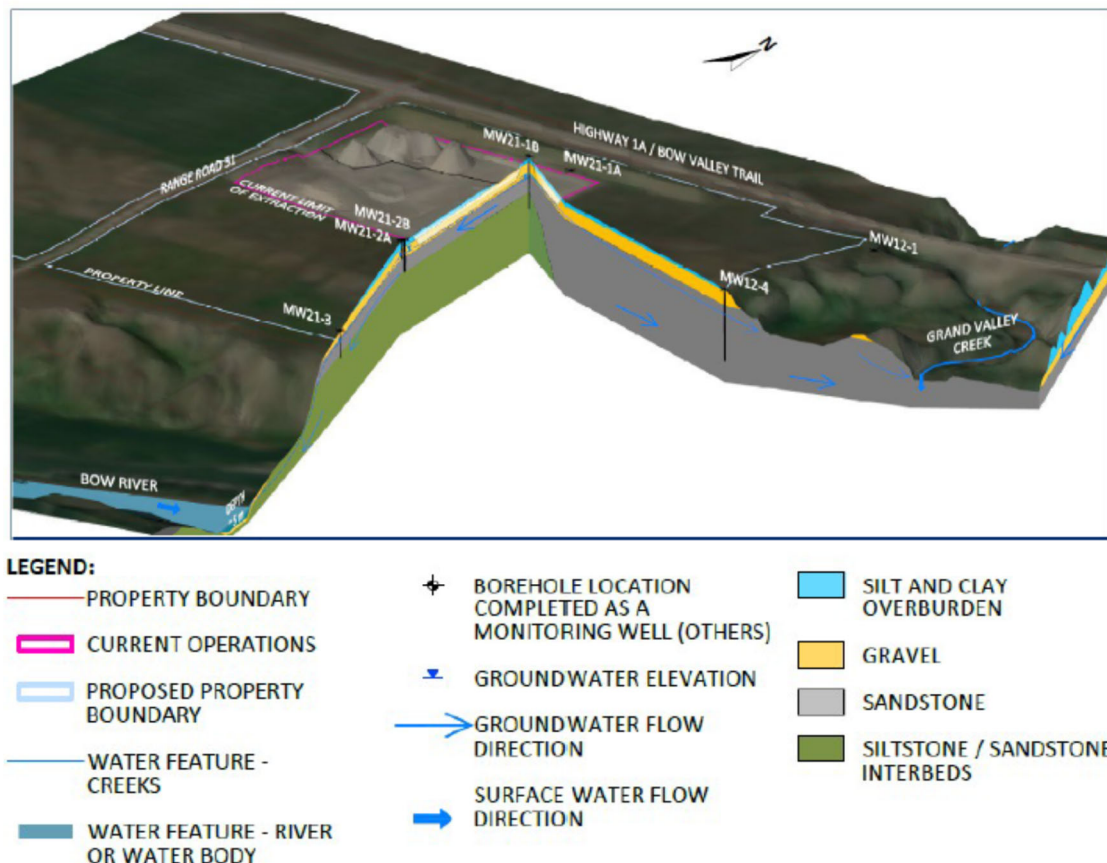
Figure 23: Bow River Catchment Area



The same approach can be taken for the Bow River, and it can be found that the existing site passes about 0.6 L/s under the site, which pales in comparison to even the low flow of 35,000 L/s in the Bow River (Section 3. 4). Once the site is developed over to Beaupre Creek, open site areas are never higher than 280,000m<sup>2</sup>, since rehabilitation of mined out areas will have progressively occurred. By pro-rata the most groundwater that passes under the site in this fashion would be less than 5 L/s, the dilution by the Bow River remaining overwhelming (about 7,000 times).

One final note to consider is the existing groundwater quality in comparison to the receiving streams. Sampling in the creek and river in December 2021 established typical surface water quality in this baseflow time of the year. In the Bow River, there is no appreciable difference between the upstream water quality and the downstream water quality. In the Grand Valley Creek, water quality concentrations actually decline from upstream to downstream, perhaps the clean groundwater from both sides dilutes the water quality that may be affected by the highway or other upstream sources.

Figure 24: SLR Conceptual Site Model



It could be argued that these positive observations may be due to the fact that the existing pit has not yet penetrated the water table. It is possible to examine the possible effect using the most onerous water quality concentrations found near the pit and performing a mass balance with the river. This was done for Total Dissolved Solids (TDS), found at 182 mg/L in the Bow River, and 474 mg/L measured at



*MW 21-2a just downgradient from the pit. Due to the relative contributions of groundwater (0.6 L/s) and surface water (35,000 L/s), no appreciable change was found. This same calculation was done for the creek where the contributions are closer (55 L/s in the creek, but 0.11 L/s coming from groundwater from the pit). The TDS of 306 mg/L in the upstream surface water would only increase to 306.3 mg/L, which is virtually immeasurable.*

*The nature of these results is overwhelming and demonstrate how implausible it is that the pit could affect surface water resources. No wells are present downgradient of the proposed extraction areas.*

### **3.8.5 Groundwater Monitoring**

As detailed in Approval DAUT0014236, BURNCO will follow the following protocol for monitoring groundwater.

#### Baseline Water Monitoring

In addition to the baseline information collected on the existing and future monitoring well locations and identified springs, BURNCO will complete a baseline monitoring program for any existing residential water well located within 400m of the project boundary if requested by the owner.

Such baseline water monitoring shall be completed by a third party-party consultant and for a period of two (2) years which will include the following:

- A two-hour pumping test will be completed to characterize groundwater flow rates in relation to aquifer drawdown. These pumping tests will be completed once at the start of the baseline testing program.
- Automatic water level recorders will be installed at each water well to determine the baseline water levels and seasonal fluctuations. Water levels will be collected for a period of two years and downloaded bi-annually.
- Groundwater samples will be collected to characterize the water quality, including hydrocarbons, dissolved metals, general chemistry parameters and turbidity. Samples will be collected bi-annually for a period of two years (4 samples per location).

#### Ongoing Water Monitoring

During operation of the West Cochrane Gravel Pit, BURNCO will monitor groundwater water levels and quality. GrandThis will include:

- Sand and gravel water table levels: automatic water level recorders will be installed at two (2) locations in the sand and gravel aquifer: one (1) monitoring location up-gradient from the excavation area; and one (1) monitoring location down-gradient from the excavation area;
- Bedrock water table levels: automatic water level recorders will be installed at two (2) locations in the bedrock aquifer: one (1) monitoring location up-gradient from the excavation area; and one (1) monitoring location down-gradient from the excavation area;

- Turbidity: Two (2) full-time turbidity monitors (Seametrics Turbo Logger 400NTU) will be installed onsite. One (1) will be located up-gradient of the current disturbance area and one located down-gradient (1).

For clarity, this commitment applies to both planned excavation areas (east of Grand Valley Creek and west of Grand Valley Creek) and so will involve twelve (12) monitoring instruments when operations are going on either side of Grand Valley Creek. These monitoring locations will also be selected and adapted in conjunction with pit progress. As new phases are developed, monitoring locations will be moved in conjunction to ensure that groundwater is being monitored up-gradient and down-gradient from the mining area.

As part of this ongoing monitoring, BURNCO will retain a third-party consultant to collect the following ongoing groundwater information in conjunction with the above instrumentation installations:

- Automatic water level recorders will be maintained at each monitoring location to monitor water levels and seasonal fluctuations. Data will be collected twice a year;
- Automatic turbidity monitors will be maintained at each monitoring location to monitor water levels and seasonal fluctuations. Data will be collected twice a year;
- Groundwater samples will be collected at each monitoring location to characterize the water quality, including hydrocarbons, dissolved metals, general chemistry parameters and turbidity. Such sampling and testing will be completed twice a year;
- Monitoring data shall be compiled into a database and statistical methods such as Control Charting and trend analysis will be utilized to capture any changes from baseline conditions.

This monitoring program will ensure that groundwater resources in the area are not being impacted by the gravel pit.

#### **Policy #20**

**BURNCO will complete a baseline monitoring program for any residential water well located within 400m of the project boundary if requested by the owner.**

#### **Policy #21**

**BURNCO will follow the groundwater monitoring program detailed in the MSDP and as required by DAUT0014236. Such monitoring will include continuous monitoring at no less than 4 locations. Monitoring will be done upgradient and downgradient of the excavation area for both the unconfined and confined aquifers (sand and gravel, bedrock). Monitoring will also include quality testing and analysis to capture any changes from baseline conditions.**

### **3.8.6 Groundwater Security**

Should any nearby water well users indicate to BURNCO that they believe their water supply has been negatively impacted due to the gravel mining operation, BURNCO will proceed as follows:

- BURNCO will investigate, as soon as practicable, the written complaint alleging the Gravel Pit operation has caused the reported surface water or groundwater interference.



- If the Complaint is related to disruption of water to a residence such that the residence is without potable water, then BURNCO will provide an alternative source of water for use in residential needs within 48 hours of receiving the Complaint. BURNCO shall continue to supply this alternative water until resolution of the complaint has been completed.
- Within a commercially reasonable timeframe of receiving the Complaint, to provide complainant with a written report containing the following:
  - description of the complaint;
  - detailed complaint investigation notes;
  - conclusion as to whether surface water or groundwater interference has occurred, and whether such interference has occurred as a result of the Gravel Pit operation; and
  - if interference has occurred as a result of the Gravel Pit operation, recommendations for remediation and/or mitigation of the impact(s), which may include among other recommendations:
    - lowering the intake of the pump to compensate for a drop-in water level;
    - re-drilling the water well to an increased depth so as to allow the pump to be installed at a lower depth;
    - drilling a new well; or
    - providing an alternate water supply.

In the event a complaint report concludes that surface water or groundwater interference has occurred as a result of the Gravel Pit operation, BURNCO shall be responsible to remediate and/or mitigate such interference at BURNCO's sole cost and expense. Such recommendations for remediation and/or mitigation shall be discussed and agreed between the Parties acting reasonably.

Policy #22
<b>BURNCO will follow the complaint protocol provided in the MSDP related to groundwater security.</b>

### 3.8.7 Groundwater Closure

Based on the advanced level of planning and mitigations, it is BURNCO's belief that the Project will not create an adverse effect related to Groundwater. BURNCO notes that:

- The groundwater resources on the site are well known with a significant network of monitoring wells and data going back to 2012;
- Multifaceted mitigation planning in place as detailed below;
- Thorough review of groundwater planning including assessment by **two** third party consulting firms;
- Public notice on water act submission and thorough review by the Town of Cochrane and the City of Calgary;
- A robust groundwater monitoring plan already in place and operating using advanced techniques and equipment;
- A equally robust commitment to groundwater security for neighbors; and
- Full review of these plans by Alberta Environment and securement of all necessary permits and authorizations.

Groundwater risk and mitigations have been thoroughly reviewed at this site. BURNCO's approach was developed in conjunction with two third party consulting firms. The associated water act application was advertised publicly and was reviewed carefully by the Town of Cochrane and the City of Calgary. BURNCO is following a multifaceted approach to groundwater protection at this site. Some key highlights include:

- An Erosion and Sediment Control (ESC) Plan in place for all site activities;
- A Stormwater Management Control Plan in place for all site activities;
- A Hazardous Waste Plan including secondary containment;
- All necessary *Water Act* and *Environmental Protection and Enhancement Act* approvals in place from Alberta Environment prior to Rocky View County decision;
- Dewatering approach to mining (no equipment operating within actual groundwater);
- A hydraulic conductivity layer left a pit bottom to provide filtration and ensure future movement of groundwater;
- A robust groundwater monitoring and reporting plan using advanced techniques and equipment;
- A groundwater security commitment for neighbors;
- Establishment of appropriate setbacks from surface riparian zones;
- Full review of these plans by Alberta Environment and securement of all necessary permits and authorizations.

With this planning and oversight in place, BURNCO is confident that the site can be successfully operated and will not have an adverse effect on groundwater resources.

#### **Policy #23**

**BURNCO will follow the groundwater planning, mitigations, and commitments as detailed in the MSDP and in BURNCO's Provincial permits.**

### **3.9 Traffic Impact Assessment and Control**

BURNCO expects to continue utilizing Range Road 51 to access Highway 1A for the duration of the site activities. This intersection was upgraded to a Type IVB standard in 2018.

#### **Policy #24**

**BURNCO will continue to utilize the upgraded intersection at Range Road 51 and Highway 1A for all activities associated with the West Cochrane #2 Gravel Pit.**

#### **3.9.1 Traffic Impact Assessment**

In 2013 a Traffic Impact Assessment (TIA) was submitted by Scheffer Andrew Ltd. on behalf of BURNCO Rock Products Ltd. This TIA was utilized to determine that an upgrade was required at the intersection of Range Road 51 and Highway 1A. The TIA determined that a Type IVb intersection was required to facilitate the development and any additional road usage. After acceptance from Rocky View County and Alberta Transportation (through a Roadside Development Permit), the intersection was upgraded in 2018. A Final Acceptance Certificate (FAC) for this intersection was received by BURNCO in January

2020. A copy of the TIA, FAC, and Roadside Development Permit and is provided as part of BURNGO's Land Use Application.

In support of this application, Scheffer Andrew Ltd. conducted a 2021 review of the 2013 TIA. This technical memo is provided as part of BURNGO's Land Use Application. It concludes:

*We have reviewed our 2013 TIA for the site, and the current traffic volumes on Highway 1A as reported by Alberta Transportation. Our review shows that background traffic growth on Highway 1A has been slower than what was assumed in 2013. In addition, BURNGO has confirmed that the maximum number of trips assumed to be generated by the pit development in 2013 are still valid. For these two reasons, the intersection layout, intersection capacity, and intersection lighting warrant calculations from the 2013 TIA are still valid today.*

As the commencement of operations for West Cochrane #2 is expected in 10 years, a TIA will be undertaken at that time to ensure that the completed road upgrades at Range Road 51 and Highway 1A remain sufficient.

#### **Policy #25**

**BURNGO will update the TIA for Range Road 51 and Highway 1A prior to commencement of site activity for West Cochrane #2 Gravel Pit as part of the DP process.**

### **3.9.2 Haul Safety**

All drivers are required to follow the BURNGO trucking policy to ensure BURNGO safety standards as well as the public's expectations are met. Drivers must always practice responsible driving habits and maintain a good driving record. As with all BURNGO operations, company employees and independent truckers involved in the hauling of aggregate must meet three criteria:

- Safety – only the highest standard of safety is appropriate to safeguard the public, the driver's peers and the driver,
- Legality – all federal, provincial and municipal laws and regulations must be followed as well as BURNGO's own regulations,
- Efficiency – the least time-consuming, safe and legal haul route must be taken.

Each spring, independent truckers wishing to work for BURNGO must register themselves and their vehicles by providing, among other things, proof of proper insurance, registration, vehicle safety inspection, and coverage by the Workers Compensation Board.

#### **Policy #26**

**BURNGO will follow the protocol provided in the MSDP related to haul safety.**

### **3.9.3 Haul Monitoring**

BURNGO participates in the Alberta Sand and Gravel Association (ASGA) truck registry program to help monitor trucks. The registry works in the following manner:

- The truck registry requires all gravel truck operators to display a four-digit number, and the phone number 1-866-901-ASGA (2742),

- If someone feels the truck is not operating in a safe and courteous manner, they can phone the complaint line and register a complaint,
- All complaints received via this number are documented and relayed to the producer (i.e. BURNCO) the truck is registered with.

The producer then follows up on the complaint to ensure it is resolved. With the truck registry, BURNCO is informed of any problems that are occurring on the haul route and can resolve them promptly.

#### **Policy #27**

**BURNCO will follow the protocol provided in the MSDP related to haul monitoring.**

### **3.10 Storm Water**

Matrix Solutions Inc. (Matrix) was retained to complete a Stormwater Management Plan (SMP) for the Project. A complete copy of the Matrix report can be found in BURNCO's Land Use Application. Section 2.5 addressed existing site conditions. The Report included a review of appropriate management measures. The following is the conclusion from the report:

*All stormwater runoff from mining areas (contact water) will be collected in dewatering excavation pits located within the mining area and will be pumped to a dedicated recharge pond located a sufficient distance away to allow for groundwater infiltration.*

*Overland flows from upstream sources (non-contact) will be directed around active mining operations using interceptor ditches and/or berms.*

*Adequate setback distances will be maintained from Beaupre Creek as well as the one unnamed watercourse identified near the Disturbed Area. Culverts of adequate capacity will be provided through the visibility berm in several locations, to convey the 1:100-year design flows.*

#### **Policy #28**

**BURNCO will ensure that regional stormwater flows (non-contact) are directed around active mining operations wherever feasible.**

#### **Policy #29**

**BURNCO will ensure that stormwater from the active mining area (contact) is collected and not discharged from the site.**

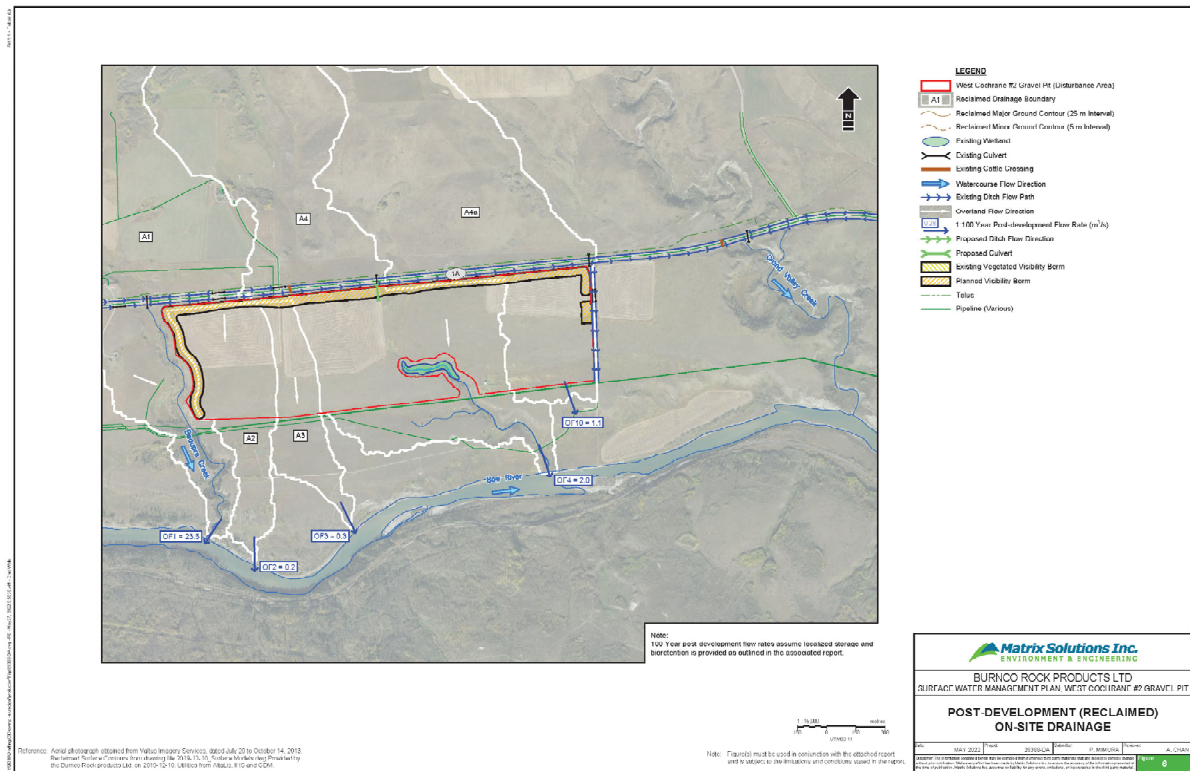
*In the final reclaimed condition, the drainage patterns are expected to have minimal impact on the surrounding area, provided the following recommendations are implemented:*

- *Because visibility berms will remain in place, the proposed culverts must be adequately sized and adequately maintained to ensure upstream flows can continue to flow through the project area after mining is completed.*
- *To ensure that post-development runoff rates are equal to or less than pre-*

- *The site will not be uniformly graded; local depressions and undulations will be provided to attenuate post-development flows and provide hydraulic grade control.*
- *The local depressions and undulations are critical in areas A2 and A4, where the onsite drainage areas have increased. Specific volume targets have been provided for these areas in Table 20.*



Figure 26: Post Development Drainage



### 3.11 Vegetation and Wildlife Controls

Matrix Solutions Inc. (Matrix) was retained to complete a Biophysical Impact Assessment (BIA) for the Project area, to assess potential impacts to the biophysical resources and recommend mitigation measures to minimize potential impacts. Section 2.2 addressed existing site conditions. The Assessment also included a review of appropriate mitigation measures which shall be observed during site operations.

Setbacks and Restricted Activity Periods apply to environmentally sensitive resources identified during the field surveys. They are based on federal, provincial, and county regulatory requirements as well as professional judgement. Matrix developed the following in relation to this project:

Table 13: Table of Setback and Restricted Activity Periods

Environmental Sensitivity	Setback and Restricted Activity Periods	Regulatory Requirement
Red-tailed Hawk Nest	<ul style="list-style-type: none"> <li>100 m setback (year-round)</li> </ul>	<ul style="list-style-type: none"> <li><i>Alberta Wildlife Act</i> (setback supports due diligence but is not specifically stated in the Act)</li> </ul>
Bald Eagle Nest	<ul style="list-style-type: none"> <li>1,000 m setback (year-round)</li> </ul>	<ul style="list-style-type: none"> <li><i>Alberta Wildlife Act</i> (setback supports due diligence but is not specifically stated in the Act)</li> </ul>
Amphibian Breeding Ponds <sup>1</sup>	<ul style="list-style-type: none"> <li>100 m setback from the edge of a breeding pond</li> <li>May require setbacks if activity is in the breeding period (April 1 to July 1)</li> <li>May require setbacks if young are present (setbacks in effect to October 1)</li> </ul>	<ul style="list-style-type: none"> <li><i>Alberta Wildlife Act</i> (setback supports due diligence but is not specifically stated in the Act)</li> <li>SARA - depending on species identified (setback supports due diligence but is not specifically stated in the Act)</li> </ul>
Key Wildlife and Biodiversity Zone	<ul style="list-style-type: none"> <li>RAP = December 15 to April 30</li> </ul>	<ul style="list-style-type: none"> <li><i>Wildlife Act</i> (RAP supports due diligence but is not specifically stated in the Act)</li> </ul>
Migratory Bird	<ul style="list-style-type: none"> <li>RAP = April 15 to August 31</li> </ul>	<ul style="list-style-type: none"> <li><i>Migratory Birds Convention Act</i></li> <li><i>Wildlife Act</i> (RAP supports due diligence but is not specifically stated in the Act)</li> </ul>
Wetland Setbacks	<ul style="list-style-type: none"> <li>6 m (year-round)</li> </ul>	<ul style="list-style-type: none"> <li><i>Alberta Wetland Policy</i> (setback supports due diligence but is not specifically stated in the Policy)</li> <li><i>Alberta Water Act</i> (setback supports due diligence but is not specifically stated in the Act)</li> </ul>
Riparian Areas	<ul style="list-style-type: none"> <li>30 m setback</li> </ul>	<ul style="list-style-type: none"> <li><i>Rocky View Land Use Bylaw</i></li> <li><i>Policy 419: Riparian Protection Policy</i></li> </ul>
Watercourses	<ul style="list-style-type: none"> <li>60 m from Bow River and Grand Valley Creek</li> <li>30 m from all other watercourses</li> </ul>	<ul style="list-style-type: none"> <li><i>Code of Practice for Pits</i></li> <li><i>Fisheries Act</i> (setback supports due diligence but is not specifically stated in the Act)</li> </ul>
Fish and Fish Habitat Setbacks	<ul style="list-style-type: none"> <li>RAP = September 16 to April 15 - within banks (to top of bank) of all watercourses except U-WC2 and U-WC3 (as they do not have defined bed and banks)</li> <li>For U-WC2 and U-WC3 drainage must be maintained and mitigation measures utilized to ensure no sedimentation of the watercourse</li> </ul>	<ul style="list-style-type: none"> <li><i>Fisheries Act</i> (RAP supports due diligence but is not specifically stated in the Act)</li> <li><i>Water Act</i>- This RAP is specific to the Class C watercourses</li> </ul>

These setbacks and restricted activity periods were applied to the project mapping and provided the following figures:

Figure 27: Applicable Riparian Setbacks

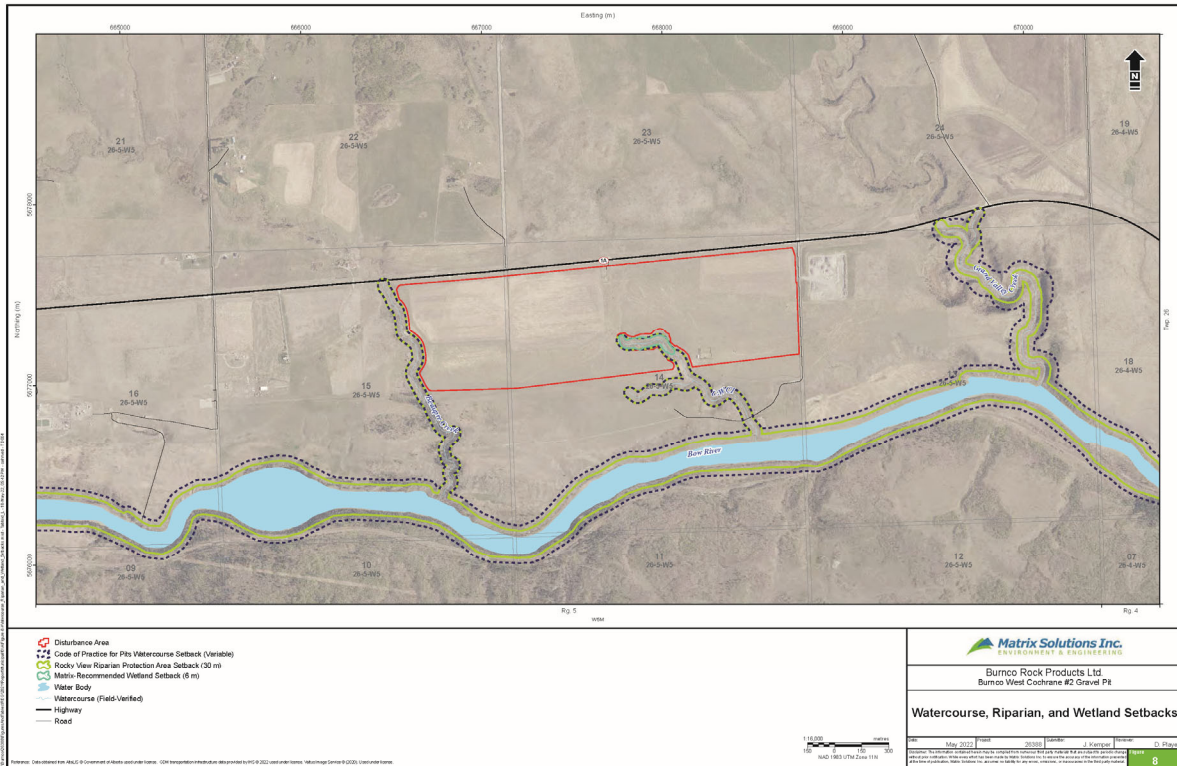
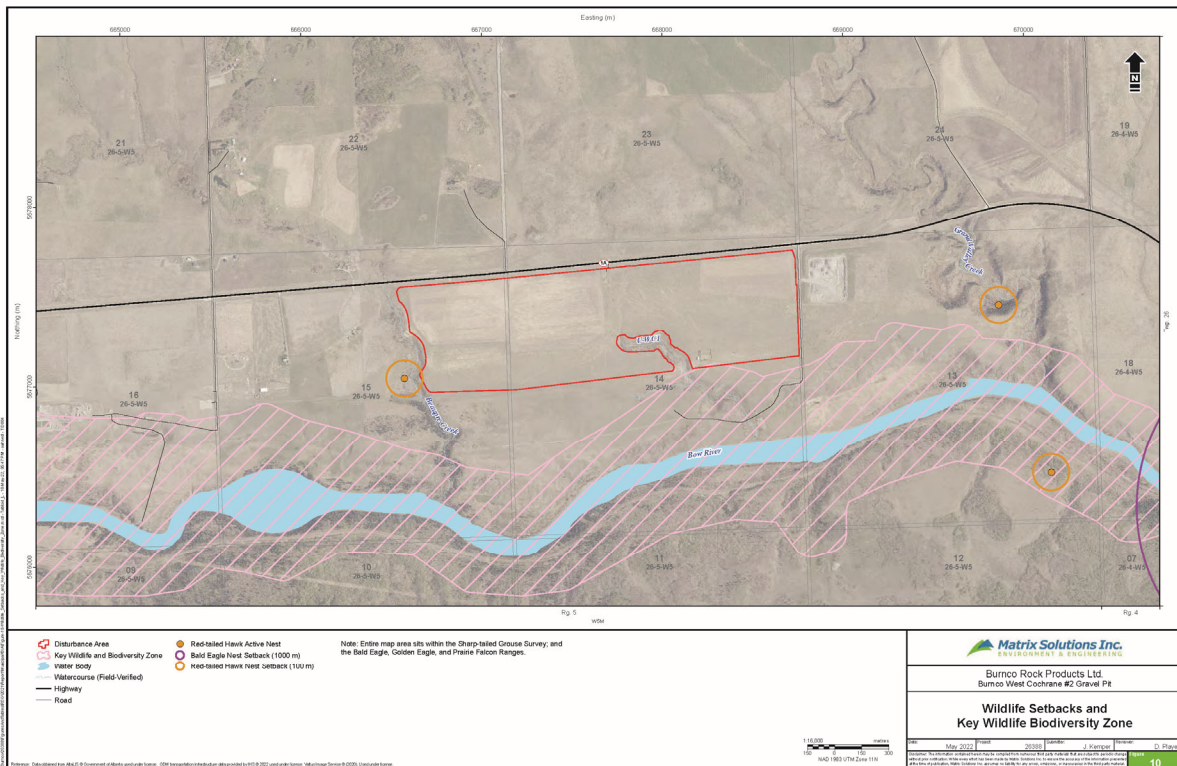


Figure 28: Applicable Wildlife Setbacks





For riparian setbacks, mine planning was permanently adjusted to incorporate the necessary setbacks from water courses, riparian areas and wetlands. Disturbance limits were adjusted to ensure these setbacks were met.

The report went on to complete an impact assessment and cumulative effect review for the following items:

- Geology,
- Hydrology, Soils and Topography,
- Vegetation and Wetlands,
- Wildlife and Wildlife habitat,
- Fish and Fish Habitat.

*The potential environmental effects of Project construction and operation were predicted, based on experience with previous gravel pits as well as experience gained through assessment of other Projects with similar environmental conditions.*

*Effects are considered to occur where anticipated future conditions resulting from the Project differ from the conditions otherwise expected from natural change, before mitigations are applied. Residual effects are those effects that remain after mitigation measures have been implemented.*

<b>Policy #32</b>
<b>BURNCO will follow the setback requirements identified in the MSDP in relation to wildlife, wetlands, riparian areas and watercourses.</b>

<b>Policy #33</b>
<b>BURNCO will follow the wildlife mitigation measures detailed in the MSDP.</b>

A summary of the mitigation measures that will be implemented to minimize Project related impacts is provided below.

Table 13: Potential Vegetation and Wildlife Impacts, Mitigation Measures, and Residual Effect

Valued Ecosystem Component	Potential Impact	Mitigation Measures	Residual Effects
Vegetation and Wetlands	Rare Plants and Rare Communities	<ul style="list-style-type: none"> <li>Based on the timing of future construction, additional rare plant surveys may be required.</li> <li><u>In the event that</u> rare plants or rare ecological communities are discovered during construction, work will be stopped, and the Construction Supervisor Environmental Advisor will be contacted. Mitigation measures will be implemented as <u>required, and</u> may include avoidance or transplanting.</li> </ul>	Direction: Negative Magnitude: High Duration: Long-term Frequency: Isolated Extent: Project Area Reversibility: Irreversible Probability: Low Confidence: High  Residual Effect: Not significant
Vegetation and Wetlands	Weeds	<ul style="list-style-type: none"> <li>Access work areas from approved areas.</li> <li>Ensure vehicles and equipment are cleaned before being allowed onsite.</li> <li>Restrict vehicle access over newly seeded areas.</li> <li>Monitor the disturbed areas for weeds and work with landowners to apply control measures if required.</li> <li>Weed control and management will be performed during construction activities to prevent prohibited or noxious weeds from being introduced or spread.</li> </ul>	Direction: Negative Magnitude: Low Duration: Long-term Frequency: Isolated Extent: Project Area Reversibility: Reversible in the <u>short term</u> Probability: High Confidence: High  Residual Effect: Not significant
Wildlife and Wildlife Habitat	Wildlife habitat loss/alteration	<ul style="list-style-type: none"> <li>Construction of new phases will commence outside of the migratory bird RAP, between April 15 and August 31 (ECCC 2018) where possible.</li> <li>If construction must take place within the migratory bird RAP, a nest sweep will be completed prior to vegetation clearing to limit the risk of impacting nesting wildlife.</li> <li>In the event an active nest is found, site-specific mitigation measures should be developed (e.g., clearly marked species specific buffer around the nest or non-intrusive monitoring). Relocate nests following consultations with applicable regulators.</li> <li><u>In the event that</u> wildlife and/or specific wildlife habitat features are identified during construction/operations, the</li> </ul>	Direction: Negative Magnitude: Low Duration: Long-term Frequency: Continuous Extent: Project Area Reversibility: Reversible in the medium to long-term Probability: High Confidence: High  Residual Effect: Not significant
Valued Ecosystem Component	Potential Impact	Mitigation Measures	Residual Effects
		<ul style="list-style-type: none"> <li>Implement immediate action to control, contain, recover and clean up any release.</li> </ul>	
Vegetation and Wetlands	Vegetation	<ul style="list-style-type: none"> <li>Follow existing roads and overlap cultivated land, minimizing the Project footprint where possible.</li> <li>Maintain compatible vegetation or vegetated ground mat, to the extent practical.</li> <li>Maintain native ground cover where possible.</li> <li>Implement progressive reclamation.</li> <li>During weed control, reduce uncontrolled overspray and unnecessary damage to native vegetation and/or cultivated land.</li> </ul>	Direction: Negative Magnitude: High Duration: Long-term Frequency: Continuous Extent: Project Area Reversibility: Reversible in the medium to long-term Probability: High Confidence: High  Residual Effect: Not significant
Vegetation and Wetlands	Riparian Areas	<ul style="list-style-type: none"> <li>No aggregate development shall be located within the County's Riparian Protection Areas (Rocky View County 2019).</li> <li>Riparian areas will include a 30 m buffer from the center of the watercourse (60 m from bank for Bow River).</li> <li>Demarcate the riparian area using flagging tape or other visual marker <u>as a means to</u> alert construction traffic to the presence of the <u>riparian, and</u> identify a no driving zone.</li> </ul>	If setbacks are adhered to, there will be no residual effects.
Vegetation and Wetlands	Wetlands	<ul style="list-style-type: none"> <li>Wetlands will be avoided.</li> <li>Maintain compatible vegetation or vegetated ground mat, to the extent practical, particularly within the wetland buffer.</li> <li>Install erosion control measures upslope of wetlands.</li> <li>Demarcate the wetland using flagging tape or other visual marker <u>as a means to</u> alert construction traffic to the presence of the <u>wetland, and</u> identify a no driving zone.</li> <li>The recommended 6 m buffer around the wetlands will not be encroached upon.</li> <li><u>In the event that</u> wetlands will be impacted, a <i>Water Act</i> application and associated wetland assessment will be completed.</li> </ul>	If setbacks are adhered to, there will be no residual effects.



Valued Ecosystem Component	Potential Impact	Mitigation Measures	Residual Effects
		<p>features should be <u>flagged</u> and the appropriate mitigation developed, which may require consultation with AEP.</p> <ul style="list-style-type: none"> <li>Progressive reclamation will occur once phases are depleted and mining operations within that phase is no longer feasible.</li> <li>Footprint avoids of riparian areas.</li> <li>Mining activities will not take place along the areas immediately adjacent to the Bow River (Figure 1).</li> <li>Install erosion/sedimentation control along fences adjacent to riparian areas and wetlands.</li> <li>Based on the timing of future construction, follow-up surveys may be required.</li> </ul>	
<b>Wildlife and Wildlife Habitat</b>	Sensory Disturbance	<ul style="list-style-type: none"> <li>Construction of new phases will commence outside of the migratory bird RAP, between April 15 and August 31 (ECCC 2018) where possible.</li> <li>If construction must take place within the migratory bird RAP, a nest sweep will be completed prior to vegetation clearing to limit the risk of impacting nesting wildlife.</li> <li>In the event an active nest is found, site-specific mitigation measures should be developed (e.g., clearly marked species specific buffer around the nest or non-intrusive monitoring). Relocate nests following consultations with applicable regulators.</li> <li>In the event that wildlife and/or specific wildlife habitat features are identified during construction/operations, the features should be <u>flagged</u> and the appropriate mitigation developed, which may require consultation with Rocky View County and AEP.</li> <li>Maintain a 1,000 m buffer from the bald eagle nest when active.</li> <li>Monitor the bald eagle nest twice per breeding season, until activity is scheduled to start within the 1,000 m buffer, to track activity of the nest, and note successful breeding within the nest.</li> <li>Construct additional nesting platforms further from the site to encourage use by the bald eagles.</li> </ul>	<p>Direction: Negative  Magnitude: Low  Duration: Long-term  Frequency: Continuous  Extent: Outside Project Area  Reversibility: Reversible in the medium to long-term  Probability: High  Confidence: High</p> <p>Residual Effect: Not significant</p>
Valued Ecosystem Component	Potential Impact	Mitigation Measures	Residual Effects
		<ul style="list-style-type: none"> <li>Once activities commence within the 1,000 m buffer, monitor the nest for activity during construction and operations.</li> <li>If the nest continues to be active and activity is planned to start within the buffer area, additional consultation may be required with AEP.</li> <li>If construction occurs within the amphibian breeding season and within the 100 m of any riparian areas or wetlands amphibian surveys will be completed. If amphibians are identified, a setback from the breeding pond will be determined in discussion with BURNCO and AEP.</li> <li>Make efforts to conduct construction during daylight hours to minimize noise disturbance to wildlife during dawn and dusk.</li> <li>Reduce noise levels of activities, whenever possible, and ensure that noise abatement equipment is in good working order.</li> <li>Based on the timing of future construction, follow-up surveys may be required.</li> </ul>	
<b>Wildlife and Wildlife Habitat</b>	Barriers to movement	<ul style="list-style-type: none"> <li>For work that is required in the KWBZ, construction of new phases will not occur between December 15 to April 30.</li> <li>Footprint avoids of riparian areas.</li> <li>Mining activities will not take place along the areas immediately adjacent to the Bow River within the KWBZ (Figure 11).</li> </ul>	<p>Direction: Negative  Magnitude: Low  Duration: Long-term  Frequency: Continuous  Extent: Project Area  Reversibility: Reversible in the long-term  Probability: High  Confidence: High</p> <p>Residual Effect: Not significant</p>
<b>Wildlife and Wildlife Habitat</b>	Potential for direct mortality	<ul style="list-style-type: none"> <li>If a SAR is encountered in the Project Area and there is potential for direct mortality, cease construction activities until consultation has occurred with AEP, and appropriate mitigation measures have been implemented (e.g., setbacks, timing restrictions).</li> <li>Construction of new phases will commence outside of the migratory bird RAP, between April 15 and August 31 (ECCC 2018), where possible.</li> </ul>	<p>Direction: Negative  Magnitude: Low  Duration: Long-term  Frequency: Continuous  Extent: Outside Project Area  Reversibility: Reversible in the medium to long-term  Probability: Low</p>

Valued Ecosystem Component	Potential Impact	Mitigation Measures	Residual Effects
		<ul style="list-style-type: none"> <li>If construction must take place within the migratory bird RAP, a nest sweep will be completed prior to vegetation clearing to limit the risk of impacting nesting wildlife.</li> <li>In the event an active nest is found, site-specific mitigation measures should be developed (e.g., clearly marked species specific buffer around the nest or non-intrusive monitoring). Relocate nests following consultations with applicable regulators.</li> <li>In the event that wildlife and/or specific wildlife habitat features are identified during construction/operations, the features should be <u>flagged</u> and the appropriate mitigation developed, which may require consultation with AEP.</li> <li>If sensitive amphibians are identified within the construction area and work will occur when young are present, install silt fence around the wetland and salvage and move the amphibians that are in the construction area to a suitable habitat.</li> <li>Investigate the possibility of installing wildlife crossing signs at points along the highway where the east and west boundaries of the site are located.</li> <li>Advise personnel to follow speed limits to improve road safety and reduce risks of wildlife mortality.</li> <li>Lower speeds during periods of reduced visibility.</li> <li>Attempt to limit traffic during periods where wildlife <u>tend</u> to be most active (i.e., dawn and dusk) to reduce the risk of wildlife mortality.</li> <li>Do not harass, feed, or interact with wildlife.</li> <li>Ensure proper containers are provided for garbage and ensure regular facility maintenance to prevent accumulation of garbage on the ground.</li> <li>Carry a spill kit and report any vehicle or equipment leaks to the appropriate authority.</li> <li>Appropriate spill kits will be provided for any onsite fuel storage tanks.</li> </ul>	<p>Confidence: High</p> <p>Residual Effect: Not significant</p>
Valued Ecosystem Component	Potential Impact	Mitigation Measures	Residual Effects
		<ul style="list-style-type: none"> <li>Do not refuel vehicles or equipment within 100 m of a wetland or riparian area.</li> <li>If immobile machinery is required to be within 100 m of the riparian area (e.g., pumps), then they should be placed in an isolated area within secondary containment capable of containing all fluids in said machinery.</li> </ul>	
<b>Fish and Fish Habitat</b>	Use of industrial equipment near watercourse that could result in deleterious substances entering the watercourses	<ul style="list-style-type: none"> <li>All machinery working near water will be cleaned and free of debris and organic matter before entering the construction site.</li> <li>All machinery and vehicles will be <u>refuelled</u> a minimum of 100 m away from the watercourse.</li> <li>If immobile machinery is required to be within 100 m of the watercourse (e.g., pumps), then they should be placed in an isolated area within secondary containment capable of containing all fluids in said machinery.</li> <li>Any equipment (personal protective equipment, fisheries equipment) used within Beaupre Creek, Grand Valley Creek or the three Unnamed Watercourses must be cleaned and disinfected according to the standards provided in the <i>Interim Guidelines for the Disinfection of Fisheries Equipment to Reduce the Spread of Whirling Disease in Southern Alberta</i> (AEP 2016).</li> <li>A site-specific spill response plan will be developed before construction occurs.</li> </ul>	<p>Direction: Neutral Magnitude: Negligible Duration: Immediate Frequency: Incidental Extent: Outside Project Area Reversibility: Reversible immediately Probability: Low Confidence: High</p> <p>Residual Effect: None</p>
<b>Fish and Fish Habitat</b>	Change in sediment concentrations resulting in poor visibility and altered food sources	<ul style="list-style-type: none"> <li>Implement setbacks as specified in Table 12.</li> <li>Develop and implement an ESC Plan addressing each watercourse if activities occur within the setbacks.</li> <li>Maintain and inspect ESC measures frequently to ensure effectiveness.</li> </ul>	<p>Direction: Neutral Magnitude: Negligible Duration: Immediate Frequency: Incidental Extent: Outside Project Area Reversibility: Reversible immediately Probability: Low Confidence: High</p> <p>Residual Effect: None</p>

Valued Ecosystem Component	Potential Impact	Mitigation Measures	Residual Effects
Fish and Fish Habitat	Potential mortality of fish and eggs resulting from deposition of sediment	<ul style="list-style-type: none"> <li>Implement setbacks as specified in Table 12.</li> <li>Develop and implement an ESC Plan addressing each watercourse if activities occur within the setbacks.</li> <li>Maintain and inspect ESC measures frequently to ensure effectiveness.</li> </ul>	Direction: Neutral Magnitude: Negligible Duration: Immediate Frequency: Incidental Extent: Outside Project Area Reversibility: Reversible immediately Probability: Low Confidence: High Residual Effect: None

The Report concluded as follows:

*Valued Ecosystem Components (VECs) within the Project Area were identified during desktop and field assessments. Activities related to the Project were determined and potential impacts of those activities on VECs were identified.*

*Mitigation measures identified in this report are based on information collected during field surveys, best management practices, regulatory requirements for setbacks and RAPs and professional judgement.*

*The Project will have no residual impacts on geology, wetlands, riparian areas or fish and fish habitat if mitigation measures are implemented. The Project will have residual impacts to hydrology, soils, vegetation, rare plants, weeds, and wildlife. These impacts are considered not significant if mitigation measures are implemented. No cumulative impacts are expected for any of the VECs within the Project Area or within the VEC spatial boundary.*

*BURNCO will be implementing progressive reclamation during the course of the Project, which will reduce the duration of an impact, as well as the amount of area being impacted. Progressive reclamation also contributes to reducing cumulative effects of the Project.*

### 3.12 Hazardous Waste Plan

All fuel storage sites will be constructed in a manner that follows the *Guidelines for Secondary Containment for Above Ground Storage Tanks*, Alberta Environmental Protection, May 1997, and comply with Part 4 of the *Alberta Fire Code 2006* for tank registrations. A bermed imperviously lined area, or other form of secondary containment, will surround fuel tanks with a minimum 110% holding capacity of the largest tank's capacity. Any spills within or beyond the bermed area of the above ground storage tanks will be controlled immediately using various techniques including diking and containing. Any spills will be collected using sorbent pads and vacuum trucks.

Materials such as oil, lubricants, glycols, etc. that are stored on-site will be labeled according to the Workplace Hazardous Materials Information System (WHIMIS) regulations and will be suitably contained. No waste material will be imported into the pit. All waste material generated from pit operations will be collected and stored in approved containers. This waste material will then be hauled on a regular basis to an approved landfill for proper disposal. Burial of waste will be prohibited during all phases of the operation. Portable sanitary facilities will be located on site. All sanitary waste will be hauled to an approved waste management treatment facility.

#### Policy #34

**BURNCO will follow the hazardous waste plan in the MSDP.**



### 3.13 Erosion and Sediment Control

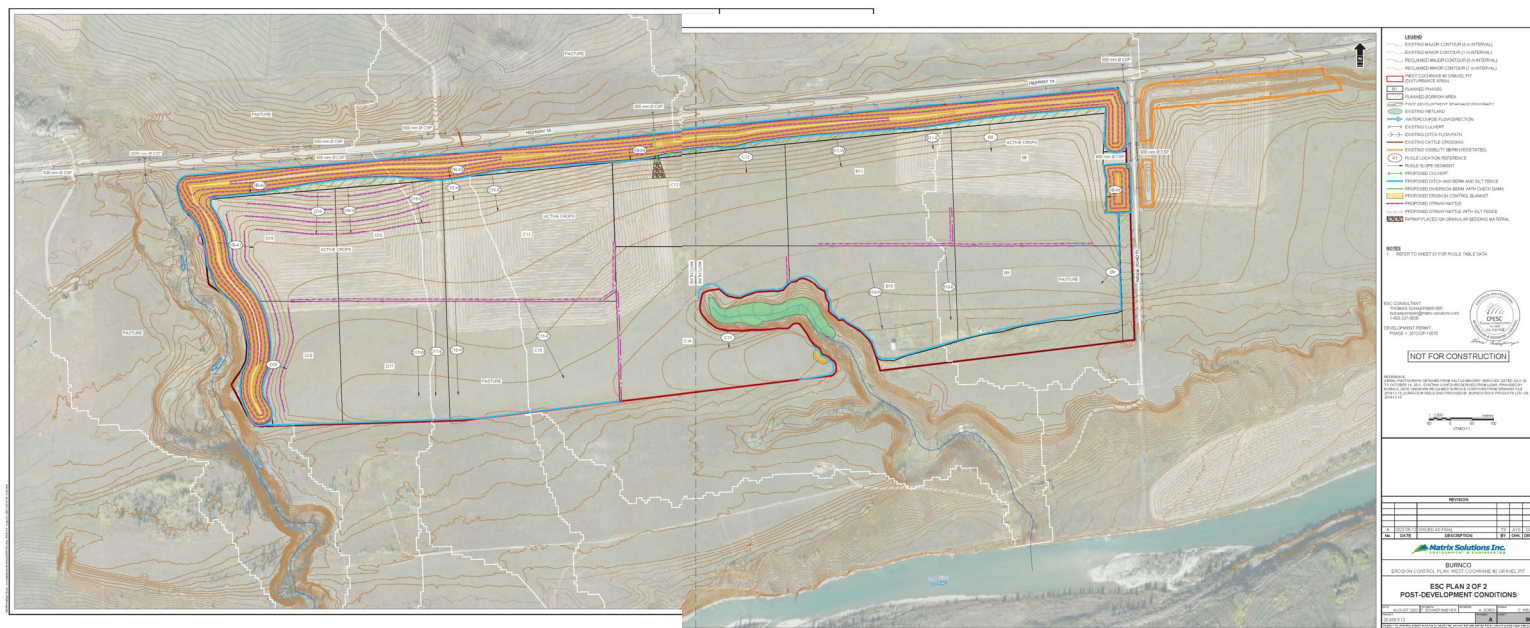
In support of the Project, Matrix Solutions Inc. (Matrix) was retained to complete an Erosion and Sediment Control Plan for the Project area. This assessment is provided as part of BURNCO's Land Use Application. It includes the following components:

- A site description and identification of erosion and sediment control areas of concern,
- A description of erosion and sediment control measures to be implemented, and appropriate maintenance and repair requirements,
- Inspection, maintenance and record keeping procedures,
- Post-construction monitoring,
- A sample erosion and sediment control inspection form.

A summary of the mitigation measures that will be implemented to minimize Project related impacts is provided below.

<b>Policy #35</b>
<b>BURNCO will follow the erosion and sediment control measures in the MSDP.</b>

Figure 29: ESC Plan



*ESC measures are proposed for installation as the phase enters active pit operation. Removal of ESC measures is proposed after re-establishment of vegetation.*

*Drainage patterns must be reasonably returned to existing or pre-development conditions to prevent problematic drainage issues when landscape alterations occur. Preferable drainage patterns include effective infiltration and temporary storage in small depressions, which is supported by proper ESC measures. The purpose of this ESC plan is to support proposed restored drainage patterns to ensure there is no risk of sediment laden drainage entering adjacent sensitive/protected watercourses.*

### 3.14 Landscaping and Site Screening

One of the key development strategies for this site in mitigating noise and visual impacts is the development of a suitable screening berm along west, north, and east portions of the Project. As described in Section 3.3, these screening berms will be developed based on milestones tied to progress of the mining areas.

In support of the Project, Matrix Solutions Inc. (Matrix) was retained to complete a Visual Impact Assessment. The assessment was conducted to identify the potential impact of the project development to the visual resources in the area.

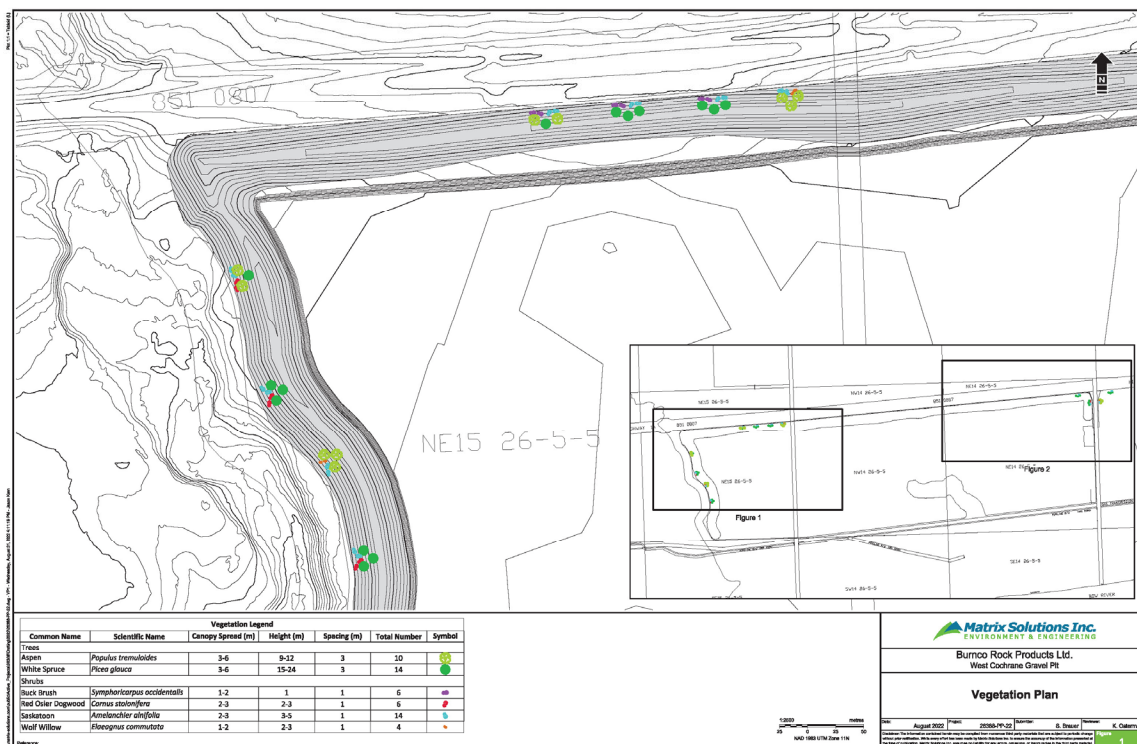
Visual resources are defined as the landforms, vegetation, water surfaces, and cultural modifications (physical changes caused by human activities) that give the landscape its visual qualities. A visual resources assessment is the study of the perception of the landscape (both aesthetic and scenic qualities) by the users of the landscape and how this perception may change with new cultural modifications (USDI 1986 a,b).

In order to enhance the appearance of the facility and reduce the impact on neighboring tenants, Matrix created a planting and maintenance plan for a visual screen adjacent to the proposed gravel pit. Rocky View County advises that screening be considered for certain development activities to manage the aesthetics of the landscape.

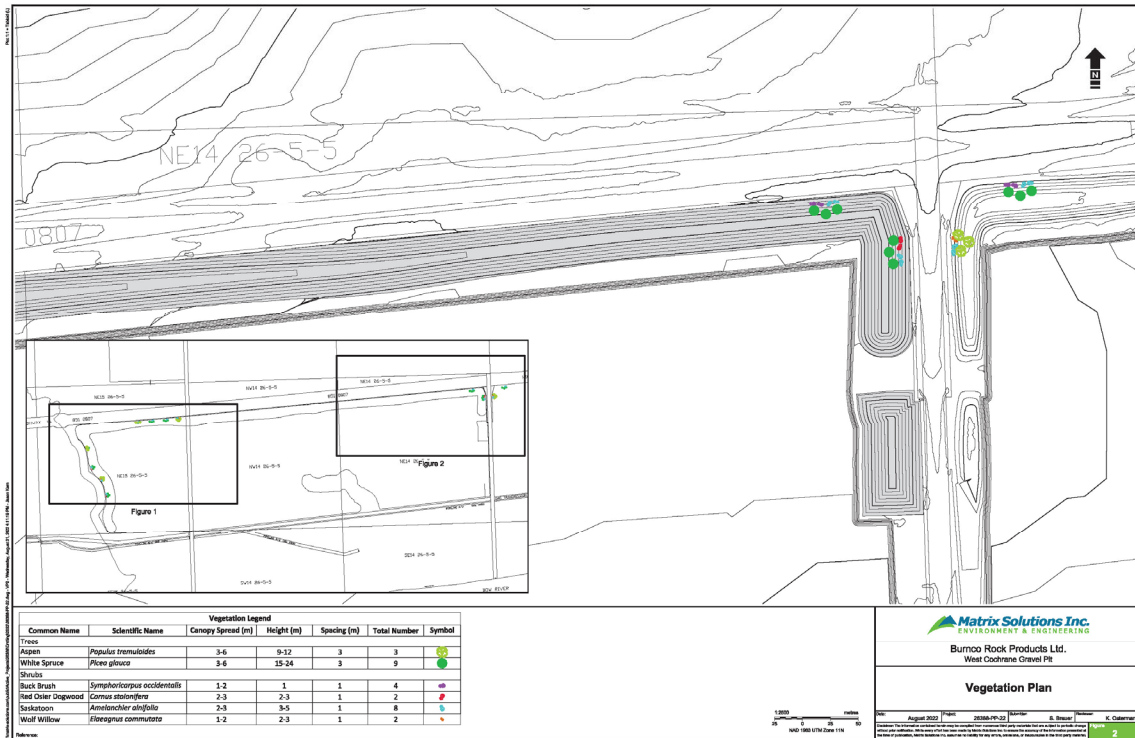
#### Policy #36

**BURNCO will follow the development and planting plan for the screening berm as provided in the MSDP. This will include the proposed berm enhancements.**

Figure 30: Visual Impact Assessment – Planting Plan







As further enhancement to the Matrix plan, BURNCO will also include additional planting blocks as follows. This planting blocks will involve berm contouring to improve visual appeal and will include additional tree planting as shown.

Figure 31: Enhanced Planting Locations

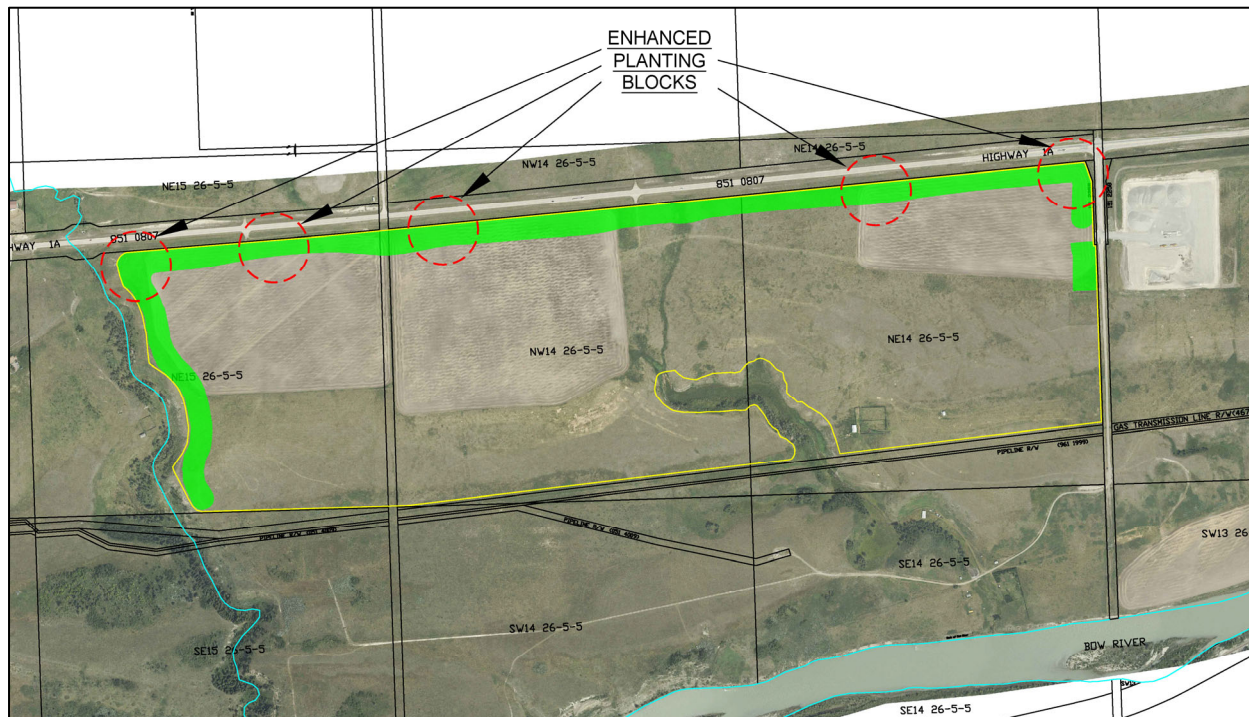
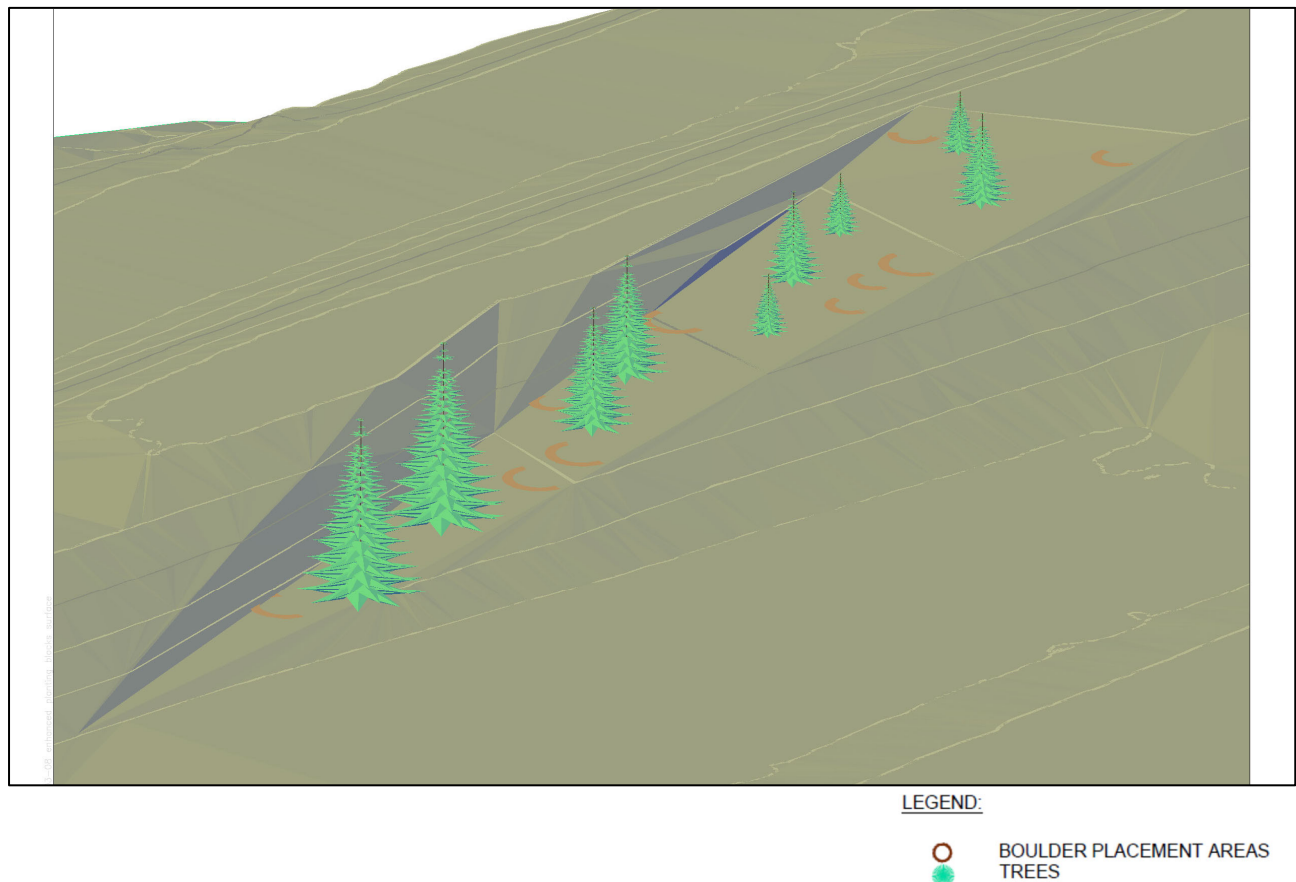


Figure 32: Enhanced Planting Detail



In addition to the above planning, Matrix evaluated the visual impact to receptors. Viewshed analysis was completed for all receptors and three-dimensional (3D) visual modelling was completed for a selection of locations to support the viewshed analysis and impact assessment. All analyses were conducted using ArcGIS, Version 10.7 (ESRI 2022), with the Spatial and 3D Analyst extensions, unless indicated otherwise.

*A total of 26 receptors were identified in the Study Area (Figure 4). These receptors have been grouped in two peripheral clusters to the west and northwest (Clusters A and B, respectively) and a central set of receptors (nominally referred to here as Cluster X). Additionally, a large section of Highway 1A is located within the Study Area, as well as a small portion of Highway 40.*

*For all 26 point receptors, the visible area was quantified for both the Existing Conditions and Full Site Mined models, calculating the total Disturbance Area and percentage of the Disturbance Area that is visible from that each receptor. Additionally, Matrix calculated the total Study Area visible before and after mitigation and a percentage loss in total Study Area viewshed (Table 1). Within Cluster A, the receptor with the highest quantitative Full Site Mined model viewshed values (generally correlating to highest impact) is A09. None of the receptors in Cluster B have any view into the Project before or after the disturbance.*

*Out of 26 total receptors, 16 receptors did not have a view into the Disturbance Area in the Existing Conditions model case. One of these receptors (X01) is located within 1.6 km of the Disturbance Area.*

Of the remaining ten receptors:

- One receptor (X02) currently has less than 10% of the Disturbance Area in view. This receptor is located within 1.6 km of the Disturbance Area.
- Six receptors (A08, X03 to X06, and X10) have greater than 10% of the Disturbance Area in view in Existing Conditions model, but proposed berms have reduced this to less than 10% of the Disturbance Area in view. Of these, six receptors (X03 to X06, and X10) are located within 1.6 km of the Disturbance Area.
- Three receptors (A09, X07, and X09) have greater than 10% of the Disturbance Area in view and proposed berms have not reduced this to less than 10% of the Disturbance Area in view. Of these, only one receptor (X07) is located within 1.6 km of the Disturbance Area.

For all receptors, Matrix evaluated the amount of reduction of Study Area viewable from the receptor. In almost all cases, the total loss in viewshed is under 10%; the exceptions being the three nearest receptors (X04, X05, and X06) to the Disturbance Area.

The line of sight analysis helps to illustrate the mitigative value provided by the berm design and planting plan. These features should provide significant screening capability for public traveling at road level and to nearby residents. Due to topography, it is not possible to fully screen operations from some residential receptors located around the development due to their significantly higher elevation, but the berm and planting will still provide some level of visual mitigation to these locations.

Figure 33: Visual Impact Assessment – Receptor Locations

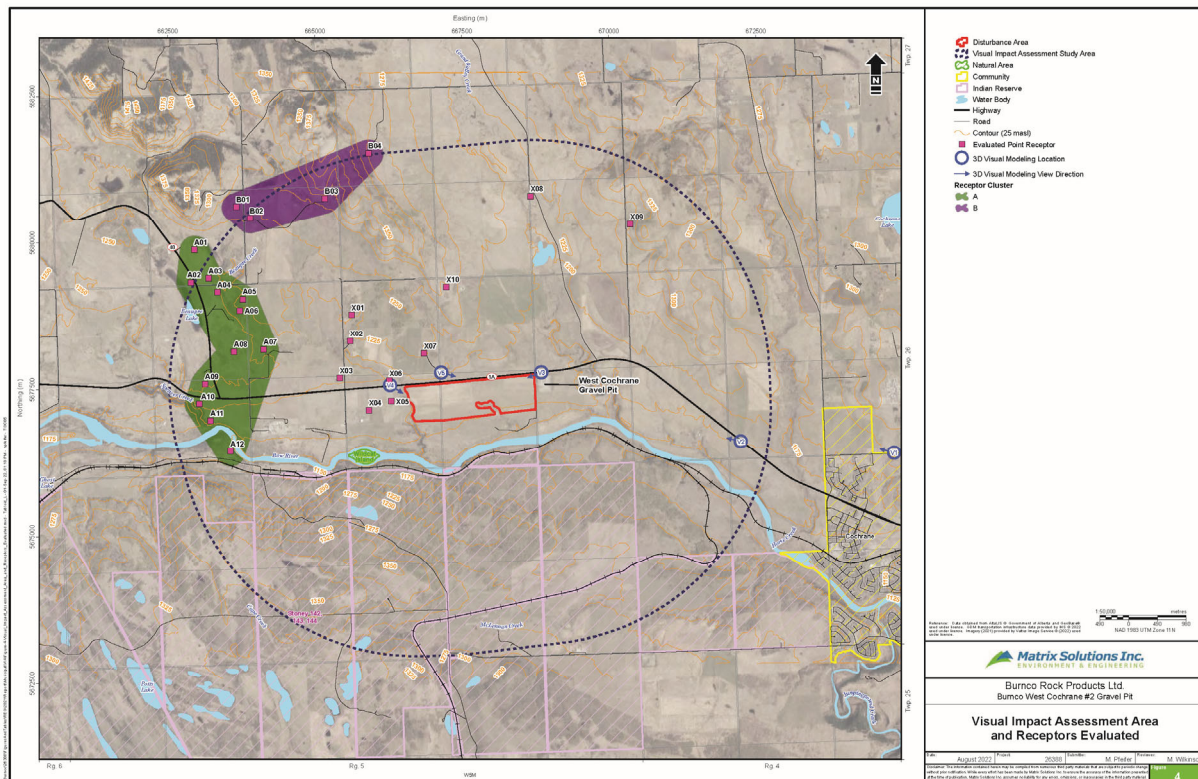




Figure 34: View of Berm and Planting Plan (Location #4)



Figure 35: View of Berm and Planting Plan (Location #5)





Figure 36: View of Berm and Planting Plan (Location #3)



As described in Section 3.3, the site will be developed based on milestones related to the progress of the mining areas. Likewise, construction of the screening berm will also be built in phases and will be done so in accordance with the following:

Phase B:

- “B” portion of screening berm to be constructed prior to any mining activities in phase B8.
- Vegetation planting on this section of berm will be completed at the time of construction.

Phase C:

- “C” portion of screening berm to be constructed prior to any mining activities in phase C12.

Phase D:

- “D” portion of screening berm to be constructed prior to any mining activities in phase D16.
- Vegetation planting on this section of berm will be completed at the time of construction.

In all cases, these screening berms will be constructed with an overburden core as insufficient volumes of topsoil and subsoil would be available to construct such significant berms. It is also intended that these berms will remain as a permanent reclamation feature. As such, proper handling of topsoil and subsoil will be followed to avoid admixing will be followed:

- Prior to placement of overburden, topsoil and subsoil will be removed from the berm development area and temporarily stockpiled,
- Overburden will then be used to shape the berm,
- Such shaping will be in accordance with the site plans;
- Such shaping will be done to ensure a visually appealing landform; and
- Subsoil and topsoil will then be replaced, and the screening berm will be seeded.

## 4.0 Cumulative Effects

The development planning process for the West Cochrane Gravel Pit included an assessment of the cumulative aspects of extraction activities in the area. A review of nearby gravel pits indicated that the closest gravel operations were a significant distance away:

- Big Hill Springs Pit (Registration #15240-00-00) – 8.5kms away,
- Robinson Pit (Registration #244731-00-00) – 8.0kms away,
- Cochrane Pit (Registration #15685-00-00) – 6.0kms away,
- Griffin Pit (Registration #15328-00-00) – 4.8kms away.

Due to these distances, and after reviewing their locations and likely scale of operations, no cumulative impact was predicted.

As described earlier, BURSCO has completed various impact assessments related to the West Cochrane Gravel Pit. These assessments included review of predevelopment conditions, operating conditions and post development conditions. Potential impacts have been identified and appropriate mitigations developed. It should also be noted that assessments were completed with both areas of the West Cochrane Gravel Pit assumed to be in operation (east side plus west side). With these mitigations in place, BURSCO is confident that impacts related to this development have been mitigated as much as reasonably possible, that the site will not have an undue impact, and that the West Cochrane Gravel Pit will be operated in a socially and environmentally responsible manner.

## 5.0 Reclamation Plan

BURNCO always strives to promptly reclaim their operations back to an equivalent land capability and to re-establish a similar grade and drainage patterns that existed prior to disturbance. The site will be predominantly reclaimed back to agricultural use as shown in the reclamation drawings provided in Appendix 3.

### Policy #37

**BURNCO will reclaim areas promptly wherever possible and in accordance with the reclamation contours and cross-sections in the MSDP. In addition, BURNCO will limit maximum disturbed area on the west side to 70 acres at any single time.**

## 5.1 Landscaping and Closure

As described in Section 3.14, the screening berms built adjacent to Highway 1A will be left as a permanent reclamation feature. These screening berms will have been constructed with an overburden core and should have mature landscaping at the time of final reclamation. The contouring associated with this permanent feature is shown on the reclamation plan in Appendix 1.

Alberta Transportation issued Road Side Development Permit #RSDP031776 on December 8<sup>th</sup>, 2021 which had reviewed BURNCO's updated site plans, including the site screening berms being left as a permanent reclamation feature.

## 5.2 Soil Salvage

All topsoil and subsoil on site will be salvaged and used in the final reclamation. Topsoil and subsoil salvage will not occur under wet, frozen, adverse field conditions or high wind velocities that will result in mixing, loss, compaction or degradation of soil. Topsoil and subsoil will be salvaged a minimum of three meters ahead of pit faces.

In some instances, topsoil and subsoil will be placed along the west development boundary for use in creating screening berms. These stockpiles will be separated from each other with topsoil used to develop the south portion of the berm and browns used to develop the north portion of the berm. These screening berms will be vegetated as soon as possible and will be sloped 3:1 with a three-meter top. Stockpile site locations will be prepared so that:

- Stockpiles are placed on stable ground,
- Stockpiles are placed in locations unaffected by pit activities,
- Stockpiles are stabilized to minimize erosion.

As much as possible, topsoil and subsoil will be directly placed into areas of reclamation.

### Policy #38

**BURNCO will ensure proper soil salvage and will follow the protocols provided in the MSDP related to soil salvage.**

### 5.3 Subgrade

Placement of overburden fill and rough grading will follow the contour plan shown in Appendix 3 Drawing No. 5: Site Reclaimed Map. Once subgrades are established, areas will be ripped and cross ripped to a depth of 0.3 meters to ensure decompaction of the subgrade. Ripping can help improve soil conditions by breaking up the surface of the overburden, increasing infiltration of surface water, and creating a better root zone.

### 5.4 Soils Placement

Once subgrades are established and decompacted, subsoil and topsoil will be spread evenly. Target replacement depths will be based on parcel and will be 85% of the pre-disturbance soils depths as detailed in Section 2.4 of this report.

### 5.5 Vegetation

Once topsoil has been evenly placed, the reclaimed areas will be re-vegetated to hayland using drill seeding at a rate no less than 22 kg/acre. Grass seed mixture will be 30% wheatgrass, 40% smooth brome, 30% Kentucky bluegrass. Once seeding is complete, a program of cutting and fertilizing will take place as necessary to ensure the hayland becomes established.

### 5.6 Weed Control

BURNCO will monitor the site for any prohibited and/or noxious weeds. Inspections will be completed on an annual basis at a minimum. Weeds found during these annual inspections will be controlled through mowing or by applications of herbicides.

#### Policy #39

**BURNCO will control weeds during operations and reclamation. These efforts will be compliant with the Weed Control Act and the Rocky View County Land Use Bylaw.**

### 5.7 Inactive Pit Conservation & Reclamation

The pit will be clearly identified by signs that indicate danger and discourage trespassing. Slopes around structures and equipment will be stabilized and sloped no steeper than 3:1. During periods of inactivity of over six months, pit faces will be sloped no steeper than 2:1. Stockpiles will be vegetated, and the weeds will be sprayed and mowed. The site will be monitored to ensure soil reclamation material is stable, weeds are controlled, and the site is secure.

Once complete, the site will be monitored on a monthly basis to ensure soil reclamation material is stable, weeds are controlled, and the site is secure.

#### Policy #40

**BURNCO will follow the protocols provided in the MSDP related to inactive pit conservation and reclamation.**



## **6.0 Annual Monitoring & Development Permit Applications**

### **6.1 Annual Monitoring**

As detailed in the previous sections of the MSDP, when this site is in operation, BURNCO will monitor a variety of items to ensure potential impacts are being mitigated as planned. Site monitoring shall include the following at a minimum:

- Historical Resources: confirmation that areas of proposed operation have received appropriate clearance from Alberta Culture & Tourism;
- Disturbance Area and Limits: confirmation that the maximum disturbance area is no more than 70 acres at any given time and that areas of proposed operation are following approved plans and are compliant with required setbacks from Wildlife, wetlands, riparian areas, water courses and utilities (such as powerline and pipelines);
- Noise: Full-time noise monitoring will ensure compliance with Directive 038 noise control guidelines;
- Dust: Full-time dust monitoring will ensure compliance with Alberta Ambient Air Quality Objectives;
- Groundwater: BURNCO will follow the groundwater monitoring program detailed in the MSDP and as required by DAUT0014236. Such monitoring will include continuous monitoring at no less than 4 locations. Monitoring will be done upgradient and downgradient of the excavation area for both the unconfined and confined aquifers (sand and gravel, bedrock). Monitoring will also include quality testing and analysis to capture any changes from baseline conditions. Such monitoring shall also include a baseline monitoring program for any residential water well located within 400m of the project boundary if requested by the owner;
- Stormwater: confirmation that “contact” stormwater is not discharged from the site;
- ESC: confirmation that ESC measures are performing as planned; and
- Vegetation and Weed control: confirmation that screening berm vegetation is healthy and that noxious weeds on all project lands are adequately controlled.

#### **Policy #41**

**BURNCO will follow the Annual Monitoring plan in accordance with the MSDP.**

### **6.2 Annual Reporting**

Within 90 days following each calendar year, BURNCO shall provide Rocky View County an annual report to provide a record of the previous year’s monitoring activity as detailed in Section 6.1.

#### **Policy #42**

**BURNCO will provide Rocky View County with an Annual Report in accordance with the MSDP and which will provide a record of the annual monitoring activities undertaken at the pit.**

### **6.3 Development Permit Applications**

When applying for a development permit application or renewal, BURNCO shall include information necessary for Rocky View County to properly review the application. As part of this MSDP application, the following assessments and reports have been completed for the entire project footprint.

- Biophysical Impact Assessment;
- Stormwater Management Plan;
- Erosion and Sediment Control (ESC) Plan;
- Environmental Noise Impact Assessment;
- Air Quality Assessment;
- Groundwater Evaluation;
- Visual Resources Assessment;
- Traffic Impact Re-Assessment; and
- Historical Resources Impact Assessment.

At the time of the first Development Permit application, the following reports will be updated. At that time, BURNCO will also confirm with Rocky View County whether there is sufficient change in site planning or circumstances to warrant revisiting of the other reports. It is understood that the plans and mitigations detailed in those previous reports shall continue to apply to the site until such time as they are replaced by a new report accepted by Rocky View County.

- A Geotechnical Assessment will be completed to provide recommendations for slope design and setbacks during operations and for final reclamation;
- The Stormwater Management Plan will be updated to a standard that is no longer a concept plan;
- The Traffic Impact Assessment will be updated to account for then traffic volumes;
- A Traffic Management Plan shall be completed;
- The Noise Impact Assessment and Control Plan will be updated as necessary to review permissible noise limits in accordance with Directive 038 ,confirm that proposed operations will be compliant with the established targets, and recommend a suitable monitoring location;
- The Air Quality Assessment and mitigation plan will be updated as necessary to confirm that proposed operations will be compliant with Alberta Ambient Air Quality Objectives, and recommend a suitable monitoring location;
- A Weed Control plan shall be completed; and
- A Landscaping Plan prepared by a professional and based on the Visual Resourced Assessment and associated planting plan as well as the enhanced planting plan presented in Section 3.14 of the MSDP.

At the time of the second Development Permit application as well as subsequent Development Permit applications, the following reports will be updated. At that time, BURNCO will also confirm with Rocky View County whether there is sufficient change in site planning or circumstances to warrant revisiting of the other reports. It is understood that the plans and mitigations detailed in those previous reports shall continue to apply to the site until such time as they are replaced by a new report accepted by Rocky View County.

- Traffic Impact Assessment will be updated to account for then traffic volumes;
- Affirmation that other assessments and plans previously submitted remain valid, or

updates as required.

**Policy #43**

**When applying for a Development Permit or Renewal, BURSCO shall include information necessary for Rocky View County to properly review the application and in accordance with the MSDP.**

## **7.0 Conclusion**

BURSCO considers the West Cochrane Gravel Pit a key site for future supply of aggregate in Rocky View County. To increase the permitted area of the pit and secure the long-term future of the facility, BURSCO has submitted this Master Site Development Plan to provide planning and operating guidance for 123.6 hectares (305.5 acres) of land. These lands will be operated as West Cochrane #2 Gravel Pit once the existing site in NW13 is depleted. This report also presented an overview of the various studies and assessments completed by third party professionals to evaluate project impacts and prescribe mitigation measures.

This project presents a great opportunity for Rocky View County and the people of Alberta in continuing to meet the growing demand for aggregates. These aggregates are critical in building our communities and maintaining our quality of life.

BURSCO is committed to the highest level of care and compliance in all our developments. It is BURSCO's belief that by following the Project Activities Plan for the lands associated with the proposed development, that BURSCO's West Cochrane #2 Pit can continue to operate in a socially and environmentally responsible manner for many years to come.

## **Appendix 1: Supporting Documents Submitted with Land Use Application**

- 1: Application for Amendment to Land Use Bylaw
- 2: Land Titles and Landowner Consents
- 3: Biophysical Impact Assessment
- 4: Stormwater Management Plan
- 5: Erosion and Sediment Control (ESC) Plan
- 6: Environmental Noise Impact Assessment
- 7: Air Quality Assessment
- 8: Groundwater Impact Assessment #1 (Matrix)
- 9: Groundwater Impact Assessment #2 (SLR)
- 10: Visual Resources Assessment
- 11: Traffic Impact Assessment + AT Authorizations
- 12: Historic Resources Impact Assessment
- 13: Open House #1 Summary
- 14: Open House #2 Summary
- 15: Existing AEP Permits and Authorizations

## Appendix 2: MSDP Policy Summary

### **Policy #1**

Within the project area, BURNCO has secured all necessary leases on the private and crown lands (road allowances) to excavate aggregate. BURNCO will continue to maintain these leases in good standing.

### **Policy #2**

BURNCO will secure historical resource clearance from Alberta Culture & Tourism before commencing any surface disturbance in any areas not yet cleared and will follow all conditions and requirements of the approval.

### **Policy #3**

Before commencing operations, BURNCO will secure a Development Permit from Rocky View County and will follow all conditions and requirements contained therein.

### **Policy #4**

BURNCO will follow all conditions and requirements of the approved Activity Plan (Registration 254757-00-01) from Alberta Environment & Parks under the Code of Practice for Pits.

### **Policy #5**

BURNCO will follow all conditions and requirements of the Water Act authorizations received from Alberta Environment & Parks.

### **Policy #6**

BURNCO will ensure that operations comply with all relevant permits and authorizations.

### **Policy #7**

BURNCO will follow the hours of operation as determined by Rocky View County as part of the Development Permit process.

### **Policy #8**

BURNCO will follow the development phasing plan as illustrated in the MSDP.

### **Policy #9**

The maximum disturbance area will be limited to no more than 70 acres at any given time.



**Policy #10**

**BURNCO will adhere to the setbacks detailed in the MSDP.**

**Policy #11**

**BURNCO will install site signage. This will include perimeter signage to discourage trespassing as well as entrance signage as necessary to identify the site and provide key information to the public.**

**Policy #12**

**Site signage shall include a 24-hour phone number for neighbors to call in the event of questions or concerns.**

**Policy #13**

**BURNCO will ensure a 7m development setback from ROW 467JK as required by the proximity agreement. BURNCO will continue to secure proximity agreements for any applicable utilities or facilities.**

**Policy #14**

**BURNCO will follow the noise control measures detailed in the MSDP. In addition, BURNCO will utilize enhanced mitigation measures if necessary, to ensure that noise is reasonably controlled and does not become a nuisance.**

**Policy #15**

**Operations at the pit will be compliant with the permissible noise limits determined through the Alberta Energy Regulator's Directive 038 Noise Control Guidelines and as measured at a surrounding dwelling would be:**

- Daytime (7am – 10pm) = 55dBa Leq 1 hour;
- Nighttime (10pm – 7am) = 45dBa Leq 1 hour;
- Or 5dBa Leq 1 hour over ambient measurements as applicable.

**Policy #16**

**BURNCO will follow the dust control measures detailed in the MSDP. In addition, BURNCO will utilize enhanced mitigation measure if necessary, to ensure that dust is reasonably controlled and does not become a nuisance.**

**Policy #17**

**Operations at the pit will be compliant with the Alberta Ambient Air Quality Objectives (AAAQO).**

**Policy #18**

**BURNCO will provide full time noise and air quality monitoring at this site.**

**Policy #19**

**BURNCO will follow the complaint response protocol provided in the MSDP related to noise and dust complaints.**

**Policy #20**

**BURNCO will complete a baseline monitoring program for any residential water well located within 400m of the project boundary if requested by the owner.**

**Policy #21**

**BURNCO will follow the groundwater monitoring program detailed in the MSDP and as required by DAUT0014236. Such monitoring will include continuous monitoring at no less than 4 locations. Monitoring will be done upgradient and downgradient of the excavation area for both the unconfined and confined aquifers (sand and gravel, bedrock). Monitoring will also include quality testing and analysis to capture any changes from baseline conditions.**

**Policy #22**

**BURNCO will follow the complaint protocol provided in the MSDP related to groundwater security.**

**Policy #23**

**BURNCO will follow the groundwater planning, mitigations, and commitments as detailed in the MSDP and in BURNCO's Provincial permits.**

**Policy #24**

**BURNCO will continue to utilize the upgraded intersection at Range Road 51 and Highway 1A for all activities associated with the West Cochrane #2 Gravel Pit.**

**Policy #25**

**BURNCO will update the TIA for Range Road 51 and Highway 1A prior to commencement of site activity for West Cochrane #2 Gravel Pit as part of the DP process.**

**Policy #26**

**BURNCO will follow the protocol provided in the MSDP related to haul safety.**

**Policy #27**

**BURNCO will follow the protocol provided in the MSDP related to haul monitoring.**

**Policy #28**

**BURNCO will ensure that regional stormwater flows (non-contact) are directed around active mining operations wherever feasible.**

<b>Policy #29</b>
<b>BURNCO will ensure that stormwater from the active mining area (contact) is collected and not discharged from the site.</b>
<b>Policy #30</b>
<b>BURNCO will follow the reclamation recommendations in the MSDP related to drainage. This will ensure that the reclaimed site does impact local or regional drainage patterns.</b>
<b>Policy #31</b>
<b>Stormwater will be managed in accordance with the submitted Conceptual Stormwater Management Plan.</b>
<b>Policy #32</b>
<b>BURNCO will follow the setback requirements identified in the MSDP in relation to wildlife, wetlands, riparian areas and watercourses.</b>
<b>Policy #33</b>
<b>BURNCO will follow the wildlife mitigation measures detailed in the MSDP.</b>
<b>Policy #34</b>
<b>BURNCO will follow the hazardous waste plan in the MSDP.</b>
<b>Policy #35</b>
<b>BURNCO will follow the erosion and sediment control measures in the MSDP.</b>
<b>Policy #36</b>
<b>BURNCO will follow the development and planting plan for the screening berm as provided in the MSDP. This will include the proposed berm enhancements.</b>
<b>Policy #37</b>
<b>BURNCO will reclaim areas promptly wherever possible and in accordance with the reclamation contours and cross-sections in the MSDP. In addition, BURNCO will limit maximum disturbed area on the west side to 70 acres at any single time.</b>
<b>Policy #38</b>
<b>BURNCO will ensure proper soil salvage and will follow the protocols provided in the MSDP related to soil salvage.</b>
<b>Policy #39</b>
<b>BURNCO will control weeds during operations and reclamation. These efforts will be compliant with the Weed Control Act and the Rocky View County Land Use Bylaw.</b>

**Policy #40**

**BURNCO will follow the protocols provided in the MSDP related to inactive pit conservation and reclamation.**

**Policy #41**

**BURNCO will follow the Annual Monitoring plan in accordance with the MSDP.**

**Policy #42**

**BURNCO will provide Rocky View County with an Annual Report in accordance with the MSDP and which will provide a record of the annual monitoring activities undertaken at the pit.**

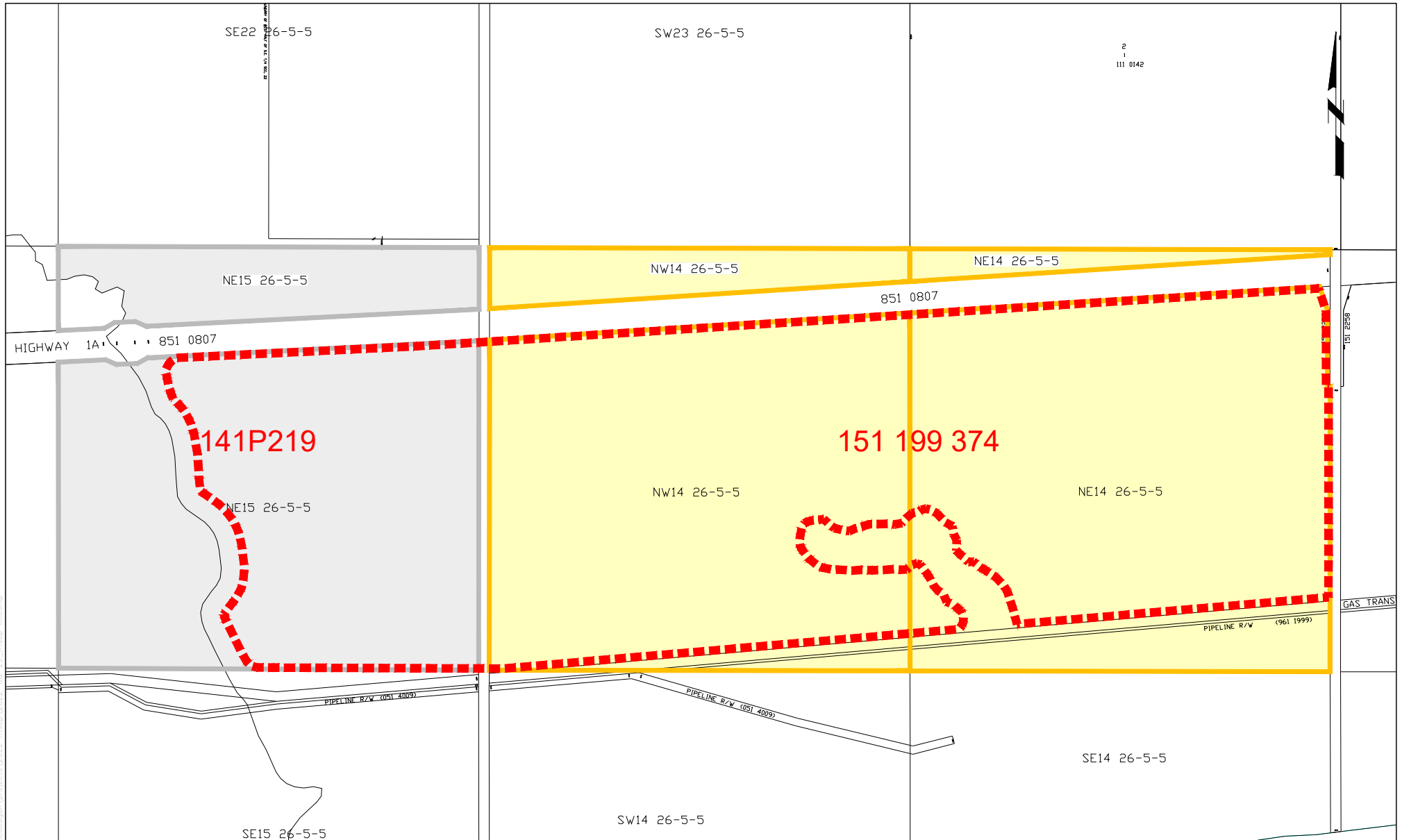
**Policy #43**

**When applying for a Development Permit or Renewal, BURNCO shall include information necessary for Rocky View County to properly review the application and in accordance with the MSDP.**

## **Appendix 3: Drawings**









**Legend**

111 222 333 TITLE NUMBER

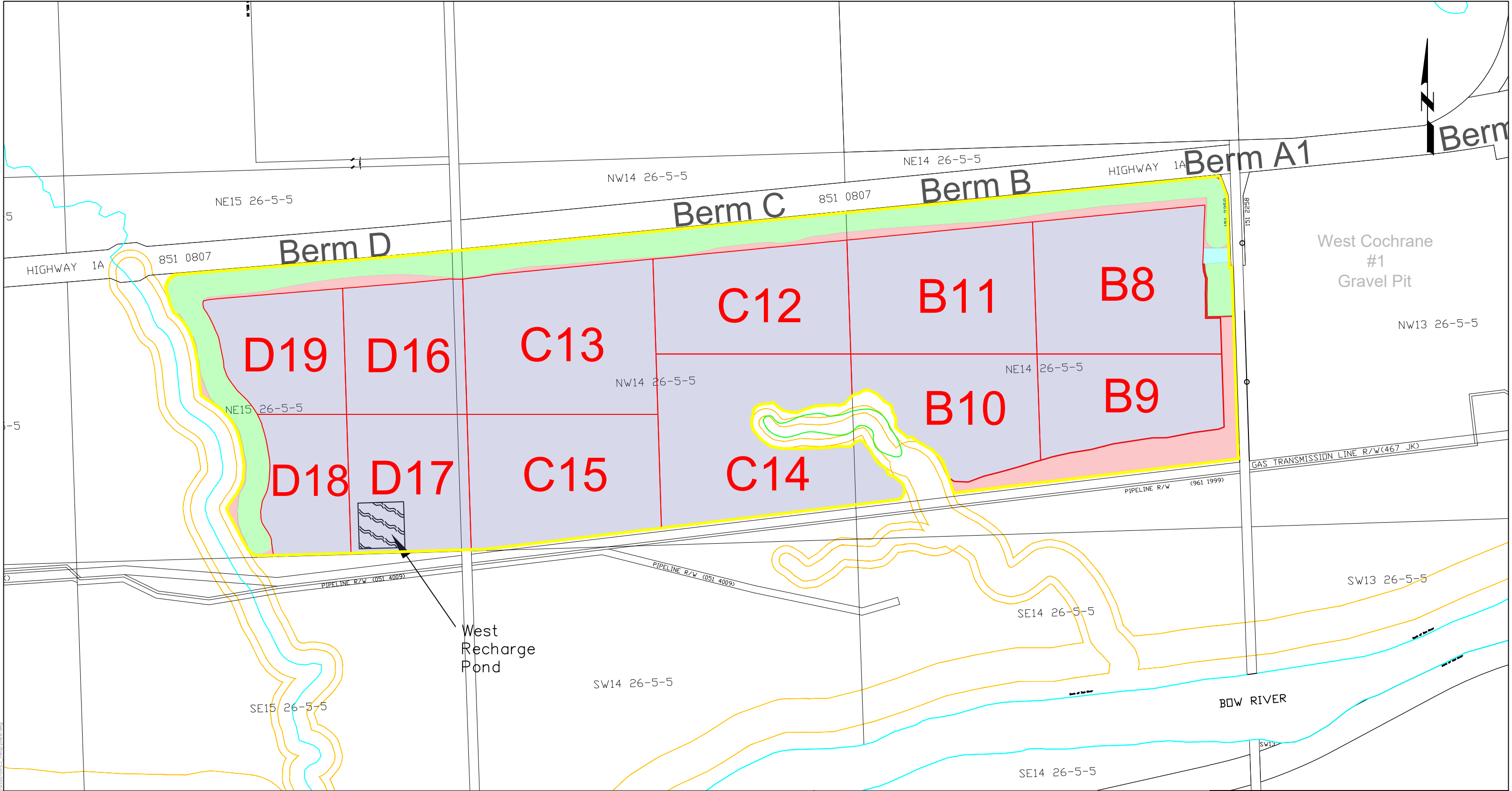
 TOTAL TITLE AREA

 TOTAL DISTURBANCE AREA

**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
LAND TITLES MAP  
NE 15-26-05 W5M; NW 14-26-05 W5M & NE 14-26-05 W5M

DATE DRAWN: APR. 2020	SCALE: 1:10,000	DRAWN BY: ML	DWG. NO. 2
DATE REVISED: AUG. 29, 2022		CHECKED BY: TC	



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LEGEND:

- Mining Area

Borrow Area

Planned Access

Visual Landscape Berm

A20

Mine Phase

Max. Limit of Disturbance (124.9 Ha)
- Cadastral
- Contours Major
- Contours Minor
- Surface Drainage Flow
- A-A'

Cross Section Alignment
- Minimum Setbacks: 30m Riparian, 60m Bow River & Grand Valley Creek
- Minimum Wetland Setback 6m

NOTES:

- All units are in meters
- All berms are constructed to 3H:1V with 5m wide top
- All reclaimed slopes are constructed to less than 10H:1V unless otherwise marked
- All mine faces are mined to no more than 1H:1V
- 3m property line setback utilized where applicable
- 7m pipeline setback in place
- West recharge pond dimensions (width/length/depth) - 90/90/1.5 (m)
- East recharge pond dimensions (width/length/depth) - 95/95/1.0 (m)

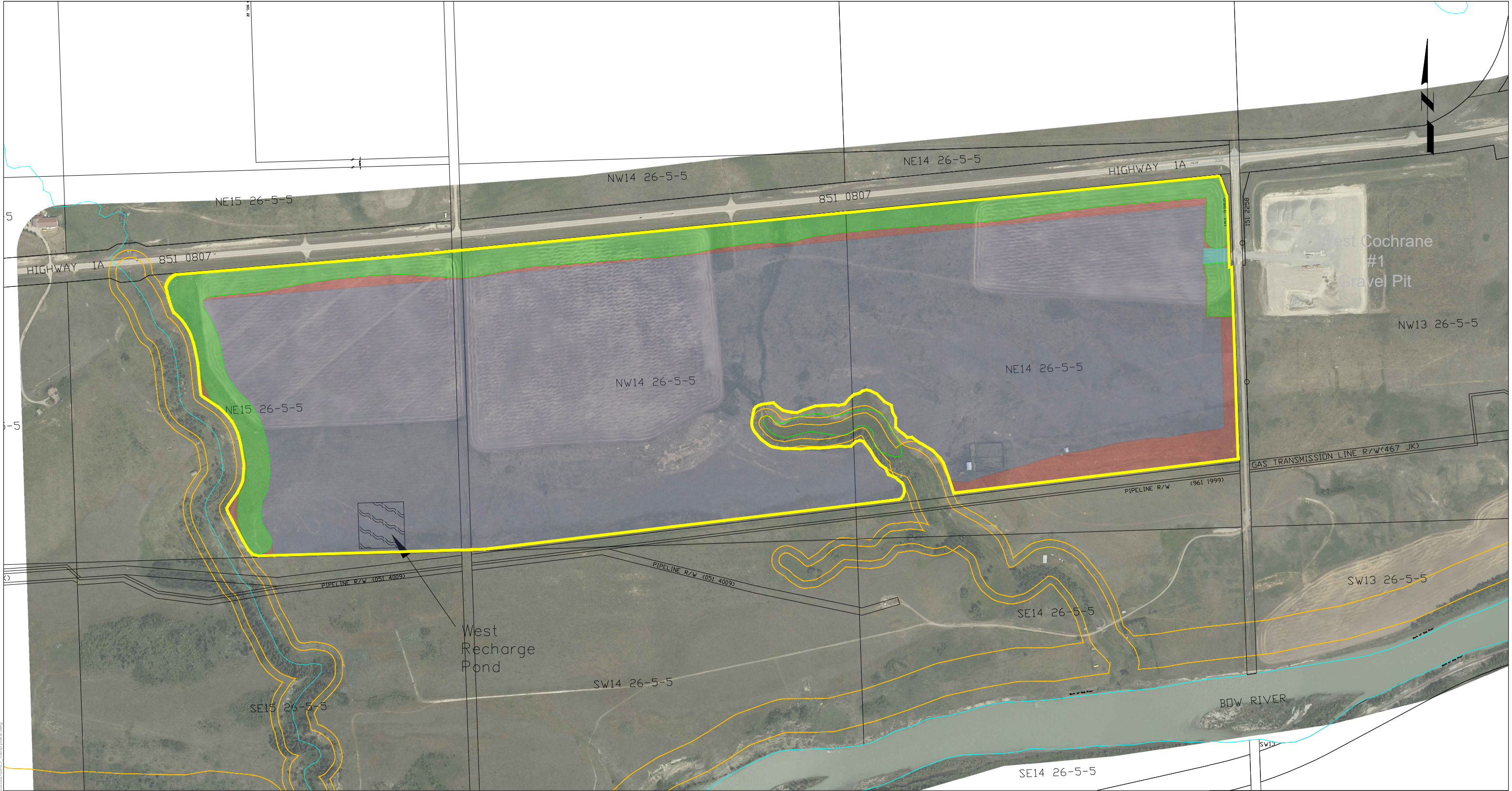
**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
MINE PHASE PLAN

NE 15-26-05 W5M; NW 14-26-05 W5M; NE 14-26-05 W5M

DATE DRAWN: AUG 24, 2022	SCALE:  1:7,500	DRAWN BY: ML	DWG. NO.  3
DATE REVISED: AUG 25, 2022		CHECKED BY: TC	





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LEGEND:

- |  |                                      |  |  |
|--|--------------------------------------|--|--|
|  | Mining Area                          |  | Cadastral  |
|  | Borrow Area                          |  | Contours Major   |
|  | Planned Access                       |  | Contours Minor   |
|  | Visual Landscape Berm                |  | Surface Drainage Flow  |
|  | Mine Phase                           |  | Cross Section Alignment  |
|  | Max. Limit of Disturbance (124.9 Ha) |  | Minimum Setbacks: 30m Riparian, 60m Bow River & Grand Valley Creek |
|  |                                      |  | Minimum Wetland Setback 6m   |

NOTES:

- All units are in meters
- All berms are constructed to 3H:1V with 5m wide top
- All reclaimed slopes are constructed to less than 10H:1V unless otherwise marked
- All mine faces are mined to no more than 1H:1V
- 3m property line setback utilized where applicable
- 7m pipeline setback in place

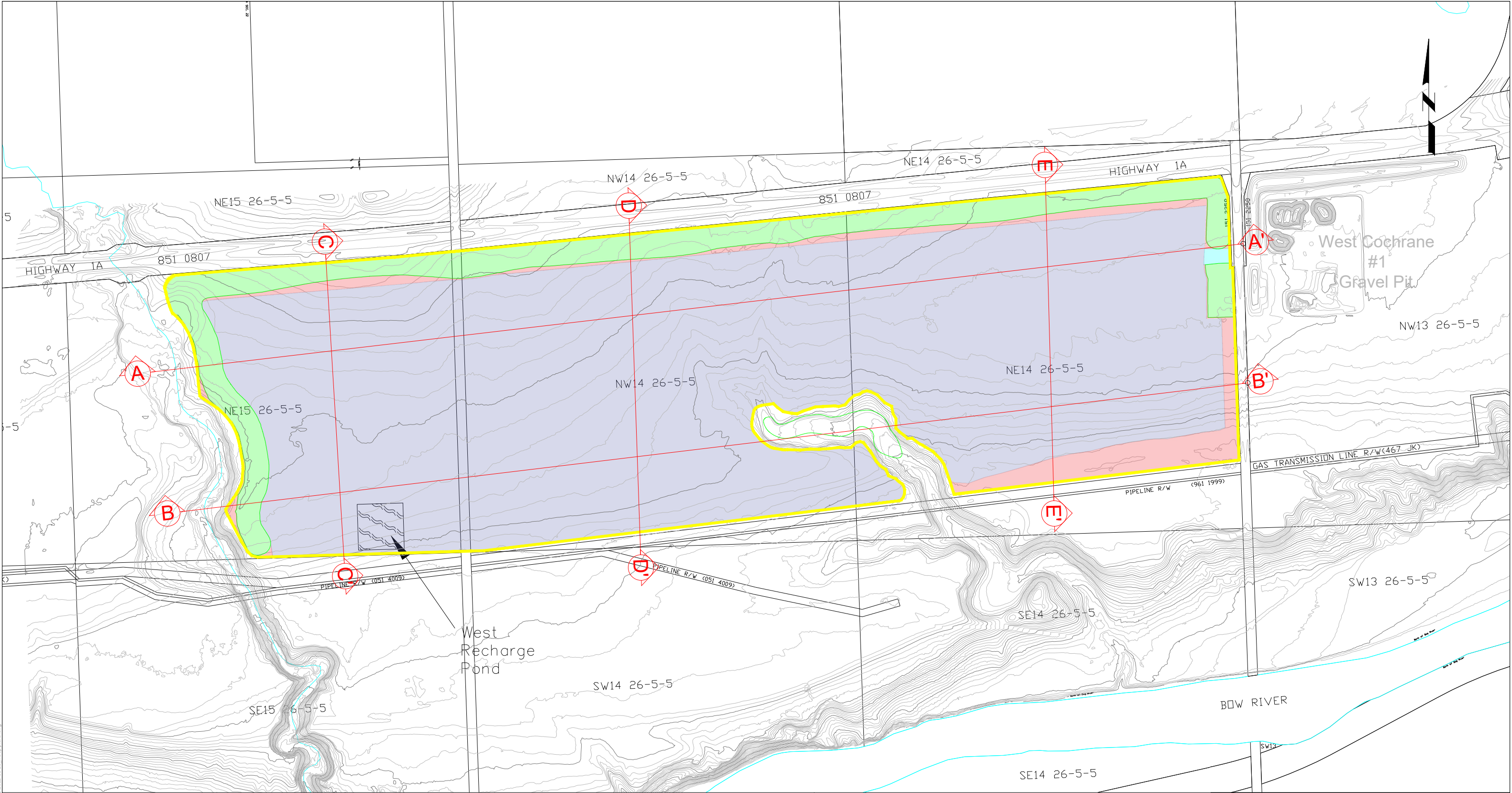
**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
SITE PLAN

NE 15-26-05 W5M; NW 14-26-05 W5M; NE 14-26-05 W5M

DATE DRAWN: AUG 24, 2022	SCALE:  1:7,500	DRAWN BY: ML	DWG. NO.  4
DATE REVISED: AUG 25, 2022		CHECKED BY: TC	





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LEGEND:

- Mining Area
- 
- Borrow Area

A20

Mine Phase

A

A'

Cross Section Alignment

NOTES:

- All units are in meters
- All berms are constructed to 3H:1V with 5m wide top
- All reclaimed slopes are constructed to less than 10H:1V unless otherwise marked
- All mine faces are mined to no more than 1H:1V
- 3m property line setback utilized where applicable
- 7m pipeline setback in place

**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
SITE EXISTING CONTOURS PLAN

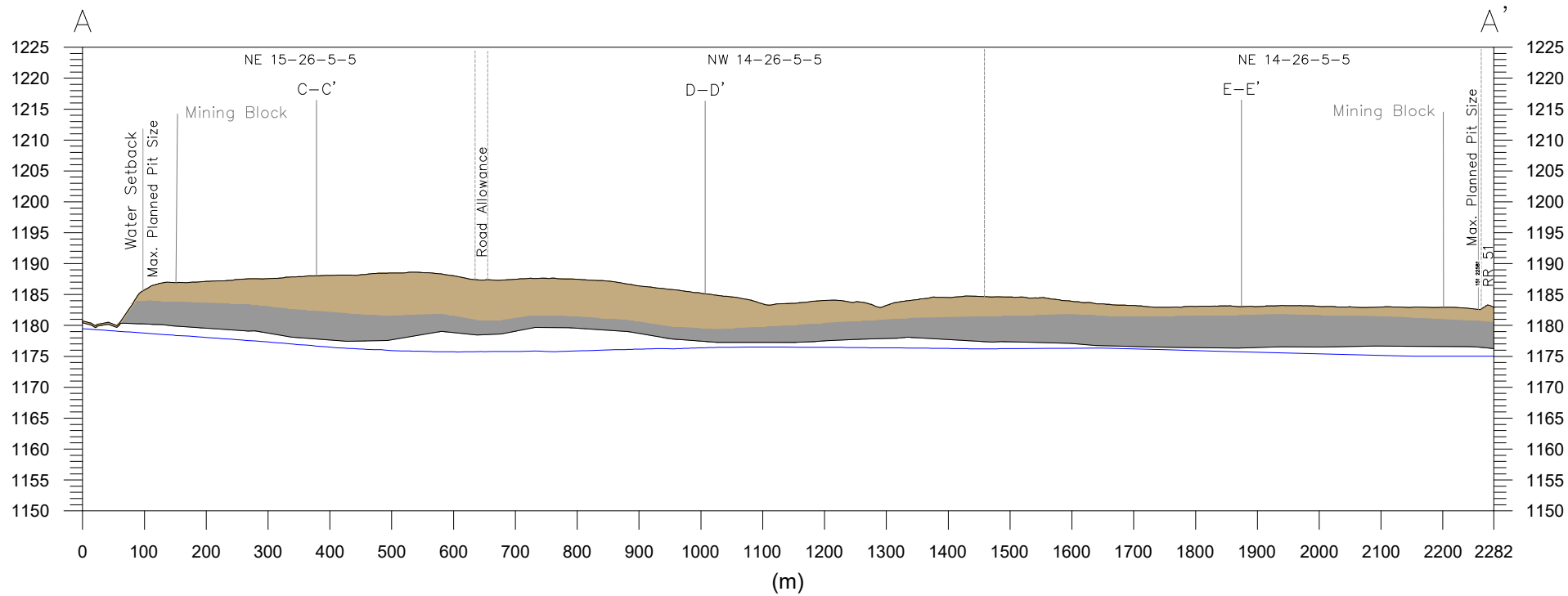
NE 15-26-05 W5M; NW 14-26-05 W5M; NE 14-26-05 W5M

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DATE REVISED: AUG 25, 2022		CHECKED BY: TC	

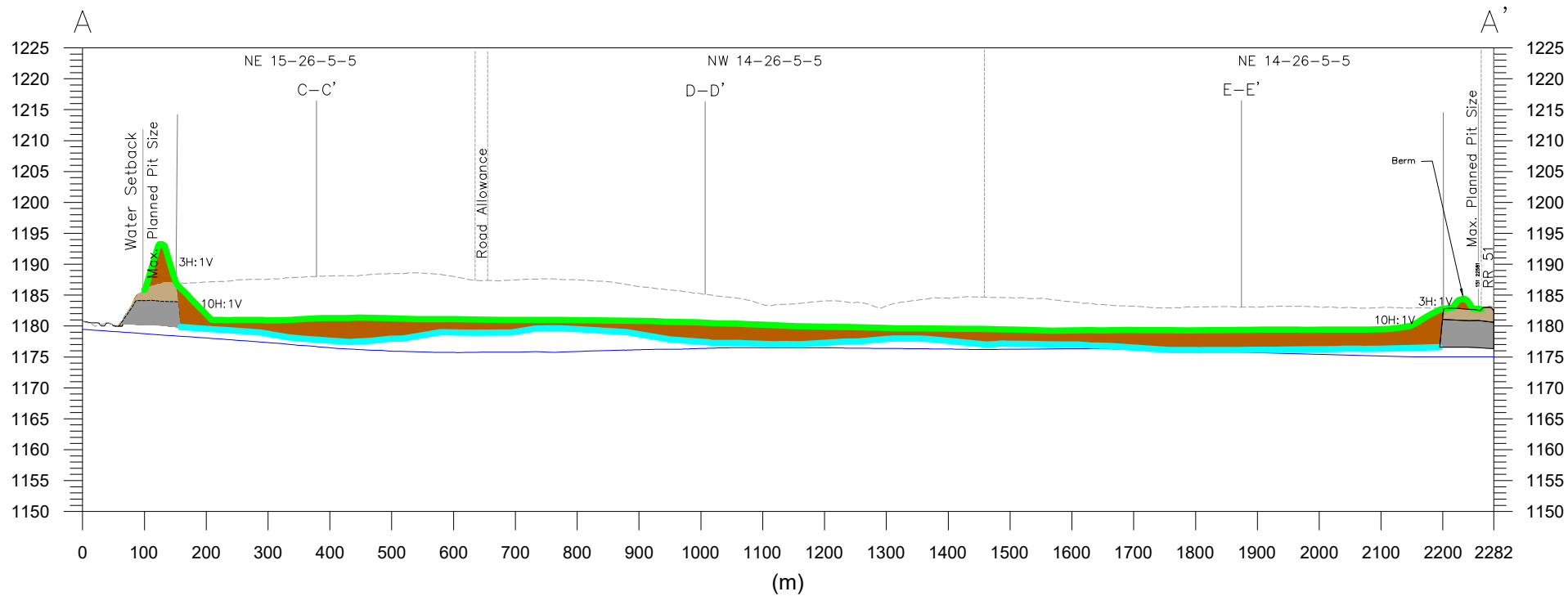




A EXISTING SITE CONDITIONS



A RECLAIMED SITE CONDITIONS



LEGEND:

- Clay
- Gravel
- Backfilled Material (Clay)
- Original Topsoil/Subsoil
- Replaced Topsoil (Averaging 0.14m) ; Subsoil (Averaging 0.14m)
- Original Ground Profile
- Original Top of Gravel
- Ground Water Table
- Hydraulic Connectivity Layer (1 ft. / 0.3m.)

NOTES:

- All units are in meters
- All berms are constructed to 3H:1V with 5m wide top
- All final interior slopes will be reclaimed to minimum 10H:1V (unless otherwise noted on the cross-section)
- All mine faces are mined to no more than 1H:1V
- 3m property line undisturbed buffer utilized where applicable
- For cross-section plans, 10:1 vertical exaggeration is exercised
- For cross-section plans, elevations are provided in MASL
- For cross-section plans, mapped gravel is underlain by bedrock
- For cross-section plans, bedrock's type, depth and extend are unknown

**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
CROSS SECTION

NE 15-26-05 W5M; NW 14-26-05 W5M & NE 14-26-05 W5M

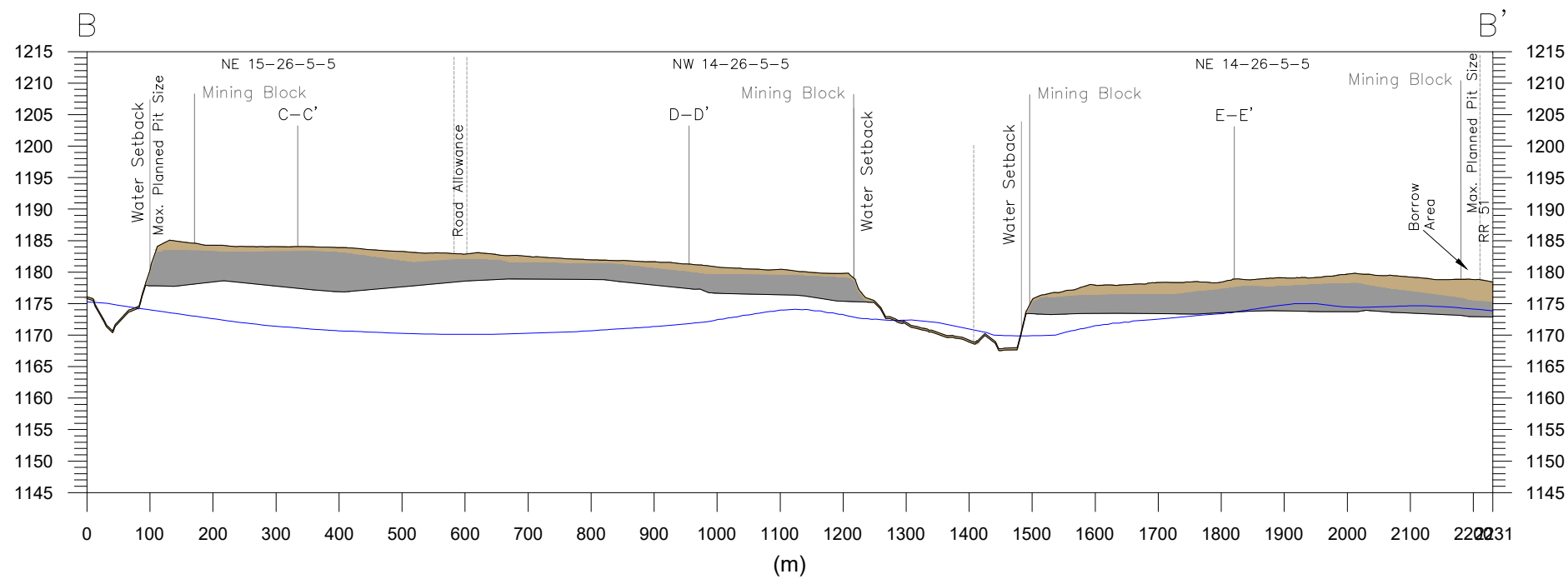
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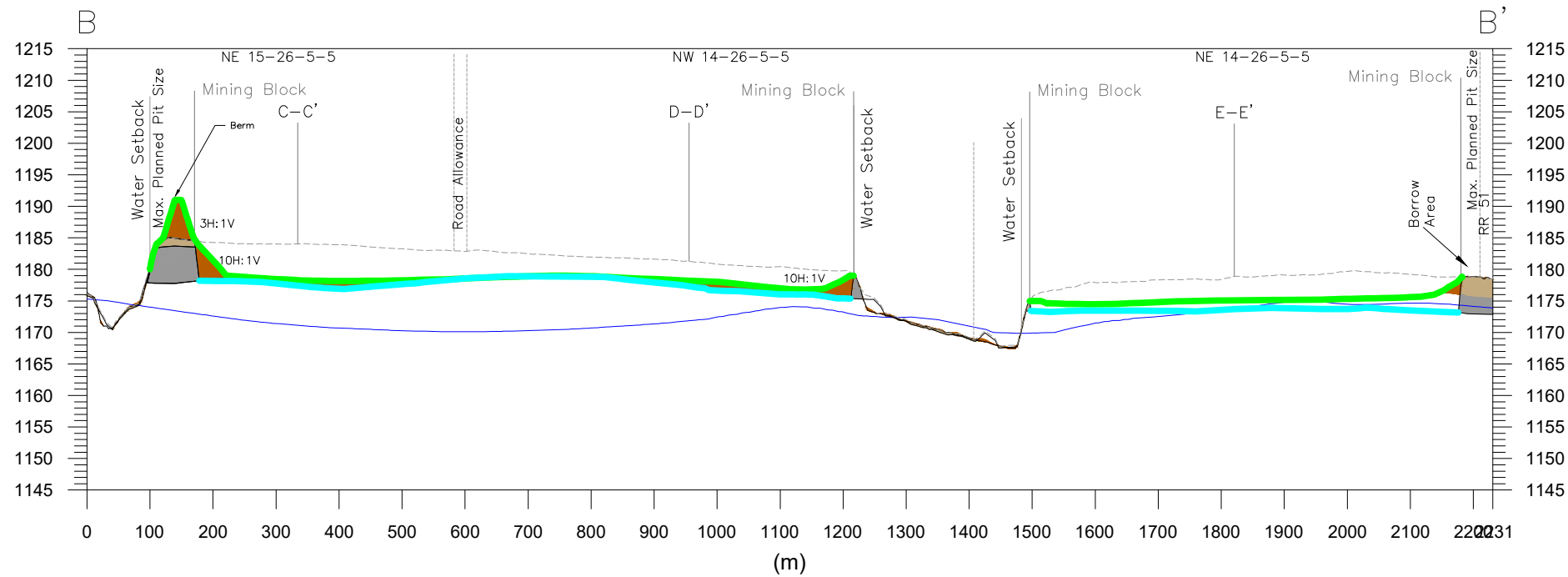
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TC

DWG. NO.  
A - A'

B EXISTING SITE CONDITIONS



B RECLAIMED SITE CONDITIONS



LEGEND:

- Clay
- Gravel
- Backfilled Material (Clay)
- Original Topsoil/Subsoil
- Replaced Topsoil (Averaging 0.14m) ; Subsoil (Averaging 0.14m)
- Original Ground Profile
- Original Top of Gravel
- Ground Water Table
- Hydraulic Connectivity Layer (1 ft. / 0.3m.)

NOTES:

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- For cross-section plans, mapped gravel is underlain by bedrock
- For cross-section plans, bedrock's type, depth and extend are unknown

**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
CROSS SECTION

NE 15-26-05 W5M; NW 14-26-05 W5M & NE 14-26-05 W5M

DATE DRAWN:  
NOV. 2021  
DATE REVISED:  
AUG. 29, 2022

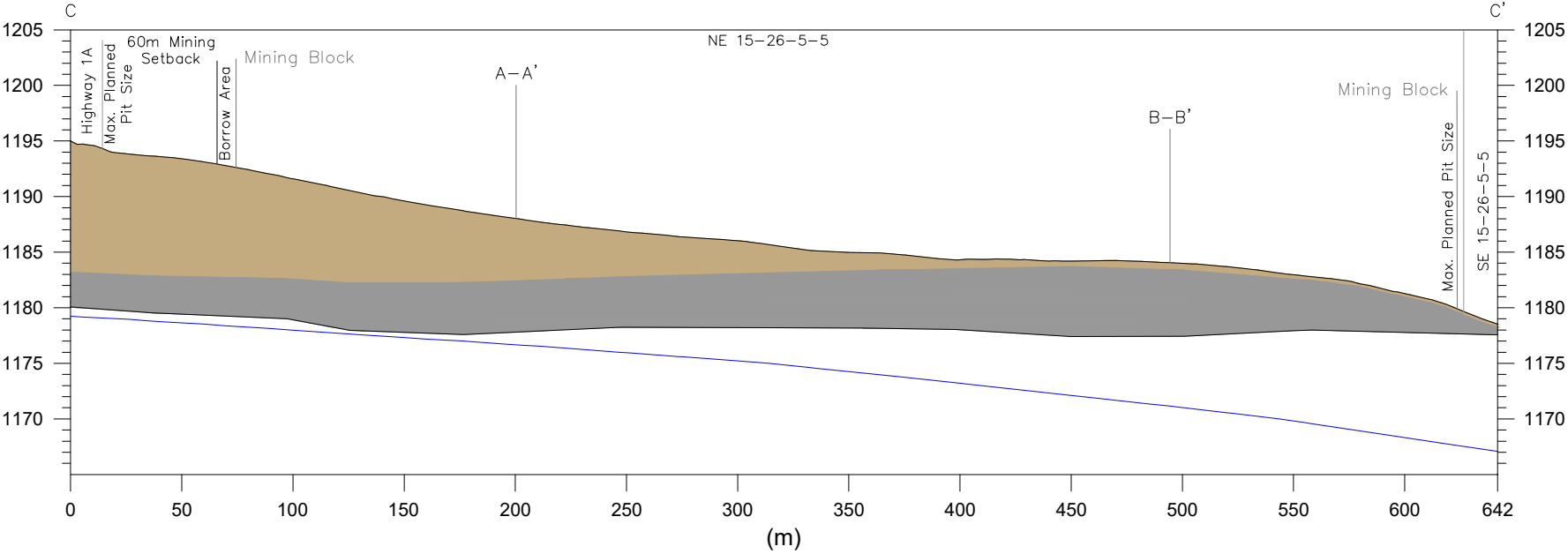
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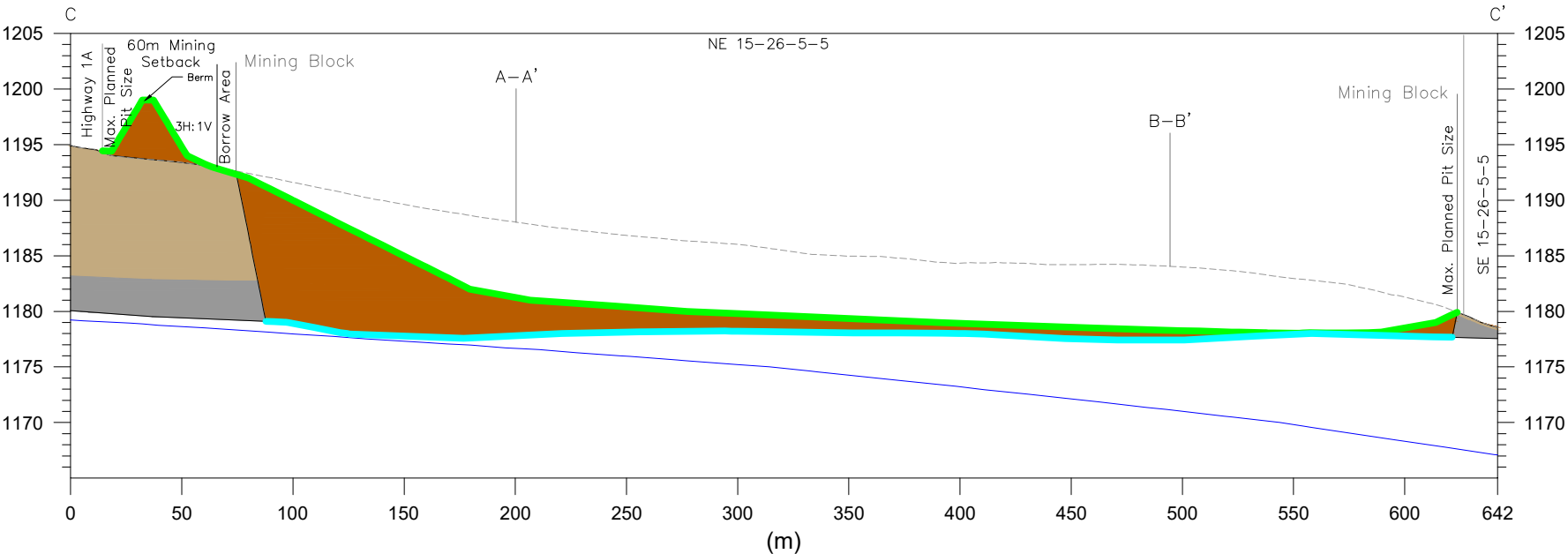
DWG. NO.  
B - B'



C EXISTING SITE CONDITIONS



C RECLAIMED SITE CONDITIONS



- LEGEND:**
- Clay
  - Gravel
  - Backfilled Material (Clay)
  - Original Topsoil/Subsoil
  - Replaced Topsoil (Averaging 0.14m) ; Subsoil (Averaging 0.14m)
  - Original Ground Profile
  - Original Top of Gravel
  - Ground Water Table
  - Hydraulic Connectivity Layer (1 ft. / 0.3m.)

- NOTES:**
- All units are in meters
  - All berms are constructed to 3H:1V with 5m wide top
  - All final interior slopes will be reclaimed to minimum 10H:1V (unless otherwise noted on the cross-section)
  - All mine faces are mined to no more than 1H:1V
  - 3m property line undisturbed buffer utilized where applicable
  - For cross-section plans, 10:1 vertical exaggeration is exercised
  - For cross-section plans, elevations are provided in MASL
  - For cross-section plans, mapped gravel is underlain by bedrock
  - For cross-section plans, bedrock's type, depth and extend are unknown

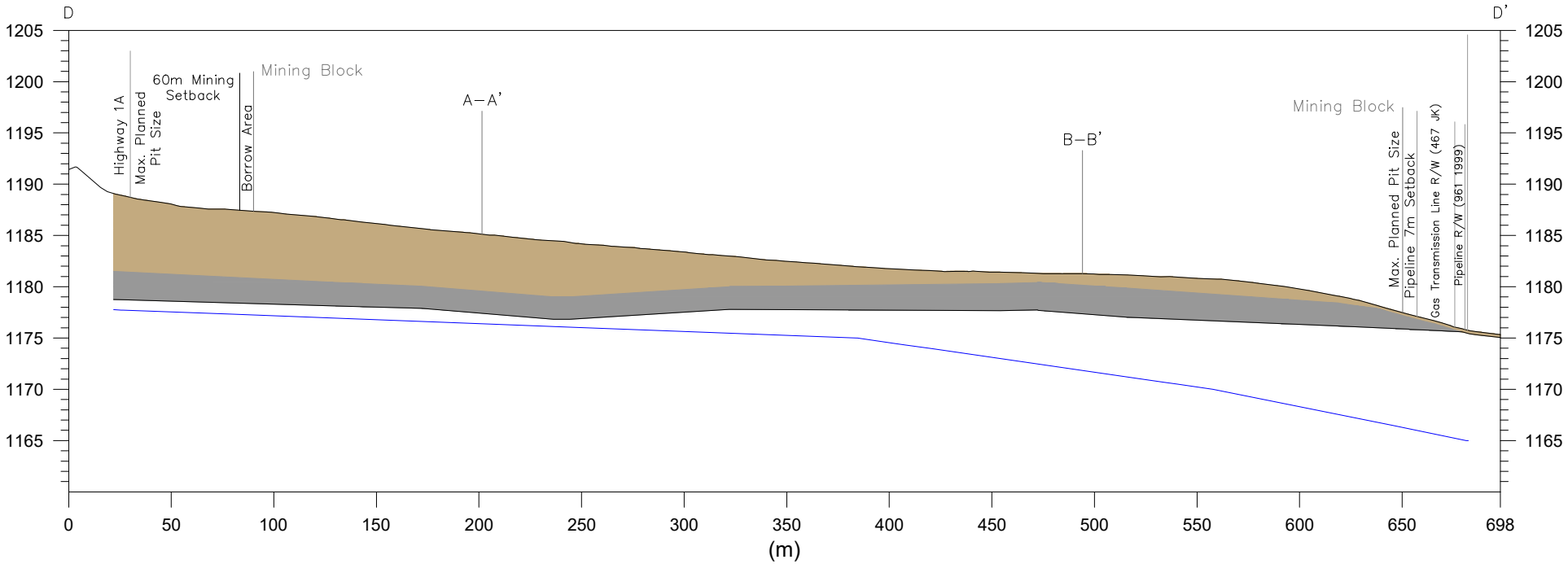
**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
CROSS SECTION  
NE 15-26-05 W5M; NW 14-26-05 W5M & NE 14-26-05 W5M

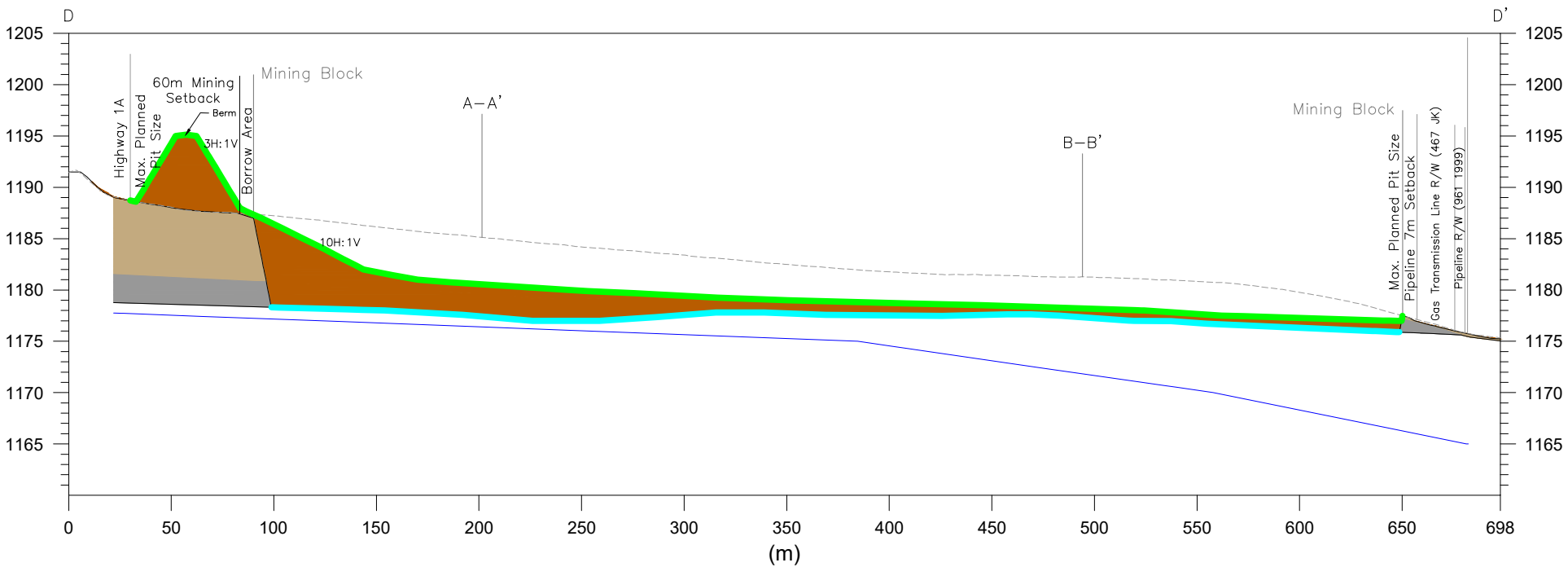
DATE DRAWN: NOV. 2021	SCALE: 1:3,000	DRAWN BY: ML	DWG. NO. C - C'
DATE REVISED: AUG. 29, 2022		CHECKED BY: TC	

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D EXISTING SITE CONDITIONS



D RECLAIMED SITE CONDITIONS



LEGEND:

- Clay
- Gravel
- Backfilled Material (Clay)
- Original Topsoil/Subsoil
- Replaced Topsoil (Averaging 0.14m) ; Subsoil (Averaging 0.14m)
- Original Ground Profile
- Original Top of Gravel
- Ground Water Table
- Hydraulic Connectivity Layer (1 ft. / 0.3m.)

NOTES:

- All units are in meters
- All berms are constructed to 3H:1V with 5m wide top
- All final interior slopes will be reclaimed to minimum 10H:1V (unless otherwise noted on the cross-section)
- All mine faces are mined to no more than 1H:1V
- 3m property line undisturbed buffer utilized where applicable
- For cross-section plans, 10:1 vertical exaggeration is exercised
- For cross-section plans, elevations are provided in MASL
- For cross-section plans, mapped gravel is underlain by bedrock
- For cross-section plans, bedrock's type, depth and extend are unknown

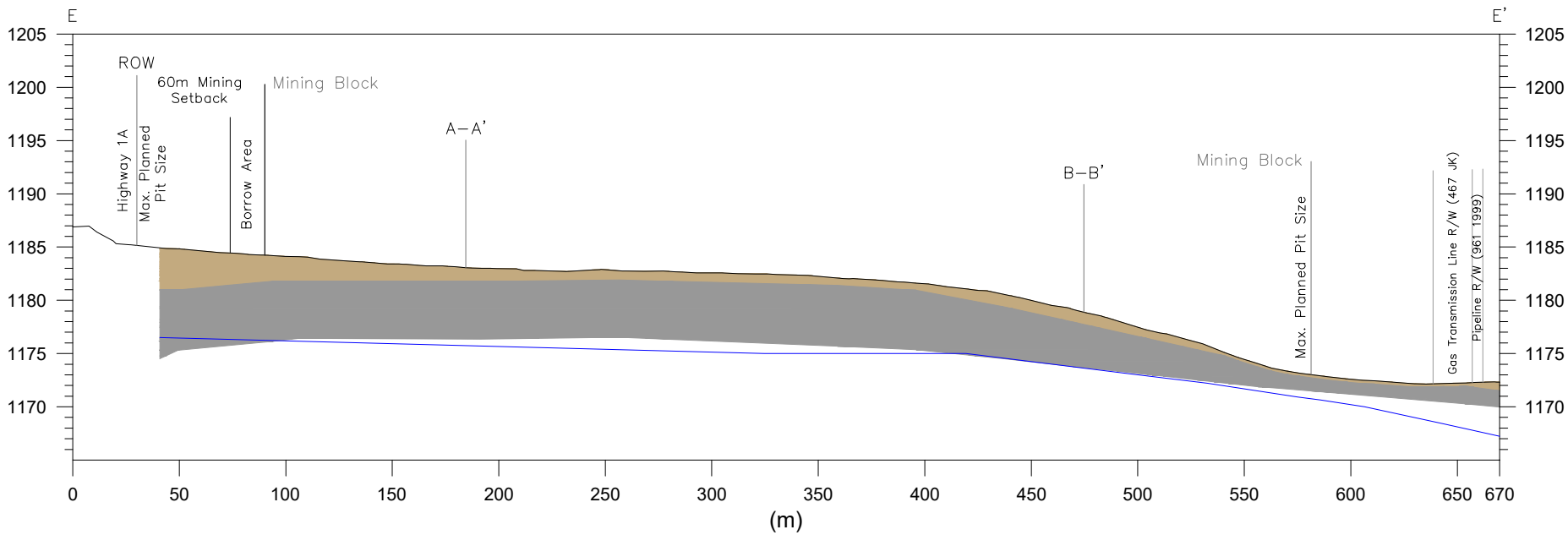
**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
CROSS SECTION  
NE 15-26-05 W5M; NW 14-26-05 W5M & NE 14-26-05 W5M

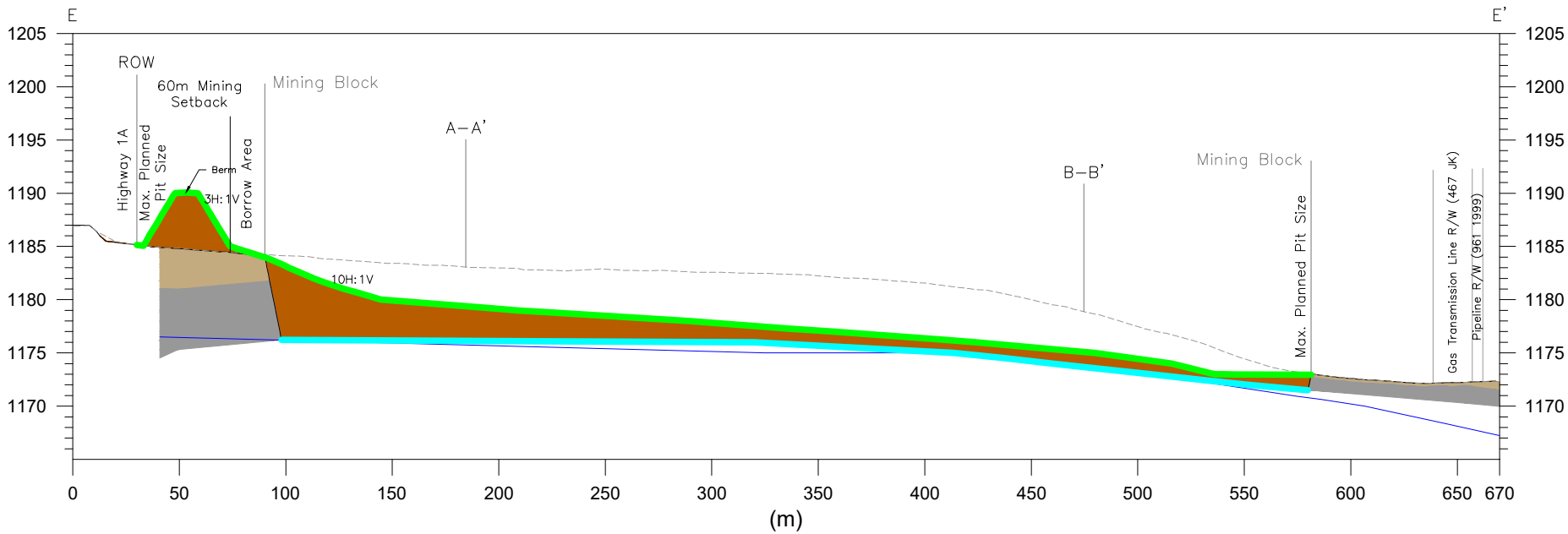
DATE DRAWN: NOV. 2021	SCALE: 1:3,000	DRAWN BY: ML	DWG. NO. D - D'
DATE REVISED: AUG. 29, 2022		CHECKED BY: TC	



E EXISTING SITE CONDITIONS



E RECLAIMED SITE CONDITIONS



LEGEND:

- Clay
- Gravel
- Backfilled Material (Clay)
- Original Topsoil/Subsoil
- Replaced Topsoil (Averaging 0.14m) ; Subsoil (Averaging 0.14m)
- Original Ground Profile
- Original Top of Gravel
- Ground Water Table
- Hydraulic Connectivity Layer (1 ft. / 0.3m.)

NOTES:

- All units are in meters
- All berms are constructed to 3H:1V with 5m wide top
- All final interior slopes will be reclaimed to minimum 10H:1V (unless otherwise noted on the cross-section)
- All mine faces are mined to no more than 1H:1V
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**BURNCO** Rock Products Ltd

WEST COCHRANE #2 GRAVEL PIT  
CROSS SECTION

NE 15-26-05 W5M; NW 14-26-05 W5M & NE 14-26-05 W5M

DATE DRAWN:  
NOV. 2021  
DATE REVISED:  
AUG. 29, 2022

SCALE:  
1:3,000

DRAWN BY:  
ML  
CHECKED BY:  
TC

DWG. NO.  
E - E'