Figure B-1. A Wirtgen 4200SM Surface Miner.

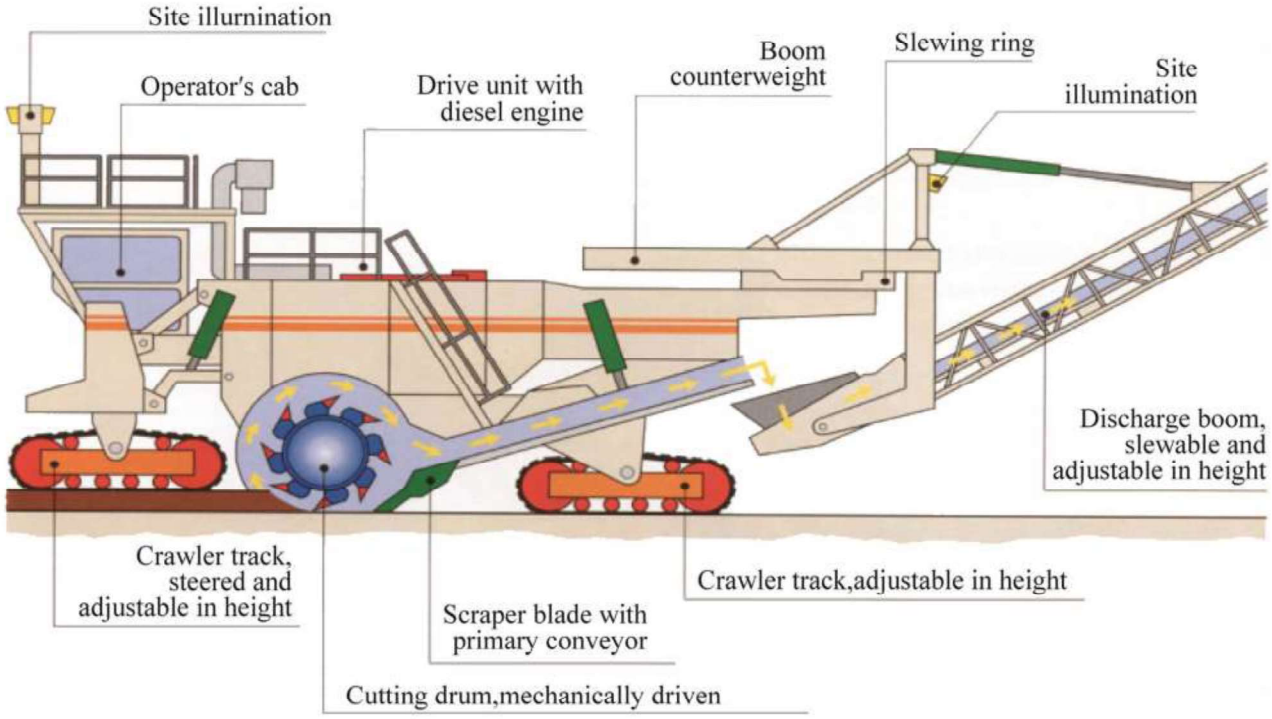


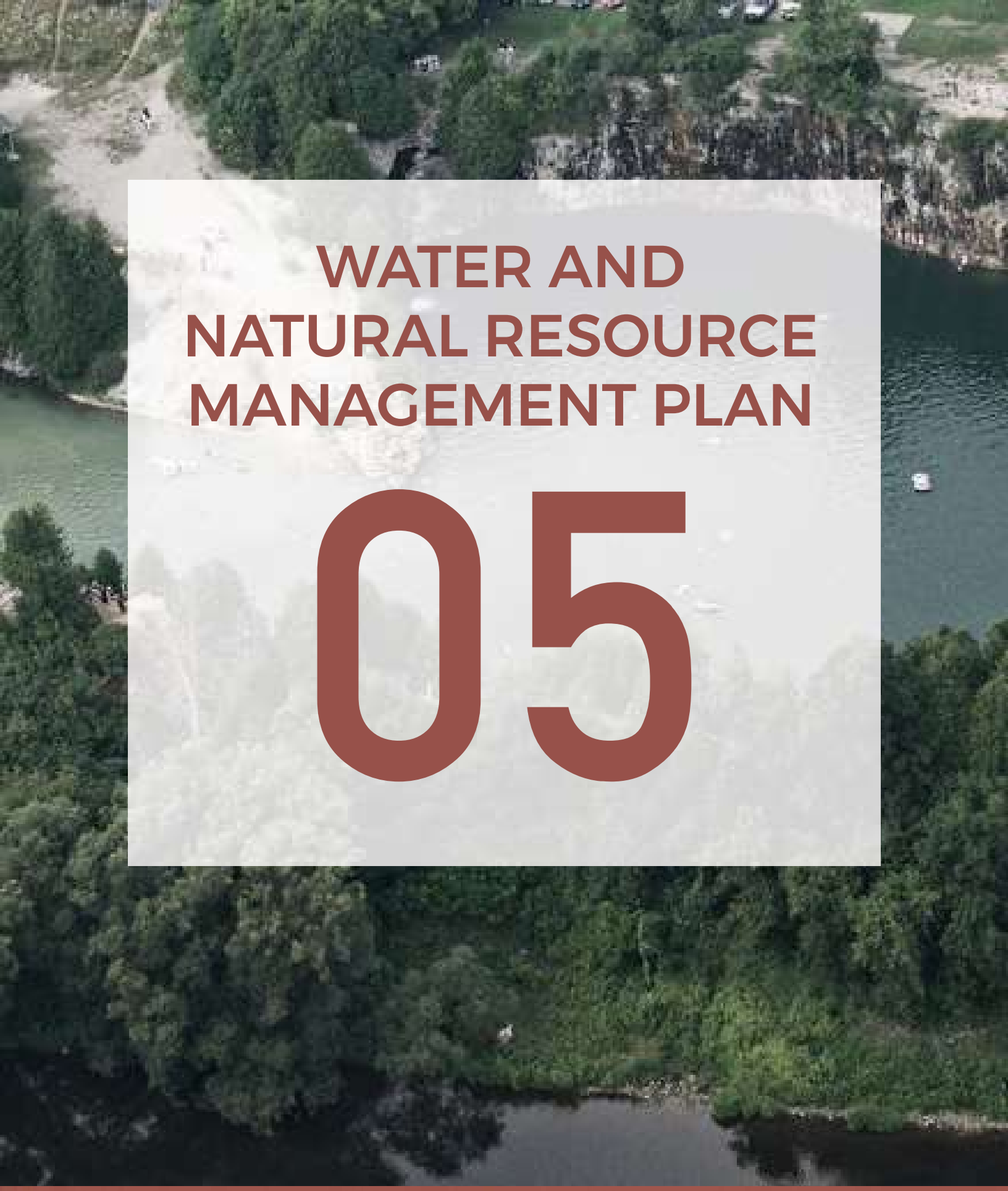
Figure B-2. A cross section of a Wirtgen surface miner in operation.

Figure B-3. A Wirtgen 4200SM Surface Miner.

Figure B-4. A Wirtgen 4200SM Surface Miner.

Figure B-5. A Wirtgen 2500SM Surface Miner.

Figure B-6. A Wirtgen 2500SM Surface Miner.



WATER AND NATURAL RESOURCE MANAGEMENT PLAN

05

NORTH PERIMETER AGGREGATES QUARRY

Friesen DRILLERS

March 13, 2019

Mr. Gordie Broda
President – Broda Properties Inc.
RR 2, Site 4, Comp. 207, Stn. MPP
Prince Albert, SK | S6V 5P9

Dear Mr. Broda,

Subject **Desktop Hydrogeological Investigation – Proposed Quarry Site**
Section 4-12-2 EPM and 33-11-2 EPM, Rural Municipality of Rosser, Manitoba

Friesen Drillers Ltd. is pleased to present this report to detail the results of our desktop hydrogeological investigation for the proposed quarry site at sections 4-12-2 EPM and 33-11-2 EPM, within the Rural Municipality (RM) of Rosser, Manitoba. The investigation included a review of local and regional hydrograph records and the generation of water table/potentiometric surface maps to establish conditions at the quarry site within a regional hydrogeological context. In addition, the available groundwater geochemistry data was obtained and reviewed.

This investigation was undertaken using existing data and reports in the area. The GWDRILL database maintained by Manitoba Sustainable Development (MSD) was accessed for information relating to groundwater wells in the region (GWDRILL, 2016). The well inventory conducted in this study did not involve intrusive well testing, flow testing, water sampling or site visits of any kind.

Project Background

The area around the site is predominantly agricultural with some residential acreages and small farms. Some areas are well treed, with other areas developed for livestock and dairy cattle production. The area is slightly elevated from the surrounding land surface, and natural drainage heads both towards the east and towards the west / southwest.

It is our understanding that the property at sections 4-12-2E and 33-11-2 E is currently owned by Broda Properties Inc. The site is located immediately south of the Winnipeg Perimeter Highway (Hwy 101), between Sturgeon road and Klimpke road, as shown below on Figure 1.

Figure 1 – Proposed quarry site, RM of Rosser. (Google Earth, 2019)

Scope of Work

The following scope of work has been developed for the project:

- Prepare a report on the conditions of the site and characterize the site conditions within the regional hydrogeological system.
- Obtain and review available local well records in the area and update the inventory undertaken in 2006.
- Review and update hydrographs in the area.

It should be noted that this review did not include regulatory information on approvals other than some commentary related to the Water Rights Act.

Regional Geology

The surficial geology of the region has been highly influenced by the subcrop of the Stony Mountain Formation. A slightly elevated upland area extends approximately north/south through the region. This elevated ridge is composed of Stony Mountain Formation rocks which were more resistant to weathering and erosion and form a topographical high. As a result of the bedrock ridge, the overburden cover in the area is generally very thin and even absent in some locations.

The surficial geology of the region consists of calcareous grey clay till that composes a layer of varying thicknesses. Surficial mapping in the area indicates less than 20 feet of overburden across the project site (Betcher, 1985). Underlying the till is a highly fractured carbonate (limestone and dolostone) rubble zone. The thickness of the rubble zone varies across the area. The rubble zone grades into more competent, fractured and bedded carbonate and shale rock. The Penitentiary and Gunn Members of the Stony Mountain Formation compose the main sub crop and overlie the Fort Garry Member of the Red River Formation. The Stony Mountain/Red River Formation contact lies at a depth of 120 to 140 feet below grade in the Stonewall area. The Red River Formation consists mainly of alternating layers of limestone and dolostone with basal shale layers. The Red River Formation is in turn underlain by the Winnipeg Formation clastic (sandstone and shale) unit, followed by Precambrian bedrock. The Winnipeg Formation is typically intersected at a depth of between 590 to 610 feet below grade (Betcher, 1985). A geological cross section is shown below as Figure 2.

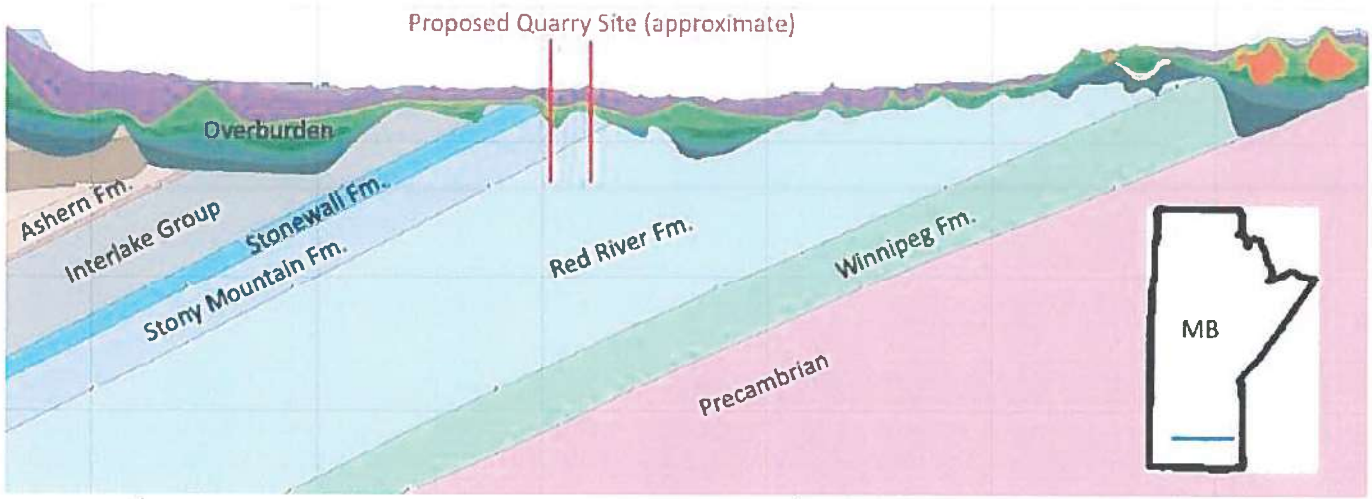


Figure 2 – Regional bedrock geology of southeastern Manitoba. (source - Manitoba Geological Survey, 2009)

With the exception of the carbonate rock surface, which is irregular due to weathering, fracturing and karstic features, the stratigraphy of the study area is relatively consistent.

Hydrogeology

The assessment of hydrogeological conditions in the area was based upon background reports and data available from Manitoba Sustainable Development (MSD). The location of the provincial observation wells closest to the project site are shown below in Figure 3. Groundwater aquifers at the site are found in the carbonate bedrock (Stony Mountain and Red River Formations) and in the deeper sandstone unit (Winnipeg Formation). In addition, overburden sand and gravel deposits form scattered aquifers of limited extent.

As the carbonate bedrock generally has very low porosity, groundwater flow in the carbonate bedrock predominantly occurs in the fracture and joint sets of the rock. The size, extent, and interconnectivity of the fracture systems controls the horizontal and vertical movement of groundwater through the bedrock. Due to this geologic condition, aquifer transmissivity and storativity can vary significantly over relatively short distances. This variability also results in substantial variations in well yields. The carbonate bedrock aquifer is a significant groundwater resource throughout Manitoba and has been developed for municipal, commercial, and domestic water supplies.

The transmissivity of the carbonate aquifer in the Winnipeg region was mapped by Baracos et al. (1983). The maps indicate that transmissivity within the northern regions of Winnipeg range from less than 10,000 to more than 100,000 USGPD/ft. The large range is typical for fractured limestone aquifers and reflects the highly variable bedrock conditions (Freeze and Cherry, 1979). Site specific aquifer testing has been conducted at the proposed quarry site (Wardrop, 2005; Friesen Drillers, 2009). These tests indicated a similarly wide range for aquifer transmissivity with values between 20,000 and 96,000 USGPD/ft. The aquifer tests also revealed that transmissive conditions at the site fluctuate seasonally with changing static water levels. Higher transmissive conditions were noted to correspond with higher static water levels.

Figure 3 – Provincial monitoring wells surrounding the proposed Quarry site.

Several groundwater recharge and discharge areas have been identified in the area. Recharge areas have been mapped west of Stonewall, within the East and West Shoal Lakes area, and northerly through the Stonewall upland area. These recharge areas contribute to local and regional flow systems, and the resultant groundwater flow is directed easterly towards the Red River. Groundwater discharge occurs near Oak Hammock Marsh, located several miles west of the City of Selkirk. The City of Selkirk water supply is also a major source of discharge for the aquifer. It is thought that a certain amount of groundwater also discharges to the Red River in the Lister Rapids area. The general direction of groundwater flow through the region is shown on the following page in Figure 4. The natural groundwater flow under the site is inferred to be easterly-southeasterly.

Hydrogeology (cont'd)

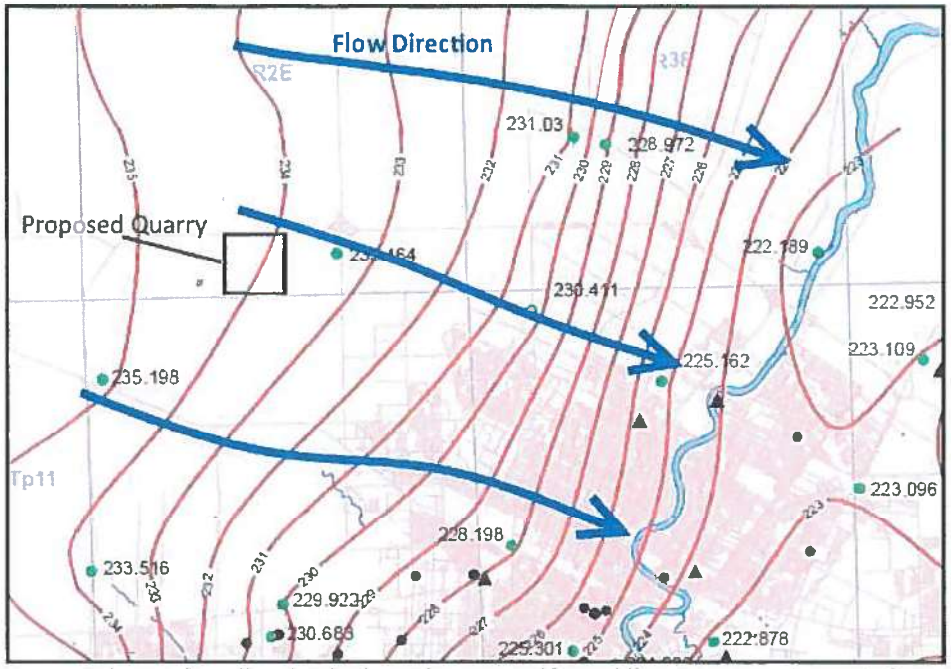


Figure 4 – Approximate groundwater flow direction in the carbonate aquifer; red lines represent the potentiometric surface; blue lines indicate flow direction. (Modified source – MSD, 2006)

The period of observation available for the regional hydrograph record is variable. Some monitoring stations date back to the mid 1960s, although most were installed after 1995. A composite plot of nine nearby hydrograph stations is shown below in Figure 5. Total annual precipitation data, shown on the following page as Figure 6, is included to supplement the analysis.

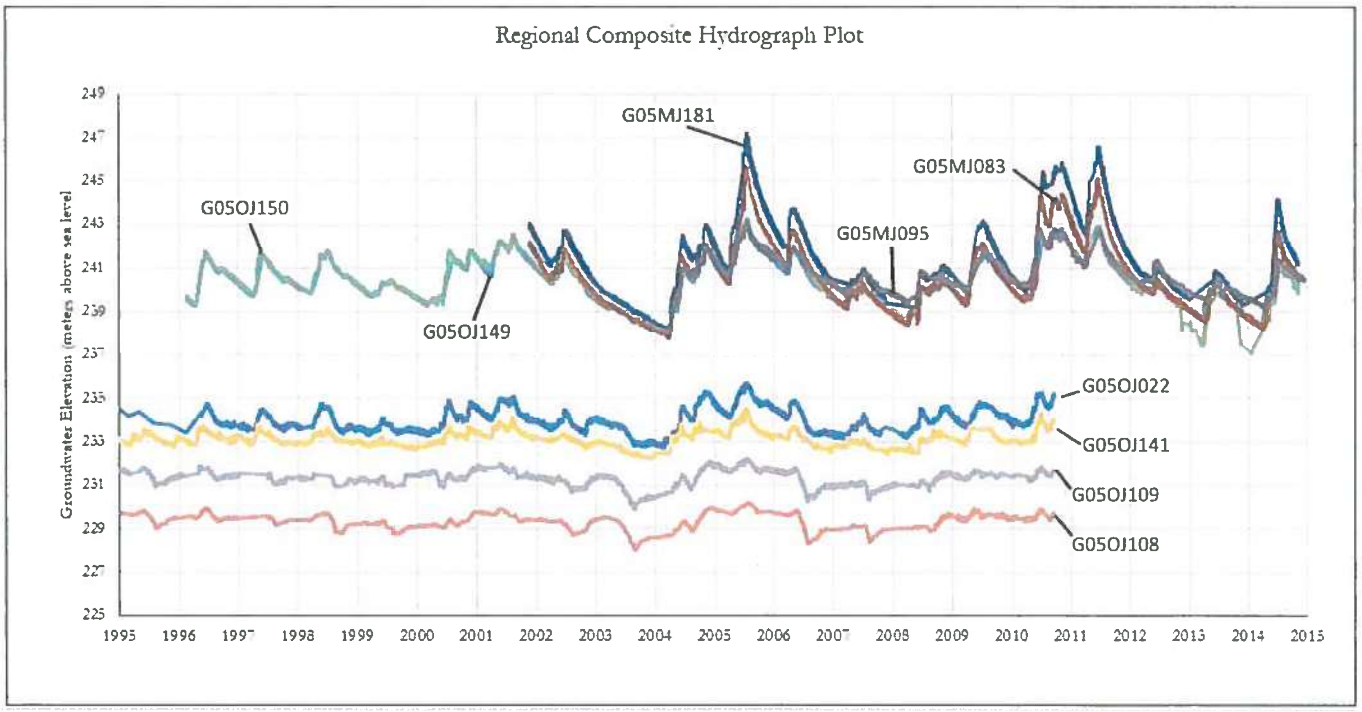


Figure 5 – composite hydrograph plot of data from regional monitoring stations. (MSD, 2016)

Hydrogeology (cont'd)

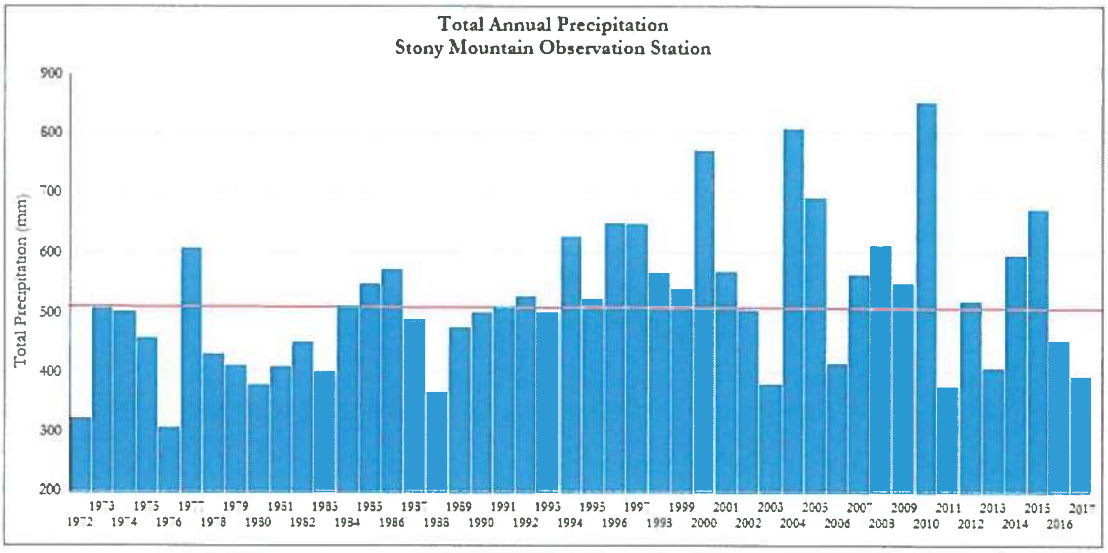


Figure 6 – Total precipitation – Stony Mountain Station, 1972 to 2017; average for the period is 518 mm/year (orange line). (data source – Environment Canada, 2018)

It is apparent from the hydrographs that static water levels in the carbonate aquifer follow seasonal and climatic trends. For example, in the years 2004 and 2005, when the total annual precipitation was well above average, groundwater levels rose significantly, reaching the highest levels recorded on the chart. The response to precipitation events is more pronounced in wells proximal to the recharge zone and appears to be dampened with increasing distance from the recharge zone. Long term trends indicate a relatively stable average groundwater elevation, and no long term drawdown was apparent from the hydrograph records.

Groundwater levels at the proposed quarry site are also expected to fluctuate based on seasonal and climatic variations. The chart of G05OJ022 is considered to closely reflect groundwater conditions in the area. Groundwater fluctuations on the order of 10 ft. are observed for the area. Given the recent years of below average precipitation, groundwater levels are expected to be at the low end of the range. However, the record also indicates that recovery occurs quick with wet conditions. The typical groundwater elevation at the site is expected to be around 237-233 m geodetic.

Groundwater Geochemistry

The available chemistry data from nearby MSD hydrograph stations was reviewed. The results are detailed below in Table 1 and plotted on the following page in Figure 7. The geochemistry of groundwater appears to be variable throughout the region. The samples plot as calcium/magnesium/bicarbonate type groundwater, which is typical for the area.

Groundwater quality appears to be controlled largely by the distance from recharge zones and the depth below grade. The freshest quality groundwater was collected from wells which are all relatively close to the Stonewall recharge area. The poorest quality samples were collected from wells which are farthest down gradient in the sample set. The sample from G05OJ149, a deep observation well, contained markedly higher concentrations of sodium and chloride than the shallower wells installed at similar locations. These results suggest that groundwater quality within the aquifers ranges with depth below grade.

Table 1
Regional Groundwater Geochemistry

Station	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	TDS	Nitrate
G05OJ022	89.1	89	107	12.9	0.5	510	87.4	186	864	0.08
G05OJ150	62.1	60.1	31.5	11.7	0.5	488	26.3	39	474	1.05
G05OJ149	94.5	63.6	84.7	13.1	0.5	522	116	82.4	700	0.01

Table 1 – Geochemistry results from the regional provincial observation wells (source – MSD, 2016).

Groundwater Geochemistry (cont'd)

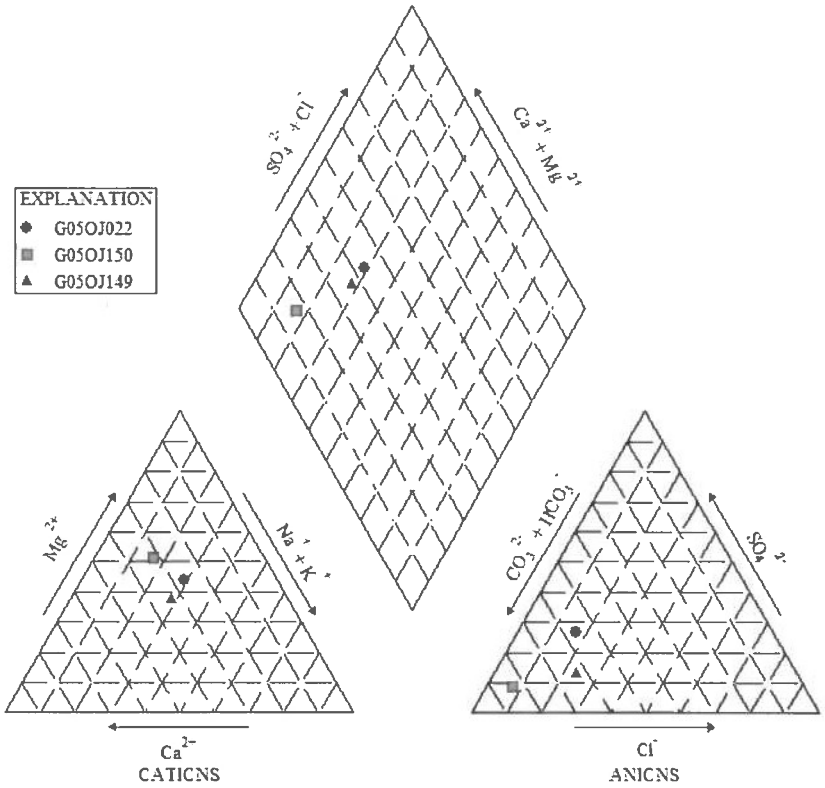


Figure 7 – Trilinear plot of regional groundwater quality. (source - MSD hydrograph network)

Significant water quality differences have been noted between the carbonate formations, in some locations. MSD has noted several instances where bacterial and organic compounds have impacted the upper aquifer, mainly due the shallow burial of the aquifer in the Stonewall and Stony Mountain areas. Leaking septic tanks, agricultural operations, and other land uses have also impacted the water quality in the upper Stony Mountain Formation, especially in the Stonewall area. In general, water quality in the underlying Red River Formation has been considered to be more suitable for domestic and municipal water supply.

Station, G05OJ022, is nearest to the proposed quarry site and is completed into the deeper carbonate aquifer formations. The total dissolved solids are expected to be in the range of 400 to 600 mg/L, with relatively low concentrations of sodium and chloride. It should be noted that these samples were collected by MSD from provincial monitoring wells, shown in Figure 3. Friesen Drillers has not verified the sample results and has assumed them to be correct and representative of actual groundwater conditions.

Nitrate, a common contaminant in groundwater, has been detected in groundwater samples from the region with somewhat alarming concentrations. Nitrate concentrations were above detection limits in four of the nine provincial observation wells reviewed. The sample with the highest concentration was collected from G05MJ081, which reported a value of 5.44 mg/L. It is interesting to note that the samples with the highest nitrate concentrations come from the shallow wells installed near the recharge area. This is to be expected, as the thin overburden in these areas reduces the protection to the aquifer from surface activities.

Sources of nitrate include leaching or runoff from agricultural and fertilizer use, sewage and manure, or as a product of excess ammonia or nitrification (Freeze and Cherry, 1979). The recommended maximum limit for nitrate in drinking water from the Canadian Drinking Water Quality Guidelines is 10 mg/L (Health Canada, 2014). Bottle fed babies subjected to nitrate in groundwater above the recommended maximum limit have higher risks of developing methaemoglobinaemia (blue baby syndrome) and thyroid gland problems (Health Canada, 2014). An elevated nitrate concentration in groundwater is a serious issue if the groundwater is regularly consumed in an untreated manner (Health Canada, 2014). The underlying issue with nitrate is that the mere presence indicates that groundwater in the area is negatively interacting with surface activities.

Previous investigations in the region have suggested that groundwater in the area has already been heavily influenced by surface activities which generate nitrates. This is an item of concern, and one that requires attention. Although it is common to have individual private septic facilities in the area, the presence of these systems in a groundwater recharge area is also a source of concern.

Well Inventory Review and Update

Previous work conducted in the area has revealed that a high percentage of private domestic wells are in relatively poor condition based on the parameters of well age, construction type, materials, and hookup type. Modern wells are constructed with PVC casing and include a modern brass hook up, complete with a manufactured pitless unit. Wells constructed prior to 1990 often have galvanized products used in the plumbing connection which can corrode over time and can allow for contaminated surface water to enter a well. This is especially an issue for the older galvanized well casings in the area.

Wells constructed in well pits were common prior to the 1960's/1970's, and have not been an accepted well hook up method for many years. Well pits were used to protect water line connections from freezing and to provide access to underground water line connections below the frost line. Well casings were cut off below the frost line and a large cribbing, usually made of either wood or concrete was placed over the top of the well. Professional well hook up contractors have not typically completed wells in pits for nearly 50 years.

New regulations, currently in discussion with government, will require new wells be installed with a pit less configuration. Well pits pose a serious risk of groundwater contamination by allowing for surface run-off to easily enter the aquifer. In addition, septic lines and waste lines are also buried in a similar manner, which can lead to interconnection under the backfill of a house basement/weeping tile/sump pits/etc. Well pits are a serious issue and need to be addressed immediately. When the well pit becomes flooded, contaminated surface water carrying debris, bacteria, pesticides, fertilizers and oil products can enter and contaminate the aquifer. Vermin and other animals can enter the well pit which can cause further contamination.

A review of the GWDRILL (2016) database identified 75 groundwater wells present within two miles from the study site perimeter. A summary of the results is shown as Table 2, attached. From the available records, 45 of the 75 wells (~60 %) have a construction date prior to 1990. The total well depths ranged from 35 to 325 feet below grade, with an average depth of 136 feet below grade. The depth of casing ranged from 10 to 134 feet below grade, with an average casing depth of 55 feet below grade. The average static water level was reported to be 17.5 feet below grade. The vast majority of the wells were noted to be used for domestic purposed, however, a few wells were noted to be used for air conditioning, recharge and livestock purposes.

The results from the desktop well inventory suggest that many of the wells in the area surrounding the proposed quarry site are expected to be in relatively poor condition. It is recommended that a field inventory be conducted to inspect the well conditions and collect raw water samples from the wells. In addition, the results indicate that a majority of the wells are constructed into the deeper Red River Formation aquifer. The completion of wells into the RRF reduces the potential for negative impacts to the wells as some degree of hydraulic separation (Gunn member) is shown to exist between the shallower rocks and the RRF.

It is important to note that the GWDRILL database was initiated in 1964. Consequently, wells constructed earlier to this date are unlikely to be included in the database. In addition, it is generally understood that the database includes a record for approximately half of the wells in the field. A field inventory would confirm the location, condition and current state of use for each well and establish a baseline for regional groundwater quality prior to quarry operation.

Assessment of Potential Dewatering Requirements

Previous investigations indicated the approximate maximum quarry depth would be up to 25 feet (~7.6 m) below an assumed grade elevation of 240 m. In addition, the approximate top of the limestone bedrock is considered to be at 235 m. This results in a quarry base elevation of approximately 232.4 m geodetic. Based on hydrograph data (G05OJ022), static groundwater levels at the site are expected to fluctuate between about 233 and 235 m geodetic elevation. Based on these assumptions, the water level would need to be lowered 3-5 m (9.8-16.4 ft.) to dewater the bedrock to the lowest excavation levels. Figure 8, shown on the following page, illustrates the relative elevations in relation to the regional groundwater fluctuations at the quarry site. It is important to note that this assessment is based off on the available regional data and that conditions in the aquifer are shown to be dynamic. Ongoing monitoring is recommended to confirm site specific hydrogeological conditions.

In the event that dewatering would be required, site specific testing at the time of implementation would be necessary to assess the potential response of the local aquifer to pumping stresses based on current conditions. Based on the aquifer parameters inferred from previous studies, to lower the groundwater level at the site by 12 feet would require sustained pumping at rates of 250 - 1,000 U.S.G.P.M. or more. The range is based on largely on the transmissive conditions encountered at the time of dewatering. The calculations were based on the Theis (1935) equation and assumption with the following parameters:

- Transmissivity: 20,000 - 98,000 US.G.P.D./ft.
- Storage coefficient: 1.0×10^{-4}

Assessment of Potential Dewatering Requirements (cont'd)

- Pumping duration: 90 days.
- Radial distance: 750 feet.

It is assumed that a water supply will be required for quarry operation. Depending on the water demand, it is possible that a groundwater supply could be designed to satisfy dewatering requirements as well. Siting the supply well locations would require additional information, including the proposed water demand, site specific geology/hydrogeology, and quarry development plans. Any implemented system should be designed and monitored by a professional hydrogeologist or engineer licensed to practice in Manitoba.

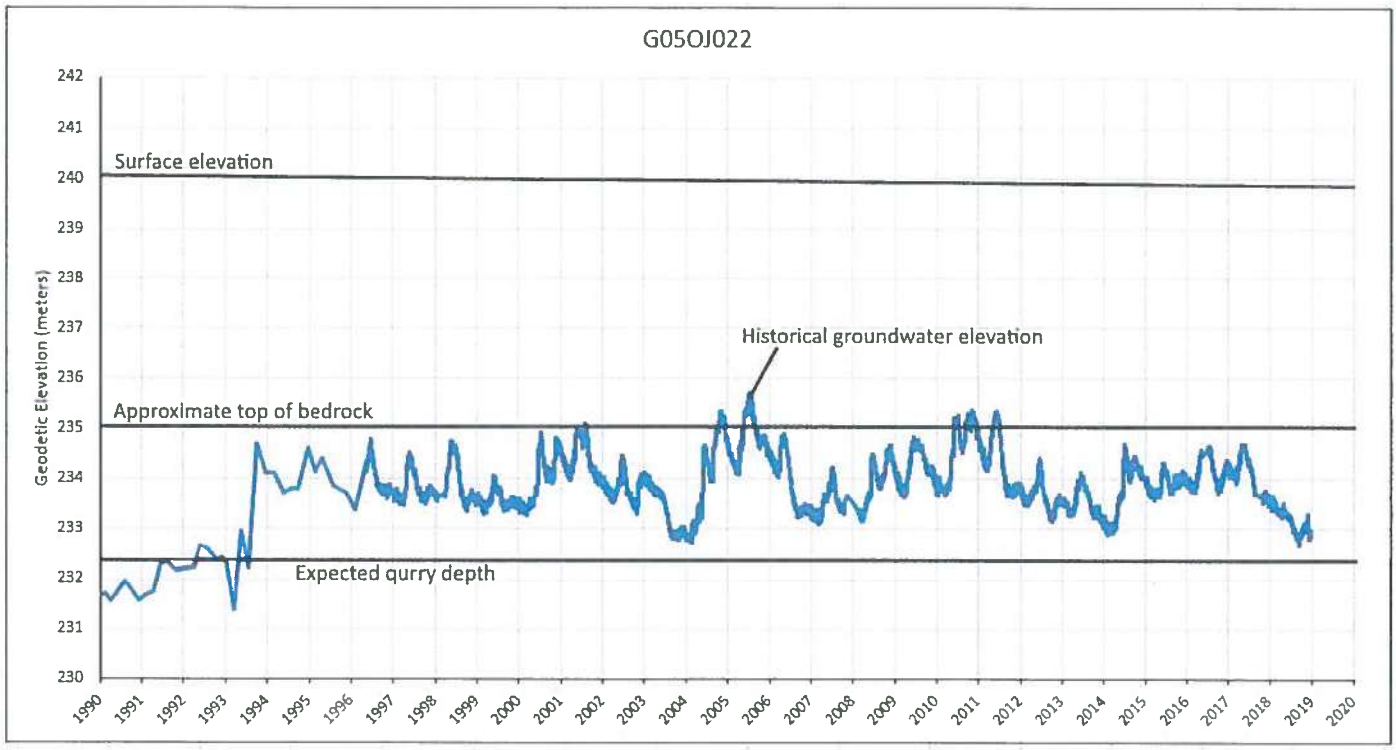


Figure 8 – Quarry elevations in relation to historical regional groundwater fluctuations. (data source - MSD, 2019)

Discussions and Recommendations

To date, MSD has not noted any water quality changes or impacts from the long standing quarry operations in the region. The bedrock aquifers in the area have a naturally shallow burial depth and have the potential to be impacted from surface activities such as landfills, lagoons, or leaking septic tanks. It is highly likely that the elevated nitrates in the region are a result of the shallow burial of the carbonate aquifer.

The Stonewall upland area serves as a major source of recharge to the carbonate aquifer and all activities in the area should take this into account. The storage of fuels and oils, etc. should be done in an environmentally friendly manner, along with the collection of on-site wastewater and wash water. Refueling should not take place on the quarry floor.

To minimize potential impacts to deeper aquifer formations, it is recommended that excavation does not penetrate the Gunn Member of the Stony Mountain Formation.

Regional hydrograph data indicates the target rocks are saturated to various levels depending on seasonal and climactic conditions. If dry rock conditions are required to quarry, dewatering will likely be required.

A dewatering system at the proposed quarry site may encounter challenges dealing with the seepage inflows into the excavations under higher static water level conditions in the Stony Mountain Formation, especially when mining the deeper portions of the bedrock.

Discussions and Recommendations (Cont'd)

Additional testing would be needed to quantify the required pumping rates and the potential aquifer responses. Preliminary estimates indicate pumping rates in the range of 250-1,000 U.S.G.P.M. or more may be required.

In our view, dewatering operations constitute groundwater use and would require a Water Rights diversion License from MSD, although this opinion should be confirmed.

Based on the available information, the potential dewatering level is above the lowest historic levels on nearby hydrograph charts. Consequently, the overall risk of negative impacts to a significant number of off site wells is considered to be low. However, we suggest the quarry development plan have procedures to deal with potential issues relating to third party groundwater users. An inspection of nearby private wells near the proposed quarrying operation is recommended prior to undertaking aggregate mining. Wells with short casing sections, or open hole through both aquifers should be monitored closely for water quality changes.

We recommend that the individual private well inventory conducted previously be reviewed and that any new wells be inspected. This should be undertaken to determine a baseline condition of the existing wells and to review the well hook ups and well completions. Baseline groundwater quality samples should also be collected. This work should be undertaken by qualified personnel that are familiar with domestic water wells and well hook ups. A licensed driller in the Province of Manitoba should undertake this work. The work should also be supervised and documented by a professional hydrogeologist or engineer.

It should be noted that a significant nitrate problem exists in the area up gradient from the proposed quarry. Site specific monitoring should be conducted to confirm local conditions in the quarry area prior to any development activity. Some of the practices in this area should be reviewed, as there are strong indicators that these practices are having a significant impact on this aquifer system.

We thank you for the opportunity to be of continued service to Broda Properties.

Should you require anything further, please call us at 204-326-2485.

Sincerely

Friesen Drillers Limited

Justin E. Neufeld, GIT
Groundwater Geologist

PROVINCE OF MANITOBA
March 14/19
J. J.
BELL
Member
22621
REGISTERED PROFESSIONAL ENGINEER

Reviewed by

Friesen Drillers Limited

(J. Jeff) Bell, B.Sc.(G.E.), P.Eng.
Hydrogeological Engineer

APEGM
Certificate of Authorization
Friesen Drillers Limited
No. 4016 Date: March 14/2019

Attachments Table 2 – Well inventory update

References

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Limitations

The scope of this report is limited to the matters expressly covered and is intended solely for the client to whom it is addressed. Friesen Drillers Limited makes no warranties, expressed or implied, including without limitation, as to the marketability of the site, or fitness to a particular use. The assessment was conducted using standard engineering and scientific judgment, principles, and practices, within a practical scope and budget. It is based partially on the observations of the assessor during the site visit in conjunction with archival information obtained from a number of sources, which is assumed to be correct. Except as provided, Friesen Drillers Limited has made no independent investigations to verify the accuracy or completeness of the information obtained from secondary sources or personal interviews. Generally, the findings, conclusions, and recommendations are based on a limited amount of data (e.g. number of boreholes drilled or water quality samples submitted for laboratory analysis) interpolated between sampling points and the actual conditions on the site may vary from that described above. Any findings regarding the site conditions different from those described above upon which this report was based will consequently change Friesen Drillers Limited's conclusions and recommendations.

Disclaimer

This Friesen Drillers Limited report has been prepared in response to the specific requests for services from the client to whom it is addressed. The content of this document is not intended to be relied upon by any person, firm, or corporation, other than the client of Friesen Drillers Limited, to who it is addressed. Friesen Drillers Limited denies any liability whatsoever to other parties who may obtain access to this document by them, without express prior written authority of Friesen Drillers Limited and the client who has commissioned this document.

Table 2
Well Inventory – 3,200 Meter (2.0 mile radius)
Proposed Quarry Site - Section 4-12-2 EPM – RM of Rosser

No.	Location	Owner	Driller	Well Use	Date	Depth (ft.)	S.W.L. (ft.)	P.W.L. (ft.)	Rate igpm
1	SE4-12-2E	BRODA CONSTRUCTION LIMITED	Friesen Drillers Ltd.	P	2006	39	11.1	17.5	165
2	SW-4-12-2E	L LAWRENCE	Friesen Drillers Ltd.	P	1978	149.9	16	25	24.9
3	SW-4-12-2E	N MARTIN	Stonewall Drilling	P	1993	135.9	18	N/A	299.8
4	NE-4-12-2E	D RITCHIE	Echo Drilling Ltd.	P	1987	139.9	15	17	19.9
5	SW4-12-2E	CRYSTAL CHARTRAND	UNKNOWN	P	1900	N/A	N/A	N/A	N/A
6	SW3-12-2E	ERNIE FUTROS	Perimeter Drilling Ltd.	R	1992	200	45	45	25
7	SW3-12-2E	ERNIE FUTROS JR.	Perimeter Drilling Ltd.	P	1992	270	47	49	35
8	NW33-11-2E	LACH BROS	Friesen Drillers Ltd.	P	1980	209.9	21	60	99.9
9	NW33-11-2E	G LACH	R. MUELLER DRILLING	P	1976	142.9	25	N/A	10
10	SE9-12-2E	DON MOURANT	Perimeter Drilling Ltd.	P	2003	110	20	21	80
11	SE-9-12-2E	R VAGER	PRUDEN DRILLING CO. LTD.	P	1964	148.9	14	N/A	19.9
12	SE-9-12-2E	D DOROSCHUK	Stonewall Drilling	P	1982	111.9	21	N/A	15
13	SE-9-12-2E	G MOHR	Stonewall Drilling	P	1979	149.9	11	19	11.9
14	NE-5-12-2E	VAGER BUILDERS	PRUDEN DRILLING CO. LTD.	P	1968	50	5	N/A	10
15	NE33-11-2E	SENECA KENNALS	Perimeter Drilling Ltd.	P	2012	220	6	N/A	120
16	9-12-2E	D DOROSHUK	Ford Drilling Ltd.	P	1973	104.9	20	N/A	6.9
17	9-12-2E	D RIEKE	Perimeter Drilling Ltd.	P	1990	124.9	15	N/A	99.9
18	NE32-11-2E	J OATWAY	Stonewall Drilling	P	1985	143.9	20	28	24.9
19	SW-10-12-2E	C KLIMPKE	Stonewall Drilling	P	1983	77.9	14	20	44.9
20	SW-10-12-2E	FUL-FLOW INDUSTRIES	Ford Drilling Ltd.	P	1980	119.9	0	22	19.9
21	SW10-12-2E	MARGARET MCKEWEN	Perimeter Drilling Ltd.	P	1996	100	25	N/A	100
22	SW-10-12-2E	FUL-FLO INDUSTRIES	Perimeter Drilling Ltd.	P	1988	141.9	20	17	109.9
23	SE-8-12-2E	N PERIMITER CONST	Stonewall Drilling	P	1989	179.9	19	N/A	39.9
24	SE8-12-2E	MARGIN OATWAY	Interlake Water Supply	P	1981	35	17	N/A	15
25	NW34-11-2E	D KROLL	Paul Slusarchuk Well Drilling LTd.	P	1983	185.9	27	N/A	24.9
26	NW9-12-2E	TOM JOUBERT	UNKNOWN	P	1974	N/A	N/A	N/A	N/A
27	NW9-12-2E	TOM JOUBERT	UNKNOWN	P	1997	N/A	N/A	N/A	N/A
28	SW-5-12-2E	J OATWAY	Stonewall Drilling	P	1978	76	7	10	10
29	NE9-12-2E	DENISE RIEHL	Perimeter Drilling Ltd.	P	1996	160	20	N/A	15
30	NE-9-12-2E	H MCDONALD CONST	PRUDEN DRILLING CO. LTD.	P	1964	97.9	10	N/A	19.9
31	NW-9-12-2E	R MUELLER	R. MUELLER DRILLING	P	1976	N/A	0	N/A	10
32	NW-9-12-2E	M CHATFIELD	Perimeter Drilling Ltd.	P	1989	104.9	15	15	79.9

33	32-11-2E	P HUDSON	MIKE FUTROS & SONS	P	1970	210.9	5	18	45.9
34	SW-34-11-2E	N FINKEL	SONIC DRILLING CO. LTD	P	1966	149.9	29	47	49.9
35	10-12-2E	C KLIMPKE	Stonewall Drilling	P	1981	134.9	14	25	15
36	10-12-2E	E KLIMPKE	Friesen Drillers Ltd.	P	1979	104.9	14	34	10
37	SE-10-12-2E	W KLIMPKE	PRUDEN DRILLING CO. LTD.	P	1966	100.9	7	9	19.9
38	SE-10-12-2E	BUILDING PRODUCTS	Paul Slusarchuk Well Drilling LTd.	P	1991	325.8	17	N/A	99.9
39	NW32-11-2E	D PEDERSEN	Stonewall Drilling	P	1981	102.9	12	20	39.9
40	NW-10-12-2E	W PETLOCK	WALKER, LORNE	P	1969	99.9	25	35	19.9
41	NW10-12-2E	CHALDEM PASAK	Stonewall Drilling	P	2000	122	20	N/A	50
42	NE-8-12-2E	N SMITH	Paul Slusarchuk Well Drilling LTd.	P	1971	138.9	17	25	29.9
43	NE-8-12-2E	S FUTROS	MANITOBA DIAMOND DRILLERS LTD.	P	1985	84.9	5	5	7.9
44	NE34-11-2E	MANITOBA HYDRO	UNKNOWN	P	2012	N/A	N/A	N/A	N/A
45	10-12-2E	MANITOBA INFRASTRUCTURE AND TRANSPORTATION	UNKNOWN	P	1900	N/A	N/A	N/A	N/A
46	NE8-12-2E	RM OF ROSSER	Perimeter Drilling Ltd.	P	1994	221.9	6	79.9	261.8
47	NW10-12-2E	CHALOEM PASAK	Stonewall Drilling	P	1981	122.9	18	26	24.9
48	NE10-12-2E	ROB SIMIACO	Perimeter Drilling Ltd.	P	1998	240	45	N/A	13.9
49	NE10-12-2E	ADESA CAR AUCTION	Maple Leaf Enterprises Ltd.	P	2004	120	4	N/A	N/A

Notes

All information sourced from Manitoba Sustainable Development – GWDRILL, (2016 edition)

Friesen Drillers Limited has not verified or field confirmed any data present in this table. All yields and static water levels are as reported and have not been verified by Friesen Drillers Limited. Current well use or operations are unknown for all wells listed.

S.W.L. – Static water level; P.W.L. – Pumping water level; N/A – Not Available; P – Production; R – Recharge.

WATER and NATURAL RESOURCES MANAGEMENT PLAN
in SATISFACTION of RURAL MUNICIPALITY OF ROSSER
QUARRY OPERATION BY-LAW NO. 8-15

SUBMITTED TO:

North Perimeter Aggregates Inc.
Broda Properties Inc.

PREPARED BY:

MLi3 Inc.

March 1, 2019

ACKNOWLEDGEMENTS

MLi3 Inc. acknowledges with gratitude the guidance and suggestions received from government representatives who offered input into the development of this Water and Natural Resources Plan (WNPMP). Further, gratitude is expressed for the guidance and suggestions offered by neighbouring landowners who voluntarily participated in the 2008-2009 Citizens Advisory Committee process to constructively critique (i) Broda's design of the evolving project, and (ii) Tetr*ES* Consultants Inc.'s 2010 Environmental Impact Assessment of the then-current project. The contributions to the WNRMP of the former Tetr*ES* team that now are part of and support Broda through MLi3 Inc. are acknowledged with particular appreciation. Third-Party Peer Review by and suggestions from Mr. Geoff Reimer, P.Eng. of GPR Project Management and Consulting Inc. were especially helpful. They are also acknowledged with particular gratitude. Third-Party Peer Reviews by Mr. David Capelle, Ph.D. and a highly respected and experienced Water Resources Engineer in Manitoba are also acknowledged with gratitude. Relevant information prepared by DST Consulting Engineers Inc., WSP Engineering and HCG Engineering is acknowledged with appreciation.

STUDY TEAM

J. Michael McKernan	Environmental Scientist; Principal in Charge
Mike J. Sweet	Environmental Scientist
Sandy Gorrie	Survey Botanist and Plant Taxonomist
Richard Bruneau	Researcher; Information Management Specialist
Anna Morrison	Researcher, Document Production, and QA

DISCLAIMER

MLi3 Inc. accepts no responsibility for damages of any kind, if any, suffered by any third party as a result of decisions made or actions based on this Water and Natural Resources Management Plan ("WNRMP; this report"). All conclusions, views, and opinions expressed in this report are those of MLi3 Inc.

USE OF THIS REPORT:

This report has been prepared for the sole benefit of Broda Properties Inc. ("Broda", or "the Client" or its agent) and may not be used by any third party without the express written consent of MLi3 Inc. and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT:

The information, opinions, and/or recommendations made in this report are in accordance with MLi3 Inc.'s present understanding of the Client's site(s) and/or the project(s) and/or actions referenced herein. If the proposed site-specific locations, site uses, actions and/or project(s) differ(s) or is/are modified from what is described in this report, or if the site conditions as described herein are altered, this report is no longer valid unless MLi3 Inc. is requested by the Client to review and revise the report to reflect the differing or modified location, land use and/or project specifics and/or the altered site condition(s).

STANDARD OF CARE:

Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in Manitoba for the specific professional service provided for the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS:

All site-specific descriptions, and statements regarding their influence on the findings and recommendations made in this report, are based on site conditions encountered by MLi3 Inc. at the time of its site-specific work and at the specific testing and/or sampling locations on the Client's property(s) examined by either Tetr*ES* Consultants Inc. or Stantec Consulting Ltd. by whom the author was employed over the periods, respectively, of 1990-2010 and 2010-2015. Environmental descriptions and other classifications and/or statements of site condition(s) have been made in accordance with normally accepted professional practices which are judgmental in nature; no specific description in this report should be considered exact, but rather to be reflective of the anticipated behaviour of the material or matrix in question. Extrapolation of in situ conditions can be made only to some limited extent beyond the understandings set out herein, being in turn based on specific localized sampling or test points. The extent depends on variability of the soil, rock, groundwater conditions, species composition, habitat types, habitat uses, etc., as influenced by geological processes, time, seasons, planned construction activity, and intended site use(s).

VARYING OR UNEXPECTED CONDITIONS:

Should any site or subsurface condition(s) be encountered in the future, if the proposed land use or project proceeds, that are different from those described in this report or encountered at the test locations referenced herein, MLi3 Inc. must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. MLi3 Inc. will not be responsible to any party for damages incurred as a result of that party failing to notify MLi3 that differing site or subsurface condition(s) are present upon becoming aware of such conditions.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

STUDY TEAM

DISCLAIMER

1.0 INTRODUCTION

1.1 INTENT TO DEVELOP HIGH-QUALITY AGGREGATE QUARRY

Broda Properties Inc. (operating in Manitoba as "North Perimeter Aggregates Inc.") has been working to develop a high-quality aggregate-supply business on the property it owns in the Rural Municipality (RM) of Rosser. The site is approximately 589 acres on lands in Section 4, Township 12, Range 2, EPM, and Section 33, Township 11, Range 2 EPM. All land in the proposed project is held by Broda.

The proposed multi-stage development is located close to and west of the intersection of Mollard Road and Metro Route 90, immediately west of Klimpke Road, ~3 km (~2 miles) southeast of the intersection of the Perimeter Highway (Provincial Trunk Highway [PTH] 101) and PTH 7 (Figure 1-1).

Figure 1-1. Development is located 1-2 miles south of Perimeter Highway, west of intersection of Mollard Road and Metro Route 90, between Sturgeon Rd (west), Klimpke Rd. (east). Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010.

The proposed operation is not a use that was permitted under the former land-use planning and administration scheme that applied to the lands before creation of CentrePort in 2008. The property is zoned for agriculture, the prevailing local land use (Figure 1-2). (The prevalence of the agricultural land use is evident in digital imagery routinely captured by satellites [Figure 1-3])

Figure 1-2. The development is planned for land now zoned and used for agriculture south of Perimeter Highway, west of west of Metro Route 90. Source: Google Earth, MLi3 Inc.

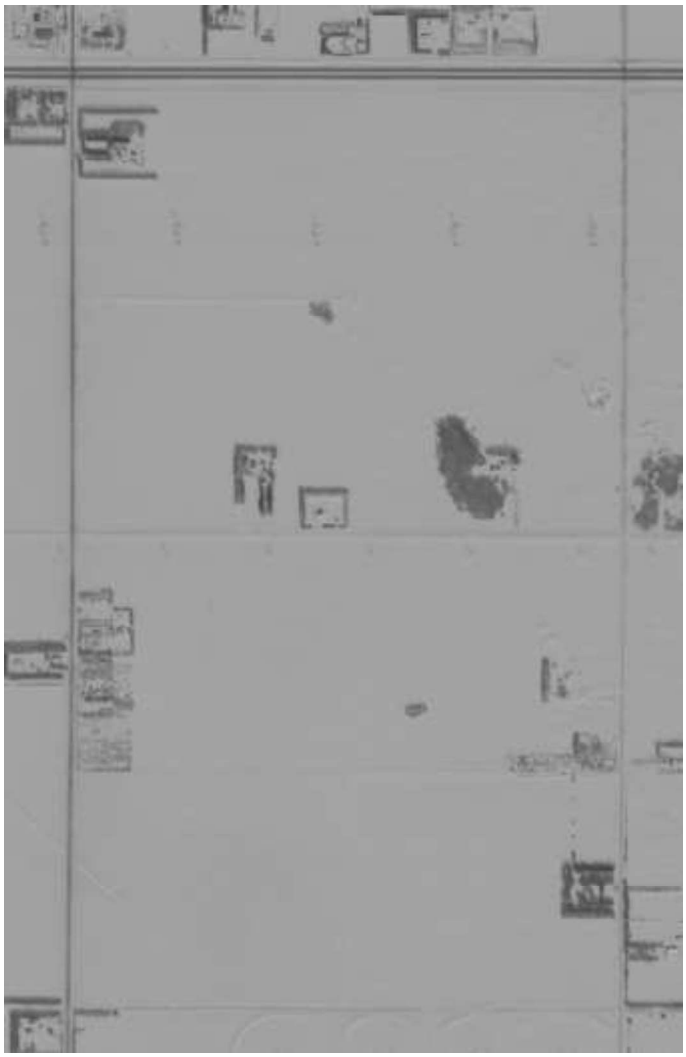

Figure 1-3. Prevalence of agriculture is reflected in unsupervised classification mapping of grey-toned "spectral signature" for cropland in recent satellite image. Darker polygons are shelterbelts, woodlots, houses, machine sheds, etc. Source: Google Earth, MLi3 Inc.

Accordingly, to support applications for Conditional Approval by the RM and South Interlake Planning Board (SIPD) of the proposed new land use, Broda worked for several years with the information and guidance from a Citizens Advisory Committee (CAC) of neighbouring landowners. This Committee collaborated briefly with Broda in 2005-2006 to help plan a project where all possible potential impacts could be identified, assessed and precluded. This was then expected to occur through a combination of careful project development and impact mitigation, ongoing environmental monitoring, and ongoing collaboration with the CAC.

The proactivity of Broda's approach, and the very high level of corporate commitments to the highest standards of possible environmental and socioeconomic care notwithstanding, several applications for the requested change in land-use zoning over many years were rejected by Rosser Council (and, accordingly, SIPD). Broda has, nonetheless, continued to believe in the

intrinsic value of the project. Broda continues to believe that there was, and is, significant growing economic need and opportunity.

Broda has therefore continued to invest in building the knowledge necessary to develop the site in a sensitive fashion, consistent with the state-of-the-art in limestone quarry development and operations.

Recent (2016) changes in the planning processes applying to the lands within the CentrePort Special Planning Area (SPA) acknowledge that the quarries should be a "permitted use". This intent is consistent with the Inland Port SPA Regulation 48/2016, specifically its Aggregate Policy 6.1.2.3. This Policy notes that in "an area designated by the appropriate provincial authority as having 'high' or 'medium' mineral content must have the mineral extracted prior to it being developed for other uses, unless otherwise approved by the authority". The Broda property is located above the last undeveloped provincially-designated 'High Quality" limestone ore body (Figure 1-4; Baracos 1983). Recovering these high-value construction materials can reduce the costs of infrastructure construction in the Winnipeg-centred region, improving construction-project economics.

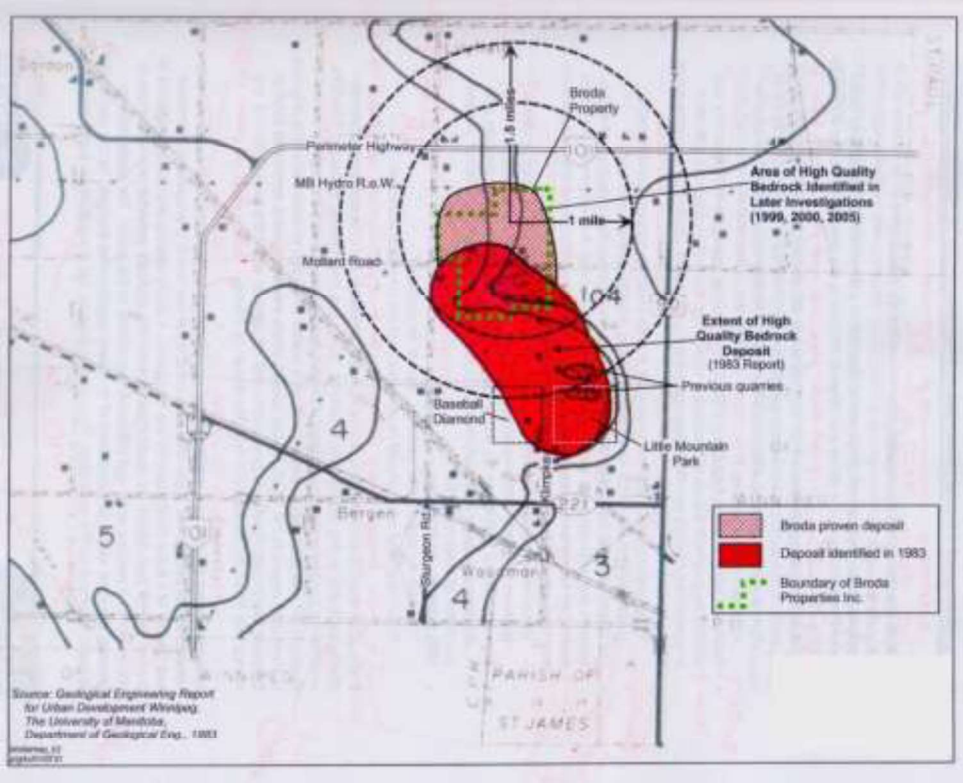

Figure 1-4. Development is located above last undeveloped provincially-designated 'High Quality" limestone-ore body. Deposits under Broda land have variable surficial topography, and are northern continuity of a geological formation trending to southeast. Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010.

To be developed in five stages, the highest concentration of the highest-value materials, located generally north of Mollard Rd., will be quarried first (Figure 1-5). This first few stages of the project development are often termed "Stage 1" throughout this report (and in related documents prepared by MLi3 for Broda). A portion of Little Mountain Park immediately southeast of the

property (Figure 1-4) was the land use developed after aggregate materials from the southerly extension of the same geological formation were quarried.

Figure 1-5. Initial development stages will address variable elevations and thicknesses of last undeveloped provincially-designated 'High Quality" limestone-ore body. Shape of complete excavation is nominal; i.e., expected but not certain. Shape will depend on field conditions. Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010

1.2 PROVINCIAL REGULATORY GUIDANCE FOR QUARRY DEVELOPMENT

The CentrePort Act, assented to on October 9, 2008, mandates the creation of an "inland port" to encourage transportation, warehousing, trade, manufacturing, and distribution throughout Manitoba, but especially in proximity to the James Armstrong Richardson International Airport. The province initiated a process to create a "Manitoba Development Plan for CentrePort Lands", which included public, multi-stakeholder liaison, and consultations. The resulting planning scheme for the CentrePort land base proposed an enhanced future for the 20,000 acres within the Perimeter Highway considered necessary for the Project (MMM Group 2009). About 54% of the CentrePort lands fall within the RM of Rosser.

The Province has authority to ensure that quarries developed on Crown lands satisfy the stringent requirements for Environmental and Community Interests Protection under the *Mines and Minerals Act*. The planning, operations-related monitoring, and decommissioning requirements set out under The *Quarry Minerals Regulation* (QMR; MR 65/92) amplify these protections. They do so in the form of specific prescriptions for beneficial action, and against specific unwanted action. These prescriptions apply strictly to projects proposed on Crown lands. Their

protective value, however, means that they are often applied to various processes for permitting, or to approvals, for private-land development. Clause 43(1)(b)(ii) of the QMR requires minimum separation/setback distance of 400 m between any rural residence and the aggregate-mining boundary. Most rural municipalities regulating aggregate operations use this setback distance as a condition in a CUA decision to create a "buffer zone". Another example would be decisions by Manitoba Sustainable Development to include several of these QMR prescriptions as conditions if a license were to be issued under *The Environment Act*.

1.3 GUIDANCE FOR QUARRY DEVELOPMENT ON CENTREPORT LANDS

The *Inland Port SPA Planning Regulation* MR 48/2016 allow a quarry as permitted land use within the Heavy Industrial Zone (Class 3; "I3"), on the CentrePort lands within the RM of Rosser. Taken together, they create another set of protections for environmental and community interests. Approval of a proposed quarry, pursuant to rezoning recommendations of the Inland Port SPA Planning Authority Board which has jurisdiction over these lands, must be made by the Minister of Indigenous and Municipal Relations. The Minister's decision can occur only after a public review of the proposal, including a public hearing administered by the Planning Authority Board.

1.4 R.M. OF ROSSER QUARRY OPERATIONS BY-LAW

In addition to these levels of environmental and community protection, including the requirements for a public hearing, and a review and issuance of approval conditions by an independent Planning Board that it co-chairs, Rosser has created a special By-law ("Quarry Operations By-Law"; Rosser By-law No. 8-15; a.k.a. the "Aggregate By-law") to create further control over such aggregate operations.

1.4.1 Assessment and Plans Required by Quarry-Operations By-law

As one type of control measure included in the Aggregate By-law, the By-law sets out requirements for several formal Assessments and Plans that must be reviewed and approved by Rosser. As prescribed in the By-law, set out in Clause 13 and Schedule A, and along with other Plans that Broda will prepare to satisfy various other requirements (e.g., MLi3 2019f), these specific Plans include the following:

- "Adaptive Management Plan" (submitted as the "Adaptive Management and Progressive Rehabilitation Plan"; ["AMPRP"]; MLi3 2019a)
- "Progressive Rehabilitation Plan" (subsumed within the AMPRP; MLi3 2019a)
- "Sound Impact Assessment" (submitted as the "Sound Impact Management Plan and Sound Impact Assessment"; ["SIMPSIA"]; MLi3 2019b)
- "Transportation Plan" (MLi3 2019c)
- "Visual Impact Assessment (submitted as the "Visual Impact Management Plan and Visual Impact Assessment"; ["VIMPVIA"]; MLi3 2019d)
- "Water and Natural Resources Management Plan" (MLi3 2019e); this plan

- Preliminary Confidential Conceptual Environmental Monitoring Plan (EMP) (MLi3 2019f; confidential; in prep.)
- Rosser Quarry Preliminary Confidential Conceptual Operating Plan. WSP Engineering (WSP Canada Group Limited). 2019 (confidential; in prep.).
- Proposed Limestone Quarry in The RM of Rosser Traffic Impact Study. WSP Engineering (WSP Canada Group Limited). 2018
- Blast Impact Assessment – Proposed North Perimeter Aggregates Quarry, Rural Municipality of Rosser, Province of Manitoba. DST Consulting Engineers Inc. 2018
- Noise Impact Assessment, Lilyfield Quarry, Rosser, Manitoba. HGC Engineering. 2018.

Broda has instructed MLi3 Inc. of Winnipeg to develop these (and other) documents (and review those prepared by others) to support its application for rezoning of its property within the RM of Rosser. The MLi3 documents have been considered, adopted and committed to by Broda (Broda *pers comm.* 2018). All the documents will be formally filed in support of Broda's request for rezoning of its property (MLi3 2019 a, b, c, d, e, f). This WNRMP will be supported by Broda's execution of the AMPRP.

This WNRMP was developed in relation to the same Project Description considered in: (i) the draft Conceptual Operating Plan; (ii) the required "Sound Impact Assessment" (SIA) component of an integrated "Sound Impact Management Plan and Sound Impact Assessment" (SIMPVIA) document; (iii) the required "Visual Impact Assessment" (VIA) component of an integrated "Visual Impact Management Plan and Visual Impact Assessment" (VIMPVIA) document; (iv) Broda's Preliminary Environmental Monitoring Plan (EMP); and (v) the AMPRP.

This document is proactive. While its preparation is intended to satisfy a formal requirement of the RM of Rosser, it is not formally required by any other regulatory body. It has been prepared at Broda's instruction to support compliance with corporate environmental due diligence policies, satisfaction of a By-law 8-15 requirement and, most importantly, to honour previous corporate commitments to Broda's neighbours and to provincial water-resources regulators.

The elements and organization of the activities outlined in this corporate WNRMP rely on published non-peer-reviewed research reports and data, published peer-reviewed reports and data, common sense, regulatory practice and precedent in Manitoba, extensive relevant professional multidisciplinary experience, academic research, and communications with and guidance from provincial regulators.

2.0 PURPOSE

The development and operation of an aggregate quarry will create impacts on the closely proximate groundwater and surface water. Landowners living beside quarries, especially those operations that are older and poorly capitalized, can and do complain of nuisance, even health impacts, because of perceived and measured they rely on (e.g. OSSGA 2010, USGS undated,

Green *et al* 2005). For parties living beside such industrial activity, the implications for their well-being can be significantly negative unless the proponent takes suitable effective steps to prevent and minimize unavoidable impacts.

Accordingly, Broda commissioned MLi3 to develop (i) the Sound Impact Management Plan component of its Sound Impact Management Plan and Impact Assessment (SIMPSIA); (ii) the Visual Impact Management Plan component of its Visual Impact Management Plant and Impact assessment (VIMPVIA); (iii) the preliminary Conceptual Environmental Monitoring Plan (EMP); (iv) the Transportation Plan (TransPlan); and (v) the Adaptive Management and Progressive Rehabilitation Plan (AMPRP) as fully integrated components of the project. To assist it to understand impact potential further so as to more precisely mitigate the potential for impacts, Broda also commissioned a Blasting Impact Assessment, a Noise Impact assessment and a Traffic Impact assessment, all produced by others. This WNRMP is to provide the data and to better plan the all the actions needed to prevent or mitigate impacts on the groundwater and surface waters of the site and immediate region. Data generated from actions prescribed in this Plan will also support execution of the AMPRP in an evidence-based and timely manner.

Execution of the five plans prepared by MLi3 will be informed and mindful of the insights gained from the other impact assessments and studies. Such execution will contribute to the corporate satisfaction of: (i) provincial requirements for protection of worker health, neighbourhood health and the ambient groundwater and surface water environments (i.e., the specific requirements of the Manitoba Workplace Safety and Health Division and Manitoba Sustainable Development ["MSD", through the former Water Management Branch]); (ii) relevant requirements of RM of Rosser By-law 8-15, (iii) proactive execution of the Development Agreement that Broda advises it will negotiate with the RM, and (iv) various corporate commitments Broda made in prior years to: (a) the reactivated local volunteer Citizens Advisory Committee, (b) participants at public Open Houses from 2004-2010, (c) public hearings administered by the RM of Rosser in 2010 about the proposed project, (d) several landowners adjoining the Broda property; (e) Mines Branch ("MMB"), and; (f) the former Water Management Branch.

The impact-prevention and/or –mitigation components of these plans, assessments and studies embody the 'state of the art' in proactive management of a modern, well-capitalized, and well–operated quarry during its operational phase. They are intended to help develop and maintain strong positive relations with the site's workers, neighbours (through planned ongoing constructive engagement with the CAC), and the project's regulators.

This document is filed in support of Broda's request for a change in the zoning of its lands. Its filing adds to the weight of evidence filed to demonstrate satisfaction of the applicable requirements set out in the *Inland Port SPA Planning Regulation* MR 48/2016 that allows a quarry as a permitted land use within the Heavy Industrial Zone (Class 3; "I3") on the CentrePort land base.

3.0 PERFORMANCE OBJECTIVES

3.1 NUISANCE AND IMPACT PREVENTION AND MANAGEMENT

The performance goals and objectives of this WNRMP are consistent with the current state-of-the-art in nuisance and impact prevention and mitigation (e.g., Manitoba Environment Act's 2015 Proposal Report Guidelines, based on the *Licensing Procedures Regulation (Manitoba Regulation No. 163/88*). They have also been informed by the findings and the insights gained from the other impact assessments and studies (WSP 2018, DST 2018, HGC 2018). They were also selected having regard to very similar work done elsewhere in the world where nuisance and impact prevention and mitigation were the purposes of evidence-based quarry planning and management (Manoj and Prasannakumar 2002). They are:

- Complete practical environmental monitoring to create the evidence needed to optimize operations of the proposed project, which will require occasional blasting to loosen rock, (thereby facilitating operations of a Continuous Surface Miner (Appendix E), to prevent or mitigate the adverse effects on the ambient sonic and visual environments having potential to impact the health of site workers, the comfort of neighbours, or habitat use by fauna on-site.
- Use credible public-domain analytical tools and methods best able to support identification and tracking of significant, persistent, post-mitigation effects of the project.
- Use the monitoring data from the Preliminary EMP (and other plan components) in optimizing and executing the five impact-prevention and/or -mitigation plans.
- Render the potential for project nuisance or impact effects for workers or neighbours to "non-significance" in the judgement of professional national and provincial regulators, including through evolution of Broda's current conceptual Blasting Plan (allowed by the QMR and the Rosser By-law) or improvements in aggregate-processing methods.
- Use the monitoring data, and public responses to these data, to evolve and refine the WNRMP over the operating years, especially for issues of consistent public and neighbour concern (e.g., insufficient springtime capacity in municipal ditches to accommodate runoff), in conjunction with inputs from MSD staff, and through dialogue with the CAC, responding proactively and thoroughly to any expressions of environmental concern or suggestions for improved surveillance methods, data interpretations and public and regulatory accountability.

3.2 PUBLIC AND REGULATORY ACCOUNTABILITY

In addition to collaboration with regulators, Broda will maintain a collaborative approach with its neighbours to execute and refine its WNRMP. Broda intends to reactivate and maintain collaborative dialogue with the Citizens Advisory Committee that Broda created in 2005. Broda supported several meetings with the CAC through 2006 to explore its needs for information and input to project planning until Committee members declined to participate after the project was rejected by Rosser Council in 2010. New participants in the Committee will be sought to augment the core of members willing to maintain their participation from the earlier years. Attendance at the CAC meetings will remain under an "open-door" policy. The former mechanisms for public accountability will be strengthened with new digital techniques. These

will provide for public input to and surveillance of quarry operations, and new techniques (e.g., interactive website, record logs [n=5]) for public and regulatory accountability.

4.0 WORK DONE TO DATE

4.1 AGGREGATE QUALITY AND QUANTITY

Investigative work to define the quality and quantity of the resources began at the site in November 1999, by the previous site owner, when 12 core holes were drilled for aggregate-assessment purposes on the north half of section 33-11-2E. This work was followed in April and May of 2000 with 14 test holes drilled on the south half of 4-12-2E. During August 2005, 9 test holes were drilled on the south half of 4-12-2E, for assessment purposes. A major and much more sophisticated assessment of surficial strata, structures and limestone quality occurred in 2015 (Stantec Consulting 2015). The new data have greatly expanded understanding of the resource.

4.2 CONFIDENTIAL DRAFT QUARRY CONCEPTUAL OPERATING PLAN

Broda has prepared a conceptual-level multi-stage plan for developing and operating the quarry (WSP Engineering [confidential; in prep.]; Appendix D). The scope of the current draft plan covers five stages of development. Key components of the plan have been influenced by the potential for minimizing nuisance effects of operations on the very few homes or businesses within three kilometres of the approximate centroid of the first three stages of the quarry (Figure 4-1). A conceptual five-stage development process has been rendered (WSP 2018), with the first three stages located north of Mollard Road. The current preliminary confidential Conceptual Operating Plan (see Appendix D) will be further refined through dialogue with MIT, MMB and the CAC, especially after conclusion of a bilateral negotiation of an Benefits Agreement.

SIPD By-law No. 01/02 has designated the area *"…specifically for mineral extraction prior to other types of developments.*" Manitoba Regulation 184/94 (Policy No. 9) sets out numerous requirements for the protection and use of such designated aggregate resources. Broda's conceptual Workplan is consistent with the relevant provisions of the SIPD By-law, MR 184/94 and MR 65/92. The conceptual Workplan sets out the current intended layout and expected quarry operations, involving:

- An evolving subsurface progressive-trench type of quarry created through use of Continuous Surface Miner technology (https://www.wirtgen.de) (see Appendix E).
- Routine monitoring of all blasting activities.
- Two wells for on-site monitoring of groundwater levels and quality. These two wells would be routinely monitored and the results disclosed to the CAC and regulators in Water Resources Branch (WRB) in MSD. Data from adjacent provincial monitoring wells (see Figure 4-5, p. 19) would be routinely gathered at the same time to assist in interpreting the

groundwater-level data generated from the on-site wells. Water-quality data for all the monitored wells would be shared with the CAC and the WRB regulators.

- Selective strategic and substantial lengths of site-perimeter berming and landscaping to create sound-absorbing/altering/reflecting screens of earthen windrows vegetated with native species adapted to the agricultural landscape of the region (Figures 4-2, 1-3).
- An office facility, associated with a scale and Scale House, which may be developed from an existing well-maintained structure on the property.

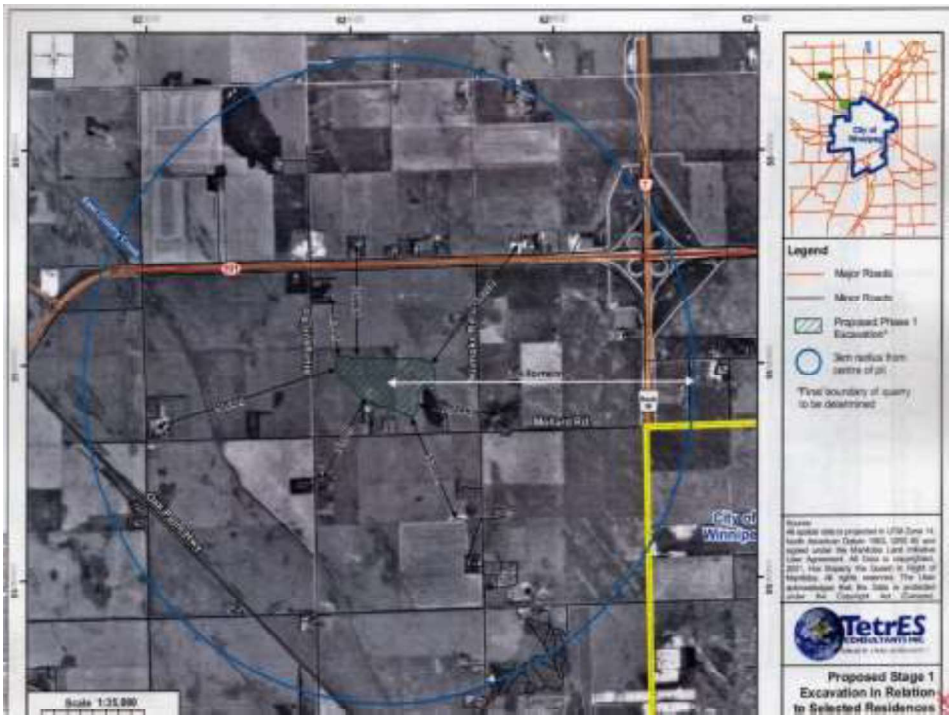

Figure 4-1. Distribution of the few occupied dwellings and businesses north of Mollard Rd. near the initial three stages of the proposed quarry. Sources: Google Earth, Tetr*ES* Consultants Inc., MLi3 Inc.

- A larger structure obscured by sound-absorbing and visual screening plantings of native trees and shrubs for large-vehicle maintenance and repairs.
- A small similarly screened workshop for small-equipment repairs.
- Stockpiles (mostly at grade) of stored aggregate products screened with sound-absorbing earthen materials.
- Protection of existing sound-absorbing/deflecting woodlots and shelterbelts.
- A machinery-parking area, located some distance north of Mollard Road in a current open area (Photo 1) that will be screened by a discontinuous strategically-placed sound-absorbing/deflecting earthen berm planted with native trees and shrubs.

Broda advises that the entire operation will be set back from and north of Mollard Road (Figure 4-2) and generally centred on the northern property (Photo 1) to maximize separation distance from the neighbours. In part, this is intended to maximize separation distance from the open excavation trench and the adjacent water-supply wells on neighbouring lands. The substantial regional background noise in the soundscape emanating consistently from the Perimeter Highway and occasionally from local and regional agricultural, industrial and commercial activities.

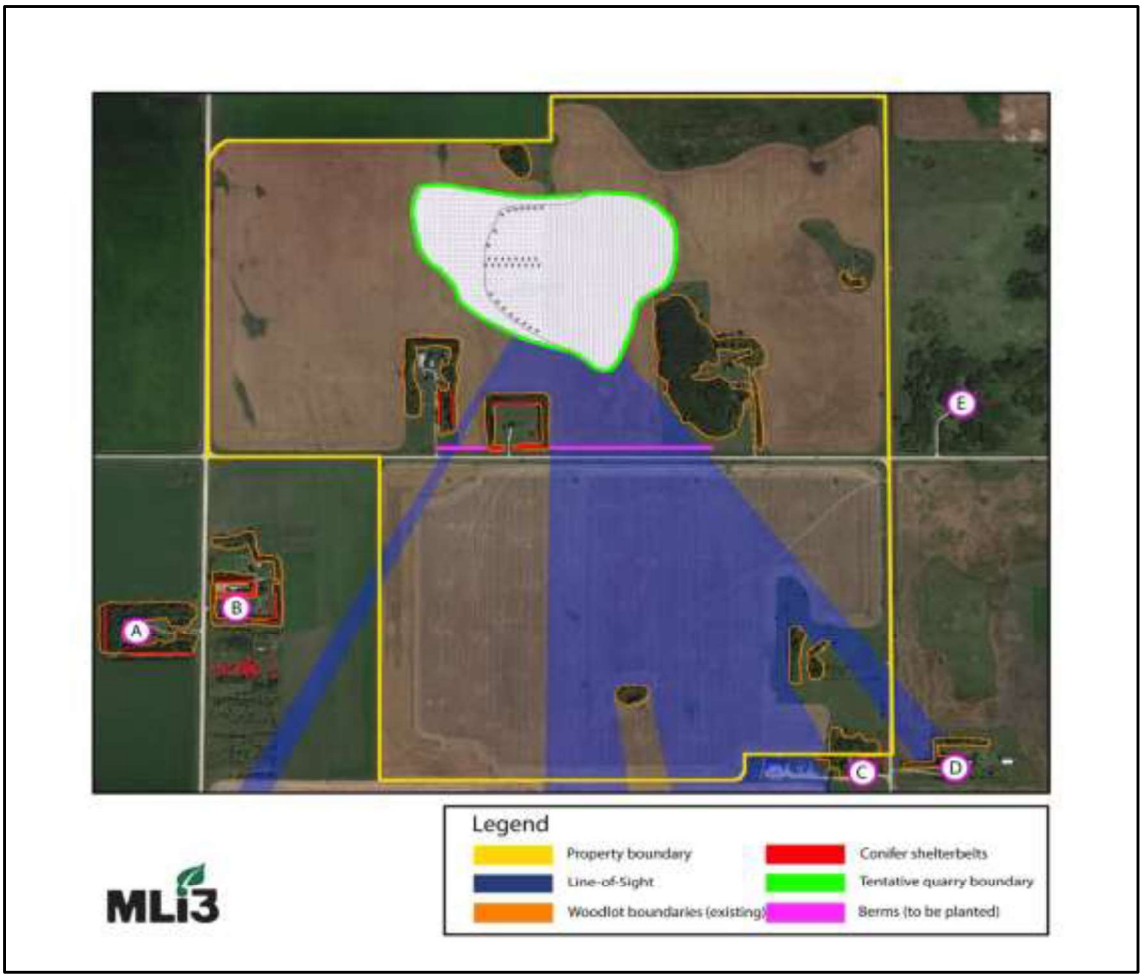

Figure 4-2. Shelterbelts and forest woodlots provide visual and sonic nuisance screening of vectors from the initial operations of the quarry to the southwest, south and southeast. Planted berms will mitigate impacts. Sources: Google Earth, MLi3 Inc.

Photo 1. Placement of the quarry's centroid of the first three stages is intended to maximize separation distance from adjoining water-supply wells from Broda's property. Sources: Google Earth, MLi3 Inc.

The site will be surrounded by discontinuous lengths, and shorter, strategically placed, sections of vegetated perimeter earthen berms. This should reduce and, in some cases and locations, completely prevent, off-site lateral propagation of sound from operating equipment and nuisance views of site operations. Soil and sandy material stockpiles will be screened by additional strategically placed (and higher) berms, to maximize localized absorption of nuisance sound (MLi3 2019b). Distances between quarry and aggregate-producing activities and the associated storage stockpiles will be minimized in the final site layout. This will help reduce on-site transportation noise by shortening the distance between material generation and material stockpiling. Berms will be planted with native fast-growing tree species like hybrid poplars (female cultivars, to prevent release of nuisance seed ['cotton']) and water-transpiring trees and shrubs.

Broda intends to plant fast-growing species on the strategic-screening berms such that summer sound-propagating pathways of most site buildings and viewscapes of most site operations should be minimal after establishment of the plantings. Slower-growing coniferous tree species are also to be planted, in density and in proximity to the faster growing deciduous trees and shrubs (Manitoba Forestry n.d.; University of Minnesota n.d.). This will protect the conifers, promoting their increased survival and growth. Techniques will be identical to those used for planting rural home and farm shelterbelts (PFRA 2015), especially those immediately nearby (Photos 1, 2). The planned species composition and densities are to enhance sound-absorbing and -screening capacity and visual texture and complexity. This will be very important where berms are planned to block the few sound-propagating pathways and sightlines for several landowners adjoining the Stage 1 quarry. The potentially significant pathways (i.e., < 1 km) are

to the south and north, not the east, southeast or west and southwest. These will be the highest priority for immediate placement of vegetated berms (Figure 4-2).

Photo 2. Typical shelterbelt of deciduous trees (e.g., aspen) protecting conifers (e.g., spruce), near intersection of Mollard Rd. and Klimpke Rd. Photo taken Oct 28, 2017. Source: MLi3 Inc.

On average, up to ~80% of the time (DST 2018), Broda intends to use "Continuous Surface Miner" technology to loosen and fragment rock as efficiently as possible. Up to ~20% of the time, on average, (DST 2018), Broda will use judicious blasting techniques to loosen rock that is too hard to be broken up by the Surface Miner. This combination will be superior to the best current practices in the Manitoba quarrying industry. Broda plans to quarry the limestone using the Surface Miner to create a progressive-trenching excavation (Figure 4-3).

This technique will excavate loose rock down to its nominal design depth of ~5-8 m (Figure 4-4) so it can be crushed and conveyed for stockpiling. Final depth of excavation will depend on future varying combinations of excavation conditions, groundwater elevations and markets for the various types of construction materials that can be created from the crushing operation.

As previously noted, most heavy operating equipment will be placed or will operate at the base of the excavation (Figure 4-4). This places the equipment well below the sight- and sound-propagating pathways towards neighbouring homes.

As noted, the limestone would be quarried from an evolving, slowly moving and reconfiguring moving-trench excavation (Figure 4-3), traveling sequentially back-and-forth across the property over the years. Broda intends that non-commercial overburden quarried will be used to sequentially backfill areas behind the moving face. Thus, ongoing daily excavation operations will also, *de facto*, serve as execution of key elements of Broda's Adaptive Management and Progressive Rehabilitation Plan (AMPRP; MLi3 2019a), fulfilling the corporate commitments set out in the AMPRP.

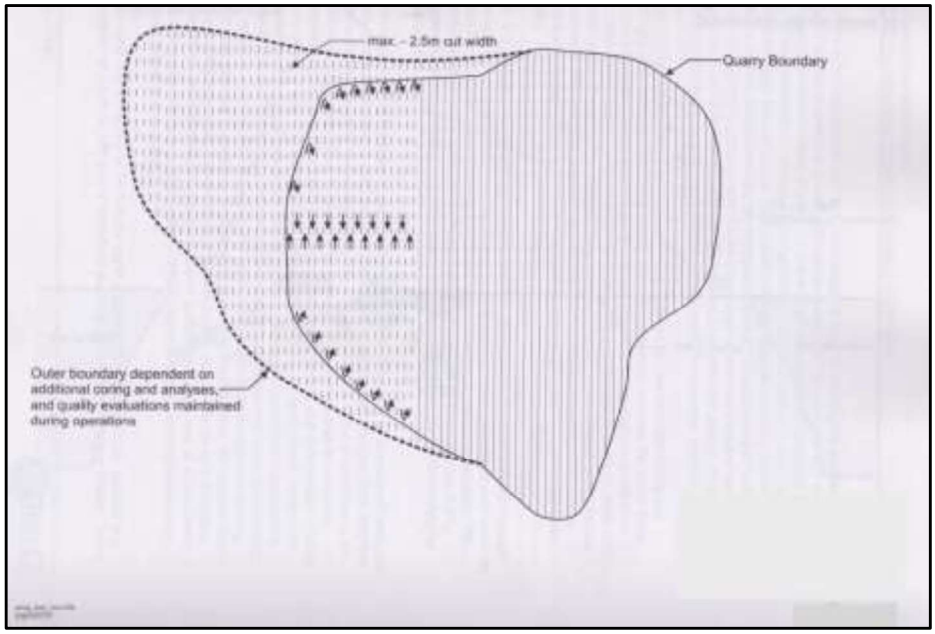

Figure 4-3. Initial quarry-development stages will address variable elevations and thicknesses of limestone-ore body using progressive-trenching excavation method. Final shape of complete excavation is nominal and will depend on field conditions. Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010

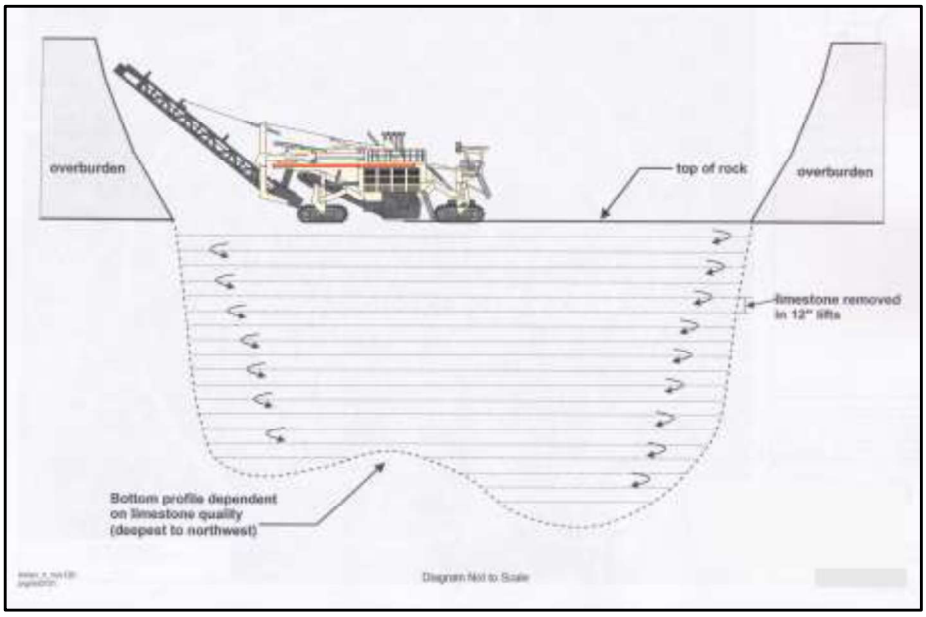

Figure 4-4. Excavators and conveyors delivering aggregate to surface will be well below sight- and sound-propagating pathways of adjoining properties. Final depth is nominal and uncertain; will depend on field conditions. Direct sound dissemination will be vertical, not lateral. Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010

The quarry is intended to operate "seasonally" from about April to about November. Broda advises that the production goal is 5,000 to 6,000 tonnes/day of limestone, to be achieved during a Monday to Friday work week, 7 a.m. until 6 p.m., and on Saturdays 9 a.m. until noon. Broda estimates 15 to 20 seasonal workers will be hired during the operation phase, for a period up to a nominal 20+ years. When the "Phase 2" lands (south of Mollard Rd.) are developed, the staff size could grow.

Stockpiled finished limestone products are intended to be purchased and hauled by trucks to client. The proximity of the Broda quarry to Winnipeg and the Capital Region means that haul costs to construction sites should be substantially reduced over trucking from Stony Mountain and Stonewall. This would also mean fewer GHG emissions from haulage. Broda expects 150–200 trucks/day at peak production, and 50–75 trucks/day when aggregate demand is lower.

During collaborative consultations with Manitoba Infrastructure (formerly Manitoba Infrastructure and Transportation; MIT) in February 2010, MIT advised that it would not likely allow direct access to the Perimeter Highway (No. 101) by quarry vehicles. This was despite Broda's request for such access to reduce the sound impact of haulage past the sole resident close to the site on Mollard Road. Consistent with this dialogue, and guidance from MI (Magnusson *pers comm* 2017, Coleman *pers comm.* 2017), Broda's planned access to the site is still from Brookside Boulevard, along a short (~1-mile) section of Mollard Road (Photo 3, 4; MLi3 2019c).

Photo 3. Recently upgraded intersection of Mollard Road and Brookside Blvd, looking north from Mollard. Photo taken Oct 28, 2017. Source: MLi3 Inc.

Broda has advised that it intends to enforce proper site access and egress. It will also ensure no chronic local road-dust nuisance is created by truck traffic. It plans to pave and maintain the portion of Mollard Road between its site and Brookside Blvd. (Photo 4), and to integrate that upgraded road section with the recently upgraded intersection with Brookside Blvd. (Photos 3, 4; MLi3 2019c), pending final review of results from the confidential WSP Traffic Impact Study (WSP Engineering 2018).

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Photo 4. West-facing view of Mollard Road taken from east side of upgraded intersection with Brookside Blvd. Photo taken Oct 28, 2017. Source: MLi3 Inc.

Broda also intends to maintain this upgraded access route (e.g., removing these costs from the RM's annual road-maintenance budget, a very significant benefit to the RM). In response to complaints, which it will monitor, document and disclose (section 6 herein), Broda has committed to check and take immediate corrective action (Tetr*ES* Consultants 2010). The quarry is planned to satisfy regulatory requirements and be subject to public regulatory reviews. Quarry operations will be the subject of a benefits-sharing Agreement "Development Agreement" measures that Broda intends to negotiate with the RM of Rosser.

4.3 REVIEW AND RECONSIDERATION OF ISSUES AFFECTING BRODA'S PROJECT PLANNING, LAYOUT AND OPERATIONS

Broda has reviewed the records for meetings with the CAC from 2005-2006 for issues it expressed. Broda's review has guided the data-gathering and impact-prevention activities that have been completed to date, including the confidential draft Conceptual Operating Plan (WSP 2019 in prep.; see Appendix D). In developing this Plan, Broda has reconsidered all past guidance received through collaborative dialogue with government departments and officials (especially Manitoba Conservation, Manitoba Mines Branch and Manitoba Infrastructure).

4.4 WATER MANAGEMENT

Broda's most intensive and sustained investment in the past decade has been in building understanding of the surface and groundwater environments at the site and in the region. The product was a Water Management Plan (WMP) created by KGS Group for Tetr*ES* Consultants in 2010. The KGS 2010 WMP was filed in support of Broda's last unsuccessful application for a conditional use approval in 2010. Among other things, the WMP examined the potential for dewatering (or other) effects on drinking-water wells on adjoining lands and defined initial conceptual impact-prevention and mitigation measures. This WNRMP builds upon and amplifies the 2010 KGS WMP. In due course, this WNRMP will likely evolve as data accumulate.

4.4.1 Groundwater Yields, Levels and Chemistry Patterns

Because surface runoff accumulations are not likely to affect operations or neighbours, Broda has investigated the potential for quarry-dewatering operations to create impacts. Broda has completed substantial hydrogeological work at the site over the recent ~15-year period.

4.4.1.1 Baseline Groundwater Yields

Previous hydrogeological work included test drilling of the shallow bedrock and installation of two monitoring wells in the shallow (Stony Mountain formation) and deep (Red River formation) bedrock aquifers (Friesen Drillers 2006a). In November 2002, two test holes were drilled on southeast 4-12-2E and completed as monitoring wells in the shallow (7.6 m) and deep (45.7 m) bedrock aquifers. During August 2005, nine test holes were drilled on the south half of 4-12-2E, for aggregate quantity and quality-assessment purposes, with four test holes completed as monitoring wells. Short-term, low-capacity hydrogeological pumping tests were completed in September 2005, January 2006, November 2006 and March 2007 (Friesen Drillers 2009) to determine baseline groundwater yields.

4.4.1.2 Baseline Groundwater Levels

Using two of several monitoring wells that survived farming practices on the site over the years, a record of water levels from both the Stony Mountain and Red River aquifers was collected from July 2006 through April 2009 data collected by Tetr*ES* Consultants (KGS 2010; Figure 4-5). These data are contrasted with the long-term water-level record for the Red River Formation from 1965 to 2010 in a Provincial government monitoring well located 1.6 km to the northeast.

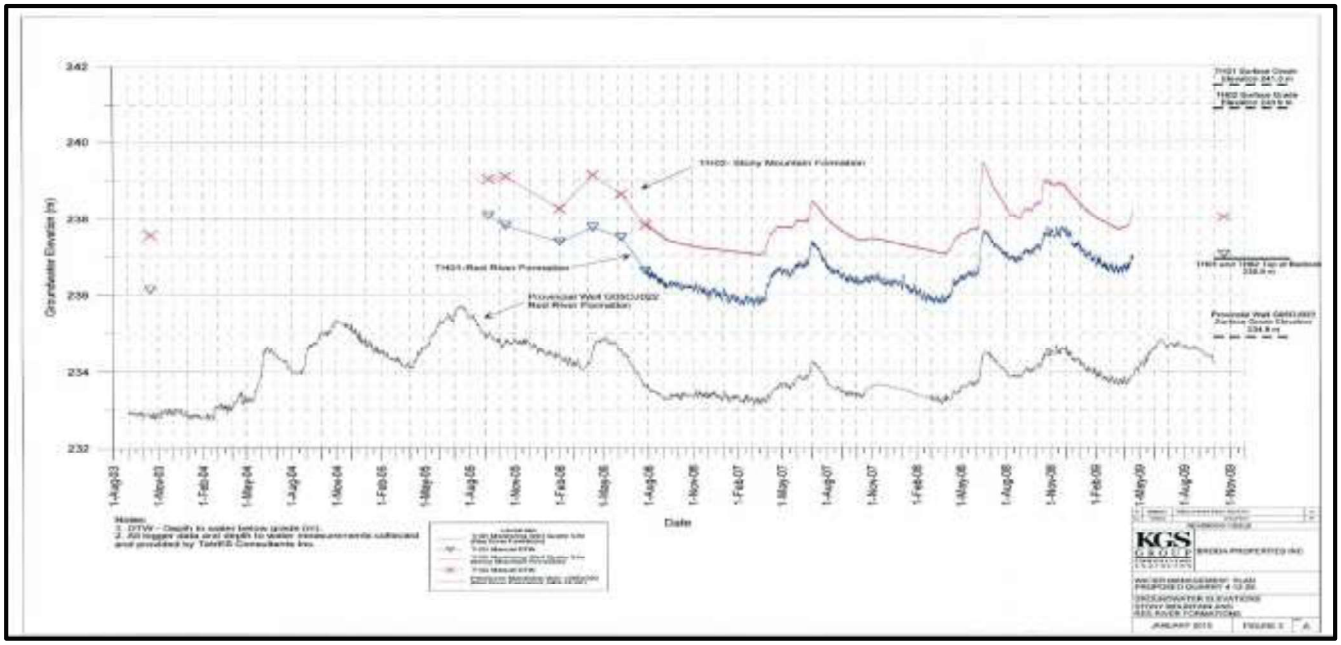

Figure. 4-5. Continuous Groundwater-Level Data for On-Site Wells (2006-09) and for Adjacent Provincial Groundwater-Monitoring Well (2003-09).

No well monitoring occurred for some years but data were retrieved from the two on-site monitoring well dataloggers in late 2016 by Stantec Consulting for MLi3 Inc. (Figure 4-6).

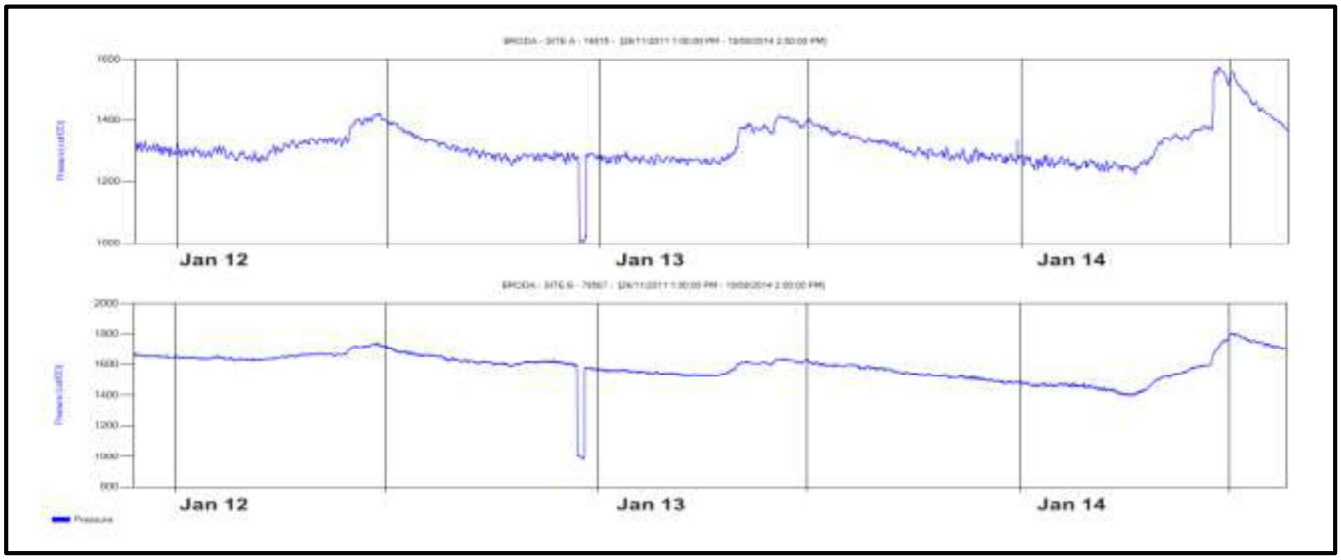

Figure 4-6. Recent (2016) Groundwater-Level Data for On-Site Wells.

These data are not straightforward to interpret. The seasonal trends correspond well with the trends in the other data, from prior monitoring over the past decade, but because these data were recorded in units of *pressure*, while the prior data are expressed as *elevations* above sea level, the datasets and trends are not strictly compatible. They have therefore have not yet been entered into the longer-term dataset. They will be if the pressure data can be translated into elevations.

Attempts to gain additional data from the wells before freeze-up were made in November 2017 in hopes that the additional data would corroborate the earlier data and that both additional datasets could be included in the longer-term dataset. Unfortunately, the wells had been vandalized and the dataloggers were missing (Mathers *pers com* 2018).

4.4.1.3 Baseline Regional Water-Supply Well Conditions

During July 2006, an inventory of 55 water-supply wells was carried out on lands within a radius of ~3 km (~2 miles) from the site (Friesen Drillers 2006b). This survey established the "baseline" number, proximity and apparent condition of neighbouring wells before the project began. Broda has just commissioned Friesen Drillers to update this information such in hopes that it can be available to support the filing for rezoning (Broda *pers comm.* 2019).

4.4.1.4 Baseline Groundwater Quality

Analytical chemistry data created a dataset on the benchmark quality of the groundwater.

4.4.2 Water-Management Planning

Broda intends to operate the quarry and manage discharges within protocols that adhere to regulatory requirements while preventing or mitigating unexpected adverse effects to the drainage network, adjacent lands, and stakeholders. Substantial studies have been completed to

support this intent. A key task has been defining an operations plan that will minimize impacts on adjoining landowners' wells.

4.4.2.1 Considering Potential Effects on Neighbouring Water Wells

The 2010 KGS WMP examined the potential for dewatering (or other) effects on drinking water wells on adjoining lands. The 2010 Plan concluded that the largest volumes of groundwater in the Stony Mountain formation are present in shallow bedrock fractures within a nominal depth of 2-3 m below the top of the bedrock, mainly in the central part of the quarry centered on the shallowest bedrock. Below 2-3 m, the data suggested that much less water may be in storage in the bedrock. Therefore, the greatest pumping effects on the groundwater regime in the local area were then expected to occur within the upper few metres of the bedrock. This was then expected to occur mainly in the spring when higher water levels and associated higher volume dewatering pumping would logically take place. Less extensive dewatering effects were then (and continue now) to be expected during summer "maintenance" pumping.

As the quarry is deepened into more competent bedrock, much less pumping is anticipated to be needed to maintain groundwater levels below the base of the quarry.

This second phase of (deeper) pumping could have some local effect on water levels in the Stony Mountain Formation. Because KGS judged the deeper rock to be less transmissive, it concluded that the drawdown effects on nearby shallow wells would likely be relatively minor. Also, because Broda's initial quarry excavations trenching will occur in the shallowest, most fractured and permeable bedrock, longer-term dewatering pumping is expected to be minimized.

4.4.3 Regulatory Consultations to Establish Management Approach and Goals

Broda and its consultants (Tetr*ES*, KGS, Stantec, MLi3) have now had almost 15 years of meetings with provincial officials to discuss local and regional water-management needs for the project. Discussions have focused on ensuring it creates no new pressure on the water-management systems. Discussion has also focused on how the proposed quarry can help the province create new solutions to historic regional drainage challenges. The key officials have been those in the departments of managing water storage or conveyance infrastructure.

On January 24, 2017, representatives of Water Resources Branch in MSD and Manitoba Infrastructure reiterated previous advice that Broda should commit to site-operation rules (as Broda proposed in 2009), to prevent pumping of excess groundwater from the site to drains in spring seasons when watertables and field runoff were both high, or in periods of high rainfall events. MI and WRB further advised that, in any event, Broda would likely be compelled to abide by licensed site-operation rules insofar as licensed discharges were concerned. While most of the discussion focused on the East Colony Creek (ECC) receiving-channel option, continuing the focus of previous discussions, MI and WRB requested Broda's willingness to be flexible, depending on circumstances, to use either the ECC or the City Protection Drain (CPD), as directed by the province, to receive discharges of seasonal excess groundwater from its site. This would allow valuable flexibility for the Province in responding to requests from other parties for discharge of seasonal runoff.

4.4.4 Drainage Surveys, Flow Modeling and Channel-Capacity Determinations

Broda's quarry-dewatering activity must be authorized by the provincial regulatory authority under the auspice of *The Water Rights Act*. Authorization is in the form of a licence. Typically, a license contains specific conditions and prescribed operating protocols to ensure that 'diversion of water resources' (which quarry dewatering would be) does not negatively affect others. Because on-site runoff accumulations are not likely to affect operations or neighbours, Broda has investigated and developed management-performance objectives accordingly, to preclude potential impacts to local drainage capacity. Broda will operate the quarry and manage occasional discharges within protocols that adhere to (or frequently exceed) regulatory requirements while preventing or mitigating unexpected adverse effects to the local and regional drainage network, adjacent lands, and stakeholders.

In the prior rezoning CUA-hearing process, to prevent operations-related impacts on neighbours' abilities to drain their lands each spring, Broda committed that quarry-dewatering activities would cease if substantial rainfall events occurred that would greatly utilize the capacity of the local drainage system if Broda had to dewater its quarry in spring. Presently the land base is drained naturally by gravity via surface drains to the municipal drainage system. Dewatering activities would cease if flows in the local municipal drains to which the province allowed Broda to discharge water from its quarry exceeded flow rates considered the maximum available in either ECC (delivering runoff south, to the Assiniboine River), or in the City Protection Drain (delivering runoff east, to the Red River). Broda commissioned work in 2011 to establish these maximum channel-capacity (i.e. threshold-limit) rates so they could be included in an updated WMP.

These rates were established for discharges to East Colony Creek but have yet to be determined for the CPD. The ECC capacity-rate limits were established through dialogue with Water Resources Branch in ~2011-12, after Broda's consultants surveyed the southern drainage pathway. Using the data from these surveys, Stantec constructed a finite-element model of ECC from about a half-mile upstream of Mollard Road to Omand's Creek, and thence to the Assiniboine River (Figure 4-7).

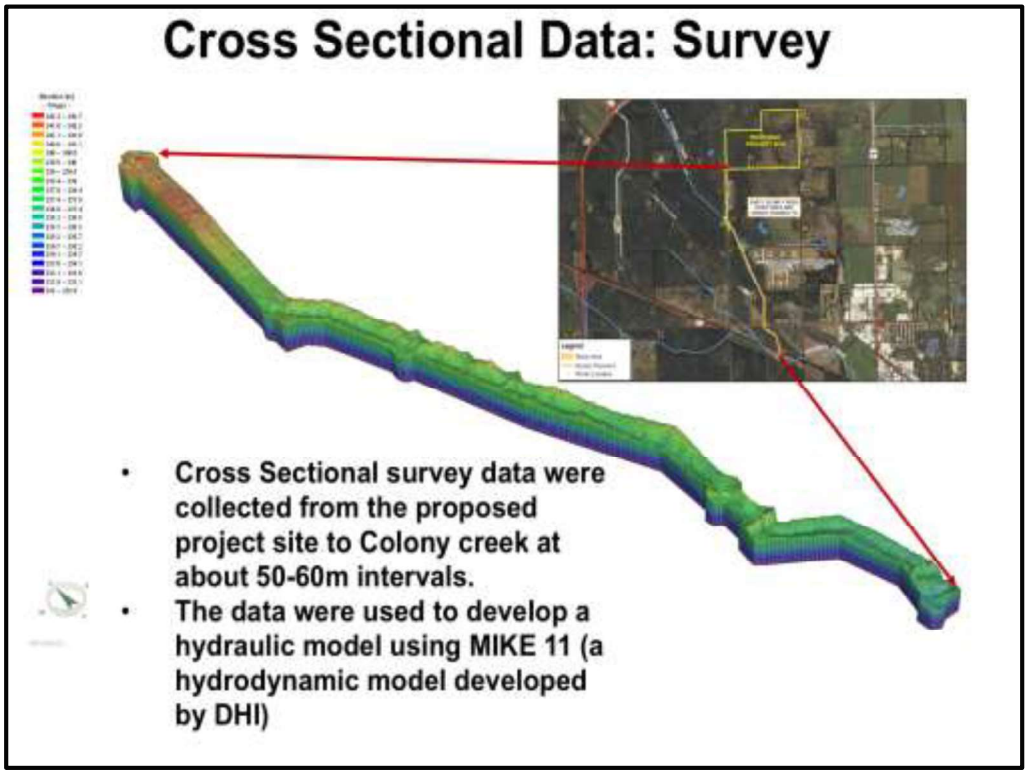

Figure 4-7. East Colony Creek Modelling and Flow-path Analysis.

Cross-sectional and invert (ditch- or channel-bottom) data were used in the Stantec 2011 model (and are now used in this WNRMP) to:

- Establish continuous invert elevations along the flow paths for identifying obstructions to flow (e.g., collapsing banks, culvert inverts higher than the upstream channel invert, undersized culverts, aquatic plant growth) within the channels (which the RM has since considered in its planning for annual channel-maintenance activities).

- Help establish how monitoring data for water levels at staff gauges or other immovable features (e.g., culvert tops) could be used to determine the extent of remaining conveyance capacity in either receiving watercourse, and the extent of need for any additional channel maintenance by the RM (or the province).

- Suggested the basis of a voluntary operational regime for managing discharge rates such that agreed-upon water levels at key locations along the watercourse would not be exceeded. Broda would commit to discharging to whatever watercourse that WRB officials approved for receiving the discharge when quarry dewatering was needed.

- Determine the maximum conveyance capacity of the expected receiving watercourses (i.e. East Colony Creek). The rates would be determined by the condition of the receiving watercourse (i.e., its observed flow in relation to the apparent amount of conveyance capacity remaining in the channel). The ECC maximum flow rate was established through dialogue

with Water Resources Branch (WRB) in ~2011-12. Conceptually, Discharges to the ECC would occur under a 3-tiered system of remaining channel capacity, allowing:

- **"unconstrained discharge**" (e.g., flows of 2.0 – 3.5 cubic metres per second [cms or m^3/s] to ECC),
- "**moderately constrained discharge**" (e.g., 1.0 – 2.0 m^3/s to ECC), and
- "**highly (i.e. nearly zero) to completely constrained discharge**" (e.g., 0.0 – 0.5 m^3/s to ECC).

The maximum nominal capacity of ECC capable of avoiding spring flooding has been established from interpretation of the modeling output (Stantec 2011) as 4 m^3/s (140 cfs). While discharge rates have been established for releases to East Colony Creek, they have yet to be determined for the CPD. Interim CPD drain profiling (Fig. 4-8(b) will assist this).

In January 2017, MLi3 completed additional drainage-channel invert studies and determinations of cross-section at apparent flow-obstruction points along the CPD, using satellite data (Figure 4-8). That same month, Broda renewed its commitment to WRB officials to establish new staff gauges on sites preferred by the province upstream and downstream of Broda's lands. Data from Broda's real-time monitoring of water levels at these gauges (and at other key locations [e.g., road-underpass culverts]) will be shared with the province to improve and expand real-time hydrological monitoring for the local area. This might assist provincial drainage management and, perhaps, even flood forecasting.

Based on the Stantec work done to date, (greatly more than what proposed quarries have filed in support or applications in the past), MLi3 Inc. has concluded that intermittent planned discharges from the Broda quarry pursuant to the scheme proposed by the WRB, when combined with natural flow, will not exceed the receiving system's capacity. Waterway capacity should therefore be fully protected for all users during key seasons.

MLi3's 2017 field surveys have verified that WRB indications (in dialogue years ago), that flow obstructions along the ECC pathway would be removed, have been acted on. One key obstruction identified by the modeling has been removed. As part of the CentrePort Canada development (especially drainage planning associated with CentrePort Canada Way), the key flow constraint at Inkster Boulevard has been replaced by installation of modern new large-capacity culverts (Photo 5). Adherence to the maximum theoretical (i.e. modelled) receiving-channel rate of ~4 m^3/s in ECC should thus be fully protective. This requires confirmation.

Ongoing CentrePort Development can significantly affect Broda's season-specific access to the drainage capacity of the ECC. As noted herein, Broda will track developments that affect the downstream conveyance capacity and will adjust its Water Management Plan and, if needed, its Monitoring Plan, to address such evolution in downstream capacity.

Photo 5. New High-Flow Culverts under Inkster Blvd. to Enhance Capacity.

Such confirmation is intended by Broda. Through dialogue with the WRB, Stantec Consulting and MLi3, Broda will verify WRB's confidence in the model and its underlying data and assumptions. Broda and Stantec will review with WRB how the 2011 model output can be interpolated to identify "safe" flow rates that are higher than the existing computed capacities predicted to cause no localized flooding.

Using the output, Broda, Stantec and WRB will explore the probable effect of the recent improvement to the ECC crossing beneath Inkster Blvd. The mathematical improvement in channel conveyance will be extrapolated from the model output. It will very likely be determined that the new high-capacity culverts have increased the allowable flow capacity of the drain to rates perhaps somewhere between ~4 and ~7 m^3/s. These higher threshold (or "trigger") water levels at which pumping could safely begin could then be permitted by the WRB.

In all likelihood, the permitted pumping regime will be substantially higher than the flow scenarios of 4.0 and 6.5 m^3/s at Inkster Blvd. modelled in 2011 that then predicted "minor" and "significant" flooding, respectively. The same flow regime today would very likely be allowed with zero flooding. Other opportunities to improve conveyance will also be explored using the data displayed in Figure 4-8(a). This could result in even higher permitted flow rates once the localized additional improvements are completed and verified by WRB.

This important process is committed in S. 10 ("Next Steps").

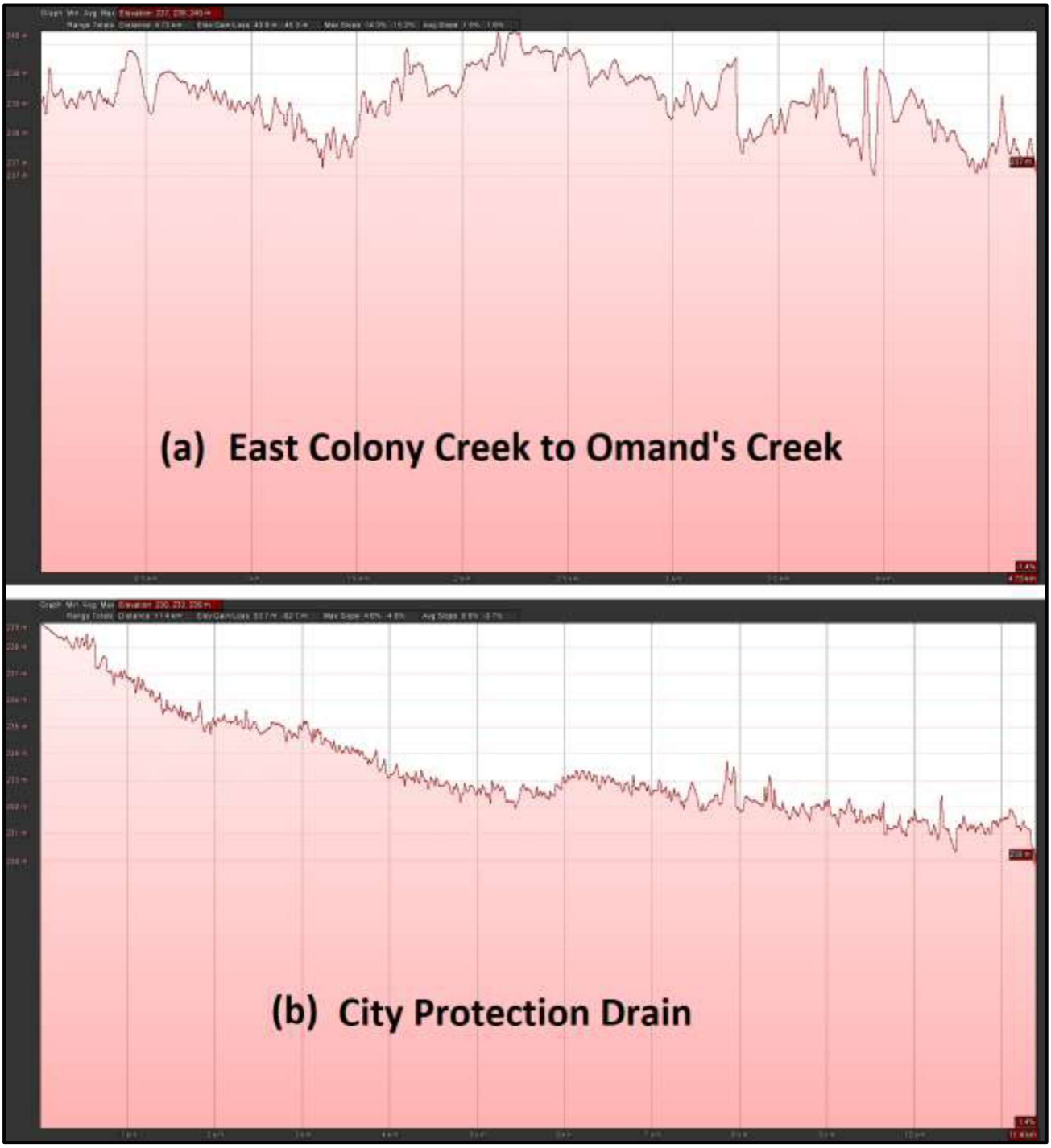

Figure 4-8. Descending channel-invert profiling for optional discharge pathways, illustrating flow constrictions (i.e., low points in profiles) needing attention (i.e., removal of restrictions) to improve conveyance capacities. Poorly-sized culverts smaller than the necessary flow capacity, and culverts installed at elevations inhibiting flow, account for some of the "spikes" in the profiles.

4.5 NATURAL RESOURCES MANAGEMENT

4.5.1 Ecosystem Classification

The Broda site occurs in the Winnipeg Ecodistrict of the Lake Manitoba Plain Ecoregion at the southeastern portion of the Lake Manitoba Plain. The Lake Manitoba Plain Ecoregion is divided into 12 ecodistricts. This area coincides with the central lowland area of the Red River Plain where the ecoregion's largest community ecodistrict, Winnipeg, is located (Smith et al. 1998).

The Winnipeg Ecodistrict is part of a transitional zone between boreal forest to the north and the aspen parkland to the southwest. The vegetation in the ecodistrict ranges from trembling aspen/oak groves (often found along stream channels and in better-drained sites, and found on the Broda land) to white elm, basswood, cottonwood, Manitoba maple and green ash on alluvial floodplain deposits and lower river terraces. Pockets of prairie grassland occur in poorly drained and/or remote sites, or those unfit for mechanized agriculture throughout the ecodistrict. Open wetlands with grasses and sedges are common where standing water is present for all or part of the year. A small wetland occurs on the site. Trembling aspen, willows and shrubs occur where soils are poorly drained, while bur oak and native grass species occupy drier sites on loamy to clay soils (Environment Canada 2006), such as found at the site.

The ecodistrict is flat and underlain by limestone bedrock covered with varying depths of clay, glacial till and topsoil. Depending on overburden composition, cereal crop production is the prevalent land use. Where soils are rocky, livestock and livestock-feed production are common. Crop production occurs on part of the Broda property. Dairy farming occurs nearby.

4.5.2 Vegetation Species Composition

Historically, the native vegetation found within the Winnipeg Ecodistrict consisted of tall prairie grass and meadow prairie-grass communities (Smith et al. 1998). Due to cultivation and the development of drainage ditches, the native vegetation has largely disappeared.

Much of the site is currently cultivated for crop production. In September 2004, site surveys created an inventory of vegetation and terrestrial habitats. Three sites were visited, a species list was compiled and a subjective estimate of dominance was determined (using the DAFORS scale where D >50%, A = 25-50%, F = 5-25%, O = 1-5%, R <1%; Appendix A, Table 1).

Site 1 was located on the east side of the site where a dugout located in the center of Site 1 had created a small wetland. The pond appeared to be about 0.5-0.75 m higher than normal, likely due to the excessive rainfall during autumn of 2004. The wetland was surrounded by previously excavated spoil and limestone boulders. Upland areas were predominantly grassland with a few trees and shrubs. Most locations had 100% vegetative cover. Smooth brome, bluegrass, Canada thistle, and several species of goldenrod dominated this site (Appendix A, Table 1). Other species were less common. None were considered provincially 'rare' or 'endangered'.

Site 2 was an area of drier prairie immediately northwest of, and connected to, Site 1. This area contained a variety of surviving native prairie plants such as bergamot, purple prairie clover, cut-

leaved anemone, blazing star, goldenrod and asters. There were also patches of smooth brome and thistle (not as frequently found as at Site 1). The site also supported several small shrub thickets, which consisted of Saskatoon, silverberry, shrub rose, willow and trembling aspen. There were no provincially 'rare' or 'endangered' plant species encountered at this site.

A small patch of undisturbed prairie grassland may yet survive at this site. Many native prairie species were present. While the site has not yet been greatly compromised by invasion of smooth brome and Canada thistle, shrubs and weedy species are invading.

Site 3 was a wooded area ~200 m west of the two prairie grassland sites. This site contained a farmyard surrounded by a 2.5-ha mature bur oak forest. Although the canopy cover was 80 to 90% (Appendix A, Table 2), both the under-story and herbaceous layer were well developed, supporting a diversity of plant species (Appendix A, Table 2).

The oak forest was bordered to the west by a woodlot containing aspen, Manitoba maple, hawthorn, chokecherry and poplar. A small shallow dugout had then-recently been excavated at the western edge of this woodlot. To the east, the oak forest was bordered by a stand of large poplar trees. To the south, trembling aspen was encroaching on what once seemed to be oak savannah. A small dugout bordered by grasses and shrubs was surrounded on three sides by barbed-wire fence to the north.

Due to the predominance of trees at Site 3, vegetation surveys were conducted to gather information relating to average tree height, density and age. The trees were sampled using a point-quarter method. The understory was examined using a point-frequency intercept method (Smith 1996). For the former, two 100-m transects were established in representative areas of the oak forest. Points were then sampled at 10-m intervals along these transects. For each point, the following parameters were measured; the canopy cover, distance from the point to the nearest tree in each of four quadrants, species of each tree measured, and tree diameter at chest height. Tree height was measured for one tree at each point using a clinometer. Tree age was determined using an increment borer for one tree at each point for the first transect only. For the point-frequency intercept, the understory species closest to the tape at each 1-m interval was recorded. Cover estimates for the shrub layer were impossible to obtain (due to season lateness). The same transect was used for both tree and understory characterization.

The average height of the oak was ~14 m with a mean diameter at chest height of 21 cm. The average age of the sampled oak trees was 57 years, though there were also numerous small oak shrubs and oak seedlings (Appendix A, Table 2). There were ~1,100 oak trees per hectare. All but four of the trees were single-stem trees (Appendix A, Table 2). Few of the oaks had well-developed side branches. The understory contained a well-developed sparse shrub layer, dominated by bur oak in various sizes, prickly rose, and Saskatoon (Appendix A, Table 2).

4.5.3 Wildlife Surveys

4.5.3.1 Birds

Waterfowl are considered abundant in the Lake Manitoba Ecoregion (Environment Canada 2006). Potholes and small ponds dotted throughout agri-Manitoba often provide excellent breeding, brood rearing and foraging habitat for waterfowl and other water birds. During migration, many of these waterbodies are used for staging activities. All three sites provide suitable habitat for breeding songbirds and upland game birds. During the September 2004 site visit, several small flocks of ruffed grouse were observed using Site 2. A list of bird species potentially found within the site is available in Appendix B, Table 1. Field studies at the site in the fall of 2004 did not reveal the presence of any bird species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the *Species at Risk Act* (SARA), and/or the *Manitoba Endangered Species Act* (MBESA) as being 'endangered', 'threatened', or 'of special concern' (COSEWIC 2006; SARA 2006; MBESA 2006).

4.5.3.2 Mammals

All three of the surveyed sites provide potential mammal habitat. Mammals considered common to agricultural areas around Winnipeg and expected on the site include white-tailed deer, coyotes, cotton-tailed rabbits, and Richardson's ground squirrels. All are adapted to areas transitional between open grassland habitats and aspen groves. Mammals that may potentially use the site are listed in Appendix B, Table 2. Field studies at the Project site in 2004 did not reveal the presence of any mammal species listed by the COSEWIC, the SARA, and/or the MBESA as being 'endangered', 'threatened', or 'of special concern'. Site 1 contained several dozen deer beds, and several wildlife trails leading to the dugout. Several large badger holes were also observed. Site 2 contained many deer beds, with wildlife trails leading into and out of the area, and additional badger holes.

4.5.3.3 Reptiles and Amphibians

Although no reptiles or amphibians were observed during the site visit, the dugouts, grassland, and woodland habitats provide excellent habitat for several reptile and amphibian species. During the site visit, these reptile and amphibian species had likely begun hibernation, or were dispersing to hibernacula, and therefore would not have been observed. A list of reptile and amphibian species that potentially inhabit the site is provided in Appendix B, Table 3.

4.5.4 Species at Risk

4.5.4.1 Vegetation

The oak forest found at Site 3 is an excellent example of a 'Mesic Oak Forest' as classified in the Minnesota Land Cover Classification Scheme (MLCCS 2004). This classification provides a more complete description than that of the Manitoba Conservation Data Centre (MCDC 1996).

The following are characteristics of a 'Mesic Oak Forest':

- Oak comprising >30% of the stand being the dominant species.
- An upland site containing primarily deciduous trees.
- A closed-canopy cover of greater than 70%.
- Straight, single-stemmed trunks that lack spreading lower branches.
- A well-developed shrub layer sparse enough to support a layer of forbs and grasses.

The Site 3 oak forest meets or exceeds all these criteria. This site is unusual in that bur oak is the only tree species found in the main part of the oak forest. The site also has a substantial amount of small oak trees, suggesting that oak regeneration is ongoing. This situation is rare in mesic oak forests. Most such forests show no oak regeneration, and are succeeding to other hardwood species due to active logging, fire suppression, and grazing pressure. While an active fire-suppression campaign exists in the RM of Rosser, there is no active logging or grazing in this woodland. This oak forest, however, is only 2.5 ha in size and contains trees that are only ~70 years old. It is not known if this stand is a remnant of a larger natural oak forest, or if it has developed as secondary growth from the seeds of a few original bur oak trees.

Natural stands of mesic oak forest are rare in Manitoba (MLCCS 2004), tentatively listed as "S3" ('rare' or 'uncommon' but not 'imperilled'; MCDC 1996). The unusual characteristics of this forest include that it contains bur oak at the northwest limit of their range (Burns and Honkala 1990).

4.5.4.2 Wildlife

A total of 20 wildlife species listed as 'endangered', 'threatened', 'vulnerable', having 'special concern' or 'rare' by COSEWIC, SARA, MBESA and/or the MCDC (MCDC 2006), could potentially inhabit or migrate through the Project site (Appendix B Tables 4, 5 and 6). Of these species, 14 are birds, two are amphibians, one is a reptile, two are mammals, one is an invertebrate and one is a fish. While preferred habitat for many of these species (e.g., native prairie, wet meadow, fen, etc. is uncommon within the site), there is potential habitat to support Short-eared Owl, Loggerhead Shrike and northern leopard frog.

4.6 WORK DONE BY OTHERS

4.6.1 Provincial Data Generation for Regional Drainage-Planning Support

The Province may have data that could be helpful to updating and improving Broda's current Water and Natural Resources Management Plan. The province determined the conveyance capacity of the City Protection Drain some years ago to support design of a new stormwater-retention pond serving a new subdivision east of Pipeline Rd. north of the Perimeter highway (Henderson *pers comm* 2017). As Broda works with the province to update its plan annually, the data from the Katz study may prove helpful.

The province has also secured newer LiDAR data for Winnipeg's urban drainage (and the Capital Region). Some of these data are for the Sturgeon Creek watershed, including the municipal and provincial drainage system near the Broda site that flows to the Assiniboine River (Henderson *pers comm* 2017). MLi3 accessed some of the local data, and constructed an image showing where there is adjacent coverage, and the ability to construct a Digital Elevation Model (DEM), of the drainage systems near Broda's property. As shown in the image, the province has excluded the Broda property from the public-domain mapping of elevations (see Figure 4-9 below) but the data exist for the entire local area.

Access to these local LiDAR data can facilitate Broda and the province working together to help define ranges of allowable discharges from the site under specific adverse seasonal weather conditions of concern (e.g., during spring runoff). The province has significant expertise in using LiDAR data to construct and use DEMs for planning drainage infrastructure and drainage regimes in its flooding-management planning. The DEMs and the topographic and infrastructure mapping support modeling to predict maximum allowable flow rates in canals and ditches under different adverse weather conditions, to help define critical maximum channel-capacity limitations, and maximum allowable pumping rates to canals of interest, etc. These LiDAR data thus create an important basis for WSD's determination of maximum acceptable discharges that will regulate Broda's site discharges under specific weather scenarios.

4.6.2 Regional Drainage-Constraint Removal

MLi3's 2017 field surveys have verified that WRB indications (in dialogue years ago) that flow obstructions along the ECC pathway identified in the Tetr*ES* modeling would be removed have been acted on. Key obstructions have been removed. As part of the CentrePort Canada development (especially drainage planning associated with CentrePort Canada Way), the key flow constraint at Inkster Boulevard has been removed by installation of modern new large-capacity culverts (Photo 5). (This means that Broda's planned adherence to the maximum receiving-channel rate of ~4 m^3/s in ECC would thus be conservative i.e. overprotective).

4.7 PERFORMANCE OBJECTIVES

Performance objectives have been established to guide execution of this WNRMP. These objectives, and the commitments and actions of this Plan, are in concordance with elements of the province's 2016 Water Strategy (e.g., Policies 6.1, 6.5, 6.6 and 6.7):

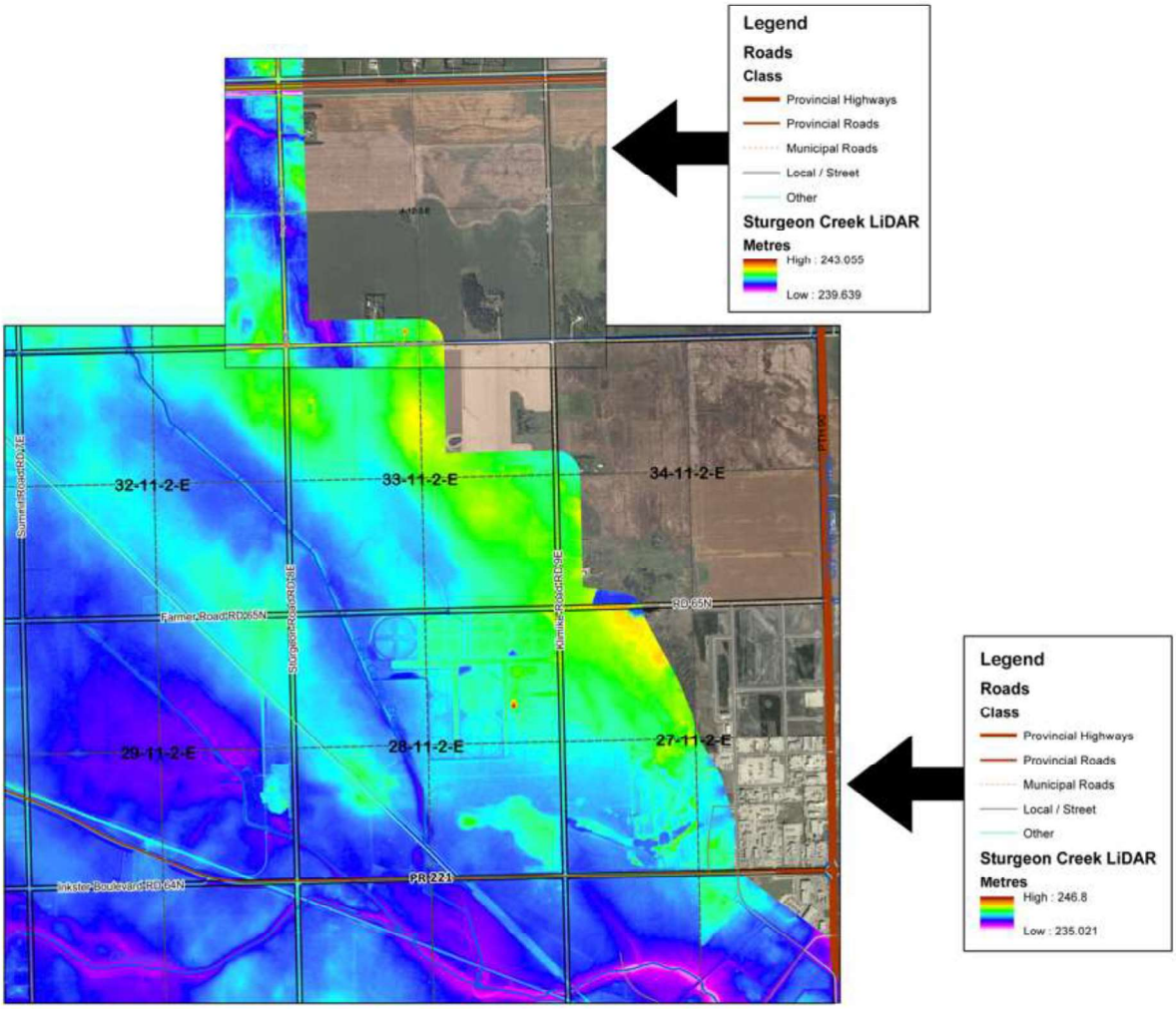

Figure 4-9**.** Recent LiDAR Data acquired for Sturgeon Creek watershed (including East Colony Creek).

"Policy 6.1 - Drainage works shall be designed to remove excess rainfall from cropland during the growing season.

Policy 6.5 - Drainage projects shall be planned and executed so that projects in one area do not adversely affect another area.

Policy 6.6 - The protection of wetlands shall be a consideration in planning and developing drainage projects.

Policy 6.7 - Water retention, and control and timing of runoff, shall be promoted as part of watershed management." (MSD 2016).

Photo 5. New High-Flow Culverts under Inkster Blvd. to Enhance Capacity.

4.7.1 Do No Harm

Broda has committed, in previous documents and public hearing processes (e.g., Tetr*ES* 2010), that quarry-dewatering activities during operations would be undertaken in a manner that does not have negative effects on neighboring land. A negative effect would occur if water from quarrying-dewatering activities was utilizing sufficient portions of local drain capacity to cause runoff to stay on a neighbor's property longer than it normally would, delaying spring seeding. To avoid this, pumping to dewater the quarry pit will not commence in spring until most runoff has moved into the drainage-ditch system.

Broda has committed to adhere to strict licencing and permitting conditions regulating any quarry-dewatering activity. As directed by the regulatory approvals to be issued for this project, and as previously demonstrated by Broda (e.g., in the 2010 rezoning CUA public-hearing process), dewatering activities will cease if there is a substantial rainfall event that will fully utilize the capacity of the drainage system if Broda had intentions of pumping water at that time to the designated receiving watercourse (Tetr*ES* 2010). Dewatering activities will also cease if flows in the local drains to which Broda is permitted to discharge exceed rates considered to be the maximum available to Broda in either the ECC (delivering runoff south to the Assiniboine River), or in the CPD (delivering runoff north and east to the Red River). These rates have been established for discharges to East Colony Creek but are yet to be determined for the CPD.

There is a possibility of another negative effect on neighbors if pumping to dewater the quarry draws down the local watertable to a depth that affects neighboring domestic wells. Broda has previously committed (Tetr*ES* 2010) to:

- stopping all dewatering pumping immediately upon being advised of such an adverse effect on a neighbour's well, and

- providing alternate water supply if this occurs until the watertable rises and the neighbour can pump water from his/her own well.

4.7.2 Work Effectively with Provincial Water-Management Personnel

Broda and its consultants have had over a decade of meetings with provincial water-resource planners and regulators to discuss local and regional water-management needs and how the proposed quarry can create new solutions to historic drainage challenges, while ensuring it creates no new pressure on the water-management systems. This Plan reflects the guidance received from many officials in these agencies. This includes guidance in 2017 updating previous discharge-pathway preferences of the province, new information about recent improvements to drainage infrastructure, and new guidance regarding needs for flow-path improvements in provincial waterways. Broda's site-development plan will include actions and works recommended in drainage studies by Stantec in 2011, which identified opportunities for capacity and flow improvement. Stantec's previous assessment of local drainage-improvement opportunities has been discussed several times over the years with WRB including in January 2017. At that time, WRB indicated satisfaction with the studies and Broda's planned actions.

In 2017, Broda reiterated its commitment to WRB officials to establish new staff gauges on sites preferred by the province upstream and downstream of Broda's lands. Data from Broda's real-time monitoring of water levels at these gauges (and at other key locations [e.g., road-underpass culverts]) will be shared with the province. This could help improve and expand real-time hydrological monitoring for the local area to assist provincial drainage management and even flood forecasting. This could assist the RM and the province in their plans to take actions in accordance with the province's new Water Strategy. Broda's commitment to sharing of hydrometric monitoring data from new staff gauges with the municipality and other users can improve local and regional water-management decision-making, reducing flooding impacts.

WRB and MI representatives advised in a meeting on January 24, 2017, that the Province is actively seeking partnerships to assist in cost-sharing for a variety of public services. Broda had previously committed to undertake various conveyance-enhancement measures in ECC, as directed by provincial authorities. It renewed that commitment in the meeting. Broda again affirms its willingness to do so in this Plan. The work could be undertaken in either of the two suggested receiving watercourses, in addition to the voluntary drain-survey and modeling work it did in 2011 to identify flow restrictions in ECC. Such action could, for instance, include:

- identification and removal of beaver dams (e.g., on Omand's Creek at Dublin Ave. east of Sherwin Rd.);
- upgrading of the junction of ECC into Omand's Creek;
- upgrading the crossing of Omand's Creek at King Edward St.;
- upgrading the CP Rail crossing of Omand's Creek downstream of Bergan Cutoff Rd.; and
- possible similar flow improvements in the Grassmere Drain.

4.7.3 Regulatory Compliance

This Water and Natural Resources Management Plan has been prepared to satisfy:

- the relevant conditions and clauses established in the RM of Rosser Quarry By-Law 8-15;
- environmental and community-interest protections in *The Mines and Minerals Act;*
- applicable portions of the *Quarry Minerals Regulation* (QMR; MR 65/92), *The Special Planning Area Regulation* (MR 49/2016), and *The Inland Port Planning Regulation* (MR 48/2016);
- *The Water Rights Act,* which is specific provincial legislation governing the use and diversion of water resources, including both surface and groundwater (Appendix C);
- *The Water Resource Administration Act,* which is legislation governing the construction or alteration of water-control works within or affecting provincial waterways;
- land-use descriptions defining the Heavy Industrial Zone (Class 3);
- relevant recommendations made by the Inland Port SPA Planning Authority Board in its consideration of prior rezoning applications (even for Class 1 and Class 2 land uses); and
- relevant approval conditions made by the Minister of Indigenous and Municipal Relations after her consideration of prior public-hearing processes administered by the Board.

4.7.3.1 Permitting of Discharges to Watercourses

Broda intends to use the existing municipal and provincial surface-water drainage network to facilitate the removal of water from the project site, when and if needed, but only in a manner that causes no impact on its neighbours. Broda's quarry dewatering would alter the existing pre-development (but not "natural") drainage patterns of Sections 4 and 33 when quarry operations commence. To do so, the planned drainage changes and discharges need to be formally approved by both (i) MSD, which has regulatory jurisdiction and licensing authority over the diversion of water under the auspice of *The Water Rights Act*, and (ii) the RM of Rosser, as the Plan involves use of the municipal drainage network.

A key corporate commitment and requirement is to obtain all required approvals and permits. Broda cannot construct water-control works affecting others without a permit from the Water Stewardship Division of MSD. To obtain the permit allowing runoff to leave Broda's property boundaries and enter a municipal ditch, the company must also have approval from Manitoba Infrastructure.

The relevant review and approval agencies within MI are the "Engineering and Construction Group" ("ECG") and the "Operations and Maintenance Group" ("OMG"). In drafting this Water Management and Natural Resources Plan, Broda consulted with ECG and OMG representatives to ensure appropriate understanding of its requirements. This Plan reflects this understanding. It

will be submitted for formal review and approval as part of Broda's application for an "Authorization to do Works in a Provincial Waterway" pursuant to s. 14(4) of the *Water Resources Administration Act.* The application will request approval to discharge into a provincial drain. The application will provide data on the expected drainage route and amount of flow. Further, Broda will formally secure confirmation from a Manitoba Infrastructure Technical Services Engineer that planned off-site drainage will not adversely affect the provincial road system.

Whether discharged to a municipal roadside ditch, or to a provincial waterway, excess seasonal groundwater may need to be removed from the quarry, especially each spring, after spring snowmelt and runoff, to allow seasonal quarrying to resume. Applications for approval to both pump and to discharge excess groundwater would be needed. A previous (2002) discharge permit issued to Broda for such discharges has expired. A renewal application is thus being prepared to SD's Water Rights Licensing group ("Groundwater Section"), which grants such groundwater-pumping and -discharge permits pursuant to *The Water Rights Act.*

Broda intends to file this WNRMP with the RM in support of its assertion that all relevant requirements of By-Law 8-15 have been met.

Periodic review of the operation of the quarry against these performance objectives will help any interested party to determine whether the Plan is working, and having the desired effect(s).

5.0 SURFACE-WATER-MANAGEMENT PLAN

For clarity, this report will address individual components of the Water and Natural Resource Management Plan prescribed in Rosser By-Law 8-15 by separating the report into a Water-Management Plan (comprised of separate Surface-Water Management [s. 5], a Groundwater-Management Plan [s.6]) and a Natural Resources Management Plan (s. 7).

The following outlines the Surface-Water-Management Plan for the proposed quarry. To facilitate quarry operations, occasional site dewatering will have to occur, removing surface-water accumulation from precipitation and snowmelt and potential groundwater seepage onto the floor of the (moving) quarry excavation. Natural (gravity) drainage is not available. Quarry excavation could, in some years, intrude into groundwater formations. So pumping must be used to remove the accumulated water for quarry operations to proceed in some years.

The following portion of the Plan shows how dewatering operations and planned releases will comply with the applicable provincial and municipal legislation, regulations and by-laws.

The 2010 interim WMP prepared by KGS engineers demonstrated that the proposed dewatering activity for the site would not be expected to affect the groundwater source(s) for neighboring property.

Groundwater management and protection of the groundwater resource is based on ensuring that the occasional blasting causes no unmitigated impacts on groundwater yields and quality. This will be achieved through sensitive, community-based evolution of Broda's Blasting Plan and its WNRMP and preliminary Conceptual EMP. The key element of Broda's plan for preventing impacts to local and regional surface waters is to manage quarry-dewatering discharges to preclude such effects. MLi3 Inc. believes this Plan is the best possible that could be developed for this site and operations at this time utilizing environmentally 'Best Available Technology Economically Achievable' (USEPA 2008).

5.1 EXISTING DRAINAGE CONDITIONS

The municipal and provincial drainage systems have been in place for decades. They provide a well-established capability for drainage of surrounding agricultural land. The City Protection Drain (CPD), the Grassmere Drain, East Colony Creek (ECC) and Omand's Creek are all provincial waterways. Both the municipal and provincial systems were built to facilitate drainage from local land. They are able to accommodate average growing season runoff.

Broda's property bisects the Sturgeon Creek and Grassmere Drain watersheds. Broda's portion of section 4 drains east and south to the north municipal drain on Mollard Rd. The property in Section 33 drains north to Mollard Rd. Flows then travel westerly into the east Sturgeon Rd. Drain and south to the ECC. The south half of Section 33 drains southwesterly towards ECC.

Both Section 4 and 33 are relatively flat. Air-photo history shows some seasonal pooling of water along the western edge of Broda's portion of Section 4, and in the southern half of Section 33. Both properties have some smaller agricultural drainage channels. These help facilitate surface-water drainage off the land towards the municipal and provincial drainage systems.

Broda intends to consult with the landowner south of its lands to attempt negotiation of an arrangement to bury a discharge line beneath this neighbouring land. This would allow occasional direct conveyance of excess seasonal groundwater to the ECC, a provincial waterway, bypassing the RM ditch. This would mean that the RM has no formal jurisdiction over the discharges to the ECC. Therefore, the permitting process under *The Environment Act,* administered by MSD, would not be needed.

MI and WRB of SD requested (Henderson and Jackson *pers comm* 2017) that Broda maintain flexibility in selecting the receiving channel for its discharges. While the long-term preference discussed with these agencies was the ECC, the possible value of using the CPD was raised. Broda expressed such willingness, and has committed to use either the ECC or the CPD to receive discharges of seasonal excess groundwater from its site, as directed by the province. As noted in s. 4.3.2 and described more below, Broda has established voluntary Operating Rules to ensure that the incremental quarry-dewatering discharges do not cause injurious exceedances of "normal flows" in the drains downstream in the ECC or in the Grassmere Drain. This will allow the Province flexibility in responding to requests from other parties for discharge of their seasonal runoff. (This could include the City of Winnipeg as an interested party viz. the CPD).

5.2 EXISTING DRAINAGE CAPACITIES AND ATTRIBUTES

Neither the CPD nor the ECC is a "perfect" receiving watercourse. The CPD is shorter, but more encumbered by flow constrictions. The CPD is more constrained by Agricultural, Commercial and Industrial inputs (although recent suburban subdivisions are adding more to these inputs). The ECC is more constrained by CentrePort discharges, and those from longer-standing urban subdivisions. Omand's Creek flows are greatly constrained by plant growth and flow constraints. The City has recently undertaken voluntary flow improvements to enhance capacity to accept runoff discharges from CentrePort lands (e.g., Photo 5).

The site-operation decision rules that Broda proposed in 2009, and has recently renewed its commitment to, will prevent pumping of excess site groundwater to ditches and drains in spring seasons when watertables and field runoff were both high, or in periods of high rainfall. These commitments should be sufficient to meet the RM's need for protection of local landowner needs for runoff priority, while meeting provincial land-use policies. (MLi3 understands they are consistent with practices now in place, and accepted, in the RM of Rockwood [Reimer *pers comm* 2017]).

5.3 PREFERRED-DISCHARGE ROUTE IDENTIFICATION

In 2010, an initial Water Management Plan (WMP)for the proposed quarry was developed by KGS Group. The KGS WMP identified two potential drainage routes for water from quarry-dewatering activities. These were southwest to the ECC and Omand's Creek or northeast to the CPD and the Grassmere Drain. Subsequent input from the government departments responsible for drainage in this area (especially MIT [now MI], at that time) revealed that East Colony Creek was MIT's preferred option. Provincial Drainage Licensing personnel advised KGS and TetrES that a potential licensing requirement could be for an engineering study to identify potential flow limitations and potential flow-improvement work needed in the drains (KGS 2010).

5.4 DRAINAGE-CAPACITY DETERMINATION AND MAXIMUM-FLOWRATE MODELING

After the ECC was selected by MIT, Broda did additional work to assess its potential to accept water discharged from occasional quarry-dewatering activities. This work included (i) on-the-ground surveys of ECC in April and August of 2011 to evaluate the condition of, and flow constraints within, the drainage pathway from Mollard Rd. to the Assiniboine River, and (ii) hydraulic modeling to assess the route's maximum-flow capacity to accommodate discharge rates possible from pit dewatering. Using the data from the surveys, Stantec constructed a finite-element model of ECC from about a half-mile upstream of Mollard Rd. to Omand's Creek, and thence to the Assiniboine River. Cross-sectional and invert data were used in the model to:

- establish continuous invert (ditch- or channel-bottom) elevations along the flow path;
- identify potential obstructions to flow (e.g., collapsing banks, culvert inverts higher than the upstream channel invert, undersized culverts, macrophyte [aquatic plant] growth within the

channel [usually in areas of collapsed banks], etc.) which the RM could consider in its planning for annual channel-maintenance activities;

- establish the maximum conveyance capacity of the expected receiving watercourses; and
- help establish how monitoring data for water levels at staff gauges or other immovable features (e.g., culvert obverts [tops]) could be used to determine the extent of remaining conveyance capacity in either receiving watercourse (including possible effects of ongoing CenrePort development on downstream ECC capacity, as CentrePort continues to grow).

Figure 4-8(a) showed the portion of the ECC that was assessed and modeled by Stantec. The model identified one area where flow in the creek could spill over the creek banks if the flow rate was equivalent to rates being contemplated to dewater the quarry. That key constriction was at Inkster Blvd. Discussion with MIT indicated that the constriction could be re-engineered to eliminate this potential overflow, in relation to local drainage improvements needed to support CentrePort. Photo 5 shows this key localized flow constraint since being upgraded.

5.5 ON-SITE STORAGE

When quarry development begins, Broda intends to reroute all existing and new drainage on the property internally, temporarily storing the water until external conditions allow for water to be released from the property. The final quarry Operating Plan will detail the final routing of the water. The internal drainage system will direct water to a common point within the site. From there, the water will be pumped as soon as possible into the designated municipal or provincial drains. The on-site storage component of this project will improve local runoff-management conditions because there is a smaller land base contributing to peak flows, and because the proposed pumping protocol precludes discharge until local drainage conditions are acceptable.

5.6 PERMITTED DISCHARGE-PUMPING RATE

Whether discharged to an RM roadside ditch or to a provincial waterway, seasonal “excess groundwater” would need to be removed from the quarry each spring, after snowmelt and runoff, to allow quarrying to resume. However, no party can construct such water-control works potentially affecting others without a permit from the Water Stewardship Division (Water Resources Branch[WRB]) of MSD (i.e., a *Water Rights Act* authorization). Broda’s site-operation decision rules prevent pumping of excess site groundwater to ditches and drains in spring seasons when watertables and field runoff are both high, or in periods of high rainfall.

Such discharges must still be licensed. Applications for approval to discharge excess groundwater would still be needed. A previous (2002) discharge permit issued by the WRB to Broda for temporary discharges has expired. As part of this Plan, a renewal application is being prepared to MSD’s WRB. Broda will submit an “Application for Licence to Construct Water Control Works” seeking approval from WRB to undertake the following activities:

- Construct internal drainage network within the Broda property on Sections 4 and 33.

- Construct on-site drainage to a common point (likely in the southwest corner of property) in Section 4 as part of the Phase 1 development). This common point will be below grade, and thus accumulated water will have to be pumped to be discharged from the site.

- Construct an internal site-drainage and -storage system within the quarry complex until the field conditions under which permitted discharge can occur have developed.

The discharge pump to be placed in the storage area will be aligned to direct flow discharges directly into the municipal-provincial drainage system. The discharge rate will be set at a rate acceptable to the WRB and MI. For example: current ECC capacity would allow for up to 20 000 USgpm under low-flow conditions. In any event, the prescribed rate must and will ensure congruence with typical licensed discharge rates relative to then-current channel-flow conditions.

5.6.1 Discharge Options Available

As noted below, Broda's Plan acknowledges that there are two basic discharge options. Broda instructed Stantec to use the model to identify potentially acceptable ranges of discharge rates that would prevent over-use of channel "mainstem" (or "bank-full") conveyance capacity. The Plan calls for ongoing dialogue with WRB and MI to collaboratively define the current and future capacities of the two receiving pathways to service the quarry and the other local users in equitable ways.

5.6.1.1 Option 1 – Piped Discharge to RM Drainage Ditch and Flow to Open-Channel Provincial Drain

Flows would be discharged directly via a PVC pipe installed westerly across Broda's property discharging into the Sturgeon Rd. east drain. Flows would then continue south to the East Colony Creek, entering the ECC drain via a culvert sized in consultation with the WRB and MI.

Engineering analysis and modelling has determined that the existing mainstem capacity of the Sturgeon Road east-side drain south to ECC is 1.3m^3/s (45.91 cfs or 20 605 USgpm). The modelling shows no ditch flooding is predictable under a wide range of weather conditions at this flow rate (Figure 4-10). The proposed pumping rate is half the known existing capacity of the municipal drain.

This Plan acknowledges that pumping will be licensed or authorized by the province only under strictly controlled conditions. Similar dewatering projects for quarry operations are authorized to begin pumping only under the following conditions, which Broda has already expressed a willingness to comply with (documented in previous project submissions).

Licence conditions established by WRB (in collaboration with MI) for similar quarry-dewatering projects include the following:

- All discharge flows must be contained within the physical banks of all downstream municipal infrastructure;

- Discharge rates are not to exceed rates established by WRB and MI;

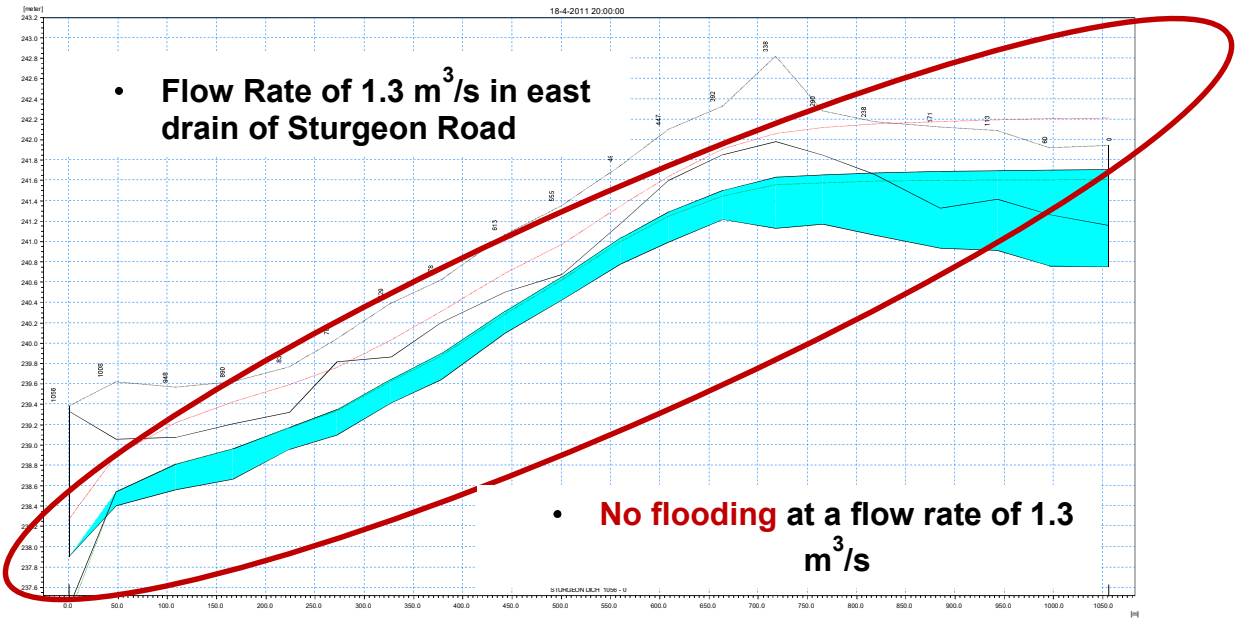

Figure 4-10. Establishing Flow Rate in ECC to Preclude Flooding Under Existing Flow Constraints.
Source: Stantec Consulting Inc. 2011

- No pumping can occur during freezing or icing conditions; and
- Pumping cannot occur until water levels at locations prescribed by WRB are at or below the obvert (top) of the existing culvert(s). (These levels would be indicated by black lines marked on the east side of culverts designated by WRB and MI).

In some cases, WRB has established specific markers or triggers on existing municipal and provincial drainage infrastructure. The markers are elevations (literally horizontal lines) painted on culverts that indicate a water level at which pumping operations can begin. Broda's Plan commits to operating the quarry each spring such that its discharges maintain flows in these ditches and culverts at levels below the designated elevations (i.e., the marked black lines).

The modeling developed for the east drain of Sturgeon Road provides elevations and other detail that WRB can translate to the real-world infrastructure, specifically to delineate "trigger" elevations on the upstream end of existing culverts in the east side drain of Sturgeon Road. These designations will act as indicators that allow authorizing pumping to begin.

The 2011 engineering report indicated that the east road drain of Sturgeon Road has an in-channel mainstem capacity of 1.3 m^3/s, at which there are no overland flooding. A flow rate of 1.3 m^3/s could thus be the maximum rate allowed by WRB under any circumstances in the drain.

With a proposed pumping rate of 0.63 m^3/s, this Plan discharge option is based on Broda's commitment that dewatering pumping would occur only when the sustained flows in the east

Sturgeon Road drain were at 0.67 m^3/s or lower. The proposed pumping scheme must be formally approved by the RM as this option uses a municipal right of way for receiving water.

5.6.1.2 Option 2 – Piped Discharge to Open-Channel East Colony Creek Provincial Drain

If the option of using the identified municipal road right of way is not feasible for any reason, an alternative option is available to Broda for quarry-dewatering and discharge activity.

Broda would bury a discharge pipe from the initial centroid of the proposed development north of Mollard Road placing it to run south through the land base south of Mollard Rd., and southwest through private property. The pipe would discharge directly into East Colony Creek, a provincial waterway managed by MI.

Any such burying of pipe would have to be done with the consent of the southern property owner. The proposed alignment would have to be licensed by MSD. To legally install the pipe in provincially owned drainage infrastructure, a permit issued by the province pursuant to *The Water Resources Administration Act* would be needed. For MI to authorize this, the department would need to be satisfied that the proposed activity will not impact its infrastructure. This information need has been met because the model used to identify the "no effect" discharge rate (creating no flooding impacts) encompassed the local reach of the ECC drain.

In Stantec's model, the reach in which the pipe would be installed has been hydraulically modelled. Re-interpretation of the 2011 modeling output suggests that at the location in question, the in-channel mainstem and bank-full flow rates that should cause no predicted flooding on adjacent property are 4.0 m^3/s and 6.2 m^3/s, respectively, taking into account the recent improvements to the drain at Inkster Blvd. This means that Broda's Plan could be successfully implemented at a bank-full ECC flow rate up to 6.5 m^3/s (230 cfs or 103 000 USgpm). The model suggests that pumping from the quarry site could safely commence when flows are at 5.87 m^3/s (205 cfs or 92 000 USgpm). (NOTE: Bank-full capacity needs yet to be verified. This Plan contains a commitment to do so as one of the actions committed to support refinement of the Plan; see s. 10).

Again, these higher flow rates can be translated into geodetic elevations by WRB and MI. These elevations can be transcribed onto existing infrastructure by marking the upstream end of a culvert with a line indicating the water level at which Broda's pumping activity can occur.

It should be noted that this approach has been used to authorize, licence and govern pumping and dewatering activity for the Rockwood Quarries in the RM of Rockwood.

It should again be recognized that this Plan's commitments not to exceed prescribed pumping rates is conservative. Since this model was developed, local improvements have been made to the crossing at Inkster Blvd. identified as being a potential concern for flooding. Because culvert upgrades have occurred, the higher licensed flows could be considered for pumping purposes.

Depending on negotiations with the southern landowner, Broda will seek authorization to discharge flows into ECC at the maximum flow threshold determined by MI. This is likely not to

exceed ~4 m^3/s if Option 1 is selected or ~6.5 m^3/s if option 2 is selected (both rates assuming WRB's and MI's confirmation of the interpreted 2011 model output; see "Next Steps" in s. 10). For purposes of conservatism, the Plan contemplates the lower rate being relied upon.

5.7 ADVANCE PUBIC NOTICE AND ACCOUNTABILITY ABOUT DISCHARGE MANAGEMENT

Broda will maintain open communications with the quarry's neighbors. Modeling of East Colony Creek has shown that sufficient capacity exists to accommodate the predicted quarry-dewatering flows. (Similar work will determine the maximum capacity in the City Protection Drain). Also, Broda may be able to use piped discharged to receiving systems. This combination of approaches means that quarry-dewatering flows are very unlikely to use enough capacity in either receiving system that neighboring properties' drainage is reduced (i.e. impacted).

5.8 ADAPTIVE MANAGEMENT PLAN

The license condition prescribed by WRB allowing pumped discharges will likely require that permanent existing water-control infrastructure (e.g., existing culverts, new staff gauges) be installed or marked with a clearly displayed, identifiable horizontal line(s) on the infrastructure visible from the applicable roadside that shows the levels at which Broda's pumping can commence. An Adaptive Management Plan (AMP) is required by the By-law to support the licensee's ability to satisfy all the licensed conditions of approval. The AMP requires:

- Monitoring plans
- Mitigation measures
- Trigger mechanisms
- Contingency plans

Broda's parallel Adaptive Management and Progressive Rehabilitation Plan (AMPRP; MLi3 2019a) contains operating guidelines that satisfy these By-law conditions. Broda's ASMPRP will evolve in coordination with, and will be interdependent with, evolution in the Water Management Plan component of Broda's WMNRMP

5.9 BY-LAW 8-15 SCHEDULE B – "ANCILLARY USE PERMIT"

Section 1, clause (d) of Schedule B sets out the requirement for an "Ancillary Use Permit" to assist a prospective licensee to address drainage and water issues:

> *iv) a review of the most technological means to minimize the potential impact on property from negative effects of…run-off on the surface and ground water;*

Broda has committed to employ the Best Available Technology Economically Achievable and Best Practices to construct and operate the quarry. Its reliance on Best Practices will be equivalent to that exemplified by other regional licensed quarry operators or better. (In the latter

regard, Broda's reliance on Continuous Surface Miner technology will exceed Best Practices of all other quarry operators in Manitoba). Strict site-safety and spill-containment and management protocols will be established. Accordingly, and because of the orientation of the internal drainage network and the fact that most water collection will be undertaken below grade, the surface-water-contamination risk is minimal. If there is a spill, it will be of only small quantities of biodegradable hydrocarbons, which will be contained within the quarry and treated properly on site. Requirements for issuance of the "Ancillary Use Permit" have thus been, or will soon be, fully satisfied.

The risk of groundwater contamination has been identified in section 6 of this Plan.

5.10 BY-LAW 8-15 – SCHEDULE C

Schedule C sets out the considerations the RM considers before issuing a license for a quarry operation. The considerations specific to groundwater and surface water include:

> *iv. "Any possible effects on ground and water resources", and:*
> *ix. "The drainage provisions approved in the Water and Natural Resources Management Plan".*

The known and reasonably predictable effects on surface water and groundwater have been explored in this document. The known and reasonably predictable potential impacts have been eliminated or minimized to insignificance through site layout or design, and commitments to (i) use of Best Available Technology Economically Achievable (BATEA; USEPA 2008, Wikipedia undated) and Best Practices for constructing and operating a modern well-engineered quarry, and (ii) execution of the WNRMP, EMP; and AMPRP. Should there be significant unforeseen impacts, provincial approval of the *Water Rights* License can be revoked or the conditions and terms of the approval modified. The RM has similar discretion.

Additionally, the powers of the provincial legislation regulating water resources enable the province to order whatever remedial work may be necessary to mitigate potential issues.

Any plan by Broda to alter the works licensed under *The Water Rights Act* requires formal approval from the province. The works intended to be altered need appropriate technical analysis prior to approval to ensure that any proposed changes do not impact the surrounding landowners or existing provincial or municipal drainage works.

Under Section 2 in Schedule C, the By-Law also establishes criteria by which a licence can be refused. The key clause specific to surface water and groundwater is as follows:

> *v. "lacks adequate data of assurance that groundwater quality or supply will not be adversely affected, and/or"*
> *vi. "Poses a threat of environmental danger to any unique or significant ecological, wildlife, water fowl or fisheries areas…."*

Each clause specific to drainage has been addressed in this Plan.

In respect of Clause iii, the Surface Water Management Plan within this Plan must and will be licensed and permitted pursuant to *The Water Rights Act*. As demonstrated in this Plan, licensed pumping activity will occur only under conditions in the existing drainage system that can fully and safely accommodate site discharges. Additionally, Broda will undertake maintenance of and repairs to ensure sustainability of the licensed discharge system, consistent with its proactive commitment to Best Practices and BATEA. By virtue of a well-founded project-design process (over a decade long), commitments to state-of-the-art technology and corporate proactivity, and commitments to accountability to neighbours and regulators, there is no reasonably foreseeable expectation for Broda to need to improve or alter the existing drainage system.

5.11 ADDITIONAL WORK NEEDED TO SUPPORT SURFACE WATER-MANAGEMENT PLANNING

Broda has made commitments for additional actions to fulfill the intent of this Plan:

- Measure culvert diameters along the CPD receiving watercourse, especially to identify undersized (flow-constraining) culverts.
- Identify flow constrictions along the CPD in a fashion similar to the work done for the ECC.
- Map culverts and flow-constriction (e.g., beaver dam, bank slumpage) locations along the CPD using Google Earth (e.g., Figure 3-4(b). Compete mapping to show how the culverts, and the adjoining land uses, have changed over time, using the historical photography available at selected locations. Show also how cross-sections (X-sections) at key flow-constricting locations have evolved over time, creating flow barriers. Include key data, cross-sections and imagery in the next Surface-Water Management Plan.
- Evaluate the relative merits of the two receiving watercourses to help prioritize action items needed to improve the conveyance capacity of each, and their relative priority.
- Contact planners and regulators to determine the effects of CentrePort developments on future drainage plans for ECC and Omand's Creek and their conveyance capacities.
- Verify that bank-full capacity of the ECC at the proposed receiving point is 6.5 m^3/s.
- Propose locations for installation of new staff gauges to WRB, and install after finalizing number, locations and methods for "benchmarking" each gauge.
- Re-survey (i) all on-site monitoring wells every year, and integrate all accumulated data in the longer-term database, and (ii) all habitats capable of theoretical support to designated species every five years, and develop any necessary habitat-protection measures, for immediate implementation and effectiveness monitoring.

To the maximum extent possible, Broda will conduct this work in collaboration with provincial departments, branches, or agencies (especially MSD, MI, SD and the MCDC).

6.0 GROUNDWATER-MANAGEMENT PLAN

As noted above, occasional site dewatering will be needed, to remove surface-water accumulation from precipitation, snowmelt and groundwater seepage into the quarry excavation. Quarry excavation could, in some years, intrude into groundwater formations. In such circumstances, pumping must remove the accumulated water for quarry operations to proceed in the spring of those years. At the time that most of the hydraulic investigations for the quarry were undertaken, water levels in the underlying aquifers were very high (Figure 4-6). Since that time, water levels may have dropped significantly (Bell *pers comm* 2015, 2019). It is possible that under present groundwater levels, little or no dewatering will be required to allow quarrying.

Thus, the key element of Broda's plan for preventing impacts to local and regional surface waters is to manage quarry-dewatering discharges to prevent such effects. The 2010 interim WMP prepared by KGS engineers demonstrated that the proposed dewatering activity for the site will not likely affect the groundwater sources for neighboring properties. The risk of groundwater contamination was a key focus of that planning exercise, as the development of the interim WMP was intended to preclude risks to adjoining off-site wells and water supplies. In this updated subsequent Plan, groundwater management therefore consists largely of ensuring that occasional blasting (about 15-24 times per operating season, statistically speaking) causes no impacts on groundwater yields and quality.

This will be achieved through (i) use of mining technology that greatly minimizes the use of blasting, and (ii) sensitive and community-based evolution of Broda's Blasting Plan, in concert with (iii) proactive execution of the Broda AMPRP and the preliminary conceptual EMP. As noted in section 4, Broda has re-committed to the reliance on Continuous Surface Miner technology because it greatly minimizes the use of blasting. MLi3 understands that few other quarry developers or operators in central Canada have seen the need to adopt this very high-cost machinery. No regulatory requirement for its use has yet been created by the province, nor any jurisdiction in Canada. Yet Surface Miner technology is 'Best Available Technology Economically Achievable'. Broda will be its first user in Manitoba.

Further, Broda's Blasting Plan is informed by the results of the recent Blasting Impact Study completed by DST Consulting Engineers (2018), and follows its recommendations. Ignoring the significance of use of Surface Miner technology on reducing the need to blast, and focusing solely on definition of charge strength and blasting practices designed to prevent impacts, the DST study (2018, p. 15) reports that Broda's adherence to its site-specific recommendations will mean no impact on adjoining well yields.

For all these reasons, MLi3 Inc. believes this Plan is the best possible that could be developed for this site and operations at this time utilizing as it does, and as it will, 'Best Available Technology Economically Achievable' (USEPA 2008) Further, these other plans, in combination with BATEA and Best Practices used to operate the quarry, can prevent significant unmitigable impacts on groundwater quantity or quality in off-site wells.

7.0 NATURAL RESOURCES MANAGEMENT PLAN

The Broda site occurs within the 'Winnipeg Ecodistrict', part of a transitional zone between boreal forest to the north and the aspen parkland to the southwest. The vegetation in the ecodistrict ranges from trembling aspen/oak groves (often found along stream channels and in better-drained sites, including on the Broda land) to white elm, basswood, cottonwood, Manitoba maple and green ash on alluvial floodplain deposits and lower river terraces. Pockets of prairie grassland occur in poorly drained and/or remote sites, or those unfit for agriculture. Open wetlands with grasses and sedges occur where standing water is present for all or part of the year. A small wetland occurs on the site. Trembling aspen, willows and shrubs occur where soils are poorly drained, while bur oak and native grass species occupy drier sites on loamy to clay soils, such as found at the site.

The ecodistrict is flat. Depending on overburden composition, cereal crop production is the prevalent land use. Where soils are rocky, livestock and livestock-feed production are common. Crop production occurs on part of the Broda property. Dairy farming occurs nearby.

7.1 REGIONAL AND LOCAL SIGNIFICANCE OF HABITATS

7.1.1 Vegetation

Due to cultivation and the development of drainage ditches, the native vegetation (tall-grass and mixed-grass prairie) has largely disappeared from the site. Most of the site is cultivated for crop production. In 2004, site surveys inventoried the species composition of habitats at three sites. Baseline vegetation species composition and dominance were typical.

Where a dugout has created a small wetland, it was surrounded by previously excavated spoil and limestone boulders. Upland areas were predominantly grassland with a few trees and shrubs. Most locations had 100% vegetative cover. Smooth brome, bluegrass, Canada thistle, and several species of goldenrod dominated this site. Other species were less common. None were considered provincially 'rare' or 'endangered'. The vegetation of these habitats is not uncommon, nor particularly valuable from an intrinsic perspective. Their diminishing presence because of industrial pressures like agriculture and mining increases their local value however.

Two areas of drier prairie contained a variety of surviving native prairie plants such as bergamot, purple prairie clover, cut-leaved anemone, blazing star, goldenrod and asters. There were also patches of smooth brome and thistle (invasive species). The site also supported several small shrub thickets consisting of Saskatoon, silverberry, shrub rose, willow and trembling aspen. There were no provincially 'rare' or 'endangered' plant species encountered at this site. A small patch of undisturbed prairie grassland may yet survive on the site; many native prairie species were present. The patch has not yet been fully invaded by smooth brome and thistle. This makes these small patches native prairie species intrinsically valuable and worthy of protection.

A wooded area west of the two prairie grassland sites contained a farmyard surrounded by a mature bur oak forest. Although the canopy cover was extensive, both the under-story and

herbaceous layer were well developed, supporting a diversity of plants. The oak forest was bordered by a woodlot containing aspen, Manitoba maple, hawthorn, chokecherry and poplar. A small shallow dugout had then-recently been excavated at the western edge of this woodlot. To the east, the oak forest was bordered by a stand of large poplar trees. To the south, trembling aspen was encroaching on what once seemed to be unusual oak savannah.

The oak forest is an excellent example of a 'Mesic Oak Forest'. This is unusual, in that bur oak is the only tree species found in the main part of the oak forest. The bur oak are growing at the northwest limit of their range, and natural stands of mesic oak forest are uncommon in Manitoba, tentatively listed as 'rare' or 'uncommon' (but not 'imperilled'). The site also has a substantial amount of small oak trees. This area, however, is only 2.5 ha in size and contains trees that are only ~70 years old. Taken together, this suggests that oak regeneration is ongoing, a situation rare in mesic oak forests which usually show no oak regeneration, and are usually succeeding to other hardwood species because of fire suppression or grazing pressure. While a fire-suppression campaign exists in the RM of Rosser, there is no grazing in this woodland.

7.1.2 Avifauna

Waterfowl are considered abundant in the Lake Manitoba Ecoregion, especially in and near the small often-ephemeral ponds dotted throughout the agricultural lands around Winnipeg that can provide excellent breeding, brood rearing, foraging and migration-staging habitats for waterfowl and other water birds. The site provides suitable habitat for waterfowl, breeding songbirds and upland game birds. In 2004, small flocks of ruffed grouse were observed using the native prairie habitats. A list of bird species potentially found within the site was compiled). No bird species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the *Species at Risk Act* (SARA), and/or the *Manitoba Endangered Species Act* (MBESA) as being 'endangered', 'threatened', or 'of special concern'.

The preservation of waterfowl habitat this close to the International Airport is not something that the Winnipeg Airport Authority would encourage. Because the hydrophilic (water-loving) vegetation species around the wetland (arguably not even a true "prairie pothole' prized for their waterfowl productivity) are not regionally or locally unique, nor are they ecologically important, there is no pressure (or moral authority) on Broda to preserve this small habitat. The interests of public safety might, arguably, suggest that the small excavation be filled in to end the attraction to waterfowl at a site less than 10 km from the airport.

7.1.3 Wildlife

The site also provides mammal habitat for species common to agricultural areas around Winnipeg including white-tailed deer, coyotes, cotton-tailed rabbits, and Richardson's ground squirrels. All are adapted to areas transitional between open grassland habitats and aspen groves. Mammals that may use the site do not include species listed by the COSEWIC, the SARA, and/or the MBESA as being 'endangered', 'threatened', or 'of special concern'. Several dozen deer beds, several wildlife trails leading to the dugout and several badger holes were observed. While valuable habitat for such animals is present and is clearly used, and important to resident populations, these populations are not regionally or locally unique, nor ecologically important.

7.1.4 Herptiles

Although no reptiles or amphibians were observed during the 2004 site visit, the dugouts, grassland, and woodland habitats provide excellent habitat for several reptile and amphibian species. During the site visit, these reptile and amphibian species had likely begun hibernation, or were dispersing to hibernacula, and therefore would not have been observed. Such species are becoming rarer. Important to any resident populations, these habitats are not regionally or locally unique, but therefore could be quite important nonetheless.

7.1.5 Endangerment

A total of 20 wildlife species listed as 'endangered', 'threatened', 'vulnerable', or having 'special concern' or 'rare' by COSEWIC, SARA, MBESA and/or the MCDC could potentially inhabit or migrate through the site. Of these species, 14 are birds, two are amphibians, one is a reptile, two are mammals, one is an invertebrate and one is a fish. While preferred habitat for many of these species (e.g., native prairie, wet meadow, fen, etc., is uncommon within the site), there is potential habitat to support Short-eared Owl, Loggerhead Shrike and northern leopard frog. Clearly, habitats able to support these endangered species should be protected.

7.2 PERFORMANCE OBJECTIVES

7.2.1 Habitat Preservation and Restoration During Rehabilitation

Broda has committed that it will undertake progressive rehabilitation of the site vegetation and habitats as the granular resources are extracted. Progressive restoration techniques will be consistent with Best Practices required on Crown lands, or better. Site rehabilitation will be designed to seek highest possible valued uses of the remaining property. Thus, native prairie habitats will be protected from agriculture and mining pressures. Native Boreal Forest tree and shrub species will dominate the new landscapes created after the excavations have been backfilled. Although local farmers use 'lure crops' to attract waterfowl to their lands to support local hunting (RM Rosser Website [www.rmofrosser.com]), Broda will not use such species because the adjacent airport seeks to avoid bird attractants.

7.2.2 Protection and Preservation of Designated Habitats and Key Species

Broda has committed to the protection and preservation of the uncommon and valuable habitats that occur on the property and the species they might support unless habitats are implicated by site layout plans, and until such protection threatens the economic viability of the quarry (i.e. consistent with BATEA).

7.2.3 Effective Engagement with Provincial Sustainable Development Personnel

Meetings have been held over the years with personnel in the Manitoba Conservation Data Centre (MCDC) to assist in the understanding of findings about specific grassland, shrub, bird and wildlife species identified on the property. Data from site surveys (Appendix A) have been shared with the CDC, and will continue to be.

8.0 MONITORING TO ASSESS PERFORMANCE

8.1 MONITORING TO ASSESS DISCHARGE-MANAGEMENT PERFORMANCE

Monitoring the effectiveness of the Surface-Water-Management Plan will occur as follows:

- Broda staff will check with provincial staff to determine their preferred drainage system to receive the excess water before starting any occasional pit-dewatering activities;
- Broda staff will then monitor the water levels in that drainage-canal system, using the staff gauges that Broda staff have previously installed and other permanent markers;
- Monitoring data will be shared with the provincial staff who will interpret whether, at any moment in time, any Broda discharges could exceed the capacity of either system;
- No discharges will occur unless rates of planned discharge are less than the mutually-agreed level-threshold values preventing discharge to either drainage system; and
- A documentation log of reported concerns will be maintained and reviewed annually.

As part of the quarry's regular maintenance and "good housekeeping" activities, the drains will be regularly monitored. Local barriers to flow will be reported to the province. As requested by the province, and as occasionally permitted by Water Stewardship to do drain maintenance, Broda will take actions supporting regional provincial work to prevent localized impediments to drainage. A second documentation log of any such reported concerns, and associated mitigation actions, will be maintained and shared annually with the province.

8.2 MONITORING NEIGHBOURING WATER-SUPPLY CONSISTENCY

Broda will maintain regular contact with its neighbors. Neighbors dependent on water-supply wells will have a publicized (including a hand-delivered notice of a) 24-hour call-in line to use if they suspect that a water-supply interruption is being caused by Broda's occasional quarry-dewatering actions. A third documentation log of any such reported concerns will be maintained. It too will be shared annually with the province. Any perceived impact to a neighbour's well reported to Broda will be investigated promptly. Solutions to water-supply interruptions have been discussed in previous Broda documents placed in the public domain (Tetr*ES* 2010; KGS 2010). Broda's commitments remain in place.

8.3 NATURAL RESOURCES SURVEYS

Periodic natural resources surveys will occur to track the condition and species composition of key indicator species of vegetative and wildlife-habitat health and diversity for demonstration of these parameters on the site. As noted in Broda's preliminary Conceptual Environmental Monitoring Plan (EMP), such surveys will use the same techniques and survey locations as

previously used and studied in 2004. This can allow assessment of trends in species composition, habitat condition and habitat use over time. Repeat 5-year surveys may identify and could quantify the benefits expected from protection of existing habitat, and from new habitats created on site (e.g., from berming and associated native-plant species introductions, and from termination of mechanized agriculture).

9.0 PLAN EVOLUTION

This Plan will evolve as performance metrics accumulate and as performance trends can be identified and tracked. The major factor affecting how the Plan will evolve through time is the level of the water table at the site, on one hand, and the presence or absence of concerns about Broda's dewatering operations, on the other. It is unlikely that aspects of natural resources management will prove to be key factors in plan evolution. Evolution of the WMNRMP will be reflected in evolution of the parallel AMPRP.

10.0 NEXT STEPS

Broda has made commitments for additional timely actions to fulfill the intent of this Plan:

- Measure culvert diameters along the City Protection Drain, especially to identify and undersized culverts (e.g., 24"-diameter culverts) not yet replaced.

- Identify the state of current flow constrictions on the CPD in the same way the work was done for the ECC. Working with the WRB and MI to update and improve this plan, Broda and the WRB and MI will consider data from the Katz study (Henderson and Jackson *pers comm* 2017) as WRB re-estimates the capacity of the City Protection Drain. That capacity estimate may now be dated, having been computed some years ago to support design of a new stormwater-retention pond serving a new subdivision east of Pipeline Road north of the Perimeter Highway. Broda's new interpretation of provincial LiDAR data (Figure 4-8b) may be helpful to this work.

- Map CPD flow restrictions using current satellite and LiDAR data and the historical photography at selected locations. Key data, cross-sections and imagery will be included in the next Surface Water Management Plan iteration.

- Evaluate the relative merits of the two receiving watercourses to help prioritize the action items needed to improve the conveyance capacity of each.

- Negotiate an arrangement with the owner of adjacent southern land to bury a piped discharge directly to a provincial waterway.

- Contact planners and regulators to determine the effects of CentrePort developments on future drainage plans for ECC and Omand's Creek and their conveyance capacities.

- Verify, through dialogue with Broda, Stantec Consulting, WRB and MI, that the 2011 Stantec model output can be interpolated to identify "safe" flow rates exceeding current channel capacity that will not result on localized flooding, accounting for the recent improvement to the ECC crossing beneath Inkster (Photo 5). This improvement has very likely increased the allowable flow capacity of the drain (perhaps to somewhere between ~4 and ~7 m^3/s). This suggests higher thresholds (or "trigger") water levels at which pumping could safely begin (i.e. higher than the flow scenarios of 4.0 and 6.5 m^3/s at Inkster Blvd. predicted to result in "minor" and "significant" flooding, respectively).

- Work with WRB and MI to establish safe discharge rates to the City Protection Drain (in the same fashion, but with current information) as was done for discharges to East Colony Creek.

- Propose locations for the number and installation of staff gauges to WRB and MI, and install after finalizing number, locations, methods for installation and invert of each gauge.

- Mark the upstream ends of the culverts selected by WRB and MI to indicate pumping "trigger" rates.

- Install the staff gauges at the locations selected by WRB and MI for monitoring of safe pumping- "trigger" water levels at these selected locations.

- Update water-level data for the regional aquifer from the appropriate government department.

- Complete the QA review for the data retrieved in fall 2016 from malfunctioning dataloggers still resident within the two on-site monitoring wells (Figure 4-7), once they are replaced or repaired, and integrate useful data with those previously interpreted by KGS Group (when it prepared the 2010 interim Water Management Plan).

- Finalize the interim site preliminary Confidential Conceptual Operating Plan to reroute all existing and new drainage on the property internally to an appropriate location for temporary water storage if local drain-capacity conditions require such expensive controlled release from the property.

- Submit an "Application for Licence to Construct Water Control Works" seeking approval to develop and operate the quarry-dewatering discharge system.

- Collaborate with the WRB and MI to support its designation of final elevations to be marked on the upstream end of existing culverts in the Sturgeon Road east-side drain to delineate the final "trigger" elevations for maximum permitted pumping causing no downstream flooding.

- Revise the Adaptive Management and Progressive Rehabilitation Plan (AMPRP; MLi3 2019a) to fully satisfy By-law 15-8 and provincial statutory requirements under the *Water*

Rights Act for information about discharge-related monitoring plans, mitigation measures, "trigger" mechanisms and contingency plans;

- Re-survey (i) all on-site monitoring wells every year, and integrate all accumulated data in the longer-term database, and (ii) all habitats capable of providing theoretical support to designated and key "indicator" species every five years. Develop any necessary habitat-protection measures, for immediate implementation and monitoring of effectiveness

- Re-survey the conditions and reported yields of all neighbouring monitoring wells previously surveyed, such that results can inform next iterations of this WNRMP and the AMPRP.

To the maximum extent possible, Broda will conduct this work/activity in collaboration with provincial departments, branches, or agencies (especially MI, MSD [WRB] and MCDC).

11.0 CLOSURE

This inaugural Water and Natural Resources Management Plan integrates the expectations and requirements of provincial and/or municipal civil servants having relevant expertise and responsibilities. MLi3 Inc. and Broda believe that it satisfies the specific regulatory requirements within the appropriate jurisdictions. Additionally, it satisfies specific visions, expectations and legal requirements within these departments.

As has been demonstrated, Broda has completed the necessary technical investigations required to analyze the limits of the existing drainage infrastructure and develop a dewatering and water-management plans that utilize this infrastructure accordingly. The site-operation decision rules to guide quarry-dewatering and water-discharge operations that Broda proposed in 2009, and renewed its commitment to last year, will prevent pumping of excess site groundwater to ditches and drains in spring seasons when watertables and field runoff are both high, or in periods of high rainfall. These commitments should be sufficient to meet the RM's need for protection of local landowner needs for runoff priority, while meeting provincial land-use policies. The temporary-storage component of the proposed development is also a benefit to the local drainage system as it can be used to reduce peak runoff from the site's runoff 'footprint'.

The provincial licenses to be issued for the project will clearly outline the conditions under which pumping activity can occur. WRB and MI approvals can be modified at any point to mitigate any unforeseen concerns that may arise from the permitted activity. The provincial license is a legally binding document and is enforceable. Its violation can result in a myriad of enforcement measures including remedial orders, fines and potential cancellation. This key component of the Surface Water Management Plan is also the heart of the plan to protect the groundwater resource.

The municipal permits to be issued for quarry operation also have clauses relevant to surface water and the municipal drainage system. These concerns would be very similar in nature to the

Water Rights licenses issued for the project. The RM has the ability under both the *Municipal Act* and By-Law 8-15 to also engage in enforcement activity, if required, if Broda selects the discharge option using the municipal drainage ditch.

It can be concluded that the governance tools available to regulate surface-water-management activity that Broda has committed to abide by are adequate to address any relevant concerns that may develop from any party. The proposed water-management components of the Plan are sound. The WRB's exacting licensing model relied upon in formulating this Plan is being used by quarry operations elsewhere in Manitoba to safely manage quarry-dewatering activities.

Natural resources on the site have intrinsic value. Several habitats (and their many dependent species) are worthy of the economically-viable protection that Broda has committed.

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APPENDIX A NATURAL RESOURCES SURVEY RESULTS

Appendix A, Table 1 Plant Species list for Sample Sites 1, 2 and 3				
Species		**Abundance[1]**		
Scientific Name	**Common Name**	**Site 1**	**Site 2**	**Site 3**
Acer negundo	Manitoba maple	R		O
Agropyron repens	couch grass	O		
Amelanchier alnifolia	Saskatoon		O	O
Andropogon gerardi	big blue stem	O	O	
Anemone multifida	cut-leaved anemone	R		
Antennaria sp.	pussytoes	R		
Arctium tomentosum	cotton burdock		R	
Armoracia rusticana	horse radish	F	O	
Artemisia frigida	pasture sage	F	O	
Artemisia ludoviciana	prairie sage		R	
Asclepias speciosa	showy milkweed		R	
Aster laevis	smooth aster	O	O	
Aster pansus	many-flowered aster	O	O	
Bromus inermis	smooth brome	D	O	
Caragana arborescens	common caragana	R		
Cirsium arvense	Canada thistle	A	F	
Cornus stolonifera	red osier dogwood	R		
Craetegus sp.	hawthorn			O

Appendix A, Table 1 Plant Species list for Sample Sites 1, 2 and 3				
Species		**Abundance[1]**		
Scientific Name	**Common Name**	**Site 1**	**Site 2**	**Site 3**
Eleagnus commutata	silverberry	O	O	
Fraxinus pennsylvanica	green ash	R		
Galium boreale	northern bedstraw	O	O	
Glycyrrhiza lepidota	wild licorice	R	R	
Helianthus maximilianii	narrow-leaved sunflower	O	R	
Lactuca pulchella	wild blue lettuce	R		
Liatris punctata	dotted blazing star		R	
Melilotus alba	white sweet clover	A	O	
Melilotus officinalis	yellow sweet clover	R		
Monarda fisulosa	bergamot		R	
Petalostemon purpurea	purple prairie clover		R	
Phalaris arundinacea	canary reed grass	O		
Poa sp.	bluegrass	A	A	
Populus deltoides	poplar	R		O
Populus tremuloides	trembling aspen	R	R	O
Prunus virginiana	chokecherry			O
Quercus macrocarpus	scrub oak			D
Rosa arkansana	prairie rose	F		
Rosa acicularis	prickly rose		O	O

Appendix A, Table 1 Plant Species list for Sample Sites 1, 2 and 3				
Species		**Abundance[1]**		
Scientific Name	**Common Name**	**Site 1**	**Site 2**	**Site 3**
Rubus ideaus	Raspberry			O
Schizachyrium scoparium	little blue stem	R		
Solidago canadensis	Canada goldenrod	A	F	
Solidago gigantea	giant goldenrod	O		
Solidago rigida	rigid goldenrod	O	F	
Sonchus arvensis	perennial sow thistle	O		
Spartina pecinata	prairie cord grass	O		
Symphoricarpos albus	western snowberry	F	O	O
Taraxacum officinale	dandelion	F		
Thalictrum venulosum	meadow rue			R
Tragopogon dubius	goats beard	O		
Typha latifolia	cattail	O		
Viburnum trilobum	high-bush cranberry			O
Vicia cracca	American vetch	R		
Zizia aptera	heart leaved alexander		R	

Appendix A, Table 2 Characteristics of the 2.4-ha Oak Forest (Site 3)	
Parameter	**Value**
Oak frequency	100%
Oak density	1109 trees/ha
Basal area	0.034 m^2/tree
Area occupied per tree	9.02 m^2/tree
Tree distance to sample point (mean ± standard deviation)	3.00 ± 1.54 m, n = 88
Tree height (mean ± standard deviation)	13.5 ± 3.1 m, n = 22
Diameter at Breast Height (DBH) (mean ± standard deviation)	20.9 ± 6.4 cm, n = 88
Tree age (mean ± standard deviation)	56.8 ± 12.4 yr, n = 11
Canopy cover	83.6 ± 14.4 %, n = 22
Shrub frequency (%):	
Bur oak	29.2
Prickly rose	25.3
Saskatoon	24.8
Snowberry	5.0
Raspberry	3.0
Highbush cranberry	3.0
Chokecherry	0.5

Appendix B, Table 1 Bird Species Potentially Inhabiting the Project Site		
Scientific Name	**Common Name**	**Status[a]**
Podilymbus podiceps	Pied-billed Grebe	B
Podiceps auritus	Horned Grebe	B
Podiceps grisegena	Red-necked Grebe	B
Podiceps nigricollis	Eared Grebe	B
Aechmophorus occidentalis	Western Grebe	B
Phalacrocorax auritus	Double-crested Cormorant	B
Botaurus lentiginosus	American Bittern	B
*Ixobrychus exilis**	Least Bittern*	B
Ardea herodias	Great Blue Heron	B
Branta canadensis	Canada Goose	B
Aix sponsa	Wood Duck	B
Anas crecca	Green-winged Teal	B
Anas americana	American Widgeon	B
Anas platyrhynchos	Mallard	B
Anas rubripes	American Black Duck	B
Anas discors	Blue-winged Teal	B
Anas acuta	Northern Pintail	B
Anas strepera	Gadwall	B
Anas clypeata	Northern Shoveler	B
Aythya valisineria	Canvasback	B

Appendix B, Table 1 Bird Species Potentially Inhabiting the Project Site		
Scientific Name	**Common Name**	**Status[a]**
Aythya collaris	Ring-necked Duck	B
Aythya affinis	Lesser Scaup	B
Bucephala albeola	Bufflehead	B
Melanitta fusca	White-winged Scoter	B
Bucephala clangula	Common Goldeneye	B
Lophodytes cucullatus	Hooded Merganser	B
Mergus merganser	Common Merganser	B
Haliaeetus leucocephalus	Bald Eagle	B
Cathartes aura	Turkey Vulture	B,N
Circus cyaneus	Northern Harrier	B
Accipiter striatus	Sharp-shinned Hawk	B
Accipiter cooperii	Coopers Hawk	B
Buteo jamaicensis	Red-tailed Hawk	B
*Buteo regalis****	Ferruginous Hawk***	B
Aquila chrysaetos	Golden Eagle	B
Falco columbarius	Merlin	B
Falco sparverius	American Kestrel	B
Perdix	Gray Partridge	P,I
Tympanuchus phasianellus	Sharp-tailed Grouse	B
Fulica americana	American Coot	B

Appendix B, Table 1 Bird Species Potentially Inhabiting the Project Site		
Scientific Name	**Common Name**	**Status[a]**
Charadrius vociferus	Killdeer	B
Tringa solitaria	Solitary Sandpiper	B
Actitis macularia	Spotted Sandpiper	B
Bartramia longicauda	Upland Sandpiper	B
Limosa fedoa	Marbled Godwit	B
Limosa haemastica	Hudsonian Godwit	M
Gallinago	Wilson's Snipe	B
Scolopax minor	American Woodcock	B
Larus pipixcan	Franklin's Gull	B
Larus delawarensis	Ring-billed Gull	B
Larus argentatus	Herring Gull	B
Sterna hirundo	Common Tern	B
Sterna forsteri	Forster's Tern	B
Columba livia	Rock Dove	P
Zenaida macroura	Mourning Dove	B
Bubo virginianus	Great Horned Owl	P
Otus asio	Eastern Screech Owl	P
Asio otus	Long-eared Owl	B
*Asio flammeus**	Short-eared Owl*	B
Nyctea scandiaca	Snowy Owl	W

Appendix B, Table 1 Bird Species Potentially Inhabiting the Project Site		
Scientific Name	**Common Name**	**Status[a]**
Chordeiles minor	Common Nighthawk	B
Caprimulgus vociferus	Whip-poor-will	B
Chaeura pelagica	Chimney Swift	B
Ceryle alcyon	Belted Kingfisher	B
Colaptes auratus	Northern Flicker	B
Empidonax alnorum	Alder Flycatcher	B
Empidonax minimus	Least Flycatcher	B
Sayornis phoebe	Eastern Phoebe	B
Tyrannus verticalis	Western Kingbird	B
Tyrannus	Eastern Kingbird	B
Eremophila alpestris	Horned Lark	B
Pica	Black-billed Magpie	P
Corvus brachyrhynchos	American Crow	B
Corvus corax	Common Raven	P
Tachycineta bicolor	Tree Swallow	B
Stelgidopteryx serripennis	*Northern Rough-winged Swallow*	*B*
Hirundo pyrrhonota	Cliff Swallow	B
Troglodytes aedon	House Wren	B
Cistothorus platensis	Sedge Wren	B
Cistothorus palustris	Marsh Wren	B

Appendix B, Table 1 Bird Species Potentially Inhabiting the Project Site		
Scientific Name	**Common Name**	**Status[a]**
Sialia sialis	Eastern Bluebird	B
*Anthus spragueii**	Sprague's Pipit*	B
*Lanius ludovicianus****	Loggerhead Shrike***	B
Lanius excubitor	Northern Shrike	W
Sturnus vulgaris	European Starling	P
Dendroica petechia	Yellow Warbler	B
Dendroica pensylvanica	Chestnut-sided Warbler	B
Dendroica coronata	Yellow-rumped Warbler	B
Geothlypis trichas	Common Yellowthroat	B
Spizella pallida	Clay-colored Sparrow	B
Ammodramus savannarum	Grasshopper Sparrow	B
Pooecetes gramineus	Vesper Sparrow	B
Chondestes grammacus	Lark Sparrow	B
Passerculus sandwichensis	Savannah Sparrow	B
*Ammodramus bairdii***	Baird's Sparrow**	B
Ammodramus leconteii	Le Conte's Sparrow	B
Dolichonyx oryzivorus	Bobolink	B
Agelaius phoeniceus	Red-winged Blackbird	B
Sturnella neglecta	Western Meadowlark	B
Xanthocephalus	Yellow-headed Blackbird	B

Appendix B, Table 1 Bird Species Potentially Inhabiting the Project Site		
Scientific Name	**Common Name**	**Status[a]**
Euphagus carolinus	Rusty Blackbird	B
Euphagus cyanocephalus	Brewer's Blackbird	B
Quiscalus quiscula	Common Grackle	B
Molothrus ater	Brown-headed Cowbird	B
Spiza americana	Dickcissel	B
Carduelis tristis	American Goldfinch	B
Passer domesticus	House Sparrow	P
Cardurlis hornemanni	Hoary Redpoll	W
Cardurlis flammea	Common Redpoll	W

Source: Godfrey 1986; Robbins *et al*. 1983; COSEWIC 2003; Manitoba Conservation 2003

[a] Note: B = breeding, M = migrant and not breeding, P = permanent resident, N = northern extent of range, W = winter range, I = introduced

* deemed species at risk by COSEWIC

** deemed species at risk by MESA

*** deemed species at risk by both MESA and COSEWIC

Appendix B, Table 2 Mammals Potentially Inhabiting the Project Site	
Scientific Name	**Common Name**
Felis concolor	Cougar (Mountain Lion)
Odocoileus hemionus	Mule deer
Odocoileus virginianus	White-tailed deer
Canis latrans	Coyote
Vulpes	Red fox
Urocyon cinereoargenteus	Gray fox
Ursus americanus	Black bear
Mephitis	Striped skunk
Procyon lotor	Raccoon
Castor canadensis	Beaver
Ondatra zibethicus	Muskrat
Mustela rixosa	Least weasel
Mustela erminea	Shorttail weasel
Mustela frenata	Longtail weasel
Mustela vison	Mink
Lutra canadensis	River otter
Erethizon dorsatum	Porcupine
Sylvilagus floridanus	Eastern cottontail
Lepus townsendi	Whitetail jackrabbit

Appendix B, Table 2 Mammals Potentially Inhabiting the Project Site	
Scientific Name	**Common Name**
Lepus americanus	Snowshoe hare
Marmota monax	Woodchuck
Taxidea taxus	Badger
Condylura cristata	Starnose mole
Blarina brevicauda	Short-tail shrew
Sorex palustris	Northern water shrew
Microsorex hoyi	Pygmy shrew
Sorex cinereus	Masked shrew
Sorex arcticus	Arctic shrew
Zapus hudsonius	Meadow jumping mouse
Peromyscus maniculatus	Deer mouse
Napaeozapus insignis	Woodland jumping mouse
Onychomys leucogaster	Northern grasshopper mouse
Microtus pennsylvanicus	Meadow vole
Microtus ochrogaster	Praire vole
Phenacomys intermedius	Mountain phenacomys
Spermophilus tridecemlineatus	Thirteen-lined ground squirrel
Citellus franklini	Franklin ground squirrel
Citellus richardsoni	Richardson ground squirrel
Thomomys talpoides	Northern pocket gopher

Appendix B, Table 2 Mammals Potentially Inhabiting the Project Site	
Scientific Name	**Common Name**
Geomys bursarius	Plains pocket gopher
Synaptomys borealis smithi	Northern bog lemming
Myotis lucifugus	Little brown myotis
Myotis keeni	Keen myotis
Lasionycteris noctivagans	Silver-haired bat
Lasiurus borealis	Red bat
Eptesicus fuscus	Big brown bat
Lasiurus cinereus	Hoary bat

Source: Banfield 1984; Burt and Grossenheider 1980; Manitoba Conservation 2003; COSEWIC 2003

Appendix B, Table 3 Reptiles and Amphibians Potentially Inhabiting the Project Site	
Scientific Name	**Common Name**
Opheodrys vernalis	Smooth Green Snake
Thamnophis radix haydeni	Western Plains Garter Snake
Thamnophis sirtalis parietalis	Red-sided Garter Snake
Storeria occipitomaculata	Northern Redbelly Snake
Chrysemys picta belli	Western Painted Turtle
Chelyfra serpentina	Common Snapping turtle
Eumeces septentrionalis	Prairie Skink*
*Rana pipiens**	Northern Leopard Frog*
Rana sylvatica	Wood Frog
Pseudacris triseriata maculata	Boreal Chorus Frog
Bufo americanus hemiophrys	Canadian Toad
Bufo cognatus	Great Plains Toad*
Bufo americanus	American Toad
Ambystoma tigrinum diaboli	Gray Tiger Salamander
Necturus maculosus	Mudpuppy

* deemed species at risk by COSEWIC

Source: Preston 1982; COSEWIC 2003

Appendix B, Table 4 Species Protected Under COSEWIC* and/or MBESA**		
Scientific Name	**Common Name**	**Habitat**
Birds		
Ixobrychus exilis	Least Bittern[C]	marshes with cattails, sluggish streams
Buteo regalis	Ferruginous Hawk[B]	plains/prairies
Falco peregrinus	Peregrine Falcon[B]	open country with marshes, lakes and ponds
Tympanuchus cupido	Greater-Prairie Chicken[M]	tall grass prairie
Coturnicops noveboracensis	Yellow Rail[C]	wet meadows, fens and grassy marshes
Charadrius melodus	Piping Plover[B]	sandy shorelines
Asio flammeus	Short-eared Owl[C]	open country plains with marshes and sloughs
Melanerpes erythrocephalus	Red-headed Woodpecker[C]	open deciduous woods
Anthus spragueii	Sprague's Pipit[C]	northern plains
Lanius ludovicianus	Loggerhead Shrike[B]	open grass/shrubland
Ammodramus bairdii	Baird's Sparrow[M]	high plains
Athene cunicularia	Burrowing Owl[B]	open prairie/grassland
Reptiles		
Eumeces septentrionalis	Prairie Skink	sandy habitat, open grasslands with loose soil
Amphibians		
Bufo cognatus	Great Plains Toad	open grasslands with wet areas

Appendix B, Table 4 Species Protected Under COSEWIC* and/or MBESA**		
Scientific Name	**Common Name**	**Habitat**
Rana pipiens	Northern Leopard Frog[C]	grasslands and wet woods
Mammals		
Urocyon cinereoargenteus	Gray Fox[C]	forests and marshes

Source: COSEWIC 2007 and Manitoba Conservation 2007

*Committee on the Status of Endangered Wildlife in Canada (COSEWIC)

**Manitoba Endangered Species Act (MESA)

C = listed under COSEWIC B = listed under COSEWIC AND MESA M = listed under MBESA

Appendix B, Table 5
Rare Wildlife Species Known to Occur within the Winnipeg Ecodistrict - Manitoba Conservation Data Centre

Scientific Name	Common Name	G_Rank	S_Rank
Accipiter cooperii	Cooper's Hawk	G5	S4B
Falco peregrinus anatum	American Peregrine Falcon	G4T3	S1B
Athene cunicularia	Burrowing Owl	G4	S1B
Strix varia	Barred Owl	G5	S3S4
Charadrius melodus	Piping Plover	G3	S2B
Coturnicops noveboracensis	Yellow Rail	G4	S4B
Lanius ludovicianus migrans	Migrant Loggerhead Shrike	G4T3Q	S1
Geomys bursarius	Plains Pocket Gopher	G5	S3
Hesperia dacotae	Dakota Skipper	G2G3	S2S3
Ichthyomyzon castaneus	Chestnut Lamprey	G4	S3S4

Source: Manitoba Conservation Data Centre 2006

Appendix B, Table 6 Codes Used for Evaluating and Ranking Species of Conservation Concern by Manitoba Conservation Data Centre	
Rank	**Definition**
1	Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.
2	Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.
3	Uncommon throughout its range or in the province (21 to 100 occurrences).
4	Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (>100 occurrences).
5	Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially irradicable under present conditions.
U	Possibly in peril, but status uncertain; more information needed.
H	Historically known; may be rediscovered.
X	Believed to be extinct; historical records only, continue search.
Other Heritage Codes	
G#G#	Numeric range rank: A range between two of the numeric ranks. Denotes range of uncertainty about the exact rarity of the species. G= Global; S = Provincial
S#S#	
Subrank	
T	Rank for subspecific taxon (subspecies, variety, or population); appended to the global rank for the full species, e.g., G4T3.
Qualifiers	
A	Accidental in the province; including species (usually birds or butterflies) recorded very infrequently, hundreds or thousands of kilometres outside their usual range.
B	Breeding status of a migratory species. Example: S1B, SZN – breeding occurrences for the species are ranked S1 (critically imperilled) in the province, non-breeding occurrences are not ranked in the province.

Appendix B, Table 6
Codes Used for Evaluating and Ranking Species of Conservation Concern by Manitoba Conservation Data Centre

Rank	Definition
E	An exotic established in the province; may be native in nearby regions.
HYB	Element represents a hybrid of species.
N	Non-breeding status of a migratory species. Example: S1B,SZN - breeding occurrences for the species are ranked S1 (critically imperilled) in the province, non-breeding occurrences are not ranked in the province.
P	Indicates the element may potentially occur in the province.
Q	Taxonomic questions or problems involved, more information needed; appended to the global rank.
R	Reported in the province, but lacking documentation which would provide a basis for either accepting or rejecting the report.
T	Rank for subspecific taxon (subspecies, variety, or population); appended to the global rank for the full species.
Z	Ranking not applicable.
#	A modifier to SX or SH; the species has been reintroduced but the population is not yet established.
?	Inexact or uncertain; for numeric ranks, denotes inexactness.

Source: Manitoba Conservation Data Centre 2006

APPENDIX C REGULATORY REQUIREMENTS

1. Provincial Regulatory Approvals – *The Water Rights Act*

The Water Rights Act is provincial legislation that governs the use and diversion of water resources in the province of Manitoba. Broda Quarries is planning to alter the existing drainage on their property, and as such require regulatory approval in the form of a Licence to Construct and Operate Water Control Works issued from Sustainable Development to undertake any drainage improvements or pumping activity.

The Water Rights Act prescribes that:

The Province of Manitoba owns and governs the use and diversion of water resources within the province of Manitoba. The Act specifically states:

Property in water

2 Except as otherwise provided in this Act, all property in, and all rights to the use, diversion or control of, all water in the province, insofar as the legislative jurisdiction of the Legislature extends thereto, are vested in the Crown in right of Manitoba.

For a project proponent to undertake the construction of drainage working or the pumping (or diversion) of water, the proponent requires a licence authorizing the construction, establishment or maintenance of water control works as compelled by Section 3(1) of the *Water Rights Act* which reads:

Prohibition against use of water

3(1) Except as otherwise provided in this Act or the regulations, no person shall

(a) in any manner whatsoever use or divert water, unless he or she holds a valid and subsisting licence to do so; or

(b) construct, establish, operate or maintain any works, unless he or she holds a valid and subsisting licence to do so; or

(c) control water or construct, establish, operate or maintain any water control works, unless he or she holds a valid and subsisting licence to do so.

The Water Rights Act defines "water control works" as:

***"water control works"** means any dyke, dam, surface or subsurface drain, drainage, improved natural waterway, canal, tunnel, bridge, culvert borehole or contrivance for carrying or conducting water, that*

(a) temporarily or permanently alters or may alter the flow or level of water, including but not limited to water in a water body, by any means, including drainage, or

(b) changes or may change the location or direction of flow of water, including but not limited to water in a water body, by any means, including drainage;

In Section 27 it is clearly stated that *The Water Rights Act* takes precedence over *The Municipal Act*:

27 Where there is a conflict between this Act and The Municipal Act, this Act prevails.

2. PURPOSE AND ASSOCIATED LEGAL RESPONSIBILITIES OF *WATER RIGHTS ACT* LICENCING AND PROVINCIAL AUTHORIZATION VIA *THE WATER RESOURCES ADMINISTRATION ACT*.

The province has ultimate jurisdiction over water and water-related activities under the auspice of *The Water Rights Act*.

The provincial approval, in the form of a "Licence to Construct Water Control Works", is a legal document that outlines the conditions which will allow the quarry and its operators to discharge water from the site, and examines any potential impact the project may have on area water resources, as well as any potentially affected land base.

The licencee is compelled to legally abide by the conditions set forth in the licence. Violation of licence terms and conditions can lead to the issuance of Remedial Orders, charges, fines, and licence cancellation if the violations are recurring. Additionally, the province can amend licences to mitigate new or additional unforeseen concerns that can arise from the activities endorsed by the licence.

The Authorization issued under the auspice of *The Water Resources Administration Act* by Manitoba Infrastructure is a permit authorizing the undertaking of the prescribed activity. In this case, very specific hydraulic conditions must exist in for pumping activity to commence, meaning water levels must reach a certain level before discharge is allowed. Under the powers of this legislation, violation of these conditions can result in Remedial Orders, fines, and removal of the works if required. Additionally, the province can amend its approval to correct or mitigate unforeseen issues related to the pumping activity.

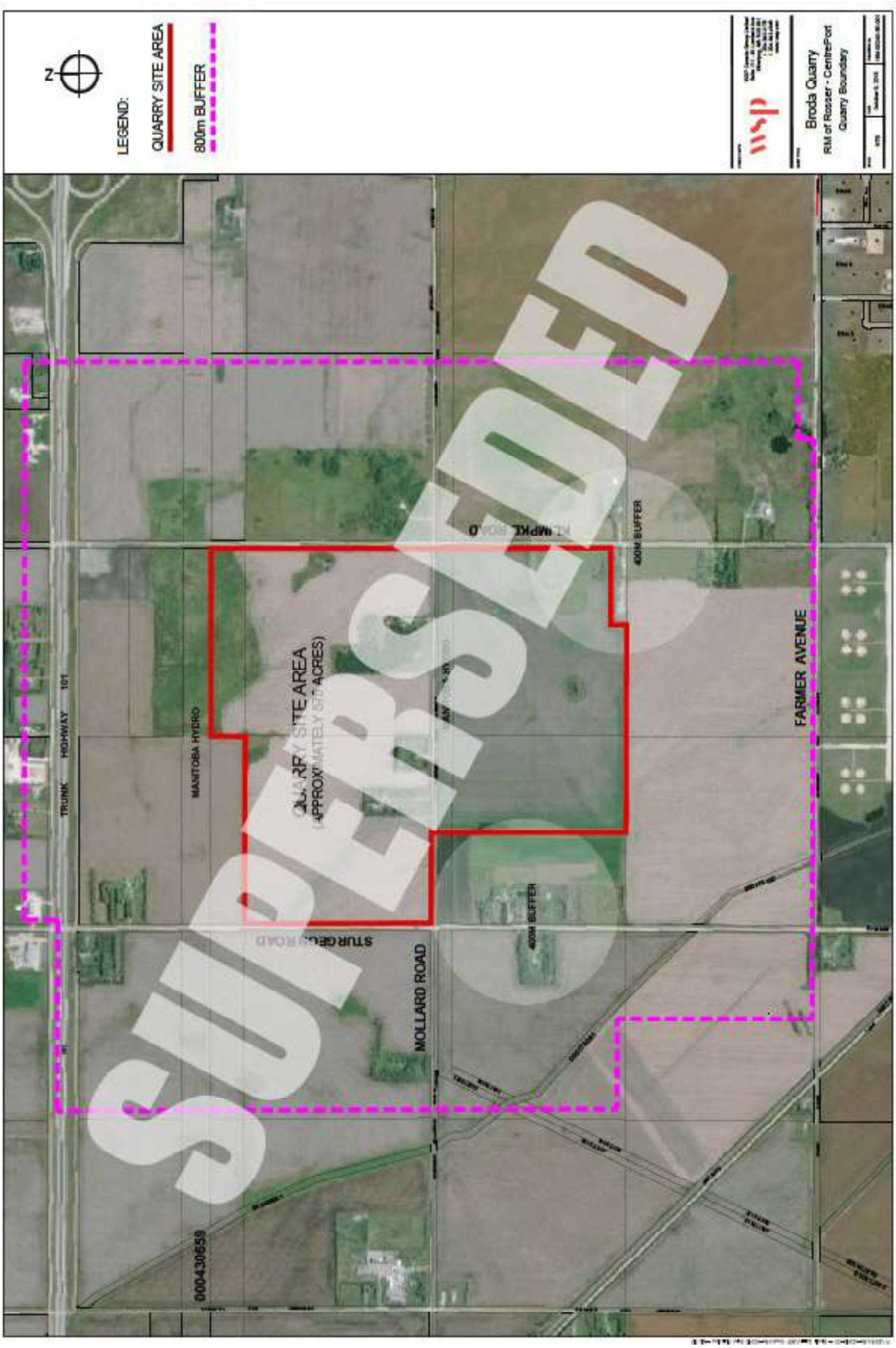
APPENDIX D CONCEPTUAL SITE OPERATING PLAN

Initial Site Layout and Development Schematics

The conceptual operating plan, which continues to evolve, has been built around a core commitment to the use of Continuous Surface Miner technology. A typical Surface Miner, in this case, manufactured by Wirtgen, is shown in figure A-1 below.

Figure A-1. A Wirtgen 4200SM Surface Miner.

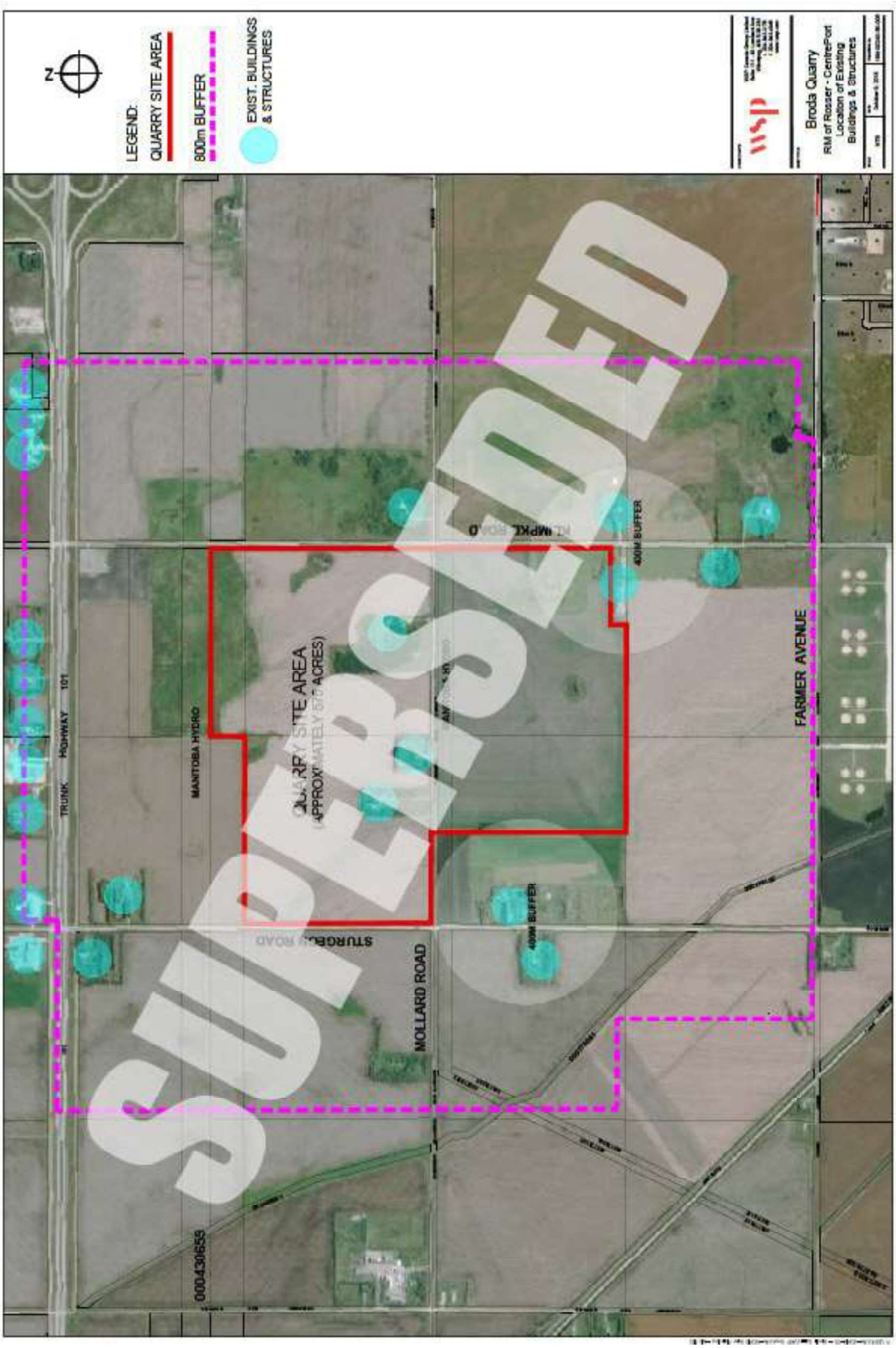
The most important elements of the current working draft of the Conceptual Operating Plan are preliminary site layout drawings which have been developed mindful of (i) the physical attributes of the site; (ii) the intended reliance on Surface Miner technology; (iii) the intention to minimize surface water ponds and groundwater accumulations on the site; and (iv) many corporate commitments to preclude, or minimize, visual and sound impacts being experienced at adjoining properties. The current draft drawings follow below; these draft drawings have recently been superseded and will continue to evolve before being finalized and submitted for review by the RM of Rosser.

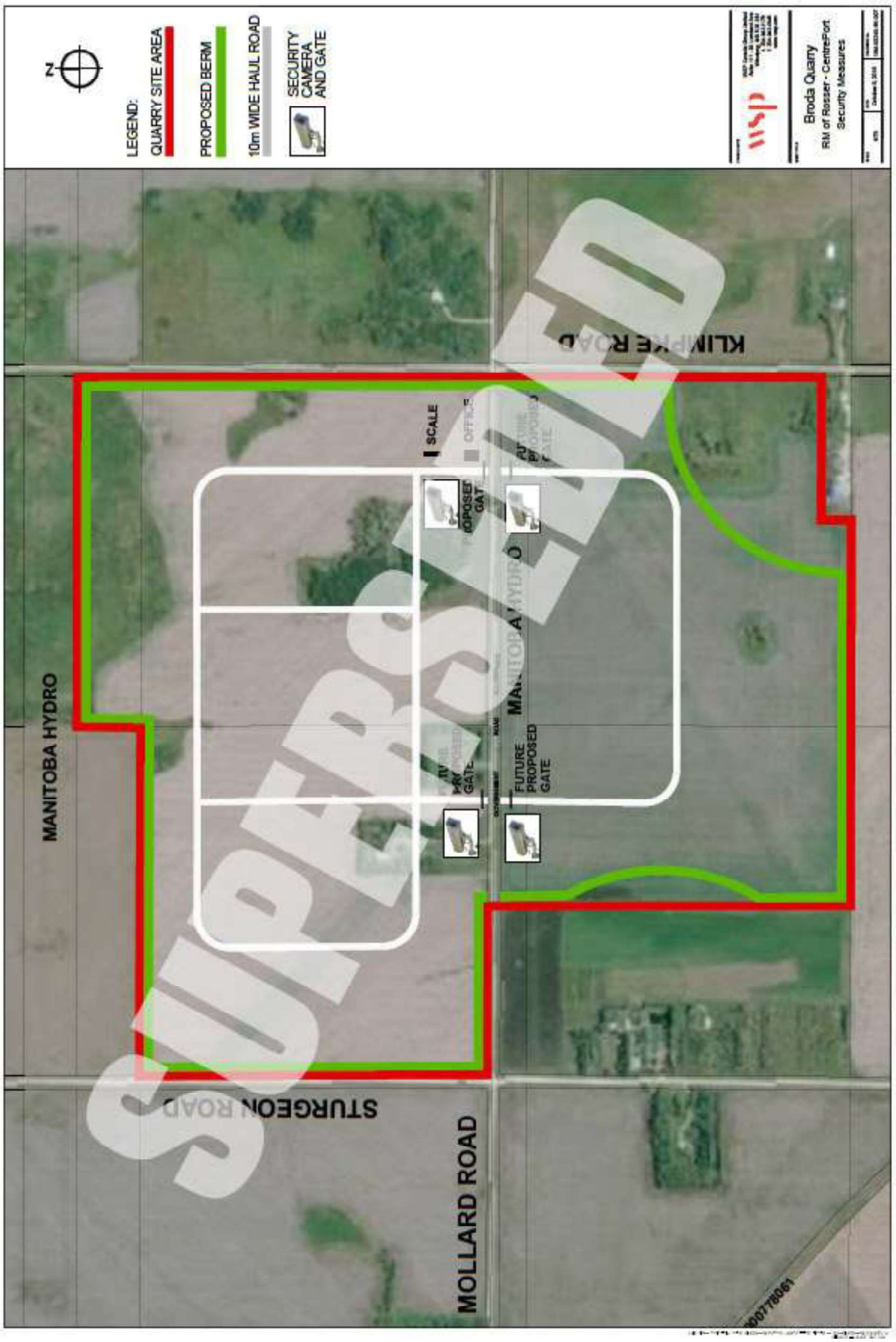

LEGEND:
QUARRY SITE AREA
800m BUFFER
Broda Quarry
RM of Rosser - CentrePort
Quarry Boundary
TRUNK HIGHWAY 101
MANITOBA HYDRO
400M BUFFER
FARMER AVENUE
MOLLARD ROAD
000430659
SUPERSEDED

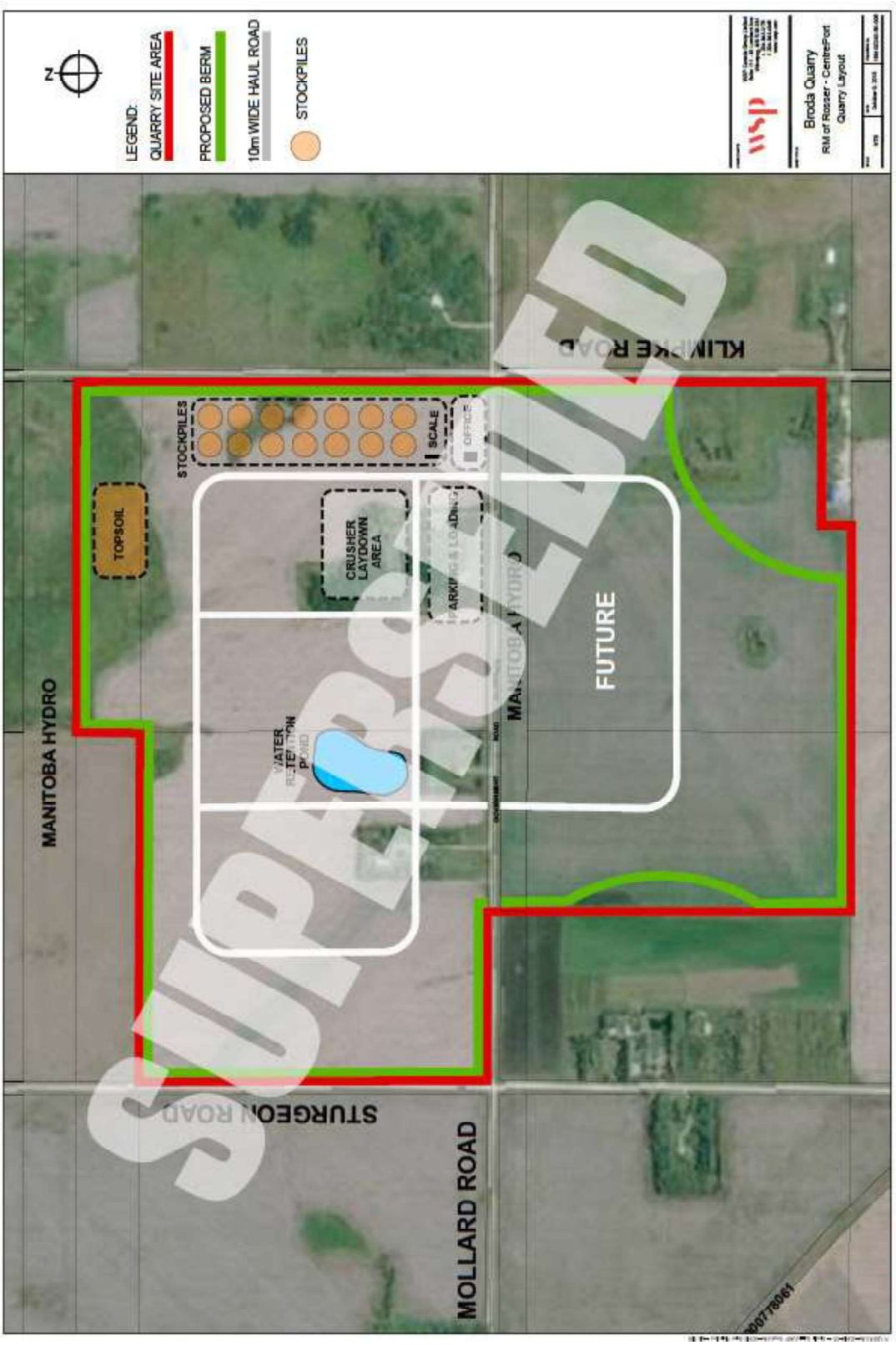

LEGEND:
QUARRY SITE AREA
Broda Quarry
RM of Rosser - CentrePort
Land Area and Excavation
MANITOBA HYDRO
PROPOSED QUARRY AREA = 2,326,942 Sq.m
APPROXIMATE DEPTH OF EXCAVATION = ±10 m
MOLLARD ROAD
SUPERSEDED


LEGEND:
QUARRY SITE AREA
Broda Quarry
RM of Rosser - CentrePort
Phasing
PHASE 1
PHASE 2
PHASE 3
PHASE 4
PHASE 5
MANITOBA HYDRO
MOLLARD ROAD
SUPERSEDED


LEGEND:
QUARRY SITE AREA
REHABILITATION AREA
Broda Quarry
RM of Rosser - CentrePort
Site Rehabilitation
MANITOBA HYDRO
MOLLARD ROAD
SUPERSEDED


LEGEND:
QUARRY SITE AREA
800m BUFFER
EXIST. BUILDINGS & STRUCTURES
Broda Quarry
RM of Rosser - CentrePort
Location of Existing Buildings & Structures
QUARRY SITE AREA
(APPROXIMATELY 57.0 ACRES)
400M BUFFER
400M BUFFER
FARMER AVENUE
MOLLARD ROAD
MANITOBA HYDRO
TRUNK HIGHWAY 101
000430655
SUPERSEDED


LEGEND:
QUARRY SITE AREA
PROPOSED BERM
10m WIDE HAUL ROAD
SECURITY CAMERA AND GATE
Broda Quarry
RM of Rosser - CentrePort
Security Measures
MANITOBA HYDRO
MOLLARD ROAD
SCALE
FUTURE PROPOSED GATE
SUPERSEDED


LEGEND:
QUARRY SITE AREA
PROPOSED BERM
10m WIDE HAUL ROAD
STOCKPILES
Broda Quarry
RM of Rosser - CentrePort
Quarry Layout
MANITOBA HYDRO
STOCKPILES
SCALE
TOPSOIL
CRUSHER LAYDOWN AREA
FUTURE
MOLLARD ROAD
SUPERSEDED

APPENDIX E CONTINUOUS SURFACE MINER TECHNOLOGY

Wirtgen Technology and Models in Particular

From: https://www.wirtgen.de/en/technologies/application/surface-mining/surface_mining.php

As the surface miner moves forward, a special cutting drum rotates against the direction of travel, cutting layers of material from the rock formations and crushing it in the process. The primary conveyor picks up the material in the drum housing and transports it towards the rear of the machine, where it is then accepted by the slewable and height-adjustable discharge conveyor. The discharge conveyor loads the material into trucks or dumpers or discharges it to the side of the miner. The discharge height can be adjusted to the height of the transport vehicles. The surface miner is driven via four steerable and height-adjustable track units. An automatic levelling system ensures precise adherence to the cutting depth, thus enabling even thin seams or layers to be mined selectively and with maximum accuracy.

Strict environmental standards in terms of noise and dust emissions make the vibration-free surface mining process attractive in comparison to drilling and blasting. The stable, precise and level surfaces produced in mining, earthworks and rock operations are suitable for immediate use as pavements, slopes or tunnel floors.

From: https://media.wirtgen-group.com/media/02_wirtgen/media_1/media_1_06_surface_miners_2/media_1_06_surface_miners_2_00_general_information/W_brochure_Surface-Mining_0116_EN.pdf

The economical exploitation of primary resources in opencast mining is becoming increasingly difficult as the mineral content of many deposits is dwindling due to difficult geological conditions. In rock construction, machines are required for precise levelling operations under restricted space conditions. Our patent remedy in both cases is mechanical exploitation by means of surface mining. Being the innovative leader in this technology, Wirtgen is passionately driving the development of this economical and environmentally gentle process, using its expertise to successfully master the even more demanding challenges lying ahead.

We not only develop innovative machines of the highest quality. With our machine technology, we also constantly endeavour to keep environmental pollution as low as possible. A WIRTGEN surface miner is a perfect example of this philosophy: it impresses with its environmentally friendly technology as it cuts, crushes and loads rock in a single operation. A tremendous advantage of selective mining is that the vibrationless mining operation without drilling and blasting is accompanied by low levels of dust and noise. The low environmental impact also permits maximum exploitation of the deposit right up to the edge of residential areas. The selective mining of high-quality materials requires considerably less space than conventional mining methods. Our fuel-efficient, intelligently controlled engines comply with the strictest exhaust emission standards.

Figure B-1. A Wirtgen 4200SM Surface Miner.

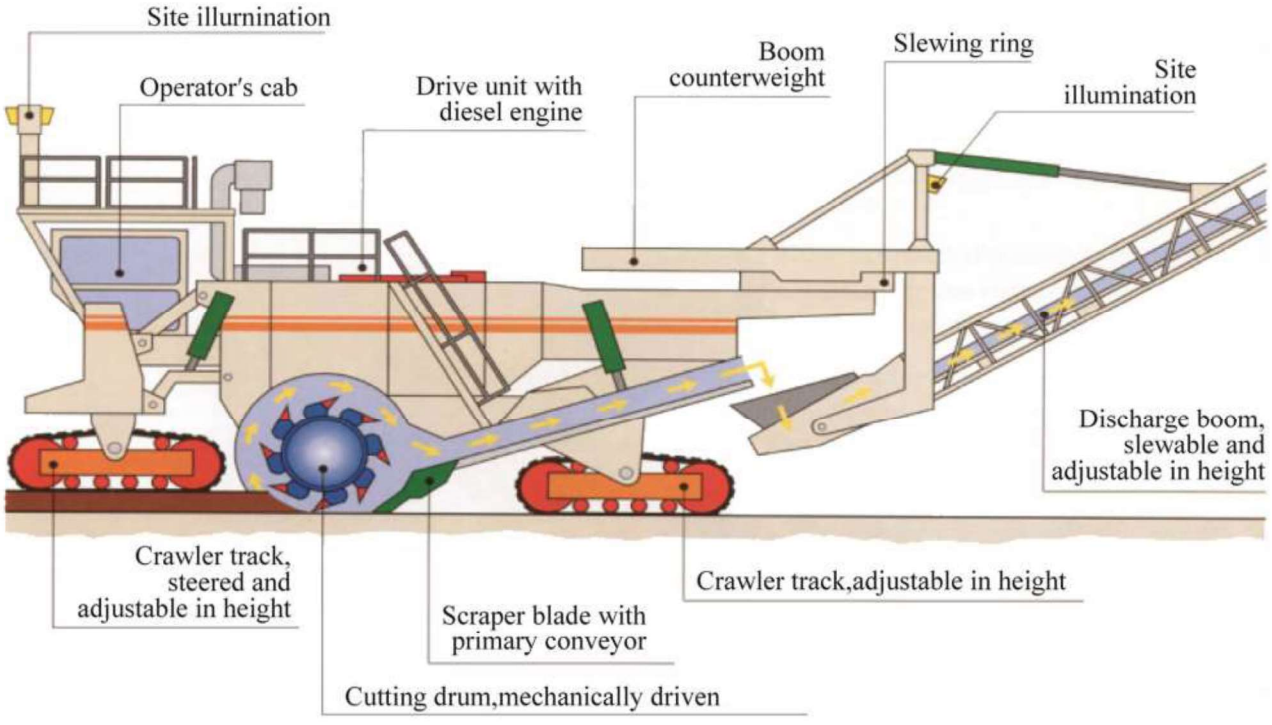


Figure B-2. A cross section of a Wirtgen surface miner in operation.

Figure B-3. A Wirtgen 4200SM Surface Miner.

Figure B-4. A Wirtgen 4200SM Surface Miner.

Figure B-5. A Wirtgen 2500SM Surface Miner.

Figure B-6. A Wirtgen 2500SM Surface Miner.

ADAPTIVE MANAGEMENT PLAN & PROGRESSIVE REHABILITATION PLAN

06

NORTH PERIMETER AGGREGATES QUARRY

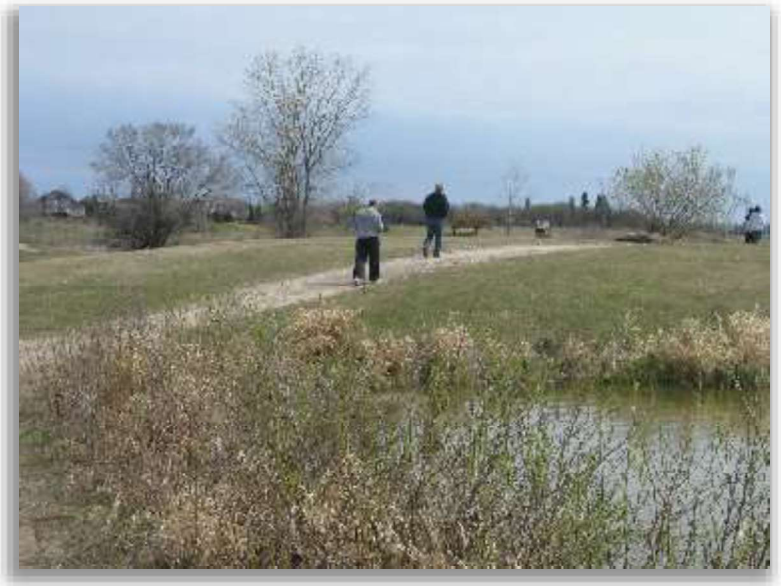
ADAPTIVE MANAGEMENT and PROGRESSIVE REHABILITATION PLAN in SATISFACTION of RURAL MUNICIPALITY of ROSSER QUARRY OPERATION BY-LAW NO. 8-15

SUBMITTED TO:

North Perimeter Aggregates Inc.
Broda Properties Inc.

PREPARED BY:

MLi3 Inc.



March 1, 2019

ACKNOWLEDGEMENTS

MLi3 Inc. acknowledges with gratitude the guidance and suggestions received from government representatives who offered input into the development of this Adaptive Management and Progressive Rehabilitation Plan (AMPRP). Further, gratitude is expressed for the guidance and suggestions offered by neighbouring landowners who voluntarily participated in the 2008-2009 Citizens Advisory Committee process to constructively critique (i) Broda Property's design of the evolving project, and (ii) Tetr*ES* Consultants Inc.'s 2010 Environmental Impact Assessment of the then-current project. The contributions to the AMPRP of the former Tetr*ES* team that now are part of and support Broda through MLi3 Inc. are acknowledged with particular appreciation. Relevant information prepared for Broda by DST Consulting Engineers Inc., WSP Engineering and HCG Engineering is acknowledged with appreciation.

STUDY TEAM

Mike McKernan	Environmental Scientist; Principal in Charge
Mike Sweet	Environmental Scientist (no longer associated with MLi3)
Jacki Reidy	Environmental Scientist
Richard Bruneau	Researcher; Information Management Specialist
Anna Morrison	Researcher, Document production and QA

DISCLAIMER

MLi3 Inc. accepts no responsibility for damages of any kind, if any, suffered by any third party as a result of decisions made or actions based on this Adaptive Management and Progressive Rehabilitation Plan ("this report"). All conclusions, views and opinions expressed in this report are those of MLi3 Inc.

USE OF THIS REPORT:

This report has been prepared for the sole benefit of Broda Properties Inc. ("Broda", or "the Client" or its agent) and may not be used by any third party without the express written consent of MLi3 Inc. and the Client. Any use which a third party makes of this report is the responsibility of such third party.

BASIS OF THE REPORT:

The information, opinions, and/or recommendations made in this report are in accordance with MLi3 Inc.'s present understanding of the Client's site(s) and/or the project(s) and/or actions referenced herein. If the proposed site-specific locations, site uses, actions and/or project(s) differ(s) or is/are modified from what is described in this plan, or if the site conditions as described herein are altered, this report is no longer valid unless MLi3 Inc. is requested by the Client to review and revise the report to reflect the differing or modified location, land use, action and/or project specifics and/or the altered site condition(s).

STANDARD OF CARE:

Preparation of this report, and all associated work, was carried out in accordance with the normally accepted standard of care in Manitoba for the specific professional service provided for the Client. No other warranty is made.

INTERPRETATION OF SITE CONDITIONS:

All site-specific descriptions, and statements regarding their influence on the findings and recommendations made in this report, are based on site conditions encountered by MLi3 Inc. at the time of its site-specific work and at the specific testing and/or sampling locations on the Client's property(s) examined by either Tetr*ES* Consultants Inc. or Stantec Consulting Ltd. by whom the author was employed over the periods, respectively, of 1990 - 2010 and 2010 -2015. Environmental descriptions and other classifications and/or statements of site condition(s) have been made in accordance with normally accepted professional practices which are judgmental in nature; no specific description in this report should be considered exact, but rather to be reflective of the anticipated behaviour of the material or matrix in question. Extrapolation of in situ conditions can be made only to some limited extent beyond the understandings set out herein, being in turn based on specific localized sampling or test points. The extent depends on variability of the soil, rock, groundwater conditions, species composition, habitat types, habitat uses, etc., as influenced by geological processes, time, seasons, planned construction activity, and intended site use(s).

VARYING OR UNEXPECTED CONDITIONS:

Should any site or subsurface condition(s) be encountered in the future, if the proposed land use or project proceeds, that are different from those described in this report or encountered at the test locations referenced herein, MLI3 Inc. must be notified immediately to assess if the varying or unexpected conditions are substantial and if reassessments of the report conclusions or recommendations are required. MLi3 Inc. will not be responsible to any party for damages incurred as a result of that party failing to notify MLi3 that differing site or sub-surface condition(s) are present upon becoming aware of such conditions.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 INTENT TO DEVELOP HIGH-QUALITY AGGREGATE QUARRY

Broda Properties Inc. (operating in Manitoba as "North Perimeter Aggregates Inc.") has been working to develop a high-quality aggregate-supply business on the property it owns in the Rural Municipality (RM) of Rosser. The site is approximately 589 acres on lands in Section 4, Township 12, Range 2, EPM, and Section 33, Township 11, Range 2 EPM. All land in the proposed project is held by Broda.

The proposed multi-stage development is located close to and west of the intersection of Mollard Road and Metro Route 90, immediately west of Klimpke Road, ~3 km (~2 miles) southeast of the intersection of the Perimeter Highway (Provincial Trunk Highway [PTH] 101) and PTH 7 (Figure 1-1).

Figure 1-1. Development is located 1-2 miles south of Perimeter Highway, west of intersection of Mollard Road and Metro Route 90, between Sturgeon Rd (west), Klimpke Rd. (east). Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010.

The proposed operation is not a use that was permitted under the former land-use planning and administration scheme that applied to the lands before creation of CentrePort in 2008. The property is zoned for agriculture, the prevailing local land use (Figure 1-2). (The prevalence of the agricultural land use is evident in digital imagery routinely captured by satellites [Figure 1-3])

Figure 1-2. The development is planned for land now zoned and used for agriculture south of Perimeter Highway, west of west of Metro Route 90. Source: Google Earth, MLi3 Inc.

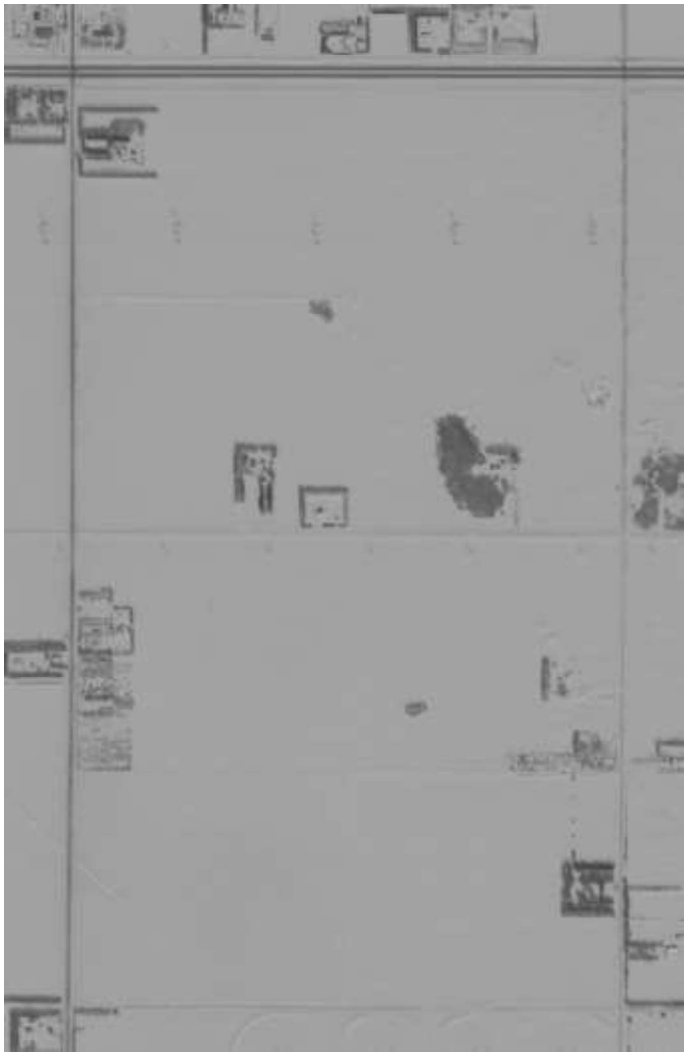


Figure 1-3. Prevalence of agriculture is reflected in unsupervised classification mapping of grey-toned "spectral signature" for cropland in recent satellite image. Darker polygons are shelterbelts, woodlots, houses, machine sheds, etc. Source: Google Earth, MLi3 Inc.

Accordingly, to support applications for Conditional Approval by the RM and South Interlake Planning Board (SIPD) of the proposed new land use, Broda worked for several years with the information and guidance from a Citizens Advisory Committee (CAC) of neighbouring landowners. This Committee collaborated briefly with Broda in 2005-2006 to help plan a project where all possible potential impacts could be identified, assessed and precluded. This was then expected to occur through a combination of careful project development and impact mitigation, ongoing environmental monitoring, and ongoing collaboration with the CAC.

The proactivity of Broda's approach, and the very high level of corporate commitments to the highest standards of possible environmental and socioeconomic care notwithstanding, several applications for the requested change in land-use zoning over many years were rejected by Rosser Council (and, accordingly, SIPD). Broda has, nonetheless, continued to believe in the intrinsic value of the project. Broda continues to believe that there was, and is, significant growing economic need and opportunity.

Broda has therefore continued to invest in building the knowledge necessary to develop the site in a sensitive fashion, consistent with the state-of-the-art in limestone quarry development and operations.

Recent (2016) changes in the planning processes applying to the lands within the CentrePort Special Planning Area (SPA) acknowledge that the quarries should be a “permitted use”. This intent is consistent with the *Inland Port SPA Regulation 48/2016*, specifically its Aggregate Policy 6.1.2.3. This Policy notes that in “an area designated by the appropriate provincial authority as having ‘high’ or ‘medium’ mineral content must have the mineral extracted prior to it being developed for other uses, unless otherwise approved by the authority". The Broda property is located above the last undeveloped provincially-designated ‘High Quality” limestone ore body (Figure 1-4; Baracos 1983). Recovering these high-value construction materials can reduce the costs of infrastructure construction in the Winnipeg-centred region, improving construction-project economics.

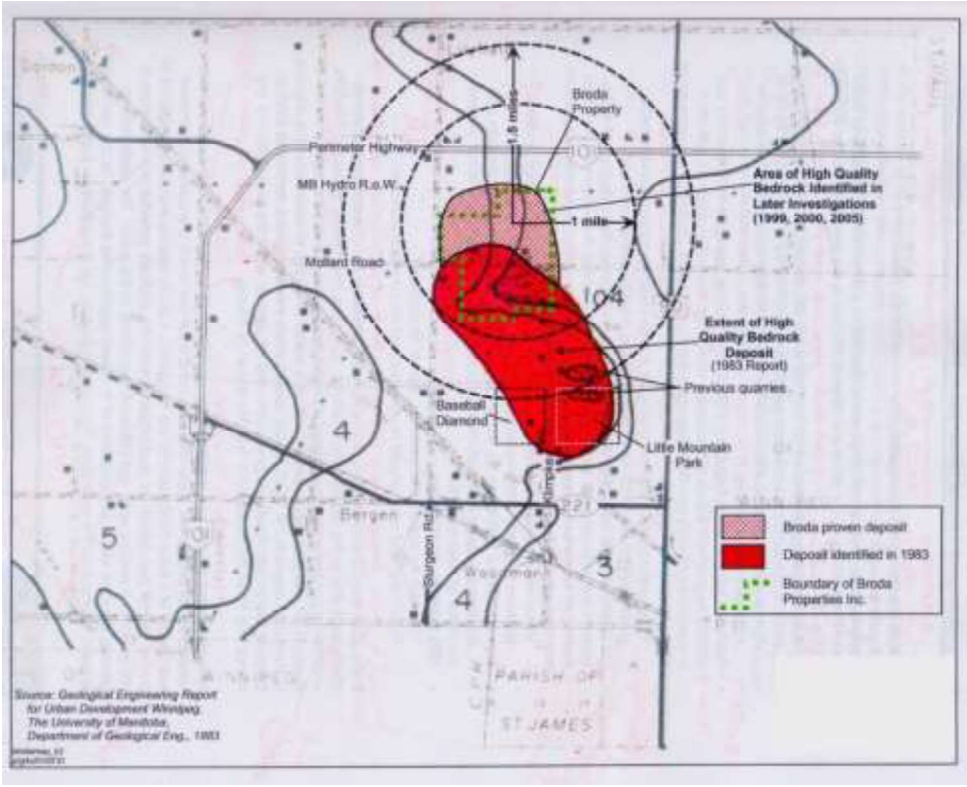


Figure 1-4. Development is located above last undeveloped provincially-designated ‘High Quality” limestone-ore body. Deposits under Broda land have variable surficial topography, and are northern continuity of a geological formation trending to southeast. Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010.

To be developed in five stages, the highest concentration of the highest-value materials, located generally north of Mollard Rd., will be quarried first (Figure 1-5). The first few stages of the project development are often termed “Stage 1” throughout this report (and in related documents prepared by MLi3 for Broda). Little Mountain Park immediately southeast of the property (Figure 1-4) was the land use developed after aggregate materials from the southerly extension of the same geological formation were quarried.

Figure 1-5. Initial quarry stages of the development will address variable elevations and thicknesses of last undeveloped provincially-designated 'High Quality" limestone-ore body. Shape of complete excavation is nominal; i.e., expected but not certain. Shape will depend on field conditions. Sources: Google Earth, KGS Group 2010, Tetr*ES* Consultants Inc. 2010.

1.2 PROVINCIAL REGULATORY GUIDANCE FOR QUARRY DEVELOPMENT

The CentrePort Act, assented to on October 9, 2008, mandates the creation of an "inland port" to encourage transportation, warehousing, trade, manufacturing, and distribution throughout Manitoba, but especially in proximity to the James Armstrong Richardson International Airport. The province initiated a process to create a "Manitoba Development Plan for CentrePort Lands", which included public, multi-stakeholder liaison, and consultations. The resulting planning scheme for the CentrePort land base proposed an enhanced future for the 20,000 acres within the Perimeter Highway considered necessary for the Project (MMM Group 2009). About 54% of the CentrePort lands fall within the RM of Rosser.

The Province has authority to ensure that quarries developed on Crown lands satisfy the stringent requirements for Environmental and Community Interests Protection under the *Mines and Minerals Act*. The planning, operations-related monitoring, and decommissioning requirements set out under The *Quarry Minerals Regulation* (QMR; MR 65/92) amplify these protections. They do so in the form of specific prescriptions for beneficial action, and against specific unwanted action. These prescriptions apply strictly to projects proposed on Crown lands. Their protective value, however, means that they are often applied to various processes for permitting, or to approvals, for private-land development. Clause 43(1)(b)(ii) of the QMR requires minimum separation/setback distance of 400 m between any rural residence and the aggregate-mining boundary. Most rural municipalities regulating aggregate operations use this setback distance as a condition in a CUA decision to create a "buffer zone". Another example would be decisions by Manitoba Sustainable Development to include several of these QMR prescriptions as conditions if a license were to be issued under *The Environment Act*.

1.3 GUIDANCE FOR QUARRY DEVELOPMENT ON CENTREPORT LANDS

The *Special Planning Area Regulation MR* 49/2016 and the *Inland Port SPA Planning Regulation* MR 48/2016 allow a quarry as permitted land use within the Heavy Industrial Zone (Class 3; "I3"), on the CentrePort lands within the RM of Rosser. Taken together, they create another set of protections for environmental and community interests. Approval of a proposed quarry, pursuant to rezoning recommendations of the Inland Port SPA Planning Authority Board which has jurisdiction over these lands, must be made by the Minister of Indigenous and Municipal Relations. The Minister's decision can occur only after a public review of the proposal, including a public hearing administered by the Planning Authority Board.

1.4 R.M. OF ROSSER QUARRY OPERATIONS BY-LAW

In addition to these levels of environmental and community protection, including the requirements for a public hearing, and a review and issuance of approval conditions by an independent Planning Board that it co-chairs, Rosser has created a special By-law ("Quarry Operations By-Law"; Rosser By-law No. 8-15; a.k.a. the "Aggregate By-law") to create further control over such aggregate operations.

1.4.1 Assessments and Plans Required by Quarry-Operations By-law

As one type of control measure included in the Aggregate By-law, the By-law sets out requirements for several formal Assessments and Plans that must be reviewed and approved by Rosser. As prescribed in the By-law, set out in Clause 13 and Schedule A, and along with other Plans that Broda will prepare to satisfy various other requirements (e.g., MLi3 2019f), these specific Plans include the following:

- Adaptive Management Plan (submitted as the Adaptive Management and Progressive Rehabilitation Plan; ["AMPRP"]; MLi3 2019a); i.e., this plan
- Progressive Rehabilitation Plan (subsumed within the AMPRP; MLi3 2019a)
- Sound Impact Assessment (submitted as the Sound Impact Management Plan and Sound Impact Assessment; ["SIMPSIA"]; MLi3 2019b)
- Transportation Plan (MLi3 2019c)
- Visual Impact Assessment (submitted as the Visual Impact Management Plan and Visual Impact Assessment; ["VIMPVIA"]; MLi3 2019d)
- Water and Natural Resources Management Plan (MLi3 2019e)
- Preliminary Environmental Monitoring Plan (EMP) (MLi3 2019f; confidential, in prep.)
- Rosser Quarry Conceptual Operating Plan. WSP Engineering (WSP Canada Group Limited). 2019 (confidential, in prep)
- Proposed Limestone Quarry in the RM of Rosser Traffic Impact Study. WSP Engineering (WSP Canada Group Limited). 2018