DUNTROON EXPANSION QUARRY

ANNUAL SUMMARY REPORT

WALKER AGGREGATES INC.

PROJECT NO.: 111-53312.00

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June 02, 2017

Mr. Matthew McMahon, M.Sc

Environmental Performance Lead - Aggregates
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Dear Mr. McMahon:

Subject: Duntroon Expansion Quarry
Annual Summary Report

WSP Canada Inc. is pleased to present the enclosed adaptive management plan summary report for the Duntroon Expansion Quarry, documenting the monitoring data collected for the performance indicator trigger monitoring program, the long term trend groundwater and surface water monitoring program, the long term trend ecological monitoring program and the ecological enhancement and mitigation monitoring plan.

This summary report is for the period of January 1, 2016 through December 31, 2016. Historical data, where available, have been included to provide context to the observed values in 2016.

We trust that the information provided is sufficient for your needs at this time. Please contact the undersigned if you have any questions or comments.

Respectfully Submitted,
WSP Canada Inc.

Michael Varty, P. Eng
Director, Environment

SLW/nah

WSP ref.: 111-53312.00

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EXECUTIVE SUMMARY

The Duntroon Expansion Quarry is located on County Road 91, west of the village of Duntroon on Lot 25, Concession XII in the Township of Clearview, County of Simcoe. The existing quarry property is located south of County Road 91, on Lot 24 and the expansion quarry property is located north of County Road 91 (see Figure 1).

The Duntroon Quarry has been in operation since the early 1960s on the south side of County Road 91 (existing quarry). Since 1995 the quarry has been operated by Walker Aggregates Inc. (WAI), a wholly owned subsidiary of Walker Industries Holdings Ltd. The licensed property of the existing quarry operates in accordance with Aggregate Resource Act (ARA) license number 3514. The expansion quarry is licenced to WAI under ARA licence number 607841, issued August 6, 2014.

The Adaptive Management Plan (AMP) annual summary report is a requirement of the Aggregate Resources Act licensing of the expansion quarry.

Walker Aggregates environmental commitment is to manage its lands so that in the long term, the ecology is healthier than its current condition. This will be accomplished through environmental initiatives detailed on the ARA Site Plans and the AMP to ensure that protection, mitigation, and enhancement measures sustain local environmental resource features and functions for future generations.

Aggregate extraction in Phase 1 of the expansion quarry began in late June 2016, making 2016 the first year of reporting for the adaptive management plan.

The potential impacts for each phase of Quarry operations are outlined in the AMP with details on specific protection and monitoring measures. This annual summary report will focus on quarry operations in Phase 1 and the associated monitoring measures that were completed in support of the AMP in 2016.

Given the extraction that has occurred in the existing quarry, extraction in Phase 1 of the expansion quarry is not expected to result in any negative impacts to off-site water resources and/or ecological features and functions. Therefore, the monitoring and mitigation requirements during this phase of extraction are such that the response of the natural environment system will be monitored by means of the groundwater, surface water and wetland monitoring network, and results compared to predictions.

The AMP consists of four monitoring programs: the Performance Indicator Trigger Monitoring program (PITM), the Long Term Trend Groundwater and Surface Water Monitoring program (LTT), the Long Term Trend Ecological Monitoring program (LTTEM) and the Ecological Enhancement and Mitigation Monitoring program (EEMM). The AMP annual summary report is a consolidated summary report documenting the observations from each of the monitoring programs.

This annual report consists mainly of PITM and LTT monitoring data and reporting as the LTTEM and the EEMM have limited monitoring and reporting within the first three years of operations at the expansion quarry.

Table 3.2 in the AMP document indicates that the trigger periods for the PITM are initiated as soon as extraction in the expansion quarry proceeds beyond Phase 1. During extraction in Phase 1, interim trigger levels for surface water flows and surface water temperatures are based on historic data until targets can be established for water levels and temperatures in sensitive natural heritage features, based on comparison against monitoring data obtained at control stations located in the Pretty River and Batteaux Creek drainage basins.

The atypical climate conditions in 2016, being higher than normal temperatures and lower than normal precipitation, resulted in some surface water flows and/or temperatures that exceeded the assigned monthly interim PITM trigger levels at specific locations. However, since the PITM trigger periods do not come into effect until after Phase 1 (Table 3.2 in the AMP), mitigation action was not required.

The interim trigger levels recorded in 2016 are attributed exclusively to the effects of the atypical climate conditions and not the initiation of extraction activities at the expansion quarry. For example, interim trigger level exceedances were recorded early in 2016, before extraction activities had been initiated.

It is recommended that the interim trigger levels currently set out in the AMP be adjusted to reflect the 2016 monitoring results.

Conclusions and recommendations are made based on the review of the 2016 monitoring data including the revision of the interim trigger levels.

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1 INTRODUCTION

The Duntroon Expansion Quarry is located on County Road 91, west of the village of Duntroon on Lot 25, Concession XII in the Township of Clearview, County of Simcoe. The existing quarry property is located south of County Road 91 and the expansion quarry is located north of County Road 91. The expansion quarry property is located adjacent to the approved (August 24, 2012) MAQ Aggregates Inc. (MAQ) Highland Quarry, an independent third party. The locations of these quarry properties and of other lands owned by Walker Aggregates are shown on Figure 1.

The Duntroon Quarry has been in operation since the early 1960s on the south side of County Road 91 (existing quarry). Since 1995 the quarry has been operated by Walker Aggregates Inc. (WAI), a wholly owned subsidiary of Walker Industries Holdings Ltd. The licensed property of the existing quarry operates in accordance with Aggregate Resource Act (ARA) license number 3514. The expansion quarry is licenced to WAI under ARA licence number 607841, issued August 6, 2014.

The Adaptive Management Plan (AMP) annual summary report is a requirement of the Aggregate Resources Act licensing of the expansion quarry. The reader is referred to the AMP document, dated December 6, 2013, for specific details of the AMP monitoring, mitigation and reporting requirements.

The high quality dolostone produced from the Duntroon Quarry is in demand as building material and also for use in agricultural, recreational and environmental projects. This demand initiated an expansion of the existing footprint of the quarry to include property north of County Road 91 (the expansion quarry). WAI received approval from the Consolidated Joint Board on June 18th, 2012, to expand their quarry operation into the expansion lands. The expansion quarry property comprises a licensed area of 65.9 ha (162.9 acres), within which 58.5 ha (144.5 acres) is approved for extraction. A sinking cut was made in early October 2015 and a tunnel was constructed under County Road 91 to link the existing and expansion quarry properties. Active extraction in the expansion quarry started on June 28, 2016, making 2016 the first year of reporting for the AMP.

Table 2.3 in the AMP document summarizes the expected timing for extraction in each Phase. The phasing is also detailed on the Site Plan 2B of 4 Operational Plan. Phase 1, Phase 2a and Phase 2b are identified on Figure 2a – Site Sketch. The site sketch is based on conditions in November 2016.

The potential impacts for each phase of Quarry operations are outlined in the AMP with details on specific protection and monitoring measures. This annual summary report will focus on quarry operations in Phase 1 and the associated monitoring measures that were completed in support of the AMP in 2016.

Given the extraction that has occurred in the existing quarry, extraction in Phase I of the expansion quarry is not expected to result in any negative impacts to off-site water resources and/or ecological features and functions. Therefore, the monitoring and mitigation requirements during this phase of extraction are such that the response of the natural environment system will be monitored by means of the groundwater, surface water and wetland monitoring network, and results compared to predictions.

As stated in Table 3.2 of the AMP, trigger monitoring criteria for water flows, water temperature and wetland water levels will apply during their respective trigger periods as soon as extraction proceeds beyond Phase 1. Interim trigger values have been developed for water flows and water temperature using historical monitoring data. These interim trigger values will be updated as further monitoring data become available during Phase 1.

Further site background details including more detailed information on the site, monitoring requirements, watershed aggregate extraction activities, monitoring program contact names and other activities in local watersheds, are provided in Appendix A.

2 CLIMATE DATA

Climate data that is used as part of hydrogeological studies is generally obtained from an operational climate station with at least 30 years of data located in close proximity to the subject area. Environment Canada routinely publishes 30 Year Normals (or averages) for active climate stations with at least 30 years of climate data. The 30 Year Normal data is used as a historical baseline against which recent climate data are compared to determine if a particular year or month is wetter or drier than normal. The information is also used in the assessment of future conditions and impacts that may occur as a result of changes in land use.

Historically, climate data from the Thornbury Slama Station were used to assess annual water budget components as part of the Permit to Take Water monitoring programs. Justification for using the climate data from this station was provided in previous Permit to Take Water monitoring summary reports prepared for the Duntroon Quarry (Existing Quarry). Operation of the Thornbury Slama station was cancelled in May 2005.

After a detailed assessment of nearby climate stations (refer to previous PTTW Summary Reports prepared for the Duntroon Quarry), the Shanty Bay Climate Station, located on Lake Simcoe approximately 60 km east of the Duntroon Quarry, was assessed and provided a reasonable correlation with the climate data from the Thornbury Slama climate station.

In 2008, WAI established, an automatic weather station (the WAI station) in the vicinity of the existing quarry which provides the following local climate data:

— Wind speed and direction;
— Average hourly air temperature (°C); and
— Total hourly precipitation (mm)

There have historically been technical and operational issues with the weather station at the quarry, but the station has been operating consistently since July 2015. There is one section of missing hourly climate data at the WAI station from April 4 2016 at 9:00 am through April 16, 2016 at 9:00 am. The climate data from April at the WAI station is qualified by that absence. The data from the weather station has been used to compile local daily, monthly and yearly climate information for the reporting year of 2016. The climate station data has been presented with the data from the Shanty Bay station in Appendix A, so that the yearly climate information can be compared against the Environment Canada regional data.

For the purpose of this annual report, both the Shanty Bay and the WAI climate station data have been evaluated. Once a more consistent record of local climate conditions has been established, the local and regional climate data will be used exclusively to prepare seasonal and annual water budget assessments based on the Thornthwaite-Mather method, as used by Environment Canada. The information from the WAI climate station can be used to compile seasonal and annual water surplus/deficit amounts for consideration in surface water runoff and groundwater recharge evaluations and for comparison against quarry discharge volumes.

The 30-Year Climate Normal data and a calculated water budget for the Thornbury Slama Station are provided in Appendix A, on Table A-1. The Shanty Bay climate data and the calculated water budget for 2015 and 2016 are provided in Tables A-2 and A-3, respectively. The WAI climate station data and the calculated water budget for 2016 are provided in Table A-4. Figures A-1 through A-3 provide a graphical plot of the monthly precipitation and water surplus for each calculated water budget with the data for the 30-Year Climate Normal provided for comparison.

The 2016 climate data at the Shanty Bay station reports a significantly higher amount of precipitation than the WAI station (941 mm vs. 556 mm), although the WAI station is missing climate data in early to mid-April, which could be skewing these results. The mean monthly temperature at the Shanty Bay station is also typically warmer than the mean monthly temperature reported at the WAI station (8.4°C vs. 7.2°C). The mean monthly temperature for the Shanty Bay and WAI climate stations are plotted with the 30-Year normal mean monthly temperature in Figure A-4. The total monthly precipitation for the Shanty Bay and WAI climate stations are plotted with the 30-Year normal total monthly precipitation in Figure A-5.

2.1 AIR TEMPERATURE

At the Shanty Bay climate station, the monthly mean temperature in 2016 was 8.4°C, 1.6°C higher than the 30-Year Climate Normal value of 6.8°C. The monthly average temperature in April was 1.4°C lower than normal. The months of February, March, May, June, July, August, September, October and November were within 1.1°C to 3.4 °C warmer than normal. The months of January and December 2016 were within +/-1°C of the normal.

At the WAI climate station, the mean monthly temperature in 2016 was 7.2 °C, 0.4°C warmer than the 30-Year Climate Normal value of 6.8°C. The average monthly temperature in August and November were within 1.5°C to 1.7°C warmer than normal. The months of January, March, May, July and September were all warmer than normal, but within +1°C of the normal mean monthly temperature. February and June were cooler than normal, but within -1°C of the normal mean monthly temperature. December was 1.8 °C cooler than normal. The April temperature data at the WAI station is not included in this discussion as the data set is incomplete.

Warmer than normal air temperatures contribute to increased evaporation from open water and increased evapotranspiration from plants, which then increase their water uptake from the soil, intensifying the effects of an already dry summer. Warmer than normal air temperatures also contribute to increased surface water temperatures.

2.2 PRECIPITATION

At the Shanty Bay climate station in 2016, the total amount of precipitation received was 941 mm, or 25 mm (2.6 %) less than the calculated 30-Year Climate Normal (1971-2000) of 966 mm. The months of February, May, June, July, September and November received between 14% and 56% less precipitation than normal, while the months of January, March, August and December received between 22 % and 92% more precipitation than normal. The months of April and October received a normal amount of precipitation (within 10% of the Normal). The precipitation reported in August at the Shanty Bay climate station, while higher than normal, was concentrated in eight major precipitation events, including two events with over 30 mm of rain (August 16) and over 37 mm of rain (August 13). This type of intense rain event does not provide optimum conditions for precipitation to infiltrate and replenish the water table and a majority of the precipitation ends up as run off.

At the WAI climate station in 2016, the total amount of precipitation received was 556 mm, or 410 mm (42 %) less than the calculated 30-Year Climate Normal (1971-2000) of 966 mm. The month of March received 168% more precipitation than normal, while the remainder of the year, with the exclusion of February, received between 43% and 92% less precipitation than normal. February received within 5% of the normal amount of precipitation. The month of April has not been included in this discussion, since the data set is incomplete for that month. Beginning in May, the months become increasingly drier than normal, culminating in the months of September and October, where only 8 mm and 7 mm of precipitation was reported in each month, respectively.

The abnormal distribution of precipitation over the early summer months and into September contributed to drier than normal conditions and resulted in lower than normal measured flow rates at several surface water monitoring stations.

2.3 ANNUAL WATER BUDGET

The climate data from the Shanty Bay and WAI stations (temperature and precipitation) are used to calculate a general water budget for the area that provides a measure of losses to evaporation of the precipitation. The difference between the monthly precipitation and the monthly evaporation (adjusted for daylight hours) yields the estimated water surplus or deficit for that month, and similarly for the annual totals. The estimated evaporation is based on the method originally developed by Thornthwaite, and incorporates a water holding capacity for the soil, which is taken into account in the calculation of the actual water surplus. The annual water surplus is a measure of the amount of water that is available for surface runoff and groundwater recharge. Results of the water balance are summarized on the following table. Shanty Bay and the WAI stations are both included in the analysis for 2016. The WAI climate station is missing data for April 2016 and the water budget is qualified by this missing data.

Table 1 - 2016 Water Balance

PARAMETER	THORNBURY SLAMA (30-Year Normal)	SHANTY BAY	WAI
		2016	2016
Annual Precipitation (mm)	966	941	556
Potential Water Surplus (mm)	368	308	-39
Actual Water Surplus (mm)	395	410	301

The water surplus represents the amount of water that is available on an annual basis for infiltration into the ground surface to recharge the groundwater flow system and for surface runoff to the creeks. Partitioning of the annual water surplus into the groundwater recharge and surface water runoff components is estimated based on the site's surface topography (or slope), soil or rock type and the type of vegetation that is present. The Ministry of the Environment has provided estimates of infiltration factors for various types of slope, soil and vegetation cover in their land development guidelines (MOE, 1996). For the general conditions present across the Duntroon Quarry and the surrounding area, the infiltration factor is estimated and presented on Table 2.

Table 2 - Duntroon Quarry and Surrounding Area Infiltration Factor

FEATURE (RANGE OF INFILTRATION FACTORS)	SITE CHARACTERISTICS	CORRESPONDING INFILTRATION FACTOR
Slope (0.1-0.4)	Hilly land to rolling land	0.1 to 0.2
Soil Type (0.1-0.4)	Medium combinations of clay and loam to exposed fractured bedrock	0.2 to 0.4
Vegetation Cover (0.1-0.2)	Cultivated lands to woodland	0.1 to 0.2
OVERALL INFILTRATION FACTOR RANGE		**0.4 to 0.8**

Based on this likely range of infiltration values, the annual water surplus can be separated into groundwater recharge and surface runoff components as follows.

Table 3 - Groundwater Recharge and Surface Water Runoff

ANNUAL SURPLUS	GROUNDWATER RECHARGE	SURFACE WATER RUNOFF
30 Year Normals (395 mm)	158 to 316 mm per year 0.050 to 0.100 L/s/ha	237 to 79 mm per year 0.075 to 0.025 L/s/ha
2016 Shanty Bay Data (410 mm)	164 to 328 mm/year	246 to 82 mm/year
2016 WAI Data (395 mm)	120 to 241 mm/year	181 to 60 mm/year

In areas where the slope and/or nature of the land changes significantly (such as on the Escarpment slope or in low-lying wetland areas as extreme examples), the partitioning of recharge and runoff will vary from that indicated above. In addition, the presence of karst features at the ground surface, such as sinking stream channels and suffusion dolines, particularly near the brow of the Escarpment, will also affect the proportions of recharge and runoff that occur. In the vicinity of the Escarpment brow, the entire water surplus (or more) may recharge the local groundwater system above the Escarpment to become groundwater discharge springs at the Escarpment face that drain into local surface water courses on the Escarpment slope below. It is noted that based on the local WAI climate data, any water surplus is only recorded for the months of January through March, 2016 when monthly average temperatures were below zero.

3 PERFORMANCE INDICATOR TRIGGER MONITORING PROGRAM

3.1 METHODS

The Performance Indicator Trigger Monitoring (PITM) program is the regulatory compliance component of the AMP with respect to water-related issues.

The purpose of the PITM program is to monitor the effects of quarry operations on water resources with respect to levels, flows and temperature, and to initiate any actions necessary to adapt quarry operations so that the values of each of these parameters remain within their normal monthly patterns of seasonal variation. Any long term changes in prevailing climatic conditions will be incorporated into the AMP by developing statistical relationships between key AMP monitoring stations and two surface water flow and temperature control stations that are located in the Pretty River and Batteaux Creek drainage basins. These two control stations are situated beyond any possible influence of quarry operations or significant water users.

The PITM program provides for the monitoring of water resources that support natural heritage features. These are the features outside of the limit of extraction that potentially are sensitive to fluctuations in water regimes, such as provincially significant wetlands and fisheries.

These locations are monitored so that appropriate actions may be taken to modify routine quarry operations and/or implement contingency mitigation measures, to ensure that quarry operations do not negatively impact water resources which directly support natural heritage features, namely:

- Springs that discharge at the Niagara Escarpment east of the expansion quarry. These springs help to sustain surface water flow and fish habitat below the brow of the Niagara Escarpment in tributary streams of the Pretty River and Batteaux Creek;
- Surface water flows that support fish habitat in the Beaver River west of the expansion quarry; and
- Surface water levels and flows and groundwater levels that support wetland features and functions.

It is recognized that, in some instances, there may be factors, such as atypical climate conditions, which have no connection to quarry operations that could affect flow and/or temperature conditions at some monitoring locations. The monitoring programs in the AMP are designed to assist in identifying cause and effect relationships. In order to incorporate any effects that long term trends in regional climatic conditions (i.e. climate change) have on local groundwater springs and/or surface water level and flow conditions that are monitored as part of the PITM, monitoring will be conducted at the surface water control sites in the Pretty River and the Batteaux Creek sub-watersheds.

For Phase I quarry operations, the potential for off-site water-related effects to any of the provincially significant wetlands and/or Escarpment springs is very low.

During Phase 1, interim trigger values are based on historic monthly measurements at each monitoring location, and will be updated annually and as part of the 5-year review of the AMP. 2016 data collected as part of the PITM monitoring program will be used to update the interim trigger values for 2017 and to help incorporate the long term trends in regional climate on the groundwater springs and/or surface water level and flow conditions monitored as part of the PITM. It is noted that PITM trigger periods do not come into effect until Phase 1 is completed.

A description of the PITM regulatory monitoring stations is included in Table 3.3 of the AMP document. Please see Figure 4 for monitoring station locations.

The AMP specifies that upon initiation of extraction activities, the surface water Escarpment springs are to be monitored bi-weekly in July and August and monthly during other times of the year. Monitoring is to include as a minimum, temperature and a visual assessment of flow conditions. Where possible, measurements using an electromagnetic flow meter were completed. Surface water Escarpment spring monitoring stations include SW10, SW11, SW11A-E, SW21C, SW24A and SW77.

Water pumped into and out of the dewatering sumps and the water moving off-site as quarry discharge is monitored under the Permit to Take Water and the Environmental Compliance Approval. The quarry discharges into the RR6 wetland, west of the existing quarry. There is no specified monitoring requirement for the quarry discharge under the AMP. Field chemistry parameters (temperature, pH, dissolved oxygen and conductivity) are to be recorded quarterly at the dewatering sumps (Sump 1 and Sump 2 in the existing quarry and future Sump 3 on the expansion floor). Pumping rates and the metered flow of the quarry discharge are not specified as part of the AMP and are not reported on in this AMP Summary Report.

Temperature and surface water channel flow are to be monitored hourly at all surface water control stations excepting the existing and expansion quarry surface water features. PITM surface water monitoring stations include locations in three separate watersheds:

— The Pretty River tributary system: SW16, SW17, SW17A, SW18 and PR Control,
— The Batteaux Creek tributary system: SW9, SW14, SW15 and BC Control, and
— The Beaver River tributary system: SW1, SW2, SW0-2, SW3, SW6A and SW3B (‘RR3 Karst’)

Pressure transducers and a staff gauge have been installed at stations: SW1, SW2, SW0-2, SW3, SW6A, SW9, SW15, SW16 and SW18. Staff gauges have been installed at stations: SW14, SW17, SW17A, RR3 Karst, PR Control and BC Control; these stations are real-time logger to web stations. Stream flow at the surface water control stations is to be measured quarterly, once the stage discharge relationships at these stations have been established. Flow measurements are to be taken with a Valeport electromagnetic flow velocity meter or manually. Field chemistry parameters (temperature, pH, dissolved oxygen and conductivity) are to be recorded monthly.

Upon initiation of extraction activities, drivepoint monitors in the wetlands are to be to be monitored bi-weekly for the months of May, June and July and monthly during other times of the year. Monitoring is to include measurements of groundwater level, ponded water depth and water temperature. The drivepoints are located in the following wetlands:

— ANSI A wetland: DP6 (vernal pool)
— ANSI B wetland: Bridson DP and DP9
— RR2 wetland: DP5 (vernal pool) and DP7 (vernal pool)
— RR3 wetland: DP10
— RR6 wetland: DP2, DP4 and DP8

During Phase I quarry operations, a reference wetland station will be established in either the Nottawasaga Lookout Provincial Park or the Pretty River Provincial Park with input from the Ministry of Natural Resources and Forestry (MNRF) and the Nottawasaga Valley Conservation Authority (NVCA).

3.2 MONITORING RESULTS

The results of the AMP performance indicator trigger monitoring program in 2016 are presented in the following section.

As stated in Table 3.2 of the AMP, trigger monitoring criteria for water flows, water temperature and wetland water levels will apply during their respective trigger periods as soon as extraction proceeds beyond Phase 1. Interim trigger values have been developed for water flows and water temperature using historical monitoring data. These interim trigger values will be updated as further monitoring data become available during Phase 1.

3.2.1 SURFACE WATER FLOW

For stream flow and/or flow at Escarpment springs, the interim red trigger value is set as the historic lowest monthly value recorded at a specific location. The interim yellow trigger value is calculated either by increasing the red value by 15%, or by using the third-lowest monthly flow value over the historic period of record, whichever is the higher value. Green interim trigger values are set above the yellow interim trigger value.

Interim flow trigger values are outlined in Table 3.5, Appendix B of the AMP document. Monitoring locations are outlined on Figure 3. A brief description of the surface water locations is provided in Table B1, Appendix B.

3.2.1.1 STREAM FLOW

Observations on the 2016 stream flow monitoring results are presented in Table 4, below:

Table 4 - Surface Water Monitoring Stations - Results

Monitoring Station	Figure	Observations
Pretty River Tributary System		
SW16	B-28	Stream flow values generally within previously reported range.
SW17	B-29	New maximum flow reported in March 2016.
SW17A	B-30	Stream flow values generally within previously reported range.
SW18	B-32	Stream flow values generally within previously reported range.
PR Control	B-56	New maximum flow reported in March 2016.
Batteaux Creek Tributary System		
SW9	B-15	Stream flow values generally within previously reported range.
SW14	B-26	New maximum flow reported in March 2016.
SW15	B-27	Stream flow values generally within previously reported range.
BC Control	B-57	New maximum flow reported in March 2016.
Beaver River Tributary System		
SW1	B-1	New peak flow measured in April 2016.
SW2	B-2	Spring maximum flow reported in March 2016.
SW0-2	B-4	New maximum flow reported in March 2016.
SW3	B-7	Stream flow values generally within previously reported range.
SW6A	B-12	Fall stream flows are lower than average.
SW3B ('RR3 Karst')	B-55	Stream flow values generally within previously reported range.

3.2.1.2 ESCARPMENT SPRINGS

The results of the 2016 AMP monitoring program at the Escarpment spring monitoring stations are summarized in Table 5, below.

Table 5 - Escarpment Springs Monitoring Stations - Results

Monitoring Station	Figure	Observations
SW10	B-16	Stream flow values generally within previously reported range.
SW11	B-17	Stream flow values generally within previously reported range.
SW11A	B-18	Stream flow values generally within previously reported range.
SW11B	B-19	Stream flow values generally within previously reported range.
SW11C	B-20	Stream flow values generally within previously reported range.
SW11D	B-21	Stream flow values generally within previously reported range.
SW11E	B-22	Stream flow values generally within previously reported range.
SW21C	B-38	Peak measured stream flows reported in March and April of 2016.
SW24A	B-46	Stream flow values generally within previously reported range.
SW77	B-53	New maximum flow reported in March 2016 (2.5 L/s). Summer average flow lower than 2015, but higher than 2013 and 2014.

3.2.1.3 CONTROL STATIONS

During Phase I of quarry operations, when the likelihood of quarry-related water effects off-site is extremely low, Walker Aggregates will develop statistically valid relationships for flow and temperature conditions between specified key AMP monitoring locations and control stations in the Pretty River sub-catchment drainage basin and in the Batteaux Creek sub-catchment drainage basin. Larger sample sizes generally lead to increased precision when developing relationships. The statistical validity of the relationships between flow and temperature conditions between the specified AMP monitoring locations and the control stations is expected to increase as data collection progresses.

The key AMP monitoring locations in the Pretty River sub-catchment drainage basin are SW17, SW17A and SW18 and the key AMP monitoring location in the Batteaux Creek sub-catchment drainage basin is SW14.

The control stations have been established at the following locations:

— Batteaux Creek Sub-watershed Station (“BC Control”) – surface water control station located at the north side of the road culvert on 21/22 Sideroad, Clearview Township, approximately 1350 m east of Concession 10.

— Pretty River Sub-watershed Station (“PR Control”) – surface water control station located at the north side of the road culvert on 30/31 Sideroad, Town of the Blue Mountains, approximately 390 m west of the boundary line between Clearview Township and Town of Blue Mountains.

Photo 1 - Batteaux Creek sub-watershed control station

Photo 2 – Pretty River sub-watershed control station

As part of the annual assessment of the surface water systems, patterns of flow and water temperature and general chemistry at the AMP control and surface water stations are compared to patterns at existing long term regional flow gauging stations. The long term gauging stations selected for comparison are the Mad River station at Avening and the Pretty River station at Collingwood.

The long term regional flow data for the Mad River station at Avening and the Pretty River station at Collingwood are presented in Appendix A as Figures A-6 and A-7. The data for these figures was obtained from the Government of Canada real-time hydrometric data web-site (https://wateroffice.en.gc.ca). Historical data for the Mad River station at Avening (02ED015) is available from 1988 through 2015. Instantaneous daily surface water flow data for 2016 was obtained from the real-time data set using the daily flow recorded at 5 am (incomplete daily data sets did not allow for a daily average value). Historical data for the Pretty River station at Collingwood (02ED031) is available from 2006 through 2015. Average daily surface water flow data for 2016 was obtained from the real-time data set.

The statistical relationships developed over time between the controls stations and quarry monitoring locations will be used to supplement and then replace the initial interim targets that are based on the historic monthly monitoring database. The methodology to establish the long term triggers based on the control station relationships will be established through the first 5-year review of the AMP.

3.2.1.4 TRIGGER EXCEEDANCES

As stated in Table 3.2 of the AMP, trigger monitoring criteria for water flows, water temperature and wetland water levels will apply during their respective trigger periods as soon as extraction proceeds beyond Phase 1. Interim trigger values have been developed for water flows and water temperature using historical monitoring data. These interim trigger values will be updated as further monitoring data become available during Phase 1.

Exceedances of the interim trigger values for stream flow are discussed below in chronological order. Monthly summary tables including measured stream flow and temperature values are included in Appendix B (Tables B7 - B 30).

3.2.1.4.1 JANUARY 2016

Surface water flow rates and temperatures at the Escarpment springs and the surface water monitoring stations, including SW1, SW2 and SW0-2, were collected during the January monthly monitoring event (January 19-22, 2016).

There was no active aggregate extraction in the expansion quarry in January 2016. The expansion quarry began actively extracting aggregate in late June of 2016.

Stream flow at the Escarpment springs and the surface water monitoring stations is interpreted to be influenced by the climate in the months of November and December 2015, which were significantly drier (36 mm and 57 mm less precipitation) and warmer (3°C and 6°C) than the 30 Year Climate Normal (Shanty Bay climate station).

— Green zone stream flow measured at: SW6A, SW16, SW17 & SW77.
— Yellow zone stream flow interim triggers measured at: SW1, SW2, SW11, SW17A & SW21C.
— Red zone stream flow interim triggers measured at: SW14 & SW24A.

The yellow and red zone interim stream flow trigger values that were exceeded in the month of January are attributed to the atypically dry November and December and are not attributed to the expansion quarry.

3.2.1.4.2 FEBRUARY 2016

Surface water flow and temperatures at the Escarpment springs and the surface water monitoring stations, including SW1, SW2 and SW0-2 were collected during the February monthly monitoring event (February 16-19, 2016).

There was no active aggregate extraction in the expansion quarry in February 2016. The expansion quarry began actively extracting aggregate in late June of 2016.

Stream flow at the Escarpment springs and the surface water monitoring stations is interpreted to be influenced by the drier than normal climate in November and December 2015 (discussed above) and the drier than normal January (WAI climate station), which was 30 mm drier than the 30 Year Climate Normal (Shanty Bay climate station). The precipitation in February is reported as being slightly wetter than normal (approximately 3 mm more precipitation); however, a majority of this precipitation occurred after the February monitoring event (February 19th, 16 mm; February 28th, 25 mm).

— Green zone stream flow measured at: SW1, SW2, SW10, SW11, SW17, SW17A, SW18 & SW77.
— Yellow zone stream flow interim triggers measured at: SW21C & SW24A.
— Red zone stream flow interim triggers measured at: SW16.

The yellow and red zone interim stream flow trigger values that were exceeded in the month of February are attributed to the atypical climate conditions in the preceding months and are not attributed to the expansion quarry.

3.2.1.4.3 MARCH 2016

Surface water flow and temperature data at the Escarpment springs and most of the surface water stations were collected during the March monthly monitoring event (March 14-16, 2016). The flow and water temperature at SW1, SW2 and SW0-2 were collected on March 18^{th}, 2016.

There was no active aggregate extraction in the expansion quarry in March 2016. The expansion quarry began actively extracting aggregate in late June of 2016.

March 2016 was significantly wetter than normal, and is also typically the month when the majority of the snow pack melts, resulting in higher stream flows.

There were no yellow or red zone interim triggers for stream flow measured in March 2016.

3.2.1.4.4 APRIL 2016

Surface water flow and temperature data at the Escarpment springs and most of the surface water stations were collected during the April monthly monitoring event (April 19-21, 2016). Flows and water temperature were recorded at SW1, SW2 and SW0-2 on April 22, 2016.

There was no active aggregate extraction in the expansion quarry in April 2016. The expansion quarry began actively extracting aggregate in late June of 2016.

— Green zone stream flow measured at: all surface water stations and Escarpment springs with the exception of SW24A.
— Yellow zone stream flow interim triggers measured at: SW24A (1.8 L/s vs. interim trigger of 1.9 L/s).
— There were no red zone interim triggers for stream flow measured in April 2016.

The yellow zone stream flow trigger value that was exceeded at SW24A is interpreted to be the result of atypical climate conditions leading up to the month of April. April climate data from the WAI climate station is incomplete for the month of April. The data at the Shanty Bay climate station indicates a decrease in water surplus in April down to zero by May 2016. It is interpreted that due to the location of SW24A, below an outcrop of the Manitoulin Formation bedrock at an elevation of approximately 460 m ASL, the seep may be more sensitive to changes in the water surplus.

The yellow zone stream flow trigger value measured at SW24A in April 2016 is interpreted to be the result of the atypical climate conditions experienced in early 2016 and is not attributed to the expansion quarry.

3.2.1.4.5 MAY 2016

Surface water flows and water temperature data were collected at the Escarpment springs and most of the surface water monitoring stations during the May monthly monitoring event (May 17-19, 2016). Flow and temperature data at SW1, SW2 and SW0-2 were recorded on May 13, 2016.

There was no active aggregate extraction in the expansion quarry in May 2016. The expansion quarry began actively extracting aggregate in late June of 2016.

Stream flow at the Escarpment springs and the surface water monitoring stations is interpreted to be influenced by the atypical climate conditions leading up to the monitoring event in May 2016. The water surplus in May is calculated to be zero using both Shanty Bay and WAI climate station data. The precipitation in May 2016 is 43% less than normal. The Escarpment springs SW21C and SW24A are shown to be sensitive to these conditions.

— Green zone stream flow measured at: SW11, SW77 and surface water monitoring locations.
— Yellow zone stream flow interim triggers measured at: SW10.
— Red zone stream flow interim triggers measured at: SW21C & SW24A.

The yellow and red zone interim stream flow trigger values that were exceeded in the month of May are interpreted to be the result of the atypical climate conditions and are not attributed to the expansion quarry.

3.2.1.4.6 JUNE 2016

The surface water flow and temperature data were collected from the Escarpment springs and most of the surface water monitoring locations during the June monthly monitoring event (June 21-23, 2016). SW1, SW2 and SW0-2 flow rate and temperature data were collected on June 17, 2016.

Active extraction at the expansion quarry began in late June of 2016.

- Green zone stream flow measured at: Escarpment springs and surface water monitoring locations with the exception of SW14.
- Yellow zone stream flow interim triggers measured at: None.
- Red zone stream flow interim triggers measured at: SW14.

The interim trigger stream flow values for June are lower than those in May and appear to better represent the measured stream flows reported in June 2016. The only interim trigger value that was exceeded in June was at SW14, which is located downstream of a pond that is located on private property. The flow out of the pond is regulated manually by means of a valve, which controls the release of the water from the pond into the channel that eventually flows out to the culvert on Concession 10, where SW14 is measured. One scenario that may have influenced the red zone trigger exceedance at SW14 is if the property owner wanted to raise the level in the pond and had reduced the flow out of the pond. Another possible cause for the reduced flow is a partial blockage of the channel upstream from the monitoring location.

The red zone interim stream flow trigger value exceedance is not attributed to the expansion quarry.

3.2.1.4.7 JULY 2016

Surface water flow and temperature data were collected bi-weekly at the Escarpment springs in July 2016, as stipulated by the PITM. Monitoring events were completed on July 5th, 2016 and during the July monthly monitoring event on July 19-21, 2016. Surface water monitoring stations were measured during the monthly event only. Flow and temperature data at SW1, SW2 and SW0-2 were monitored on July 22nd, 2016.

The expansion quarry began actively extracting in Phase 1 in late June 2016.

July 5th Event (Escarpment springs only)

- No interim stream flow trigger exceedances.

July 19-22nd Event

- Green zone stream flow measured at: SW10, SW11, SW21C, SW24A, SW1, SW2, SW14, SW17, & SW17A.
- Yellow zone stream flow interim triggers measured at: SW77, SW0-2, SW6A, SW15, SW16, & SW18.
- Red zone stream flow interim triggers measured at: None.

The interim stream flow trigger values for July are generally lower than or equal to the interim trigger values developed for the month of June. The interim trigger values continue to be representative of the measured stream flow conditions at the Escarpment springs, with the exception of the yellow zone interim trigger stream flow measured at SW77. This trigger value should be adjusted to reflect the flow value of 0.1 L/s during the summer months as this appears to be typical flow for this period. Table B-4 in Appendix B shows the summer average for SW77 from 2010 to 2016 and for the period of 2012, 2013 and 2014, the summer average stream flow at SW77 is 0.1 L/s or <0.1 L/s.

The yellow zone stream flow interim trigger exceedances indicated for SW0-2, SW6A, SW15, SW16 and SW18 are indicative of the drier than average summer, but are still within previously reported values. For example, SW15 is reported as 'dry' in July, which is typical for this surface water station, and is why there is no red stream flow interim trigger. SW16 is also typically ponded by mid-summer, with standing water at the surface water station, but no measurable flow, which is why there is no red zone stream flow interim trigger.

The yellow zone stream flow interim triggers recorded in July 2016 are interpreted to be the result of the atypically dry summer, with May, June and July receiving 43% to 65% less precipitation than normal. The interim trigger value exceedances are not attributed to the expansion quarry.

3.2.1.4.8 AUGUST 2016

Surface water flow and water temperature data were collected during the August monthly monitoring event (August 23-25, 2016). An additional site visit was completed on August 9th, 2016 to make observations at the Escarpment springs, as stipulated in the AMP. SW1, SW2 and SW0-2 data were collected on August 19th, 2016. SW0-2 was not accessible for measurement on August 19th due to the presence of livestock (cattle).

August 9th Event (Escarpment springs only)

— Green zone stream flow measured at: SW10 & SW77.
— Yellow zone stream flow interim triggers measured at: SW21C & SW24A.
— Red zone stream flow interim triggers measured at: SW11.

August 19th & 23-25th Events

— Green zone stream flow measured at: SW21C, SW24A, plus surface water monitoring stations with the exception of SW6A.
— Yellow zone stream flow interim triggers measured at: SW10, SW11 & SW77.
— Red zone stream flow interim triggers measured at: SW6A.

The interim stream flow triggers for August are generally lower than the interim trigger values established for July.

There was variation noted in the measured flows at the Escarpment springs between the two events in August, with surface water flow at SW21C and SW24A increasing from August 9th to August 23-25th, out of the yellow interim trigger zone and into the green zone. Conversely, surface water flow at stations SW10 and SW77 dropped down from the green zone into the yellow interim trigger zone. The surface water flow at SW11 increased from the red interim trigger zone into the yellow interim trigger zone.

The flow at SW6A was also recorded in the red interim trigger zone in August 2016, but this is not the lowest flow recorded for SW6A. A flow of 9.0 L/s was recorded at SW6A in September 2003.

August 2016 is the fourth month in a row of significantly less precipitation than normal, and the exceedances of the interim trigger values at the Escarpment springs reflect these atypical climate conditions. August received 67% less precipitation than normal. The exceedance of the yellow and red interim trigger values in August 2016 are interpreted to be the result of the atypical climate conditions in 2016 and are not attributed to the expansion quarry.

3.2.1.4.9 SEPTEMBER 2016

Surface water flow measurements and water temperature data were collected at the Escarpment springs and the surface water monitoring stations, including SW1, SW2 and SW0-2, during the September monthly monitoring event (September 19-21, 2016).

There were no interim stream flow trigger exceedances in September 2016. The interim trigger values developed for stream flow for the month of September appear to accurately reflect the measured stream flow conditions during the September monthly monitoring event.

3.2.1.4.10 OCTOBER 2016

Surface water flow measurements and water temperature at the Escarpment springs and the surface water monitoring stations, including SW1, SW2 and SW0-2, were collected during the October monthly monitoring event (October 17-19, 2016).

— Green zone stream flow measured at: Escarpment spring and surface water monitoring stations with the exception of SW11 and SW18.
— Yellow zone stream flow interim triggers measured at: SW11 & SW18.
— Red zone stream flow interim triggers measured at: None.

The calculated water surplus in 2016 (see Figure A-3) had not recovered in October 2016, as it would typically under normal climate conditions. The flows reported in the red and yellow interim trigger zones are attributed to the atypical climate conditions observed in 2016, and not to the aggregate extraction in Phase I of the expansion quarry.

3.2.1.4.11 NOVEMBER 2016

Surface water flow measurements and air temperature data were recorded at the Escarpment springs and most of the surface water monitoring stations during the November monthly monitoring event (November 14-16, 2016). Flow measurements and water temperatures were recorded at SW1, SW2 and SW0-2 on November 18, 2016.

— Green zone stream flow measured at: SW10, SW21C, SW24A, SW77, SW1, SW2, SW16, SW17 & SW18.
— Yellow zone stream flow interim triggers measured at: SW0-2, SW6A, SW14 & SW15.
— Red zone stream flow interim triggers measured at: SW11 & SW17A.

The measured flow rate at SW18 had recovered from the yellow interim trigger zone into the green zone in November 2016. The calculated water surplus in 2016 (see Figure A-3) had not recovered in November 2016, as it would typically under normal climate conditions. From May to November 2016, there was 378mm less precipitation than normal (WAI climate station data compared to 30 year climate normal), and the measured stream flows in November reflected these atypical climate conditions. The yellow and red zone stream flow interim trigger exceedances are not attributed to the aggregate extraction activities in Phase 1 of the expansion quarry.

3.2.1.4.12 DECEMBER 2016

Surface water flow measurements and water temperature data were collected at the Escarpment springs and most of the surface water monitoring stations during the December monthly monitoring event (December 12-14, 2016). Flow rates and temperatures at SW1, SW2 and SW0-2 were collected on December 16th, 2016.

— Green zone stream flow measured at: SW10, SW21C, SW77, SW1, SW15 & SW17A.
— Yellow zone stream flow interim triggers measured at: SW11, SW24A, SW2, SW14, SW16, & SW18.
— Red zone stream flow interim triggers measured at: SW0-2, SW6A, & SW17.

The month of December 2016 received 72 mm less precipitation than normal (WAI climate station compared to the 30 year climate normal). The water surplus did not recover in 2016, as would typically happen in late fall/early winter. These atypical climate conditions are reflected in the lower than normal flows reported in the yellow and red stream flow interim trigger zones. These interim stream flow trigger values are not attributed to the aggregate extraction activities occurring in Phase 1 of the expansion quarry.

3.2.1.5 MITIGATION MEASURES UNDERTAKEN

There were no mitigation measures undertaken in 2016. Mitigation measures are not anticipated to be required in Phase I, since extraction during Phase I is not expected to result in negative impacts to off-site water resources and/or ecological features and functions, given the extraction that historically has occurred in the Existing Quarry.

An overview of the proposed future mitigation measures that may be implemented if necessary, as outlined in the AMP document, is included in Sections 5.4.1 and 5.4.2, below.

3.2.1.5.1 ROUTINE WATER MANAGEMENT MEASURES

In addition to the Site Plans, and this AMP, routine water management and mitigation are regulated by approvals under the Ontario Water Resources Act (PTTW No. 7725-AACS54, dated September 22, 2016) and the Environmental Protection Act (ECA No. 1521-A4VJ4X, dated October 17th, 2016). These measures have, to the extent possible, been aligned with the monitoring requirements that exist under the AMP.

The AMP mitigation objectives are based on the release of the required volumes of water to the landscape in the vicinity of the wetlands without negatively affecting the surrounding environment. The initial discharge volumes, if and when required, will be based proportionately on the respective sizes of the surface drainage catchment areas extracted from the respective watersheds (Beaver River or Batteaux Creek), in each Phase.

The proportionate discharge to each watershed/wetland can be adjusted, as necessary, based on the results of the AMP Performance Indicator Trigger Monitoring Program. Discharge into the wetlands will be managed by adjusting pumping rates and/or by means of flow restrictor valves in discharge lines, as required. Discharge into individual wetlands will be adjusted as necessary to maintain target hydrographs in each wetland/watercourse.

For more information on the proposed discharge points and designs that will be implemented progressively during the excavation of the Phases of the expansion quarry, please see Section 2.3 of the AMP document.

Routine water management activities are fully expected to maintain quarry operations in compliance with the AMP trigger criteria, and protect the surrounding natural environment and water resources.

In the event that the routine water management activities described above do not fully achieve the objectives of the AMP, contingency measures will be implemented.

3.2.1.5.2 CONTINGENCY MITIGATION MEASURES

Contingency mitigation measures are available to be implemented by Walker Aggregates when, and if, the AMP monitoring indicates such measures are necessary. As previously noted, the extraction of Phase I of the expansion Quarry is not expected to result in negative impacts to off-site water resources and/or ecological features and functions, given the extraction that historically has occurred in the Existing Quarry. No impacts are predicted during the first 5 years of operations and no contingency mitigation measures are required at this time. Contingency mitigation measures were not required to be implemented during the 2016 monitoring period.

The design of site specific discharge structures, or contingency mitigation measures located outside the area of extraction must be approved by the MNRF and included in the AMP prior to any construction (ARA Site Plan Hydrogeology Note 7E).

Contingency mitigation measures that are available during operations could include and earthen buttress to act as a hydraulic barrier; temporary grouting techniques used locally to reduce hydraulic conductivity; pumping from deeper, cooler water for discharge; modifying the outflow characteristics of surface water from a wetland; recharge injection wells etc.. For a full list and detailed explanation of the contingency mitigation measures that could be implemented during operations please reference Section 2.4.1 in the AMP document.

Any potentially necessary contingency mitigation measures for the next 5 years of operation (not expected) and the subsequent 5 year periods will be designed and included in the AMP through the 5-Year Comprehensive Review process.

The necessity for contingency mitigation measures will be identified based on the progress of extraction, monitoring results and the PITM program.

3.2.2 SURFACE WATER TEMPERATURE

For water temperature in streams and/or Escarpment springs, monthly interim trigger values are established for the months of June through September to reflect the period when warm surface water temperatures have the potential to affect sensitive fish habitat areas that are present downstream, below the Escarpment brow. The interim red zone trigger values are set as the highest monthly temperature that has been recorded through the historic period of record. The interim yellow zone trigger value is set at 10% below the interim red zone trigger value. The interim green zone trigger value is anything that is below the yellow zone trigger value.

Interim temperature trigger values are outlined in Table 3.6, Appendix B of the AMP document.

3.2.2.1 SURFACE WATER COURSES

The surface water monitoring stations are monitored once a month during the months of June, July, August and September and the surface water temperature is recorded and compared to the interim trigger values developed specifically for each surface water station.

Surface water monitoring stations are listed in Table 8, above.

3.2.2.2 ESCARPMENT SPRINGS

The Escarpment spring monitoring stations are monitored once a month during the months of June and September and bi-weekly in July and August. Surface water temperature is recorded and compared to the interim trigger values developed for specifically for each Escarpment spring monitoring station.

3.2.2.3 CONTROL STATIONS

The Batteaux Creek (BC Control) and Pretty River (PR Control) control stations provide context to the recorded surface water temperature data. The control stations are discussed in section 3.2.1.3, above.

3.2.2.4 TRIGGER EXCEEDANCES

As outlined in Table 3.2 of the AMP, trigger monitoring criteria for water flows, water temperature and wetland water levels will apply during their respective trigger periods as soon as extraction proceeds beyond Phase 1. Interim trigger values have been developed for water flows and water temperature using historical monitoring data. These interim trigger values will be updated as further monitoring data become available during Phase 1.

Exceedances of the interim trigger values for water temperature are discussed below in chronological order. Monthly monitoring summary tables are included in Appendix B (Tables B17 - B 24).

3.2.2.4.1 JUNE 2016

Surface water temperature data were collected from the Escarpment springs and the majority of the surface water monitoring stations during the June monthly monitoring event (June 21-23, 2016). Temperature data at SW1, SW2 and SW0-2 was collected on June 17, 2016.

The average monthly temperature in June was 16.5°C (WAI climate station). This is within 0.1°C of the 30 year climate normal average monthly temperature for June (16.6°C). The maximum daily temperature recorded at the WAI climate station for the five days leading up to the monitoring event ranges from 25°C to 29°C and the minimum air temperature does not drop below 11°C.

Aggregate extraction in the expansion quarry was initiated at the end of June, after the June monitoring event was completed.

— Green zone temperature measured at: SW10, SW11, SW21C, SW24A and surface water monitoring stations with the exception of SW17 and SW17A.
— Yellow zone temperature interim triggers measured at: SW17 & SW17A.
— Red zone temperature interim triggers measured at: SW77.

The red and yellow zone temperature interim triggers recorded in June 2016 are attributed to the warm air temperature and reduced stream flows in the period leading up to the monthly monitoring event, and not to the expansion quarry.

3.2.2.4.2 JULY 2016

Surface water flow and temperature data were collected bi-weekly at the Escarpment springs in July 2016, as stipulated by the AMP. Monitoring events were completed on July 5th, 2016 and during the July monthly monitoring event on July 19-21, 2016. Surface water control stations were monitored during the monthly monitoring event only. Flow and temperature data at SW1, SW2 and SW0-2 was monitored on July 22nd, 2016.

July 5th Event

— Green zone temperature measured at: Escarpment springs with the exception of SW77.
— Yellow zone temperature interim triggers measured at: SW77
— Red zone temperature interim triggers measured at: None.

July 19 & 23-25rd Events

— Green zone temperature measured at: SW11, SW24A and surface water stations with the exception of SW17A.
— Yellow zone temperature interim triggers measured at: SW10, SW21C & SW17A
— Red zone temperature interim triggers measured at: SW77.

The maximum air temperature on July 5th is recorded as 26°C. The maximum air temperature on July 21st is recorded as 28°C. The yellow and red zone temperature interim triggers recorded in July 2016 are attributed to the warm air temperature and reduced stream flows in the period leading up to the monitoring events, and not to the expansion quarry.

3.2.2.4.3 AUGUST 2016

Surface water temperature data were collected during the August monthly monitoring event (August 23-25, 2016). An additional site visit was completed on August 9th, 2016 to make observations at the Escarpment springs, as stipulated in the AMP. SW1, SW2 and SW0-2 data were collected on August 19th, 2016. SW0-2 was not accessible for measurement on August 19th due to the presence of livestock (cattle).

August 9th Event (Escarpment springs only)

— Green zone temperature measured at: None.

— Yellow zone temperature interim triggers measured at: SW21C.
— Red zone temperature interim triggers measured at: Escarpment springs with the exception of SW21C.

August 19th & 23-25th Events

— Green zone temperature measured at: SW1, SW2, SW6A, SW14, & SW15.
— Yellow zone temperature interim triggers measured at: SW10, SW11, SW77, SW17 & SW18.
— Red zone temperature interim triggers measured at: Escarpment springs, SW16 and SW17A.

The monthly average temperature in August is reported to be 1.7°C warmer than the 30 year climate normal. The maximum air temperature on August 9th is recorded as 29°C. The maximum air temperature on August 24th is recorded as 25°C. The low stream flow volume and shallow nature of the Escarpment springs water courses increase their sensitivity to warmer air temperatures. The yellow and red zone temperature interim triggers recorded in August 2016 are attributed to the warm air temperature and reduced stream flows in the period leading up to, and during the monitoring events, and not to the expansion quarry.

3.2.2.4.4 SEPTEMBER 2016

Surface water temperature data was collected at the Escarpment springs and the surface water monitoring stations, including SW1, SW2 and SW0-2, during the September monthly monitoring event (September 19-21, 2016).

— Green zone temperature measured at: SW1 & SW2.
— Yellow zone temperature interim triggers measured at: SW6A
— Red zone temperature interim triggers measured at: Escarpment springs, SW14, SW15, SW16, SW17, SW17A & SW18.

The monthly average temperature in September is reported to be 1.0°C warmer than the 30 year climate normal. The maximum air temperature on September 19th is recorded as 25°C. The low stream flow volume and shallow nature of the Escarpment springs water courses increase their sensitivity to warmer air temperatures. The yellow and red zone temperature interim triggers recorded in September 2016 are attributed to the warm air temperature and reduced stream flows in the period leading up to, and during the monitoring events, and not to the expansion quarry.

3.2.2.5 MITIGATION MEASURES UNDERTAKEN

Mitigation measures are not expected to be required in Phase I, since extraction during Phase I is not expected to result in negative impacts to off-site water resources and/or ecological features and functions, given the extraction that historically has occurred in the Existing Quarry.

An overview of the proposed future mitigation measures that may be implemented if necessary, as outlined in the AMP document, is included in Sections 5.4.1 and 5.4.2, below.

3.2.2.5.1 ROUTINE WATER MANAGEMENT MEASURES

In addition to the Site Plans, and this AMP, routine water management and mitigation are regulated by approvals under the Ontario Water Resources Act (PTTW No. 7725-AACS54, dated September 22, 2016) and the Environmental Protection Act (ECA No. 1521-A4VJ4X, dated October 17th, 2016). These measures have, to the extent possible, been aligned with the monitoring requirements that exist under the AMP.

Routine water management mitigation measures were not required during the 2016 monitoring period.

The AMP mitigation objectives are based on the release of the required volumes of water to the landscape in the vicinity of the wetlands without negatively affecting the surrounding environment. The initial discharge volumes, if and when required, will be based proportionately on the respective sizes of the surface drainage catchment areas extracted from the respective watersheds (Beaver River or Batteaux Creek), in each Phase.

The proportionate discharge to each wetland feature/watershed can be adjusted, as necessary, based on the results of the AMP Performance Indicator Trigger Monitoring Program. Discharge into the wetlands will be managed by adjusting pumping rates and/or by means of flow restrictor valves in discharge lines, as required. Discharge into individual wetlands will be adjusted as necessary to maintain target hydrographs in each wetland/watercourse.

For more information on the proposed discharge points and designs that will be implemented progressively during the excavation of the Phases of the expansion quarry, please see Section 2.3 of the AMP document.

Routine water management activities are fully expected to maintain quarry operations in compliance with the AMP trigger criteria, and protect the surrounding natural environment and water resources.

In the event that the routine water management activities described above do not fully achieve the objectives of the AMP, contingency measures will be implemented.

3.2.2.5.2 CONTINGENCY MITIGATION MEASURES

Contingency mitigation measures are available to be implemented by Walker Aggregates when, and if, the AMP monitoring indicates such measures are necessary. As previously noted, the extraction of Phase I of the expansion Quarry is not expected to result in negative impacts to off-site water resources and/or ecological features and functions, given the extraction that historically has occurred in the Existing Quarry. No impacts are predicted during the first 5 years of operations and no contingency mitigation measures are required at this time. Contingency mitigation measures were not required to be implemented during the 2016 monitoring period.

The design of site specific discharge structures, or contingency mitigation measures located outside the area of extraction must be approved by the MNRF and included in the AMP prior to any construction (ARA Site Plan Hydrogeology Note 7E).

Contingency mitigation measures that are available during operations could include and earthen buttress to act as a hydraulic barrier; temporary grouting techniques used locally to reduce hydraulic conductivity; pumping from deeper, cooler water for discharge; modifying the outflow characteristics of surface water from a wetland; recharge injection wells etc.. For a full list and detailed explanation of the contingency mitigation measures that could be implemented during operations please reference Section 2.4.1 in the AMP document.

Any potentially necessary contingency mitigation measures for the next 5 years of operation (not expected) and the subsequent 5 year periods will be designed and included in the AMP through the 5-Year Comprehensive Review process. The necessity for contingency mitigation measures will be identified based on the progress of extraction, monitoring results and the PITM program.

3.2.3 WETLAND WATER LEVEL

The wetlands are protected by the retention of the majority of their catchment areas, such that nearby wetland features will continue to receive direct precipitation, as well as snowmelt and storm-event surface runoff from the lands to the north and east, and in the case of Rob Roy Swamp Wetland Complex unit RR2 wetland, from the American Hart's-Tongue Fern and Butternut protection areas to the south.

When required, wetland water levels will be managed during the active extraction phases of the quarry through to final rehabilitation by discharging quarry water into the wetlands as required to maintain the seasonal hydro-periods and surface water outflows. Discharge water quality will be regulated by approvals under the Environmental Protection Act (ECA for discharge of sewage Works).

Design and pumping rates will be refined in consultation with the MNRF, MOECC and Conservation Authority staff through the Phase I extraction period as the monitoring database expands. Preliminary target hydrographs have been developed for the three major wetland types and include target ranges for wet, average and dry conditions.

During Phase I quarry operations, a reference wetland station will be established in either the Nottawasaga Lookout Provincial Park or the Pretty River Provincial Park with input from MNRF and the Nottawasaga Valley Conservation Authority. The reference wetland station will be located away from any potential quarry effects, so that the prevailing local/regional climate conditions are incorporated into the evaluation of site-specific local wetland water level data. Water levels in the reference wetland station will indicate whether the regional climate is experiencing wet, average or dry conditions. This information will be updated seasonally and used to determine which of the three lines in the target hydrographs (wet, average or dry) should be applied at any given time. Reference wetland stations have not yet been established.

The wetland target refinement process will be verified through the long term ecological monitoring of wetlands to obtain data on the trends in amphibian habitat conditions, wetland plant species diversity and percent cover, and other ecological indicators of healthy, functional wetlands.

Drivepoint water level and ponded water depth were recorded during the following monitoring events, as outlined in the PITM:

- May 2nd 2016 (bi-weekly event)
- May monthly monitoring event (May 17th, 2016)
- June 7th 2016 (bi-weekly event)
- June monthly monitoring event (June 21st, 2016)
- July 5th, 2016 (bi-weekly event)
- July monthly monitoring event (July 19th, 2016)

One additional monitoring event was completed at the drivepoints in 2016 in August, during the site visit to observe the Escarpment springs on August 9th, 2016. This event was not required by the PITM but was completed to provide baseline data during the atypically dry and warm climate conditions that were occurring in the summer of 2016. Data from this event and the August monthly event (August 23rd, 2016) are included in Table B-31, Appendix B.

Hydrographs for the drivepoint monitors are presented in Appendix C (Figures C-63 through C-73) and include the water level inside the drivepoint as well as the elevation of the surface water that is ponded around the drivepoint, where it is present. Table C-8 in Appendix C includes water level elevations at the drivepoint locations. Occasionally over the winter the water inside the drivepoints freezes and a water level cannot be measured. The surface water ponded around the drivepoints also typically freezes over during the winter months. These events are noted in Table C-8 where they were observed during the monitoring event. Drivepoint and wetland locations are provided on Figure 3 – Monitoring Locations.

Trends and observations for drivepoint monitoring stations are outlined in Table 6, below.

Table 6- Drivepoint Monitoring Stations - Results

Monitoring Station	Figure	Observations
Bridson DP	C-73	Seasonal variation within previously reported values.
DP2	C-64	Water levels stable since 2010-2011.
DP4	C-66	Water levels relatively stable since 2011.
DP5	C-67	Water level in drivepoint recorded at a new minimum in October 2016.
DP6	C-68	Seasonal variation within previously reported values.
DP7	C-69	Limited data set.
DP8	C-70	Limited data set.
DP9	C-71	Limited data set.
DP10	C-72	Limited data set.

3.2.3.1 VERNAL BREEDING POOLS WATER LEVELS

Rob Roy PSW#2 is located north of the expansion quarry. Drivepoints DP5 and DP7 are located north of the expansion quarry in vernal pools that are part of Rob Roy PSW #2. DP5 was installed in the summer of 2007 and has been monitored monthly, when accessible, since then. Water levels at DP5 reflect the atypically dry conditions of the summer of 2016, with a new low water level recorded at the drivepoint in October 2016 (508.6 m ASL). This water level is lower than the previous minimum water level recorded at DP5 in September 2011 (508.8 m ASL). DP7 was installed in the summer of 2014 and water level monitoring has been completed monthly since the end of 2015. Water levels at DP7 show seasonal variation, with peak water levels recorded in the spring of 2016.

The ANSI A wetland is located north of the expansion lands (Figure 3). Drivepoint DP6 is located in a vernal pool in the ANSI A wetland. Water levels at DP6 have been monitored on a monthly frequency since the end of 2007 and show regular seasonal variation. Peak water elevations are reported in the spring. DP6 is often reported as “dry” over the summer months, which shows up in the hydrograph as gaps between the recorded data points.

3.2.3.2 SOIL GROUNDWATER TABLE LEVELS

Rob Roy PSW#6 is located west of the Existing Quarry. DP2 is located in the wetland area where the quarry currently discharges water pumped from the quarry floor to dewater the excavation area. DP4 is located west of SW1, immediately downstream of the twin culverts that pass under Grey County Road 31. DP8 is located in PSW#6 in between SW2 and the quarry discharge line. DP2 has been monitored monthly since the fall of 1999, when accessible. Water levels at DP2 have been very consistent since approximately 2011. There was no significant change to water levels at DP2 in 2016. The discharge from the Existing Quarry is directed into this wetland area, which is west of the quarry. The quarry discharge provides a buffer for the wetland water levels, which keeps them consistent. Water levels at DP4 have been monitored monthly since the fall of 1999, when accessible and have been consistent over the past 5 years. There was no significant change to water levels at DP4 in 2016. The quarry discharge also provides a buffer to water levels at DP4. DP8 was installed in 2014 and has been monitored on a monthly frequency since the end of 2015. Water levels at DP8 are also buffered by the quarry discharge and show little variation over the course of 2016.

Rob Roy PSW#3 is located west of the expansion quarry, across Grey County Road 30 and immediately north of the MAQ quarry property (Figure 3). Drivepoint DP10 is located in the wetland thicket swamp of RR PSW#3. Monthly monitoring at DP10 has been ongoing since the end of 2015. Water levels at DP10 show slight seasonal variation over the course of 2016.

The ANSI B wetland is located east and north east of the expansion quarry (Figure 3). The drivepoint designated Bridson DP is on the former Bridson property (now owned by WAI), just east of the expansion quarry in the buffer lands. Groundwater levels at Bridson DP show seasonal fluctuation, with a seasonal low water elevation typically in the late summer or early fall. Bridson DP was reported as "dry" during monitoring events in August, September and October of 2016, which is attributed to the atypically dry summer weather conditions.

Drivepoint DP9 was installed in 2014 and is located north-east of the expansion quarry footprint, in the ANSI B buffer lands owned by WAI. DP9 was reported as "dry" during the October and December monitoring events in 2016. The December measurement could be due to frozen conditions and may not be a true "dry" measurement. Water levels at DP9 peaked in the spring of 2016 and then declined into the late summer/fall.

3.2.3.3 REFERENCE WETLANDS

During Phase 1 of quarry extraction, reference wetlands should be established in the Nottawasaga Lookout Provincial Park and/or the Pretty River Provincial Park with input from the Ministry of Natural Resources and Forestry and the Nottawasaga Valley Conservation Authority. Ideally, one reference wetland would be established in each Provincial Park, pending land-owner permission and suitable access. These wetlands will be designated as Reference Wetland 1 and Reference Wetland 2.

These reference wetlands have not yet been established, but will be established during Phase 1 quarry operations.

3.2.3.4 TRIGGER EXCEEDANCES

As per Table 3.2 in the AMP, the trigger period for the wetland water levels is spring and early summer (June/July) as soon as extraction proceeds beyond Phase 1. There are no interim triggers for the wetland water levels. Trigger levels based on wetland vegetation and amphibian habitat will be developed and refined through the Phase 1 extraction period as the monitoring database expands and with input from agency staff.

3.2.3.5 MITIGATION MEASURES UNDERTAKEN

Mitigation measures are not expected to be required in Phase I, since extraction during Phase I is not expected to result in negative impacts to off-site water resources and/or ecological features and functions, given the extraction that historically has occurred in the Existing Quarry.

An overview of the proposed future mitigation measures that may be implemented if necessary, as outlined in the AMP document, is included in Sections 3.2.4.5.1 and 3.2.4.5.1, below.

3.2.3.5.1 ROUTINE WATER MANAGEMENT MEASURES

In addition to the Site Plans, and this AMP, routine water management and mitigation are regulated by approvals under the Ontario Water Resources Act (PTTW No. 7725-AACS54, dated September 22, 2016) and the Environmental Protection Act (ECA No. 1521-A4VJ4X, dated October 17th, 2016). These measures have, to the extent possible, been aligned with the monitoring requirements that exist under the AMP.

Routine water management mitigation measures were not required during the 2016 monitoring period.

The AMP mitigation objectives are based on the release of the required volumes of water to the landscape in the vicinity of the wetlands without negatively affecting the surrounding environment. The initial discharge volumes, if and when required, will be based proportionately on the respective sizes of the surface drainage catchment areas extracted from the respective watersheds (Beaver River or Batteaux Creek), in each Phase.

The proportionate discharge to each wetland feature/watershed can be adjusted, as necessary, based on the results of the AMP Performance Indicator Trigger Monitoring Program. Discharge into the wetlands will be managed by adjusting pumping rates and/or by means of flow restrictor valves in discharge lines, as required. Discharge into individual wetlands will be adjusted as necessary to maintain target hydrographs in each wetland/watercourse.

For more information on the proposed discharge points and designs that will be implemented progressively during the excavation of the Phases of the expansion quarry, please see Section 2.3 of the AMP document.

Routine water management activities are fully expected to maintain quarry operations in compliance with the AMP trigger criteria, and protect the surrounding natural environment and water resources.

In the event that the routine water management activities described above do not fully achieve the objectives of the AMP, contingency mitigation measures will be implemented.

3.2.3.5.2 CONTINGENCY MITIGATION MEASURES

Contingency mitigation measures are available to be implemented by Walker Aggregates when, and if, the AMP monitoring indicates such measures are necessary. As previously noted, the extraction of Phase I of the expansion Quarry is not expected to result in negative impacts to off-site water resources and/or ecological features and functions, given the extraction that historically has occurred in the Existing Quarry. No impacts are predicted during the first 5 years of operations and no contingency mitigation measures are required at this time. Contingency mitigation measures were not required to be implemented during the 2016 monitoring period.

The design of site specific discharge structures, or contingency mitigation measures located outside the area of extraction must be approved by the MNRF and included in the AMP prior to any construction (ARA Site Plan Hydrogeology Note 7E).

Contingency mitigation measures that are available during operations could include and earthen buttress to act as a hydraulic barrier; temporary grouting techniques used locally to reduce hydraulic conductivity; pumping from deeper, cooler water for discharge; modifying the outflow characteristics of surface water from a wetland; recharge injection wells etc. For a full list and detailed explanation of the contingency mitigation measures that could be implemented during operations please reference Section 2.4.1 in the AMP document.

Any potentially necessary contingency mitigation measures for the next 5 years of operation (not expected) and the subsequent 5 year periods will be designed and included in the AMP through the 5-Year Comprehensive Review process. The necessity for contingency mitigation measures will be identified based on the progress of extraction, monitoring results and the PITM program.

3.3 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the 2016 performance indicator trigger monitoring program the following conclusions and recommendations are made:

- Certain deficiencies are apparent with the implementation of the program in 2016, including the flow and temperature interim trigger level values that were adopted for the PITM Escarpment spring and surface water monitoring stations. The performance indicator interim triggers for surface water flow and surface water temperature should be re-evaluated to incorporate the conditions observed in 2016. Those values recorded in 2016 as having exceeded a specific seasonal maximum or minimum interim “trigger” value occurred as a result of atypical climatic conditions, and not as a result of quarry operations in Phase 1. The interim trigger values should be re-evaluated to include the monitoring data obtained in 2016, and modified where appropriate to better reflect existing conditions.
- Higher than normal precipitation in March of 2016 contributed to new maximum flows being recorded at several surface water monitoring stations.
- Lower than normal precipitation in May, June, July and September 2016 resulted in trigger value flow rates being reported at several of the Performance Indicator Trigger monitoring stations. These low-flow values are interpreted to be due to the atypical climate conditions experienced during 2016 and are not related to the active extraction in the

expansion quarry, which began in June 2016. The potential for off-site water-related effects to any of the provincially significant wetlands and/or Escarpment springs during Phase 1 is considered to be very low.

— Higher than normal temperatures in May through November of 2016 contributed to warmer than usual water temperatures recorded at the Escarpment spring and surface water monitoring stations. These warmer temperatures translated to interim trigger value temperatures being recorded at several of the Performance Indicator Trigger monitoring stations. These interim trigger occurrences are interpreted as being reflective of the atypical local climatic conditions throughout the year, and not due to the active extraction in the expansion quarry, which began in June 2016. The potential for off-site water-related effects to any of the provincially significant wetlands and/or Escarpment springs during Phase 1 is considered to be very low.

— During Phase I quarry operations, a reference wetland station is to be established in the Nottawasaga Lookout Provincial Park and/or the Pretty River Provincial Park with input from the MNRF and the Nottawasaga Valley Conservation Authority. Ideally there would be one reference wetland station in each Provincial Park, pending land-owner permission and suitable access. These stations will be designated as Reference Wetland 1 and Reference Wetland 2.

— Temperature readings in the standing water (if present) should be completed as part of the PITM events at the wetland monitoring stations (drive-points). These were not completed in 2016.

4 LONG TERM GROUNDWATER AND SURFACE WATER MONITORING PROGRAM

The Long Term Trend (LTT) groundwater and surface water monitoring program is ongoing for the existing and expansion quarry properties, and a version of this monitoring program will continue through the active life of both quarries through to their final rehabilitation as lakes.

Long term trend monitoring is used to track seasonal and year-over-year natural variations in the groundwater and surface water systems, as well as the progressive response of those systems as the existing quarry winds down and the expansion quarry extraction operation continues over the next 20 to 30 years, followed by several decades of rehabilitation to lakes. The LTT monitoring program will provide data that will update the environmental baseline conditions as new data become available, and identify short-term and long-term climate trends.

4.1 METHODS

The surface water drainage divides and local catchment areas for the Pretty River, Batteaux Creek, Beaver Valley and Mad River systems are illustrated on Figure 3. Monitoring stations that are part of the LTT monitoring program are also illustrated on Figure 3. The long term trend monitoring program includes selected PITM stations, as well as additional groundwater and surface water stations. The surface water and groundwater monitoring stations that are included in the PITM program are integral to this LTT monitoring program, such that monitoring results from those stations are incorporated into the assessment of long term trends.

The LTT monitoring program for the groundwater monitoring stations includes monthly manual groundwater level measurements and a network of pressure transducers that record hourly or twice daily water levels at selected groundwater monitoring wells.

Long term trend monitoring stations are listed, along with a description, in Table 4.1 of the AMP document. The location of the long term trend monitoring stations is presented on Figure 3. A summary of the well information is included in Table C-1 in Appendix C.

Long term trend monitoring stations include groundwater monitoring wells in the following locations:

— Existing quarry: 98-8, 98-9, 98-12 and PW99-1;
— Expansion quarry (injection wells): IW1, IW2, IW3 and IW4;
— Expansion quarry (monitoring wells): BH02-1, BH02-2, BH02-3, Bh02-4, BH02-5 nest, BH02-6, BH03-7 nest, BH03-8, BH08-1, BH08-2, BH08-3, NW1-9, NW10 nest, BH03-9, TW04-1, TW04-2 and TW04-3;
— Osprey quarry property: 101-B, 102-C, 103-D, 104-A, OW1-4, OW3-1 (not accessible), OW5-2 and OW6-3;
— Carmarthen Lake Farms property: CLF1 (not accessible), CLF2, CLF3, CLF4 and CLF5.

On the Osprey property, monitoring well OW1-6 was historically part of the monitoring program on the Osprey Property, but the well was damaged and is no longer accessible for monitoring purposes. Additionally, monitoring well OW3-1 has not been accessible for monitoring since November 2015. The removal of these two wells from the monitoring program does not affect the overall integrity of the program.

There are several private domestic water wells located around the periphery of the predicted drawdown zone of influence of the expansion quarry (Jagger Hims, 2007). Locations of the groundwater supplies are identified on Figure 3 as 'RW' (residential wells). Selected monitoring wells are monitored in the AMP under the Long Term Trend Groundwater and Surface Water Monitoring Program:

— East of existing and expansion quarry: RW1, RW2, RW5, RW6, RW7, RW8, RW16 (owned by WAI), RW18 (owned by WAI, to be removed by extraction) and RW19 (owned by WAI, to be removed by extraction).
— North of expansion quarry: RW3, RW4, RW17
— West of expansion quarry: RW9 (MAQ Aggregates property)

The Long Term Trend monitoring program for residential wells includes the monthly measurement of groundwater levels and the installation of pressure transducers in selected residential wells to record hourly or twice daily groundwater levels. A limited number of residential wells are also sampled annually for general chemistry, major and minor ion constituents, nutrients, total petroleum and hydrocarbons, BTEX, total suspended solids and bacteriological parameters.

Monitoring well RW20, the water supply well for the old quarry office, is listed as part of the Long Term Trend monitoring program in the AMP document. RW20 was removed with extraction activities and is no longer available for monthly groundwater levels.

Additional residential monitoring wells that have historically been part of the monitoring program for the expansion quarry but that are not part of the Long Term Trend monitoring program include RW10, RW11, RW12, RW13, RW14, RW15 and RW20. RW10 and RW11 are residential wells that are no longer included in the monitoring program on the request of the home-owners. RW12 and RW13 are currently included in the monitoring events but are not part of the Long Term Trend monitoring program. RW14 and RW15 are monitoring wells that were historically part of the monitoring network at the existing quarry, but have been decommissioned.

The LTT monitoring program also includes drivepoints that are located in the following wetlands:

— ANSI A: DP6 (vernal pool)
— ANSI B: Bridson DP, DP9
— RR2: DP5 (vernal pool), DP7 (vernal pool), Staff Gauge 1 and Staff Gauge 2 (BH03-7 SG1/ SG2)
— RR3: DP11
— RR6: DP1, DP2, DP4, DP8
— CLF wetland: DP3

The groundwater depth, ponded water depth (where available) and surface water temperature are measured monthly at the drivepoints. The surface water depth is recorded monthly at the staff gauges. Selected drivepoint monitors also have pressure transducers installed which record twice daily groundwater levels.

The surface water monitoring program under the LTT monitoring program includes monthly stream flow and temperature measurements at the surface water monitoring stations, with the exception of station QFSW2, which is measured weekly. Pressure transducers are to be installed at selected surface water stations to record hourly water level stage. Annual water measurement of field chemistry parameters (temperature, pH, conductivity and dissolved oxygen) and water quality sampling also occurs at selected surface water stations.

The LTT surface water monitoring program includes monitoring stations located in the following watersheds:

— The Pretty River tributary system: SW20
— The Batteaux Creek tributary system: SW7, SW8, SW10, SW11E, SW13, SW19, SW21A-C, SW22, SW22A and SW22C
— The Beaver River tributary system: SW3C ('RR3 Out')
— Existing quarry floor: QFSW2 and dewatering sump

The additional surface water stations with data included in this AMP summary report that are not PITM or LTT monitoring stations are the following: SWB-1, QFSW1, SW3A, SW4, SW5, SW6, SW12, SW12A, SW17B, SW21D, SW22B, SW23, SW24, SW24B, SW24C, SW25, SW26, SW26A, and SW27. The data for these additional stations is included in the report to provide context to the monitoring results for 2016 and to provide a historical record of the data collected in support of the Duntroon

Quarry expansion. A description of each surface water monitoring station is provided in Table B-1, Appendix B.

4.2 NEW MONITORS INSTALLED

New groundwater monitoring wells and drivepoints were installed in 2014, as required by the Site Plan for the expansion quarry. The new monitors are noted in the tables above, where applicable.

The details of the monitor installation and packer testing at the new groundwater monitoring wells will be submitted in the future under separate cover.

4.3 MONITORING RESULTS

4.3.1 GROUNDWATER LEVELS

4.3.1.1 SEASONAL VARIATION

Typically, groundwater levels achieve seasonal high elevations in the spring following the snow-melt and then progressively decline throughout the summer months due to higher evapotranspiration (ET) rates. In the fall, the balance between precipitation rates and lower evapotranspiration rates can result in a rise in groundwater levels. In the winter months, when precipitation is bound up in the snow pack and the shallow ground surface is frozen, groundwater levels tend to decline until the spring snow-melt, when the cycle repeats.

The magnitude of seasonal variation is generally the greatest at the topographically high groundwater recharge areas, with less seasonal variation occurring in the topographically lower lying lands and adjacent to surface water courses and/or lakes that serve as groundwater discharge areas.

4.3.1.1.1 WETLANDS

Wetland water levels showed the effects of seasonal variation to different degrees. The atypically dry and warm climate conditions in 2016 contributed to a slower than typical recovery of water levels in the fall. Wetland water levels are discussed in more detail in section 3.2.3, above.

4.3.1.1.2 BEDROCK

Groundwater monitoring wells in the long term trend monitoring network showed a varying degree of influence due to seasonal climate conditions. The atypically dry and warm climate conditions in 2016 contributed to a slower than normal recovery of groundwater levels in the fall. The seasonal variation of groundwater levels in the bedrock is discussed in more detail in the following section, where it applies to selected monitors.

4.3.1.2 EXISTING QUARRY PROPERTY

The following table outlines the observations made in 2016 at the groundwater monitoring wells that are part of the Long Term Trend groundwater monitoring network on the Existing Quarry property.

Table 7- Existing Quarry - Results

Monitoring Station	Observations in 2016	Figure
98-8	Stable water levels throughout 2016. Water levels have gradually increased at monitoring well 98-8 over time with the operation of the main reservoir at the west end of the Existing Quarry.	C-2
98-9	Water levels show seasonal fluctuations comparable to previous monitoring years. Water levels in 2016 may be showing influence from the tunnel construction.	C-3
98-12	Water levels at 98-12 have been relatively stable since 2008.	C-4
PW99-1	Stable water levels throughout 2016. The operation of the main reservoir helps to buffer water levels at PW99-1.	C-5

Monitoring data from groundwater monitoring well MW6 (Figure C-1) has also been included in Appendix C to supplement the AMP data set, although this monitor is not included in the LTT monitoring program.

A majority of the historical groundwater monitors on the Existing Quarry property have been removed as part of aggregate extraction activities. The groundwater hydrographs for monitoring wells that were not accessed in 2016 have not been included in this report. These include monitoring wells RW14, RW15 and RW20, which, respectively, are a decommissioned old hand pump well, a decommissioned residential well and the former quarry office supply well which was removed with extraction activities at the Existing Quarry.

4.3.1.3 OSPREY QUARRY PROPERTY

The following table summarizes the observations made in 2016 at the groundwater monitoring wells that are part of the Long Term Trend groundwater monitoring network on the Osprey Property.

Groundwater monitoring well OW1-6 has been destroyed and there were no groundwater levels recorded at this monitor in 2016. Groundwater monitoring well OW3-1 has not been accessible for monitoring since November 2015. Removal of these two monitoring wells does not affect the integrity of the overall program. A groundwater hydrograph with data up until November 2015 has been provided in Appendix C.

Table 8- Osprey Quarry - Results

Monitoring Station	Observations in 2016	Figure
101-B	Water levels within previously recorded seasonal variations. Slower than average recovery of water levels in the fall.	C-35
102-C	Water levels within previously recorded seasonal variations.	C-36
103-D	Water levels within previously recorded seasonal variations.	C-37
104-A	Water levels declining after September 2016, but are still higher than all-time lowest water levels recorded in October and November 2004.	C-38
OW1-4	Water levels within previously recorded seasonal variations.	C-39
OW3-1	No water level data recorded in 2016.	C-40

Monitoring Station	Observations in 2016	Figure
OW5-2	Water levels within previously recorded seasonal variations. Slower than average recovery of water levels in the fall.	C-41
OW6-3	Water levels within previously recorded seasonal variations.	C-42

Groundwater levels on the Osprey Property in 2016 were generally within previously recorded seasonal variations. Slower than usual recovery of water levels in the fall months was noted in two locations, which is attributed to the atypically dry summer and the consequent absence of a water surplus in the fall months. Under normal climate conditions (30 Year Normal at Shanty Bay Climatological Station), it is calculated that the water surplus returns in September and increases through to December (Figure A-2, Appendix A). In 2016, the calculated water surplus does not return until December (Shanty Bay climate station).

4.3.1.4 EXPANSION QUARRY PROPERTY

The following tables summarize the observations made in 2016 at the groundwater monitoring wells that are part of the Long Term Trend groundwater monitoring network on the expansion quarry property.

Table 9- Expansion Quarry Injection Wells – Results

Monitoring Station	Observations in 2016	Figure
IW1	Peak water level observed in March 2016. Lowest water level in December 2016. Over 10 m difference between peak and low water level elevations.	C-6
IW2	Peak water level in March 2016. Lowest water level recorded in October 2016.	C-7
IW3	Peak water level observed in March 2016. Lowest water level in October 2016. Over 10 m difference between peak and low water level elevations.	C-8
IW4	Peak water level observed in March 2016. Water levels show fluctuations related to seasonal climate variation over the course of 2016.	C-9

Water levels at the injection wells show fluctuations related to seasonal climate variation over the course of 2016. Due to the limited period of record for the injection wells (<2 years), further monitoring is required before more conclusions can be reached with respect to long term trends at these wells.

Table 10- Expansion Quarry Monitoring Wells - Results

Monitoring Station	Observations in 2016	Figure
BH02-1	Overall declining trend in water levels from 2003 to present.	C-10
BH02-2	Water levels declining after August 2016.	C-11
BH02-3	Water levels within previously recorded seasonal variations. Monitor is reported as dry from June through December 2016.	C-12
BH02-4	Water levels declining after August 2016.	C-13
BH02-5 nest	Water levels within previously recorded seasonal variations.	C-14

Monitoring Station	Observations in 2016	Figure
BH02-6	Water levels declining since October 2015. Monitor is immediately adjacent to the sinking cut made for tunnel construction.	C-15
BH03-7 nest	Water levels within previously recorded seasonal variations.	C-16
BH03-8	Water levels declining after August 2016.	C-17
BH08-1	New minimum water level recorded in October 2016.	C-18
BH08-2	New minimum water level recorded in November 2016.	C-19
BH08-3	New minimum water level recorded in October 2016.	C-20
NW1	Water levels declining after July 2016.	C-21
NW2	Peak water level recorded in April 2016. Water levels declining after September 2016.	C-22
NW3	Peak water level recorded in March 2016. Water levels declining after August 2016.	C-23
NW4	Water levels declining after July 2016.	C-24
NW5	Water levels declining after August 2016.	C-25
NW6	Water levels declining after August 2016.	C-26
NW7	Water levels declining after July 2016.	C-27
NW8	Water levels declining after August 2016.	C-28
NW9	Water levels declining after July 2016.	C-29
NW10 nest	DP water levels remain relatively constant. NW10 shallow and deep monitoring well water levels show variation due to seasonal climactic influence.	C-30
BH03-9	Water levels within previously recorded seasonal variations.	C-31
TW04-1	Water levels declining after August 2016.	C-32
TW04-2	Water levels declining after August 2016.	C-33
TW04-3	Water levels declining after August 2016.	C-34

Groundwater levels on the expansion quarry property in 2016 are showing the influence of the atypically dry summer, as well as influence at some locations from the tunnel excavation and aggregate extraction activities. The influence of the tunnel excavation and aggregate extraction activities are limited to local influence at monitoring wells BH02-6 (immediately next to the tunnel excavation) and BH02-4, BH02-1, NW1 and NW4 which are in close proximity to the active aggregate extraction area. The influence of the quarry activities on the groundwater levels at those wells that are in in the footprint of Phase I and in the vicinity of the current extraction activities was anticipated.

Groundwater levels at the monitors on the expansion quarry property will continue to be monitored as part of the Long Term Trend monitoring program.

4.3.1.5 CARMARTHEN LAKE FARM PROPERTIES

The following table summarizes the observations made in 2016 at the groundwater monitoring wells that are part of the Long Term Trend groundwater monitoring network on the Carmarthen Lake Farms property.

As noted previously, monitoring well CLF1 is no longer accessible to obtain water levels. The water levels at CLF2, which is in close proximity to CLF1, have historically shown similar trends to the water levels at CLF1. The historical groundwater hydrograph for CLF1 is included in Appendix C as Figure C-43.

Table 11- Carmarthen Lake Farm Properties - Results

Monitoring Station	Observations in 2016	Figure
CLF2	Water levels within previously recorded seasonal variations.	C-44
CLF3	Water levels within previously recorded seasonal variations.	C-45
CLF4	Water levels within previously recorded seasonal variations. Slower than average recovery of water levels in the fall.	C-46
CLF5	Water levels within previously recorded seasonal variations. Slower than average recovery of water levels in the fall.	C-47

4.3.1.6 RESIDENTIAL WELLS

Table 12- Residential Wells - Results

Monitoring Station	Observations in 2016	Figure
RW1	New minimum water level recorded in November 2016.	C-48
RW2	New maximum water levels recorded in January and March 2016. Remaining 2016 water levels within previously recorded seasonal variations.	C-49
RW3	Water levels within previously recorded seasonal variations.	C-50
RW4	Water levels within previously recorded seasonal variations.	C-51
RW5	Water levels within previously recorded seasonal variations. Slower than average recovery of water levels in the fall.	C-52
RW6	Water levels within previously recorded seasonal variations. Slower than average recovery of water levels in the fall.	C-53
RW7	Water levels within previously recorded seasonal variations. Slower than average recovery of water levels in the fall.	C-54

Monitoring Station	Observations in 2016	Figure
RW8	RW8 is located on a local topographical high north of the existing and expansion quarries and outside of their influence. The water level at RW8 did not recover in October and November of 2016, reflecting the atypically dry summer conditions.	C-55
RW9	RW9 is located on the CBM quarry property and has not been accessed for monitoring since September 2014.	C-56
RW16 (Bridson)	New minimum water level recorded in August 2016. Water levels are slow to recover in the fall.	C-59
RW17 (owned by WAI)	New minimum water level recorded in October 2016. Water levels are slow to recover in the fall.	C-60
RW18 (owned by WAI)	For the first half of 2016 the water levels are within previously recorded seasonal variations. Well has been reported as "dry" since August 2016. Typically water levels recover by September or October.	C-61
RW19 (owned by WAI)	New minimum water level recorded in October 2016. Well will be removed by extraction	C-62

Residential wells that are currently monitored but that are not part of the Long Term Trend monitoring program include: RW12 (Figure C-57) and RW13 (Figure C-58). Groundwater hydrographs for these residential wells, as indicated in parenthesis, have been included to supplement the 2016 AMP summary report.

Residential wells that were historically part of the monitoring program at the Duntroon Quarry but are no longer currently monitored include: RW10, RW11 (drilled and dug), RW14, RW15 and RW20. These wells are not included in the 2016 AMP Summary Report.

New minimum groundwater levels were reported at four of the residential wells in late summer/early fall of 2016. These minimum water levels are attributed to the atypically dry and warm climate conditions in 2016. These climate conditions did not allow for the typical seasonal recovery of groundwater levels in the fall; water levels were slow to recover from the dry summer and new minimums were recorded. A new maximum water level was also reported at RW2 during the spring snow-melt period.

4.3.1.7 DRIVEPOINTS

A majority of the drivepoint monitors are included in the PITM program and have already been discussed. Drivepoints that are exclusively part of the Long Term Trend monitoring program include DP1, DP3 DP11 and the staff gauges at BH03-7.

Table 13- Drivepoint Monitoring - Results

Monitoring Station	Observations in 2016	Figure
DP1	Water levels within previously recorded seasonal variations. Summer water levels reported at higher than usual elevation in 2016.	C-63
DP3	Water levels within previously recorded seasonal variations.	C-65
DP11	Monitored by Highland Quarry	N/A
BH03-7 SG1 / SG2	Minimal staff gauge readings (multiple records of station being "dry" or "buried in snow")	C-74

Water levels at the drivepoints that are exclusively monitored under the Long Term Trend monitoring program were within previously recorded seasonal variations. DP11 is monitored under the joint monitoring agreement that WAI holds with the owner of the adjacent quarry (MAQ Highland Quarry).

The staff gauges at BH03-7 are monitored on a monthly frequency, as outlined in the AMP, but there is minimal water elevation data due to the stations being reported as "dry" or "buried in snow".

Drivepoint water elevation data is presented in Table C-8 in Appendix C.

4.3.1.8 GROUNDWATER CONFIGURATION

The borehole monitors and the residential water wells are constructed as open-holes that extend into and sometimes through the dolostone rock strata of the Amabel Formation and the Fossil Hill Formation. The exceptions are BH03-7-I, BH03-7-II, BH02-5 (mid) and NW10 (mid) on the expansion lands which are shallow monitoring wells. For more information on each monitoring well, please see Table C-1, Appendix C.

In the open-hole monitors, the overburden soil, where present, is cased off with metal casing that is seated into the buried surface of the rock. The water levels that are obtained in the monitors and water wells provide a general measure of the water table and groundwater conditions through the rock column, rather than the piezometric pressure head at a specific elevation within the rock mass that would be provided by a monitor that is screened across a specific horizon in the borehole. Since the open holes extend above and below the groundwater table, the water levels in the holes represent general water table conditions within the rock.

Groundwater level elevations at the monitors were contoured for April 2015 (Figure 4), October 2015 (Figure 5), April 2016 (Figure 6) and October 2016 (Figure 7). April contours represent spring conditions and October contours represent fall conditions. The groundwater contours are presented to illustrate the local groundwater configuration and general flow directions within the Amabel aquifer. These figures illustrate that the groundwater configuration and flow pattern remain generally the same regardless of the change in water levels associated with seasonal climatic conditions.

The interpreted groundwater configuration beneath the expansion quarry exhibits an elliptical radial pattern that is centred upon the areas of higher ground formed by local bedrock hills. A groundwater divide is present in the expansion lands. The groundwater movement beneath the eastern section of the quarry expansion lands is towards the Escarpment and generally to the Batteaux Creek sub-catchment. Beneath the western part of the quarry expansion lands, the groundwater movement is to the north, generally towards the Pretty River sub-catchment, and to the west, contributing to the Beaver River sub-catchment. A southerly component of groundwater flow towards the existing quarry is also present in the vicinity of BH02-6. The presence of the tunnel beneath County Road 91 and the small extraction area in the expansion quarry (floor elevation approximately 501 m ASL) lowers the groundwater levels in the rock adjacent to the extraction area.

South of the existing quarry, groundwater movement is interpreted to be radially away from the higher ground and towards Edward Lake. Edward Lake is interpreted to be a local groundwater discharge area, as well as a collection area for local surface water run-off.

4.3.1.9 QUANTIFICATION OF DRAWDOWN INFLUENCE ZONE

In order to estimate the magnitude and the lateral extent of the zone of influence, and the distance drawdown effects of the existing quarry, expansion quarry and the MAQ Highland Quarry on the local groundwater system, the historical and recent groundwater level data obtained from the long term trend groundwater monitoring network have been evaluated.

Figure 8 provides a summary of the distance-drawdown relationships obtained at individual monitoring well locations. The figure illustrates a lower boundary influence envelope and an upper boundary influence envelope which identify the interpreted minimum and maximum extent of the distance-drawdown relationship.

4.3.1.9.1 EXISTING QUARRY

Within the extraction area of the existing quarry there has been a progressive drawdown influence of 12 m to 20 m on the local water table. As the size of the extracted area has increased, so has the zone of influence of the existing quarry on the local groundwater system. The magnitude of the drawdown influence is greatest within the extraction area at the existing quarry, and decreases relatively quickly with distance away from the extraction faces. The magnitude and lateral extent of the drawdown zone of influence is also variable around the quarry due to the variable hydraulic conductivity in the rock mass.

4.3.1.9.2 EXPANSION QUARRY

Select monitors on the expansion lands have shown influence from tunnel construction and extraction activities that were initiated in 2016. Groundwater monitors BH02-6, BH02-1 and BH02-4 have been included on Figure 8 with updated distance-drawdown co-ordinates for 2016. These monitoring wells are all located on property owned by WAI and the draw-down effects at these on-site monitors was anticipated. BH02-4 is showing approximately 3 m of drawdown at a distance of approximately 250 m from the quarry face.

4.3.1.9.3 MAQ HIGHLAND QUARRY

The distance-drawdown effects of the MAQ Highland Quarry on the groundwater monitors on the expansion lands is still being developed. The groundwater monitoring wells along the south-west corner of the expansion property were showing a slower than usual recovery in the fall of 2016 and the water level had not recovered to typical winter elevations by the end of 2016. Further investigation of the groundwater levels at NW9 and TW03-1, 2 and 3 is warranted as data are collected in 2017.

4.3.1.10 GROUNDWATER QUALITY

Annual sampling for the following parameters is required under the Long Term Trend Monitoring Program for two selected residential wells, RW1 and RW2:

- General chemistry,
- Major and minor ion constituents and nutrients,
- Total petroleum hydrocarbons and BTEX,
- Total suspended solids, and
- Bacteriological (E.coli, total coliform, heterotrophic plate count).

The samples from the groundwater monitoring locations were obtained from the two residential properties adjacent (RW1) and downgradient (RW2) from the existing and expansion properties on October 24th, 2016. The samples were collected from outside taps at each property to try and bypass the water treatment systems. Field chemistry parameters (temperature, pH, conductivity and dissolved oxygen) were recorded at the time of sampling and observations on the appearance of the sampled groundwater were noted. Water quality samples were placed in a cooler with loose ice and shipped to an accredited laboratory for analysis (Caduceon Laboratories). The groundwater quality results are presented in Table C-9, Appendix C.

The analytical results from the groundwater quality sampling are compared to the Ontario Drinking Water Quality Standards, Objectives and Guidelines (ODWQS, June 2006) and meet this guideline, with the exception of the following:

— The total coliform counts in the samples obtained from RW1 and RW2 were elevated compared to the ODWQS. The home-owners were notified by phone once the sample results were received from the lab. These results are attributed to sampling conditions and the well water is not expected to be compromised.
— Sodium and hardness in the samples obtained from RW1 and RW2 do not meet the aesthetic or operating guideline ranges specified in the ODWQS. Sodium has an aesthetic objective of 200 mg/L and a suggested maximum concentration of 20 mg/L under the ODWQS. Hardness has an operating guideline range of 80-100 mg/L indicated in the ODWQS. In the case of RW1, it is expected that the outside tap that was used to collect the water sample is not completely isolated from the water treatment system and that the sampled water has been softened (sodium 159 mg/L and hardness <1 mg/L). The water quality at RW2 is interpreted to be representative of local groundwater quality, which is naturally hard (sodium 144 mg/L and hardness 348 mg/L).
— The colour measurement at RW2 was 7 TCU (true colour units), which is higher than the ODWQS aesthetic objective of 5 TCU.

The concentration of hardness is an operational guideline and is not health related. Operational guidelines are established for parameters that, if not controlled, may negatively affect the efficient and effective treatment, disinfection and distribution of the water.

The concentration of sodium at RW1 (159 mg/L) and RW2 (144 mg/L) is higher than the maximum suggested concentration of 20 mg/L. These results are expected to be due to the water softening process (RW1) and naturally occurring groundwater quality (RW2). Sodium is not toxic. Consumption of sodium in excess of 10 grams per day by healthy adults does not result in any apparent adverse health effects. In addition, the average intake of sodium from water is only a small fraction of that consumed in a normal diet. A maximum acceptable concentration for sodium in drinking water has, therefore, not been specified. Persons suffering from hypertension or congestive heart disease may require a sodium-restricted diet, in which case, the intake of sodium from drinking water could become significant. Public drinking water systems are required to sample for sodium on a regular basis and report to the Medical Officer of Health when sodium levels exceed 20 mg/L, so that this information may be passed on to local physicians.

The aesthetic objective for colour in drinking water is 5 TCU. Colour may be contributed to by iron and manganese compounds produced by processes occurring in natural sediments or in aquifers. Colour is an aesthetic objective and is not health related.

WSP recognizes the possibility that the water sampled from the outside tap at RW1 was not representative of raw water quality due to the following reasons:

— Temperature of the water sampled was elevated (19.1°C) compared to the expected temperature of groundwater (5-8° C).
— The hardness was low.
— The sodium concentration was elevated.

Residential well sampling at RW1 and RW2 will be completed annually as part of the Long Term Trend monitoring program under the AMP.

4.3.2 SURFACE WATER SETTING

4.3.2.1 SURFACE WATER CHARACTERISTICS

The following sections outline the observations and monitoring results collected in 2016 at the surface water stations that are included in the Long Term Trend monitoring program. Several of these stations are also included in the Performance Indicator Trigger monitoring program, and have been discussed previously in this report.

This section provides an overview of the trends observed at each LTT surface water station in 2016. Long term data are available for selected surface water stations. Where data are available, it has been included for discussion and to provide context to the 2016 results.

Surface water monitoring data are presented in Appendix B, which includes: surface water hydrographs, field chemistry parameters and laboratory analysis results.

4.3.3 SURFACE WATER MONITORING STATIONS

Table 14- Surface Water Monitoring - Results

Monitoring Station	Observations in 2016	Figure
QFSW2 & Dewatering Sump(s)	Flows are within previously recorded seasonal variations. QFSW2 flows into the main sump (Sump 1). Excess water from the expansion quarry is being directed to the sumps in the existing quarry.	B-6
SW7	Flows are within previously recorded seasonal variations.	B-13
SW8	Flows are within previously recorded seasonal variations.	B-14
SW10	Flows are within previously recorded seasonal variations.	B-16
SW11E	Flows are within previously recorded seasonal variations. The average summer flow rate in 2016 is down to 1.5 L/s from 10.9 L/s in 2015 (which was a higher than average rate). The 2016 average summer flow rate is more typical of this station (see Table B-4).	B-22
SW13	A new maximum flow rate was recorded at SW13 in March 2016 (166.1 L/s). The flow rate was taken slightly downstream of the culverts due to irregular flow from the culverts (gushing).	B-25
SW19	Flows are within previously recorded seasonal variations. The peak flow rate (March 2016) was not measured due to unsafe conditions in the stream flow channel.	B-33
SW20	Flows are within previously recorded seasonal variations.	B-34

Monitoring Station	Observations in 2016	Figure
SW21	Flows are within previously recorded seasonal variations. SW21 is the flow out of an on-line pond on private property. The flow out of the pond is controlled with a valve. There is occasionally natural overflow from the pond to the downstream channel during spring melt conditions.	B-35
SW21A	Flows are within previously recorded seasonal variations.	B-36
SW21B	Flows are within previously recorded seasonal variations.	B-37
SW21C	Flows are within previously recorded seasonal variations.	B-38
SW22	Flows are within previously recorded seasonal variations.	B-40
SW22A	A new maximum flow rate was recorded at SW22A in March 2016 (11.9 L/s).	B-41
SW22C	A new maximum flow rate was recorded at SW22A in March 2016 (29.5 L/s).	B-43
SW3C ('RR3 OUT')	Monitoring at SW3C was initiated in 2015. 2016 is the first full year of monitoring surface water flows and temperature at this station.	B-54

Additional surface water monitoring data are presented for surface water stations: SWB-1, QFSW1, SW3A, SW4, SW5, SW6, SW12, SW12A, SW17B, SW21D, SW22B, SW23, SW24, SW24B, SW24C, SW25, SW26, SW26A, and SW27 in Appendix B. These stations are included in the report because, in most cases, they provide context for the results obtained at the Long Term Trend surface water stations. For example, SW24A is a seep channel flow that, together with the flow at SW24B, flows into the channel measured at SW24C before entering a pond. SW24 also flows into the same pond.

Table B-4 in Appendix B summarizes the high, low and seasonal flows for all of the surface water stations (PITM and LTT), for 2016 and, where available, includes historical data.

Table B-5, Appendix B, tabulates the field chemistry parameters that were collected during each stream flow monitoring event in 2016, and, where available, includes historical data.

Overall, the results of the Long Term Trend monitoring program in 2016 fit within previously measured results for both surface water flow and water temperature. Several new maximum flow rates were reported at LTT surface water monitoring stations, coinciding with the snow melt and atypically high precipitation in the spring (March 2016). Please see Figure A-2 for the monthly precipitation and water balance calculated for 2016 compared to the 30 year normal.

Surface water flow and temperature in the summer and fall of 2016 reflect the atypically dry and warm climate during that period, as reflected in the climate data when compared to the 30 year climate normal (see Appendix A for climate data).

4.3.3.1 BEAVER RIVER SUBCATCHMENT

The Beaver River Tributary North is an intermittent watercourse in the vicinity of the expansion quarry property. The Beaver River Tributary South is a perennial watercourse downstream (west) of Grey County Road 31. Flows to the Beaver River north and south tributary systems are continued through maintenance of wetland hydrology and associated discharge flow from Rob Roy Swamp PSW Complex units RR2 and RR6, respectively, including the pumping of excess quarry water during quarry operation and in the future by rehabilitation lake overflow (expansion quarry and existing quarry, respectively) after quarry closure.

The Beaver River sub-catchment is identified on Figure 3.

4.3.3.2 BATTEAUX CREEK SUBCATCHMENT

Tributaries of the Batteaux Creek that arise from springs below the Escarpment brow also support fisheries within approximately 1 km of their emergence (i.e. 1800 m to 2000 m southeast of the approved expansion quarry extraction area). Constructed online ponds and a golf course occur between the springs and the main areas of known fish habitat. Spatial separation and the presence of online ponds, including water withdrawal for irrigation occurring from the Batteaux Creek on-line ponds at the golf course, limit any potential impact of minor changes to flows from these springs on downstream fish habitat arising from quarry operations.

The Batteaux Creek sub-catchment is identified on Figure 3.

4.3.3.3 PRETTY RIVER SUBCATCHMENT

The lands between the quarry extraction area and the brow of the Escarpment continue to receive direct precipitation that contributes a substantial part of the recharge to the groundwater system in the dolostone aquifer that sustains local water supplies at residential wells and the seasonal flows at the Escarpment springs. This will continue throughout the extraction period and through to final rehabilitation.

Tributaries of the Pretty River that arise from springs below the Escarpment brow support fisheries within 300 m to 500 m of their emergence (approximately 1300 m to 1500 m northeast of the approved expansion quarry extraction area). A constructed pond occurs between some of the springs and the fish habitat in the Pretty River system.

The Pretty River sub-catchment is identified on Figure 3.

4.3.3.4 MAD RIVER SUBCATCHMENT

The Mad River sub-catchment is located south of the existing quarry and is identified on Figure 3. The Mad River sub-catchment does not overlap the expansion quarry property.

4.3.4 SURFACE WATER QUALITY

4.3.4.1 DEWATERING SUMPS

Surface water stations QFSW2 and the Dewatering Sump (Sump 1 and Sump 2, proposed Sump 3) are sampled quarterly for water quality. In 2016, the sampling for QFSW2 was included as the results for Sump 1 (QFSW2 flows into Sump 1). Sump 3 is planned for the quarry floor in the expansion quarry and will be included in the water quality sampling program when it is completed.

Field parameters are collected during the sampling event and are recorded in the dedicated project field book. Surface water quality samples are collected in dedicated, pre-labelled containers, placed in coolers filled with loose ice and then shipped to an accredited laboratory for the following analysis:

- General chemistry,
- Major and minor ion constituents and nutrients,
- Total petroleum hydrocarbons and BTEX,
- Total suspended solids, and
- Bacteriological (E.coli, total coliform, heterotrophic plate count).

Water quality samples were obtained from Sump 1 and Sump 2, in the Existing Quarry, on March 23rd, May 25th, August 10th and October 18th, 2016. Duplicates were collected at Sump 1 in March and May and at Sump 2 in August and October. The results of the quarterly water quality sampling at the dewatering sumps are included in Table B-6, Appendix B.

The water quality samples obtained in the first, second, third and fourth quarter at Sump 1 and Sump 2 met the Provincial Water Quality Objectives, with the exception of the field pH measured at both Sump 1 and Sump 2 during the August 2016 monitoring event (8.8 and 8.6, respectively).

The relative percent difference (RPD) was calculated for the duplicate results taken during each monitoring event. The RPD was within 20% for a majority of the parameters, with the exception of the following parameters in one or more of the sampling events: total coliform, *E.coli*, colour, total kjeldahl nitrogen, total suspended solids, ammonia, aluminum, antimony, iron, lead, manganese and selenium. Surface water sampling does not include filtering during the sampling for metals, which can influence the water chemistry results. Neither the Sump nor the DUP results exceeded the PWQO values over the course of the 2016 sampling events. Based on the RPD values, certain parameters must be interpreted with caution, but the majority of the water quality results are considered acceptable in terms of quality assurance and controls. Neither the original nor the duplicate results exceeded the PWQO values.

Bacteriological results for the water quality analysis at Sump 1 and Sump 2 in July, March and August indicate that there were total coliform and E.coli bacteria present in the dewatering sumps. The bacteriological results for total coliform and E. coli in the samples obtained from Sump 1 and Sump 2 in October are reported as “NDOGT” (no data overgrown with target) which indicates that the bacterial plate used for this analysis was overgrown. The presence of bacteriological parameters in the sumps is expected, since the sumps exist as surface water ponds in the bottom of the existing quarry and as such are subject to surface water runoff from the quarry floor and are subject to use as temporary waypoints for waterfowl. There is no specific objective for bacteriological parameters under the PWQO.

The water sampled from the dewatering sumps on the Existing Quarry floor has hardness concentrations ranging from 120 – 236 mg/L, which is expected since a portion of the water collected in the sumps is from groundwater inflow to the quarry floor. The quarry floor in the Existing Quarry is excavated to a level that is below the local groundwater table. The lower range of hardness, which is reported in samples collected from Sump 1 and Sump 2, as well as the duplicate sample, in October 2016 could indicate an influx of rainwater and surface water runoff into the sumps, after a precipitation event. Rainwater is naturally soft and would reduce the natural hardness of the water in the sumps.

4.3.4.2 SURFACE WATER STATIONS

The AMP monitoring program stipulates that annual sampling be completed at the Escarpment springs and the surface water monitoring stations as listed in Tables 3.3 and 4.2 of the AMP document. The samples are to be analyzed for the following list of parameters:

— General chemistry,
— Major and minor ion constituents and nutrients,
— Total petroleum hydrocarbons and BTEX and
— Total suspended solids.

The following Escarpment spring monitoring stations SW10, SW11A, SW11B, SW11C, SW11D, SW11E and SW21C also require laboratory analysis for bacteriological parameters (E.coli, total coliform, heterotrophic plate count).

Samples are to be obtained using standard surface water sampling procedures and then sent to an accredited laboratory for analysis.

The annual water quality sampling event was completed for the surface water monitoring stations on October 24-25th, 2016. Several stations were reported as ‘dry’ during the October sampling event and a third attempt to obtain surface water samples was made during the November monthly monitoring event (November 16th, 2016). Samples were not obtained at SW3, SW3B (RR3 Karst), SW9 or SW11A due to the stations being dry during the October and November sampling events.

The surface water samples were obtained using standard surface water sampling procedures. Duplicate samples were obtained at SW6 and SW18. Field chemistry parameters (temperature, pH, conductivity and dissolved oxygen) were recorded at the time of sampling and observations on the flow volume and appearance of the surface water station were noted. Water quality samples were placed in a cooler with loose ice and shipped to an accredited laboratory for analysis (Caduceon Laboratories).

The relative percent difference (RPD) was calculated for the duplicate results obtained at SW6 and SW18. The RPD was within 20% for a majority of the parameters with the exception of colour, total suspended solids, ammonia, phosphorus, aluminum, arsenic, iron, lead and manganese. Surface water sampling does not include field filtering of the sampled water, which can influence the water chemistry results. Neither the original nor the duplicate results exceeded the PWQO values. Based on the RPD values, certain parameters are interpreted with caution; however, the majority of the water quality results are considered acceptable in terms of quality assurance and controls.

Surface water quality analytical results are compared to the Provincial Water Quality Objectives (PWQO, July 1994). The water quality samples obtained in the fourth quarter at the designated surface water stations met the PWQO with the exception of the following:

— The concentration of iron in the samples obtained at SW10, SW11, SW11B, SW16 and SW77 are elevated compared to the PWQO for iron (0.3 mg/L).

Iron is naturally occurring in the groundwater in the vicinity of the Duntroon Quarry. The PWQO for iron is an aesthetic objective and is not health related.

4.4 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the 2016 long term trend monitoring program the following conclusions and recommendations are made:

— Lower than normal precipitation in May, June, July and September of 2016 contributed to a slower than average seasonal recovery of groundwater levels, which typically is expected in the late fall/early winter.

— Localized drawdown effects are occurring at groundwater monitors BH02-6, BH02-4 and BH02-1 and potentially NW4 and NW1. Localized drawdown within the expansion quarry property was anticipated.

— Quarterly sampling at QFSW2 should be completed in addition to the quarterly water quality sampling at the dewatering sumps.

5 LONG TERM TREND ECOLOGICAL MONITORING PROGRAM

5.1 METHODS

The long term trend ecological monitoring program is used to supplement the information from the long term trend groundwater and surface water monitoring program with information about the health and functioning of the natural heritage features in the vicinity of the expansion quarry.

The long term trend ecological monitoring program has established Phase 1 baseline monitoring as part of the quarry start-up, which includes the time period from start-up to three years (June 2016 through to June 2019).

5.2 CONCLUSIONS AND RECOMMENDATIONS

No further action is currently required for the long term trend ecological monitoring program.

6 ECOLOGICAL ENHANCEMENT AND MITIGATION MONITORING PROGRAM

6.1 METHODS

The ecological enhancement and mitigation measures monitoring (EEMM) program includes mitigation and enhancement measures not directly related to day to day operation of the quarry. The EEMM program is designed to make sure the ecological mitigation measures are properly implemented (e.g. appropriate number and species of trees are planted, amphibian habitat is self-sustaining) and that the resulting features are managed and adapted with changing conditions and trends (e.g. replanting for dead trees, controlling pest damage, control / allowing public access, etc.)

The EEMM program includes the Woodland Program, the Millar Pond relocation, the Bridson Pond enhancement and Butternut tree plantings incorporated into the Woodland Program.

The Woodland Program has been initiated. The remaining EEMM tasks required no action in 2016.

6.1.1 WOODLAND PROGRAM

The Woodland Program was initiated in 2015 in order to mitigate the impacts of woodland removal associated with later phases.

The current Reforestation Planting Plan and planting quantities table are included in Appendix E. These documents track what species of tree have been planted to date and identifies which areas have been planted in what year.

7 OPERATIONS IMPROVEMENT WORKSHOP FOR 2016

There was no operations improvement workshop completed in 2016. Aggregate extraction in the expansion quarry began in late June 2016.

As part of its commitment to working with the community, Walker Aggregates will hold an Annual Operations Improvement Workshop for neighbours and other interested stakeholders in 2017. The 2016 AMP Summary Report will be an agenda item at the Workshop.

8 SUMMARY CONCLUSIONS AND RECOMMENDATIONS

Based on our review of the monitoring data collected to support the Adaptive Management Plan groundwater and surface water monitoring program in 2016, we offer the following conclusions:

- The Adaptive Management Plan Performance Indicator Trigger Monitoring program and the Long Term Trend groundwater and surface water monitoring program was completed in 2016.
- The operational plan is being implemented as designed.
- Higher than normal precipitation in March of 2016 contributed to new maximum flows being recorded at several surface water monitoring stations.
- Lower than normal precipitation in May, June, July and September 2016 resulted in a slower than normal seasonal recovery of groundwater levels at several groundwater monitoring wells, which is typically expected in the late fall/early winter. The slow recovery of water levels to previously recorded typical "fall" elevations was also noted at RW8, which is a residential well located on a local topographical high that is isolated from potential influence from the Duntroon Quarries.
- Lower than normal precipitation in May, June, July and September 2016 resulted in interim trigger value flow rates being reported at several of the Performance Indicator Trigger monitoring stations. These triggers are not considered to be related to the active extraction in the expansion quarry, which began in June 2016. The potential for off-site water-related effects to any of the provincially significant wetlands and/or Escarpment springs during Phase I is considered to be very low.
- Higher than normal temperatures in May through November of 2016 contributed to warmer than usual water temperatures recorded at the Escarpment spring and surface water monitoring stations. These warmer temperatures translated to interim trigger value temperatures being recorded at several of the Performance Indicator Trigger monitoring stations. These interim trigger occurrences are interpreted as being reflective of local climatic conditions throughout the year, and not due to the active extraction in the expansion quarry, which began in June 2016. The potential for off-site water-related effects to any of the provincially significant wetlands and/or Escarpment springs during Phase 1 is considered to be very low.

Based on our review of the monitoring data collected to support the Adaptive Management Plan groundwater and surface water monitoring program in 2016, we offer the following recommendations:

- Certain deficiencies are apparent with the implementation of the program in 2016, including the flow and temperature interim trigger level values that were adopted for the PITM Escarpment spring and surface water monitoring stations. The performance indicator triggers for surface water flow and surface water temperature should be re-evaluated to incorporate the conditions observed in 2016. Those values recorded in 2016 as having exceeded a specific seasonal maximum or minimum interim "trigger" value occurred as a result of atypical climatic conditions, and not as a result of quarry operations in Phase 1. The interim trigger values should be re-evaluated to include the monitoring data obtained in 2016, and modified where appropriate to better reflect existing conditions.
- During Phase I quarry operations, a reference wetland station should be established in the Nottawasaga Lookout Provincial Park and/or the Pretty River Provincial Park with input from the MNRF and the Nottawasaga Valley Conservation Authority (Reference Wetland 1 and Reference Wetland 2). The location and number of reference wetlands will be dependent on land-owner permission and suitable access to the selected sites.
- Temperature readings in the standing water (if present) should be completed as part of the PITM events at the wetland monitoring stations (drive-points). These were not completed in 2016.

- Quarterly sampling at QFSW2 should be completed in addition to the quarterly water quality sampling at the dewatering sumps.
- Certain inconsistencies between the AMP document and the Site Plan should be resolved through consultation with the MNRF. These include certain aspects of wetland monitoring, annual reporting dates and the requirement of monthly reporting during Phase 1, when no adverse influences are expected.

We trust that the information provided is sufficient for your needs at this time. Please contact the undersigned if you have any questions or comments.

Respectfully Submitted,

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HIMS GEOENVIRONMENTAL LTD.

Andrew G. Hims, M.Sc., P.Eng.
Consulting Engineer

9 LIMITATIONS

This report has been prepared for the exclusive use of Walker Aggregates Inc. WSP Canada Inc. (WSP) accepts no responsibility for any damages incurred by any third party as a result of decisions made or actions taken based upon the information contained within this report.

All background information utilized in the preparation of this performance report has been relied upon in good faith, and WSP does not accept any responsibility for any mis-statements, inaccuracies, or deficiencies contained in those documents or records. The information contained in this report should be evaluated, interpreted and implemented only in the context of the assignment.

The findings and conclusions included in this report are valid only at the date of issuance. If additional information is provided in the future, such as the results of additional site-specific monitoring or observations, WSP will be pleased to re-evaluate our conclusions.

BIBLIOGRAPHY

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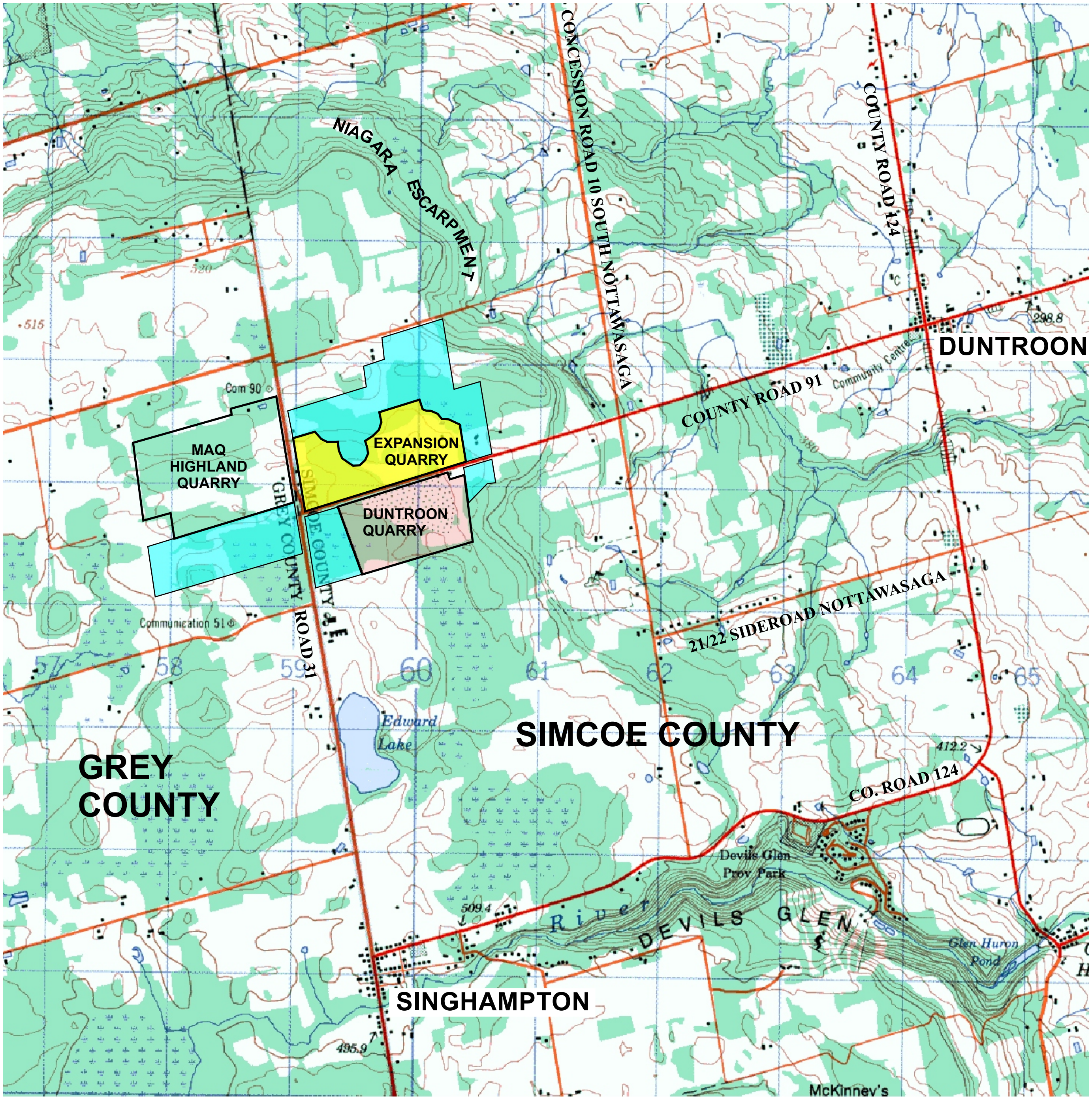
FIGURES



LEGEND

EXISTING QUARRY

EXPANSION QUARRY

WALKER OWNED BUFFER AND REFORESTATION LANDS

N W E S

Map Reference:
1:50,000 NTS sheet 41A/8, Collingwood.

0 1 km

LOCATION MAP

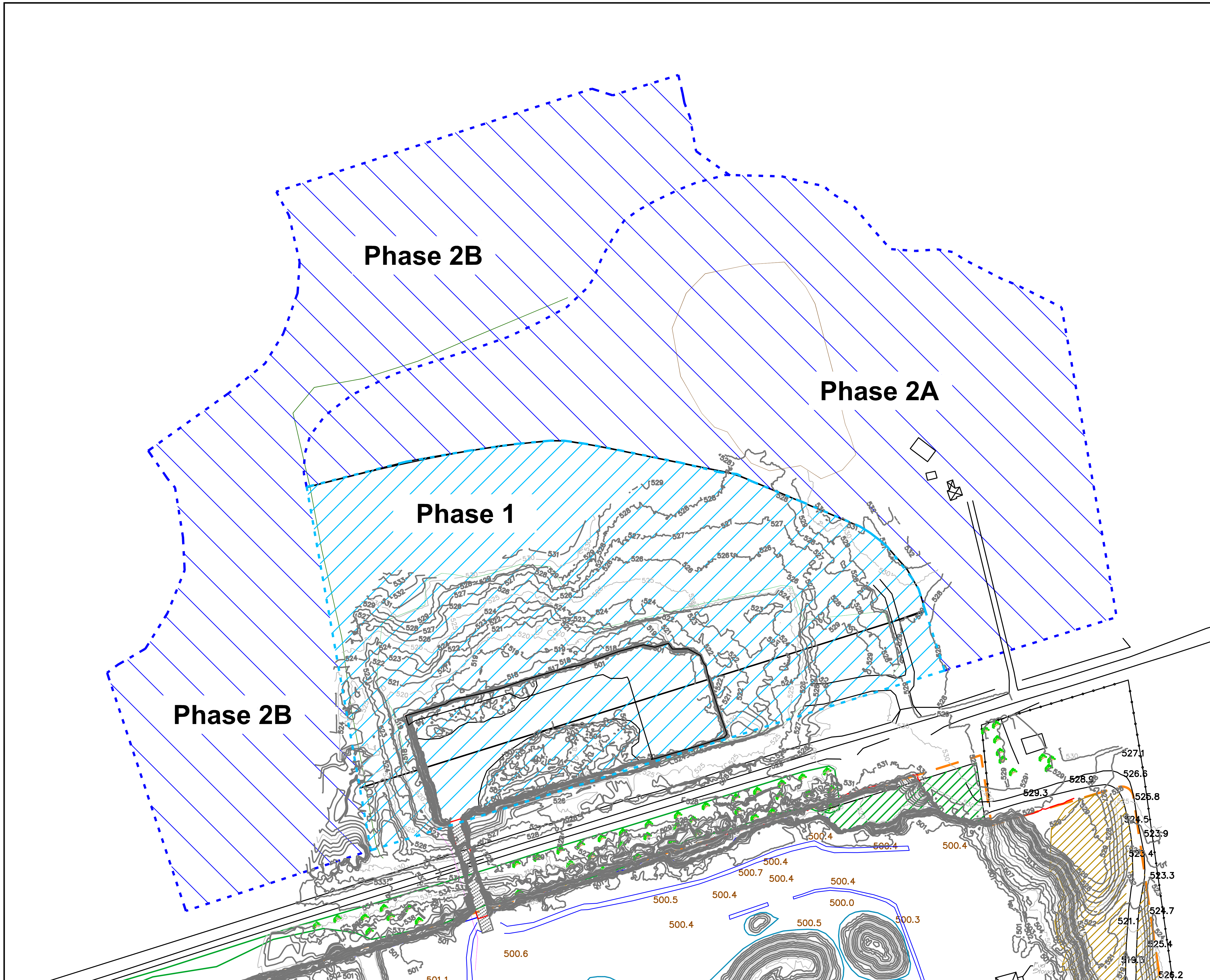
DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

walker industries
Walker Aggregates Inc.

DATE: MAY 2017	SCALE: 1:50000
PROJECT: 111-53312-00 A52.1	REF. NO.: 111-53312-00 A52_1-F1-LM

WSP

FIGURE
1



LEGEND

- Crest - Level 1
- Pile Outline
- Hydro Poles
- Limit of Extraction - Phase 1
- Limit of Extraction - Phase 2a & 2b
- Phase #1 Area - 500m
- Phase #2a & b Area - 500m
- Rock Reserves Main Pit
- Rehabilitation Area Main pit
- Limit of Extraction Main Pit

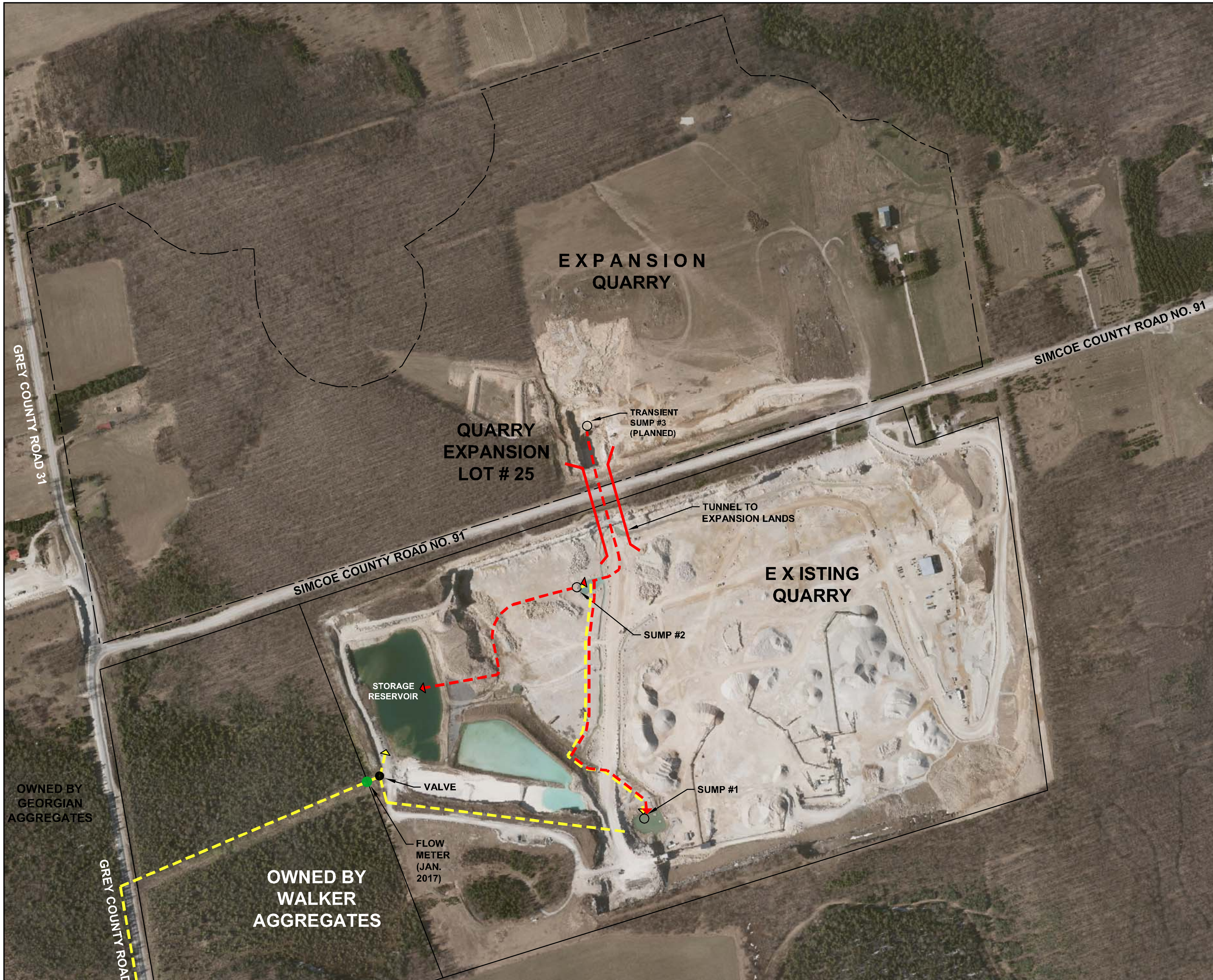
0 50 100 metres

SOURCE:
DRAWING PROVIDED BY RENISHAW (CANADA) LIMITED, DUNTROON QUARRYSITE PLAN, DATED DEC. 9, 2016.

SITE SKETCH - NOVEMBER 2016

DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

DATE: MAY 2017	SCALE: AS SHOWN
PROJECT: 111-53312-00 A52.1	FILE NO.: 111-53312-00 A52.1 F2a SP
WSP	FIGURE 2a



LEGEND

EXISTING QUARRY

DIRECTION OF WATER FLOW (EXISTING QUARRY)

DIRECTION OF WATER FLOW (QUARRY EXPANSION)

50 0 50 metres

N

AERIAL PHOTOGRAPHY SOURCE: SIMCOE COUNTY, 2016.

SITE PLAN

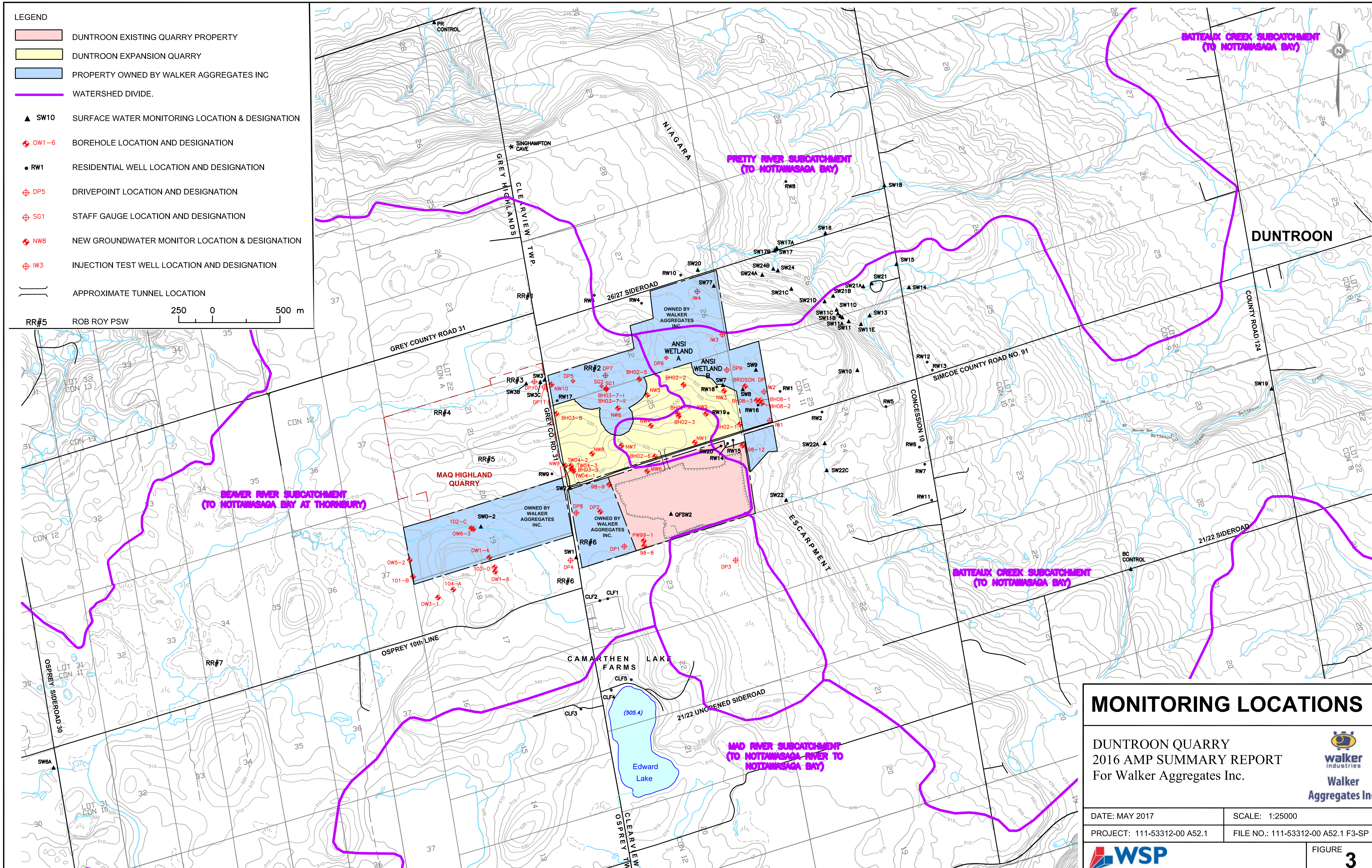
DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

walker industries
Walker Aggregates Inc.

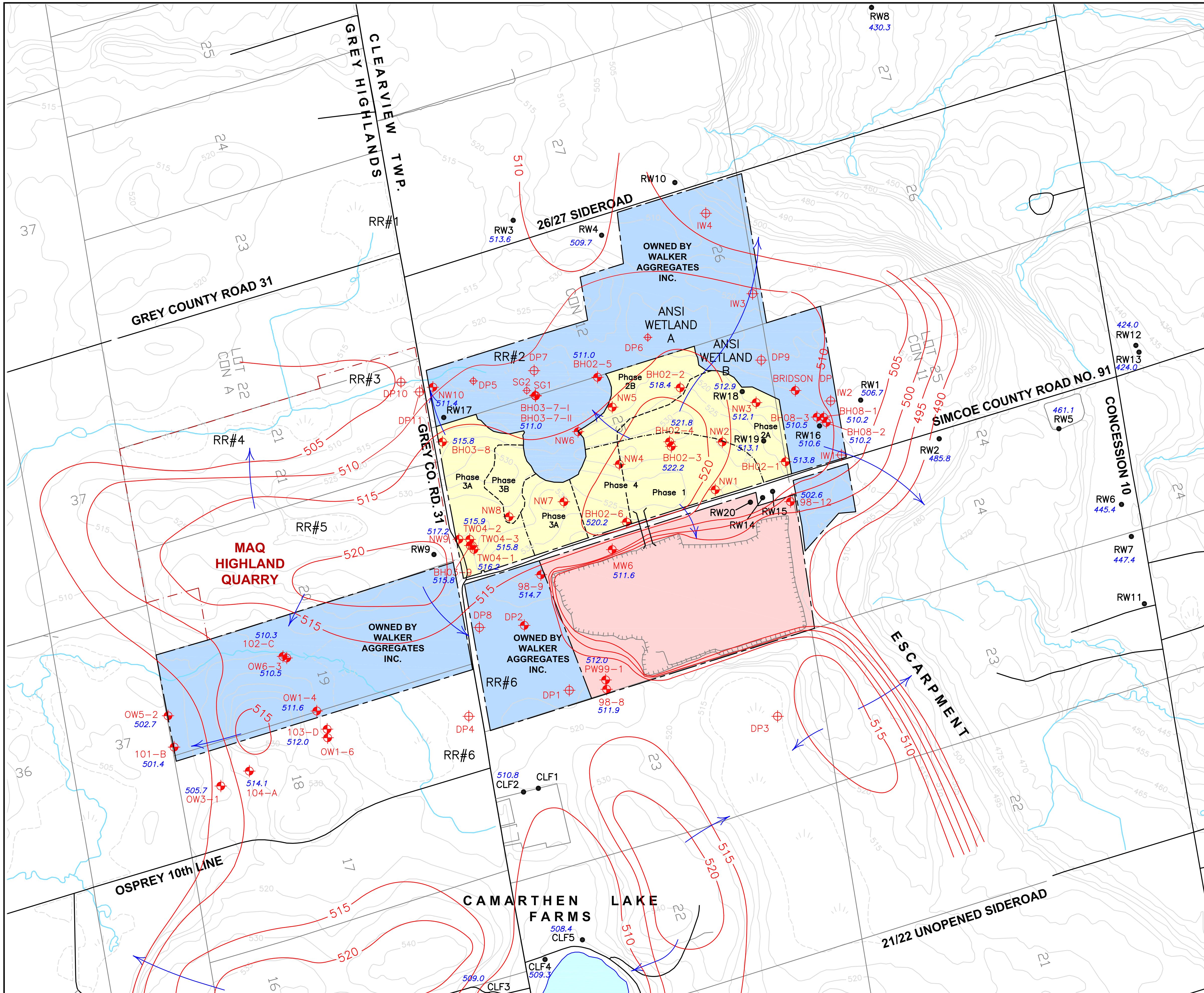
DATE: MAY 2017	SCALE: 1:5500
PROJECT: 111-53312-00 A52.1	FILE NO.: 111-53312-00 A52_1 F2b- SP

WSP

FIGURE 2b



LEGEND
DUNTROON EXISTING QUARRY PROPERTY
DUNTROON EXPANSION QUARRY
PROPERTY OWNED BY WALKER AGGREGATES INC
WATERSHED DIVIDE.
SW10 SURFACE WATER MONITORING LOCATION & DESIGNATION
OW1-6 BOREHOLE LOCATION AND DESIGNATION
RW1 RESIDENTIAL WELL LOCATION AND DESIGNATION
DP5 DRIVEPOINT LOCATION AND DESIGNATION
SG1 STAFF GAUGE LOCATION AND DESIGNATION
NW8 NEW GROUNDWATER MONITOR LOCATION & DESIGNATION
IW3 INJECTION TEST WELL LOCATION AND DESIGNATION
APPROXIMATE TUNNEL LOCATION
RR#5 ROB ROY PSW
250 0 500 m
DUNTROON
PRETTY RIVER SUBCATCHMENT (TO NOTTAWASAGA BAY)
BATTEAUX CREEK SUBCATCHMENT (TO NOTTAWASAGA BAY)
BEAVER RIVER SUBCATCHMENT (TO NOTTAWASAGA BAY AT THORNBURY)
MAD RIVER SUBCATCHMENT (TO NOTTAWASAGA RIVER TO NOTTAWASAGA BAY)
MAQ HIGHLAND QUARRY
ANSI WETLAND A
ANSI WETLAND B
OWNED BY WALKER AGGREGATES INC.
GREY COUNTY ROAD 31
SIMCOE COUNTY ROAD NO. 91
26/27 SIDEROAD
21/22 SIDEROAD
21/22 UNOPENED SIDEROAD
OSPREY 10th LINE
OSPREY SIDEROAD 30
COUNTY ROAD 124
CONCESSION 10
NIAGARA ESCARPMENT
GREY HIGHLANDS CLEARVIEW TWP.
OSPREY CLEARVIEW TWP.
CAMARTHEN LAKE FARMS
Edward Lake
SINGHAMPTON CAVE
PR CONTROL
BC CONTROL
MONITORING LOCATIONS
DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.
walker industries
Walker Aggregates Inc.
DATE: MAY 2017
SCALE: 1:25000
PROJECT: 111-53312-00 A52.1
FILE NO.: 111-53312-00 A52.1 F3-SP
WSP
FIGURE 3



LEGEND

- DUNTROON EXISTING QUARRY PROPERTY
- DUNTROON QUARRY EXPANSION PROPERTY
- PROPERTY OWNED BY WALKER AGGREGATES INC.
- BH02-6 522.6 BOREHOLE/WELL LOCATION, DESIGNATION AND WATER LEVEL ELEVATION (mASL) APRIL 14, 2014
- 515 INTERPRETED BEDROCK GROUNDWATER CONTOUR mASL
- INFERRED GENERAL GROUNDWATER FLOW DIRECTION
- APPROXIMATE TUNNEL LOCATION

150 0 150 metres

BEDROCK GROUNDWATER LEVELS APRIL 2015

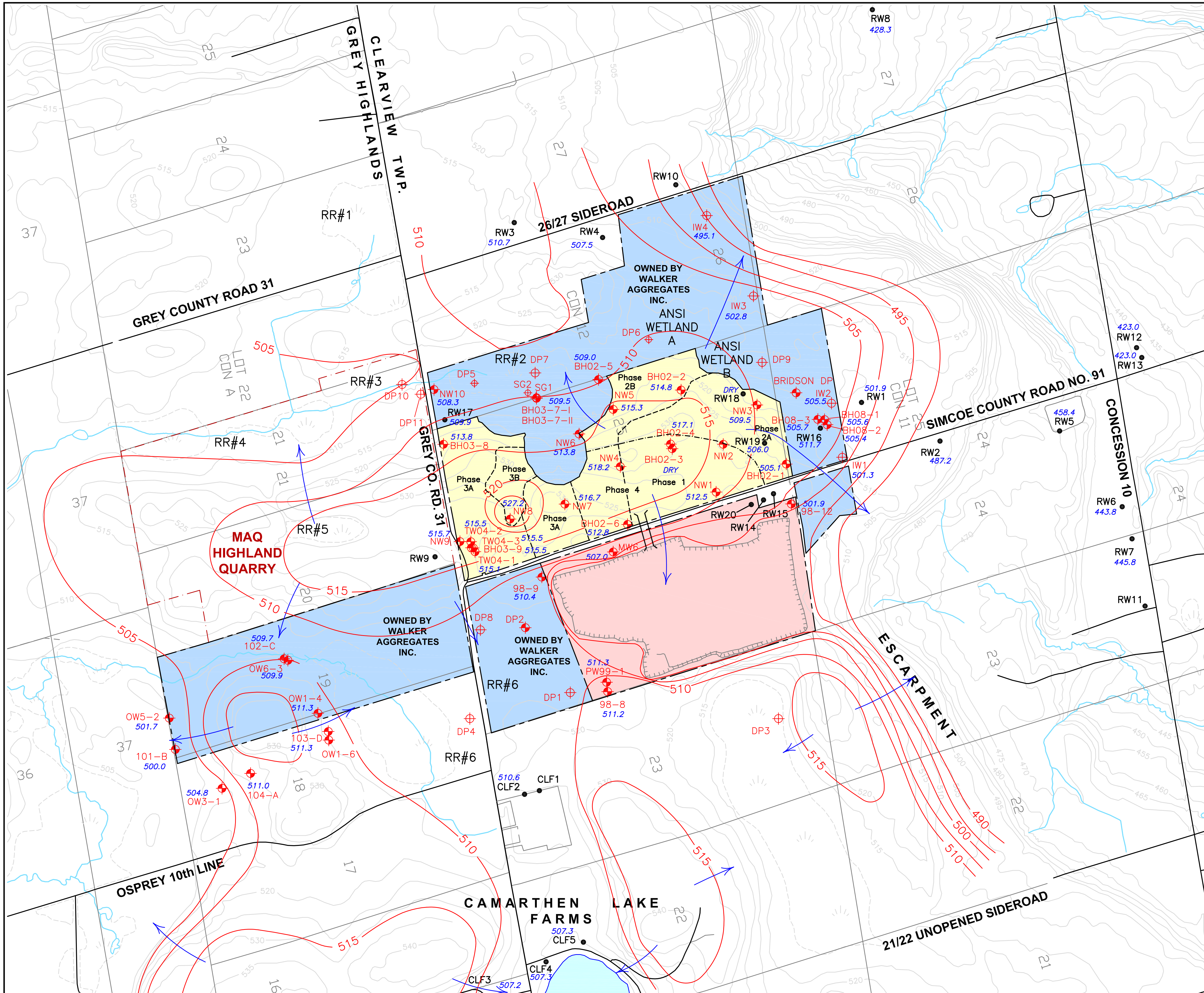
DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

walker industries
Walker Aggregates Inc.

DATE: MAY 2017	SCALE: 1:15000
PROJECT: 111-53312-00 A52.1	FILE NO.: 111-53312-00 A52.1 F4-SP

WSP

FIGURE 4



LEGEND

DUNTROON EXISTING QUARRY PROPERTY

DUNTROON QUARRY EXPANSION PROPERTY

PROPERTY OWNED BY WALKER AGGREGATES INC.

BH02-6 512.8 BOREHOLE/WELL LOCATION, DESIGNATION AND WATER LEVEL ELEVATION (mASL) OCTOBER 2015

515 INTERPRETED BEDROCK GROUNDWATER CONTOUR mASL

INFERRED GENERAL GROUNDWATER FLOW DIRECTION

APPROXIMATE TUNNEL LOCATION

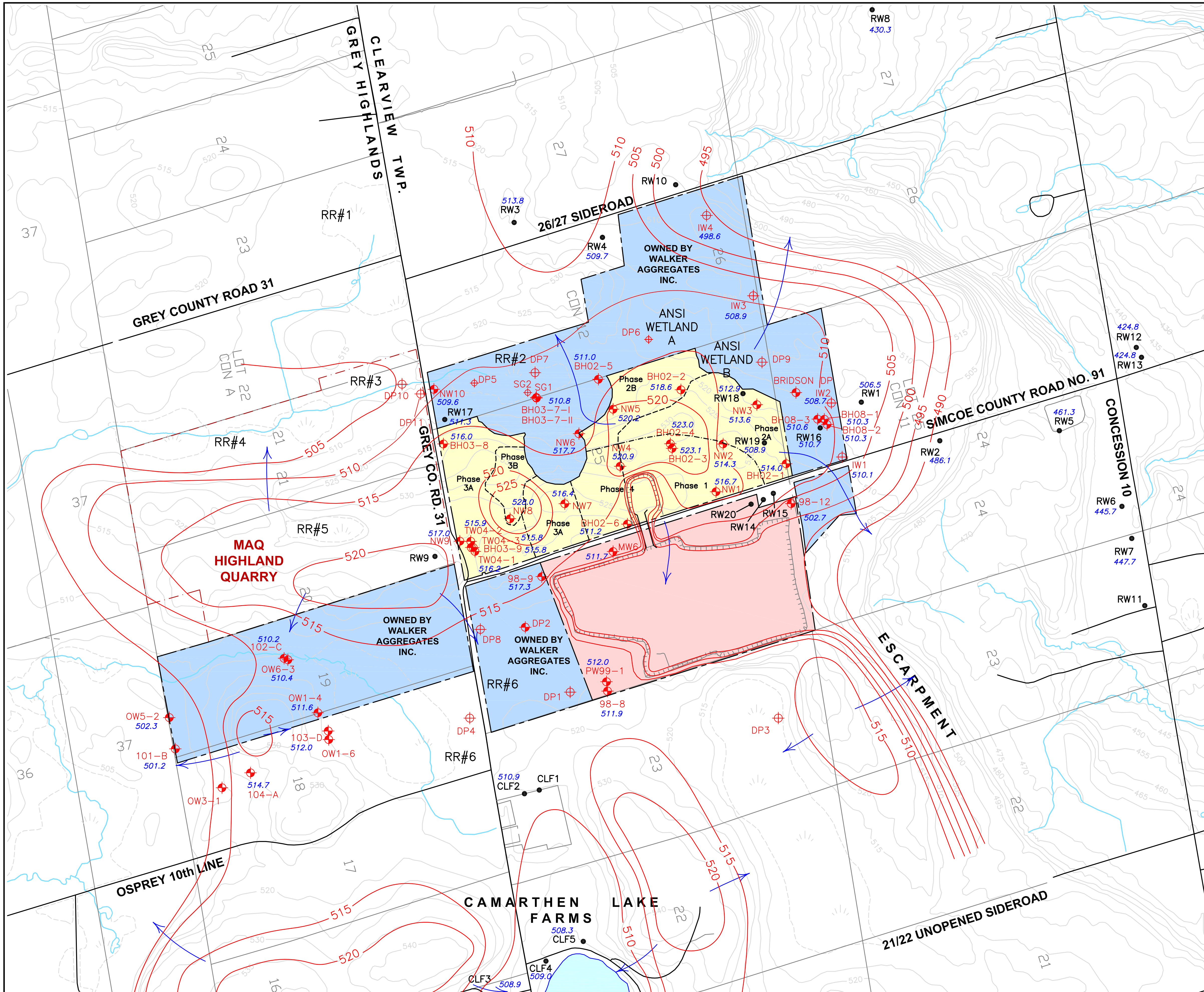
150 0 150 metres

BEDROCK GROUNDWATER LEVELS OCTOBER 2015

DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

Walker Aggregates Inc.

DATE: MAY 2017	SCALE: 1:15000
PROJECT: 111-53312-00 A52.1	FILE NO.: 111-53312-00 A52.1 F5
WSP	FIGURE 5



LEGEND

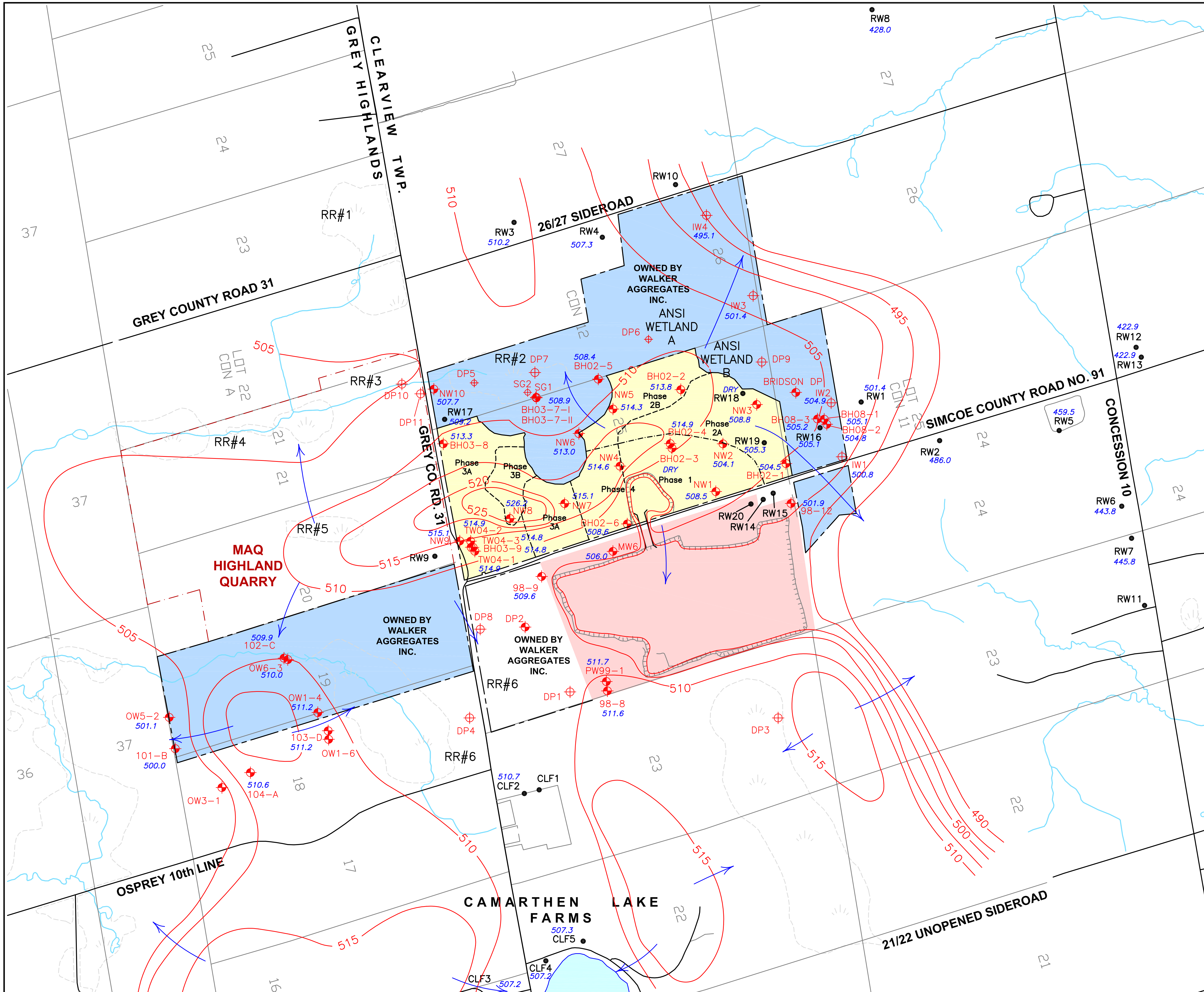
- DUNTROON EXISTING QUARRY PROPERTY
- DUNTROON QUARRY EXPANSION PROPERTY
- PROPERTY OWNED BY WALKER AGGREGATES INC.
- BH02-6 511.2 — BOREHOLE/WELL LOCATION, DESIGNATION AND WATER LEVEL ELEVATION (mASL) APRIL 2016
- 515 — INTERPRETED BEDROCK GROUNDWATER CONTOUR mASL
- INFERRED GENERAL GROUNDWATER FLOW DIRECTION
- APPROXIMATE TUNNEL LOCATION

BEDROCK GROUNDWATER LEVELS APRIL 2016

DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

Walker Aggregates Inc.

DATE: MAY 2017	SCALE: 1:15000
PROJECT: 111-53312-00 A52.1	FILE NO.: 111-53312-00 A52.1 F6-SP
WSP	FIGURE 6



LEGEND

- DUNTROON EXISTING QUARRY PROPERTY
- DUNTROON QUARRY EXPANSION PROPERTY
- PROPERTY OWNED BY WALKER AGGREGATES INC.
- BH02-6 512.8 — BOREHOLE/WELL LOCATION, DESIGNATION AND WATER LEVEL ELEVATION (mASL) OCTOBER 2016
- 515 — INTERPRETED BEDROCK GROUNDWATER CONTOUR mASL
- INFERRED GENERAL GROUNDWATER FLOW DIRECTION
- APPROXIMATE TUNNEL LOCATION

150 0 150 metres

BEDROCK GROUNDWATER LEVELS OCTOBER 2016

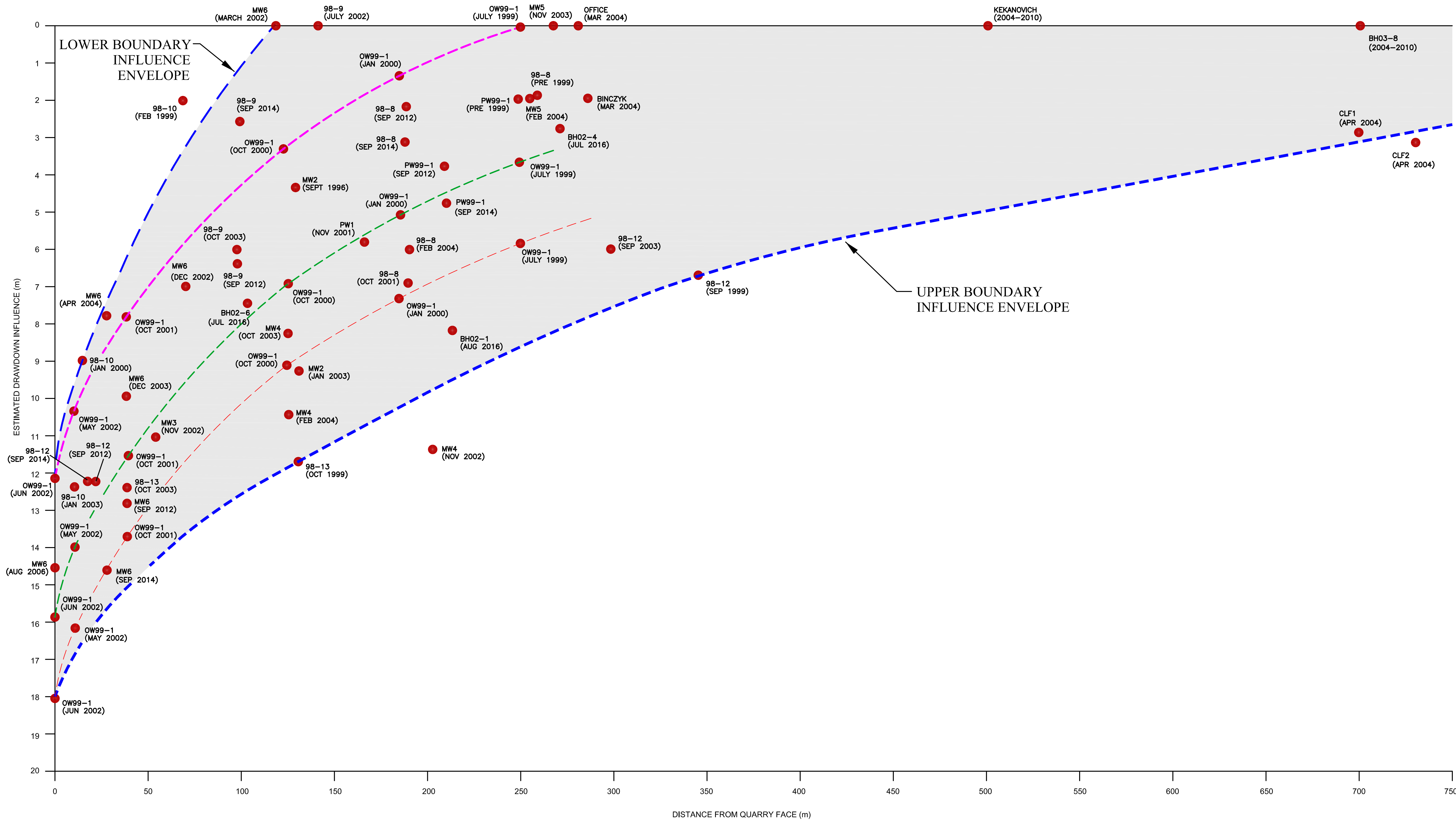
DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

walker industries
Walker Aggregates Inc.

DATE: MAY 2017	SCALE: 1:15000
PROJECT: 111-53312-00 A52.1	FILE NO.: 111-53312-00 A52.1 F7

WSP

FIGURE
7



LEGEND

- MONITOR OW99-1 PLOT BASED ON PRE-EXTRACTION GROUNDWATER LEVEL OF 518.2 mASL
- MONITOR OW99-1 PLOT BASED ON PRE-EXTRACTION GROUNDWATER LEVEL OF 516 mASL
- MONITOR OW99-1 PLOT BASED ON PRE-EXTRACTION GROUNDWATER LEVEL OF 512.3 mASL

DISTANCE - DRAWDOWN RELATIONSHIP

DUNTROON QUARRY
2016 AMP SUMMARY REPORT
For Walker Aggregates Inc.

walker industries
Walker Aggregates Inc.

DATE: MAY 2017
SCALES: AS SHOWN
PROJECT: 111-53312-00 A52.1
FILE NO.: 111-53312-00 A52.1 F8-GP
WSP
FIGURE
8