

APPENDIX

D

LONG-TERM TREND
ECOLOGICAL MONITORING
PROGRAM RESULTS



**Walker Aggregates Duntroon
Expansion Quarry Amphibian
Monitoring Program: 2019 Annual
Monitoring Report**

April 9, 2020

Prepared for:

Walker Aggregates Inc.
48 Alliance Blvd Unit 102 & 103
Barrie, ON L4M 5K3

Prepared by:

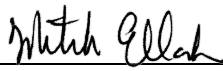
Stantec Consulting Ltd.
70 Southgate Drive, Suite 1
Guelph, ON N1G 4P5

File: 62602732




**WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM:
2019 ANNUAL MONITORING REPORT**

This document entitled Walker Aggregates Duntroon Expansion Quarry Amphibian Monitoring Program: 2019 Annual Monitoring Report was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Walker Aggregates Inc. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 
(signature)

Mitch Ellah, B.Sc.
Biologist

Reviewed by 
(signature)

Melissa Cameron M.Sc, M.LA, OALA
Ecologist / Landscape Architect



Table of Contents

1.0	INTRODUCTION	1.1
2.0	METHODS	2.1
2.1	HABITAT ASSESSMENT	2.1
2.2	AMPHIBIAN EGG MASS SURVEY	2.1
2.3	AMPHIBIAN BREEDING CALL SURVEY	2.1
2.3.1	Data Analysis	2.2
3.0	RESULTS	3.1
3.1	HABITAT ASSESSMENT	3.1
3.2	AMPHIBIAN EGG MASS SURVEY	3.3
3.3	AMPHIBIAN BREEDING CALL SURVEY	3.4
4.0	CONCLUSION	4.1
5.0	REFERENCES	5.1

LIST OF TABLES

Table 1: Amphibian Egg Mass Survey Results from 2019 and Previous Survey Years at the Walker Aggregates Duntroon Expansion Quarry Study Site.....	3.4
Table 2: Amphibian Community Documented in Breeding Call Survey and Incidental Observations at the Walker Aggregates Duntroon Expansion Quarry Study Site in 2019, 2018 and 2007	3.6

LIST OF APPENDICES

APPENDIX A: HABITAT ASSESSMENT

Appendix A1 Survey Locations

Appendix A2 Photographic Records

APPENDIX B: TABLES



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Introduction
April 9, 2020

1.0 INTRODUCTION

The focus of the wetland component of the Long Term Trend Ecological Monitoring (LTTEM) program in the Walker Aggregates Inc. Duntroon Expansion Quarry Adaptive Management Plan (Stantec 2013) is on amphibian vernal breeding pools and ensuring hydroperiods are suitable for continued hydrophytic plant growth in the surrounding wetland zones. Wetland water level monitoring is conducted as part of the PITM and the LTTWM programs and will be interpreted from a natural heritage perspective.

Ecological monitoring to complement the water level monitoring will include two components: vegetation monitoring and wildlife monitoring. Wildlife monitoring in wetlands is focused on amphibians (Anura: frogs and toads and Urodela: salamanders). Amphibians are excellent indicators of the health of the wetland area and water regime trends that could be affecting wetland function. Wildlife monitoring was initiated in 2018 (Stantec 2018) and continued in 2019. The 2019 results are described below.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Methods
April 9, 2020

2.0 METHODS

Site visits occurred on Walker Aggregates Inc. Duntroon Expansion Quarry property on three occasions in 2019 (April 16, May 16, June 19). During the visits six predetermined Stations were surveyed (Stations 1 – 6, Figure 1) for amphibian habitat and amphibian community through incidental observation. Breeding evidence was monitored through egg mass surveys and acoustic breeding call surveys as described below. Survey Stations were selected based on previous amphibian monitoring at the Subject Property and proximity to the Duntroon Quarry.

2.1 HABITAT ASSESSMENT

Habitat conditions were recorded at each Station. The habitat assessment included a variety of parameters which can affect the presence, abundance, reproduction, survival and diversity of amphibian communities: average depth, maximum depth, average length and width, substrate type, amount of litter/debris, number of egg attachment sites, likelihood of fish, emergent/wetland vegetation, edge vegetation, dominant surrounding vegetation/community, percent canopy closure and percent in-pond shrub cover and species.

A photographic record was completed at all Stations during each Site visit.

2.2 AMPHIBIAN EGG MASS SURVEY

Two Stantec biologists surveyed for amphibian egg masses at Stations 2 and 4 during each Site visit by wading through the habitat for 30 minutes and visually looking for egg masses. Each egg mass encountered was recorded and identified to species, and mass condition was described (dead/alive/hatched). Polarized sunglasses were worn which decreased glare on the water, improving egg mass detection.

Incidental amphibian observations were recorded during the egg mass surveys.

2.3 AMPHIBIAN BREEDING CALL SURVEY

During the first Site visit, Automated Recording Units (ARU's) were fastened to a tree or pole at each station in proximity to wetland features, in areas with little ground vegetation to minimize background noise. Each ARU was programmed to record daily between April 16 and June 19, 2019. For each day within the schedule period, one 10-minute recording window was programmed, starting at 21:50. With this start time, the survey would be completed at least one-half hour after sunset throughout the call survey dates

Incidental records of amphibians observed were recorded during the deployment of ARU's and in subsequent Site visits. ARU's were visited during all Site visits to check on battery levels.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Methods
April 9, 2020

ARU's were collected during the last Site visit (June 19, 2019) and brought back to the Stantec Guelph office for data downloading and analysis.

2.3.1 Data Analysis

The Bird Studies Canada (BSC) Marsh Monitoring Program (MMP) for Surveying Amphibians (BSC 2009) was utilized for analyzing the ARU data. Standardized methodology in the MMP provides repeatable data analysis for future years of monitoring. Following the MMP methodology, dates selected for amphibian call analysis at the Walker Aggregates Duntroon Pit met the following conditions:

1. Each station was surveyed three times during spring and early summer, a minimum of 15 days apart, Per the MMP, if possible, survey dates should fall within these windows: Survey 1 – April 15 – 30, Survey 2 – May 15 – 30, Survey 3 June 15 – 30.
2. Air temperatures were greater than 5 °C for first survey, 10 °C for second survey, and 17 °C for third survey.
3. Each station was surveyed for 3 minutes, beginning at least one-half hour after sunset
4. Wind strength was Beaufort Scale (BS) Code 0, 1, 2 or 3

The ARU recording periods were analyzed on April 23, May 20 and June 18, 2019. Dates were selected through an analysis of weather conditions archived from the Environment Canada Collingwood weather station. Considerations were made for an appropriate spread between analysis dates, ideal weather conditions (light winds, no precipitation, seasonal temperatures) and background noise.

Each analysis included listening for three minutes for all calling toads and frogs at a survey Station. Call levels were described using values of 1, 2, or 3. Level 1 indicates that individuals could be counted, and calls were not simultaneous. Level 2 denotes that calls are distinguishable but with some simultaneous calling. Level 3 indicates a full chorus where calls are continuous and overlapping.

Data collected in 2019 was compared to previous years egg mass survey and breeding call survey data to observe trends in abundance and diversity. Previous studies include the following:

Egg Mass Surveys

- Walker Aggregates Duntroon Expansion Quarry Amphibian Monitoring Program (Stantec 2018)
- Investigation of Salamander Community, Wildlife Scientific Collector's Permit No. 1031106 (Stantec 2010)
- Investigation of Salamander Community, Wildlife Scientific Collector's Permit No. 10452052 (Stantec - April 2008)
- Investigation of Salamander Community (Stantec - April 2009)



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Methods

April 9, 2020

Breeding Call Surveys

- Walker Aggregates Duntroon Expansion Quarry Amphibian Monitoring Program (Stantec 2018)
- Amphibian Breeding Call Survey (Stantec 2010)



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Results
April 9, 2020

3.0 RESULTS

3.1 HABITAT ASSESSMENT

An amphibian habitat assessment was completed at each of the six Stations. Station locations are shown in Appendix A.1 (Study Area, Figure 1). A photographic record showing habitat at each Station is provided in Appendix A.2. Station UTM coordinates are provided in Table B.1, Appendix B, and incidental amphibian observations in Table B.2, Appendix B. Station habitat descriptions are as follows:

Station 1

A small pond, approximately 10 m x 10 m, at the edge of a young mixed forest community bordered by a hay field/pasture. A creek approximately 15 m to the north flowed east past the feature, providing source water for the pond and surrounding area. Water was present in the pond during the June Site visit in 2018 and 2019 indicating the habitat likely supports the larval development period for most amphibians. Water depth was measured to be an average of 0.40 m and maximum depth of 0.80 m. Substrate was organic with litter/debris with a depth of 0.15 m. The pond was surrounded by willow and dogwood shrubs with a 10 % canopy closure. An abundance of grasses and vegetation provided 20 % in-pond cover. Fish were not observed and are likely not present in the feature. Depending on water depth at freeze up, this feature may provide aquatic overwintering amphibian habitat. Surrounding upland area would provide terrestrial overwintering amphibian habitat.

Station 2

This feature is a large flooded area in a mature deciduous swamp forest community which receives surface water runoff from surrounding lands. Average water depth was 0.30 m and maximum depth was 0.55 m. Water was present in the feature during the June Site visit in 2018 and 2019 indicating the habitat likely supports the larval development period for most amphibians (Harding 1997). Substrate was organic with an abundance of leaf litter and tree branch litter. Litter depth was approximately 0.10 m. Egg attachment sites were abundant, provided by organic debris and in-water shrubs. Percent canopy closure over feature was approximately 80 % by mature maple sp. Fish were not observed and likely not present in the feature. Depending on water depth at freeze up, this feature may provide aquatic overwintering amphibian habitat. Nearby permanent ponds and surrounding upland area would provide aquatic and terrestrial overwintering amphibian habitat.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Results
April 9, 2020

Station 3

Station 3 is within the mature deciduous swamp forest described for Station 2 but is located further east. Seemingly higher in elevation, Station 3 held less water than that observed at Station 2 with average depths of 0.25 m, maximum depth of 0.30 m and less flooded area. Substrate was organic with leaf litter and tree branch litter providing an abundance of egg attachment sites and in-water cover for stages of amphibian development. This feature was likely amphibian breeding and larval development habitat and not likely aquatic overwintering habitat; however, upland habitat would be available for those species that can overwinter in terrestrial habitat such as the American Toad (*Anaxyrus americanus*), Western Chorus Frog (*Pseudacris triseriata*), Wood Frog (*Lithobates sylvaticus*), Gray Treefrog (*Hyla versicolor*), and Spring Peeper (*Pseudacris crucifer*) (Harding 1997).

Station 4

A low-lying area with dense dogwood and willow shrubs. This feature received drainage from a mature deciduous forest to the south and mixed forest to the north. Average water depth was 0.20 m and maximum depth of 0.45 m. Water was present in the pond during the June Site visit in 2018 and 2019 indicating the habitat likely supports the larval development period for most amphibians. Substrate was organic with leaf litter and shrub branch litter providing an abundance of egg attachment sites and approximately 70 % in-water cover for developing amphibians. Canopy closure was 50 %, mainly provided by shrubs. Fish were not observed and likely not present in the feature. This feature was likely amphibian breeding and larval development habitat and not likely aquatic overwintering habitat, however, upland habitat would be available for those species that can overwinter in terrestrial habitat.

Station 5

A dug pond that can hold water throughout the year under adequate rainfall conditions. Approximately 21 m x 15 m, this pond had an average depth greater than 1.0 m in 2018 and 2019. Surrounding vegetation community was deciduous forest and meadow. The pond had dense emergent aquatic vegetation (cattail) along the edge and submergent vegetation (chara spp.) throughout. Substrate was a silty clay with detritus including leaf litter. Egg attachment sites were abundant from shrub debris and aquatic vegetation debris. Canopy closure was 5 % and in-water cover was 10 %, however water depth provides refuge for developing amphibians from predators. In some years this feature could provide aquatic overwintering habitat for those species that hibernate in ponds such as Green Frog (*Lithobates clamitans*) and Northern Leopard Frog (*Lithobates pipiens*) (Harding 1997). Fish were observed which were likely Brook Stickleback (*Culaea inconstans*) (non-predatory to amphibians).

Station 6

This Station is a meadow marsh floodplain habitat with a creek that flows west. Grasses were dominant with wetland vegetation including marsh marigold and cattail. Trees and shrubs were sparse with mixed composition of deciduous and coniferous species. The floodplain held water during freshet events however water depths were variable in the floodplain during the May and June Site visits. Floodplain substrate was organic with detritus and cover was approximately 90 % from tall grasses and emergent



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Results

April 9, 2020

vegetation. The amphibian community supported by this habitat would include those species and amphibian life stages adapted to drier conditions, such as the adult Northern Leopard Frog (Harding 1997). Aquatic overwintering habitat in the floodplain would be provided in sections of the creek and surrounding uplands would provide terrestrial overwintering habitat.

3.2 AMPHIBIAN EGG MASS SURVEY

The amphibian egg mass survey was completed at Station 2 and Station 4 during each Site visit (April 16, May 16, and June 19). Suitable habitat was present during each survey, providing conditions for amphibian breeding and larval development. Approximately 1500 m² (50 m x 30 m) was searched at Station 2 and 800 m² (40 m x 20 m) was searched at Station 4. The area searched was dependent on available habitat and ease of survey and egg mass detection. There was more available habitat at Station 2 when compared to Station 4 and Station 2 had minimal in water vegetation, compared to Station 4 which had dense shrub vegetation (See Section 3.1 and Photographic Record). Egg masses at Station 2 were generally dispersed over a larger area when compared to Station 4.

No egg masses were detected at either Station during the April survey (Station 4 was frozen).

In the May survey, eight (8) viable Spotted Salamander egg masses and eight (8) anura egg masses were observed at Station 2. The anura egg masses varied from small clusters to large conglomerate masses of many thousands of eggs. Many of the anura eggs were hatching during in-situ examination. The anura egg masses were identified as Wood Frog. At Station 4, fourteen (14) viable Spotted Salamander egg masses were observed.

During the June survey no viable egg masses were observed at either Station, however the remains of thirteen (13) hatched Spotted Salamander egg masses were observed at Station 2 and one (1) hatched Spotted Salamander egg mass was observed at Station 4.

In 2019, Spotted Salamander egg mass records at Stations 2 and 4 were similar to previous egg mass surveys (Table 1). Anura egg masses documented in 2019 were similar to previous surveys as well. Wood frog egg masses were identified at Station 2 which were also observed in 2009, 2008 and 2006. Anura egg masses were not observed in 2018, which was thought to have been associated with a short and warm spring season in 2018 and subsequently short egg incubation times.

Spotted Salamander incubation period is 20 – 60 days (Harding 1997), which provides a longer window of survey detection when compared to frogs and toads. Egg mass survey results from 2019, 2018, 2009, 2008 and 2006 are provided in Table 1.

Incidental amphibian observations were recorded during the egg mass surveys which included adult Chorus Frog and Spring Peeper at Station 2, and adult Chorus Frog and Green Frog at Station 4.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Results
April 9, 2020

Table 1: Amphibian Egg Mass Survey Results at Station 2 and Station 4 from 2019 and Previous Survey Years at the Walker Aggregates Duntroon Expansion Quarry Study Site

Station	Survey Date	Species	Number of Egg Masses
Station 2	4/16/2019	-	-
	5/16/2019	Spotted Salamander	8
		Wood Frog	8
	6/19/2019	Spotted Salamander	13 (hatched)
	4/26/2018	-	-
	5/23/2018	Spotted Salamander	20
	6/15/2018	Spotted Salamander	5 (hatched)
	4/27/2009	Spotted Salamander	3
		Wood Frog	"Five large carpets"
	4/30/2008	Spotted Salamander	30
		Pseudacris sp.	1
		Wood Frog	"numerous carpets - mostly hatched"
	4/27/2006	Spotted Salamander	16
		Wood Frog	200
		Northern Leopard Frog	1
Station 4	4/16/2019	-	-
	5/15/2019	Spotted Salamander	13
	6/19/2019	Spotted Salamander	1 (hatched)
	4/26/2018	-	-
	5/23/2018	Spotted Salamander	4, 1 (dead)
	6/15/2018	Spotted Salamander	1 (hatched)
	4/27/2009	Spotted Salamander	14
	4/30/2008	Spotted Salamander	Number of egg masses not reported

3.3 AMPHIBIAN BREEDING CALL SURVEY

The amphibian breeding call survey was completed within the MMP guidelines. Survey date, time and weather are provided in Table B.3, Appendix B.

Three surveys were completed at each of the six Stations for a total of eighteen surveys.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Results

April 9, 2020

The breeding call survey documented five (5) species utilizing habitat at the survey Stations: Wood Frog, Spring Peeper, Western Chorus Frog, Green Frog and Gray Treefrog. Spring Peeper was the most commonly detected species with records from twelve of eighteen surveys, followed by Western Chorus Frog (six of eighteen) and Gray Treefrog (three of eighteen). Spring Peeper was also the most abundant species with a full chorus in April and May at Station 2 and 3 and high individual counts (10 - 30) at multiple Stations.

Station 4 had the greatest diversity of species (5 species) and Station 6 the least diversity (1 species).

Background noise codes during the surveys ranged from 0 (no appreciable effect) to 2 (moderately affecting sampling) at the Stations.

Incidental amphibian observations encountered during Site visits also provide insight into amphibian community at the surveyed Stations. For example, Northern Leopard Frog, Green Frog and Gray Treefrog were documented incidentally at some Stations but were not recorded during the breeding call survey.

Breeding call survey data are provided in Table B.4, Appendix B, and incidental amphibian observations in Table B.2, Appendix B.

In comparison to breeding call surveys from previous studies (2007 and 2018), the 2019 data show some differences. Slight differences at some Stations were observed in amphibian community and abundance. Spring Peeper and Chorus Frog continue to be the most common species recorded in the Study Site. The Wood Frog was documented in breeding call surveys in 2019 at four Stations where it was not documented in 2018. Fewer Western Chorus Frog were recorded in 2019 at Stations 2 and 4 when compared to 2007 but were similar when compared to 2018 results. American Toad was not recorded in the 2019 study; however, this species was not recorded in abundance in any study year.

Amphibian activity, including breeding calls, can be hard to detect due to “explosive breeding” events. Some species, such as the Wood Frog, may only call for a few evenings and with most breeding completed in one evening (BSC 2009). When this is the case, entire species can be missed.

Habitat at each Station has not changed since 2007 and therefore amphibian populations are expected to have remained relatively similar or differences may be associated with natural fluctuations in population or seasonal weather.

A summary of the amphibian community documented at surveyed Stations in 2007, 2018 and 2019 is provided in Table 2. Individual counts and MMP call codes for each station, survey date and year are provided in Table B.4, Appendix B.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Results
April 9, 2020

Table 2: Amphibian Community Documented in Breeding Call Survey and Incidental Observations at the Walker Aggregates Duntroon Expansion Quarry Study Site in 2019, 2018 and 2007

Station	Survey Year	Wood Frog	Spring Peeper	Western Chorus Frog	American Toad	Green Frog	Gray Treefrog	Northern Leopard Frog
1	2019	✓	✓			✓ ₁	✓	
	2018	✓	✓			✓ ₁	✓	✓ ₁
	2007		✓	✓	✓	✓	✓	
2	2019	✓	✓	✓			✓	
	2018		✓	✓			✓ ₁	
	2007	✓	✓	✓	✓		✓	✓ ₁
3	2019		✓	✓			✓ ₁	
	2018	✓ ₁	✓	✓				
4	2019	✓	✓	✓		✓	✓	
	2018		✓	✓		✓ ₁		
	2007	✓	✓	✓				
5	2019	✓	✓			✓	✓	✓ ₁
	2018		✓	✓	✓	✓	✓	✓ ₁
	2007		✓	✓		✓	✓	
6	2019		✓			✓ ₁		✓ ₁
	2018		✓			✓ ₁		✓ ₁

Note: ✓₁ denotes incidental species observation not recorded in breeding call survey.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

Conclusion
April 9, 2020

4.0 CONCLUSION

The 2019 Amphibian Monitoring Program at the Walker Aggregates Inc. Duntroon Expansion Quarry was completed successfully, fulfilling the requirement of the Adaptive Management Plan which forms part of the Aggregate Resources Act licence. Data of amphibian habitat, egg mass occurrence, incidental observation and breeding calls at each survey Station were collected, providing monitoring data for amphibian community and abundance in the Study Site. Habitat at each survey Station was suitable for amphibians and, when comparing 2019 data to previous years' surveys, amphibian communities were similar in diversity and abundance at each Station.



WALKER AGGREGATES DUNTROON EXPANSION QUARRY AMPHIBIAN MONITORING PROGRAM: 2019 ANNUAL MONITORING REPORT

References
April 9, 2020

5.0 REFERENCES

- BSC [Bird Studies Canada]. 2009. Marsh Monitoring Program Participants Handbook for Surveying Amphibians. 2009 Edition. 13 pages. Published by Bird Studies Canada in cooperation with Environment Canada and the U.S. Environmental Protection Agency. February 2009.
- Harding. 1997. Amphibians and Reptiles of the Great Lakes Region. Great Lakes Environment Series. The University of Michigan.
- Stantec. 2010. Duntroon Quarry Expansion Consolidated Natural Environment Report. Lot 25, Concession 12, Township of Clearview.
- Stantec. 2013. Adaptive Management Plan (AMP). Duntroon Expansion Quarry. Lot 25 and Pt. Lot 26, Concession 11, Township of Clearview.
- Stantec. 2018. Walker Aggregates Duntroon Expansion Quarry Amphibian Monitoring Program. 2018 Annual Monitoring Report. Prepared for Walker Aggregates Inc. Prepared by Stantec Consulting



APPENDIX A: HABITAT ASSESSMENT

APPENDIX A1
SURVEY LOCATIONS

V:\01609\active\62602732\Drawing\GIS\MXD\2019_Amphibian_MonitoringPlan\62602732_AmphibianMonitoringLocations.mxd
Revised: 2020-04-03 By: dharvey



Legend

- ⊗ Egg Mass Survey
- ARU Station
- Walker Owned Lands
- Limit of Extraction - Walker
- Surface Water Features may include Fisheries Habitat

Notes

1. Coordinate System: UTM NAD 83 - Zone 17(N)
2. Data Sources: Ontario Ministry of Natural Resources, © Queens Printer Ontario, 2009.
3. Image Source: First Base Solutions WMS, 2016.
4. Wetland boundaries approximated using handheld GPS and air photo except where adjacent to proposed license boundary, surveyed in consultation with MNR.

March 2020
62602732

Client / Project

WALKER AGGREGATES INC.
DUNTROON QUARRY EXPANSION
AMPHIBIAN MONITORING PROGRAM

Figure No.

1

Title

**AMPHIBIAN MONITORING
LOCATIONS**

APPENDIX A2
PHOTOGRAPHIC RECORDS



Photo 1: Site 1, May 16, 2019: Green Frog



Photo 2: Site 2, May 16, 2019: Spotted Salamander egg mass



Photo 3: Site 6, May 16, 2019: Northern Leopard Frog



Photo 4: Site 6, May 16, 2019: Green Frog

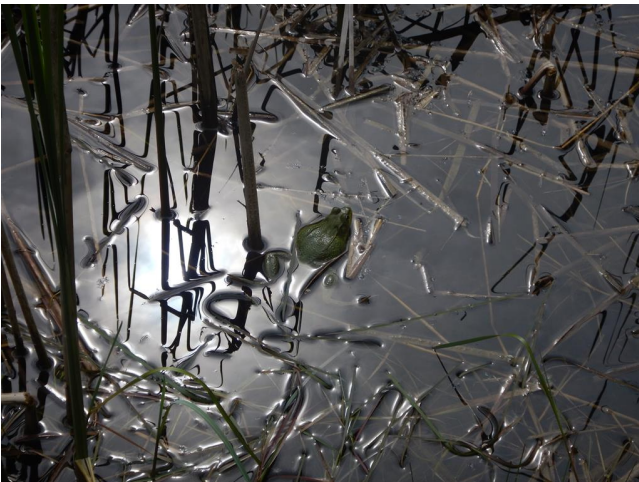


Photo 5: Site 5, June 19, 2019: Green Frog



Photo 6: Site 4, June 19, 2019: Hatched Spotted Salamander egg mass



Photo 1: Site 1, April 16, 2019.



Photo 2: Site 1, April 16, 2019.



Photo 3: Site 1, May 16, 2019



Photo 4: Site 1, May 16, 2019



Photo 5: Site 1, June 19, 2019



Photo 6: Site 1, June 19, 2019



Photo 1: Site 2, April 16, 2019



Photo 2: Site 2, April 16, 2019



Photo 3: Site 2, May 16, 2019



Photo 4: Site 2, May 16, 2019



Photo 5: Site 2, June 19, 2019



Photo 6: Site 2, June 19, 2019



Photo 1: Site 3, April 16, 2019



Photo 2: Site 3, April 16, 2019



Photo 3: Site 3, May 16, 2019



Photo 4: Site 3, May 16, 2019



Photo 5: Site 3, June 19, 2019



Photo 6: Site 3, June 19, 2019



Photo 1: Site 4, April 16, 2019



Photo 2: Site 4, April 16, 2019



Photo 3: Site 4, May 16, 2019



Photo 4: Site 4, May 16, 2019



Photo 5: Site 4, June 19, 2019



Photo 6: Site 4, June 19, 2019



Photo 1: Site 5, April 16, 2019



Photo 2: Site 5, April 16, 2019



Photo 3: Site 5, May 16, 2019



Photo 4: Site 5, May 16, 2019



Photo 5: Site 5, June 19, 2019



Photo 6: Site 5, June 19, 2019



Photo 1: Site 6, April 16, 2019



Photo 2: Site 6, April 16, 2019



Photo 3: Site 6, May 16, 2019



Photo 4: Site 6, May 16, 2019



Photo 5: Site 6, June 19, 2019



Photo 6: Site 6, June 19, 2019

APPENDIX B: TABLES

**Table B.1: ARU Stations UTM Coordinates at the Walker Aggregates
Duntroon Pit Study Site**

Station	UTM Coordinate	
	Easting	Northing
1	558849	4915550
2	559070	4915566
3	559265	4915517
4	559777	4915725
5	560348	4915470
6	559072	4914241

Table B.2: Amphibians Incidentally Observed at Survey Stations on the Walker Aggregates Duntroon Pit Study Site

Station		Incidental Observations
1	4/16/2019	No amphibians seen or heard.
	5/16/2019	Green Frog observed (1).
	6/19/2019	Green Frog observed (1).
2	4/16/2019	No amphibians seen or heard.
	5/16/2019	Chorus Frogs calling (30), Spring Peeper calling (1).
	6/19/2019	No amphibians seen or heard.
3	4/16/2019	No amphibians seen or heard.
	5/16/2019	Spotted Salamander egg mass (1) observed near ARU, Chorus Frogs (6) calling near ARU.
	6/19/2019	Gray Tree Frog calling (1).
4	4/16/2019	No amphibians seen or heard.
	5/16/2019	Chorus Frog (1) calling.
	6/19/2019	Green Frog (6) observed.
5	4/16/2019	No amphibians seen or heard.
	5/16/2019	Spotted Salamander egg masses (20) observed throughout pond, Leopard Frog (1).
	6/19/2019	Abundant Green Frogs and Leopard Frogs observed in pond.
6	4/16/2019	No amphibians seen or heard.
	5/16/2019	Green Frog observed (2).
	6/19/2019	Green Frog (1) and Leopard Frog (1) observed.
Other	5/16/2019	Spotted Salamander egg masses (17) observed in large flooded area along fenceline in deciduous swamp between Station 3 and Station 4.

Table B.3: Weather Conditions during Breeding Call Surveys at the Walker Aggregates Duntroon Pit Study Site (2007, 2018 and 2019)

Survey Round	Survey Date	Time	WEATHER			
			Minimum Daily Temperature °C	Maximum Daily Temperature °C	Total Daily Precipitation	Beaufort Wind Scale
Survey 1	4/23/2019	21:50	4	18	4	0 - 1
Survey 2	5/20/2019	21:50	6	17	0	0 - 1
Survey 3	6/18/2019	21:50	11	19	0	0 - 1
Survey 1	4/30/2018	20:29	5	14	0	-
Survey 2	5/25/2018	20:57	10	20	1	-
Survey 3	6/14/2018	21:11	13	21	0	-
Survey 1	4/30/2007	20:30	-	12	0	0
Survey 2	5/22/2007	21:10	-	13	0	1-2
Survey 3	6/14/2007	21:45	-	19	0	0

Note: Breeding call surveys in 2007 were completed on site, compared to 2018 which were recorded by ARU and analyzed at desktop. Recorded weather conditions reflect the difference in survey method.

Table B.4: Comparison of Breeding Call Survey Results from the Walker Aggregate Duntroon Pit Study Site (2019, 2018, 2007)

Station	Survey Round	Survey Year	Wood Frog (WOFR)	Spring Peeper (SPPE)	Western Chorus Frog (CHFR)	American Toad (AMTO)	Green Frog (GRFR)	Gray Treefrog (GRTF)
1	April	2019	1-2	2-15				
	May			2-25				
	June							
	April	2018	1-2	2-10				
	May			2-5				1-3
	June							
	April	2007		3	1-4			
	May			3		1-2		
	June						1-3	1-1
2	April	2019	2-8	3	1-2			
	May			3	1-3			
	June							1-2
	April	2018		1-4	1-3			
	May			2-20				1-2
	June							
	April	2007	1-2	3	3			
	May			2-30		1-1		
	June							2-8
3	April	2019		3	1-2			
	May			3	1-2			
	June							
	April	2018			1-3			
	May			3				
	June							
4	April	2019	2-10	1-2	2-6			
	May			2-8	1-1		1-1	
	June							1-1
	April	2018			2-10			
	May			1-3				
	June							
	April	2007	1-5		2-20			
	May			2-30				
	June							
5	April	2019	1-1	2-30				
	May			3				2-8
	June						1-2	
	April	2018			2-4			
	May			2-20		1-2	2-4	2-5
	June						2-4	
	April	2007		2-40	1-5			
	May			3			1-2	1-2
	June						1-3	1-5
6	April	2019		1-3				
	May			2-10				
	June							
	April	2018						
	May			2-8				
	June							



**Duntroon Quarry Expansion,
Wetland Vegetation Monitoring:
2019**

FINAL REPORT

April 23, 2020

File: 62602732

Prepared for:


Walker Aggregates Inc.

Prepared by:


Stantec Consulting Ltd.
1-70 Southgate Drive
Guelph, ON N1G 4P5
T: (519) 836-6050
F: (519) 836-2493

Sign-off Sheet

This document entitled Duntroon Quarry Expansion, Wetland Vegetation Monitoring: 2019 was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Walker Aggregates Inc. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by 
(signature)

Brian Miller Tech. Dipl.
Botanist/Ecologist

Reviewed by 
(signature)

Melissa Cameron, M.Sc., M.L.A., OALA
Ecologist/Landscape Architect

cn \\cd1220-f02\01609\active\62602732\natural environment\annual amp monitoringrpts\2019\wetland vegetation report\rpt_62602732_duntroon_wetland_veg_mon_2019_20200423_fin.docx



Table of Contents

1.0	INTRODUCTION	1.1
2.0	METHODOLOGY	2.1
2.1	VEGETATION MONITORING	2.1
2.2	QUALITATIVE PHOTOGRAPHIC MONITORING	2.2
2.3	DATA ANALYSIS	2.2
3.0	RESULTS	3.1
3.1	VEGETATION MONITORING	3.1
3.1.1	Transect 1	3.1
3.1.2	Transect 2	3.2
3.1.3	Transect 3	3.3
3.1.4	Transect 4	3.3
3.1.5	Transect 5	3.4
3.1.1	Transect 6	3.5
4.0	DISCUSSION	4.1
4.1	CONCLUSIONS	4.2

LIST OF TABLES

Table 1:	Wetland Vegetation Transects in Relation to Wetland Features and Amphibian Monitoring Stations	2.1
Table 2:	Floristic Quality Assessment	4.1

LIST OF APPENDICES

APPENDIX A FIGURES

- Figure H.1: RR2 Transect Locations
- Figure H.2: ANSI Wetland Transect Locations
- Figure H.3: RR6 Wetland Transect Locations

APPENDIX B PHOTOGRAPHIC RECORD (2019)

APPENDIX C FIELD DATA SHEETS (2019)

APPENDIX D VEGETATION PLOT DATA SUMMARY & ANALYSIS (2019)



1.0 INTRODUCTION

Ecological monitoring, including wetland monitoring, is a component of the Walker Aggregates Inc. Duntroon Expansion Quarry Adaptive Management Plan (AMP; Stantec and Hims Geoenvironmental 2013). The Long Term Trend Ecological Monitoring (LTTEM) program was developed to supplement the information from the Long Term Trend Water Monitoring (LTTWM) program with information about the health and functioning of the natural heritage features in the vicinity of the Expansion Quarry.

The wetland component of the LTTEM focuses on amphibian vernal breeding pools and ensuring hydroperiods are suitable for continued hydrophytic plant growth in the surrounding wetland zones. Wetland water level monitoring is conducted as part of the Performance Indicator Trigger Monitoring (PITM) and the LTTWM programs and will be interpreted from a natural heritage perspective. Ecological monitoring to complement the water level monitoring includes two components: vegetation monitoring and wildlife monitoring. Vegetation monitoring was initiated in 2019 at wetlands within the Rob Roy Swamp PSW Complex (RR2 and RR6) and ANSI wetlands A & B. This summary report describes the methods and results from 2019 (baseline) surveys and will be updated annually as part of the AMP reporting schedule.



2.0 METHODOLOGY

A general methodology for wetland vegetation monitoring was presented in the 2013 AMP. More detailed monitoring and data analysis methods are presented below.

2.1 VEGETATION MONITORING

Transects to monitor wetland vegetation were established in 2019 in each wetland area from the perimeter of the wetland to the selected drive point monitor where surface water monitoring is undertaken. In total, six vegetation monitoring transects (Transects 1 to 6) were established on the Subject Lands as shown on figures H.1 to H.3 of the AMP (2013; Appendix A). These will be monitored in future years to compare to the baseline (2019) data. The transects correspond with existing wetland features and amphibian monitoring stations as shown in Table 1.

Table 1: Wetland Vegetation Transects in Relation to Wetland Features and Amphibian Monitoring Stations

Transect	Wetland Feature	Nearest Amphibian Monitoring Station
T-1	Rob Roy Swamp PSW Complex (RR2)	Station 2
T-2	Rob Roy Swamp PSW Complex (RR2)	Station 3
T-3	ANSI wetland A	Station 4
T-4	ANSI wetland B	Station 5
T-5	Rob Roy Swamp PSW Complex (RR6)	Station 6
T-6	Rob Roy Swamp PSW Complex (RR6)	Station 6

Permanent 2 m x 2 m plots were established at the beginning and end of each transect: one near the edge, and one centrally located near the designated drivepoint. The corners of each plot were marked with metal pin flags and a wooden stake was placed in the centre of the plot. Coordinates of the plots were also recorded using a sub-metre GPS unit.

In each monitoring plot, several observations were made in order to accurately characterize the current conditions. A description of the canopy and shrub-layer within the plot was recorded, including information on the species present, and percent cover of each species within the plot. Species presence and percent cover was also documented for species in the ground-layer. The general health of mature trees (greater than 10 cm diameter at breast height) within 5 m of each plot and standing water depth within the plot were recorded.

Completed field sheets listing all species observed in each plot are in Appendix C. As evident in the field sheets and due to the stratified nature of ground-layer species, two or more species may overlap in the same space at varying heights, and therefore the sum of percent cover by species in any one plot may exceed 100%. An estimate of total percent cover in each plot was recorded in order to characterize the amount of vegetation versus open soil in each plot.



2.2 QUALITATIVE PHOTOGRAPHIC MONITORING

Photographic monitoring provides a visual representation of the current conditions on the Subjects Lands, allowing for annual comparisons. Given the detailed vegetation monitoring being undertaken, the photographic monitoring was intended to provide a qualitative description of each transect to supplement the quantitative vegetation data. The number, location and direction of each photograph at each plot and along each transect was recorded for continuity over the duration of the monitoring program.

Photographic monitoring from September 2019 is included in this report (Appendix B).

2.3 DATA ANALYSIS

A floristic quality assessment was completed for each plot based on the plant list collected, following methods described in Oldham et al. (1995). The floristic quality assessment for wetland communities includes identification of sensitive native plant species, “natural” quality and wetland tolerance of plant species within a plot.

Identification of potentially sensitive native plant species was based on their assigned Coefficient of Conservatism (C) value, as determined by Oldham et al. (1995). This C value, ranging from 0 (low) to 10 (high), is based on a species’ tolerance of disturbance and fidelity to a specific natural habitat. Species with a C value of 8, 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters and are considered habitat sensitive species and are usually typical of high-quality plant communities. The mean C (average C) was calculated for each plot.

The Floristic Quality Index (FQI) is a numerical value used to evaluate the natural quality of a site based on the C values. The greater the richness of conservative sensitive species at a site the higher the FQI will be and the more “natural” and high quality the site. These indices are useful to track changes in floristic quality of a site over time. The FQI value was calculated for each plot by multiplying the mean C by the square root of the total number of native species present in each plot.

Co-efficient of Wetness (CW) is another part of the floristic quality assessment. Identification and ranking of wetland plants (CW value) were determined by Oldham et al. (1995). Several updates to the wetland rankings are provided in recent plant lists by the Natural Heritage Information Centre (NHIC 2019). CW ranges on an integer scale from –5 (strongest affinity to wetland conditions) to +5 (least affinity to wetland conditions). Plants within the CW range -2 and -3 are considered facultative and CW of -4 or -5 are obligate in their preference to wetland conditions. The mean CW (average CW) was calculated for each plot.



3.0 RESULTS

Below is a summary of data collected during the first year (2019) of terrestrial vegetation monitoring. A photographic record is provided in Appendix B. Vegetation monitoring results are summarized throughout Section 3.1 and are provided in Appendices C (field forms) and D (data analysis). The floristic quality assessment for each plot is provided in Appendix D.

3.1 VEGETATION MONITORING

3.1.1 Transect 1

Transect 1 is oriented north to south and is located within a mature deciduous swamp dominated by Freeman's (swamp) maple next to an agricultural field (hay) to the north (Figure H.1). Transect 1 crosses the west edge of a previously mapped deep vernal pooling area within the swamp. No standing water was present along Transect 1 in September 2019, but evidence that standing water occurred here earlier in the season was present (e.g. hummocks, unvegetated low areas of swamp floor). Surface soil at both plots in Transect 1 was dry.

Two vegetation monitoring plots (T1-1 and T1-2) were established along this transect in 2019.

Plot T1-1: Canopy cover in this plot consists of black ash growing inside the plot (50%) and Freeman's maple (30%) hanging over the plot. Trees within and adjacent the plot were in good condition. The ground layer is densely dominated by sensitive fern (80% cover) with overall cover at approximately 90%. No exotic or rare native species were observed in Plot T1-1. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T1-1 was 5.0 and the FQI was 17.3 in 2019. One conservative species (bristle-stalked sedge, *Carex leptalea*) with a C value of 8 was recorded in the plot. This species covered approximately 5% of the plot.

The average (mean) CW of Plot T1-1 was -3.6 in 2019. This low value supports field observations of wetland conditions along transect 1 and at the plot.

Plot T1-2: No trees originate inside the plot, but large Freeman's (swamp) maple hang over the plot (60% cover). Green ash to a lesser degree (10% cover) hangs over the plot from the outside. Trees adjacent the plot were in good condition. The ground layer is moderately covered (40%) by herbaceous species. The most abundant species was sensitive fern which covered approximately 25% of the plot. No exotic or rare native species were observed in Plot T1-1. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T1-2 was 4.0 and the FQI was 11.3 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.



DUNTROON QUARRY EXPANSION, WETLAND VEGETATION MONITORING: 2019

Results
April 23, 2020

The average (mean) CW of Plot T1-2 was -3.0 in 2019. This low value supports field observations of wetland conditions along transect 1 and at the plot.

3.1.2 Transect 2

Transect 2 is oriented west to east and is located within a mature deciduous swamp dominated by Freeman's (swamp) maple (Figure H.1). Transect 2 is located on the other side of the maple swamp from Transect 1. Transect 2 also crosses a previously mapped vernal pooling area. However, this pooling area was noted as shallower than the pooling near Transect 1. No standing water was present along Transect 2 in September 2019, but evidence that standing water occurred here earlier in the season was present (e.g. hummocks, unvegetated low areas of swamp floor). Surface soil at both plots in Transect 2 was dry.

Two vegetation monitoring plots (T2-1 and T2-2) were established along this transect in 2019.

Plot T2-1: No trees originate inside the plot, but large Freeman's (swamp) maple hang over the plot (70% cover). White elm to a lesser degree (15% cover) hangs over the plot from the outside. Trees adjacent the plot were in good condition. The ground layer is moderately covered (50%) by herbaceous species. The most abundant species was necklace sedge (*Carex projecta*) which covered approximately 20% of the plot. Several of the ground layer species in this plot are growing on a rotting log inside the plot rather than on the floor of the swamp. No exotic or rare native species were observed in Plot T2-1. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T2-1 was 4.6 and the FQI was 15.4 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T2-1 was -1.9 in 2019. This moderately low value supports field observations of wetland conditions along transect 2 and at the plot.

Plot T2-2: No mature trees originate inside the plot, but mature Freeman's (swamp) maple hang over the plot (70% cover). Trees adjacent the plot were in good condition. The ground layer was moderately covered (60%) by low shrubs and small tree seedlings or saplings. Only one herbaceous species was observed at 5% cover (interior sedge, *Carex interior*). The most abundant species was necklace sedge (*Carex projecta*) which covered approximately 20% of the plot. No exotic or rare native species were observed in Plot T2-2. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T2-2 was 5.8 and the FQI was 13.0 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T2-2 was -4.2 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.



DUNTROON QUARRY EXPANSION, WETLAND VEGETATION MONITORING: 2019

Results
April 23, 2020

3.1.3 Transect 3

Transect 3 is oriented west to east and is located within a pocket of dense thicket swamp (Figure H.2). No standing water was present along Transect 3 in September 2019, but evidence that standing water occurred here earlier in the season was present. Surface soil at both plots in Transect 3 dry to moist.

Two vegetation monitoring plots (T3-1 and T3-2) were established along this transect in 2019.

Plot T3-1: No trees originate inside the plot, but balsam poplar hangs over the plot (70% cover). Trees adjacent the plot were in good condition. The ground layer was densely covered (80%) by red-osier dogwood shrubs and to a lesser extent riverbank grape vine (30%). Only two herbaceous species were observed in the plot (sensitive fern and Tuckerman's sedge) at 5% cover each. No exotic or rare native species were observed in Plot T3-1. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T3-1 was 3.3 and the FQI was 6.5 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T3-1 was -2.8 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.

Plot T3-2: No trees originate inside the plot, but green ash hangs over the plot (50% cover). The green ash and other trees adjacent the plot were in good condition. The ground layer was moderately covered (60%) by herbaceous species and red-osier dogwood shrubs. The most abundant species was sensitive fern (40% cover), red-osier dogwood (20%) and reed canary grass (15%). One exotic species (bittersweet nightshade) was observed in the plot (5% cover). No rare native species were observed in Plot T3-2. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T3-2 was 3.4 and the FQI was 11.3 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T3-2 was -2.6 in 2019. This moderately low value supports field observations of wetland conditions along transect 2 and at the plot.

3.1.4 Transect 4

Transect 4 is oriented southwest to northeast and is located within a mature eastern white cedar mixed swamp community (Figure H.2). No standing water was present along Transect 4 in September 2019. Surface soil at both plots in Transect 4 was dry to moist.

Two vegetation monitoring plots (T4-1 and T4-2) were established along this transect in 2019.

Plot T4-1: No trees originate inside the plot, but green ash hangs over the plot (50% cover). The green ash and other trees adjacent the plot were in good condition. The ground layer was densely covered (100%) by herbaceous species. The most abundant species were fowl manna grass (75% cover), spotted



DUNTROON QUARRY EXPANSION, WETLAND VEGETATION MONITORING: 2019

Results
April 23, 2020

Joe pye weed (40% cover) and panicked aster (20% cover). No exotic or rare native species were observed in Plot T4-1. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T4-1 was 3.3 and the FQI was 11.3 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T4-1 was -3.3 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.

Plot T4-2: No trees originate inside the plot, but eastern white cedar hangs over the plot (50% cover). Trees adjacent the plot were in good condition. The ground layer was moderately densely covered (70%) by herbaceous species. The most abundant species was sensitive fern (50% cover). One exotic species (bittersweet nightshade) was observed in the plot (10% cover). No rare native species were observed in Plot T4-2. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T4-2 was 3.3 and the FQI was 9.8 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T4-2 was -2.7 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.

3.1.5 Transect 5

Transect 5 is oriented north to south and is located within an inundated eastern white cedar swamp and hardwood mixed swamp. The wetland along Transect 5 was heavily inundated with water throughout during September 2019 surveys.

Two vegetation monitoring plots (T5-1 and T5-2) were established along this transect in 2019.

Plot T5-1: No trees originate inside the plot, but black ash slightly hangs over the plot (5% cover). A few of the black ash trees adjacent the plot appeared to be in decline. Other black ash were healthy and adjacent eastern white cedar were healthy. The ground layer was moderately densely covered (65%) by herbaceous species. The most abundant species was reed canary grass (60% cover). One exotic species (bittersweet nightshade) was observed in the plot (5% cover). No rare native species were observed in Plot T5-1. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T5-1 was 2.7 and the FQI was 7.1 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T5-1 was -3.7 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.

Plot T5-2: No trees originate inside the plot, but red maple hangs over the plot (50% cover). The red maple trees were healthy, while the eastern white cedar and yellow birch adjacent the plot were dead or dying. Some Balsam fir adjacent the plot were dead while others were healthy. The ground layer was moderately covered (40%) by herbaceous species. The most abundant species were fowl mannagrass



DUNTROON QUARRY EXPANSION, WETLAND VEGETATION MONITORING: 2019

Results

April 23, 2020

(20% cover) and broad-leaved cattail (15% cover). One exotic species (bittersweet nightshade) was observed in the plot (10% cover). No rare native species were observed in Plot T5-2. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T5-2 was 3.3 and the FQI was 11.7 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T5-2 was -3.5 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.

3.1.1 Transect 6

Transect 6 is oriented northeast to southwest and is located within an open eastern white cedar swamp. Many or most of the cedar trees in the swamp appear to have died in recent years. It was not possible to establish a full length transect in 2019 due to pockets of standing water and soft mucky swamp bottom. Evidence of heavy inundation throughout the transect and swamp earlier in the season was evident in September 2019. Surface soil at both plots in Transect 6 was moist to wet.

Two vegetation monitoring plots (T6-1 and T6-2) were established along this partial transect in 2019.

Plot T6-1: No living trees originate inside or adjacent the plot. Several eastern white cedar and white elm adjacent the plot and along the transect are dead. The ground layer was moderately densely covered (75%) by reed canary grass. This is the only species noted in the plot. No exotic or rare native species were observed in Plot T6-1. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T6-1 was 0.0 and the FQI was 0.0 in 2019. These values are 0 because the C value of reed canary grass is 0 (meaning this species is weedy and it grows in a variety of habitats) and it is the only species recorded in the plot. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T6-1 was -3.0 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.

Plot T6-2: No living trees originate inside or adjacent the plot. Several eastern white cedar and one white elm adjacent the plot are dead. One red maple next to the plot is healthy. The ground layer was moderately covered (50%) by herbaceous species and willow shrubs. The most abundant species in the plot were cyperus-like sedge (*Carex pseudocyperus*) at 20% cover, pussy willow (30% cover) and an immature/undeveloped grass species at 15% cover. No exotic or rare native species were observed in Plot T6-2. Appendix D is a complete list of plant species observed in this plot in 2019.

The mean C of Plot T6-2 was 4.7 and the FQI was 8.1 in 2019. No conservative species with a C value of 8, 9 or 10 were observed in the plot.

The average (mean) CW of Plot T6-2 was -4.3 in 2019. This low value supports field observations of wetland conditions along transect 2 and at the plot.



4.0 DISCUSSION

All 6 monitoring transects were established in natural wetland habitats. In 2019, all 12 plots were dominated by wetland plants and all CW values are in the negative indicating wetland conditions. Beginning in 2019, this monitoring exercise will track fluctuations in species composition at each plot over time using the floristic quality index (FQI), mean C and mean CW values. The calculation of these values does not factor in the species abundance or % cover. Instead it relies on a detailed plant list and presence / absence of species. Year-to-year variations in species abundance and % cover are to be expected in response to natural fluctuations, such as local hydrology, changes in sunlight levels (canopy closure) and climatic conditions. Nevertheless, species abundance and % cover data was collected in 2019 and was used to describe the conditions and characteristics of each plot (Section 3.1).

An overview of year one floristic assessment data is presented in Table 2 below. Future years of data will be added to this table for comparisons.

Table 2: Floristic Quality Assessment

	Total Native Species	Total Exotic Species	Mean C	FQI	No. of Conservative Species (C of 8, 9 or 10)	Mean CW
T1-1 (2019)	12	0	5.0	17.3	1	-3.6
T1-2 (2019)	8	0	4.0	11.3	0	-3.0
T2-1 (2019)	11	0	4.6	15.4	0	-1.9
T2-2 (2019)	5	0	5.8	13.0	0	-4.2
T3-1 (2019)	4	0	3.3	6.5	0	-2.8
T3-2 (2019)	10	1	3.4	11.3	0	-2.6
T4-1 (2019)	12	0	3.3	11.3	0	-3.3
T4-2 (2019)	8	1	3.3	9.8	0	-2.7
T5-1 (2019)	6	1	2.7	7.1	0	-3.7
T5-2 (2019)	12	1	3.3	11.7	0	-3.5
T6-1 (2019)	1	0	0.0	0.0	0	-3.0
T6-2 (2019)	3	0	4.7	8.1	0	-4.3

Vegetation Health

With respect to overall health of the natural features in the Study Lands, woody vegetation, particularly trees, are better long-term indicators of change in a vegetation community. Tree health can be influenced by several factors such as flooding, insect pests, fungal pathogens, windfall, ice storms, natural decline, competition with other trees and direct impacts to stem or roots.



DUNTROON QUARRY EXPANSION, WETLAND VEGETATION MONITORING: 2019

Discussion
April 23, 2020

The trees in the study area were generally healthy with a few exceptions. The largest exception is the trees located in the swamp along Transect 6 where many or most of the dominant eastern white cedar trees are dead as well as other associate trees (e.g. white elm), however the cause of mortality is unclear. Quarry operation and surface water monitoring information provided by Walker (2019) indicated that although modifications to the settling ponds in the existing quarry before 2019 were made in order to establish a hydraulic barrier between the quarry and wetland RR6, where Transects 5 and 6 are located, the purpose was to maintain water levels in the wetland. RR6 is known to be wet throughout the year as drivepoint monitoring stations DP1 (corresponding with Transect 6) and DP2 (corresponding with Transect 5) have never been dry and surface water levels can reach over 1m in depth. Discharge from the existing quarry runs along the hydro corridor between Transects 5 and 6 and is released close to Grey Rd. 31. The amount of water discharged in 2019 was similar to that of previous years. Future monitoring years may provide more insight into the change experienced by this wetland feature.

4.1 CONCLUSIONS

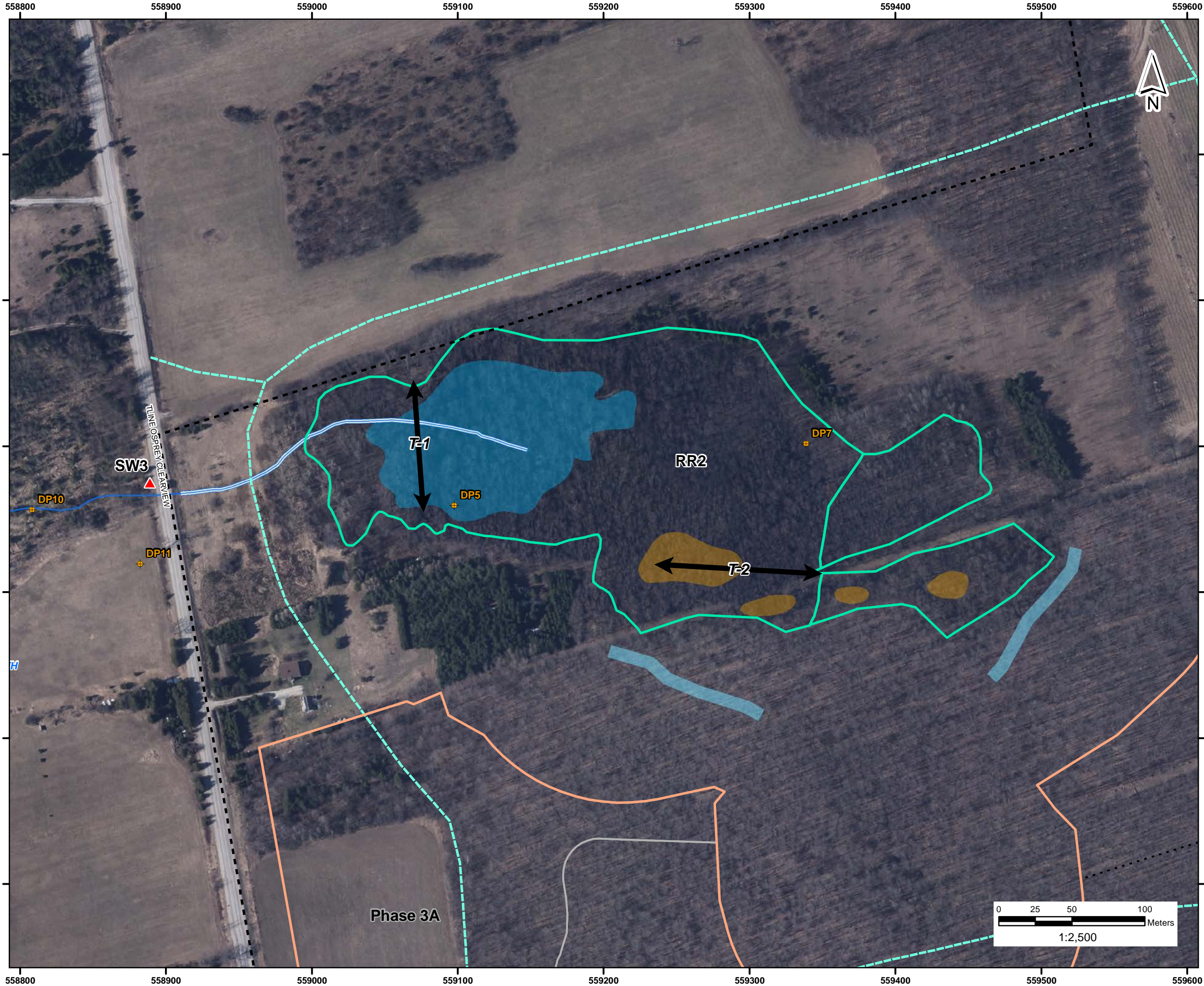
This report represents the baseline (first) year of terrestrial monitoring on the Subject Lands. Future years of monitoring will provide opportunities to observe any changes in vegetation composition of the wetland transects.



APPENDIX A FIGURES



\\Cd1220-0201609active62602732\Drawing\GISMXD\Adaptive_Management_Plan\2018_AMP\62602732_AMP_FigH-1_RR2_TransectLocations_20181220.mxd
Revised: 2018-12-21 By: dharvey



Legend

- Walker Owned Lands
- Limit of Extraction - Walker
- Phase Boundary
- Phase 4 - Lower Bench
- Surface Water Monitoring Station and Designation (Jagger Hims, 2005)
- Surface Water Monitoring Station with Observed Seepage (within 120m of the proposed licensed area)
- Surface Water Monitoring Station - Karst 2007
- Drive Point Monitoring Location
- Transect
- Karst Infiltration Area
- Surface Trench Discharge
- Dual purpose Monitoring/Recharge Wells
- Wetland ⁴
- Interpreted Wetland Catchment Areas
- Approximate location of diffuse overflow channel between ANSI A and ANSI B
- Intermittent Surface Water Features and Fisheries Habitat
- Undefined Braided Channel
- Dug Agricultural Ponds
- Vernal Pools
- Approximate Location of Deeper Vernal Pools
- Approximate Location of Shallower Vernal Pools

Notes

- Coordinate System: UTM NAD 83 - Zone 17(N)
- Data Sources: Ontario Ministry of Natural Resources, © Queens Printer Ontario, 2009.
- Image Source: First Base Solutions WMS, 2008
- Wetland boundaries approximated using handheld GPS and air photo except where adjacent to proposed license boundary, surveyed in consultation with MNR.

December 2018
62602732

Client / Project

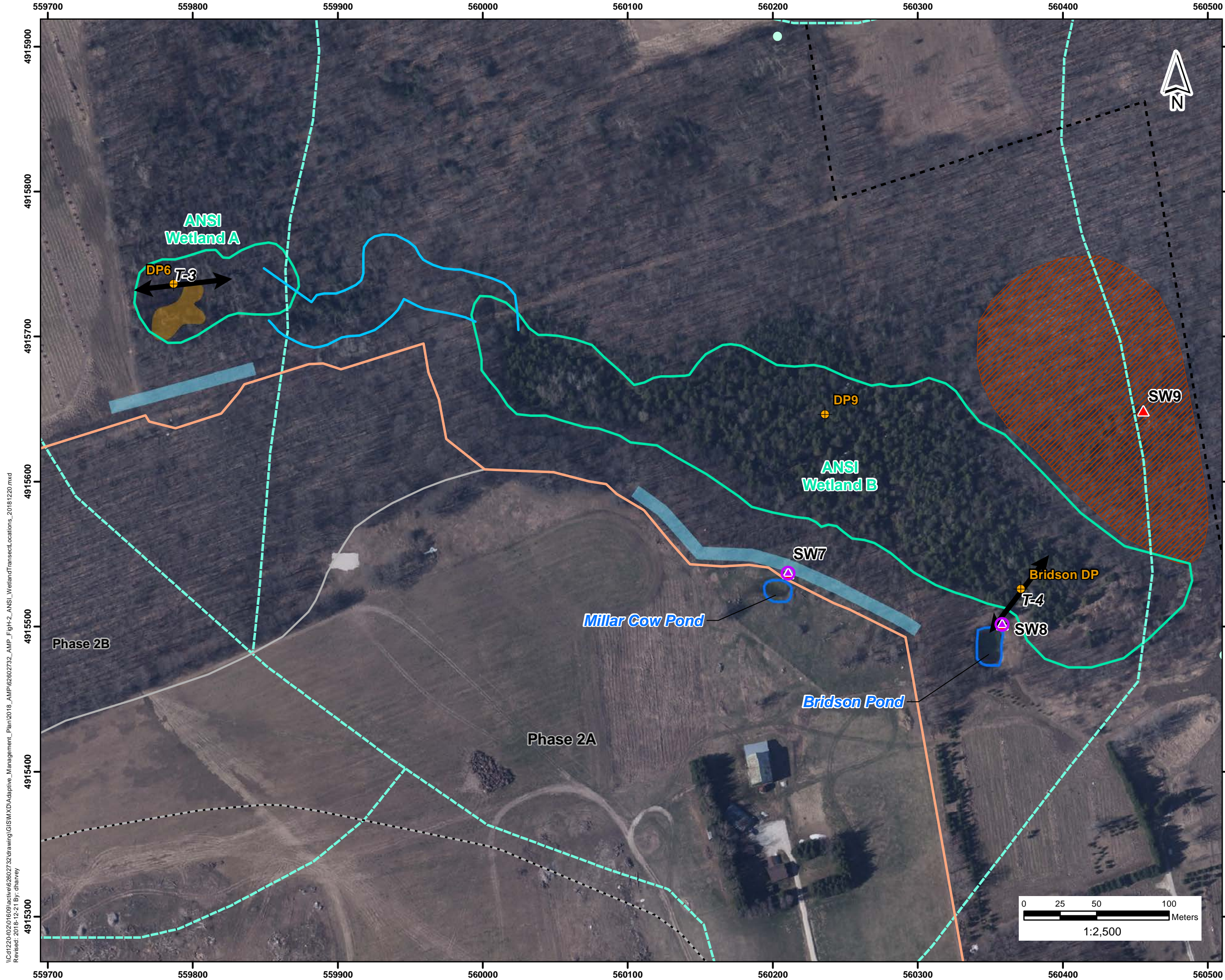
WALKER AGGREGATES INC.
DUNTROON QUARRY EXPANSION
ADAPTIVE MANAGEMENT PLAN

Figure No.

H.1

Title

RR2 TRANSECT LOCATIONS



Legend

- Walker Owned Lands
- Limit of Extraction - Walker
- Phase Boundary
- Phase 4 - Lower Bench
- Surface Water Monitoring Station and Designation (Jagger Hims, 2005)
- Surface Water Monitoring Station with Observed Seepage (within 120m of the proposed licensed area)
- Surface Water Monitoring Station - Karst 2007
- Drive Point Monitoring Location
- Transect
- Karst Infiltration Area
- Surface Trench Discharge
- Dual purpose Monitoring/Recharge Wells
- Wetland ⁴
- Interpreted Wetland Catchment Areas
- Approximate location of diffuse overflow channel between ANSI A and ANSI B
- Intermittent Surface Water Features and Fisheries Habitat
- Undefined Braided Channel
- Dug Agricultural Ponds
- Vernal Pools
- Approximate Location of Deeper Vernal Pools
- Approximate Location of Shallower Vernal Pools

Notes

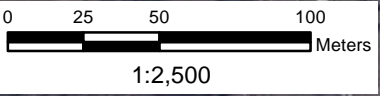
- Coordinate System: UTM NAD 83 - Zone 17(N)
- Data Sources: Ontario Ministry of Natural Resources, © Queens Printer Ontario, 2009.
- Image Source: First Base Solutions WMS, 2008.
- Wetland boundaries approximated using handheld GPS and air photo except where adjacent to proposed license boundary, surveyed in consultation with MNR.

December 2018
62602732

Client / Project
WALKER AGGREGATES INC.
DUNTROON QUARRY EXPANSION
ADAPTIVE MANAGEMENT PLAN

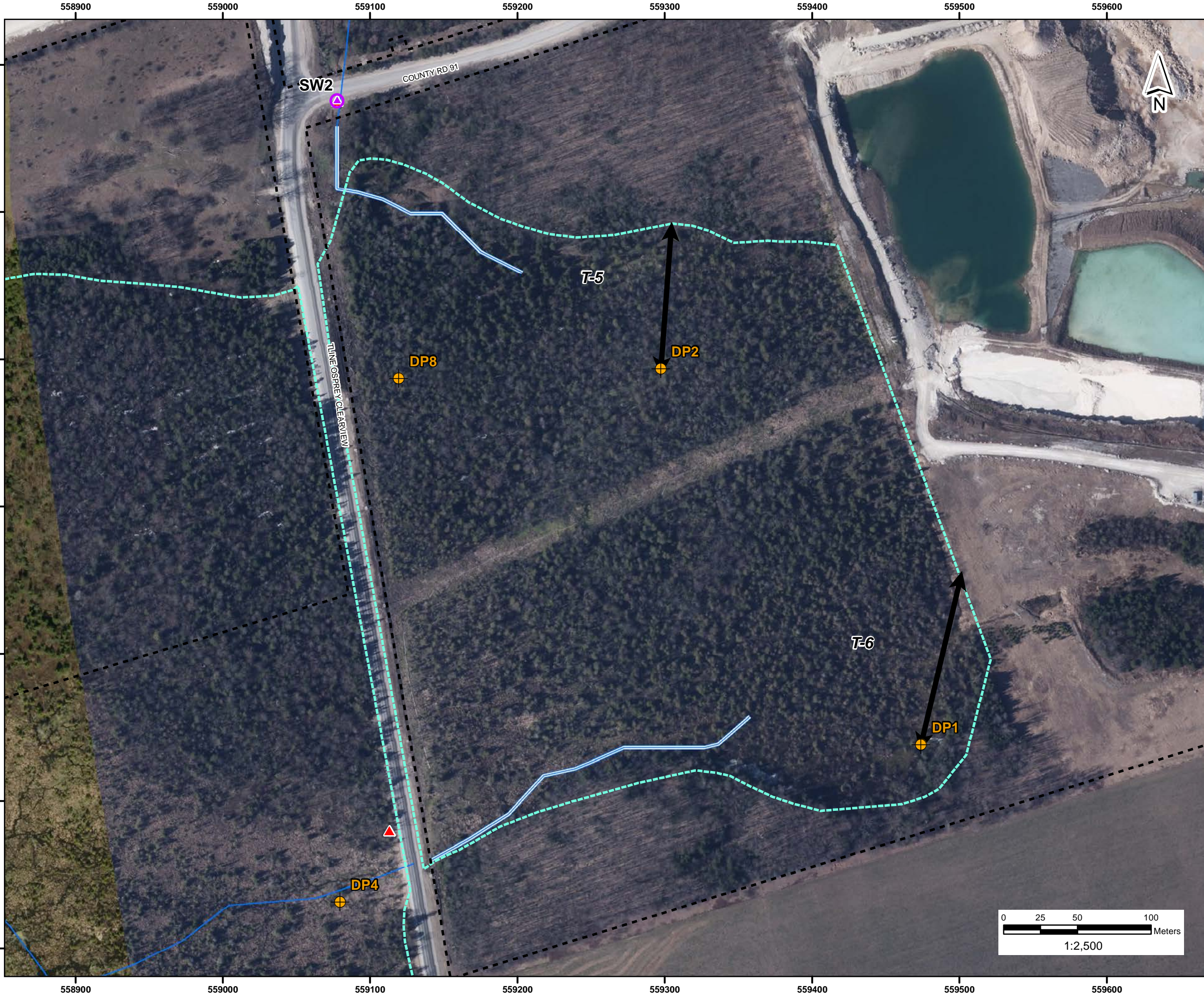
Figure No.
H.2

Title
ANSI WETLAND TRANSECT LOCATIONS



\\Cd1220-0201609active62602732drawing\\GIS\\MXD\\Adaptive_Management_Plan\\2018-12-21 By: dharvey
Revised: 2018-12-21 By: dharvey

\\Cd1220-020101609\\active\\62602732\\drawing\\GIS\\MXD\\Adaptive_Management_Plan\\2018_AMP\\62602732_AMP_FigH-3_RR6_WetlandTransectLocations_20181220_DH.mxd
Revised: 2018-12-21 By: dharvey



Legend

- Walker Owned Lands
- Limit of Extraction - Walker
- Phase Boundary
- Phase 4 - Lower Bench
- Surface Water Monitoring Station and Designation (Jagger Hims, 2005)
- Surface Water Monitoring Station with Observed Seepage (within 120m of the proposed licensed area)
- Surface Water Monitoring Station - Karst 2007
- Drive Point Monitoring Location
- Transect
- Karst Infiltration Area
- Surface Trench Discharge
- Dual purpose Monitoring/Recharge Wells
- Rob Roy Swamp PSW Complex
- Wetland ⁴
- Interpreted Wetland Catchment Areas
- Approximate location of diffuse overflow channel between ANSI A and ANSI B
- Intermittent Surface Water Features and Fisheries Habitat
- Undefined Braided Channel
- Dug Agricultural Ponds
- Vernal Pools
- Approximate Location of Deeper Vernal Pools
- Approximate Location of Shallower Vernal Pools

Notes

- Coordinate System: UTM NAD 83 - Zone 17(N)
- Data Sources: Ontario Ministry of Natural Resources, © Queens Printer Ontario, 2009.
- Image Source: First Base Solutions WMS, 2008.
- Wetland boundaries approximated using handheld GPS and air photo except where adjacent to proposed license boundary, surveyed in consultation with MNR.

December 2018
62602732

Client / Project

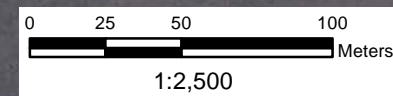
WALKER AGGREGATES INC.
DUNTROON QUARRY EXPANSION
ADAPTIVE MANAGEMENT PLAN

Figure No.

H.3

Title

RR6 WETLAND TRANSECT
LOCATIONS



APPENDIX B

PHOTOGRAPHIC RECORD (2019)





Photo 1: Transect 1, Plot 1 – September 12, 2019



Photo 2: Transect 1, Plot 1 – September 12, 2019



Photo 3: Transect 1 Habitat Photo (Mid-transect)



Photo 4: Transect 1 Habitat Photo (Mid-transect)



Photo 5: Transect 1, Plot 2 – September 12, 2019



Photo 6: Transect 1, Plot 2 – September 12, 2019



Photo 7: Transect 2, Plot 1 – September 12, 2019



Photo 8: Transect 2, Plot 2 – September 2019



Photo 9: Transect 2 Habitat Photo (Mid-transect)



Photo 10: Transect 2 Habitat Photo (Mid-transect)



Photo 11: Transect 3, Plot 1 – September 12, 2019



Photo 12: Transect 3, Plot 2 – September 12, 2019



Photo 13: Transect 4, Plot 1 – September 12, 2019



Photo 14: Transect 4, Plot 2 – September 12, 2019



Photo 15: Transect 4 Habitat Photo (Mid-transect)



Photo 16: Transect 4 Habitat Photo (Mid-transect)



Photo 17: Transect 5, Plot 1 – September 13, 2019



Photo 18: Transect 5, Plot 2 – September 13, 2019



Photo 19: Transect 5 Habitat Photo (Mid-transect)



Photo 20: Transect 5 Habitat Photo (Mid-transect)



Photo 21: Transect 6, Plot 1 – September 13, 2019



Photo 22: Transect 6, Plot 2 – September 13, 2019



Photo 23: Transect 6 Habitat Photo



Photo 24: Transect 6 Habitat Photo

APPENDIX C

FIELD DATA SHEETS (2019)

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 1 Plot: 1
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Black Ash - In plot. Acer x free. - Hanging in.	50% 30%
Shrub	* See below	

Ground-layer species in Plot and % cover by species
(Overall % Cover of Ground-layer: 90)

Onoclea sens.	80%	Scutellaria later.	<5%
Carex brunn	5%		
Eutrochium macu.	5%		
* Rhamnus alni.	5%		
C ✓ Carex projecta	5%		
Equisetum arve.	15%		
Carex leptalea	5%		
Carex intumescens			
* Rubus pube.	<5%		
Lycopus unifl.	<5%		

Water Depth: No standing water. Soil dry/fresh.
Photos Taken:

General Health of Trees within 5m of Plot: Good
Acer x free. Black Ash.

Additional Notes (habitat, disturbance, incidental wildlife):

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 1 Plot: 2
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Green Ash - Hanging in Acer x free - Hanging in	10% 60%
Shrub	Prunus virg. - Hanging in. * See below	<5%

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: 40)		
Onoclea sens.	25%	
Carex tucker.	5%	
Equisetum arve.	5%	
Symphyo. later.	<5%	
Acer x free. (seedlings)	5%	
Ulmus amer. (seedling)	5%	
Lycopus unifl.	<5%	
* Rubus pube.	<5%	

Water Depth: No standing water. At least half the plot has standing water in spring.
Photos Taken:

Soil dry/fresh.

General Health of Trees within 5m of Plot: Good
Acer x free. Green Ash.

Additional Notes (habitat, disturbance, incidental wildlife):

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 2 Plot: 1
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Ulmus amer. - Hanging in Acer x free. - Hanging in	15% 70%
Shrub	* See below	

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: 50)				Species growing on rotting log:
C ✓	Carex projecta	20%		Aralia nudic. 15%
	Bidens connata	5%		Oxalis mont. 15%
	Lycopus unifl.	5%		Rubus pube. 10% *
	Acer x free. (seedlings)	5%		Dryopteris cart. 10%
	Viola sp.	<5%		Viola sp. <5%
	Glyceria striata	5%		
	Arisaema triph.	<5%		
*	Rubus strigosus	<5%		

Water Depth: No standing water. Portions of plot may have standing water in spring.
Photos Taken:

General Health of Trees within 5m of Plot: Good
Acer x free. White elm.

Soil dry/fresh.

Additional Notes (habitat, disturbance, incidental wildlife):

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 2 Plot: 2
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Acer x free. - hanging in	40% 70%
Shrub		

Ground-layer species in Plot and % cover by species
(Overall % Cover of Ground-layer: 60)

* Rhamnus alni. 50%
Carex cf. interior 5%
Acer x free. (seedlings) <5%
White elm (sapling) 5%
Black Ash (seedlings) 10%

Water Depth: No standing water.
Photos Taken:

General Health of Trees within 5m of Plot: Mostly good, but 1 dead mature Acer x free
and 1 dead mature Betula alle.

Additional Notes (habitat, disturbance, incidental wildlife):

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 3 Plot: 1
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Populus bals. - Hanging in	70%
Shrub	* see below	

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: 40)	
* Cornus stolon. 80%	
Oxoclea sens. 5%	
Carex tucker. 5%	
* Vitis riparia 30%	

Water Depth: No standing water. Definitely had standing water earlier in season.
Photos Taken: Soil Fresh.

General Health of Trees within 5m of Plot: Good
Pop. Bals.

Additional Notes (habitat, disturbance, incidental wildlife):

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 3 Plot: 2
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Green ash - Hanging in.	50%
Shrub	* See below	

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: 60)	
Onoclea sens. 40%	Solidago cf. cana. 5%
Phalaris arun. 15%	
* Cornus stolon. 20%	
* Solanum dulc. 5%	
Carex tucker. 5%	
Lycopus unifl. 5%	
Carex projecta 5%	
Symphyo. later. 45%	
Calamagrostis cana. 10%	
Epilobium cf. color 5%	

Water Depth: No standing water. A portion of plot definitely
Photos Taken: had standing water

General Health of Trees within 5m of Plot: Good in spring.
Green Ash. Black Ash. Freeman's Maple.

Additional Notes (habitat, disturbance, incidental wildlife):

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 4 Plot: 1
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	No woody veg. growing in plot. Green ash hanging in	50%
Shrub	None	

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: <u>100</u>)			
Eutrochium macu.	40%	Carex vulp.	25%
Symphyo. lanceo.	20%	Circaea sp	25%
Glyceria striata	75%		
Equisetum arve.	10%		
Impatiens cape.	10%		
Symphyo. puni.	15%		
Solidago rugosa	10%		
Euthamia gram.	5%		
Carex hystericina	5%		
Carex stipata	5%		

Water Depth: No standing water. Soil dry to moist.
Photos Taken:

General Health of Trees within 5m of Plot: Good
ABIES BALS. FRAX. THU OCCI.

Additional Notes (habitat, disturbance, incidental wildlife): Hummingbird

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 4 Plot: 2
Date: Sept. 12, 2019
Personnel: B. Miller, K. Zupfer
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Hanging into plot	50%
Shrub	* See below	

Ground-layer species in Plot and % cover by species
(Overall % Cover of Ground-layer: 70)

Onoclea sens.	50%	
Equisetum arve.	5%	
Glyceria striata	10%	
Lycopus unifl.	5%	
* Rubus pube.	10%	
Eutrochium macu.	5%	
* Solanum dulc.	10%	
* Fraxinus pens.	5%	
Solidago rugo.	<5%	

Water Depth: No standing water. Soil dry to moist.
Photos Taken:

General Health of Trees within 5m of Plot: Good.
THU OCCI. BET ALLE. ABIES BALS. POP BALS.

Additional Notes (habitat, disturbance, incidental wildlife):
Chickadee

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 5 Plot: 1
Date: Sept. 13, 2019
Personnel: Brian Miller
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Black Ash hanging in	5%
Shrub	*See below	

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: <u>65</u>)		
Phalaris arun.	60%	
Typha latifolia	<5%	
Bidens ceruua	<5%	
* Solanum dulc.	5%	
Glyceria cf. striata	<5%	
Bidens connata	<1%	
Catha palu.?	<1%	

Water Depth: Standing water in approx. half the plot. Plot surrounded by standing water.
Photos Taken:

General Health of Trees within 5m of Plot: ~~###~~

A few black ash in decline.

Several others healthy.

White cedar healthy.

Additional Notes (habitat, disturbance, incidental wildlife):

- Invasive solanum dulcamara.
- Abundant Tussilago farfara at edge of wetland 5m away.

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 5 Plot: 2
Date: Sept. 13, 2019
Personnel: Brian Miller
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	Hanging into plot.	50%
Shrub		

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: <u>40</u>)			
Typha lat.	15%	Lycopus unifl.	5%
Bidens cernua	<5%	Solidago rugo.	<5%
* Solanum dulc.	10%	* Rubus pube.	
Glyceria striata	20%	Scutellaria later.	
Carex stipata	5%	Betula sp. seedling	1%
Bidens connata	10%		
Symphyo. lauc.	5%		
Phalaris arun.	5%		
Galium sp.	<5%		
Impatiens cape.	10%		

Water Depth: Standing water in half the plot. Organic – mucky.
Photos Taken:

General Health of Trees within 5m of Plot:

Red Maple Healthy.
White Cedar + yellow birch either dead or dying.
Balsam Fir # → some dead. some alive.
Additional Notes (habitat, disturbance, incidental wildlife):

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 6 Plot: 1
Date: Sept. 13, 2019
Personnel: Brian Miller
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	No living trees in plot or Hanging in.	
Shrub	No shrubs.	

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: 75)	
Phalaris arun. 75%	

Water Depth: No standing water. Area was inundated in spring.
Photos Taken:

General Health of Trees within 5m of Plot: Poor/Dead soil moist.
Several dead white cedar, white elm next to plot and throughout

Additional Notes (habitat, disturbance, incidental wildlife):
Leopard frog.

Duntroon Expansion Quarry – Wetland Vegetation Monitoring
62602732

Transect #: 6 Plot: 2
Date: Sept. 13, 2014
Personnel: Brian Miller
UTM:
Community:

Layer	Dominant species above Plot and % cover by species	Overall Percent Cover of Layer
Canopy	No living trees within or hanging into plot.	
Shrub	* See below	

Ground-layer species in Plot and % cover by species (Overall % Cover of Ground-layer: 50%)	
Carex pseudocypariss 20%	
Lycopus unifl. <1%	
* Rubus sp. <1%	
* Salix discolor 30%	
Immature/Undeveloped grass 15%	
Bidens <1%	

Water Depth: No standing water. Area was inundated earlier in season.
Photos Taken:

General Health of Trees within 5m of Plot: Poor/Dead

- Several dead or dying white cedar. One large dead white elm.
- One red maple is living.

Additional Notes (habitat, disturbance, incidental wildlife):

- One black ash is living.
- One dying Balsam Fir. One dying spruce.

APPENDIX D VEGETATION PLOT DATA SUMMARY & ANALYSIS (2019)

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING

Transect 1, Plot 1

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns & Fern Allies)						
x	Equisetum arvense	Field Horsetail	S5		0	0
x	Onoclea sensibilis	Sensitive Fern	S5		4	-3
ANGIOSPERMS (Dicots)						
x	Endotropis alnifolia	Alder-leaved Buckthorn	S5		7	-5
x	Eutrochium maculatum	Spotted Joe Pye Weed	S5		3	-5
x	Fraxinus nigra	Black Ash	S4		7	-3
x	Lycopus uniflorus	Northern Water-horehound	S5		5	-5
x	Rubus pubescens	Dewberry	S5		4	-3
x	Scutellaria lateriflora	Mad Dog Skullcap	S5		5	-5
ANGIOSPERMS (Monocots)						
x	Carex brunnescens	Brownish Sedge	S5		6	-3
x	Carex intumescens	Bladder Sedge	S5		6	-3
x	Carex leptalea	Bristle-stalked Sedge	S5		8	-5
x	Carex projecta	Necklace Sedge	S5		5	-3

2019	FLORISTIC ASSESSMENT FOR TRANSECT 1, PLOT 1
12	Total Species
12	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
5.0	Average Coefficient of Conservatism (mean C)
17.3	Floristic Quality Index (FQI)
1	Highly sensitive plant species with C value of 8, 9 or 10
-3.6	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING

Transect 1, Plot 2

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns & Fern Allies)						
x	Equisetum arvense	Field Horsetail	S5		0	0
x	Onoclea sensibilis	Sensitive Fern	S5		4	-3
ANGIOSPERMS (Dicots)						
x	Acer x freemanii	Freeman (Swamp) Maple	S5		6	-5
x	Lycopus uniflorus	Northern Water-horehound	S5		5	-5
x	Rubus pubescens	Dewberry	S5		4	-3
x	Symphyotrichum lateriflorum	Calico Aster	S5		3	0
x	Ulmus americana	American Elm	S5		3	-3
ANGIOSPERMS (Monocots)						
x	Carex tuckermanii	Tuckerman's Sedge	S5		7	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 1, PLOT 2
8	Total Species
8	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
4.0	Average Coefficient of Conservatism (mean C)
11.3	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-3.0	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING

Transect 2, Plot 1

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns & Fern Allies)						
x	<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	S5		5	-3
	ANGIOSPERMS (Dicots)					
x	<i>Acer x freemanii</i>	Freeman (Swamp) Maple	S5		6	-5
x	<i>Aralia nudicaulis</i>	Wild Sarsaparilla	S5		4	3
x	<i>Bidens connata</i>	Purple-stemmed Beggarticks	S4?		5	-3
x	<i>Lycopus uniflorus</i>	Northern Water-horehound	S5		5	-5
x	<i>Oxalis montana</i>	Common Wood-sorrel	S5		7	3
x	<i>Rubus idaeus</i> ssp. <i>strigosus</i>	Wild Red Raspberry	S5		2	3
x	<i>Rubus pubescens</i>	Dewberry	S5		4	-3
x	<i>Viola</i> sp.	Violet Species				
	ANGIOSPERMS (Monocots)					
x	<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	S5		5	-3
x	<i>Carex projecta</i>	Necklace Sedge	S5		5	-3
x	<i>Glyceria striata</i>	Fowl Mannagrass	S5		3	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 2, PLOT 1
11	Total Species
11	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
4.6	Average Coefficient of Conservatism (mean C)
15.4	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-1.9	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING
Transect 2, Plot 2

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
ANGIOSPERMS (Dicots)						
x	Acer x freemanii	Freeman (Swamp) Maple	S5		6	-5
x	Endotropis alnifolia	Alder-leaved Buckthorn	S5		7	-5
x	Fraxinus nigra	Black Ash	S4		7	-3
x	Ulmus americana	American Elm	S5		3	-3
ANGIOSPERMS (Monocots)						
x	Carex cf. interior	Inland Sedge	S5		6	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 2, PLOT 2
5	Total Species
5	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
5.8	Average Coefficient of Conservatism (mean C)
13.0	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-4.2	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING
Transect 3, Plot 1

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns & Fern Allies)						
x	<i>Onoclea sensibilis</i>	Sensitive Fern	S5		4	-3
ANGIOSPERMS (Dicots)						
x	<i>Cornus sericea</i>	Red-osier Dogwood	S5		2	-3
x	<i>Vitis riparia</i>	Riverbank Grape	S5		0	0
ANGIOSPERMS (Monocots)						
x	<i>Carex tuckermanii</i>	Tuckerman's Sedge	S5		7	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 3, PLOT 1
4	Total Species
4	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
3.3	Average Coefficient of Conservatism (mean C)
6.5	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-2.8	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING
Transect 3, Plot 2

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns & Fern Allies)						
x	<i>Onoclea sensibilis</i>	Sensitive Fern	S5		4	-3
ANGIOSPERMS (Dicots)						
x	<i>Cornus sericea</i>	Red-osier Dogwood	S5		2	-3
x	<i>Epilobium cf. coloratum</i>	Purple-veined Willowherb	S5		3	-5
x	<i>Lycopus uniflorus</i>	Northern Water-horehound	S5		5	-5
x	<i>Solanum dulcamara</i>	Bittersweet Nightshade	SE5			0
x	<i>Solidago cf. canadensis</i>	Canada Goldenrod	S5		1	3
x	<i>Symphyotrichum lateriflorum</i>	Calico Aster	S5		3	0
ANGIOSPERMS (Monocots)						
x	<i>Calamagrostis canadensis</i>	Bluejoint Reedgrass	S5		4	-5
x	<i>Carex projecta</i>	Necklace Sedge	S5		5	-3
x	<i>Carex tuckermanii</i>	Tuckerman's Sedge	S5		7	-5
x	<i>Phalaris arundinacea</i>	Reed Canary Grass	S5		0	-3

2019	FLORISTIC ASSESSMENT FOR TRANSECT 3, PLOT 2
11	Total Species
10	Native Species
1	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
3.4	Average Coefficient of Conservatism (mean C)
11.3	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-2.6	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING

Transect 4, Plot 1

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns & Fern Allies)						
x	Equisetum arvense	Field Horsetail	S5		0	0
ANGIOSPERMS (Dicots)						
x	Circaea sp.	Enchanter's Nightshade	S5			
x	Euthamia graminifolia	Grass-leaved Goldenrod	S5		2	0
x	Eutrochium maculatum	Spotted Joe Pye Weed	S5		3	-5
x	Impatiens capensis	Spotted Jewelweed	S5		4	-3
x	Solidago rugosa	Rough-stemmed Goldenrod	S5		4	0
x	Symphyotrichum lanceolatum	Panicked Aster	S5		3	-3
x	Symphyotrichum puniceum	Swamp Aster	S5		6	-5
ANGIOSPERMS (Monocots)						
x	Carex hystericina	Porcupine Sedge	S5		5	-5
x	Carex stipata	Awl-fruited Sedge	S5		3	-5
x	Carex vulpinoidea	Fox Sedge	S5		3	-5
x	Glyceria striata	Fowl Mannagrass	S5		3	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 4, PLOT 1
12	Total Species
12	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
3.3	Average Coefficient of Conservatism (mean C)
11.3	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-3.3	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING

Transect 4, Plot 2

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
PTERIDOPHYTES (Ferns & Fern Allies)						
x	Equisetum arvense	Field Horsetail	S5		0	0
x	Onoclea sensibilis	Sensitive Fern	S5		4	-3
ANGIOSPERMS (Dicots)						
x	Eutrochium maculatum	Spotted Joe Pye Weed	S5		3	-5
x	Fraxinus pennsylvanica	Green Ash	S4		3	-3
x	Lycopus uniflorus	Northern Water-horehound	S5		5	-5
x	Rubus pubescens	Dewberry	S5		4	-3
x	Solanum dulcamara	Bittersweet Nightshade	SE5			0
x	Solidago rugosa	Rough-stemmed Goldenrod	S5		4	0
ANGIOSPERMS (Monocots)						
x	Glyceria striata	Fowl Mannagrass	S5		3	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 4, PLOT 2
9	Total Species
8	Native Species
1	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
3.3	Average Coefficient of Conservatism (mean C)
9.8	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-2.7	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING

Transect 5, Plot 1

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
ANGIOSPERMS (Dicots)						
x	<i>Bidens cernua</i>	Nodding Beggarticks	S5		2	-5
x	<i>Bidens connata</i>	Purple-stemmed Beggarticks	S4?		5	-3
x	<i>Caltha palustris</i>	Yellow Marsh Marigold	S5		5	-5
x	<i>Solanum dulcamara</i>	Bittersweet Nightshade	SE5			0
ANGIOSPERMS (Monocots)						
x	<i>Glyceria striata</i>	Fowl Mannagrass	S5		3	-5
x	<i>Phalaris arundinacea</i>	Reed Canary Grass	S5		0	-3
x	<i>Typha latifolia</i>	Broad-leaved Cattail	S5		1	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 5, PLOT 1
7	Total Species
6	Native Species
1	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
2.7	Average Coefficient of Conservatism (mean C)
7.1	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-3.7	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING

Transect 5, Plot 2

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
ANGIOSPERMS (Dicots)						
x	Betula sp.	Birch Seedling				
x	Bidens cernua	Nodding Beggarticks	S5		2	-5
x	Bidens connata	Purple-stemmed Beggarticks	S4?		5	-3
x	Galium sp.	Bedstraw Species				
x	Impatiens capensis	Spotted Jewelweed	S5		4	-3
x	Lycopus uniflorus	Northern Water-horehound	S5		5	-5
x	Rubus pubescens	Dewberry	S5		4	-3
x	Scutellaria lateriflora	Mad Dog Skullcap	S5		5	-5
x	Solanum dulcamara	Bittersweet Nightshade	SE5			0
x	Solidago rugosa	Rough-stemmed Goldenrod	S5		4	0
x	Symphyotrichum lanceolatum	Panicked Aster	S5		3	-3
ANGIOSPERMS (Monocots)						
x	Carex stipata	Awl-fruited Sedge	S5		3	-5
x	Glyceria striata	Fowl Mannagrass	S5		3	-5
x	Phalaris arundinacea	Reed Canary Grass	S5		0	-3
x	Typha latifolia	Broad-leaved Cattail	S5		1	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 5, PLOT 2
13	Total Species
12	Native Species
1	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
3.3	Average Coefficient of Conservatism (mean C)
11.7	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-3.5	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING
Transect 6, Plot 1

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
ANGIOSPERMS (Monocots)						
x	Phalaris arundinacea	Reed Canary Grass	S5		0	-3

2019	FLORISTIC ASSESSMENT FOR TRANSECT 6, PLOT 1
1	Total Species
1	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
0.0	Average Coefficient of Conservatism (mean C)
0.0	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-3.0	Mean Wetness Value

DUNTROON EXPANSION QUARRY - WETLAND VEGETATION MONITORING
Transect 6, Plot 2

MONITORING YEAR - 2019	SCIENTIFIC NAME	COMMON NAME	PROVINCIAL STATUS (S-RANK)	COSEWIC / SARO STATUS	COEFFICIENT OF CONSERVATISM (C VALUE)	COEFFICIENT OF WETNESS
ANGIOSPERMS (Dicots)						
x	Bidens sp.	Beggarticks Species				
x	Lycopus uniflorus	Northern Water-horehound	S5		5	-5
x	Rubus sp.	Raspberry Species				
x	Salix discolor	Pussy Willow	S5		3	-3
ANGIOSPERMS (Monocots)						
x	Carex pseudocyperus	Cyperus-like Sedge	S5		6	-5

2019	FLORISTIC ASSESSMENT FOR TRANSECT 6, PLOT 2
3	Total Species
3	Native Species
0	Introduced (exotic) species
0	Species at Risk in Ontario (END, THR or SC)
0	Rare in Ontario (S1, S2 or S3)
4.7	Average Coefficient of Conservatism (mean C)
8.1	Floristic Quality Index (FQI)
0	Highly sensitive plant species with C value of 8, 9 or 10
-4.3	Mean Wetness Value