TECHNICAL MEMORANDUM

DATE October 22, 2025 **Project No.** CA-GLD-1791470A

TO Andreanne Simard - Director of Lands, Resources and Environment
Stephen May - Lands Manager, Western Region
CBM Aggregates

CC Craig DeVito, Paul Menkveld - WSP; Neal DeRuyter - MHBC

FROM Daniel Eusebi, Warren Aken **EMAIL daniel.eusebi@wsp.com**

RESPONSES TO ABOUD AND ASSOCIATES INC. / TOWNSHIP OF PUSLINCH REVIEW COMMENTS – PROPOSED CBM ABERFOYLE SOUTH LAKE PIT

The table below provides WSP's responses to review comments made by Aboud and Associates Inc. (Aboud) on February 8, 2024, related to the ARA licence application for the proposed CBM Aberfoyle South Lake Pit.

If you have any questions about the responses, please contact us at your earliest convenience.

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Attachments: Table 1 – WSP Responses to Aboud / Township of Puslinch Review Comments
Attachment 1:
- Table 2 (Weather Conditions and Staff Qualifications)
- Table 3 (ACC Data)
- Table 4 (BBS Breeding Evidence)

Attachment 2 - Fish community survey
Attachment 3 - HDF Assessment
Attachment 4 - MECP Correspondence
Attachment 5 – Natural Environment and Water Report Terms of Reference Concordance Cross-Check – Proposed CBM Aberfoyle South Lake Pit
Attachment 6 – Updated Figure 2
Attachment 7 - Supplemental Assessment of Potential Impacts to Provincially Significant Wetlands – Proposed CBM Aberfoyle South Lake Pit

https://wsponline.sharepoint.com/sites/gld-21291g/deliverables/01 agency comments/01 township of puslinch (objection letter and 9 sets of comments)/04 aboud/final/1791470a-tm-rev0-cbm aberfoyle south lake-aboud-responses_22oct2025.docx

TABLE 1

WSP Responses to Aboud / Township of Puslinch Review Comments

Table 1: WSP Responses to Aboud Review Comments

Num	Topic	Section	Aboud Comment	WSP Response
1	Natural Environment	Section 1: Introduction	The study area should include lands outside of 120 m when considering linkages and cumulative impacts.	For aggregate proposals such as the Aberfoyle South Lake Pit, the 120 m area of investigation represents 'adjacent lands' for natural heritage features as defined in the Natural Heritage Reference Manual (NHRM; MNR, 2010) that is also adopted by the ARA standards requirements. The purpose of identifying the extent of 'adjacent lands' is to establish the area in which potential impacts from a proposed change in land use might occur. The Province's recommended distances for defining adjacent lands provided in NHRM tables are drawn from various scientific studies and are an attempt to balance the range of research showing the impacts of development. The Province's recommendations are based on a review of current scientific research that includes studies covering topics such as the sensitivity of species to disturbance, the habitat requirements of species and the extent of the influence of development and site alteration on species. In a case such as the Aberfoyle South Lake Pit the impact of this type of development would be initially realized within 120 m the site, as such respecting impacts to this near-site area and application of mitigation to protect this area is a reasonable means of addressing potential impacts and applying development changes or mitigation to the proposed aggregate application. As such the report introduction reference the 120 Adjacent Land area. Although the report includes a landscape assessment beyond 120 metres, it also addresses potential influences beyond this distance where appropriate, as described below. Impacts to linkages in the local landscape beyond 120 m from the site are not anticipated. Linkage concerns would

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				be, by definition, within 120 m of the site, otherwise they would not be considered as a linkage relative to the site. Cumulative impacts relating to hydrology and hydrogeology are addressed separately in the Water Report Level 1 & 2 (WSP, 2023) and are considered in the broader landscape beyond 120 m. In addition, the investigation of wetlands and fisheries are addressed with consideration to areas beyond the 120 in the report body and subsequent addendum.
2	Natural Environment	Section 1: Introduction	The study area should include the area outside of 120m when considering impacts to natural heritage features due to drawdown impacts to groundwater, per the water report level 1 and 2, impacts are expected as far as 720m from the extraction area by the end of year 6, this has significant potential implications for all sensitive natural heritage features up to 720m.	The assessment of impact on natural heritage features within 120 m of the licence limit is a reasonable selection based on the conservative nature of modeled groundwater drawdown and sensitive nature of receptors within 120 m. The model conservatively estimates drawdown and baseflow changes as detailed in Section 3.5.3. of Appendix G of the Water Report. Mill Creek is modelled as a drain boundary condition for the impact assessment on wetlands, as this represents drawdown conservatively. This approach is conservative but reasonable for its purpose. It is expected that the monitored response of the aquifer to extraction would be significantly less than that predicted. As provincially significant wetlands (PSW) and sensitive watercourses are identified nearby the licence limits, the natural heritage features most likely to be impacted by the proposed operations have been included in the impact assessment. It is reasonable to conclude any impacts likely to occur are likely to occur within 120m of the licence limit. Therefore, the impact assessment focused on natural heritage features within 120m is a reasonable approach in the NE impact assessment.

Num	Topic	Section	Aboud Comment	WSP Response
3	Natural Environment	Section 2: Environmental Policy Context	Section 2.8: fish habitat is listed as both Greenlands and Core Greenlands. Please clarify.	Fish habitat is listed as a component of both the Greenlands (Section 5.5.1) and Core Greenlands (Section 5.4.2) designations according to the County's Official Plan.
4	Natural Environment	Section 2: Environmental Policy Context	Section 2.9 does not reference any of the relevant GRCA policies or regulations regarding wetlands or watercourses. Please include relevant polices to this section.	Exception for aggregates under *Conservation Authorities Act* states that prohibitions in subsection (1) do not apply to an activity approved under the *Aggregate Resources Act* (ARA) after December 18, 1998, the date the *Red Tape Reduction Act*, 1998 received Royal Assent. 2017, c. 23, Sched. 4, s. 25. This pit proposal is an application under the ARA. With respect to the new CA Regulation 41/24, the GRCA 2024 document of the *Policies for the Administration of the Prohibited Activities, Exemptions and Permits Regulation Ontario Regulation 41/24* are considered in the approach to address impacts and mitigation recommendations. However, under Section 4.0 Areas of Regulation 41/24 it states: *the Regulation does not apply to activities approved under the Aggregate Resources Act (Conservation Authorities Act, RSO 1990, C. 27, 28(10))* This response matrix fulfills the circulation and participation component of the ARA and consideration to GRCA Regulations both new and old, are essentially implemented in the NETR report with respect to wetlands and watercourses for which the GRCA has expertise. Watercourses are also subject to DFO guidance and approval through an on-going iterative review process initiated through the submission of a Request for Review that is currently in progress.

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5	Natural Environment	Section 4: Methods	Table 1: please include weather conditions, names and qualifications of staff members undertaking these assessments, particularly for the ELC and wetland delineation.	Please see Attachment 1, Table 2: Weather Conditions and Staff Qualifications for weather conditions of each field survey.
6	Natural Environment	Section 4: Methods	Table 1: most of these surveys occurred in 2018, which is close to the five year limit of validity of information. Surveys to update 2018 information should be completed prior to any site clearing for amphibians, breeding birds and botanical inventories, should the project begin later than December 2024.	Site visits have been conducted, as noted in the responses, where data appeared outdated or where additional clarity was needed to support the comments provided. Furthermore, it should be noted that in the case of Aberfoyle South Lake Pit, the majority of the extraction area is agriculture with low potential for SAR or other rare/sensitive species. These conditions have been confirmed through on-going site visits (quarterly) and complementary review of aerial imagery that support the fact that there has been no notable change to habitat on site.
7	Natural Environment	Section 4: Methods	Section 4.3.3: Please identify the sampling protocol used to complete the Turtle Habitat Assessment.	The habitat assessment was based on guidance from the Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario (MNRF 2015), as well as habitat descriptions from Blanding's Turtle General Habitat Description (MNRF 2013) COSEWIC Assessment and Status Report for Snapping Turtle (COSEWIC 2009) and the COSEWIC Assessment and Status Report for Blanding's turtle (COSEWIC 2017).
8	Natural Environment	Section 4: Methods	Section 4.3.1 identifies that an early summer, late summer and fall botanical was completed, this contradicts references elsewhere, identifying the first survey as a spring botanical. Early summer is more appropriate terminology per the timing of the survey.	Acknowledged.

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9	Natural Environment	Section 4: Methods	Section 4.3.6 identifies that the assessment protocol followed the MNRF 2017 protocol, given that the protocol has had several iterations since 2017 including most recently, changes in guidance provided by the MECP, please clarify that all trees greater than 10cm were reviewed for suitability and survey parameters met the requirements for assessment per the most recent MECP guidance documents (2022).	All trees greater than 10 cm DBH were considered in the bat habitat assessment.
10	Natural Environment	Section 4: Methods	Per AA's Pre Consultation peer review, visual encounter surveys for snakes should have taken place alongside other herptile surveys.	Visual encounter surveys for snakes were conducted concurrently with all other field surveys, as described in Section 4.3.8, Section 5.6 and Appendix E of the NER.
11	Natural Environment	Section 4: Methods	Per AA's Pre Consultation peer review, a linkage and connectivity assessment needed to take place. This appears not to have been done, and the results of such an assessment are not discussed in this document.	An assessment of wildlife movement corridors/linkages was completed as part of the discussion of animal movement corridor SWH in Section 6.7.3 of the NER.

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12	Natural Environment	General	Per AA's Pre Consultation Peer Review, headwater drainage feature assessments were required for the site, these surveys are not identified or discussed in the report. This survey is particularly important to determine the regime for tributary 3 as well as to identify any HDF's that occur within the agricultural areas.	It should be noted that Tributary #3 has been referred to as both intermittent and perennial within the different existing conditions reports. The reference to the seasonality of the stream has been based on the fact that the installed loggers have measured zero flow on at least four occasions, while during these periods, pooled water was still present. Further to this, the water depth during these low flow periods is likely limiting to fish as during summer, there is insufficient baseflow to consistently sustain water in Tributary #3. Additional information is provided in the attached Fish Community Assessment. Therefore, referring to Tributary #3 as intermittent is appropriate when considering fish habitat. Per the Evaluation, Classification and Management of Headwater Drainage Features Guidelines (TRCA & CVC 2014), pre-consultation with the Conservation Authority is recommended to determine scope and identify gaps with respect to the need for a Headwater Drainage Feature (HDF) Assessment. GRCA reviewed and provided comments on the Terms of Reference in November 2021 and did not identify the need for a HDF assessment. As such, it was not included in the field survey scope. Subsequently, in response to Aboud's comment, a HDF Assessment has been undertaken. The site visits were completed in August 2024, March 2025 and May 2025 in accordance with the abovementioned guideline (TRCA & CVC 2014) and Section 4, Module 11 for Unconstrained Headwater Sampling of the Ontario Stream Assessment Protocol (MNRF Version 10, 2017). Potential HDFs, drainage patterns and linkages between the site and watercourses (i.e. Tributary 3, Tributary 5 & Mill Creek) were identified. Nine areas were identified as having potential HDF (Attachment 3):

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				▪ Of the nine potential HDFs, seven (HDF 3 to HDF9) were dry or only contained stagnant water in the spring assessment and were all dry in the summer assessment. ▪ It was observed that the remaining two features (HDF1 and HDF2) provided some movement of water off the property and were moved forward through the unconstrained HDF assessment. Based on the assessment, drainage segments HDF1 and HDF2 were assessed at the *Maintain Recharge*, while the seven remaining drainage segments were assessed as *No Mitigation Required*. The following recommended management, outlined by the HDF Guidelines (TRCA and CVC, 2014), are in place for Maintain Recharge of HDFs on site: ▪ Maintain overall water balance by implementing mitigation measures to promote infiltration of rainwater runoff. It should also be noted that, due to the implementation of O.Reg.41/24, HDF are no longer under the jurisdiction of Conservation Authorities, and further, Conservation Authority policies are not applicable to applications under the ARA, which do not require permits or approvals from Conservation Authorities.

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13	Natural Environment	General	Per AA's Pre Consultation Peer Review, Fish Community Sampling was required for the on-site watercourses to determine species present, these surveys were not identified or discussed in the report.	A fish community survey was undertaken in September 2024, and the assessment is provided in Attachment 2. The findings of the fish community survey support what is reported in Section 5.6.4 of the NER. Tributary #3 was classified as fish habitat with assumed similar species assemblage as Mill Creek. This classification was in line with MNR records and observations of small-bodied fish within Tributary #3. The assessment in the NER took into account that Tributary #3 is fish habitat. The Mill Creek is frequently sampled with current data available. The Project was submitted for DFO review to assess the potential of the Project to result in 'death of fish' and/or 'harmful alteration, disruption or destruction of fish habitat' (HADD). Ongoing consultation with DFO is underway. DFO are reviewing the water reports as well as the supplementary technical memoranda, which include all Tributaries as well as Mill Creek.
14	Natural Environment	General	Per AA's Pre Consultation Peer Review, a feature-based water balance assessment of the wetlands present on/adjacent to site (TRCA wetland water balance risk evaluation (2017), or equivalent), discussion of impacts to the wetland due to the proposed changes to the quantity of water, including the proposed significant changes in the groundwater elevation, should be included in the report.	The potential impacts of the proposed pit operation on PSW areas have been further assessed through a more detailed examination of wetland hydrology on a zone-by-zone basis, following hydrologic first principles. The supplemental assessment considered the relative importance of the water inputs and outputs and the effect of the organic layer in retaining water to the hydrology of the seven PSW zones identified at the Site in the Water Report.

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				- The PSW zones to the north of the Site are primarily supported by direct precipitation and surface water during high water level events (such as the spring freshet), and impacts to these zones are predicted to be minor (Zone 5) to minimal (Zones 1 and 6) during operation and post-rehabilitation. - The PSW zones to the east, south, and west of the Site primarily rely on direct precipitation with little input from runoff or groundwater discharge. Consequently, potential impacts to these wetland zones were predicted to be minor (Zones 2 and 3) to negligible (Zones 4 and 7) during operations and post-rehabilitation. - The exception is Zone 3a in the southern central portion of the Site, which has a moderate potential for impact during the early years of operation, primarily due to a short-term reduction in groundwater inputs to that PSW sub-zone as a result of aggregate extraction. Overall, the potential for impacts to the PSW zones surrounding the Site are predicted to be minor to negligible, with the exception of PSW Zone 3a, which can be monitored and may require corrective action during early phases of operations to ensure its wetland function is maintained. The proposed monitoring, conceptual approach to the development of triggers, and potential corrective actions are detailed in the Monitoring Plan

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15	Natural Environment	Section 5: Existing Conditions	Section 5.5.3: A valid spring botanical was not undertaken, the generally accepted spring botanical window is from Late April through early June, ideally taking place in May where ephemeral species are present. As the first botanical inventory took place June 26 and June 29, spring ephemeral species may not have been identified, as ephemeral species that would no longer be physically present by late June are not identified in the species lists (e.g. trout lily (Erythronium americanum), bloodroot (Sanguinaria canadensis), wild leek (Lilium tricoccum)). Jack-in-the-pulpit, red trillium and Virgina waterleaf persist well into summer.	The Terms of Reference included a three season botanical inventory, which was completed: early summer, late summer and fall. As discussed in Section 4.3.1, summer surveys were deemed more appropriate and useful because the majority of natural plant communities on the site were characterized by swamp, and summer is the period during which most wetland vegetation is identifiable. Several spring species and woodland sedges that would be captured during a spring visit were still recorded on the plant list, and no early-season SAR or rare plant species were flagged through the SAR screening. Further, because all of the swamp is also PSW and therefore must be protected, a conservative approach can be taken to assume that other common spring ephemeral species with swamp habitat preference are present.
16	Natural Environment	Section 5: Existing Conditions	A three season botanical was listed in the studies to be performed in the Terms of Reference, including a spring study.	See Response to Comment #15
17	Natural Environment	Section 5: Existing Conditions	Table 3: please provide this data in the form of call level codes, per the Marsh Monitoring Program's protocol.	Please see Attachment 1, Table 3: Anuran Call Count Survey Results for the Proposed Aberfoyle South Pit Expansion Study Area
18	Natural Environment	Section 5: Existing Conditions	Section 5.6.1, please include a summary column outlining whether the habitat meets the threshold for significance.	See Response to Comment #17
19	Natural Environment	Section 5: Existing Conditions	Section 5.6.2: please identify which of the 52 observed species were considered to be breeding (possible, probable, and confirmed), and provide the highest breeding	Please see Attachment 1, Table 4: Breeding Bird Evidence

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			evidence for each species identified during the point counts.	
20	Natural Environment	Section 5: Existing Conditions	Section 5.6.4: please include a text summary of the fish habitat survey results here.	A fish community survey was undertaken in September 2024, and the assessment is provided in Attachment 2.
21	Natural Environment	Section 5: Existing Conditions	Section 5.6.5 – Per communication with the MECP on a nearby municipal project, Blanding's turtle habitat likely occurs in the vicinity of the study area and should be considered for this project. Please reach out to MECP for details on the observation and how it may impact the work.	Acknowledged. WSP is communicating with MECP.
22	Natural Environment	Section 6: Assessment of Significant Natural Heritage Features	Section 6.1: Blanding's turtle habitat should be included in the assessment of significance.	Although the study area is within the range of Blanding's turtle, no individuals were observed during the field surveys. The MECP has provided information indicating that Blanding's Turtle sightings have been recorded approximately 2 km from the proposed extraction site. Assessed as Low in SAR Screening.
23	Natural Environment	Section 6: Assessment of Significant Natural Heritage Features	Section 6.1 Black Ash requires updating due to recent changes, including Black Ash protections under the ESA having been implemented.	Acknowledged. However, all black ash identified on the site were dead. As stated in Table 1 of the Black Ash Assessment Guidelines (MECP 2024) and in accordance with O. Reg. 6/24, dead black ash trees do not receive individual protections under Section 9 of the ESA, and therefore also do not receive habitat protections under Section 10 of the ESA (and in accordance with O. Reg. 7/24). Further, a health report is only required for live trees measuring greater than 8 cm DBH. Because all the black ash trees on the site are dead, no health report is required.

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24	Natural Environment	Section 6: Assessment of Significant Natural Heritage Features	Section 6.2: fish habitat significance within the study area requires significant additional detail, including the significance of each tributary, their thermal regimes and if they have been identified as permanent or intermittent. Mill Creek is a known important Trout spawning area, and this information should be discussed in the report, as it pertains to changes in groundwater flow to Mill Creek and identified tributaries.	A fish community survey was undertaken in September 2024 and the assessment is provided in Attachment 2. Ongoing consultation with DFO is underway. DFO is reviewing the water reports as well as the supplementary technical memoranda, which include all Tributaries as well as Mill Creek.
25	Natural Environment	Section 6: Assessment of Significant Natural Heritage Features	Section 6.4: the use of on-site and off-site is unclear, recommend that text in the report is consistent with figures in the use of license boundary/site boundary and study area.	Acknowledged. As defined in Section 1.1, the site boundary corresponds to the area that is proposed for licensing under the ARA.
26	Natural Environment	Section 6: Assessment of Significant Natural Heritage Features	Section 6.7.2 identifies that SWH for Seeps is present in the study area, and that impacts to seeps are discussed in section 7. Impacts to Seeps are not carried forward to the impact assessment sections 7.1 or 7.2, this must be addressed as it has implications to negatively impact the SWH per the impacts to groundwater	The term ‘seeps’ in the Natural Environment Report refer to diffuse groundwater discharge into wetlands and surface water features (such as Mill Creek). The statement contained in the Natural Environment Report is based on the observation of vegetation often associated with groundwater discharge, observed in or near Mill Creek, as detailed in the appendices of that report and the attached Supplemental Assessment of Potential Impacts to Provincially Significant Wetlands – Proposed CBM Aberfoyle South Lake Pit (Attachment 7). WSP acknowledges inconsistent naming but confirms these observations align with the Water Report’s findings regarding groundwater and surface water interactions near Mill Creek. Impact assessments of these features are complete and presented in the Natural Environment Report and Water Report and supplemented in additional comment responses where applicable.

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				Within the Natural Environment Report, these features are assessed for impacts in Section 6.0 (with references to the detailed impact assessments for the overarching features that represent habitat in Section 7.0, like the PSW).
27	Natural Environment	Section 7: Impact Analysis	Overall, the Impact Analysis section is lacking in carrying forward significant features identified in the existing conditions, including the presence of significant wildlife habitat on site in the form of Seeps, habitat for species of conservation concern, and deer wintering as well as the potential to impact Species at Risk, particularly Black Ash, which is a facultative wetland species. Impacts to the groundwater extend significantly further than the identified study area and have significant implications for impacts to SWH and SAR, in particular Seeps are important components of habitat for winter wildlife and any changes to the water table may impact black ash at a significant distance from the site.	See Response to Comment #26. Given the extensive size of the off-site woodland and wetland habitat within the study area, these features are expected to serve primarily as core habitat (e.g., deer wintering area, interior forest habitat). The woodland habitat and associated Provincially Significant Wetland (PSW) are situated outside the proposed extraction zone and will not be directly affected. The proposed pit is predicted to cause limited changes to the hydrology of the wetlands, which demonstrate considerable variability in existing conditions. As such, the wetlands are expected to continue supporting a range of wildlife functions, including habitat for Wild Turkey, Ruffed Grouse, and White-Tailed Deer and an adequate moisture regime for Black Ash. In addition, Black Ash was observed in the thicket swamp at the north edge of the site, all individuals in this community were dead due to emerald ash borer infestation. Therefore, no adverse impacts to Black Ash in this community are anticipated as a result of the proposed extraction activities.

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	Natural Environment	Section 7: Impact Analysis	Section 7:1: Per Water Reports level 1 & 2, a permanent change in groundwater gradients is expected as a result of the pond, including an increase in groundwater level in the southwest corner of up to 1m, and a decrease in groundwater level in the north east corner of up to 1m, impacts to fish habitat as a result of these changes are not discussed in detail in the report.	As presented in the Supplementary Assessment of Potential impacts to baseflow in Mill Creek and Tributary 3, and as shared with DFO - As discussed in the Water Report and further illustrated through the introduction of new modelled surface water stations, there will be a localized redistribution of baseflow along reaches of Tributary 3 and Mill Creek post-rehabilitation relative to current conditions. There will be short reaches that experience a decrease in baseflow and short reaches that experience an increase in baseflow, both on Mill Creek and on Tributary 3 Overall, the net change in baseflow to the system as a whole in the vicinity of the site as simulated at the confluence of Tributary 3 and Mill Creek is predicted to very small, about 0.1% This small change is not considered to have any notable effect on the function or ecological integrity of the watercourse.
29	Natural Environment	Section 7: Impact Analysis	Section 7.1: Per the groundwater monitoring report included as Figure 15 in Appendix G of Water Reports level 1 & 2, a section of Mill Creek totalling ~1600 m in length will see dramatic decreases in groundwater input, while a ~900 m length of this area will no longer receive any groundwater input at all. This will have repercussions for the thermal regime of the creek and Brook and Brown Trout spawning. Impacts to fish habitat due to these changes are not discussed in detail in the report. These changes to the groundwater input to Mill Creek and its tributaries likely constitutes a harmful alteration, disruption and destruction (HADD) of fish habitat. Fish habitat is protected from HADD under the Fisheries Act. Impacts to	See Response to Comment #28. Ongoing consultation with DFO is underway. DFO is reviewing the water reports as well as the supplementary technical memoranda, which include all Tributaries as well as Mill Creek.

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			fish habitat because of these changes are not discussed in detail in the report	
30	Natural Environment	Section 7: Impact Analysis	Section 7.1: the discussion of Tributary 3 identified the watercourse as perennial, while earlier in the report it is identified as intermittent, please identify which is correct.	See response to Comment #12.
31	Natural Environment	Section 7: Impact Analysis	Section 7.2: per the Water Report Level 1 and 2 (modelled groundwater drawdown, year 6), the PSW's north of concession road 2, up to 720m from the site, will see drawdown impacts of 1m to 0.1m because of the creation of the pond. Further discussion of this impact is warranted, as a potential reduction in hydroperiod may adversely impact the vegetation communities in these features, particularly any vernal pools that may occur within the area that were not assessed for amphibians, as they are located off site.	See response to Comment #14 - PSW Zones
32	Natural Environment	Section 7: Impact Analysis	Section 7.2: impacts related to the increase in groundwater level at the southwestern limit of the site require consideration as part of the impact assessment, upland communities are present directly south of the limit, and an increase in the groundwater level may cause negative impacts to this vegetation community.	To minimize the potential for groundwater uplift, a supplemental assessment is presented in the attached Technical Memorandum. A tile drain is proposed as a mitigation measure to limit groundwater uplift. The proposed tile drain will convey excess water to Tributary 3 and increase baseflow in that reach of Trib 3.

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33	Natural Environment	Section 7: Impact Analysis	Section 7.2: This discussion identifies that berms may be included within the 30m setback area, this has not been discussed or included on any figures as part of the application within the NHE report, construction and location of any proposed berms should be included and discussed in figures and reports as part of the proposed development as well as discussion regarding impacts to the adjacent PSW due to the installation and management of berms.	Acknowledged. A figure including proposed berm heights, lengths, and locations will be included and considered in all aspects. It is also identified on the Site Plan.
34	Natural Environment	Section 7: Impact Analysis	Section 7.2: the use of 70% coniferous trees within the buffer planting is not appropriate for the site, any rehabilitation should consider the directly adjacent existing vegetation community and upland species assemblages present in the study area and create a contiguous native species assemblage that increases the area and contiguity of the existing community.	The planting plan was based on the revised rehabilitation plan prepared for the nearby Lanci Pit Expansion which was accepted by the Township. This revised rehabilitation plan was updated based on comments received from a peer review, and was ultimately approved. To clarify, the 70% coniferous species recommendation was for tree plantings on the Site as a whole, and was not meant to be specific to the PSW buffer planting area. It is agreed that the buffer planting area adjacent to the PSW should include species characteristic of the PSW, as well as species characteristic of a transitional upland / wetland interface, and that are suited to the planting conditions, as is stated in Section 7.2 of the NER.
35	Natural Environment	Section 7: Impact Analysis	Section 7.4: Please include details of the cumulative effects assessment. Only the results are discussed with no context of what was reviewed or considered. This should include discussion of groundwater drawdown impacts outside of the 120m study area.	A summary of this assessment as it relates to Natural Environment was included in the NER. A cumulative effects assessment as it pertains to water resources is provided in the Water Report.

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36	Natural Environment	General	Please include a new section between sections 7 and 8 that addresses whether the work will conform with the policies identified in section 2.	The Impact Assessment section of NER is focused on meeting the noted policy of Section 2 of the NER. The recommendations and mitigation and the scope of the full NER is presented in a manner to demonstrate compliance with the various policy.
37	Natural Environment	Section 8: Rehabilitation/ Mitigation/ Monitoring	Section 8.1 includes a recommendation of the use of European larch and Norway spruce in the buffer plantings, these non-native species do not provide any ecological benefits and should be removed from the proposed planting list.	Trees will be planted along the Concession 2 Road frontage (east side of site). These two rows of trees will be planted in front of the berm required for noise attenuation during operations, to provide additional screening to the site. It is acknowledged that European Larch and Norway Spruce are non-native species, and as such native Tamarack and white/black spruce will be used in the buffer planting.
38	Natural Environment	Section 8: Rehabilitation/ Mitigation/ Monitoring	Section 8.1 of the NHE requires additional details, which must be carried forward to the Site Plan Drawing no. 4. Per the Wellington County OP, the rehabilitation plan is to be prepared in detail by a recognized expert. Please include information on the plan identifying that it was prepared by a recognized expert. Additional information regarding the density of nodal plantings should also be included.	The Site Plan was prepared by a qualified expert and includes qualifications as prescribed by the Aggregate Resources Act. The Planting Plan was developed with input from terrestrial ecologists, and based on the approved rehabilitation plan prepared for the Lanci Pit. Nodal plantings should be planted at a density of 1600/ha (based on 2.5 m spacing), with a target density of 1200/ha after two years. This condition has been added to the Rehabilitation Plan.
39	Natural Environment	Section 8: Rehabilitation/ Mitigation/ Monitoring	Section 8.2.1: Active season for birds is April 1-August 31 per Environment Canada guidelines. It should also be noted that while nesting is less common, active nests of migratory birds continue to be protected outside of the active season.	Acknowledged. The nesting dates provided in the NER correspond to the Environment Canada dates beyond which less than 5% of the nesting species are predicted to be nesting. With the 2022 Modernized Migratory Birds Regulation (MBR), nest protections for most species have moved from year-round to when nests have conservation value (i.e., when active). As per zone C2, the nesting period for species associated with forest, open and wetland habitats, excluding 0% dates range between March 31 and

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				April 5 to August 16 and August 27. To be conservative and cover this range, the site plan has been updated to indicate the active season for birds as April 1-August 31.
40	Natural Environment	Section 8: Rehabilitation/ Mitigation/ Monitoring	Section 8.2.2: due to the presence of wildlife within the study area, and potential for wandering wildlife entering the extraction area, the entirety of the extraction area should be appropriately fenced to exclude wandering wildlife within the site prior to any site clearing and throughout extraction. The site limits should also be reviewed for wildlife within these limits prior to any site clearing.	Exclusionary fencing will be installed and incorporated into site plans, with adjustments made through "field fitting" as directed by an environmental specialist. These measures will be monitored on a quarterly basis and after high rainfall events. The fencing will serve multiple purposes, including: • Erosion control • Demarcation of protected areas • Wildlife exclusion or directional guidance These components are typically required as part of the operational plan for any pit development. Prior to site clearing, pre-construction wildlife sweeps will be conducted to identify any species at risk. If such species are found, they will be safely relocated to suitable habitats under the guidance of qualified personnel.

Num	Topic	Section	Aboud Comment	WSP Response
41	Natural Environment	Section 8: Rehabilitation/ Mitigation/ Monitoring	Section 8.3: A long term monitoring plan to review the site for potential impacts to vegetation and wildlife must also be implemented to ensure unexpected impacts are addressed over the course of the extraction. This monitoring should include at minimum the following studies: 1.Three season vegetation plot monitoring to assess for changes in vegetation communities, including floristic quality index and average wetland plant coefficients. 2. Amphibian surveys to determine changes in populations due to changes in hydroperiod. 3. Assessment of changes to the length of the hydroperiod of the adjacent wetlands and impacts to the vegetation communities. 4. Fisheries assessments to monitor for impacts to redds as a result of changes in groundwater availability.	A water and ecological monitoring plan have been developed and included in the agency responses. The monitoring plan focuses on ground water levels and baseflow as well as wetland botanical monitoring and fish community monitoring.
42	Natural Environment	Section 8: Rehabilitation/ Mitigation/ Monitoring	Results of the monitoring are to include an annual summary report outlining the results, changes from pre-extraction conditions, proposed thresholds to identify impacts are occurring, and adaptive management of unforeseen impacts.	See Response to Comment #41
43	Natural Environment	Section 9: Summary and Recommendations	Updates to section 9 are required per the comments identified above.	Updates have been addressed here with supporting information. All key recommendations will be incorporated into the Site Plans which are legally binding documents that guide operation initiatives, protection, mitigation and compliance under the ARA.

Num	Topic	Section	Aboud Comment	WSP Response
44	Natural Environment	Section 9: Summary and Recommendations	As noted in the ToR comments, a pre, during, and post development comprehensive monitoring plan, which includes adaptive management and appropriate triggers for additional investigation Is required.	The surface water and groundwater monitoring program is described in Section 8.6 of the Water Report and in the refined addendum monitoring plan for the site (provided under separate cover). See Response to Comment #41
45	Natural Environment	Figures	The location of proposed berms have not been included in any NH figures, construction equipment within the buffer and creation of berms is also considered development and should be included and considered in all aspects of the proposals impacts.	Acknowledged. This information has been incorporated into the updated site plan.
46	Natural Environment	Figures	Figure 2: the ELC boundary near ACC#2 Is identified as wetland/meadow mix and is contiguous with the PSW limit, if this area is wetland, it should be included as part of the wetland limit per OWES and removed from within the extraction limit.	This area is separated from the PSW by a band of upland habitat. Further, the area is regularly cut for hay by the farmer and therefore does not meet the definition of a wetland per the OWES, as the plants do not reach maturity / fruiting. No changes required.
47	Natural Environment	Figures	Figure 2: The ELC communities identified at the south western limit are wetland communities (SWM/SWC), their limits do not match the limits of the mapped PSW, wetland limits should be updated and integrated to match the limits of identified wetland communities.	The ELC communities SWM and SWC at the southwest limit of the Study Area are off-Site and therefore vegetation types are identified from the Site edge. Figure 2 has been updated such that these two wetland communities now match the provincial mapping (Attachment 6).
48	Natural Environment	Figures	Figure 4 does not include a legend for the numbers noted on the map. The legend included includes many items which are not present on the map.	Figure 4 is a figure produced by the Grand River Conservation Authority Wetland Mapping application that was placed into a branded template for the purposes of the report. The legend includes several data layers that were turned on to be visible, but that did not overlap the Site.

Num	Topic	Section	Aboud Comment	WSP Response
49	Natural Environment	Figures	An additional figure should be created that includes the area of the cumulative impact assessment, including the limits of changes to groundwater levels at the 6-year mark included in the water reports in comparison to natural heritage features within these limits.	See response to Comment #35.
50	Natural Environment	Appendices	Appendix A: please include the communication with the County, Township, and GRCA regarding acceptance of the ToR.	Please see Attachment 5.
51	Natural Environment	Appendices	Appendix B: please include the request for information sent to MECP by WSP, including any follow up communication.	Please see Attachment 4 with a copy of the request for information submitted to MECP. Please note that MECP responded referencing an email they provided for another project by the same client. A copy of this email correspondence has also been included in Attachment 4.
52	Natural Environment	Appendices	Appendix D: please include the sources from the background review that identified the possible presence of the species listed in the SAR screening.	A comprehensive background review and SAR screening was completed for the project, which included a review of numerous resources, such as species occurrence databases, publicly available mapping, range maps, background reports and agency information requests. As such, a species record may occur from multiple sources. A list of the resources that were reviewed is provided in Section 4.1 of the NER.
53	Natural Environment	Appendices	Appendix D: Blanding’s turtle rationale only considers overwintering habitat, overland movement potential and nesting must also be considered for the site. Additionally, this species is ranked low potential, while other turtle species with similar habitat requirements have been listed as moderate.	Blanding's turtle is discussed in Section 5.6.5 of the NER. At the time of the assessment there were no occurrence records for Blanding's turtle within 9 km of the site identified during the background review. Subsequent to this, the MECP has provided information indicating that Blanding's Turtle sightings have been recorded approximately 2 km from the proposed extraction site. Although there were no observations during surveys, additional mitigation

Num	Topic	Section	Aboud Comment	WSP Response
				measures (exclusionary fencing) will be included into the updated site plan. The probability for Blanding's turtle to occur in the Study Area was assessed to be low. Conversely, there were occurrence records for both Painted Turtle and Snapping Turtle in the vicinity of the Study Area, resulting in a higher probability of occurrence. These species are more commonly observed at sites in Puslinch. It should be noted that there are no known overwintering habitat that would be preferred by turtles in license areas nor evidence of any nesting sites, including predate sites in the extraction area which is coincident with active agricultural lands.
54	Natural Environment	Appendices	Please include an ELC data card for each community inventoried on site, including representative photos of each community.	Pertinent information relating to the ELC, including dominant species, maturity, snags and deadfall, and locations of any rare plant species, is presented in the NER. WSP will be pleased to answer any specific questions relating to any of the ELC communities.
55	Natural Environment	Appendices	Please include an appendix with a list of species identified during the background review and their sources.	Please refer to the response for comment #52 above.
56	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point a: include additional details on best management practises, or a citation to a specific document.	Reference will be included regarding relevant BMPs such as the MNR Bank Swallow Best Management Practices for the Protection, Creation and Maintenance of Bank Swallow Habitat in Ontario, (MNRF 2017)

Num	Topic	Section	Aboud Comment	WSP Response
57	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point a: BMP's must include consideration for wandering wildlife and wildlife rescue due to entrapment within the construction/ESC area, and regular review of equipment on site for wildlife such as snakes or turtles.	A site-specific BMP with standard practices will be recommended to be prepared upon license approval. This will be Wildlife Encounter BMP and included training, signage, encounter procedure, site (exclusionary fencing if applicable) and equipment inspection, etc. This has been added as a condition on the Site Plan.
58	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point a.ii: The active nesting season is April 1-August 31. Nest searching is not recommended in heavily vegetated areas, such as the unevaluated wetlands within the extraction area.	Clearing will be completed outside of the active season (April 1 – August 31) - notes have been updated on the site plans. Should clearing be require during the nesting season, nest sweeps will be completed to ensure compliance with the MBCA.
59	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point b.i: The 30 m setback should not contain berms; this impact has not been properly addressed in the NHE or site plan documents.	Perimeter grading, are commonly implemented within 30-metre setbacks for aggregate applications in Ontario, particularly where current land use in the future setback area is agricultural or otherwise actively disturbed (such as at South Lake). The setback with its perimeter grading serves as an ecological buffer that controls water, thus facilitating the management of water onsite and protecting the adjacent lands.

Num	Topic	Section	Aboud Comment	WSP Response
60	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point b.ii: There should be ESC fencing erected around the entire site, not just at certain points. A more detailed ESC plan needs to be included. Please define “actively monitored and maintained”.	See Response to Comment #40 Where necessary, fencing has been incorporated into the site plans, and its function is both directional and exclusionary depending on site-specific conditions. This is not typically uniformly applied across the entire site because certain areas benefit from it more than others, while some locations may not warrant fencing due to topography, hydrology, or existing vegetation. Regarding the request to define “actively monitored and maintained”: this refers to a structured inspection and maintenance protocols common to CBM aggregate operations.
61	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point b.vi: see comment 59.	See Response to Comment #59
62	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Mitigation is not included for potential impacts to SAR/SWH	No specific mitigation measures to address SWH or SAR were provided in the NER. Rather, BMPs and mitigation measures for other significant natural heritage features were assessed to be sufficient to address potential indirect impacts to SWH/SAR.

Num	Topic	Section	Aboud Comment	WSP Response
63	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point c.i: Given the potential impacts to all the watercourses within the study area and within the vicinity of the site, the DFO RFR should include not only tributary 3, but also tributaries 1, 2, 4, and 5, as well as the entire stretch of Mill Creek running along the property boundary, and downstream of the site as far as the groundwater impacts will occur, as they will all be affected by changes to the water balance at the site.	Ongoing consultation with DFO is underway. They are reviewing the water reports as well as the supplementary technical memoranda, which include all Tributaries and Rivers.
64	Natural Environment	ARA Site Plan Document – Aberfoyle South Pit Expansion drawings 1-5s - Drawing No. 3 of 5 Section L. Report Recommendations	Point e.i: include full natural heritage monitoring plan as described in point 39 of this review or refer to the updated NER section	Based on the results of the NER, monitoring of ecological features are focused on the wetland and fish habitat features. The monitoring programs have been detailed in the comment response documents prepared to address agency inquires. The complementary wetland monitoring is presented in the additional PSW assessment provided.
65	Natural Environment	ARA Site Plan Document: Drawing 4 of 5 – rehabilitation plan	Note D1(Tree Planting areas), noted within the drawing is not listed on the page. See section 8 comments of the report for additional direction regarding the rehabilitation plan.	Rehabilitation Plan has been updated

Num	Topic	Section	Aboud Comment	WSP Response
66	Natural Environment	General	In conclusion, our review of the submitted report has determined that additional details are required in the form of an updated report prior to approval of the NER and the Site Plans. This additional information will include confirmation of approval of the Terms of Reference via inclusion of the correspondence between the municipalities, confirmation of the completion of all required studies per an accepted Terms of Reference and the Pre-Consultation Peer Review, results of the breeding bird surveys, a list of wildlife species identified in the background review, discussion of the effects of the reduction of groundwater impacts on the watercourses on/adjacent to the site and their fish communities, and details of an adaptive mitigation and monitoring plan for the site	Responses have been provided in a comment response matrix with supporting addenda and figures, as necessary.

ATTACHMENT 1

Table 2 (Weather Conditions and Staff Qualifications)

Table 3 (ACC Data)

Table 4 (BBS Breeding Evidence)

Table 2: Weather Conditions and Staff Qualifications

Date	Type of Survey	Weather Conditions	Staff and Qualifications
April 24, 2018	Anuran Call Count (ACC) Survey #1, Amphibian Egg Mass Survey #1, Turtle Habitat Assessment, Visual Encounter Survey (VES)	Temperature: 7 to 12°C, Wind Speed: <5 km/h, Wind Direction: N/A, Cloud: 100%, light to moderate rain	Amber Sabourin HBSc (Env), Darren Benallick (Fisheries Technician)
May 9, 2018	ACC #2, Amphibian Egg Mass Survey #2, VES	Temperature: 16 to 23°C, Wind Speed: 0 to 15 km/h, Wind Direction: east to southeast, Cloud: 5-30%, no rain	Amber Sabourin HBSc (Env), Jamie Weir (Fisheries Technician)
May 29, 2018	Breeding Bird Survey (BBS) #1, VES	Temperature: 23 to 24°C, Wind Speed: 0 to 19 km/h, Wind Direction: east, Cloud: 0%, no rain	Luke Owens B.A. Hons. (Terrestrial)
May 29-June 22, 2018	Bat Acoustic Survey		Luke Owens B.A. Hons. (Terrestrial)
June 18, 2018	ACC #3, VES	Temperature: 21 to 22 °C, Wind Speed: 5-30 km/h, Wind Direction: northwest, Cloud: 85-100%, no rain	Amber Sabourin HBSc (Env), Luke Owens B.A. Hons. (Terrestrial)
June 22, 2018	BBS #2, VES	Temperature: 9 to 15°C, Wind Speed: 19km/h, Wind Direction: east, Cloud: 5-30% no rain	Luke Owens B.A. Hons. (Terrestrial)
June 26, 2018	Ecological Land Classification (ELC), Botanical Inventory #1, Fish Habitat Survey, VES, Woodland / Wetland boundary delineation	Temperature: 19 to 24°C, Wind Speed: 5 to 17 km/h, Wind Direction: southeast, Cloud: 30%, no rain	Amber Sabourin HBSc (Env), Danielle Radu M.Sc (Terrestrial)
June 29, 2018	BBS #3, ELC, Botanical Inventory #1 - continued, Fish Habitat Survey, VES, Woodland / Wetland boundary delineation	Temperature: 22 to 28°C, Wind Speed: 5km/h, Wind Direction: N/A, Cloud: 0%, no rain	Luke Owens B.A. Hons. (Terrestrial)
August 31, 2018	ELC, Botanical Inventory #2, VES	Temperature: 14 to 23°C, Wind Speed: 0 to 10km/h, Wind Direction: east, Cloud: 0 to 60%, no rain	Amber Sabourin HBSc (Env), Danielle Radu M.Sc (Terrestrial)
October 7, 2021	Botanical Inventory #3, VES	N/A	Danielle Radu M.Sc (Terrestrial)
March 5, 2023	Black Ash Survey	N/A	Corey Burt MSc., ISA Certified Arborist – ON-2635A

Date	Type of Survey	Weather Conditions	Staff and Qualifications
August 14, 2023	Wetland/Woodland Delineation, VES	N/A	Shannon Ritchie M.Sc (Terrestrial)
September 12, 2023	Wetland staking and delineation (with the GRCA and consultant for the Township of Puslinch).	N/A	Shannon Ritchie M.Sc (Terrestrial)
September 10, 2024	Fish Community Survey	Temperature: 9 to 20°C, Wind Speed: 3-19 km/h, Wind Direction: N/A, Cloud: 0%	Jamie Weir (Fisheries Technician), Pierre Paquette Dip.T. (FWT)
August 30, 2024 March 19, 2025 May 5, 2025	Headwater Drainage Feature (HDF) Assessment	Summer: Temperature: 25, Cloud Cover: 40%, No rain Spring 1: Temperature: 20, Cloud Cover: 30%, No rain Spring 2: Temperature: 11, Cloud Cover: 40%, No rain	Courtney Huber H.B.Sc, CAN-CISEC

Table 3: Anuran Call Count Survey Results for the Proposed Aberfoyle South Pit Expansion Study Area

Survey Station	Habitat	Survey #	Species[1], Call Code[2], and Abundance[3]				SWH Assessment
			AMTO	GRTF	SPPE	WOFO	
1	Small pond surrounded by deciduous swamp	1	—	—	—	2-5	Two indicator species of woodland breeding SWH were observed. However, individuals did not meet the abundance threshold. Habitat not SWH.
		2	—	1-1	—	—	
		3	—	—	—	—	
2	Flooded depression in agricultural field	1	3-FC	—	—	3-FC	Habitat does not meet minimum size or distance from woodland criteria to be considered a wetland for the purposes of amphibian breeding SWH evaluation. Habitat not SWH.
		2	—	—	—	—	
		3	—	—	—	—	
3	Several small, flooded depressions in agricultural field	1	—	—	3-FC	1-5	Two indicator species of wetland breeding SWH were observed. However, individuals did not meet the abundance threshold. Habitat not SWH.
		2	2-5	1-3	3-FC		
		3	—	—	—	—	
4	Pond on residential property	1	—	—	3-FC	1-2	Two indicator species of woodland breeding SWH were observed. However, individuals did not meet the abundance threshold. Habitat not SWH.
		2	1-1	1-2	—	—	
		3	—	—	—	—	
5	Deciduous swamp	1	—	—	—	—	Survey results did not meet minimum number of indicator species for SWH. Habitat not SWH.
		2	2-3	—	—	—	

Survey Station	Habitat	Survey #	Species[1], Call Code[2], and Abundance[3]				SWH Assessment
			AMTO	GRTF	SPPE	WOFO	
		3	—	—	—	—	
6	Edge of agricultural field looking into a woodlot	1	—	—	1-2	1-4	Two indicator species of woodland breeding SWH were observed. However, individuals did not meet the abundance threshold. Habitat not SWH.
		2	2-3	—	3-5	—	
		3	—	—	—	—	

[1] Species: AMTO = American toad; GRTF = Gray treefrog; SPPE = spring peeper; WOFO = Wood frog
[2] Call Code: 1 – Individuals can be counted; calls not simultaneous; 2 – Calls distinguishable; some calling simultaneously; 3 – Full chorus; calls continuous and overlapping; abundance cannot be estimated for this code
[3]Abdundance: Count of individuals heard, or FC if full chorus of undistinguished individuals heard
Call Code - Abundance (e.g., 1-1, which is Call Code Level 1 with 1 individual counted).

Table 4: Breeding Bird Evidence

Scientific Name	Common Name	SRANK[a]	GRANK[a]	ESA Status[b]	Breeding Status and Highest Breeding Code										
Birds					BBS01	BBS02	BBS03	BBS04	BBS05	BBS06	BBS07	BBS08	BBS09	BBS10	BBS11
Alder Flycatcher	*Empidonax alnorum*	S5B	G5	–		Possible (S)			Possible (S)				Probable (T)	Possible (S)	
American Crow	*Corvus brachyrhynchos*	S5B	G5	–	Probable (T)			Possible (S)	Probable (T)	Possible (S)	Possible (S)				Possible (S)
American Goldfinch	*Carduelis tristis*	S5B	G5	–	Possible (H)		Possible (H)	Possible (S)	Possible (S)	Possible (S)			Possible (H)		Possible (S)
American Kestrel	*Falco sparverius*	S4	G5	–	Possible (H)										
American Robin	*Turdus migratorius*	S5B	G5	–	Probable (T)	Possible (S)	Possible (H)	Possible (S)	Possible (H)	Possible (S)			Possible (S)	Possible (S)	
Bank Swallow	***Riparia riparia***	**S4B**	**G5**	**THR**	Observed (X)										
Barn Swallow	***Hirundo rustica***	**S4B**	**G5**	**SC**	Possible (H)	Possible (H)			Possible (H)						
Black-capped Chickadee	*Poecile atricapillus*	S5	G5	–			Possible (S)			Possible (S)		Possible (S)	Possible (S)		Possible (S)
Blue Jay	*Cyanocitta cristata*	S5	G5	–	Possible (H)	Possible (H)	Possible (H)		Observed (X)	Possible (H)	Possible (H)				
Blue-headed Vireo	*Vireo solitarius*	S5B	G5	–							Possible (H)				
Bobolink	***Dolichonyx oryzivorus***	**S4B**	**G5**	**THR**	Probable (D)	Probable (T)									
Brown-headed Cowbird	*Molothrus ater*	S4B	G5	–		Possible (H)	Possible (S)	Observed (X)	Possible (S)				Possible (S)		
Canada Goose	*Branta canadensis*	S5	G5	–									Possible (H)		
Cedar Waxwing	*Bombycilla cedrorum*	S5B	G5	–		Possible (H)	Possible (H)							Possible (H)	
Chipping Sparrow	*Spizella passerina*	S5B	G5	–	Possible (S)	Possible (S)	Probable (T)							Possible (S)	
Common Grackle	*Quiscalus quiscula*	S5B	G5	–	Possible (H)			Possible (S)	Possible (H)				Possible (H)		Possible (H)
Common Loon	*Gavia immer*	S5B, S5N	G5	–			Observed (X)		Observed (X)						
Common Raven	*Corvus corax*	S5	G5	–		Possible (S)									
Common Yellowthroat	*Geothlypis trichas*	S5B	G5	–	Observed (X)	Possible (S)	Possible (S)	Possible (S)	Possible (S)				Probable (T)		Probable (T)
Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5	–					Possible (S)				Possible (H)		Possible (S)
Eastern Phoebe	*Sayornis phoebe*	S5B	G5	–	Possible (S)		Possible (S)								
Eastern Wood-pewee	***Contopus virens***	**S4B**	**G5**	**SC**						Possible (S)	Possible (S)	Probable (T)		Possible (S)	Possible (S)
European Starling	*Sturnus vulgaris*	SNA	G5	–	Observed (X)		Observed (X)	Observed (X)							
Gray Catbird	*Dumetella carolinensis*	S4B	G5	–	Possible (S)			Possible (S)							Possible (S)
Great Crested Flycatcher	*Myiarchus crinitus*	S4B	G5	–	Possible (S)		Possible (S)			Probable (T)				Possible (S)	Possible (S)
House Finch	*Haemorhous mexicanus*	SNA	G5	–											Possible (S)
House Sparrow	*Passer domesticus*	SNA	G5	–		Possible (H)									
House Wren	*Troglodytes aedon*	S5B	G5	–				Possible (S)							Possible (S)
Indigo Bunting	*Passerina cyanea*	S4B	G5	–	Probable (T)	Possible (S)	Probable (A)	Possible (S)	Possible (S)	Possible (S)				Probable (T)	
Killdeer	*Charadrius vociferus*	S5B, S5N	G5	–	Probable (T)				Possible (S)				Possible (H)		
Mourning Dove	*Zenaida macroura*	S5	G5	–		Possible (H)							Possible (H)		
Northern Cardinal	*Cardinalis cardinalis*	S5	G5	–			Possible (S)		Possible (S)	Possible (S)				Possible (S)	
Northern Flicker	*Colaptes auratus*	S4B	G5	–					Possible (S)					Possible (S)	Possible (S)
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	S4B	G5	–									Possible (H)		
Northern Waterthrush	*Parkesia noveboracensis*	S5B	G5	–									Possible (S)	Probable (T)	Possible (S)
Ovenbird	*Seiurus aurocapilla*	S4B	G5	–	Possible (H)					Possible (H)	Probable (T)	Probable (T)			
Red-bellied Woodpecker	*Melanerpes carolinus*	S4	G5	–				Possible (S)		Possible (S)	Possible (S)				
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5	–			Possible (S)	Possible (S)	Probable (T)	Possible (S)	Probable (T)	Probable (T)			Possible (S)
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5	–	Observed (X)	Observed (X)	Observed (X)		Observed (X)				Probable (T)	Observed (X)	Possible (S)
Rock Pigeon	*Columba livia*	SNA	G5	–									Observed (X)		Possible (H)
Savannah Sparrow	*Passerculus sandwichensis*	S4B	G5	–	Probable (T)	Probable (T)			Probable (T)						
Song Sparrow	*Melospiza melodia*	S5B	G5	–	Probable (T)	Probable (T)	Possible (S)	Probable (T)	Probable (T)	Possible (S)			Possible (S)	Probable (T)	Probable (T)
Turkey Vulture	*Cathartes aura*	S5B	G5	–			Possible (H)								
Veery	*Catharus fuscescens*	S4B	G5	–				Possible (S)		Possible (S)	Possible (S)		Probable (T)	Possible (S)	
White-breasted Nuthatch	*Sitta carolinensis*	S5	G5	–							Possible (S)				
Wood Duck	*Aix sponsa*	S5	G5	–									Observed (X)		
Yellow-bellied Sapsucker	*Empidonax flaviventris*	S5B	G5	–										Possible (S)	

[a] Ranks based upon determinations made by the Ontario Natural Heritage Information Centre (2019) G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure. SNA = Not applicable for Ontario Ranking (e.g. Exotic species)
[b] Status: *Endangered Species Act*, 2007. General (O.Reg 242/08 last amended 31 March 2022 as O. Reg. 328/22). Species at Risk in Ontario List (O.Reg 230/08 last amended 25 January 2023 as O. Reg. 9/23); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)
Bolded text indicates species at risk.
Breeding Bird Evidence (BE) Level
Possible: **H = Species observed in its breeding season in suitable nesting habitat** **S = Possible (S) male/breeding calls in suitable nesting habitat in breeding season**
Probable: **T**=Territory **A**=Anxiety Behaviour **D**=Display **P**=Pair **N**=Nest Building (Wren / Woodpecker) **V**=Visiting Nest **M**=Multiple (at least 7) individuals with S
Confirmed: **AE**= Adult Nest Entry/Exit **CF=**Carrying Food **DD**= Distraction **FS**=Food/Faecal Sack **FY**=Fledged Young **NE**=Nest with Eggs **NU**=Used Nest **NY**=Nest with Young **NB**=Nest Building (non-Wren / Woodpecker)
Observed: **X**= Species observed in its breeding season (no breeding evidence)

ATTACHMENT 2

Fish community survey

TECHNICAL MEMORANDUM

DATE November 1, 2024 **Project No.** CA-GLD-1791470A

TO David Hanratty
Votorantim Cimentos

CC Heather Melcher, Neal DeRuyter, Stephen May

FROM Warren Aken **EMAIL warren.aken@wsp.com**

CBM ABERFOYLE SOUTH PIT EXPANSION – FISH COMMUNITY ASSESSMENT

WSP Canada Inc. (WSP) has been retained by CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada), to provide consulting services for the proposed CBM Aberfoyle South Pit Expansion (the Project).

In order to fully address stakeholder comments and ensure CBM has the required information available to respond, WSP has undertaken a fish community survey associated with watercourses on the Aberfoyle South Pit Expansion Site.

For the purpose of this memorandum, the following definitions are used (APPENDIX A):

- **Site** - the total land area within the property owned by CBM that is proposed for licensing under the ARA. The site is approximately 44 ha.
- **Extraction Limit** – The total area within the site in which aggregate is proposed for extraction. The total area of the Extraction Limit is approximately 27 ha.
- **Study Area** - The Study Area for the fish community survey encompasses the Mill Creek and associated unnamed tributaries.

FISH COMMUNITY SURVEY

There are five unnamed tributaries to Mill Creek associated with the Site. The following four unnamed tributaries (excluding Tributary #3) lie outside of the licence boundary, as seen on the figure attached (APPENDIX A).

- **Tributary #1** originates in the Mill Creek-Puslinch PSW approximately 780 m southeast of the property and flows through the southeast corner of the property and into Mill Creek;
- **Tributary #2** originates in the Mill Creek-Puslinch PSW approximately 130 m east of the property and flows into Mill Creek;
- **Tributary #4** originates in the Mill Creek-Puslinch PSW approximately 180 m west of the property and flows into Tributary #3 just west of the property; and

- **Tributary #5** originates in the Mill Creek-Puslinch PSW just northwest property and flows southwest into Tributary #3.

Tributary #3 originates in the Mill Creek-Puslinch PSW approximately 330 m north of the property, flowing first through the Mill Creek-Puslinch PSW and then through the northwest portion of the Site before re-entering the Mill Creek-Puslinch PSW and joining Mill Creek approximately 530 m west of the property (APPENDIX A).

With extensive fisheries information available for the Mill Creek (i.e., from MNR), the focus of the fish community survey was on Tributary #3, and its associated branch (Tributary #5). Tributary #1 and #2 were also assessed along Sideroad 20 South prior to entering the Site. Tributary #4 was not assessed during the 2024 survey as it is located off-Site and is likely to have similar fish habitat characteristics and fish assemblage as Tributary #5.

Fish sampling was undertaken on September 9 and 10, 2024 by means of a portable battery driven electrofishing device (Smith-Root LR24). Electrofishing is the use of electricity to catch fish and is regarded as the most effective single method for sampling fish communities in streams (Plafkin *et al*, 1989[1]).

Results

Mill Creek has a coldwater thermal regime and is known to support several fish species, including blacknose dace (*Rhinichthys atratulus*), bluntnose minnow (*Pimephales notatus*), brook stickleback (*Culaea inconstans*), central mudminnow (*Umbra limi*), common shiner (*Luxilus cornutus*), creek chub (*Semotilus atromaculatus*), fathead minnow (*Pimephales promelas*), rainbow darter (*Etheostoma caeruleum*), rock bass (*Ambloplites rupestris*), and white sucker (*Catostomus commersonii*) (MNRF 2023a). It also supports sensitive coldwater species such as brown trout (*Salmo trutta*) and brook trout (*Salvelinus fontinalis fontinalis*) (MNRF 2023a and b).

MNR data indicate that Tributaries #1, #2, #3, and #4 have a coldwater thermal regime and are likely to support a similar fish community as recorded in the main branch of Mill Creek (MNRF 2023a). The fish community survey completed by WSP found 12 fish species within Tributaries #1, #2, #3, and #5 (Table 1). Brown trout were only caught in Tributary #1. The fish community survey also confirmed that although a range of small-bodied fish were caught within Tributary #3, several shallow muddy sections limit the movement of larger fish such as trout upstream. Within Tributary #3, upstream of Tributary #5, there is limited spawning and rearing habitat for coldwater species such as brown trout. Within the upper reaches of Tributary #3, brook stickleback and central mudminnow dominated the fish assemblage.

[1] Barbour, M.T., J. Gerritsen, B.D. Snyder, and J.B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.

Table 1: Fish Community Survey Results, September 2024

Species	Trib#1	Trib#2	Trib#3	Trib#5
Pumpkinseed (*Lepomis gibbosus*)	20		3	
Northern Redbelly Dace (*Chrosomus eos*)	33	1	72	
Western Blacknose Dace (*Rhinichthys obtusus*)	105		48	
Brook Stickleback (*Culaea inconstans*)	15	11	210	46
Fathead Minnow (*Pimephales promelas*)	3		6	
Central Mudminnow (*Umbra limi*)	20	4	72	3
Creek Chub (*Semotilus atromaculatu*)	5	1	155	
Golden Shiner (*Notemigonus crysoleucas*)	1		1	
White Sucker (*Catostomus commersonii*)		1	47	
Northern Pearl Dace (*Margariscus nachtriebi*)			4	
Blacknose Shiner (*Notropis heterolepis*)			1	
Brown Trout (*Salmo trutta*)	9			

All the fish species recorded in Mill Creek and the associated tributaries within the study area are considered secure and common in Ontario and globally (S5; G5). No aquatic SAR were assessed to have ranges that overlap the Study Area, and no critical aquatic SAR habitat was determined to be present within the Study Area (DFO 2024).

On-Site hydraulic and geomorphic investigations for Tributary #3 concluded that the tributary is an intermittent water feature that is characterized by a narrow channel and high riparian cover. It should be noted that Tributary #3 has been referred to as both intermittent and perennial within the different existing conditions reports. The reference to the seasonality of the stream has been based off the fact that the installed loggers have measured zero flow on at least four occasions, while during these periods, pooled water was still present. Further to this, the water depth during these low flow periods is likely limiting to fish as during summer, there is insufficient baseflow to consistently sustain water in Tributary #3. Therefore, referring to the Tributary #3 as intermittent is appropriate when considering fish habitat.

During the September 2024 survey, it was noted that the average wetted depth was less than 0.3 m with deep organic muck sections present through the middle reach of Tributary #3 (APPENDIX B). The presence of watercress indicates that the tributary is likely groundwater-fed (O'Neil and Hildebrand 1986 and WSP 2024). No specialized habitats (e.g., spawning) were identified in Tributary #3.

Closure

This information has been incorporated into the DFO Request for Review. We trust this memorandum meets your current needs. If you have any further questions regarding this memorandum, please contact the undersigned.

WSP Canada Inc.

[redacted]

Warren Aken
Senior Aquatic Ecologist

[redacted]

Amber Sabourin
Lead Ecologist

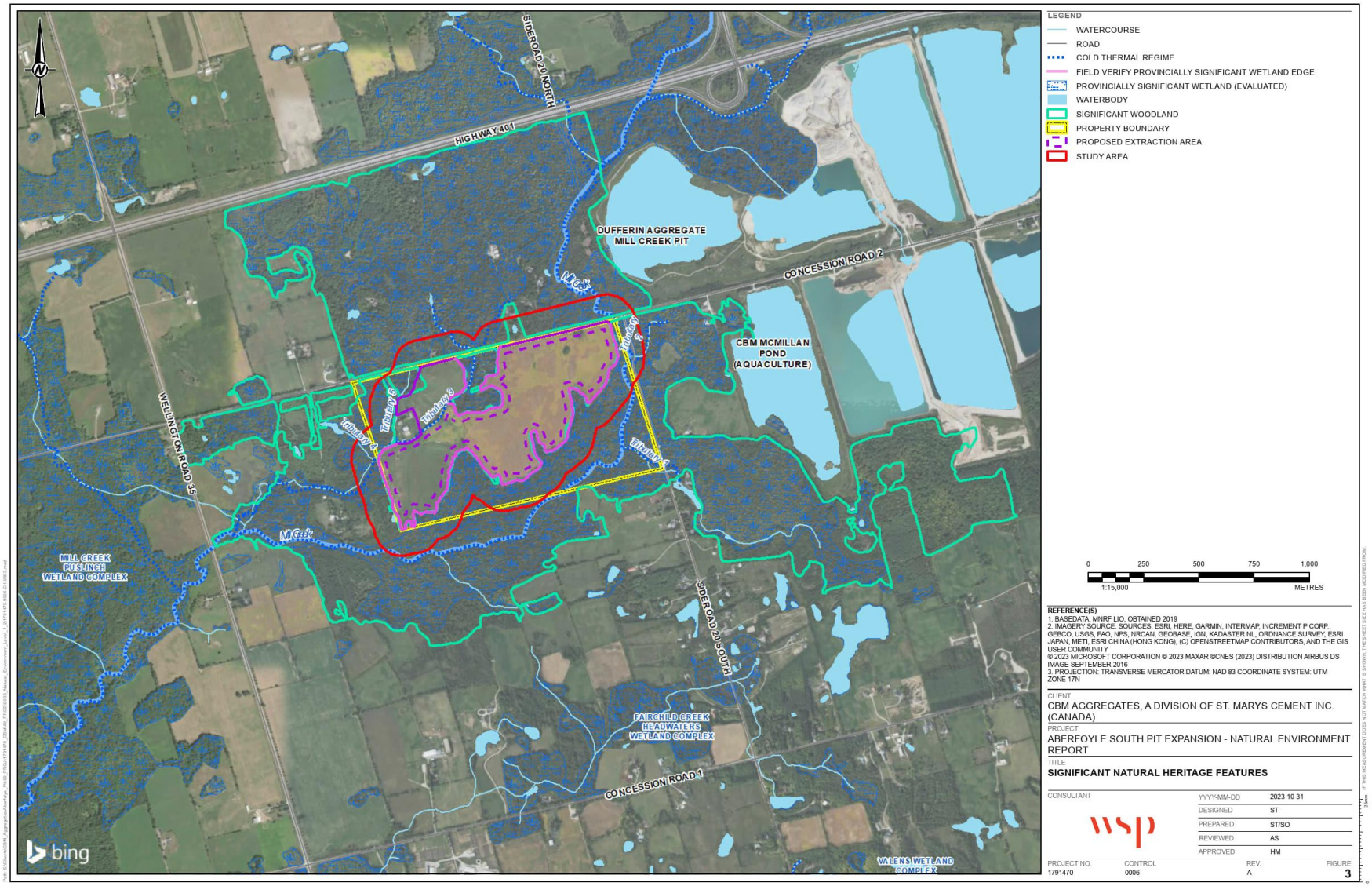
WA/AS/mp

Attachments: Appendix A: Study Area - Associated Watercourses
Appendix B: Photos

https://wsponline.sharepoint.com/sites/gld-21291g/deliverables/natural environment report/fish community assessment/ca-gld-1791470a-l-rev0-cbm_aberfoyle_fish_community-01nov2024.docx

APPENDIX A

Study Area - Associated Watercourses


SIDEROAD 20 NORTH
HIGHWAY 401
DUFFERIN AGGREGATE
MILL CREEK PIT
CONCESSION ROAD 2
CBM MCMILLAN
POND
(AQUACULTURE)
WELLINGTON ROAD 35
MILL CREEK
PUSLINCH
WETLAND COMPLEX
SIDEROAD 20 SOUTH
FAIRCHILD CREEK
HEADWATERS
WETLAND COMPLEX
CONCESSION ROAD 1
VALENS WETLAND
COMPLEX
bing
LEGEND
WATERCOURSE
ROAD
COLD THERMAL REGIME
FIELD VERIFY PROVINCIALLY SIGNIFICANT WETLAND EDGE
PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
WATERBODY
SIGNIFICANT WOODLAND
PROPERTY BOUNDARY
PROPOSED EXTRACTION AREA
STUDY AREA
0 250 500 750 1,000
1:15,000
METRES
REFERENCE(S)
1. BASEDATA: MNRF LIO, OBTAINED 2019
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
© 2023 MICROSOFT CORPORATION © 2023 MAXAR ©CNES (2023) DISTRIBUTION AIRBUS DS
IMAGE SEPTEMBER 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N
CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)
PROJECT
ABERFOYLE SOUTH PIT EXPANSION - NATURAL ENVIRONMENT REPORT
TITLE
SIGNIFICANT NATURAL HERITAGE FEATURES
CONSULTANT
wsp
YYYY-MM-DD 2023-10-31
DESIGNED ST
PREPARED ST/SO
REVIEWED AS
APPROVED HM
PROJECT NO. 1791470
CONTROL 0006
REV. A
FIGURE 3

APPENDIX B

Photos

Insert file pathway here

Photo 1. Mill Creek at SW2 (March 2024)

Photo 2. Mill Creek at SW2 (March 2024)

Photo 3. Mill Creek at SW2 (October 2019)

Photo 4. Mill Creek at SW3 (October 2019)

Photo 5. Mill Creek at SW3 (March 2024)

Photo 6. Mill Creek at SW3 (July 2018)

wsp

Proposed Aberfoyle South Pit Expansion

Date: September 2024

Project No: CA-GLD-1791470A

Attachment 2: Photo Plate

Photo 7. Tributary #3 at SW1 (March 2024)

Photo 8. Tributary #3 at SW1 (March 2024)

Photo 9. Tributary #3 at SW1 (October 2019)

Photo 10. Tributary #3 at SW4 (March 2024)

Photo 11. Tributary #3 at SW4 (March 2024)

Photo 12. Tributary #3 at SW4 (October 2019)

Insert file pathway here

Photo 7. Tributary #3 (September 2024)

Photo 8. Tributary #3 (September 2024)

Photo 9. Tributary #3 (September 2024)

Photo 10. Tributary #1 (September 2024)

Photo 11. Tributary #2 (September 2024)

Photo 12. Tributary #5 (September 2024)

ATTACHMENT 3

HDF Assessment

TECHNICAL MEMORANDUM

DATE 22 October 2025 **Project No.** CA-GLD-1791470A

TO Andreanne Simard - Director of Lands, Resources and Environment
Stephen May - Lands Manager, Western Region
CBM Aggregates
CC Craig DeVito, Warren Aken, Paul Menkveld - WSP; Neal DeRuyter - MHBC

FROM Courtney Huber **EMAIL** **courtney.huber@wsp.com**

HEADWATER DRAINAGE FEATURE ASSESSMENT - PROPOSED CBM ABERFOYLE SOUTH LAKE PIT

1.0 INTRODUCTION

WSP Canada Inc. (WSP) has been retained by CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada), to provide consulting services for the proposed CBM Aberfoyle South Pit Expansion (the Site).

In order to fully address stakeholder comments and ensure CBM has the required information available to respond, WSP has undertaken a Headwater Drainage Feature Assessment associated with drainage on the Aberfoyle South Pit Expansion Site.

For the purpose of this memorandum, the following definitions are used:

- **Site** - the total land area within the property owned by CBM that is proposed for licensing under the ARA. The Site is approximately 44 ha.
- **Extraction Limit** – The total area within the Site in which aggregate is proposed for extraction. The total area of the Extraction Limit is approximately 27 ha.
- **Study Area** - The Study Area for the headwater drainage feature assessment encompasses the drainage features connecting to Mill Creek and associated unnamed tributaries on the Site.

This assessment s undertaken to compliment the Water Report for this application, which includes characterization of larger surface water features and a surface water balance (which allocates surplus to infiltration and run off) (WSP 2023a).

2.0 METHODS

Headwater Drainage Feature (HDF) assessments were conducted to confirm the flow and connection of the surface water features on the Site. Potential HDFs, drainage patterns and linkages between the Site and nearby Mill Creek and associated tributaries were identified during the HDF assessments. The assessments are based on data collected in the on-site surface water features according to Ontario Stream Assessment Protocol (OSAP) Section 4 Module 11 – Unconstrained Headwater Sampling (Gorenc and Stanfield, March 2017) and the *Evaluation, Classification, and Management of Headwater Drainage Features Guidelines* (HDF Guidelines) developed by the Toronto and Region Conservation Authority and Credit Valley Conservation (TRCA and CVC, 2014) to evaluate and classify each feature.

The HDFs were defined with the following characteristics, as outlined by the HDF Guidelines: *Evaluation* (Part 1), *Classification* (Part 2) and *Management* (Part 3).

2.1 Part 1 – Evaluation

Based on a review of aerial imagery, it was concluded that the HDFs on the subject property were 'low sensitivity sites' (i.e., features that are ill-defined, contain only ephemeral flow and are unlikely to contain sensitive species and/or habitat) and as such, a Rapid Survey Technique was used for assessment, as outlined in the HDF Guidelines (TRCA and CVC, 2014).

The Unconstrained Headwater Sampling as outlined by OSAP (2017), allows for a rapid assessment method for characterizing the amount of water and sediment transport and storage capacity and drainage feature types found on an extended landscape where access is generally unconstrained. The Unconstrained Headwater Sampling specifically identified three Sampling events:

Sample Event 1: Conducted in the short period of time following a major freshet event, which in Ontario generally occurs during late winter and spring, and before new vegetative growth covers and disrupts any newly deposited sediment.

Sample Event 2: Conducted in late April through mid-May, after the melt/thaw related interflow has ceased. This survey should be completed prior to leaf out so that vegetation growth does not impact findings, preferably, after at least three days with no precipitation.

Sample Event 3: Conducted in July to mid-September, following at least three days without a significant (i.e. flow generating) precipitation event.

Information collected during the three sample events encompassed the following general parameters, where relevant:

- Feature Type (e.g., defined natural channel, channelized, not defined, etc.)
- Riparian Conditions (e.g., none, cropped land, forest, etc.)
- Flow Conditions (e.g., no water, standing water, interstitial flow, minimal or substantial flow)
- Feature Vegetation
- Feature / Bankfull Widths / Depths
- Sediment Deposition / Transport
- Flow Measures
- Longitudinal Gradient
- Site Features (e.g., roughness)
- Channel Connectivity

The HDFs assessed on the subject property were mapped on an aerial photography base, shown on Figure 1 in Appendix A – *Headwater Drainage Feature Assessment Mapping.*

2.2 Part 2 – Classification

The data collected during the HDF evaluation phase (Part 1: Evaluation) was used to apply appropriate classifications to the HDFs being assessed, identifying the functions of each HDF that were considered during Part 3: Management Recommendations. Following the Guidelines, a classification was applied to each of the following four categories: Hydrology; Riparian; Fish and Fish Habitat; and Terrestrial Habitat (see Table 1).

2.3 Part 3 - Management

The classification categories identified in Part 2 provide the basis of the management recommendations provided. A flow chart in the Guidelines provides guidance through the process of translating the classification results to management recommendations for the overall Site.

3.0 RESULTS

The first HDF assessment was conducted on the Site, on August 30, 2024, to capture *Sampling Event 3* (OSAP 2017) for the summer assessment, additional HDF assessments were conducted in the spring of 2025. The second site visit, representing *Sampling Event 1* (OSAP 2017), occurred on March 19, 2025, following a major freshet event and before new vegetation growth covered and disrupted any newly deposited sediment. A third visit, representing *Sampling Event 2* (OSAP 2017), was conducted on May 5, 2025, after the melt/thaw related interflow had ceased. Event 2 also was completed prior to leaf-on so that vegetation growth did not impact findings.

The HDFs assessed focussed on the main agricultural field where the Extraction Limit is located as well as the surrounding forested areas located to the southeast and northwest of the property. Prior to onsite field investigations and during the initial Site assessment (Summer 2024) nine areas were highlighted as potential HDFs (Figure 1). This summer assessment only provided base-line flow, therefore the following spring assessments (freshet & spate) provided further insight.

The agricultural field was observed as having many wet areas during the spring assessments which hold water in low-lying areas and remain in a relatively stagnant state on the property in the spring and become dry in the summer. Of the nine potential HDFs, seven (HDF 3 to HDF9) were dry or only contained stagnant water in the spring assessment and were all dry in the summer assessment. It was observed that the remaining two features (HDF1 and HDF2) provided some movement of water off the property and were moved forward through the unconstrained HDF assessment.

In total, two segments were assessed under the HDF Guidelines in the Study Area: HDF1, and HDF2. The branches of the HDFs were determined to contain shallow flowing water in the spring of 2025, therefore a full Unconstrained Headwater Drainage Feature Assessment was conducted. The results of the HDF assessments are provided below.

- **HDF1**: Channelized through active cropland; native vegetation, contributing terrestrial habitat, but no direct fish use. This feature was actively flowing during the spring field assessment, conveying flow from the agricultural field.
- **HDF2**: Swale through active cropland; native vegetation, contributing terrestrial habitat, but no direct fish use. This feature was actively flowing during the spring field assessment, conveying flow from the agricultural field.

The classification and management recommendation for each HDF feature segment resulting from the field evaluations of the two features is provided in Table 1 along with management recommendations in accordance with the *Guidelines*, below.

Table 1: Summary of HDF functional classifications and management recommendations

Drainage Feature Segment	Step 1		Step 2	Step 3	Step 4		Management Recommendation
	Hydrology*	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat	Modifiers	
HDF 1	FC – 4 (Minimal surface flow) FT – 2 (Channelized) ***Contributing Functions - Ephemeral***	Active Agriculture / Channelized	Cropped Land ***Limited Functions***	Allochthonous transport only ***Contributing Functions***	RC – 3 (Cropped Land & 6 (Scrubland) Movement Corridor. ***Contributing Functions***	Active Agriculture	Mitigation, however following modifiers the management was reduced to **Maintain Recharge** "Maintain overall infiltration rates at site"
HDF 2	FC – 4 (Minimal surface flow) FT – 2 (Channelized) ***Contributing Functions - Ephemeral***	Active Agriculture & Wetland Feature /Channelized	Cropped Land ***Limited Functions***	Allochthonous transport only ***Contributing Functions***	RC – 3 (Cropped Land), 6 (Scrubland) & 7 (Wetland) Movement Corridor ***Contributing Functions***	Active Agriculture	Mitigation, however following modifiers the management was reduced to **Maintain Recharge** "Maintain overall infiltration rates at site"
HDF 3	FC – 1 (No Surface Water) FT – 4 (No defined feature) ***Limited or Recharge***	Active Agriculture	Cropped Land ***Limited Functions***	Allochthonous transport only ***Contributing Functions***	No terrestrial habitat present ***Limited Functions***	Active Agriculture	***No Management Required***
HDF 4	FC – 1 (No Surface Water) FT – 4 (No defined feature) ***Limited or Recharge***	Active Agriculture	Cropped Land ***Limited Functions***	No connection to a fishery. ***No Function***	No terrestrial habitat present ***Limited Functions***	Active Agriculture	***No Management Required***
HDF 5	FC – 1 (No Surface Water) FT – 4 (No defined feature) ***Limited or Recharge***	Active Agriculture	Cropped Land ***Limited Functions***	No connection to a fishery. ***No Function***	No terrestrial habitat present ***Limited Functions***	Active Agriculture	***No Management Required***
HDF 6	FC – 1 (No Surface Water) FT – 4 (No defined feature) ***Limited or Recharge***	Active Agriculture	Cropped Land ***Limited Functions***	No connection to a fishery. ***No Function***	No terrestrial habitat present ***Limited Functions***	Active Agriculture	***No Management Required***

Drainage Feature Segment	Step 1		Step 2	Step 3	Step 4		Management Recommendation
	Hydrology*	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat	Modifiers	
HDF 7	FC – 1 (No Surface Water) FT – 4 (No defined feature) ***Limited or Recharge***	Active Agriculture	Cropped Land ***Limited Functions***	No connection to a fishery. ***No Function***	No terrestrial habitat present ***Limited Functions***	Active Agriculture	***No Management Required***
HDF 8	FC – 1 (No Surface Water) FT – 4 (No defined feature) ***Limited or Recharge***	Active Agriculture	Cropped Land ***Limited Functions***	No connection to a fishery. ***No Function***	No terrestrial habitat present ***Limited Functions***	Active Agriculture	***No Management Required***
HDF 9	FC – 1 (No Surface Water) FT – 4 (No defined feature) ***Limited or Recharge***	Active Agriculture	Cropped Land ***Limited Functions***	No connection to a fishery. ***No Function***	No terrestrial habitat present ***Limited Functions***	Active Agriculture	***No Management Required***

* FC = OSAP Flow Condition Codes; FT = OSAP Feature Type Codes, RC= Riparian Condition Code

4.0 RECOMMENDED MANAGEMENT

Based on the assessment in Section 3.0, two drainage segments (HDF1 and HDF2) were assessed at the *Maintain Recharge,* while the seven remaining drainage segments were assessed as *No Mitigation Required* (as outlined in Table 1).

The following recommended management, outlined by the HDF *Guidelines (*TRCA and CVC, 2014*),* are in place for ***No Management*** of HDFs on site:

- The feature that was identified during desktop pre-screening has been field verified to confirm that no feature and/or functions associated with headwater drainage features are present on the ground and/or there is no connection downstream. These features are generally characterized by lack of flow, evidence of cultivation, furrowing, presence of a seasonal crop, and lack of natural vegetation. No management recommendations required.

The following recommended management, outlined by the HDF *Guidelines (*TRCA and CVC, 2014*),* are in place for ***Maintain Recharge*** of HDFs on site:

- Maintain overall water balance by implementing mitigation measures to promote infiltration of rainwater runoff.
- Terrestrial features have been assessed in the Natural Environment Report Proposed Aberfoyle South Pit Expansion (WSP 2023b) and there are no notable terrestrial functions associated with them.

5.0 CONCLUSION

The HDF assessment was undertaken to compliment the Water Report. The Headwater Drainage Feature Assessment associated with drainage on the Aberfoyle South Pit Expansion Site has two drainage segments (HDF1 and HDF2) assessed at the *Maintain Recharge.*

To evaluate if recharge has been maintained the surface water balance, included in Section 6.5 of the Water Report (WSP 2023a), presents predicted changes in infiltration. Under existing conditions 70% of surplus water infiltrates. As a result of the creation of a pit pond on the Site, surplus is captured and infiltrated, maintaining and marginally increasing recharge as a proportion of the Site water balance. In operational conditions and in post-rehabilitated conditions Site wide recharge is maintained and slightly enhanced from from 70% to 76% of surplus. Therefore, the Water Balance of the Site shows that the proposed development promotes infiltration and therefore fulfills the recommendations outlined above in Section 4.0.

WSP Canada Inc.

[redacted]

Courtney Huber, H.B.Sc
Aquatic Ecologist

[redacted]

Daniel Eusebi, BES, RPP, MCIP
Senior Principal Ecologist

CH/PGM/DE/ld

Attachments: Appendix A – Headwater Drainage Feature Mapping
Appendix B – Unconstrained HDF Assessment Forms
Appendix C – Photo Reference

REFERENCES

Gorenc and Stanfield. 2017. Ontario Stream Assessment Protocol (OSAP) Section 4 Module 11 – Unconstrained Headwater Sampling Guideline.

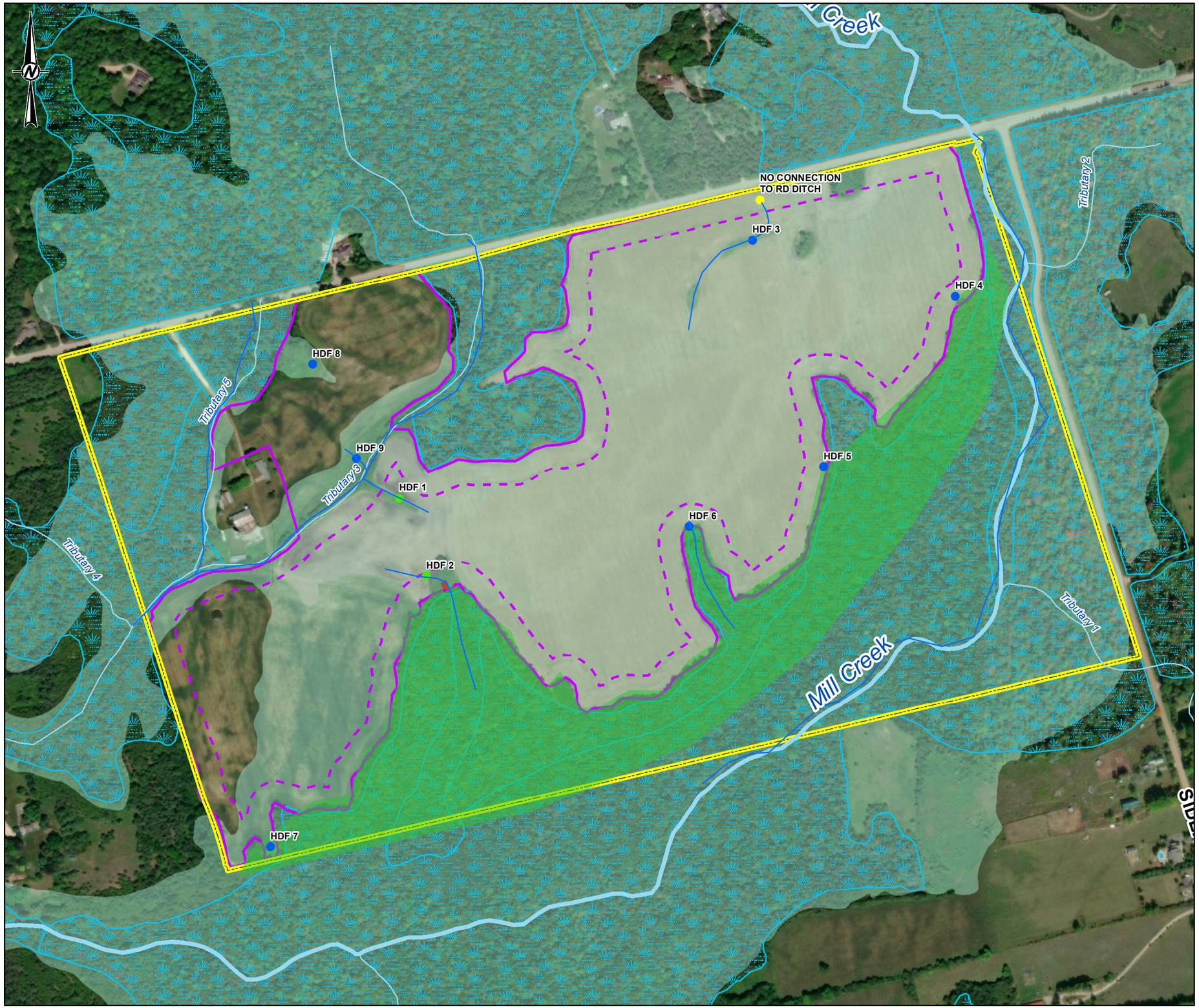
Toronto and Region Conservation Authority (TRCA) and Credit Valley Conservation (CVC). 2014. Evaluation, Classification and Management of Headwater Drainage Features Guideline.

WSP, 2023a. Water Report Level 1/2 Aberfoyle South Pit Expansion. Report dated November 2023.

WSP. 2023b. Natural Environment Report Proposed Aberfoyle South Pit Expansion. Report dated November 2023.

APPENDIX A

Headwater Drainage Feature Mapping



LEGEND

- NO CONNECTION TO RD DITCH
- STAGNANT WATER, NO FLOW
- SURFACE RECHARGE
- DRAINAGE LINES
- WATERCOURSE
- CEDAR SWAMP - FLOODED
- OUTLET PIPE (SOUTH)
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA
- FLOODPLAIN (GRCA)

0 100 200 300 400

1:5,000 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2019
2. PRODUCED USING INFORMATION UNDER LICENSE WITH THE GRAND RIVER CONSERVATION AUTHORITY © GRAND RIVER CONSERVATION AUTHORITY, 2021
3. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY IMAGE SEPTEMBER 2016

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC.(CANADA)

PROJECT
ABERFOYLE SOUTH PIT EXPANSION

TITLE
HEADWATER DRAINAGE FEATURE ASSESSMENT

CONSULTANT

wsp

YYYY-MM-DD	2025-07-10
DESIGNED	SO
PREPARED	SO
REVIEWED	GWS
APPROVED	GWS

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0008	0	**9**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

Path: S:\Clients\CBM_Aggregates\Aberfoyle_P69\9_PRO\1791470_CBM40_PRO\0008_South_Pit_Extension\1791470-0008-CH-0009.mxd

APPENDIX B

Unconstrained HDF Assessment Forms

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 2024083 0 Project #: CA-GLD-1791470A Recorder/Crew: CH

Stream Name: N/A Stream Code: NA Site Code: HDF1

Site Limits: Upstream WP# 43°25'59.06"N, 80°11'33.19"W Field Assessment: ☒ Sample 1 Unconnected HDF:

Downstream WP# 43°26'0.53"N, 80°11'36.95"W ☐ Sample 2 ☐ Not connected to

Direction of Assessment: ☐ Upstream ☒ Downstream ☐ Sample 3 downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☒ Baseflow (3)

Flow Condition ☐ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5)
☒ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7)
☒ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☒ Cropped (3) ☐ Meadow (4) ☒ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☒ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m):	5	10	20	Elevation (cm) :	3	7	10	Gradient (º):	n/a

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☒	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☒	☐	☐	☐

Feature Roughness ☒ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☒ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): 0.8 Bankfull Depth (mm) 20

Entrenchment Total: ☐ >40 m ☒ <40 m Left Bank ____ m Right Bank ____ m Total width ____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☒ Estimated (4)

Wetted Width (m)	Wetted Depth (mm)			Hydraulic head (mm)			Volume (L)			Distance (m)			Time (s)		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
0.2	0.04	0.04	0.05	0	0	0									

Sediment Transport

Adjacent ☐ None (1) ☒ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Feature ☒ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): ____ ____ ____ ____ ____

☒ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Date: yyyy/mm/dd 20240830 Project #: CA-GLD-1791470A Field Assessment: ☒ Sample # 1 ☐ Sample # 2 ☐ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____
WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

Groundwater Indicators ☒ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☒ Absent ☐ Present Comment: No sampling conducted

WP#	Photo #	Code	Category	Description
1	1	HDF1	4	Start of HDF in agricultural field
2	2	HDF1	4	End of HDF with ocnvergence of Tributary 3

Additional Notes:

Site Break ☒ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 2025/03/19 Project #: CA-GLD-1791470A Recorder/Crew: CH

Stream Name: N/A Stream Code: NA Site Code: HDF1

Site Limits: Upstream WP# 43°25'59.06"N, 80°11'33.19"W Field Assessment: ☐ Sample 1 Unconnected HDF:

Downstream WP# 43°26'0.53"N, 80°11'36.95"W ☒ Sample 2 ☐ Not connected to

Direction of Assessment: ☐ Upstream ☒ Downstream ☐ Sample 3 downstream network

Flow Influence ☒ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition ☐ Dry (1) ☒ Interstitial Flow (3) ☐ Substantial Flow (5)
☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7)
☒ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☒ Cropped (3) ☐ Meadow (4) ☒ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☒ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m):	5	10	20	Elevation (cm) :	3	7	10	Gradient (º):	n/a

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☒	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☒	☐	☐	☐

Feature Roughness ☒ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☒ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): 0.8 Bankfull Depth (mm) 20

Entrenchment Total: ☐ >40 m ☒ <40 m Left Bank m Right Bank m Total width m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☒ Estimated (4)

Wetted Width (m)	Wetted Depth (mm) 1 2 3	Hydraulic head (mm) 1 2 3	Volume (L) 1 2 3	Distance (m) 1 2 3	Time (s) 1 2 3
0.7	0.11 0.15 0.12	1 1 1			

Sediment Transport

Adjacent	☐ None (1)	☒ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)
Feature	☒ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)

Sediment Deposition Measures (mm):

☒ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Date: yyyy/mm/dd 20250319 Project #: CA-GLD-1791470A Field Assessment: ☐ Sample # 1 ☒ Sample # 2 ☐ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____
WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

Groundwater Indicators ☒ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☒ Absent ☐ Present Comment: No sampling conducted

WP#	Photo #	Code	Category	Description
1	1	HDF1	4	Start of HDF in agricultural field
2	2	HDF1	4	End of HDF where it converges with Tributary 3

Additional Notes:

Site Break ☒ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 2025050 5 | Project #: CA-GLD-1791470A | Recorder/Crew: CH

Stream Name: N/A | Stream Code: NA | Site Code: HDF1

Site Limits: Upstream WP# 43°25'59.06"N, 80°11'33.19"W | Downstream WP# 43°26'0.53"N, 80°11'36.95"W

Direction of Assessment: ☐ Upstream ☒ Downstream

Field Assessment: ☐ Sample 1 ☐ Sample 2 ☒ Sample 3

Unconnected HDF: ☐ Not connected to downstream network

Flow Influence ☐ Freshet (1) ☒ Spate (2) ☐ Baseflow (3)

Flow Condition ☐ Dry (1) ☒ Interstitial Flow (3) ☐ Substantial Flow (5) ☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7) ☒ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8) ☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☒ Cropped (3) ☐ Meadow (4) ☒ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☒ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☒ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m):	5	10	20
Elevation (cm):	3	7	10

Gradient (º): n/a

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☒	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☒	☐	☐	☐

Feature Roughness ☒ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☒ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): 0.8 Bankfull Depth (mm) 20

Entrenchment Total: ☐ >40 m ☒ <40 m Left Bank ____ m Right Bank ____ m Total width ____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☒ Estimated (4)

Wetted Width (m)	Wetted Depth (mm)	Hydraulic head (mm)	Volume (L)	Distance (m)	Time (s)
	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
0.55	0.05 0.11 0.07	0.5 0.5 0.5			

Sediment Transport

Adjacent ☐ None (1) ☒ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5) ☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Feature ☒ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5) ☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): ____ ____ ____ ____ ____

☒ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Date: yyyy/mm/dd 20250505 Project #: CA-GLD-1791470A Field Assessment: ☐ Sample # 1 ☐ Sample # 2 ☒ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____
WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

Groundwater Indicators ☒ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☒ Absent ☐ Present Comment: No sampling conducted

WP#	Photo #	Code	Category	Description
1	1	HDF1	4	Start of HDF in agricultural field, N
2	2	HDF1	4	End of HDF where it converges with Tributary 3, M

Additional Notes:

Site Break ☒ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 2 0 2 4 0 8 3 0 | Project #: CA-GLD-1791470A | Recorder/Crew: CH

Stream Name: N/A | Stream Code: NA | Site Code: HDF2

Site Limits: Upstream WP# 43°25'56.72"N 80°11'35.74"W | Downstream WP# 43°25'55.75"N 80°11'32.01"W

Direction of Assessment: ☐ Upstream ☒ Downstream

Field Assessment: ☒ Sample 1 ☐ Sample 2 ☐ Sample 3

Unconnected HDF: ☐ Not connected to downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☒ Baseflow (3)

Flow Condition ☐ Dry (1) ☒ Standing Water (2) ☐ Interstitial Flow (3) ☐ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type ☐ Defined Natural Channel (1) ☒ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☒ Wetland (6) ☐ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☒ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☒ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m):	5	10	20
Elevation (cm):	2	5	8

Gradient (º): n/a

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☒	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐	☐

Feature Roughness ☒ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☒ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): 4 | Bankfull Depth (mm) 10

Entrenchment Total: ☐ >40 m ☒ <40 m | Left Bank ____ m | Right Bank ____ m | Total width ____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☒ Estimated (4)

Wetted Width (m)	Wetted Depth (mm)	Hydraulic head (mm)	Volume (L)	Distance (m)	Time (s)
	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
1.2	0.05 0.08 0.05	0 0 0			

Sediment Transport

Adjacent	☒ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)
Feature	☒ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)

Sediment Deposition Measures (mm): ____ ____ ____ ____ ____

☒ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Date: yyyy/mm/dd 20240830 Project #: CA-GLD-1791470A Field Assessment: ☒ Sample # 1 ☐ Sample # 2 ☐ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____
WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

Groundwater Indicators ☒ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☒ Absent ☐ Present Comment: No sampling conducted

WP#	Photo #	Code	Category	Description
1	1	HDF2	4	Start of HDF in agricultural field
2	2	HDF2	4	Forested Area near drainage pipe

Additional Notes:

Site Break ☒ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 2025031 9 | Project #: CA-GLD-1791470A | Recorder/Crew: CH

Stream Name: N/A | Stream Code: NA | Site Code: HDF2

Site Limits: Upstream WP# 43°25'56.72"N 80°11'35.74"W | Downstream WP# 43°25'55.75"N 80°11'32.01"W

Direction of Assessment: ☐ Upstream ☒ Downstream

Field Assessment: ☐ Sample 1 ☒ Sample 2 ☐ Sample 3

Unconnected HDF: ☐ Not connected to downstream network

Flow Influence ☒ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition ☐ Dry (1) ☒ Interstitial Flow (3) ☐ Substantial Flow (5) ☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7) ☒ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8) ☐ Multi-thread (3) ☒ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☒ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☒ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m):	5	10	20
Elevation (cm):	2	5	8

Gradient (º): n/a

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☒	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐	☐

Feature Roughness ☒ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☒ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): 8 Bankfull Depth (mm) 10

Entrenchment Total: ☐ >40 m ☒ <40 m Left Bank ____ m Right Bank ____ m Total width ____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☒ Estimated (4)

Wetted Width (m)	Wetted Depth (mm) 1 2 3	Hydraulic head (mm) 1 2 3	Volume (L) 1 2 3	Distance (m) 1 2 3	Time (s) 1 2 3
6.6	0.2 0.026 0.19	1 1 1			

Sediment Transport

Adjacent	☒ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)
Feature	☒ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)

Sediment Deposition Measures (mm): ____ ____ ____ ____ ____

☒ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Date: yyyy/mm/dd 20250319 Project #: CA-GLD-1791470A Field Assessment: ☐ Sample # 1 ☒ Sample # 2 ☐ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

Groundwater Indicators ☒ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☒ Absent ☐ Present Comment: No sampling conducted

WP#	Photo #	Code	Category	Description
1	1	HDF2	4	Start of HDF in agricultural field
2	2	HDF2	4	Forested Area near drainage pipe

Additional Notes:

Site Break ☒ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 2025050 5 | Project #: CA-GLD-1791470A | Recorder/Crew: CH

Stream Name: N/A | Stream Code: NA | Site Code: HDF2

Site Limits: Upstream WP# 43°25'56.72"N 80°11'35.74"W | Downstream WP# 43°25'55.75"N 80°11'32.01"W

Direction of Assessment: ☐ Upstream ☒ Downstream

Field Assessment: ☐ Sample 1 ☐ Sample 2 ☒ Sample 3

Unconnected HDF: ☐ Not connected to downstream network

Flow Influence ☐ Freshet (1) ☒ Spate (2) ☐ Baseflow (3)

Flow Condition ☐ Dry (1) ☒ Interstitial Flow (3) ☐ Substantial Flow (5) ☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7) ☒ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8) ☐ Multi-thread (3) ☒ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☒ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☒ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☒ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☒ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m):	5	10	20	Elevation (cm):	2	5	8	Gradient (º):	n/a

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☒	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐	☐

Feature Roughness ☒ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☒ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): 7 | Bankfull Depth (mm) 10

Entrenchment Total: ☐ >40 m ☒ <40 m | Left Bank ____ m | Right Bank ____ m | Total width ____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☒ Estimated (4)

Wetted Width (m)	Wetted Depth (mm)			Hydraulic head (mm)			Volume (L)			Distance (m)			Time (s)		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
5.5	0.16	0.02	0.13	1	1	1									

Sediment Transport

Adjacent	☒ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)
Feature	☒ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)

Sediment Deposition Measures (mm): ____ ____ ____ ____ ____

☒ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Date: yyyy/mm/dd 20250505 Project #: CA-GLD-1791470A Field Assessment: ☐ Sample # 1 ☒ Sample # 2 ☐ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

WP# _____ Perched Height (mm): _____ Jumping Height (mm): _____

Groundwater Indicators ☒ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☒ Absent ☐ Present Comment: No sampling conducted

WP#	Photo #	Code	Category	Description
1	1	HDF2	4	Start of HDF in agricultural field
2	2	HDF2	4	Forested Area near drainage pipe

Additional Notes:

Site Break ☒ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

APPENDIX C

Photo Reference

Photo 1: HDF1 taken 2025-03-19 during Sample Event 1 – Spring Freshet. Photo looking northeast from the agricultural field.

Photo 2: HDF1 taken 2025-05-05 during Sample Event 2 – Spring Spate. Photo looking northeast from the agricultural field.

Photo 3: HDF1 taken 2024-08-30 during Sample Event 3 - Summer. Photo looking northeast from the agricultural field.

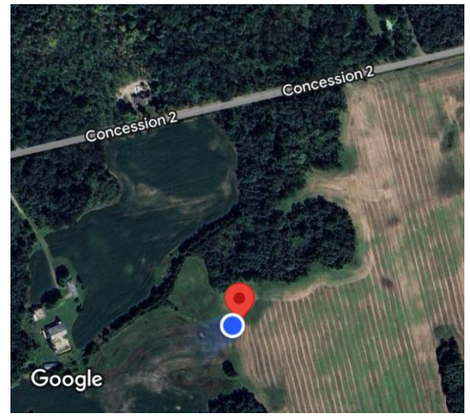


Photo 4: HDF1 location of photos at 43°25'59.06"N, 80°11'33.19"W

Photo 5: HDF2 taken 2025-03-19 during Sample Event 1 – Spring Freshet. Photo looking northeast from the agricultural field where the HDF started.

Photo 6: HDF2 taken 2025-05-05 during Sample Event 2 – Spring Spate. Photo looking northeast from the agricultural field where the HDF started.

Photo 7 : HDF2 taken 2024-08-30 during Sample Event 3 - Summer. Photo looking northeast from the agricultural field where the HDF started.

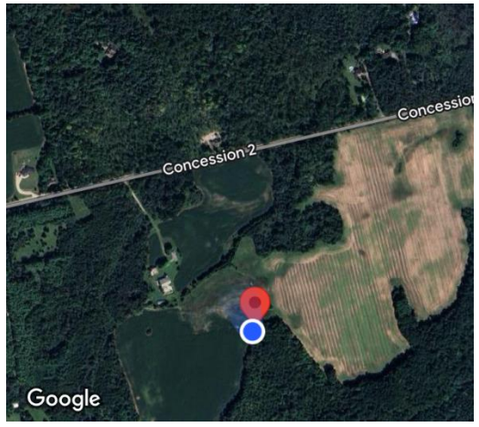


Photo 8: HDF2 location of photos at 43°25'55.75"N 80°11'32.01"W

Headwater Drainage Feature Assessment, CBM Aberfoyle South Pit
REPRESENTATIVE PHOTOGRAPHS

Date Taken: 2024/2025

Project No: CA-GLD-1791470A

Figure No: 1

ATTACHMENT 4

MECP Correspondence

From: Species at Risk (MECP)
To: Sabourin, Amber
Subject: RE: SAR Information Request - [redacted]
Date: May 16, 2019 3:04:46 PM
Attachments: DRAFT-Proponents Guide to Preliminary Screening-May 2019.pdf

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EXTERNAL EMAIL

Hello Amber.
Thank you for your email.
As you may know, the Ministry of the Environment, Conservation and Parks (MECP) has accepted responsibility for the administration of the Endangered Species Act (ESA). Work associated with ESA authorizations has being centralized from 25 Ministry of Natural Resources and Forestry district offices into one, newly formed Permissions and Compliance team within the new Species at Risk Branch in MECP. This branch is staffed by former MNRF employees with experience in the ESA.
To facilitate communications with our clients, the MECP has established a one-window e-mail account, sarontario@ontario.ca, for applications, report submissions and other communications relating to applications and authorizations under the ESA. sarontario@ontario.ca will also be the primary contact for clients who wish to determine whether their proposed activity is likely to contravene the ESA. Staff in this new branch will continue to be available to provide advice to you.
To support our new centralized model, we have been working on the attached guide to help clients work through the preliminary screening process; including providing advice to clients on how they can gather the information you have requested from publicly available information sources. Please feel free to contact us at sarontario@ontario.ca if you think your activity is likely to contravene the ESA and if you would like further advice on authorization options.
Please see the attached guide for your use.
Sincerely,
Kristina
for Permissions and Compliance Section
Species at Risk Branch
Ministry of the Environment, Conservation and Parks

From: Sabourin, Amber
Sent: May-16-19 10:31 AM
To: Species at Risk (MECP)
Subject: SAR Information Request - Blezard

Good morning,

We are working on a license application under the *Aggregate Resources Act* for a site located at [redacted] I am contacting you to request any species at risk information you may have for the site or adjacent area. Please see the attached map outlining the site boundary.

We have conducted a SAR screening, including a review of NHIC data, which has returned the following list of 22 species with ranges that overlap the study area:

[redacted]	[redacted]
[redacted]	[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Please let me know if you require any additional information in order to fulfill this request.

Regards,

Amber

Amber Sabourin (H.B.Sc (Env))
Ecologist

Golder Associates Ltd.
6925 Century Avenue, Suite #100, Mississauga, Ontario, Canada L5N 7K2
T: +1 905 567 4444 | **D:** +1 905 567-6100 x1819 | **C:** +1 416-779-5711 | **golder.com**
E: Amber_Sabourin@golder.com
LinkedIn | Facebook | Twitter

Work Safe, Home Safe

ATTACHMENT 5

Natural Environment and Water Report Terms of Reference Concordance Cross-Check – Proposed CBM Aberfoyle South Lake Pit

TECHNICAL MEMORANDUM

DATE January 27, 2025

Project No. CA-GLD-1791470A

TO David Hanratty, Stephen May
CBM Aggregates

FROM Amber Sabourin; George Schneider

**EMAIL amber.sabourin@wsp.com;
george.schneider@wsp.com**

NATURAL ENVIRONMENT AND WATER REPORT TERMS OF REFERENCE CONCORDANCE CROSS-CHECK - PROPOSED CBM ABERFOYLE SOUTH LAKE PIT

CBM Aggregates (CBM) received an objection letter to the Aberfoyle South Lake Pit Aggregate Resources Act application submission for a Class A Pit from the Township of Puslinch on May 10, 2024. This technical memorandum provides a cross-check of the comments in the objection letter to the Terms of Reference (TOR), dated September 7, 2023, submitted to the Township.

The comments addressed here are specific to the Natural Environment Report (NER) and the Water Report Level 1/2 prepared by WSP Canada Inc. (WSP). The TOR concordance cross-check is presented in Table 1.

WSP Canada Inc.
6925 Century Avenue, Suite #100, Mississauga, Ontario, L5N 7K2, Canada
T: +1 905 567 4444 F: +1 905 567 6561

Table 1: Terms of Reference Concordance Table

Terms of Reference Item / Agency Comment	Report Section / Page Reference
NATURAL ENVIRONMENT REPORT	
Background data compilation and review of existing documents and information sources which will be focused on designated features in the vicinity of the site. This will include a review of relevant County of Wellington and Provincial policies.	▪ Section 2.0 Environmental Policy Context, pg. 2 ▪ Section 4.1 Background Review, pg. 7
Review of the water balance completed as part of the surface water assessment, as described above, and assessment of the potential impacts of that water balance on natural features on, and in the vicinity of, the site.	▪ Section 6.0 Assessment of Significant Natural Heritage Features, pg. 33 ▪ Section 7.0 Impact Analysis, pg. 45
Species at Risk (SAR) screening focussing on those species listed under the Ontario Endangered Species Act (ESA) and federal Species at Risk Act (SARA). First completed at a desktop exercise using up to date air photos, and then updated based on the results of the field surveys.	▪ Section 4.1 Background Review, pg. 7 ▪ Section 5.5.3 Vascular Plants, pg. 23 ▪ Section 5.6 Wildlife, pg. 27, 30, 31, 32 ▪ Section 6.1 Habitat of Endangered or Threatened Species, pg. 33 ▪ Section 6.7.5 Habitat for Species of Conservation Concern, pg. 43 ▪ Appendix D, Species at Risk Screening
Communication with the MECP and MNRF for additional information regarding SAR, fisheries data and the Mill Creek Puslinch Provincially Significant Wetland.	▪ Section 4.1 Background Review, pg. 7 ▪ Appendix B, MNRF Correspondence
Plant community assessment using the Ecological Land Classification (ELC) system for southern Ontario (Lee et al. 1998).	▪ Section 4.3.1 Plant Community Surveys and Botanical Inventory, pg. 10 ▪ Section 5.5 Vegetation, pg. 18 ▪ Figure 2, Ecological Land Classification and Survey Stations

Terms of Reference Item / Agency Comment	Report Section / Page Reference
Delineate/confirm the boundaries of natural heritage features including wetlands and woodlands using a handheld GPS. Note that wetlands were delineated using Ontario Wetland Evaluation System (OWES). The wetland boundary will be verified in the field with the Grand River Conservation Authority (GRCA). The woodland boundary will be verified in the field with the County and/or Township. CBM will have the boundaries surveyed by a registered surveyor.	▪ Section 4.3.1 Plant Community Surveys and Botanical Inventory, pg. 10 ▪ Section 5.5 Vegetation, pg. 18 ▪ Section 6.3 Significant Wetlands, pg. 35 ▪ Section 6.4 Significant Woodlands, pg. 38 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Figure 3, Significant Natural Heritage Features
Three season botanical inventory, including surveys for butternut and black ash.	▪ Section 4.3.1 Plant Community Surveys and Botanical Inventory, pg. 10 ▪ Section 5.5 Vegetation, pg. 18 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Appendix C, Vascular Plants List
Aboud Comment: 16. A three season botanical was listed in the studies to be performed in the Terms of Reference, including a spring study.	The Terms of Reference included a three season botanical inventory, which was completed: early summer, late summer and fall. As discussed in Section 4.3.1, summer surveys were deemed more appropriate and useful because the majority of natural plant communities on the site were characterized by swamp, and summer is the period during which most wetland vegetation is identifiable. Several spring species and woodland sedges that would be captured during a spring visit were still recorded on the plant list, and no early-season SAR or rare plant species were flagged through the SAR screening. Further, because all of the swamp is also PSW and therefore must be protected, a conservative approach can be taken to assume that other common spring ephemeral species with swamp habitat preference are present.

Terms of Reference Item / Agency Comment	Report Section / Page Reference
Three rounds of anuran call count surveys following protocols from the Marsh Monitoring Program method for vocalizing frog surveys (BSC 2008).	▪ Section 4.3.2 Anuran Call Count Survey, pg. 10 ▪ Section 5.6.1 Amphibians, pg. 23 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Appendix E, Wildlife List
Two rounds of amphibian habitat assessment and egg mass surveys following protocols from the Sampling Protocol for Determining the Presence of Jefferson Salamanders (Ambystoma jeffersonianum) in Ontario (JSRT 2013).	▪ Section 4.3.4 Amphibian Egg Mass Survey, pg. 11 ▪ Section 5.6.1 Amphibians, pg. 23 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Appendix E, Wildlife List
Assessment of the site and vicinity as habitat for Blanding's turtle.	▪ Section 4.3.3 Turtle Habitat Assessment, pg. 11 ▪ Section 5.6.5 Other Wildlife, pg. 31 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Appendix E, Wildlife List
Three rounds of breeding bird surveys following protocols from the Canadian Breeding Bird Survey (Downes and Collins 2003), and the Ontario Breeding Bird Atlas (Cadman et al. 2007).	▪ Section 4.3.5 Breeding Bird Survey, pg. 11 ▪ Section 5.6.2 Breeding Birds, pg. 27 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Appendix E, Wildlife List
Bat habitat and acoustic surveys based on guidance from the MNRF document Survey Protocol for Species at Risk Bats within Treed Habitats (MNRF 2017) and Bat and Bat Habitat: Guidelines for Wind Power Projects (MNR 2011).	▪ Section 4.3.6 Bat Survey, pg. 11 ▪ Section 5.6.3 Bats, pg. 28 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Appendix E, Wildlife List
Wildlife habitat assessment and general wildlife surveys (Visual Encounter Surveys) following provincially accepted methods (Bookhout 1994; McDiarmid 2012; MNRF 2016; MNRF 2017; Pyle 1994).	▪ Section 4.3.8 Visual Encounter Survey, pg. 13 ▪ Section 5.6 Wildlife, pg. 23 ▪ Appendix E, Wildlife List

Terms of Reference Item / Agency Comment	Report Section / Page Reference
Aboud Comment: 10. Per AA's Pre Consultation peer review, visual encounter surveys for snakes should have taken place alongside other herptile surveys.	Visual encounter surveys for snakes were conducted concurrently with all other field surveys. ▪ Section 4.3.8 Visual Encounter Survey, pg. 13 ▪ Section 5.6 Wildlife, pg. 23 ▪ Appendix E, Wildlife List
A qualitative fish habitat assessment in Mill Creek and tributaries on the site and in the vicinity, using MTO Fisheries Assessment Protocols and Golder's Technical Procedures (unpublished file information). These protocols include a description of aquatic habitat (e.g., permanence, stage, confinement), habitat mapping of key habitat features (e.g., riffles, pools, woody debris) and characteristics (e.g., wetted and bankfull width/depth, substrate types, cover, seepage areas), a description of riparian and/or aquatic vegetation, identifying locations of any critical fish habitat areas or barriers to fish movement and observations of any fish and aquatic species.	▪ Section 4.3.7 Fish and Fish Habitat Survey, pg. 12 ▪ Section 5.6.4 Fish and Fish Habitat, pg. 31 ▪ Figure 2, Ecological Land Classification and Survey Stations ▪ Appendix F, Fish Habitat Survey Results
Aboud Comment: 13. Per AA's Pre Consultation Peer Review, Fish Community Sampling was required for the on-site watercourses to determine species present, these surveys were not identified or discussed in the report.	As the *Fisheries Act* provides protection of all fish and fish habitat the assessment considered if Tributary #3 was frequented by fish or provided an area on which fish depended directly or indirectly to carry out their life processes. Given the amount and quality of background information available, and supporting data collected through the qualitative fish habitat assessment, a comprehensive fish community sampling was not deemed necessary to complete the assessment under the *Fisheries Act* for the NER. Tributary #3 was classified as fish habitat with assumed similar species assemblage as Mill Creek. This was in line with MNRF records and observations of small-bodied fish within Tributary #3. The assessment in the NER took into account that Tributary #3 is fish habitat.

Terms of Reference Item / Agency Comment	Report Section / Page Reference
	Once the decision was made that Tributary #3 was fish habitat, the need to submit a Request for Review (RFR) was triggered to assess the potential of the Project to result in 'death of fish' and/or 'harmful alteration, disruption or destruction of fish habitat' (HADD). Based on the impact assessment in the NER and Water Report Level 1/2, the reduction in base flow in Tributary #3 was highlighted as a potential HADD. At this point, fish community composition was considered to incorporate spawning activities, nursery and rearing areas, as well as food supply and migration to inform the determination of a HADD. A fish community survey is often completed at this stage, however with existing records of brown trout spawning within the Mill Creek catchment, brown trout were selected as an indicator species to carry forward in the HADD assessment. Therefore, a fish community survey was not deemed necessary to complete the assessment of HADD for the RFR. Subsequently, in response to Aboud's comment, a fish community survey was undertaken in September 2024 and the assessment is attached to this letter. A total of 12 fish species were found within Tributaries #1, #2, #3, and #5. The survey also confirmed that although a range of small-bodied fish were caught within Tributary #3, several shallow muddy sections limit the movement of larger fish such as trout upstream. Within Tributary #3, upstream of Tributary #5, there is limited spawning and rearing habitat for coldwater species such as brown trout. The survey also validated notes and observations on the presence of watercress and channel morphology, with a note added that water levels were lower than

Terms of Reference Item / Agency Comment	Report Section / Page Reference
	previously indicated and a deep muck section was present through the middle reach. The findings of the fish community survey support what is reported in the NER in: ▪ Section 5.6.4 Fish and Fish Habitat, pg. 31
Aboud Comment: 12. Per AA's Pre Consultation Peer Review, headwater drainage feature assessments were required for the site, these surveys are not identified or discussed in the report. This survey is particularly important to determine the regime for tributary 3 as well as to identify any HDF's that occur within the agricultural areas.	It should be noted that Tributary #3 has been referred to as both intermittent and perennial within the different existing conditions reports. The reference to the seasonality of the stream has been based on the fact that the installed loggers have measured zero flow on at least four occasions, while during these periods, pooled water was still present. Further to this, the water depth during these low flow periods is likely limiting to fish as during summer, there is insufficient baseflow to consistently sustain water in Tributary #3. Additional information is provided in the attached Fish Community Assessment. Therefore, referring to Tributary #3 as intermittent is appropriate when considering fish habitat. Per the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines (*TRCA & CVC 2014*)*, pre-consultation with the Conservation Authority is recommended to determine scope and identify gaps with respect to the need for a Headwater Drainage Feature (HDF) Assessment. GRCA reviewed and provided comments on the Terms of Reference in November 2021 and did not identify the need for a HDF assessment. As such, it was not included in the field survey scope. Subsequently, in response to Aboud's comment, a HDF Assessment has been undertaken. A site visit was completed in August 2024 in accordance with the abovementioned guideline (TRCA & CVC

Terms of Reference Item / Agency Comment	Report Section / Page Reference
	2014) and Section 4, Module 11 for *Unconstrained Headwater Sampling of the Ontario Stream Assessment Protocol* (MNRF Version 10, 2017). Potential HDFs, drainage patterns and linkages between the site and watercourses (i.e. Tributary 3, Tributary 5 & Mill Creek) were identified for summer conditions and compared with aerial imagery. Eight areas were identified as having potential HDF: ▪ Four potential HDF areas along the south and east forest, where agricultural drainage was observed to have eroded the field edge and areas suggested impacts from surface flow. These four potential HDFs enter the forest and disperse, and had limited evidence of continued drainage towards Mill Creek. ▪ Three potential HDF areas associated with the northwest forest along Tributary #3 and Tributary #5. Observations included very wet areas with some standing water and erosion along the agricultural field that appeared to drain into the tributaries. ▪ The last potential HDF was identified in the agricultural field near Concession Road 2, where pockets of cattails and grasses were observed with standing water. Aerials suggest there is potential drainage from the north, southwestward through the field, however no defined channels or erosion was evident during the site visit.
Assessment of Significant Wildlife Habitat, per the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (2015).	▪ Section 6.7 Significant Wildlife Habitat, pg. 39
Assessment of linkages and connectivity for wildlife.	▪ Section 6.7.3 Animal Movement Corridors, pg. 42
Aboud Comment: 11. Per AA's Pre Consultation peer review, a linkage and connectivity assessment needed to take place. This appears not to have been done, and the results of such an assessment are not discussed in this document.	An assessment of wildlife movement corridors/linkages was completed as part of the discussion of animal movement corridor SWH. ▪ Section 6.7.3 Animal Movement Corridors, pg. 42

Terms of Reference Item / Agency Comment	Report Section / Page Reference
Analysis of the data collected in conjunction with the background data compilation and integration with the hydrogeological and surface water studies to complete a potential impact assessment.	▪ Section 7.0 Impact Analysis, pg. 45
Aboud Comment: 14. Per AA's Pre Consultation Peer Review, a feature-based water balance assessment of the wetlands present on/adjacent to site (TRCA wetland water balance risk evaluation (2017), or equivalent), discussion of impacts to the wetland due to the proposed changes to the quantity of water, including the proposed significant changes in the groundwater elevation, should be included in the report.	A feature-based water balance assessment was not included in the approved Terms of Reference. The impact assessment was conducted in accordance with ARA, County of Wellington and GRCA guidelines. GRCA EIS guidelines require that potential impacts on specific wetland features and/or functions are assessed. However, a feature-based water balance assessment is not required. The surface water balance provides average monthly and annual estimate of changes to surface water surplus from changes to catchments and land uses. The wetland features collect water from shallow groundwater and overflow from stream high water events. For this reason, we feel the HGS model is a more accurate estimate of the impacts on the wetland features since it incorporates surplus information from the surface water balance, existing surface water monitoring data and the changes in groundwater levels.
Development of the final rehabilitation, including appropriate setbacks, upland and wetland plantings, creation of wetlands and wildlife habitat, and a monitoring plan, where appropriate.	▪ Section 8.1 Rehabilitation Concept, pg. 49 ▪ Figure 5, Rehabilitation Plan
Aboud Comment: 44. As noted in the ToR comments, a pre, during, and post development comprehensive monitoring plan, which includes adaptive management and appropriate triggers for additional investigation Is required.	▪ The surface water and groundwater monitoring program is described in Section 8.6 of the Water Report. The program specifies proposed monitoring locations. ▪ The following triggers and adaptive management steps are specified in the Water Report:

Terms of Reference Item / Agency Comment	Report Section / Page Reference
	– Groundwater and surface water levels shall be reviewed by CBM quarterly, and reported to the MNRF annually as part of the licence requirements. – Water level trends during Operations and Post-Rehabilitation shall be compared to Pre-Operational conditions. – If the results of the monitoring program indicate the potential for adverse impact to groundwater users (private wells) or surface water features (Mill Creek and its tributaries), then appropriate enhanced monitoring and/or mitigative actions would be developed and implemented.
One single natural environment report that includes a description of existing conditions through the desktop review and results of the field surveys, an assessment of impacts on all natural features, as outlined in the Provincial Policy Statement (MMAH 2020), the rehabilitation plan, a description of any mitigation and monitoring, and will meet the requirements of: ▪ Natural Environment Report (NER), based on ARA standards (Ontario 2020). ▪ Environmental Impact Assessment (EIA) for the County of Wellington (Wellington 2021). ▪ Environmental Impact Study guidelines and submission standards for Wetlands of the GRCA (2005).	The NER meets the requirements of the province, County of Wellington and GRCA, as outlined in the following sections of the NER: ▪ Section 1.1 Purpose, pg. 1 ▪ Section 2.1 Aggregate Resources Act, pg. 2 ▪ Section 2.2 Provincial Policy Statement, pg. 3 ▪ Section 2.8 County of Wellington, pg. 6 ▪ Section 2.9 Grand River Conservation Authority, pg. 6 ▪ Section 3.0 Description of Proposed Development, pg. 7 ▪ Section 4.0 Methods, pg. 7 ▪ Section 5.0 Existing Conditions, pg. 14 ▪ Section 6.0 Assessment of Significant Natural Heritage Features, pg. 33 ▪ Section 7.0 Impact Analysis, pg. 45 ▪ Section 8.0 Rehabilitation / Mitigation / Monitoring, pg. 49

Terms of Reference Item / Agency Comment	Report Section / Page Reference
WATER REPORT LEVEL 1/2	
A review of publicly available data and reports relevant to the Site and subwatershed.	▪ Section 3.0 – Background Information – pg. 3-4 - lists reports that were reviewed and incorporated into the assessment ▪ References – pg. 55-57 – lists all references cited in this assessment
A review of the Grand River Source Protection Plan (GRCA 2021) and any other applicable policies.	▪ Section 4.9 – Regional Setting - Source Water Protection Considerations - pg. 7 ▪ Section 8.3 Impact Assessment – Source Water Protection – pg. 41
A field investigation program that includes: ▪ Borehole drilling, grain size analysis and monitoring well installation (see Figure 1) ▪ Baseline groundwater quality monitoring (general water quality parameters including major ions, metals, and petroleum hydrocarbons) ▪ Hydraulic conductivity testing (single well response tests) of the monitoring wells installed as part of the field program ▪ Groundwater level and temperature monitoring (dataloggers to record water level and temperature hourly and downloaded quarterly)	▪ Section 5.0 - Site Field Program – pg. 8 ▪ Section 5.1 – Borehole Drilling and Monitoring Well Installation – pg. 9-10 ▪ Section 5.5 – Water Quality – pg. 17-20 ▪ Section 5.4 – Hydraulic Testing – Pg. 16 ▪ Section 5.3 – Groundwater Temperature – pg. 14-15 ▪ Associated figures, tables and appendices ▪ Field investigation also included an aggregate resource investigation, which was provided as a separate report.
A review of local groundwater users based on the Ministry of the Environment, Conservation and Parks (MECP) Water Well Information System (WWIS) and Permit To Take Water (PTTW) databases.	▪ Section 4.8, 4.8.1 and 4.8.2 – Water Users – Pg. 6-7.
A private well survey of properties surrounding the site was originally planned for 2020 or 2021. The purpose of such a survey was to supplement the MECP WWIS information and “ground truth” the current condition of neighbouring resident’s water supply wells. Activities would have included door-to-door visits	▪ Section 10.2 - Recommendations – recommendation to conduct a private well survey is included in the report. – pg. 51

Terms of Reference Item / Agency Comment	Report Section / Page Reference
and subsequent interactions between field staff and residents. Participation would be entirely voluntary. However, as a result of ongoing COVID-19 concerns this task has been postponed for the time being. It is proposed that this activity be completed at later date prior to any aggregate extraction taking place on the site.	
In conjunction with surface water studies, the development of a Site water budget for Existing, Operations and Rehabilitated Scenarios to determine pre- and post-development surplus, runoff, and infiltration rates.	▪ Section 6.0 and subsections – Water Balance – pg. 30-37 ▪ Section 8.2 – Impact Assessment – Potential Impacts to surface Water – pg. 40
The construction and calibration of a 3D numerical groundwater flow model based on the “Tier 3 Model” with high resolution refinement of the model mesh within the immediate area of the site, and subsequent predictive simulations to estimate potential water flow impacts of the proposed below-water extraction on surrounding groundwater and surface water receptors.	▪ Section 7 – Groundwater Modelling – pg. 37 ▪ Appendix G – Groundwater Modelling
The development of a groundwater analytical model to predict the potential for thermal impacts to local watercourses, including Mill Creek, taking into account the Grand River Conservation Authority (GRCA) Cumulative Effects Assessment Best Practices Paper (GRCA 2010).	▪ Section 7 – Groundwater Modelling – pg. 37 ▪ Appendix G – Groundwater Modelling ▪ Section 8.1.3. – Potential Groundwater Temperature Impacts ▪ Section 9.0 – Cumulative Effects Assessment
Development of a monitoring plan for groundwater.	▪ Section 8.6 – Proposed Monitoring Program
The results of the hydrogeological assessment will be summarized in a Maximum Predicted Water Table Report and a Level 1 and 2 Water Report that fulfills the current County of Wellington Official Plan policies and ARA requirements.	▪ Level 1 &2 Water Report – November 2023 ▪ Maximum Predicted Water Table Report - November 2023
Background review of the available information pertaining to within approximately 500 metres of the site. the information reviewed will consist of: Aerial photographs and topographic, physiographic, and geologic mapping	▪ Section 3.0 – Background Information – pg. 3-4 - lists reports that were reviewed and incorporated into the assessment

Terms of Reference Item / Agency Comment	Report Section / Page Reference
Published water resources reports Any existing permits or monitoring reports from the site, and nearby lands (e.g., Mill Creek Pit)	▪ References – pg. 55-57 – lists all references cited in this assessment ▪ Associated figures, tables
Review of GRCA floodplain data for the site, and assessment of potential impacts of extraction on flood elevations on-site and both upstream and downstream.	▪ Section 5.6.2 – GRCA Regulated Area and Floodplain Mapping pg. 21 ▪ Figure 6 – Floodplain Mapping ▪ NOTE – a more detailed flood mapping assessment has recently been completed and is attached to this response letter.
Site reconnaissance to identify and confirm drainage features and catchment boundaries adjacent to the pit. The site reconnaissance is also used to corroborate the findings of the information review and identify local features that were not apparent from the background review.	▪ Section 5.6 – Surface Water – pg. 20-30 ▪ Associated figures, tables
A water budget and pit water balance using a Thornthwaite water budget tool, developed for the existing pit footprint area (footprint) and the proposed expansion lands. The Thornthwaite water budget information will be used to develop an annual pit water balance for the existing operation. A future pit water balance will be estimated by including future footprint and land-use information.	▪ Section 6.0 and subsections – Water Balance – pg. 30-37 ▪ Section 8.2 – Impact Assessment – Potential Impacts to surface Water – pg. 40
The floodplain assessment will provide appropriate flooding intervals through mapping and elevations for the site and the study area.	▪ Section 5.6.2 – GRCA Regulated Area and Floodplain Mapping pg. 21 ▪ Figure 6 – Floodplain Mapping ▪ NOTE – a more detailed flood mapping assessment has recently been completed and is attached to this response letter.
The in-stream water level, temperature and flow monitoring in Mill Creek and associated tributaries in the vicinity of the site will allow Golder to characterise the creek reaches and therefore better understand potential effect of the	▪ Section 5.6 – Surface Water – pg. 20-30 ▪ Associated figures, tables

Terms of Reference Item / Agency Comment	Report Section / Page Reference
proposed extraction on site. The in-stream water level monitors will be paired with stream piezometer monitoring stations and visited quarterly.	
An effects assessment on features within the catchment of the site that documents the magnitude and significance of expected changes in the water budget of the site.	▪ Section 6.0 and subsections – Water Balance – pg. 30-37 ▪ Section 8.2 – Impact Assessment – Potential Impacts to surface Water – pg. 40
Development of a monitoring plan for surface water.	▪ Section 8.6 – Proposed Monitoring Program
A report that describes the surface water assessments, including a description of existing and proposed conditions and expected effects, and will ultimately be included as an appendix to the Level 1 and 2 Water Report.	▪ Level 1 &2 Water Report – November 2023

CLOSURE

We trust that this memorandum meets your current needs. If you have any questions or require clarification, please contact WSP at your earliest convenience.

WSP Canada Inc.

Amber Sabourin, HBSc Env
Senior Ecologist

George Schneider, MSc, PGeo
Senior Geoscientist

AVS/HM/CDV/GWS/ld

Attachments: Attachment 1 – Fish Community Assessment
Attachment 2 – Flood Mapping Assessment

https://wsponline.sharepoint.com/sites/gld-21291g/deliverables/01 agency comments/township of puslinch/final/ca-gld-1791470a_tm_cbm aberfoyle lake_tor concordance_nat env & water_27jan2025.docx

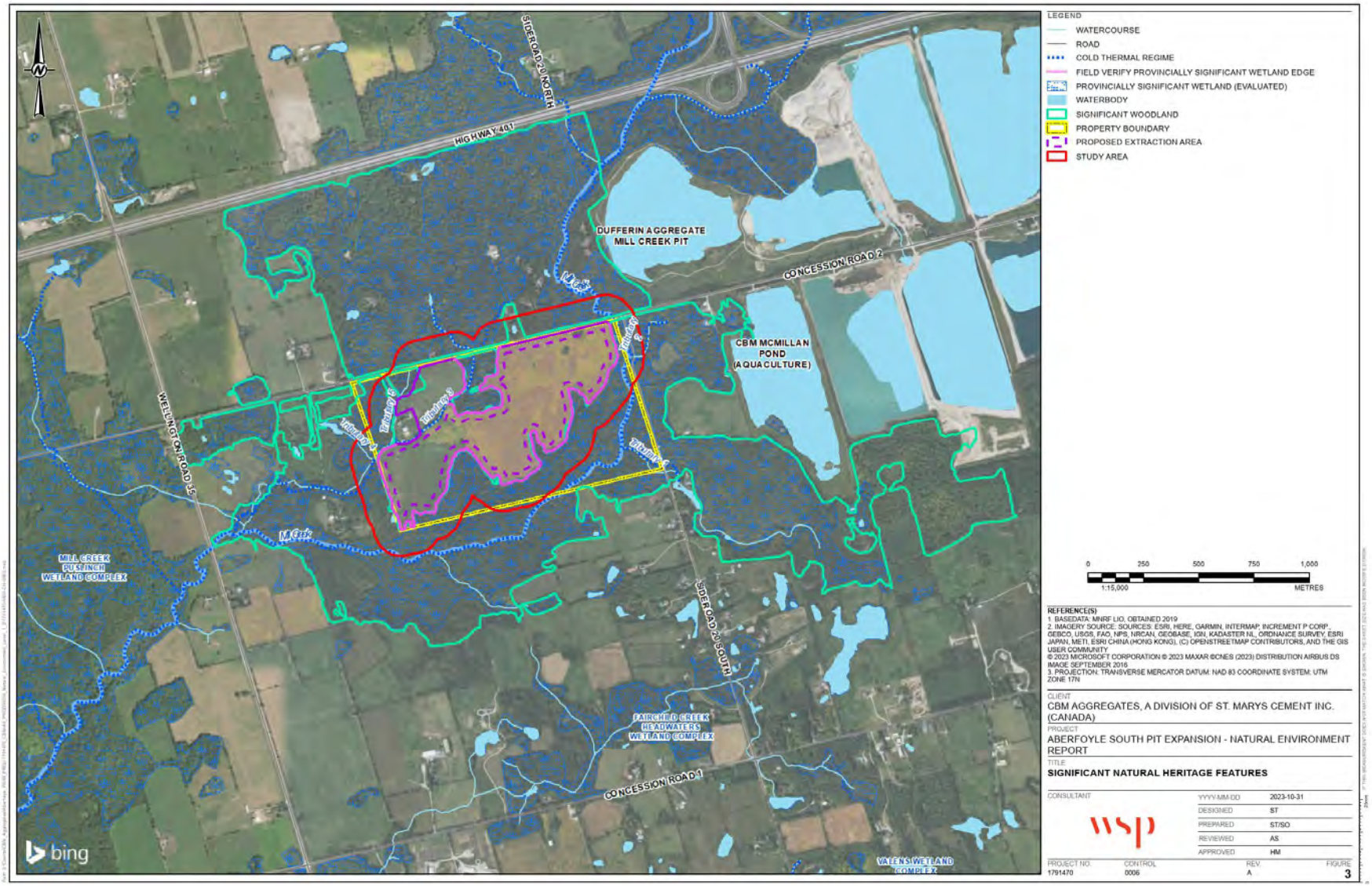
ATTACHMENT 1

Fish Community Assessment

Please see above, Attachment 2 - October 22, 2025 Technical Memo

APPENDIX A

Study Area - Associated Watercourses


HIGHWAY 401
SIDEROAD 20 NORTH
DUFFERIN AGGREGATE
MILL CREEK PIT
CONCESSION ROAD 2
CBM MCMILLAN
POND
(AQUACULTURE)
WELLINGTON ROAD 35
MILL CREEK
PUSLINCH
WETLAND COMPLEX
SIDEROAD 20 SOUTH
FAIRCHILD CREEK
HEADWATERS
WETLAND COMPLEX
CONCESSION ROAD 1
VALENS WETLAND
COMPLEX
bing
LEGEND
WATERCOURSE
ROAD
COLD THERMAL REGIME
FIELD VERIFY PROVINCIALLY SIGNIFICANT WETLAND EDGE
PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
WATERBODY
SIGNIFICANT WOODLAND
PROPERTY BOUNDARY
PROPOSED EXTRACTION AREA
STUDY AREA
0 250 500 750 1,000
1:15,000
METRES
REFERENCE(S)
1. BASEDATA: MNRF LIO, OBTAINED 2019
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
© 2023 MICROSOFT CORPORATION © 2023 MAXAR ©CNES (2023) DISTRIBUTION AIRBUS DS
IMAGE SEPTEMBER 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N
CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)
PROJECT
ABERFOYLE SOUTH PIT EXPANSION - NATURAL ENVIRONMENT REPORT
TITLE
SIGNIFICANT NATURAL HERITAGE FEATURES
CONSULTANT
wsp
YYYY-MM-DD 2023-10-31
DESIGNED ST
PREPARED ST/SO
REVIEWED AS
APPROVED HM
PROJECT NO. 1791470
CONTROL 0006
REV. A
FIGURE 3

APPENDIX B

Photos

Insert file pathway here

Photo 1. Mill Creek at SW2 (March 2024)

Photo 2. Mill Creek at SW2 (March 2024)

Photo 3. Mill Creek at SW2 (October 2019)

Photo 4. Mill Creek at SW3 (October 2019)

Photo 5. Mill Creek at SW3 (March 2024)

Photo 6. Mill Creek at SW3 (July 2018)

Insert file pathway here

Photo 7. Tributary #3 at SW1 (March 2024)

Photo 8. Tributary #3 at SW1 (March 2024)

Photo 9. Tributary #3 at SW1 (October 2019)

Photo 10. Tributary #3 at SW4 (March 2024)

Photo 11. Tributary #3 at SW4 (March 2024)

Photo 12. Tributary #3 at SW4 (October 2019)

Insert file pathway here

Photo 7. Tributary #3 (September 2024)

Photo 8. Tributary #3 (September 2024)

Photo 9. Tributary #3 (September 2024)

Photo 10. Tributary #1 (September 2024)

Photo 11. Tributary #2 (September 2024)

Photo 12. Tributary #5 (September 2024)

ATTACHMENT 2

Flood Mapping Assessment

TECHNICAL MEMORANDUM

DATE January 23, 2025 **Project No.** 1791470A

TO David Hanratty
CBM Aggregates, a division of St. Mary's Cement Inc. (Canada)

CC George Schneider

FROM Mohsin Siddique; Craig DeVito **EMAIL craig.devito@wsp.com**

FLOOD MAPPING – PROPOSED ABERFOYLE SOUTH LAKE PIT

1.0 INTRODUCTION

In November 2023, CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada), submitted a Class A Pit Below Water licence application under the *Aggregate Resources Act (ARA)* at the proposed Aberfoyle South Lake Pit located at 6947 Concession Road 2, in the Township of Puslinch, County of Wellington, Ontario (referred herein as Property). WSP Canada Inc. (WSP), has been retained by CBM to complete an assessment of various return period event flood elevations from Mill Creek on the Property, as requested from the Grand River Conservation Authority (GRCA) during their review of the Terms of Reference for the ARA licence application.

The Property is approximately 85 hectares (ha) in size and is located at 6947 Concession Road 2, in the Township of Puslinch, County of Wellington, Ontario. Of this Property, approximately 44 ha are proposed for licensing under ARA (referred herein as Site) and the extraction area within the Site is approximately 27 ha in size (Figure 1.1). The Property is comprised of approximately 50% agricultural fields which are flanked by three wooded areas in the northwest, north-central and southeast portions of the Property and an unoccupied residence in the western portion of the Property (Figure 1.1).

The predominant surface water features in the vicinity of the Site include Mill Creek and its tributaries. Mill Creek flows from north to south along the eastern and southeastern portion of the property (Figure 1.1), exits the Property along the southern boundary, and then flows westward approximately 150 m to the south of the Property boundary. There are five small tributaries to Mill Creek proximal to the Property (Figure 1.1), referred to as Tributary 1, 2, 3, 4 and 5. Tributaries 1, 3 and 5 originate off-Property but then flow onto the Property and join Mill Creek, while Tributaries 2 and 4 are located entirely off-Property.

2.0 OBJECTIVE

The primary objective of this technical memorandum is to assess floodplains of Mill Creek and Tributary 3 and provide the results in terms of storm flood elevations and floodplain maps for 5-year, 10-year, 25-year, 50-year and 100-year storm floods, noting that considering the layout of Site and extraction area, and the overall drainage pattern, floodplains of Tributaries 1, and 5 were not assessed.

3.0 METHODOLOGY

To assess the floodplain of the study area, hydraulic modeling was conducted using HEC-RAS software (version 6.3.1). Two (2) one-dimensional steady flow HEC-RAS models: (1) Mill Creek and (2) Tributary 3, were used. The models of Mill Creek and Tributary 3 are based on GRCA's HEC-RAS models for the regional flood (provided by GRCA) and uses Canadian Geodetic Vertical Datum of 1928 (CGVD28) / North American Datum (NAD) of 1983 of the Canadian Spatial Reference System (NAD83(CSRS)). Note that for floodplain mapping, flood elevations were converted to CGVD2013 / NAD1983 using GPS.H tool (Government of Canada, 2024).

The calibration parameters and associated values in both models were assumed unchanged from their respective regional flood models. Upstream and downstream boundary conditions in the models included storm inflows (for 100-year, 50-year, 25-year, 10-year and 5-year storm floods), extracted from GRCA's respective HEC-2 models, along the reaches and downstream channel bed slopes. Tables 1 and 2 provide input boundary conditions (storm inflows for 5-year to 100-year storm floods) for HEC-RAS models along the reaches of Mill Creek and Tributary 3, respectively.

4.0 RESULTS

The results of the HEC-RAS modeling based on CGVD2013 / NAD1983 are presented as storm flood elevations (Tables 3 and 4) and the floodplain maps (Figures 1.2 through 1.6) along the reaches of Mill Creek and Tributary 3. The summary of results is as follows:

- **Mill Creek:**
  - Floodplain boundaries of 100-year and 50-year storm floods, were found to overlap the Site boundary at the northeastern corner of the Property, however, floods were not found to extend beyond the extraction area limit. No flooding was observed in the other parts of the Site due to Mill Creek.
  - Storm flood elevations at the northeast corner of the Property, where the Mill Creek flood water is found to enter the Property (Section 14551), ranged from 303.61 metres above sea level (masl) for 100-year storm flood to 303.17 masl for 5-year storm flood.
- **Tributary 3:**
  - Floodplain boundaries of all storm floods were found to overlap the Site boundary, however, only the 100-year and 50-year storm floods were found to extended beyond the extraction area limit. Note that the extraction area is located on the southern side of the Tributary 3.
  - Storm flood elevations at the northern corner of the Property, where the Tributary 3 flood water is found to enter the Property (Section 1600.1), ranged from 302.8 masl for 100-year storm flood to 302.61 masl for 5-year storm flood.

5.0 POTENTIAL IMPACTS TO SURFACE WATER

- Due to the overlapping of floodplain and the extraction area, flood water is expected to enter the Site and extraction area. It is expected that the pits in the extraction area would act as storage area and provide additional temporary storage capacity for the flood water in comparison to the current conditions, which would help reduce the effects of flooding downstream from the Site. By extension, the retention of runoff and reduction to peak flows would lead to the potential for lower rates of sediment erosion / transport.
- It is expected that the large flood events would result in a temporary stoppage in operations, depending on the elevation of the flood waters. If pit access or the safe operation of equipment is at risk, operations will be stopped. This stoppage is expected to be short-lived, as flood waters are expected to recede in a matter of days and the potential for significant damage to the site infrastructure would be minimal.
- Pit operations will be planned to limit the risks of flood water being conveyed through the pit pond(s) and short circuiting of the creek channel. This will be achieved through earth berming and extraction planning. The site plans have been updated to address flood risk potential and the comments received so the pit pond can provide flood storage without short circuiting. Updated site plans are provided in the attachments.

6.0 CLOSURE

We trust that this technical memorandum meets your current needs. If you have any questions or require clarification, please contact the undersigned at your earliest convenience.

WSP Canada Inc.

Mohsin Siddique, PhD, PEng
Water Resources Engineer

Craig DeVito, PEng
Water Resources Engineer

MS/CDV/ld/mp

Attachments: **Tables:**

Table 1: Storm Inflows along Mill Creek
Table 2: Storm Inflows along Tributary 3
Table 3: Water Surface Elevations of Storm Floods along Mill Creek
Table 4: Water Surface Elevations of Storm Floods along Tributary 3

Figures:

Figure 1.1: Site Location and Cross Sections
Figure 1.2: Storm Flood Elevation Map for 100-year Storm Flood
Figure 1.3: Storm Flood Elevation Map for 50-year Storm Flood
Figure 1.4: Storm Flood Elevation Map for 25-year Storm Flood
Figure 1.5: Storm Flood Elevation Map for 10-year Storm Flood
Figure 1.6: Storm Flood Elevation Map for 5-year Storm Flood

Site Plans:

Drawing 1: Existing Features Plans
Drawing 2: Operational Plan
Drawing 3: Operational Notes Plan
Drawing 4: Rehabilitation Plan

https://wsponline.sharepoint.com/sites/gld-21291g/deliverables/hydrogeology level 1 and 2/15 floodplain assessment jun2024/1791470a-tm-rev0-final-cbm lake flood assessment-23jan2025.docx

REFERENCES

Government of Canada (2024). GPS.H tool. Available at: https://webapp.csrs-scrs.nrcan-rncan.gc.ca/geod/tools-outils/gpsh.php

TABLES

Table 1: Storm Inflows along Mill Creek

Cross-section ID	Storm Inflow (m^3/s)					
	Regional Flood (1982)	100-year	50-year	25-year	10-year	5-year
19380	127	15	12.5	9.8	6.2	4.1
16101	165	18.4	16	13.3	9.2	6.2
12200	165	16	14.2	12.5	9.2	6.4
8901.4	165	14.6	13.3	11.5	8.5	6
8886.3	153	n/a	n/a	n/a	n/a	n/a
4560	141	13.2	12	10.5	7.8	5.6

n/a: not applicable

Table 2: Storm Inflows along Tributary 3

Cross-section ID	Storm Inflow (m^3/s)					
	Regional Flood (1982)	100-year	50-year	25-year	10-year	5-year
1600.4	15.3	2.4	1.9	1.4	0.8	0.5

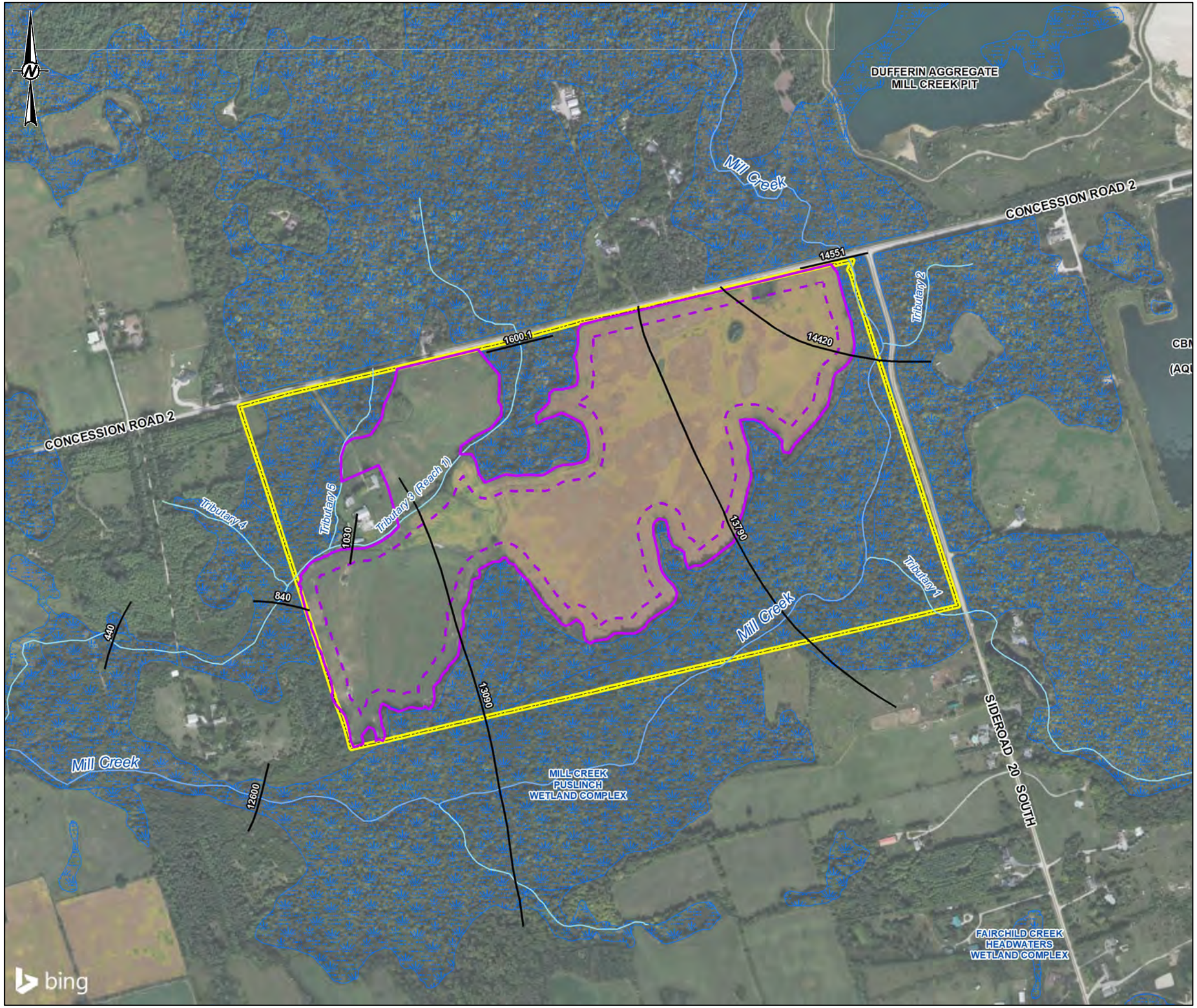
Table 3: Water Surface Elevations of Storm Floods along Mill Creek

Cross Section ID	Storm Flood Elevations (masl)					
	Regional Flood (1982)	100-year	50-year	25-year	10-year	5-year
14551	304.55	303.61	303.55	303.48	303.33	303.17
14420	304.48	303.51	303.45	303.37	303.19	303.01
13790	303.75	302.50	302.43	302.34	302.18	302.03
13090	303.27	301.24	301.17	301.08	300.91	300.76
12600	302.80	300.94	300.86	300.77	300.59	300.41

Table 4: Water Surface Elevations of Storm Floods along Tributary 3

Cross Section ID	Storm Flood Elevations (masl)					
	Regional Flood (1982)	100-year	50-year	25-year	10-year	5-year
1600.1	303.19	302.80	302.78	302.74	302.65	302.61
1030	302.55	301.96	301.90	301.84	301.86	301.79
840	302.03	301.59	301.55	301.50	301.21	301.14
440	301.66	300.78	300.74	300.71	300.65	300.61

FIGURES



LEGEND

- CROSS-SECTION
- WATERCOURSE
- ROAD
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA

KEY MAP

0 100 200 300 400

1:7,500 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2019
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

IMAGE SEPTEMBER 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
ABERFOYLE SOUTH LAKE PIT

TITLE
SITE LOCATION AND CROSS-SECTIONS

CONSULTANT

wsp

YYYY-MM-DD	2025-01-23
DESIGNED	ST
PREPARED	CGE/SO
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0017	0	**1.1**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
0 25mm

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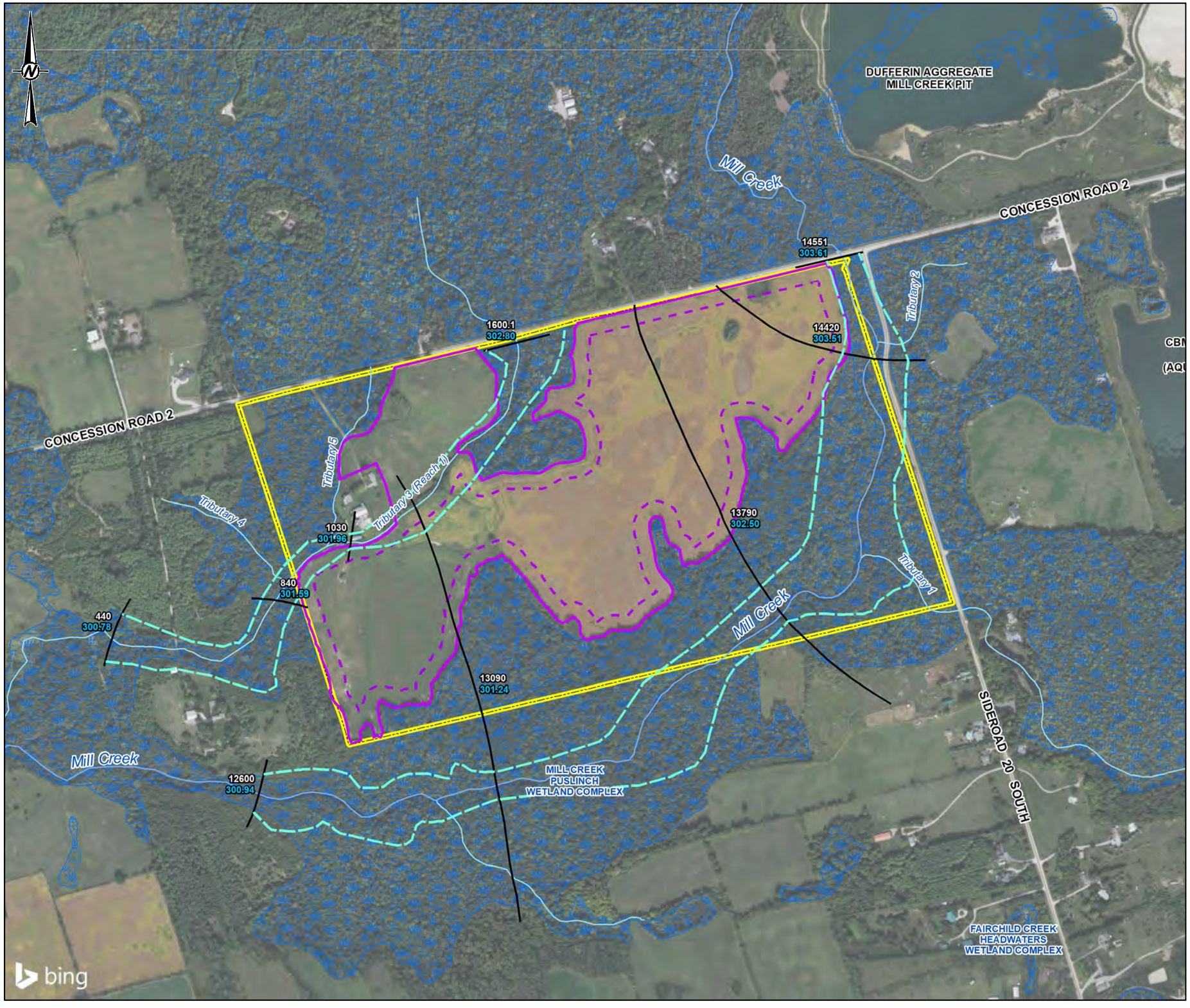

LEGEND

- CROSS-SECTION
- FLOODPLAIN EXTENT
- WATERCOURSE
- ROAD
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA

0 100 200 300 400

1:7,500 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2024
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
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3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
ABERFOYLE SOUTH LAKE PIT

TITLE
STORM FLOOD ELEVATION MAP - 100 - YEARS FLOOD LEVELS (CGVD2013)

CONSULTANT

YYYY-MM-DD	2025-01-23
DESIGNED	ST
PREPARED	KP
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0017	0	**1.2**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

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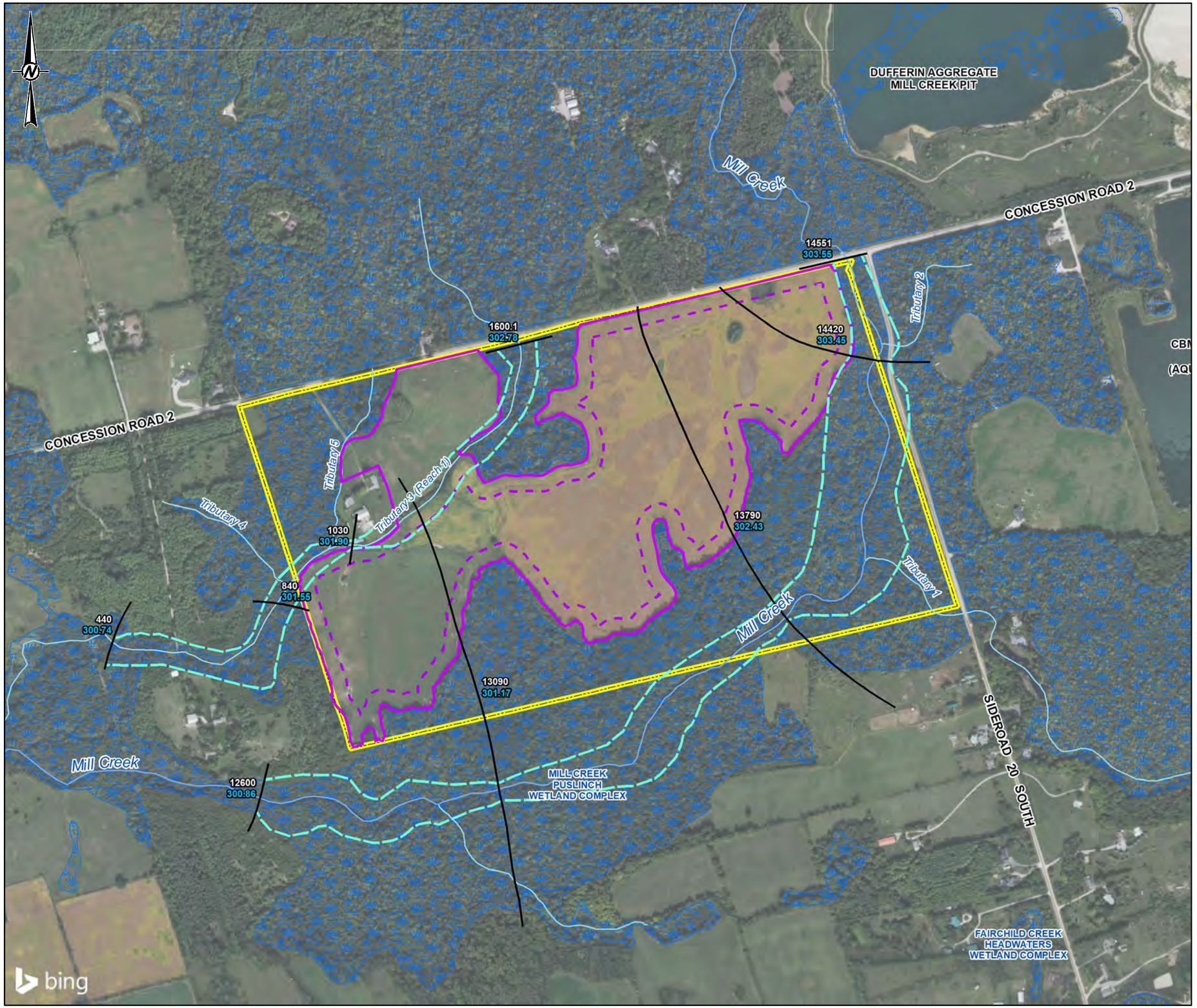

LEGEND

- CROSS-SECTION
- FLOODPLAIN EXTENT
- WATERCOURSE
- ROAD
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA

0 100 200 300 400

1:7,500 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2024
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
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3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
ABERFOYLE SOUTH LAKE PIT

TITLE
STORM FLOOD ELEVATION MAP - 50 - YEARS FLOOD LEVELS (CGVD2013)

CONSULTANT

YYYY-MM-DD	2025-01-23
DESIGNED	ST
PREPARED	KP
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0017	0	**1.3**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
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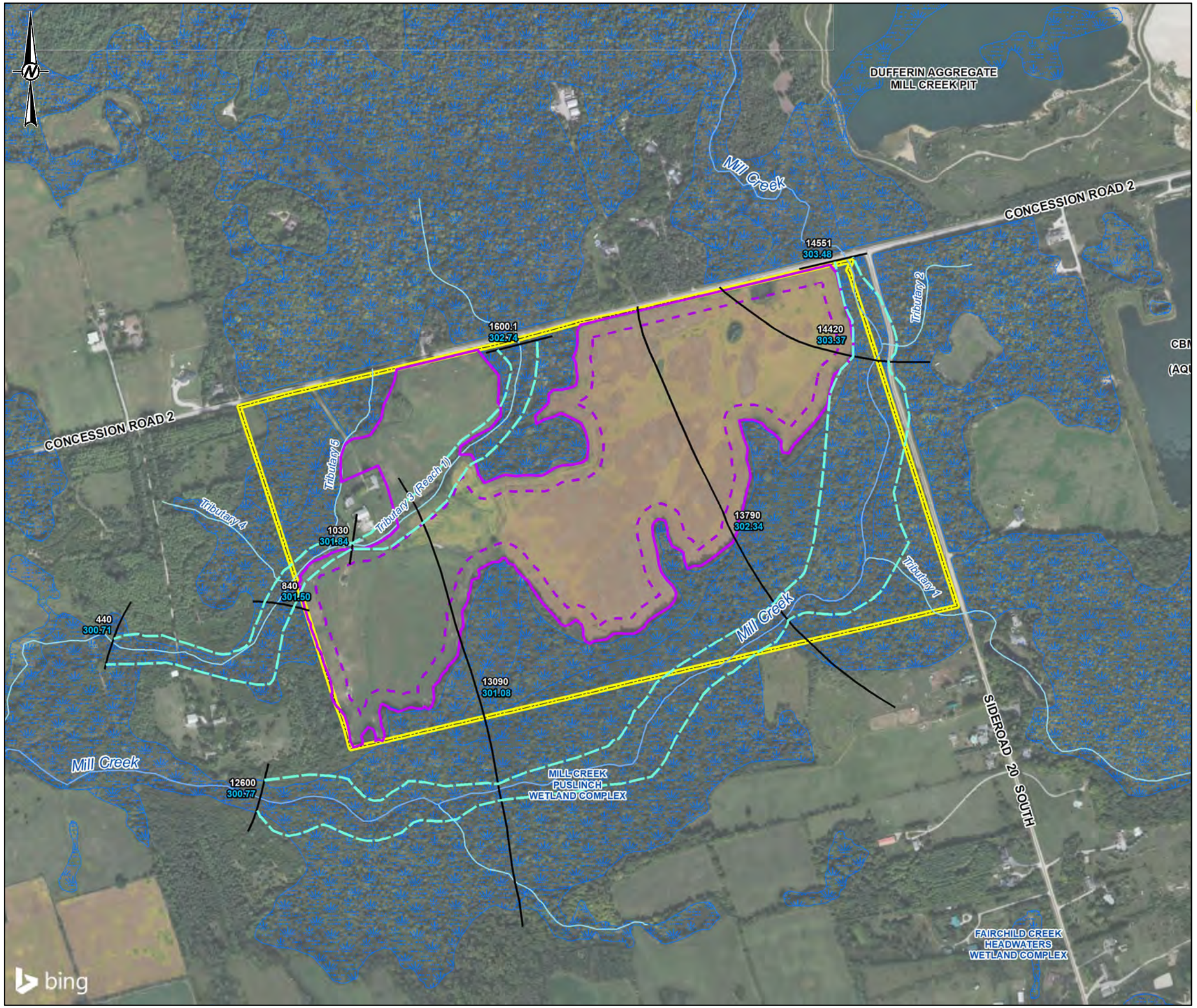

LEGEND

- CROSS-SECTION
- FLOODPLAIN EXTENT
- WATERCOURSE
- ROAD
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA

0 100 200 300 400

1:7,500 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2024
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
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3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
ABERFOYLE SOUTH LAKE PIT

TITLE
STORM FLOOD ELEVATION MAP - 25 -YEARS FLOOD LEVELS (CGVD2013)

CONSULTANT

YYYY-MM-DD	2025-01-23
DESIGNED	ST
PREPARED	KP
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0017	0	**1.4**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

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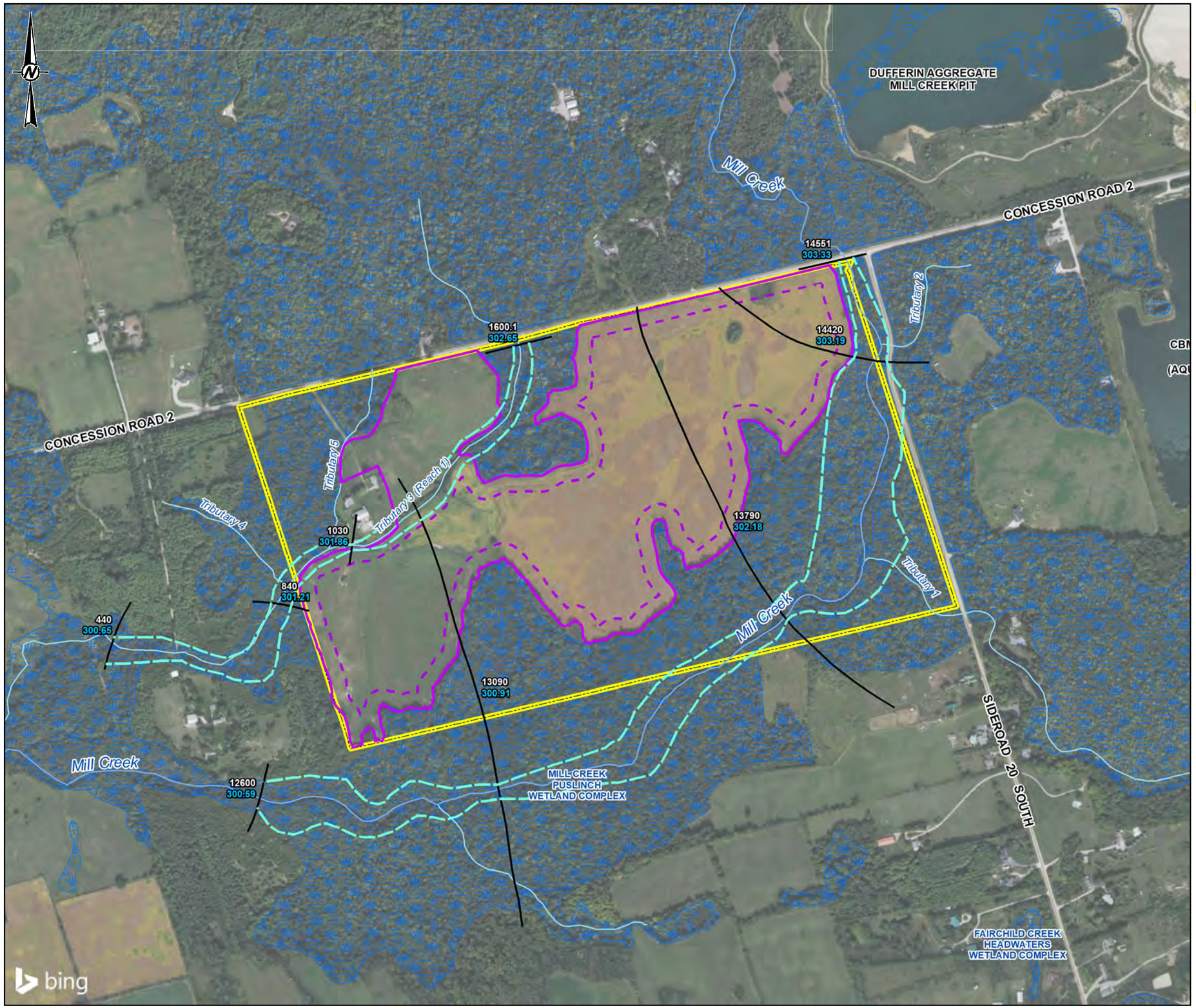

LEGEND

- CROSS-SECTION
- FLOODPLAIN EXTENT
- WATERCOURSE
- ROAD
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA

0 100 200 300 400

1:7,500 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2024
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

IMAGE SEPTEMBER 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
ABERFOYLE SOUTH LAKE PIT

TITLE
STORM FLOOD ELEVATION MAP - 10 - YEARS FLOOD LEVELS (CGVD2013)

CONSULTANT

YYYY-MM-DD	2025-01-23
DESIGNED	ST
PREPARED	KP
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0017	0	**1.5**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
25mm
0

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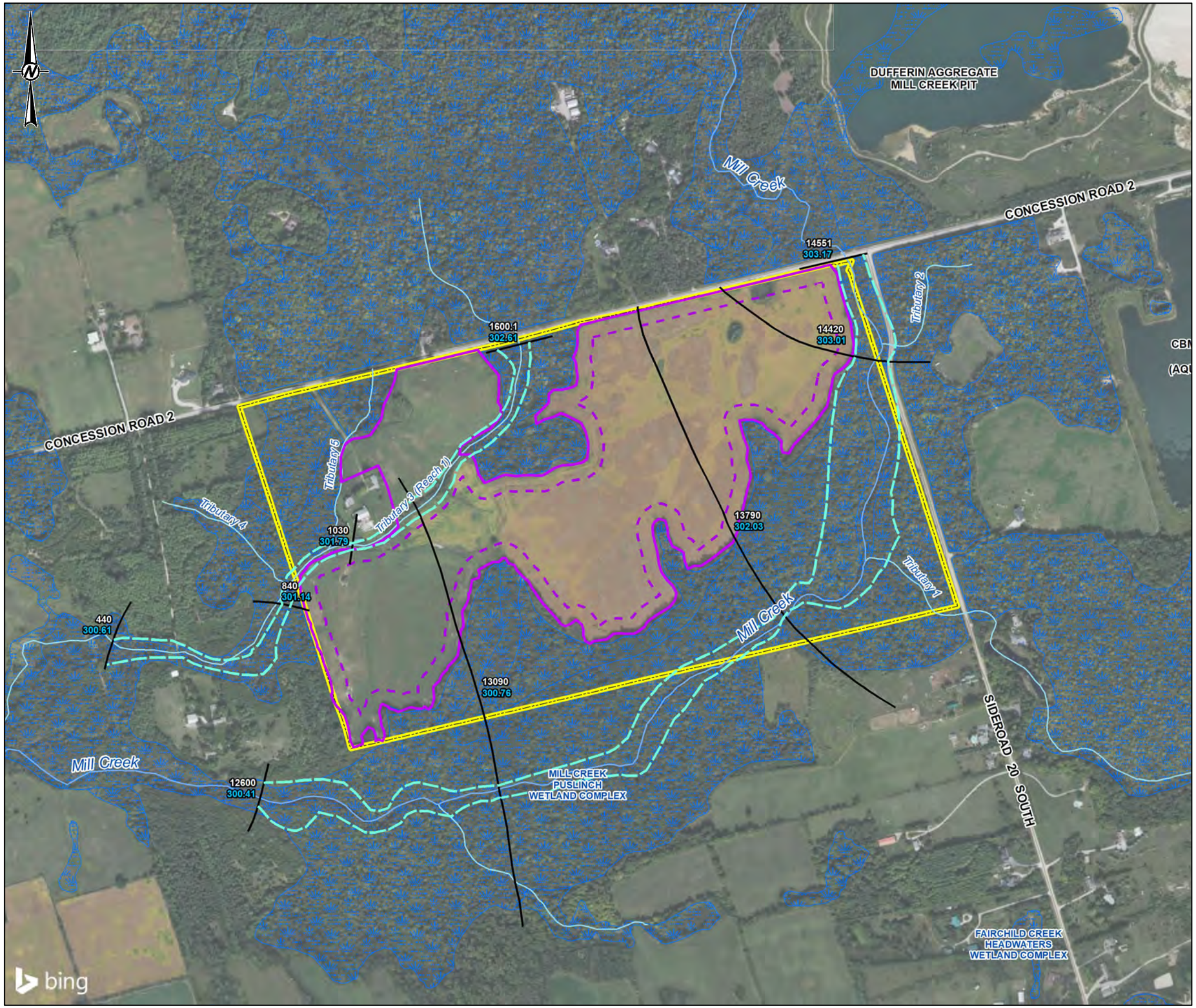

LEGEND

- CROSS-SECTION
- FLOODPLAIN EXTENT
- WATERCOURSE
- ROAD
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA

0 100 200 300 400

1:7,500 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2024
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

IMAGE SEPTEMBER 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT
ABERFOYLE SOUTH LAKE PIT

TITLE
STORM FLOOD ELEVATION MAP - 5 - YEARS FLOOD LEVELS (CGVD2013)

CONSULTANT

YYYY-MM-DD	2025-01-23
DESIGNED	ST
PREPARED	KP
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0017	0	**1.6**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM:
0 25mm

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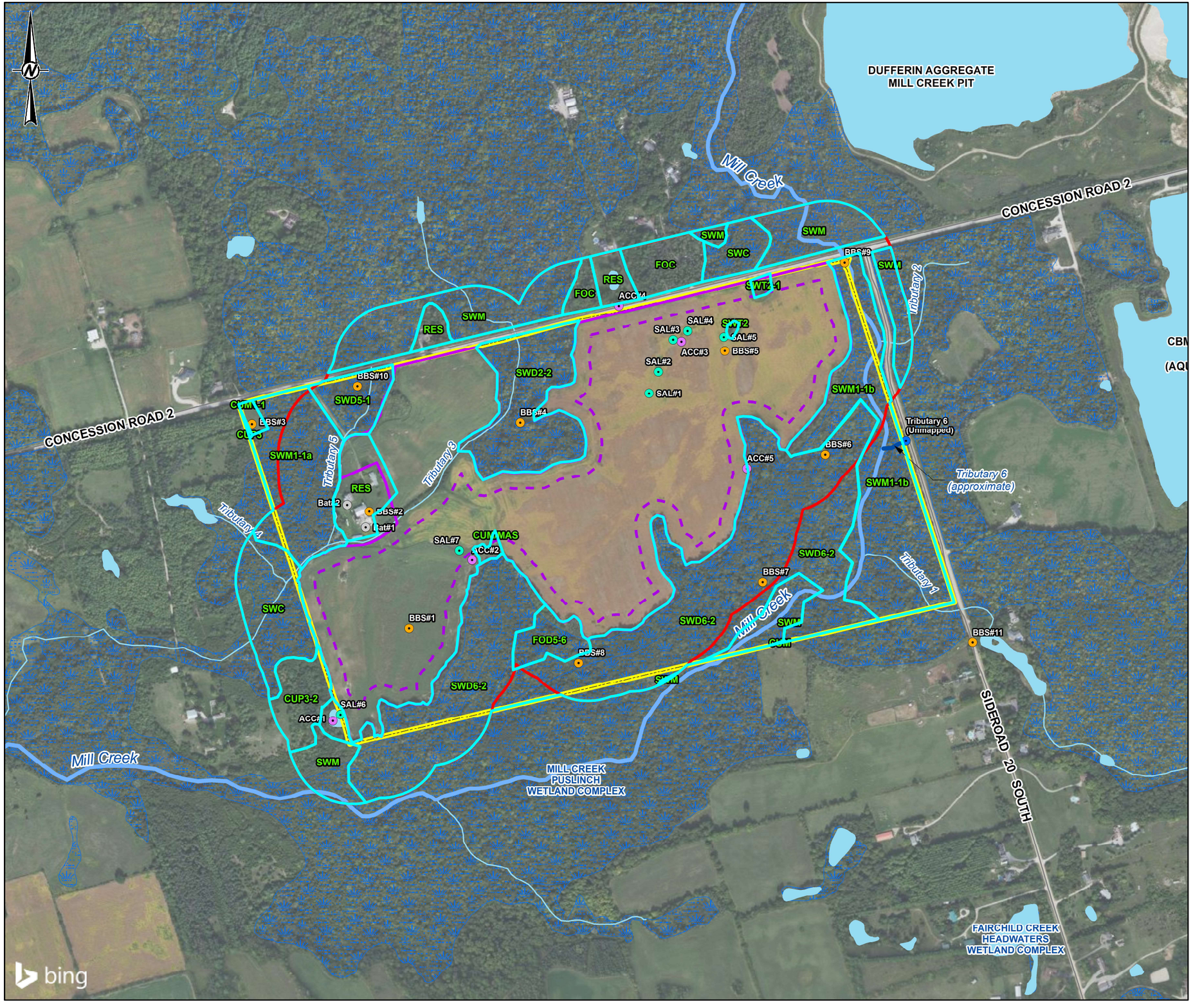
SITE PLANS

Please see Current Site Plan

ATTACHMENT 6

Updated Figure 2



LEGEND

SURVEY STATION LOCATION

- AMPHIBIAN EGG MASS SURVEY STATION
- ANURAN CALL COUNT SURVEY STATION
- BAT DETECTOR SURVEY STATION
- BREEDING BIRD SURVEY STATION
- UNMAPPED TRIBUTARY LOCATION
- UNMAPPED WATERCOURSE
- WATERCOURSE
- ROAD
- PROVINCIALLY SIGNIFICANT WETLAND (EVALUATED)
- WATERBODY
- PROPERTY BOUNDARY
- LICENCE BOUNDARY / SITE BOUNDARY
- PROPOSED EXTRACTION AREA
- STUDY AREA
- ELC BOUNDARY

ELC Code	Description
CUM	Cultural Meadow
CUM/MAS	Cultural Meadow / Marsh Inculsion
CUM1-1	Goldenrod Forb Meadow
CUP3	Pine Coniferous Forest
CUP3-2	White Pine Coniferoud Plantation
FOC	Coniferous Forest
FOD	Deciduous Foreset
FOD5-6	Sugar Maple-Basswood Deciduous Forest
RES	Residential
SWC	Coniferous Swamp
SWD2-2	Green Ash Deciduous Swamp
SWD5-1	Black Ash Deciduous Swamp
SWD6-2	Silver Maple Deciduous Swamp
SWM	Mixed Swamp
SWM1-1	White Cedar - Hardwood Mixed Swamp
SWT2	Thicket Swamp
SWT2-1	Alder Thicket Swamp

0 100 200 300 400

1:7,500 METRES

REFERENCE(S)

1. BASEDATA: MNRF LIO, OBTAINED 2019
2. IMAGERY SOURCE: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

IMAGE SEPTEMBER 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT

CBM AGGREGATES, A DIVISION OF ST. MARYS CEMENT INC. (CANADA)

PROJECT

ABERFOYLE SOUTH PIT EXPANSION - NATURAL ENVIRONMENT REPORT

TITLE

ECOLOGICAL LAND CLASSIFICATION AND SURVEY STATIONS

CONSULTANT

wsp

YYYY-MM-DD	2025-09-24
DESIGNED	ST
PREPARED	CGE/SO
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
1791470	0006	A	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

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