SECOND PEER REVIEW OF THE DBH ADDENDUM SOIL SERVICES SURFICIAL SOILS ASSESSMENT BRAMPTON BRICK APPLICATION

Prepared for:
The City of Brampton

By:
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INTRODUCTION

The following describes the results of a second peer review of the reports prepared by Mr. David Hodgson of DBH Soil Services Inc. on behalf of Brampton Brick concerning the proposed quarry located within the City of Brampton, Regional Municipality of Peel. The 1st DBH report has the title *Surficial Soils Study West Half of Lot 12, Concession 6 WHS, City of Brampton, Regional Municipality of Peel* and is dated August, 2008. A 2nd report summarizing additional information has been prepared by DBH Soil Services Inc. It is this 2nd surficial soils report with the title, *Addendum and Peer Review Response for the Norval Quarry Surficial Soil Study West Half of Lot12, Concession 6 WHS, City of Brampton, Regional Municipality of Peel*; that is the subject of additional peer review comments summarized by AgPlan in this report.

AgPlan Limited was retained in October, 2010 by the City of Brampton to complete the surficial soils peer review following a set of guiding questions which are summarized in this report as Appendix 1. The findings and their implications, related to Brampton's set of guiding questions, were summarized previously in a peer review report by AgPlan (*Peer Review of the DBH Soil Services Surficial Soils Assessment Brampton Brick Application*, 2011).

The analysis of positive and negative effects associated with the proposed Brampton Brick undertaking is multidisciplinary. As a result, this peer review should be read in conjunction with reports and peer reviews in other subject areas such as environment/natural heritage, hydrology, hydrogeology, planning and transportation. The information used and the opinions expressed in this peer review (including appendices) may be supplemented, reconsidered or otherwise revised by the author due to new or previously unknown information.

BACKGROUND

The 1st peer review by AgPlan (2011) included discussions based on the review of some published literature and on the wording, or lack thereof, within policy. This discussion is not repeated within this current document. However, the original matrix summary has been repeated within Appendix 2 and has an additional column to summarize whether the DBH report has provided information which has resulted in the modification of the implications and conclusions presented in the 1st AgPlan peer review (2011).

FINDINGS

Findings are summarized in two ways - descriptively in the following section and in the summary Matrix 2-1 in Appendix 2. As in the previous AgPlan report, both the text description as well as the summary matrix should be read because not all of the peer review findings are repeated within each of these two components. Peer review comments related to policy and legislation are based on the interpretation of specific sections of policy or legislation and are summarized in Matrix 2-2 in Appendix 2.

The original DBH Soil Services report stated that its terms of reference were *to complete a soil survey/Canada Land Inventory (CLI) classification, soil volume calculation and micro drainage assessment for an area identified as* [the] *West half of Lot 2, Concession 6 WHS, City of Brampton in the Regional Municipality of Peel*. The DBH report addendum described additional terms of reference which were to provide *advice to Beacon Environmental with respect to the existing surficial soil characteristics in the areas of vegetation protection and enhancement, and to Golder Associates regarding soil hydrologic properties (on and off site), and investigated offsite artificial drainage. DBH Soil Services Inc completed a review of Official Plan Documentation provided by the Region of Peel and the City of Brampton*

The following bulleted points summarize peer review observations related to methods, information bases, data limitations/certainty, missing information, mitigation/monitoring and conclusions.

<u>Methods</u>

- The DBH Soil Services report addendum does not contain a section on methods. However, some references to methods are made within the text - the use of recent aerial photography to

identify tile drainage and the fact that micro drainage mapping was based on topographic mapping. In some instances specific reference to methods and/or explanations for why one method was chosen as opposed to another are not present. For example, why microdrainage methods do not include photo interpretation has not been explained.

- The Addendum report does not include laboratory measurements for soil physical and chemical characteristics which could serve as a baseline against which the success of rehabilitation could later be measured. The report would benefit from information which outlines possible and probable impacts to surficial soils, measurements used as indicators of those impacts and finally, the acceptable limits within which those indicators demonstrate successful rehabilitation.

Information Base.

- The data source listing is helpful at the beginning of the report and demonstrates some consideration of interdisciplinary work. However, the original and addenda reports by Beacon as well as Golder have not been referenced. Thus, the way in which the DBH surficial soils information was used by Beacon Environmental and/or Golder Associates is not readily apparent.

Data Limitations/Certainty

- As stated within the 1st AgPlan peer review (2011), discussion on the limitations of soil survey is still not present in the Addendum report.
- The DBH Addendum contains no discussion of limitations associated with the identification of tile drainage or on the analysis of microdrainage.
- The discussion about the detailed soil survey includes reference to disturbed areas but none appear to be mapped.

Missing Information

- The DBH Addendum contains no cross reference to soils information collected for purposes of environmental, hydrology and hydrogeological studies completed on behalf of Brampton Brick.
- The policy review from the Provincial Policy Statement (PPS, 2005), the Official Plans for the Region of Peel and the City of Brampton, the Aggregate Resources Act (1990) and the Greenbelt Plan (2005) provide a rationale for the elimination of an agricultural after use. However, The DBH Addendum provides no evidence concerning surficial soils and their role in the rehabilitation of the proposed quarry to lands of equal or better *ecological value* as described within the Greenbelt Plan.

  > *5. When operators are undertaking rehabilitation of mineral aggregate operation sites in the Protected Countryside, the following provisions apply:…*
  > *b) The disturbed area of a site will be rehabilitated to a state of equal or greater ecological value, and for the entire site, long-term ecological integrity will be maintained or restored, and to the extent possible, improved;…*
- The DBH Addendum contains no discussion on the significance, if any, of the site having 2700 - 2900 average crop heat units.
- As stated in the original peer review, microdrainage information described and mapped by DBH does not include a discussion on the changes to micro drainage and any possible subsequent changes to surface water quantity or quality that will result due to the quarry. Reference to those matters or to documents prepared by other consultants and that discussed drainage and subsequent changes would assist in evaluating the microdrainage information presented.
- Calculations for the volume of topsoil and subsoil are subject to assumptions similar to those described in the original DBH surficial soils assessment. The topsoil resources section contains estimates of the volume of the "A" horizon and of the "B" horizon based on the total sample size of 16. A reference to statistics would assist in understanding whether this sample size was sufficient. The soil volume calculation also includes a number of assumptions but has no data to assist in evaluating whether these assumptions are reasonable. For example, a poorly drained soil called Jeddo has been mapped on the site in the areas proposed to be excavated. What is the probability that Jeddo soils will be sufficiently dry to be stripped without soil damage and at what time of year is this probability highest (related to low moisture content)?

- The topsoil and subsoil volumes are not linked to the operational site plan and to use in progressive rehabilitation.
- The addendum provides no additional information with respect to the following information outlined previously by AgPlan (2011). There are several instances where links amongst the reports, completed by different disciplines providing information on behalf of Brampton Brick, are not provided. For example:
  - the relationship between the volumes of the "A" horizon and the "B" horizon and the volumes of material required for berms as shown in the operational site plan; an indication of changes which will occur in those berms as a result of progressive rehabilitation;
  - the comparison of depths to the water table and the fluctuations in depth by season and year and the significance of those depths and fluctuations relative to the recommendation for stripping soils in a dry condition;
  - the DBH seed mixtures recommended for soils and the seed mixtures' acceptability in natural and/or urban situations;
  - the significance of changes in the surface water micro drainage pattern relative to the drainage pattern during shale mining through to rehabilitation and post-rehabilitation.
- The time over which the site will be stripped, mined and rehabilitated (including the time required to return groundwater levels to a pre-mining condition) has the potential to be extensive, that is, much longer than the normal planning timeframe of 20 to 30 years. Changes to natural heritage features may be extensive during such a long time; therefore, estimates of impact to natural heritage systems will require some estimation of the state of surficial soils in natural heritage systems relative to soils stockpiled and/or imported for site rehabilitation.
- The DBH Soil Services Addendum report contains no recommendations with respect to the characteristics of soils imported to the site as part of soil rehabilitation.
- The addendum report establishes no baseline of current surficial soil ecological value against which subsequent rehabilitation can be assessed for equal or better ecological value post-rehabilitation.

Mitigation/Monitoring

- The Addendum report contains no additional information relative to the following statement previously made (AgPlan, 2011). The general surficial soils rehabilitation plan is reasonable but is lacking in specific information. Given that the soils on the site are high in clay content, changes in soil structure resulting from soil compaction can lead to a massive soil structure that changes water movement and plant available water - subsequently affecting soil productivity. The DBH report provides insufficient detail concerning soil compaction prevention, mitigation and mitigation success.
- The general rehabilitation plan includes 4 basic steps related to surficial soils. These steps as stated are reasonable but the probability that they will be followed so as to result in the maintenance of ecological value has not been stated within the DBH Addendum report.
- As stated previously (AgPlan, 2011), the successful use of vegetation and/or crop types will depend on soil physical and chemical characteristics at the time of rehabilitation. For example, certain crops will not grow on poorly drained soils and those that do grow may not prevent soil erosion by water depending on the relative amount of silt through to fine clays present in the soils on the site. Therefore, the DBH Soil Services report does not provide sufficient detail with respect to soil characteristics and the suitability of different crop types or species of vegetation relative to different soil conditions.

Conclusions

- There is no conclusions section within the DBH Addendum. The Addendum does state, on the basis of the analysis of policy, that rehabilitation to an agricultural after use is not required. Regardless, comments provided previously (AgPlan, 2011) still apply as they relate to the maintenance and/or improvement of ecological value. Other information sources and field analyses need to be considered for the characterization of primary and secondary impacts to surficial soils as part of ecological systems. These other sources of information are necessary to the analysis of whether the subject quarry should be approved. In particular, the report does not

comprehensively and completely address the requirements of the Provincial Policy Statement (2005) and the Greenbelt Plan as there is no discussion on:

- surficial soils concerning the *ecological value* and *ecological function* of the site soils. Additionally, there is little discussion about the relationship between soils on the site and those soils in adjacent areas,
- *soil quality* and how that *soil quality* will be measured, maintained and possibly improved, and
- the surficial soil characteristics of the site and surrounding area as being a good choice for the proposed Brampton Brick undertaking.

- Moreover, the DBH addendum report still does not link policy requirements for the maintenance and possibly improvement of surficial soils as those soils are part of the maintenance and/or improvement of ecological value. For example:
  - Specific information concerning the probability of soil compaction or the actual time when soils might be at their driest has not been presented within the report.
  - The methods to be used to stabilize the berms and the effects on soil quality of the operational plan plantings and the subsequent retrieval and reuse of the soils in final rehabilitation of the site are not described.
  - The relative success of the operational plan and of the final rehabilitation plan cannot be ascertained without additional information.
- Finally, contrary to the policy requirements of the Provincial Policy Statement (2005) and the Greenbelt Plan, the recommended mitigation and monitoring measures, related to soils as part of natural heritage systems, are incomplete:
  - Soil quality before excavation has not been compared to soil quality after rehabilitation.
  - The effects of mining below the water table are not described as they relate to soils as part of natural heritage systems, and the impacts have not been estimated.
  - Comparative evidence has not been provided to demonstrate that the proposed site excavation and rehabilitation addresses the PPS requirement an extraction that *minimizes social and environmental impacts*).

CONCLUSIONS

Based on this peer review, the DBH Soil Services addendum technical report on surficial soils (2012), as supplied by Brampton Brick, does not warrant approval based on the requirements of legislation and policy. Therefore, the acceptance of the DBH Soil Services Inc. report by the City of Brampton is not recommended.

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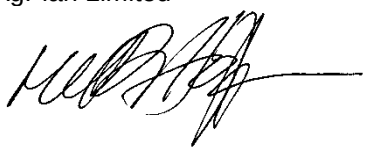

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REFERENCES

The following references have been cited and are in addition to those references already used as a framework for the 1st AgPlan peer review (2011) of the DBH Soil Services Inc. report (2008).

AgPlan Limited. 2011. *Peer Review of the DBH Soil Services Surficial Soils Assessment Brampton Brick Application*. Prepared for the City of Brampton.

AgPlan Limited. 2004. Brampton, the City of. 2010. *Guideline Principles and Questions for Brampton Peer Reviewers Brampton Brick Peer Review.*

DBH Soil Services Inc. 2012. *Addendum and Peer Review Response for the Norval Quarry Surficial Soil Study West Half of Lot12, Concession 6 WHS, City of Brampton, Regional Municipality of Peel*. Prepared for Brampton Brick.

APPENDIX 1

MATRIX 1

REVIEW SUBCOMPONENT	GUIDING QUESTIONS
Purpose	**Is the purpose of the work clearly and understandably stated in the applicant's report/study?**
	Are all relevant and probable issues and impacts encompassed by the purpose?
	Is the purpose worded so that it encompasses the questions that are relevant to surficial soils and/or agriculture?
Methodology	**Is the methodological approach to the purpose technically sound to permit an objective review of issues, data, facts, and appropriate to fulfill the purpose?**
	Are there technical concerns related to the methodology and assumptions that may compromise the analysis and/or the conclusions of the report/study?
Information	**Are relevant data and facts clearly and consistently presented in the applicant's report/study?**
	Is the information useful and is the data used critical to the conclusions?
	Are the data useful and accurate, or are there concerns about their quality?
	Are complete, relevant and appropriate data sets provided?
	Are the relevant data and other information sufficiently detailed? Is anything missing?
Certainty	**Are certainties and uncertainties of the proposal's success openly and objectively stated in the applicant's report/study?**
	Are all assumptions clearly stated? Are the assumptions reasonable?
	Are the standards or thresholds commonly accepted in surficial soils and/or agriculture identified and appropriately utilized?
Issue Gaps	**Are there issue gaps arising from the peer review?**
	Were all identified issues addressed?
	Are there additional issues identified through the peer review that need to be addressed?
	Are there any key issues (from the perspective of surficial soils and/or agriculture) that have not been studied?
Mitigation/ Monitoring	**Are realistic mitigation measures (or contingency plans) proposed in the applicant's report/study? Are they presented in sufficient detail?**
	Do the proposed measures mitigate the impacts?
	Will the proposed measures be adequate to address outstanding concerns?
Conclusion	**Are the conclusions of the report/study supported by and follow from the work undertaken?**
	Are the conclusions relevant to the purpose/objectives of the work?
	Would the peer reviewer reach the same conclusions, and if not, then what conclusions would that reviewer reach?
	Do the conclusions satisfy the applicable policies of the Official Plans and provincial plans, policies, guidelines and standards?
Adequacy	**Generally, does the applicant's report/study adequately address the stated**

REVIEW SUBCOMPONENT	GUIDING QUESTIONS
	purpose?
	Does the applicant's report/study adequately address the stated purpose, from the perspective of surficial soils and/or agriculture?
	Is there anything that I would have done differently?
	Is the applicant's report/study complete?

APPENDIX 2

Norval Quarry Rezoning Application (Brampton Brick)

MATRIX 2-1 SURFICIAL SOILS

August 31, 2012

Preliminary Review Table
This table has been completed to provide a summary of the peer review work to date.

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
Purpose			
Is the purpose of the work clearly and understandably stated in the applicant's report?	Yes. However, the purpose is limited to the characteristics of surficial soils and neglects discussion related to agriculture and the natural heritage components within the Greenbelt Plan and the PPS.	The 2nd report provides evidence for the rejection of the consideration of agricultural rehabilitation. However, the DBH addendum report does not provide sufficient information related to the natural heritage/environmental requirements of the Greenbelt and PPS	Requirements the Greenbelt/PPS are not met by this report.
Does the purpose set out the proper direction to undertake the study?	Yes, but is scoped too narrowly to surficial soils and micro drainage and therefore neglects agriculture and natural heritage.	Scoping is still too narrow and neglects natural heritage/environmental component.	It has not been demonstrated, from the perspective of soils, that there will be no negative impacts on the *natural features, ecological value* or *ecological functions*
Methodology			
Is the methodological approach technically sound? Is the review of issues, data, and facts objective and appropriate?	Methodology for soil survey is reasonable. Limitations associated with soil classification, soil survey and interpretive classifications (e.g. CLI) are not present/discussed. Discussions of limitations are not normally a part of practice but are part of the scientific literature.	The addendum report contains no information concerning soil interpretive classifications related to vegetation proposed to be part of the rehabilitation plan. No evidence was provided to indicate if soil potential will change positively or negatively and within what limits as a result of the proposed rehabilitation.	Problems with soil correlation and with consistent CLI ratings for given soils (Oneida and Chingacousy mapped within the proposed site) are not mentioned and are not used to put the site in context. Interpretations of soils related to natural heritage/environmental components is still lacking within the surficial soils report.
Does the peer review identify any technical concerns stemming from	The methodology is focused on soil survey and neglects reference to statistical	The DBH Addendum adds statements about observations associated with A and B horizon	The average depth and thickness of the A and B horizons is based on a small sample size (less than 30 samples where 30

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
the methodology (and assumptions made to inform the methodology) that may compromise the analysis and/or conclusions of the report?	analysis, for example.	thicknesses but no additional field analyses were completed to provide a better sample size. As another example, no information is presented with respect to whether a poorly drained lacustrine soil is likely to be sufficiently dry so as to avoid soil compaction. .	samples are stated by some authors as a necessary minimum for parametric statistics). Therefore, averages may not be correct. Other assumptions are made in the topsoil and subsoil calculations as well as the rehabilitation plan without reference to probabilities related to those assumptions. Therefore, whether these assumptions are reasonable is difficult to ascertain.
Information			
Are relevant data and facts clearly and consistently presented in the technical report?	Yes but limited to surficial soils, micro drainage and soil survey.	The DBH Addendum does provide additional data with respect to microdrainage. However, microdrainage channels shown in Figure B do not match the microdrainage channels shown in Figure A. The DBH Addendum does not contain a review of the literature on the characteristics of surficial soils where former extraction areas have been rehabilitated to match or exceed pre-excavation ecological value. Additionally, DBH has not provided a baseline of soil physical and chemical properties which establishes the pre-excavation ecological value of surficial soils.	Missing baseline data as well as contextual information suggest that a reasonable measure of the maintenance and/or improvement of ecological value cannot be made for surficial soils.
Is information gathered from appropriate sources? Is the information useful? Accurate? Are there concerns regarding their quality or validity?	Sources are reasonable related to surficial soils. Other sources need to be considered for primary and secondary impacts to agriculture and natural heritage. There is no link between crop type/seed mixes and their utility in	Agricultural issues have been eliminated by policy analysis in the DBH Addendum. As stated in the previous point in the matrix, DBH has not provided sufficient literature to allow a reviewer to ascertain the probability of the maintenance of surficial soils as part of the eco-logical value in an ecological	Missing baseline data as well as contextual information suggest that a reasonable measure of the maintenance and/or improvement of ecological value cannot be made for surficial soils.

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
	agricultural systems or natural heritage systems.	system	
Is the data used critical to the conclusions?	The conclusions are statements of fact but do not link the requirements of policy with the findings of the report. Other facts presented in the literature that are associated with rehabilitation of soils have not been used in support of specific rehabilitation recommendations or plans.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	The conclusions provide no insight as to whether the proposal is consistent with the PPS. Specific information concerning the probability of soil compaction or the actual time when soils might be at their driest has not been presented within the report. There is no relationship established between the amount of materials available and their use in berms which are shown as part of the operational plan. The methods to be used to stabilize the berms and the effects on soil quality of the operational plan plantings and the subsequent retrieval and reuse of the soils in final rehabilitation of the site are not described. The relative success of the operational plan and of the final rehabilitation plan cannot be ascertained without additional information.
Is the Brampton Brick report thorough/comprehensive/complete? To respond to this question, peer reviewers must consider accuracy, appropriateness and timing/seasonality of the data collection (if applicable). Where specific technical report warrants, there may be a need to consider broader connections (i.e.: water inter-relationships). Please indicate if you feel	The report is not comprehensive or complete given the requirements of the Greenbelt Plan and the PPS. There is no discussion about problems with correlation in the use of soil names and in the application of CLI ratings for common field crops for those specific named soils. The scientific literature related to the depth to free water within the profile and how that depth to free water changes seasonally has not been used to make	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	The terms of reference for this surficial soils study are too narrowly focused. However, if the report is to be judged solely on the basis of the terms of reference, there are still problems related to sample size, descriptions of limitations and reference to probable success of rehabilitation of the site.

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
this is lacking in the Brampton Brick report and what broader connections should be considered.	recommendations related to the timing of soil removal. The sample size for the depth of A and B horizons is inadequate for the calculation of an average value (parametric statistics). Microdrainage information does not use the locations of existing swales which can be seen on aerial photographs.		
How comprehensive and complete are the recommended mitigation and monitoring measures proposed by Brampton Brick? This includes assessing direct and indirect impacts; short and long term aspects.	Recommended mitigation and monitoring measures related to soils and agriculture are incomplete. Soil quality before excavation has not been compared to soil quality after rehabilitation. The effects of mining below the water table are not described as they relate to soils as components of agriculture and/or natural heritage areas. Site alternatives have not been addressed.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns (except for the removal of the agricultural issue).	There are no references to existing studies or to analyses specific to the proposed site that provide information that would allow a reader of the report to put the site in context - where context examines why the site is relatively better or poorer than other potential sites and also provides context over time to demonstrate existing soil characteristics relative to post-rehabilitation soil characteristics.
The gap analysis will assess the relative importance of the data gaps and limitations to the project and identify potential options for addressing them. As such, a recommendation from a peer reviewer could be that additional survey and baseline monitoring	Data gaps include a lack of reference to the requirements of the Greenbelt Plan and the PPS, consideration of site alternatives, reference to the probability of rehabilitation success, and inadequate baseline against which to measure rehabilitation success. The report also	The original findings described in the column to the left have been reduced given the elimination of agriculture as an issue. In contrast, ecological component is still present and implications are for the most part still present.	Data gaps (e.g., no soil dry bulk density, no field saturated hydraulic conductivity, no link to other reports and “secondary impacts”, no discussion of fill characteristics and subsequent effects) restrict the ability to characterize the number and magnitude of impacts associated with the proposed Brampton Brick undertaking.

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
must be undertaken as the project proceeds, provided the necessary frameworks are in place to direct this data collection and any changes that are triggered.	lacks reference to studies completed by others related to water quality and quantity, dust, noise, traffic and the significance of these findings relative to surficial soils within agriculture and/or natural heritage areas.		
Certainty			
Are certainties and uncertainties of the proposal's success openly and objectively stated in the applicant's report/study?	No.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	The relative probability of obtaining similar soil quality post-rehabilitation is not outlined within the surficial soils report.
Are all assumptions clearly stated? Are the assumptions reasonable? Analysis of assumptions and parameters.	No.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	As discussed previously, assumptions associated with the classification of continua, soil classification correlation and soil interpretive classification correlation are not described in the report.
Are the standards or thresholds commonly accepted in this type of technical area identified and appropriately utilized? (i.e.: transportation, soils, natural environment? Etc…)	There are few specific standards outside of those specified within policy or within the scientific literature.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	There is no professional organization dictating minimum requirements or standards for the examination of surficial soils.
Issue Gaps			
Are there issue gaps arising from the review?	Yes. The requirements of the PPS are ignored -site rehabilitation to create similar levels of soil quality, choice of site with lowest impacts to agriculture. Interrelationships between disciplines have not been	Agricultural issues have been eliminated by policy analysis in the DBH Addendum. No additional information in the DBH Addendum alters the statements made for implications described in the adjacent column.	Issues list as yet to be created; discipline specific issues are outlined at the end of this document.

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
	described to demonstrate primary and secondary impacts. For example, ability to stabilize berm slopes (necessary for visual effects and noise attenuation) of Chingacousy A horizon assuming that this material will become part of the berms shown in the operational plan.		
Were the identified issues addressed in the technical report?	No.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	Discipline specific issues are outlined at the end of this document.
Are there key issues, related to the specific technical report, that have not been considered?	Yes.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	Discipline specific issues are outlined at the end of this document.
Mitigation/Monitoring			
Are realistic mitigation measures/ rehabilitation plans proposed in the applicant's report? Is there sufficient detail?	No. For example, baseline conditions for dry bulk density have not been described. Thus, the density of soils post-rehabilitation cannot be compared to allow for a measure of the "success" of rehabilitation.	Agricultural issues have been eliminated by policy analysis in the DBH Addendum. No additional information in the DBH Addendum alters the statements made for implications described in the adjacent column.	Mitigation measures are generally descriptive, that is, they do not provide a minimum standard of what will be done, nor do they indicate soil/ecological value characteristics that will be monitored and at what point specific mitigation measures will be applied relative to those soil/ecological value characteristics.
Do the proposed measures mitigate the impacts? Is the end result desirable from a technical point of view?	No. The probability of impacts (given previous studies of lands rehabilitated to an agricultural after use) has not been used to estimate impacts. There is no reference to the literature	Agricultural issues have been eliminated by policy analysis in the DBH Addendum. No additional information in the DBH Addendum alters the statements made for implications described in the adjacent column.	Cannot reasonably estimate impacts nor characterize their probable success.

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
	on the success of mitigation measures applied to mitigate estimated impacts for rehabilitated lands in Ontario.		
Will the proposed measures be adequate to address outstanding concerns?	No. Measures lack specificity.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	Cannot measure/characterize effects after the application of mitigation because a baseline has not been established.
Conclusion			
Do the conclusions satisfy the applicable policies of the relevant policy documents that need to be consulted as per the specific discipline (i.e.: Official Plan, Provincial legislation, standards and guidelines, etc…). This should be informed by the policy matrix. Have implications relating to required jurisdiction and agency approvals including environmental assessments been identified?	No. The requirements of the PPS and therefore the Greenbelt Plan have not been adequately described and characterized. Report would appear to have been produced to meet ARA Category 2 standards.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	The planned use is not consistent with Provincial planning policy.
Are the conclusions relevant to the purpose/objectives and supported by the work undertaken by the report authors?	Yes, given the terms of reference supplied to DBH Soil Services. No, because the terms of reference are too narrowly focused.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	Policy requirements are not met.
Based on the peer review, would the same conclusions be	No.		

Guideline Question	Original Findings regarding the Brampton Brick Report	Findings in the Second Peer Review Results	Implications if this concern/issue is not addressed
determined?			
Adequacy			
Does the applicant's report/study adequately address the stated purpose?	No. There is some reference to agriculture but no reference to the requirements outlined in the PPS policies 2.4.3, 2.4.4, 2.5.3 and 2.5.4. With respect to natural heritage, there is no reference to section 2.1.6 within the PPS or to section 4.2.3 (5b) in the Greenbelt Plan.	Agricultural issues have been eliminated by policy analysis in the DBH Addendum. No additional information in the DBH Addendum alters the statements made for implications described in the adjacent column.	Policy requirements are not met.
Is there anything that should, in your opinion, have been done differently?	Yes. As described previously.	No additional information in the DBH Addendum alters the statements made for original findings and implications described in the adjacent columns.	Policy requirements are not met.

Conclusions Summary

- The report includes references to operational design based on technical reports where there is no specific reference to the soil materials described in the surficial soils study and shown as affecting the design.
- There is a description of on-site soils and a map provided as support for those descriptions but there is no cross reference to soils information collected for purposes of environmental and hydrogeological studies.
- Reference is made to the soils report for Peel Region and the summary of mapped soils is correct. However, there are no discussions about the limitations associated with the soil survey or soil surveys generally.
- There is no reference to soils as part of ecological systems or to the role of soils in the maintenance and improvement of *ecological value*.

MATRIX 2-2 POLICY/LEGISLATION MATRIX

Act or Policy	Legislative and/or Policy Component Considered relative to Agriculture	Discussion/Interpretation
The Greenbelt Plan		
	4.3.2 Non-Renewable Resource Policies For lands within the Protected Countryside, the following policies shall apply: 1. Activities related to the use of non-renewable resources are permitted in the Protected Countryside, subject to all other applicable legislation, regulations and municipal official plan policies and by-laws. The availability of mineral aggregate resources for long-term use will be determined in accordance with the PPS, except as provided below. 2. Non-renewable resources are those non-agriculture based natural resources that have a finite supply, including mineral aggregate resources. Aggregates, in particular, provide significant building materials for our communities and *infrastructure,* and the availability of aggregates close to market is important both for economic and environmental reasons.	This section provides the information that the availability of aggregate resources will be determined following the requirements of the PPS. Those requirements have not been addressed in the in the surficial soils report.
	4.3.2 Non-Renewable Resource Policies 4. The Ministry of Natural Resources will pursue the following under the *Aggregate Resources Act,* for all *mineral aggregate operations* , including wayside pits and quarries, within the Protected Countryside: a. Rehabilitated area will be maximized and disturbed area minimized on an ongoing basis during the life-cycle of an operation; b. Progressive and final rehabilitation efforts will contribute to the goals of the Greenbelt Plan; c. The Ministry of Natural Resources will determine the maximum allowable disturbed area of each *mineral aggregate operation*. Any excess disturbed area above the maximum will be required to be rehabilitated. For existing operations this shall be completed within 10 years of the date of approval of the Greenbelt Plan, and 50% completed within six years. For new operations, including expansions, the total disturbed area shall not	This section emphasizes the requirement for ongoing rehabilitation during extraction and includes timelines. This requirement may affect the amount and use of surficial soil materials stored in berms during the period of extraction and post extraction. Subsequent reference in part (d) concerning surface water quality and quantity relates to the drainage pattern identified by DBH as well as to characteristics of surficial soils.

Act or Policy	Legislative and/or Policy Component Considered relative to Agriculture	Discussion/Interpretation
	exceed an established maximum allowable disturbed area; and d. An application for a *mineral aggregate operation* or wayside pits and quarries may be permitted only where the applicant demonstrates that the quantity and quality of groundwater and surface water will be maintained as per Provincial Standards under the *Aggregate Resources Act.*	
	4.3.2 Non-Renewable Resource Policies 5. When operators are undertaking rehabilitation of *mineral aggregate operation* sites in the Protected Countryside, the following provisions apply: a. The aggregate industry will work with the Ministry of Natural Resources to consider the development and implementation of comprehensive rehabilitation plans in areas of high concentration of *mineral aggregate operations* ; b. The disturbed area of a site will be rehabilitated to a state of equal or greater *ecological value* , and for the entire site, long-term ecological integrity will be maintained or restored, and to the extent possible, improved; c. If there are *key natural heritage features* or *key hydrologic features* on the site, or if such features existed on the site at the time of application: i. The health, diversity and size of these *key natural heritage features* and *key hydrologic features* will be maintained or restored and, to the extent possible, improved to promote a net gain of ecological health; and ii. Any permitted extraction of mineral aggregates that occurs in a feature will be completed, and the area will be rehabilitated, as early as possible in the life of the operation. d. Aquatic areas remaining after extraction are to be rehabilitated to aquatic enhancement, which shall be representative of the natural ecosystem in that particular setting or ecodistrict, and the combined terrestrial and aquatic rehabilitation shall meet the intent of 4.3.2.5 (c).	From the surficial soils perspective, part (b) is of significance. Soil characteristics are part of the ecology of the area and none of the documents reviewed described how the site soils would have an equal or greater ecological value post-rehabilitation.

Act or Policy	Legislative and/or Policy Component Considered relative to Agriculture	Discussion/Interpretation
	e. Outside the Natural Heritage System, and except as provided in 4.3.2.5 (b), (c) and (d), final rehabilitation will appropriately reflect the long-term land use of the general area, taking into account applicable policies of this Plan and, to the extent permitted under this Plan, existing municipal and provincial policies.	
The Provincial Policy Statement (2005)		
	PPS 2.5.3.1 Progressive and final rehabilitation shall be required to accommodate subsequent land uses, to promote land-use compatibility, and to recognize the interim nature of extraction. Final rehabilitation shall take surrounding land use and approved land-use designations into consideration.	This section of the PPS can be interpreted to mean that rehabilitation must be reflection of the countryside designation within the Greenbelt Plan.

The Aggregate Resources Act		
	12. (1) In considering whether a licence should be issued or refused, the Minister or the Board, as the case may be, shall have regard to, (a) the effect of the operation of the pit or quarry on the environment; (b) the effect of the operation of the pit or quarry on nearby communities; (c) any comments provided by a municipality in which the site is located; (d) the suitability of the progressive rehabilitation and final rehabilitation plans for the site; (e) any possible effects on ground and surface water resources; (f) any possible effects of the operation of the pit or quarry on agricultural resources; (g) any planning and land use considerations; (h) the main haulage routes and proposed truck traffic to and from the site; (i) the quality and quantity of the aggregate on the site; (j) the applicant's history of compliance with this Act and the regulations, if a licence or permit has previously been issued to the applicant under this Act or a predecessor of this Act; and (k) such other matters as are considered appropriate. R.S.O. 1990, c. A.8, s. 12; 1996, c. 30, s. 9 (1, 2); 2002, c. 17, Sched. F, Table.	From a surficial soils perspective, parts (a) and (d) are of most significance. However, all parts of this section of the ARA need to be addressed within the surficial soils report.
Aggregate Resources Act Standards Category 2		
	1.2 Operations 1.2.2 details of how the stripping and stockpiling of the topsoil and overburden will be dealt with; 1.2.19 details on how berms will be vegetated and maintained;	Specific information about the berms shown in the operational design and the storage location of topsoil (A horizon), B horizon and C horizon (parent materials) is not clear within the surficial soils report. There are no discussions about the kinds of equipment that will be used and their projected effects on soils (particularly

	1.2.20 the general types of equipment that will normally be used on site; 1.2.28 any recommendations and/or monitoring program(s) identified in the technical reports.	soil compaction and/or soil mixing).
	1.3 Progressive Rehabilitation 1.3.2 details on how the overburden and topsoil will be used to facilitate progressive rehabilitation; 1.3.3 the location, design and type of vegetation (e.g. grasses, legumes, shrubs and trees, etc.) that will be established on the site during progressive rehabilitation; 1.3.4 how the slopes will be established on the excavation faces and the quarry floor; 1.3.5 details on how progressive rehabilitation will be conducted in relation to the operational sequences; and 1.3.6 if proposed, details on the importation of topsoil or inert material to facilitate rehabilitation of the site.	Again, the specifics for all parts of progressive rehabilitation are not clear. The Long planning report makes reference to the use of inert fill. Information on the texture, density and structure of the fill and the effect of those characteristics on field saturated hydraulic conductivity, for example, are not discussed.
	1.4 Final Rehabilitation 1.4.1 if proposed, details on the importation of topsoil or inert material to facilitate rehabilitation of the site; 1.4.2 how the final slopes will be established on all excavation faces and the quarry floor; 1.4.3 the location, design and type of vegetation (e.g. grasses, legumes, shrubs, and trees, etc.) that will be established on the site during final rehabilitation; 1.4.4 any building(s) or structure(s) to remain on the site; 1.4.5 anticipated elevation of the groundwater table; 1.4.6 any internal haul roads that will remain on the site;	As stated previously, details are lacking with respect to importation of soil materials. The desirability of the proposed grasses and legumes has not been described within the surficial soils report. Additionally, there is no discussion about depth to free water within surficial soils as opposed to ground water table elevation - existing conditions, operational conditions and post-rehabilitation conditions.

	1.4.7 final surface water drainage and drainage facilities on the site; 1.4.8 the final elevations of the rehabilitated areas of the site illustrated by a one or two meter contour interval, expressed as metres above mean sea level, and; 1.4.9 location of cross-section(s). **1.5 Cross-Sections** 1.5.1 one or more cross-sections of existing conditions, rehabilitation and the anticipated final elevation of the groundwater table, within the licensed boundary; 1.5.2 the final slope gradients that will be established 1.5.3 the cross-section of a typical berm design that will be constructed on the site	
	2.1 Summary Statement A summary statement accompanying an application for a licence must be signed by the author and provide information on the following: 2.1.1 any planning and land use considerations; 2.1.2 the agricultural classification of the proposed site, using the Canada Land Inventory classes. For the land being returned to agriculture, the proposed rehabilitation techniques must be identified.	The summary statement requirements specify the need for an analysis of planning policy - the detail of which is lacking in the surficial soils report. The addendum report does described Canada Land Inventory soil capability class for uses other than agriculture.
	3.0 Prescribed Conditions that Apply to Category 2 Licences **The licence is subject to the following conditions:** 3.1 Dust will be mitigated on site. 3.2 Water or another provincially approved dust suppressant will be applied to internal haul roads and processing areas as often as required to mitigate dust. 3.3 Processing equipment will be equipped with dust suppressing or collection devices, where the equipment creates dust and is being	There are no discussions about the effects of dust on surficial soils. There are no discussions about soil rehabilitation on internal haul roads and processing areas.

	operated within 300 metres of a sensitive receptor. 3.4 Any recommendations and/or recommended monitoring program identified in the technical reports will be described on the site plan and all records will be retained by the licensee and made available upon request by the Ministry of Natural Resources for audit purposes.	
	5 .0 Operational Standards that Apply to Licences 5.4 topsoil must be stripped sequentially prior to aggregate extraction; 5.6 all topsoil or overburden that is stripped during the operation of the site will be stored separately with vegetated stable slopes; 5.16 removal of topsoil from the site shall not occur; 5.17 all topsoil or overburden stripped in the operation of the site is used in the rehabilitation of the site; 5.18 adequate vegetation is established and maintained to control erosion of any topsoil or overburden replaced on the site for rehabilitation purposes; 5.21 rehabilitation of the site shall ensure that: 5.21.1 adequate drainage and vegetation of the site is provided; and 5.21.2 any compaction of the site is alleviated;	Most of these components have been addressed generally within the surficial soils report. The clay soils found on the site have the potential, under wet or moist conditions, to lose their structure (where structure refers to the aggregation of soil particles into distinct forms such as blocky or granular). If structure is lost then the soil is described as massive and soil water relationships are change significantly. The soil water change subsequently affects the health and cover of vegetation.

Issues

- No baseline soils chemical and physical characteristics.
- No reference the literature indicating the probability of the maintenance of soil ecological value and ecological function.
- Few links amongst information provided by different disciplines.
- Lack of detail - for example, vehicle load relative to soil bearing capacity, use of geotextiles to improve soil bearing capacity, specific vehicle traffic patterns for the removal of topsoil and subsoil and the placement of the soils in berms, no reference to the literature to help ascertain the probable level of soil compaction and the relative success in alleviating compaction, no current versus post-rehabilitation soil capability/potential discussion.