Objective
The purpose of this report is to document the methodology that was used to update and refine the identification of High Potential Mineral Aggregate Resources Areas (HPMARA) mapping on Schedule C to the Regional Official Plan. The update to HPMARA mapping implements the recommendations of the North West Brampton Shale Resources Policy Review. The refinement undertaken is consistent with Regional Council direction regarding the North West Brampton Shale Resources Policy Review, Regional Official Plan policies for the identification of mineral aggregate resources and the Provincial Aggregates Resources Constraint Model for mapping of mineral aggregate resource areas described in the Ministry of Natural Resources and Forestry’s Non-Renewable Resources Training Manual (1997, Version 1.1.). The proposed mapping refinements have been incorporated into the proposed schedule attached to the draft Regional Official Plan Amendment.

Background
The Regional Official Plan identifies HPMARA on Schedule C, in accordance with policy 2.5.1 of the Provincial Policy Statement, 2014. The Regional HPMARA represents the lands which contain primary and secondary sand and gravel resource areas and selected bedrock resource areas that are not constrained by provincial or municipal policies which prohibit aggregate resources extraction.

The existing HPMARA on Schedule C was created in 2001. At that time, the mapping of HPMARA was refined to exclude resource areas where mineral aggregate extraction was prohibited by the Region of Peel Official Plan. The HPMARA mapping was refined based on constraints criteria listed in policy 3.3.2.3 of the Regional Official Plan (areas where extraction is prohibited).

The criteria that were used to create the HPMARA identification in North West Brampton were updated through Regional Official Plan Amendment 21B in 2014 to reflect provisions in the Greenbelt Plan that prohibit new or expanding mineral aggregate extraction in significant natural heritage features. In 2009, aggregate resources mapping, including mapping of shale bedrock resources in North West Brampton, was updated by the Ontario Geological Survey in the Aggregate Resources Inventory for the Region of Peel (ARIP 165 – Revised). As a result of the updated Official Plan policy and bedrock mapping, it is recommended that the identification of HPMARA on Schedule C in North West Brampton where HPMARA is being retained within the Greenbelt be amended to reflect these changes. The proposed amendment reflects changes to:

1. Provincial mapping of mineral aggregate bedrock resources (base map)
2. Regional mapping of the Core Areas of the Greenland System (constraints)
3. Areas of registered plans of subdivisions and/or settlement (constraints)

The methodology used to produce the amended Schedule C is provided below.
Amendment Methodology

Step 1: Identify the Existing North West Brampton HPMARA (2001) Base Data Layers

The base Geographic Information System (GIS) layer that was used to produce the original North West Brampton HPMARA (2001) is composed of a bedrock resources data set as provided by the Ministry of Northern Development and Mines (MNDM). The 2001 North West Brampton HPMARA excludes those areas which fall within the Core Areas of the Greenlands System, Escarpment Protection Areas (Niagara Escarpment Plan), registered plans of subdivision, and/or settlement areas as these were identified in 2001.

Step 2: Identify the Updated Provincial Mapping (base map)

In 2009, the Ontario Geologic Survey (OGS) released new bedrock resources mapping data in an update to the Aggregate Resources Inventory Paper (ARIP) for Peel Region referenced as ARIP 165 – Revised. The bedrock mapping data provided in the Provincial ARIP reports prepared by the OGS are available for download in a GIS data compilation referenced as The Aggregate Resources of Ontario (ARO). The OGS updates and releases Aggregate Resources of Ontario data compilations annually. The ARO – 2018 data was obtained and used as the basis for updating HPMARA mapping in North West Brampton as it provides the most recent aggregate resources mapping data for Peel.

The mapping of the areal extent of bedrock formations contained in the ARIP/ARO data, and that is considered potentially available for extraction, is determined from bedrock geology maps, overburden drift thickness and bedrock topography maps, and from the interpretation of water well records, oil and gas well data and geotechnical test hole data. Areas where bedrock resources may be accessible are delineated based on depth of overburden (drift thickness). Areas where bedrock outcrops or is within 1 m of the ground surface are considered potential resource areas because of their easy access. Resource areas are also considered accessible where drift thickness is up to 8 m. Bedrock areas overlain by 8 to 15 m of overburden may provide resources which have extractive value only in specific circumstances. Outside of these delineated areas (<1m, 1m to 8m and 8m to 15m), the bedrock is assumed to be covered by more than 15 m of overburden, a depth generally considered to be too great to allow economic extraction unless part of the overburden is composed of economically attractive deposits (OGS ARIP 165 REV, 2009).

The North West Brampton Shale Policy Background Study reviewed the OGS ARIP reports and opinions obtained from the shale brick industry and concluded that bedrock areas having an overburden depth less than 8 m was preferred by the industry and have the greatest potential for shale extraction. For the purposes of refining the identification of HPMARA in the Greenbelt portion of Northwest Brampton, areas of bedrock overlain by drift thickness up to 8 m in depth were selected from the GIS data to identify areas with the greatest potential for extraction.
Step 3: Identify Policy Constraints for Aggregates Extraction

A constraints analysis was then completed in order to identify areas that are not available for future extraction based on current provincial and municipal policies. The following provincial and Regional Official Plan policies, which are applicable in North West Brampton, identify features or areas where aggregates extraction is not permitted:

a) Greenbelt Plan s.4.3.2(3)(a)

1. No new mineral aggregate operation and no new wayside pits and quarries, or any ancillary or accessory use thereto, shall be permitted in the following key natural heritage features and key hydrologic features:
   i. Significant wetlands;
   ii. Habitat of endangered species and threatened species; and
   iii. Significant woodlands, unless the woodland is occupied by young plantation or early successional habitat (as defined by the Ministry of Natural Resources and Forestry). In this case, the application must demonstrate that sections 4.3.2.6 (b), (c) and 4.3.2.7 (c) have been addressed and that they will be met by the operation;

b) Region of Peel Official Plan s.3.3.2.3

Prohibit new or expanded mineral aggregate extraction sites and wayside pits and quarries or any ancillary or accessory uses thereto, in the following areas:

a) the Core Areas of the Greenlands System;
b) the Escarpment Protection Area of the Niagara Escarpment Plan;
c) the Natural Core Areas as designated within the Oak Ridges Moraine Conservation Plan Area;
d) Key natural heritage features and hydrologically sensitive features and the associated minimum vegetation protection zone, as defined by the Oak Ridges Moraine Conservation Plan, within the Oak Ridges Moraine Conservation Plan Area, except as permitted by the Oak Ridges Moraine Conservation Plan; and
e) Significant woodlands within the Greenbelt Natural Heritage System unless the woodland is occupied by early successional habitat or young plantation. The prohibition within significant woodlands within the Greenbelt Natural Heritage System applies only to new mineral aggregate extraction sites and wayside pits and quarries and their ancillary or accessory uses.
f) Approved settlement areas as designated in area municipal official plans in the Rural System, and registered plans of subdivision, unless permitted by the area municipality pursuant to Policy 3.3.2.2.

GIS data sets for the above features and areas were obtained based on best available current information. It should be noted that according to Regional Official Plan policy 2.3.2.3 for the purpose of defining the Core Areas of the Greenlands System for mineral aggregate resource extraction uses within the Rural System, the Core Areas only include core woodlands that are a minimum of 30 hectares in size and exclude as core valley and stream corridors all valley and
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NORTH WEST BRAMPTON SHALE RESOURCES POLICY REVIEW REGIONAL OFFICIAL PLAN AMENDMENT – RECOMMENDATION FOR COUNCIL ADOPTION (ROPA - 32)

stream corridors that have a drainage area of less than 125 hectares.

Step 4: Refinement of the HPMARA Mapping

Further refinement of the HPMARA was undertaken to address fragmentation of small parcels which are the result of the constraints analysis and residential clusters. The refinement criteria is based on the “Criteria for Refinement of Fragmented Caledon HPMARA Lands” as documented in the *Caledon Community Resources Study, 1999* (CCR 1999). The CCR 1999 was prepared to develop a model for the management of aggregate resources in the Town of Caledon and was used to delineate and refine the Regional HPMARA aggregate resources mapping in the Town of Caledon Plan.

The criteria for determining fragmented HPMARA lands, which would be subsequently removed, that would be applicable within North West Brampton include:

1. The area is too small in size to be economically viable for licensing as a pit or quarry. These parcels are generally considered 10 hectares or less in size.
2. Irregular or long narrow shape which is impractical to extract properly because of required setbacks, sloping, buffers, etc., of a normal licensed operation.
3. Area is Isolated from other aggregate resources areas or along (or straddling) a roadway.

The CCR 1999 also identified residential clusters as an exclusion based on the principle of minimizing both existing and future land use conflicts and providing a balance between aggregate resources extraction and rural non-farm residential uses. The HPMARA refinement in North West Brampton applied this principle and defined residential clusters to be two or more small developed non-farm residential lots within proximity to each other. Residential clusters meeting this definition were considered unavailable for resource extraction.

As a refinement to the HPMARA mapping, the Bovaird Road road allowance was removed as extraction within the road allowance is unlikely.

Step 5: Update the North West Brampton HPMARA

The proposed amended Schedule C to the Official Plan was produced by:

- Starting with the 2001 North West Brampton HPMARA data layer as a base layer (Step 1).
- Adding areas of newly identified provincially significant bedrock which was updated by MNDM in 2009, which updated provincial mapping from the 2001 data layer (Step 2).
- Removing the areas of bedrock which are no longer identified as provincially significant bedrock by MNDM in 2009 using updated provincial mapping data from the ARO 2018 data set and the recommended 8 m overburden thickness criteria to identify resource areas that have the greatest potential for shale extraction (Step 2).
• Removing areas which are identified in the Greenbelt Plan or the Regional Official Plan as not permitting aggregate extraction to occur (Step 3 policy constraints).
• Removing properties developed with rural residential clusters and fragmented small areas of isolated resources which meet the refinement criteria (Step 4 final refinements).

Mapped illustration of the additions and deletions to HPMARA in North West Brampton are attached.
Map of Features and Areas where Aggregate Extraction is not Permitted, including Prohibited Features and Areas (Regional Official Plan Policy 3.3.2.3)

May, 2019

Legend
- High Potential Mineral Aggregate Resource Area to be Added
- High Potential Mineral Aggregate Resource Area to be Deleted
- Fragmented High Potential Mineral Aggregate Resource Area to be Deleted
- Existing High Potential Mineral Aggregate Resource Area
- Rural Lot Severances
- Significant Woodlands ≥ 4 ha in the Greenbelt
- Provincial Greenbelt Plan Boundary
- Core Areas of the Greenland System
- Regional Urban Boundary

This Schedule forms part of the Region of Peel Official Plan and should be read in conjunction with the Plan’s written text and with the area municipal official plans. Information outside of Peel Region is shown on this Schedule for illustrative purposes to display inter-regional linkages. Contains information licensed under the Open Government License - Ontario.

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