

## **Unit 1G- Stage 4: Excavation**

### **Overview of Stage 4 Options for Mitigation of Development Impacts**

The objective of Stage 4 is to address development impacts on an archaeological site with cultural heritage value or interest. This unit outlines requirements for shaded section:

<b>Protection and Avoidance</b>	
<ul style="list-style-type: none"> <li>• The use of physical, legal, planning and administrative tools to protect the archaeological site and avoid it during development, with the objective of preserving it intact.</li> <li>• If the archaeological site remains unaltered, no additional fieldwork is required. Archaeological concerns have been addressed and development may proceed.</li> <li>• This is the preferred option for archaeological sites with cultural heritage value or interest.</li> </ul>	
<b>Strategy</b>	<b>Options</b>
Project redesign	<ul style="list-style-type: none"> <li>• Exclusion of the protected area</li> <li>• Incorporation of the protected area</li> </ul>
Reduction of impacts	<ul style="list-style-type: none"> <li>• Frozen ground access</li> <li>• Partial protection and avoidance</li> <li>• Protection of sealed deposits</li> <li>• Temporary protection and avoidance</li> </ul>
Use of legal, planning and administrative tools for long-term protection	<ul style="list-style-type: none"> <li>• Designation</li> <li>• Zoning bylaw</li> <li>• Condition on title</li> <li>• Easement</li> <li>• Transfer of Ownership</li> </ul>
<b>Excavation</b>	
<ul style="list-style-type: none"> <li>• Controlled removal and recording of archaeological site context, cultural features and artifacts, to document the site’s cultural heritage value or interest and preserve its information for future study</li> <li>• When the archaeological site no longer exists in the ground, archaeological concerns have been addressed and development may proceed.</li> </ul>	
<b>Construction Monitoring</b>	
<ul style="list-style-type: none"> <li>• Monitoring development activities to document sealed or deeply buried archaeological resources or to ensure avoidance of protected areas.</li> </ul>	

For unshaded sections, see *Standards and Guidelines for Archaeological Fieldwork: Stage 4: Protection and Avoidance* and *Standards and Guidelines for Archaeological Fieldwork: Stage 4: Construction Monitoring*.

## **Stage 4 – Excavation**

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Preserving an archaeological site with cultural heritage value or interest intact for future generations is always the preferred option. Excavation converts the archaeological site into data (excavation records, artifacts) resulting in loss of contextual information. It should only be done if protection and avoidance are not possible.

While it may not be necessary to excavate the whole archaeological site, excavation strategies must focus on recovering as much data as possible rather than sampling the site, to fully document the site's cultural heritage value or interest and ensure the conservation, protection and preservation of the heritage of Ontario.

### **Objectives**

- To document the archaeological site context, cultural features and artifacts in all portions of the archaeological site
- To document the removal of the archaeological site
- To preserve the archaeological site's information for future study.

### **Excavation of Archaeological Sites**

#### **Standards**

1. Before conducting fieldwork, review all relevant reports of previous fieldwork on the archaeological site or property.
2. Conduct excavation when weather and lighting conditions permit identification of subsurface cultural features and safe recovery of artifacts. Do not conduct excavation when weather and lighting conditions reduce the chance of recovering data or cause damage to artifacts (e.g. snow cover, frozen ground, conditions of excessive rain or drought, heavy fog).
3. Establish a permanent datum that can be directly tied to a development map and record its coordinates using the Global Positioning System (GPS) according to the requirements set out in *Standards and Guidelines for Archaeological Fieldwork: Using the Global Positioning System (GPS)*.
4. If Stage 3 and 4 are combined, conduct a controlled surface pick-up and surface mapping before excavation. See *Standards and Guidelines for Archaeological Fieldwork: Stage 2* for details.
5. Establish a grid across the site based on the datum to determine placement of test units and for recording cultural features and artifact

- locations. The grid must be mapped using transit and tape measurements. Unmeasured estimated grids are not acceptable.
6. Excavate by systematic levels (stratigraphic or standardized).
  7. Excavate all cultural features by hand (by shovel or by trowel).
  8. Unless otherwise noted in the following site-specific standards and guidelines, retain all artifacts and other archaeological resources for review in the lab. After lab review, any discards must comply with *Standards and Guidelines for Artifact Documentation and Analysis*.
  9. If fieldwork uncovers human remains, cease fieldwork and report the discovery to the appropriate authorities. See *The Discovery of Human Remains – Best Practices* for details.
  10. Document all cultural features, including recording plans and profiles, by photographs and drawings. All documentation must include scales and north orientation.
  11. When the archaeological site is only partially excavated and the remainder left intact through incorporation strategies, any exposed faces must be recorded, shored up to avoid collapse and then backfilled.
  12. Document all fieldwork in detail, including:
    - Field notes, maps and photographic records of all field methods, archaeological findings, and unusual or difficult situations encountered in the field
    - Description of field conditions or unusual physical features affecting fieldwork strategy decisions or identification of artifacts or cultural features (e.g. heavy and wet soils, dense root mats, boulders, rubble).
    - Logs of photographic documentation, maps and graphics.

### **Excavation by Hand**

All archaeological sites with cultural heritage value or interest, whether single- or multi-component, must be excavated completely or partially by hand. Hand excavation recovers more data than mechanical topsoil removal. It is the preferred technique to document an archaeological site's range of material and formation processes.

The following are general standards for all archaeological sites excavated by hand. Additional standards and guidelines for specific types of archaeological sites begin on page **x**.

#### **Standards**

1. Remove plough zone or topsoil by hand and screen soil.

2. Excavate in one square metre units.
3. Excavation of the core of the site must include:
  - the main concentration of artifacts in the surface scatter
  - the concentration of positive test pits
  - the area around all high-yielding Stage 3 test units.
4. Screen soil through mesh no greater than six millimetres, except:
  - for confirmed single component Paleo-Indian and Early Archaic archaeological sites, screen soil through mesh no greater than three millimetres (at least 20% of all units in sandy soil, 10% of all units in heavy soil)
  - very heavy soils may be water screened.
5. Excavate into the first five centimetres of subsoil, unless excavation uncovers a cultural feature.
6. Clean all exposed subsoil surfaces by shovel (“shovel shine”) or trowel to aid in identifying any subsurface cultural features.
7. Document *invisible* or *ghost* features through horizontal and vertical mapping of artifact concentrations extending into the subsoil.
8. Extend excavation, regardless of yield, two metres (i.e. two excavation units) beyond any cultural features uncovered.
9. Excavate cultural features only after they have been completely exposed (i.e. not in sections corresponding to each unit excavation).
10. If there is potential for or documentation of cultural features outside the core of the archaeological site, follow up hand excavations with mechanical topsoil removal in those areas.

***Invisible or Ghost Features***

These cultural features were originally pits. Because of their age, any organic material that would have made the soil darker has leached away, leaving pit contents sitting in what appears to be unaltered subsoil.

**Excavation by Mechanical Topsoil Removal (Topsoil Stripping)**

The preferred method for removal of topsoil is hand excavation. Topsoil stripping destroys any evidence of later site formation processes, and leaves behind displaced artifacts. The rationale for using it is that the loss of fragmentary information in the topsoil layer and left behind after excavations are complete is offset by the careful documentation of intact archaeological resources below.

Due to the greater risk mechanical topsoil removal poses to the preservation of archaeological resources, it must be used with caution as an excavation technique, and only where indicated as appropriate in these standards and guidelines.

The following are general standards for all archaeological sites excavated using mechanical topsoil removal. Additional standards and guidelines for specific types of archaeological sites begin on page **x**.

### **Standards**

1. Mechanical topsoil removal may be considered in addition to hand excavation if the archaeological site meets all of these conditions:
  - the archaeological site has been subjected to agricultural ploughing for many years
  - the archaeological site has only one cultural stratum below topsoil
  - the archaeological site extent is large
  - the cultural affiliation of the archaeological site (Woodland or later) gives a reasonable expectation that extensive sub-surface cultural features and settlement data may be present
  - Stages 2 and 3 assessments have documented a representative sample of ploughzone artifacts and their distribution.
2. Mechanical topsoil removal must stop above the topsoil/subsoil interface with minimal subsoil intrusions. Never use mechanical removal below the topsoil level. If soil conditions do not allow mechanical topsoil removal without intruding into subsoil (e.g. very wet or dry soil conditions) delay mechanical topsoil removal until conditions are appropriate or remove topsoil by hand.
3. Reduce the extent of mechanical topsoil removal and increase hand excavation by shovel if it appears that mechanical topsoil removal may affect the integrity of cultural features or the recovery of surface artifacts. Indications of this include:
  - the archaeological site seems to reveal few or no cultural features (e.g. in deeply plough-disturbed areas or as a result of site occupation activities)
  - cultural features expected to contain artifacts do not appear to contain many or any (e.g. artifact-rich midden deposits in village sites, cultural features in most Western Basin Late Woodland sites in south-western Ontario).
4. Do not expose more than 25% of the archaeological site or more than can be excavated in 10 days (whichever is less) at any one time. If there is a pause in excavation, cover all unexcavated areas with tarpaulins and straw or soil.

5. To avoid damage to the underlying archaeological site, use heavy machinery that pulls soil away (e.g. excavator, backhoe with flat edged bucket, grader with extendable arm). Machinery that pushes soil (e.g. bulldozer, belly scraper) is not an acceptable alternative, as it causes increased damage by travelling directly over the newly exposed archaeological resources.
6. Clean all exposed subsoil surfaces by shovel (“shovel shine”) or trowel following mechanical topsoil removal.

## **Site-specific Standards and Guidelines**

### **Woodland Archaeological Sites**

When these archaeological sites are found in plough-disturbed settings, it is usually possible to use a combination of hand excavation and mechanical topsoil removal:

#### **Standards**

1. Hand excavate the following:
  - plough zone over middens identified in Stage 3, in one square metre units
  - a sample of plough zone in areas away from middens, if this was not conducted during Stage 3.
  - cultural layers and paleosols by strata/units.
2. The remainder of the archaeological site may be excavated using mechanical topsoil removal.
3. Record and map all settlement pattern data using the grid established in Stage 3, according to accepted practice (any combination of triangulation, square plans, total station).
4. Retain all artifacts and record by cultural feature (excavated half or quadrant and internal strata) or by grid unit context if not recovered from a cultural feature.
5. Excavate intact midden deposits and complex stratified features (e.g. semi-subterranean sweat lodge) by strata/lens, and retain artifacts according to strata. Record multiple continuous profiles across these features (minimally along maximum length and width).
6. Section and record the depth and angle of a minimum of 10-20% of post moulds per defined structure (e.g. house wall, palisade).

#### **Guidelines**

1. In contact-era Woodland village archaeological sites, very small diagnostic trade goods such as trade beads may be recovered by hand

excavating plough zone and screening soil through three millimetre mesh.

2. Based on professional judgement, the amount of the archaeological site excavated by hand may be increased as needed to recover data documenting site formation processes and intra-site variability. Increased hand excavations may focus on:
  - house walls
  - non-habitation structures
  - palisade wall sections
  - open plazas
  - other areas identified as having a distinct function.
3. Based on professional judgement, Stage 3 findings and Stage 4 excavations, hand excavate a five metre wide strip of 1x1 metre units across the centre and the ends of identified longhouses, beginning the strip one metre outside the house wall, excavating through the house, and ending one metre outside the other side (see diagram).
4. Based on professional judgement, the following categories of artifacts may be counted and discarded in the field instead of retained for counting and discarding in the lab:
  - fire-cracked rock
  - undecorated ceramic micro-sherds (smaller than 2 centimetres diameter) with one or both surfaces missing.

Record these categories following *Standards and Guidelines for Artifact Documentation and Analysis*.

## **Large Lithic Scatters**

### **Standards**

1. When the archaeological site extent is over 2500 square metres, centre excavations at individual foci or artifact concentrations across the site, either:
  - where Stage 3 assessment documented the highest concentrations of artifacts **or**
  - where Stage 3 assessment showed separate components or activity areas **or**
  - at locations otherwise identified during excavation as warranting block excavation.
2. Excavate units between these block excavation areas either by evenly spaced placement of individual units or by a continuous row of units.

Expand excavations in these areas when yield increases or when artifact distribution patterns reveal individual activity or site formation processes or individual cultural features.

### **Large Lithic Quarry Archaeological Sites**

#### **Standards**

1. Conduct detailed controlled surface pickup to augment Stage 3 CSP.
2. Concentrate full excavation on those mapped areas exhibiting reduction sequences, associated living patterns or chronological events on the site.
3. Excavate locations of primary quarrying activities to record the active quarry face of the deposit.
4. Retain all lithic debris from areas of single component habitation or specific reduction sequence activities for counting and discarding in the lab.

#### **Guidelines**

1. Based on professional judgement, lithic debris from all other areas may be counted and discarded in the field.

### **Nineteenth Century Domestic Archaeological Sites**

When these archaeological sites are found in plough-disturbed settings, it is usually possible to use a combination of hand excavation and mechanical topsoil removal.

#### **Standards**

1. For archaeological sites that mostly pre-date 1830, hand excavate plough zone in the core of the surface scatter and where Stage 3 unit yields are highest.
2. For archaeological sites that mostly post-date 1830, hand excavate all midden areas followed by mechanical topsoil removal on the remainder of the archaeological site. Clean the exposed subsoil surface by shovel (“shovel shine”) or trowel.
3. For large cellar features, hand excavate at least two opposing quadrants (e.g. northeast and southwest quadrants) and record all exposed profiles.
4. Excavate large and complex structural features following the requirements for complex stratified sites (page **x**).
5. Document architectural or structural remains (e.g. foundation footings, stone-lined wells, brick or stone paths or patios) with scale drawings and photographs. Where excavation requires the removal of

architectural or structural remains, map and draw them and hand excavate any intact cultural layers beneath.

### **Guidelines**

1. Where appropriate, conduct full excavation of cellar features (i.e. four quadrants). Heavy post-use fill above living strata in cellar depressions may be removed mechanically.
2. For deep stone-lined wells, excavation and documentation may be limited for health and safety reasons to:
  - exposing and mapping the surface
  - excavating one side, removing the well wall and any rubble or fill to a maximum depth of 2 metres, to document construction details.
3. Based on professional judgement, the following categories of artifacts may be counted and discarded in the field instead of retained for counting and discarding in the lab:
  - structural and building artifacts (bricks, plaster, and mortar only).

Record these categories following *Standards and Guidelines for Artifact Documentation and Analysis*.

### **Deeply Buried Archaeological Sites and Complex Stratified Archaeological Sites**

These types of archaeological sites are found in urban and brownfield settings and under silt deposits in river flats. Their sealed nature means additional contextual information may be preserved, requiring specialized methods to recover it.

### **Standards**

1. Excavate by hand all natural strata or deposition episodes.
2. Once basic site stratigraphy has been confirmed and documented, mechanical topsoil removal may be used to remove overburden to a depth of five centimetres above archaeological resources.
3. Use established recording methods designed for complex site documentation (e.g. Harris matrix or Parks Canada methods).
4. Record strata profiles for all exposed faces of the site deposit, including orientation (i.e. north/south/east/west), horizontal and vertical scales.
5. Record cultural features encountered in strata profiles and record recovered material to feature context.
6. In very deeply buried archaeological sites, ensure that conditions meet health and safety regulations and Construction Safety Association

standards, including clothing, protection from potential landfill toxins and contaminants, working around heavy machinery, access and width-depth ratios for trenches.

### **Guidelines**

1. Excavation units may vary from the standard 1 square metre as determined appropriate to site and context (e.g. 2 x 2 metres, 6 x 10 metres).
2. For nineteenth and twentieth century archaeological sites, take soil samples only when determined appropriate.
3. As appropriate, consult with geomorphologists and soil experts when developing excavation strategies.

## **Undisturbed Aboriginal Archaeological Sites**

### **Standards**

Due to their rarity, every effort should be made to protect and avoid these archaeological sites, and the decision to excavate must be considered with care. If these sites must be excavated:

1. Excavate by hand and shovel only, in 1 square metre units. Do not use heavy machinery.
2. Excavate in standardized levels (five or 10 centimetres) when removing homogeneous strata until natural or cultural strata are evident, and then excavate by those strata.
3. Excavate into subsoil at least 10 centimetres below subsoil interface.
4. As cultural features and post moulds are not always clearly evident in undisturbed archaeological sites, for areas where post moulds and features are expected but are not evident, conduct vertical profiling of subsoil. Excavate by shovel through subsoil by vertical thin sections of no more than 5 centimetres to a depth of 10-15 centimetres below the unit floor.
5. Piece-plot the horizontal and vertical locations of all diagnostic artifacts and formal tools, and artifact patterns associated with activity areas, house or living floors or artifact concentrations.

### **Guidelines**

1. As appropriate, consult with geomorphologists and soil experts when developing excavation strategies.

## **Rare Archaeological Sites**

### **Standards**

Protection is the preferred option for archaeological sites in unusual locations (e.g. wet, waterlogged or cobble beach soil conditions) or having unusual characteristics for the area (e.g. earthworked sites). If these sites must be excavated:

1. Consult experts in such sites and review current methodologies when developing excavation strategies.
2. The excavation strategy must be consistent with the unusual and sensitive characteristics of the particular site and the expectations set out in the professional literature.

### **Guidelines**

1. As appropriate, consult with geomorphologists and soil experts when developing excavation strategies.

## **Determining Where to End Excavations**

Unit yield is a measurable indicator of the outer extent of an archaeological site excavation, but it must be used in conjunction with knowledge and interpretation of site use patterns. The area occupied by the archaeological site's inhabitants encompasses more than areas of waste disposal or functional activities such as tool manufacture. Interpretation of the archaeological site must also account for areas of low artifact counts such as sleeping areas.

The following chart provides unit yield and other indicators as a guide determine when the archaeological site can be considered fully documented and excavation complete.

**Determining Where to End Excavations**

<b>Mechanical Topsoil Removal</b>		
<b>Type of archaeological site</b>	<b>Unit yield indicators of extent of site</b>	<b>Other indicators</b>
<ul style="list-style-type: none"> <li>• Large Woodland and post-contact sites</li> <li>• Domestic sites post-dating 1830</li> </ul>	Not applicable	All cultural features are uncovered and excavated. Excavation must extend a minimum of 10 metres beyond uncovered cultural features.
<b>Excavation by Hand</b>		
<b>Type of archaeological site</b>	<b>Unit yield indicators of extent of site</b>	<b>Other indicators</b>
<ul style="list-style-type: none"> <li>• Small pre- and post- contact sites</li> <li>• Domestic sites pre-dating 1830</li> </ul>	Units at the edge of the excavation yield fewer than 10-15 artifacts, unless they include at least two of <ul style="list-style-type: none"> <li>• formal tools or diagnostic artifacts</li> <li>• fire cracked rock, bone or burnt artifacts.</li> </ul>	Testing of site periphery indicates no further high artifact yielding units in a five-metre buffer beyond the limit of block excavation.  Excavations must extend a minimum of 2 metres beyond uncovered cultural features.
<ul style="list-style-type: none"> <li>• Sites located in a region where lithic scatters are typically low-yielding (e.g. north or east of the Niagara Escarpment)</li> <li>• Paleo-Indian and Early Archaic Sites</li> <li>• Undisturbed sites</li> </ul>	Units at the edge of the excavation yield fewer than 5-10 artifacts, unless they include at least two of <ul style="list-style-type: none"> <li>• formal tools or diagnostic artifacts</li> <li>• fire cracked rock, bone or burnt artifacts.</li> </ul>	Testing of site periphery indicates no further high artifact yielding units in a 10-metre buffer beyond the limit of block excavation.  Excavations must extend a minimum of 2 metres beyond uncovered cultural features.
<ul style="list-style-type: none"> <li>• Large, dense lithic scatters where yields per unit extend well over 100 artifacts.</li> </ul>	Unit yield drops to 10% of core yields (determined by averaging the 10 highest yield units in the core of the site). <ul style="list-style-type: none"> <li>• For example, if the core yield is 200</li> </ul>	All centres of high artifact concentration have been excavated.  Areas of low concentration between these areas have been confirmed as containing

**Standards and Guidelines for Consultant Archaeologists final draft  
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	artifacts per unit, excavation can stop where units yield 20 artifacts per unit).	lower yields, and are not discrete component, habitation or activity areas.
<ul style="list-style-type: none"> <li>Lithic quarry sites</li> </ul>	Not applicable	All discrete areas of possible reduction sequences, habitation or temporally discrete events have been fully excavated and documented.
<ul style="list-style-type: none"> <li>Deeply buried sites</li> <li>Complex stratified sites</li> </ul>	Not applicable given stratified nature of site	<p>All strata with cultural heritage value or interest have been fully documented and excavated.</p> <p>Limits of area of development impacts have been documented and excavated (i.e. do not excavate strata beyond this area).</p>

## Collecting Soil Samples for Analysis

Complete Stage 4 documentation of archaeological sites includes analysis of soil samples.

Samples must be sufficient to meet the following objectives:

- To document patterns of site use (e.g. use patterns from different areas within a site, such as middens or longhouses, or from separate components of a multi-component site)
- To identify the range of floral and faunal remains in a site
- To provide a sample of large or rich deposits or distinct concentrations, of floral or faunal remains or artifacts
- To identify rare specimens (e.g. parasites, wild rice)
- To recover very small artifact classes (e.g. micro-debitage, trade beads).

### Standards

1. Collect soil samples from cultural features using shovel and bucket. Do not collect soil samples by trowelling, as it destroys floral and faunal specimens.
2. The number of litres collected for a soil sample may vary by cultural feature content, site type, and sampling procedure. Sampling strategies and the basis for determining sample size must be set out in the report and substantiated by citation of appropriate literature and sampling calculations.

<b>Site-specific Standards for Soil Sample Strategies</b>	
<b>Type of Archaeological Site</b>	<b>Minimum Soil Samples</b>
Paleo-Indian and Archaic sites	Collect soil samples from all cultural features.
Aboriginal village sites	Collect soil samples from: <ul style="list-style-type: none"> <li>• all ash pits and hearths</li> <li>• all cultural strata in middens, living floors, and semi-subterranean sweatlodges</li> <li>• 10% of all other cultural features in each longhouse and from the area outside longhouses.</li> </ul>
Aboriginal sites other than villages	Collect soil samples from: <ul style="list-style-type: none"> <li>• all cultural features or strata rich in organic remains or containing</li> </ul>

	<p>diagnostic artifacts</p> <ul style="list-style-type: none"> <li>• 5% of all other cultural features.</li> </ul>
Post-contact non-Aboriginal domestic sites	<p>Collect soil samples from:</p> <ul style="list-style-type: none"> <li>• each root cellar quadrant or privy by strata</li> <li>• 5% of all other cultural features.</li> </ul>

### **Guidelines**

1. Based on professional judgement, larger quantities of cultural feature fill may be collected to recover larger samples of floral, faunal, parasite and small artifact categories, or to speed up completion of field excavations (i.e. by collecting all or most fill content for analysis out of the field rather than conduct detailed hand excavations).
2. Additional soil samples may be collected to be preserved “dry” (without flotation) for future research or pollen analysis.
3. When mapping and defining invisible or ghost cultural features by piece plotting artifacts, collecting soil samples may conflict with requirements for piece plotting. Collecting soil samples is not required where:
  - there is no evidence of organic material in the fill and
  - the loss of piece-plotted data would reduce the ability to interpret the cultural feature’s formation and function.

### **Related Units:**

- *Standards and Guidelines for Archaeological Fieldwork: Stage 4: Protection and Avoidance*
- *Standards and Guidelines for Archaeological Fieldwork: Stage 4: Construction Monitoring*
- *Standards and Guidelines for Archaeological Fieldwork: Using the Global Positioning System (GPS)*
- *Standards and Guidelines for Archaeological Fieldwork: Stage 2*
- *Standards and Guidelines for Artifact Documentation and Analysis*
- *The Discovery of Human Remains – Best Practices*
- *Project Reports and Maps: Stage 4 Excavation*