Memorandum

August 31, 2020

To:	Prasoon Adhikari, City of Guelph	Ref. No.:	11176407
From:	Jason Bergsma, P Eng./mm/9 J-P Fleras, ISA Certified Arborist (ON-1632A)	Tel:	905-682-0510
cc:	James Seery, ISA Certified Arborist (ON-2350A), GHD Jean Starchuk, City of Guelph Timea Filer, City of Guelph		
Subject:	**Tree Inventory and Recommendations Goldie Mill Ruins, Guelph, Ontario**		

At the request of the Corporation of the City of Guelph (City), GHD Limited (GHD) provides the following tree inventory and recommendations for trees located at the Goldie Mill Ruins.

1. Background

The Goldie Mill Ruins (hereinafter referred to as "Site") is one of the most historic manufacturing locations in Guelph. The Site is located at 75 Cardigan Street in Guelph, Ontario, on the west side of the Speed River north of Eramosa Road.

Previous environmental investigations identified soil impacts above the Ministry of Environment, Conservation and Parks' Generic Site Condition Standards for parkland use ("MECP Standards"). In 2018, a Screening Level Risk Assessment ("SLRA") was completed to further evaluate the potential for human health and ecological risks associated with the soil impacts and to create a risk management plan for the Site. The SLRA identified a potential for an unacceptable risk to the following:

- Human receptors through direct contact and/or inhalation
- Ecological receptors through direct contact and/or soil erosion to surface water

To mitigate the potential risks identified in the SLRA, construction of an approximately 4,220 square metres ("m^2") soil cap was recommended. This area includes heavily treed areas, recently landscaped areas, and areas with steep slopes. Construction of the 2018 proposed soil cover would require removal of large amounts of established vegetation and related habitat, and would be expected to generate approximately 5,000 tonnes of soil waste. In 2019, GHD was retained by the City to determine if a less impactful approach could be used at the Site to mitigate potential risks related to on-Site soil impacts. To meet this objective, GHD proposed supplementing the existing soil quality data set and further assessment of the potential for risk using Site-specific exposure scenarios and the most current science.

GHD identified areas of the Site that contain surface soils with concentrations of polycyclic aromatic hydrocarbons ("PAHs") and metals greater than the MECP Standards. PAH surface soil exceedances appear to be wide-spread but are generally marginal in magnitude. Metals exceedances are minimal and not wide-spread across the Site.

GHD further assessed the potential for risk using Site-specific exposure scenarios and the most current science to determine if a less impactful approach to risk mitigation could implemented. GHD determined that the concentrations of PAHs and metals identified in surface soils will not pose a concern to recreational human and/or ecological receptors provided a series of risk management strategies are implemented, including excavation and disposal of soil from a reduced area of approximately 830 m^2, to a maximum depth of 500 millimetres (mm) (approximately 20 inches). The reduced excavation area recommended by GHD contained significantly less established vegetation and related habitat than the previous recommendation. Further, several trees in GHD's recommended area appeared to be in poor health. As such, following a Site visit by GHD and City Forestry staff, the City requested GHD complete a tree inventory in and near the excavation area to provide recommendations for removals and/or remediation methods for preserving existing trees.

2. Site Visit and Tree Inventory

Numerous trees of varying species, size, and condition are located in the reduced excavation area. Impacts to Site trees were anticipated based on the proposed excavation limits and depth. It was also expected that the proposed excavation would cause further decline in overall health and/or compromise structural integrity of some Site trees. As such, a Site visit and tree inventory was completed on August 21, 2020 by a GHD International Society of Arboriculture (ISA) Certified Arborist and subsequently approved by City Forestry staff. The purpose of the Site visit and tree inventory was to document the condition of Site trees and to provide recommendations for tree preservation and tree removal based on the proposed excavation limits and depth.

The tree inventory was limited to trees with the potential to be impacted by the proposed works and/or trees within close proximity to the proposed excavation. The tree inventory was prepared to support activities related to soil excavation only (i.e. no hard cap asphalt paving works). Inventoried trees were tagged with a metal ID tag for clear field identification of Site trees.

Tree inventory data collected included tree species, diameter at breast height (DBH), dripline radius, condition (trunk integrity, canopy structure, and canopy vitality), and overall health (healthy, poor and in decline, or dead). The DBH of inventoried trees was typically measured at 1.37 m above grade, with the exception of trees with branch unions, large lateral branches, or deformities that would result in an unrepresentative DBH measurement.

Tree condition was assessed based on trunk integrity, canopy vitality, and canopy structure. All three components of condition were assigned a condition rating, from poor to good, based on tree observations. In general, a condition rating of "poor" was assigned if a given deficiency was displayed in more than 40% of the tree, whereas a condition rating of "good" was assigned if a given deficiency was displayed in less than 10% of the tree. The assessment of trunk integrity included observations with respect to the trunk and any

visible roots or buttress roots. Observations for trunk integrity included trunk lean, cracks/splits/ seams, presence of cavities or decay, presence of multiple stems, the presence of mechanical damage to the trunk or roots, and the presence of girdling roots. Crown structure observations included the overall structural quality of the crown. Observations included the presence of codominant leaders, multiple branch unions per node, included bark at branch unions, epicormic growth, and broken or dead branches. The assessment of canopy vitality included observation with respect to the vigour and health of the canopy. Presence or abundance of foliage, twig elongation, epicormic growth, deadwood, and the presence of pests and pathogens were used as indicators of canopy vitality.

Each inventoried tree was also assigned an overall health rating (healthy, fair, poor, in decline, or dead) based on the condition ratings and overall appearance of the tree.

In total, 24 trees were inventoried on Site. The tree inventory is shown in **Table 1** and is presented on **Figure 1**.

3. Recommendations

3.1 Tree Removals

Trees recommended for preservation and removal are presented in **Table 1**. Tree removal was only considered for trees in poor health or poor structure that would not survive tree preservation methods outlined in **Section 3.2**. If these trees were to be retained and not removed, they are anticipated to pose a risk to users of the nearby public trail and greenspace.

In total, GHD recommends that six trees are removed based on their condition and anticipated impacts to tree health or stability as a result of surrounding soil excavation. Condition of trees proposed for removal is presented in **Table 1** and the attached **Photolog**. Justification for the tree removal recommendation is provided in **Table 1** and summarized below. Trees recommended for removal include the following:

- Tree 704 – Siberian Elm: poor condition, anticipated poor stability and risk to building, trail and park users
- Tree 706 – Siberian Elm: poor condition, anticipated poor stability and risk to building, trail and park users
- Tree 711 – Manitoba Maple: healthy condition, anticipated poor stability and risk to building, trail and park users
- Tree 722 – Austrian Pine: poor condition and diseased, tree death anticipated
- Tree 723 – Austrian Pine: poor condition and diseased, tree death anticipated
- Tree 724 – Austrian Pine: poor condition, tree death anticipated

3.2 Excavation Methodology for Tree Preservation

Because of the planned excavation activities within the Tree Protection Zones, injury mitigation measures in accordance with the City's *Tree Technical Manual* (December 2019) are required for the duration of the

excavation and site restoration, including but not limited to root-sensitive soil removal, root pruning and supervision of works by a Qualified Arborist during work. The City's Private Tree By-law does not apply to works undertaken on City property.

Injury to tree roots within the reduced excavation area may be mitigated by several methods. Where tree roots of trees to be preserved are anticipated to be present within the excavation area the following methods are recommended:

1. Do not excavate within 1.0 m horizontal distance from the outside edge of trees to be preserved
2. Remove soil via hydrovac or hand digging within the Tree Protection Zone radius as specified for each tree in **Table 1**. Hydrovac water pressure to be limited such that exposed roots are not damaged and root bark is not torn or damaged.
3. Do not remove more than one quarter (¼) of the soil in the Tree Protection Zone at one time to maintain tree stability and prevent root desiccation. Work in segments around the tree trunk (as in pie slices). Replace with moist topsoil immediately after excavation. Roots should **not** be exposed to air for more than 2 hours.
4. Where tree roots of trees to be preserved are encountered during excavation (including outside of the Tree Protection Zones), attempts should be made to work around roots and mitigate damage to any exposed structural, lateral, fibrous roots. Severely torn/damaged roots shall be pruned with a clean and sharp hand saw, pruners, or loppers under the supervision of an ISA Certified Arborist. Root pruning should result in a clean cut with bark firmly attached. All other roots of trees to be preserved should be covered with moist topsoil to mitigate desiccation and should not be exposed to air for more than 2 hours. Preservation of undamaged or less damaged roots will improve tree recovery and stability.
5. Upon replacing soil in the Tree Protection Zone, tamp soil under and around tree roots to mitigate settlement. Compaction above fine/fibrous roots should be minimal, so as to ensure healthy root respiration and growth.
6. The excavated area should be inspected prior to snowfall to identify settlement within the root zone. Settled areas should be backfilled with topsoil and seeded/sodded.

As per the City *Tree Technical Manual,* the above excavation methodology is to be overseen by an ISA Certified Arborist.

In the event that a tree becomes structurally unsafe as a result of excavation activities, the tree should be reassessed from a risk management perspective.

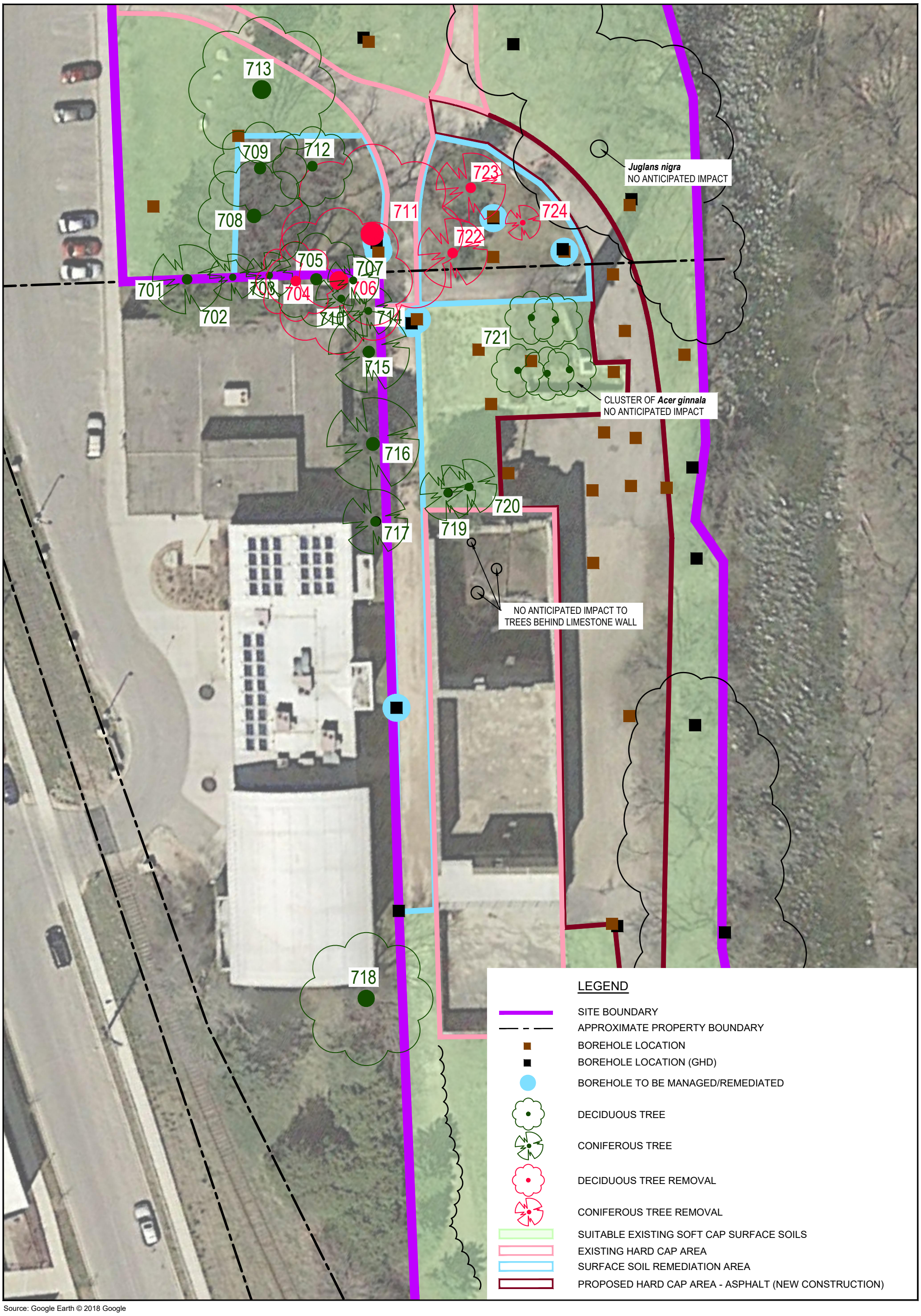
4. Compensation/Replacement Tree Planting Recommendations

GHD recommends that the six trees proposed for removal are compensated as per the aggregate caliper formula in the City *Tree Technical Manual*. GHD also recommends that the replacement trees are native species and consideration is made for shade tolerance and Site moisture regimes.

According to the City of Guelph, planting is currently scheduled for spring 2021 (or fall) depending on the timing of completion of the restoration and site works.

5. Closing

GHD trusts that this memo provides the required information to fulfill the requirements of the City of Guelph. Please do not hesitate to contact the above-signed with questions or concerns.



Source: Google Earth © 2018 Google

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CITY OF GUELPH
75 CARDIGAN STREET, GUELPH, ONTARIO
GOLDIE MILL RUINS

11176407-00
Aug. 31, 2020

TREE INVENTORY AND RECOMMENDATIONS

FIGURE 1

CAD File: N:\CA\St Catharines\Legacy\DRAWINGS\11170000s\11176000s\11176407\11176407-MEMO\11176407-00(MEMO009)\11176407-00(MEMO009)GN\11176407-00(MEMO009)GN-SC001.DWG

Table 1

Goldie Mill Ruins - Tree Inventory and Recommendations
City of Guelph
Guelph, ON

Tree Tag No.	Species (Common Name)	Species (Scientific Name)	Diameter at Breast Height (DBH; cm)	Estimated Dripline Radius (m)	Tree Protection Zone Radius (m)[1]	Trunk Integrity	Canopy Structure	Canopy Vigour	Overall Health	Recommendation	Justification for Recommendation
701	Norway Spruce	*Picea abies*	67.7 @ 1.2 m	4	8.4	Fair	Fair	Fair	Healthy	Preserve - Preservation recommendations for Tree 702 will mitigate injury to this tree	Tree is in sufficiently good condition to recover from recommended remediation method and minimal injury to roots is anticipated (<5%). Approximately 5% of root system located within remediation zone, based on the tree protection zone radius.
702	Norway Spruce	*Picea abies*	49.6	3	6	Good	Fair-Good	Fair-Good	Healthy	Preserve - Do not excavate within 1.0 m of trunk. Hydrovac or hand dig between 1.0 and 6.0 m from trunk. Work around exposed roots and do not allow roots to dry once exposed.	Tree is in sufficiently good condition to recover from recommended remediation method; height of tree, shallowness of root system, and proximity to building, necessitates non-invasive excavation to mitigate damage to roots within excavation limits. Approximately 30% of root system located within remediation zone, based on the tree protection zone radius.
703	Norway Spruce	*Picea abies*	42.5	3	6	Fair-Good	Fair-Good	Fair-Good	Healthy	Preserve - Do not excavate within 1.0 m of trunk. Hydrovac or hand dig between 1.0 and 6.0 m from trunk. Work around exposed roots and do not allow roots to dry once exposed.	Tree is in sufficiently good condition to recover from recommended remediation method; height of tree, shallowness of root system, and proximity to building, necessitates non-invasive excavation. Approximately 60% of root system located within remediation zone, based on the tree protection zone radius.
704	Siberian Elm	*Ulmus pumila*	60.4	4	7.2	Poor-Fair	Poor-Fair	Fair	Poor	Remove	Trunk and canopy in poor-fair condition, and overall health considered poor. Dead root, basal rot, and dead limb in canopy on north side observed. Approximately 60% of root system located within remediation zone; further decline anticipated as a result of remediation works. Species prone to damage from wind and ice accretion.
705	Siberian Elm	*Ulmus pumila*	47	5	6	Fair-Good	Fair	Fair	Healthy	Preserve - Do not excavate within 1.0 m of trunk. Hydrovac or hand dig between 1.0 and 6.0 m from trunk. Work around exposed roots and do not allow roots to dry once exposed.	Tree is in sufficiently good condition to recover from recommended remediation method; height of tree, shallowness of root system, and proximity to building, necessitates non-invasive excavation. Approximately 60% of root system located within remediation zone, based on the tree protection zone radius. Species prone to damage from wind and ice accretion.
706	Siberian Elm	*Ulmus pumila*	46.7	8	9	Fair	Poor-Fair	Fair	Poor	Remove	Canopy structure in poor-fair condition. Potential rot and strong lean to east observed. Approximately 65% of root system located within remediation zone, based on the tree protection zone radius; further decline anticipated as a result of remediation works. Species prone to damage from wind and ice accretion.
707	Austrian Pine	*Pinus nigra*	23.2	3	4	Fair-Good	Fair-Good	Fair-Good	Healthy	Preserve - Do not excavate within 1.0 m of trunk. Hydrovac or hand dig between 1.0 and 4.0 m from trunk. Work around exposed roots and do not allow roots to dry during replacement of soil.	Tree is in sufficiently good condition to recover from recommended remediation method; height of tree, shallowness of root system, and proximity to building, necessitates non-invasive excavation to mitigate damage to roots within excavation limits. Approximately 40% of root system located within remediation zone, based on the tree protection zone radius.
708	Black Walnut	*Juglans nigra*	43.4	6	7	Fair-Good	Fair	Fair-Good	Healthy	Preserve - Do not excavate within 1.0 m of trunk. Hydrovac or hand dig between 1.0 and 7.0 m from trunk. Work around exposed roots and do not allow roots to dry once exposed.	Tree is in sufficiently good condition to recover from recommended remediation method and taproot will provide structure during soil replacement. Approximately 60% of root system located within remediation zone, based on the tree protection zone radius.
709	Black Walnut	*Juglans nigra*	40.6	5	6	Fair-Good	Fair	Fair-Good	Healthy	Preserve - Do not excavate within 1.0 m of trunk. Hydrovac or hand dig between 1.0 and 6.0 m from trunk. Work around exposed roots and do not allow roots to dry once exposed.	Tree is in sufficiently good condition to recover from recommended remediation method and taproot will provide structure during soil replacement. Approximately 60% of root system located within remediation zone, based on the tree protection zone radius.
710	Austrian Pine	*Pinus nigra*	27.2	3	4	Fair-Good	Fair-Good	Fair-Good	Healthy	Preserve - Preservation recommendations for Tree 705 and 707 will mitigate injury to this tree	Tree is in sufficiently good condition to recover from recommended remediation method and minimal injury to roots is anticipated (<5%). Approximately 5% of root system located within remediation zone, based on the tree protection zone radius.
711	Manitoba Maple	*Acer negundo*	47.6, 37.2	10	11	Poor-Fair	Fair	Fair-Good	Healthy with Poor Structure	Remove	Tree has strong east-northeast lean. Removal of soil/material to the west will likely cause tree to destabilize and fail. Crown reduction may mitigate lean; however, this may result in significant epicormic growth around pruning cuts and produce poor canopy structure and increased loading. It is assumed that 80% of the root zone is within the excavation limits, based on the tree protection zone radius. Roots may have been impacted previously during installation of stone chip trail.
712	Black Walnut	*Juglans nigra*	33.1	4	5	Good	Fair-Good	Fair-Good	Healthy	Preserve - Do not excavate within 1.0 m of trunk. Hydrovac or hand dig between 1.0 and 5.0 m from trunk. Work around exposed roots and do not allow roots to dry once exposed.	Tree is in sufficiently good condition to recover from recommended remediation method and taproot will provide structure during soil replacement. Approximately 70-80% of the root system is located within the remediation excavation zone, based on the tree protection zone radius.

Table 1

Goldie Mill Ruins - Tree Inventory and Recommendations
City of Guelph
Guelph, ON

Tree Tag No.	Species (Common Name)	Species (Scientific Name)	Diameter at Breast Height (DBH; cm)	Estimated Dripline Radius (m)	Tree Protection Zone Radius (m)[1]	Trunk Integrity	Canopy Structure	Canopy Vigour	Overall Health	Recommendation	Justification for Recommendation
713	Black Walnut	*Juglans nigra*	38.3, 37.6, 42.9, 40.9	7	9.6	Fair	Fair	Fair-Good	Healthy	Preserve - Prune exposed roots to face of excavation with a clean and sharp hand saw or pruners	Tree is approximately 4.0 m from excavation limit and in sufficiently good condition to recover from remediation activities. Approximately 10% of the root system is located within the remediation excavation zone, based on the tree protection zone radius.
714	Austrian Pine	*Pinus nigra*	21.4	3	4	Fair-Good	Fair	Fair-Good	Healthy	Preserve - works previously completed along path/trail	Tree to be assessed for construction-related impacts one year after completion of construction activities
715	Austrian Pine	*Pinus nigra*	31.9	4.5	5.5	Fair-Good	Fair-Good	Fair	Fair - Potential decline due to *Diplodia* tip blight	Preserve - works previously completed along path/trail	Tree to be assessed for construction-related impacts one year after completion of construction activities
716	Austrian Pine	*Pinus nigra*	46.1	5	6	Fair	Fair	Fair	Healthy	Preserve - works previously completed along path/trail	Tree to be assessed for construction-related impacts one year after completion of construction activities
717	Austrian Pine	*Pinus nigra*	22.6	3.5	4.5	Fair-Good	Fair	Poor-Fair	Poor	Preserve - works previously completed along path/trail	Tree to be assessed for construction-related impacts one year after completion of construction activities
718	Silver Maple	*Acer saccharinum*	61.1	7	8.4	Good	Fair	Fair-Good	Healthy	Preserve - works previously completed along path/trail	No anticipated impacts; tree is approximately 10.0 m from excavation limit.
719	Austrian Pine	*Pinus nigra*	32.8	3	4.8	Fair-Good	Fair-Good	Fair	Healthy	Preserve - works previously completed along path/trail	No significant impacts anticipated.
720	Austrian Pine	*Pinus nigra*	29.9	3	4.8	Fair-Good	Fair	Fair	Healthy	Preserve	No significant impacts anticipated.
721	Amur Maple	*Acer ginnala*	21.4, 15.9	4	5	Fair	Good	Good	Healthy	Preserve - works previously completed along path/trail	No significant impacts anticipated.
722	Austrian Pine	*Pinus nigra*	26.8	4	5	Fair-Good	Fair-Good	Fair	Fair - Potential decline due to *Diplodia* tip blight	Remove	Additional stress caused by root severance may cause tree to decline further. Assumed 100% of root system located within remediation area. Tree structure will likely be compromised by excavation regardless of proposed excavation method.
723	Austrian Pine	*Pinus nigra*	29.2	4	5	Fair-Good	Fair	Poor	Poor - In decline due to *Diplodia* tip blight	Remove	Additional stress caused by root severance may cause tree to decline further. Assumed 100% of root system located within remediation excavation area. Tree structure will likely be compromised by excavation regardless of proposed excavation method.
724	Austrian Pine	*Pinus nigra*	22.1	2	3.6	Fair-Good	Fair-Good	Poor-Fair	Poor	Remove	Additional stress caused by root severance may cause tree to decline further. Assumed 100% of root system located within remediation excavation area. Tree structure will likely be compromised by excavation regardless of proposed excavation method.

Notes:

[1] Tree protection zone is based on the diameter of the trunk and dripline radiusas per the City of Guelph *Tree Technical Manual* (2019). All trees are considered to be within parks and open spaces; therefore, the Tree Protection Zone is the Potential Rooting Area as defined in the *Tree Technical Manual*.

Attachment A

Photo 1 - Northwest-facing view of trunk of tree 704 (proposed for removal). Note dead root pointing southwards.

Tree Inventory Photographs

Photo 2 - South-facing view of canopy of tree 704 (proposed for removal). Note poor structure in codominant leaders and dead limb pointing northwards (yellow arrow).

Tree Inventory Photographs

Photo 3 - West-facing view of trunk of tree 704 (proposed for removal). Note large wound that is approximately 5 cm deep.

Tree Inventory Photographs

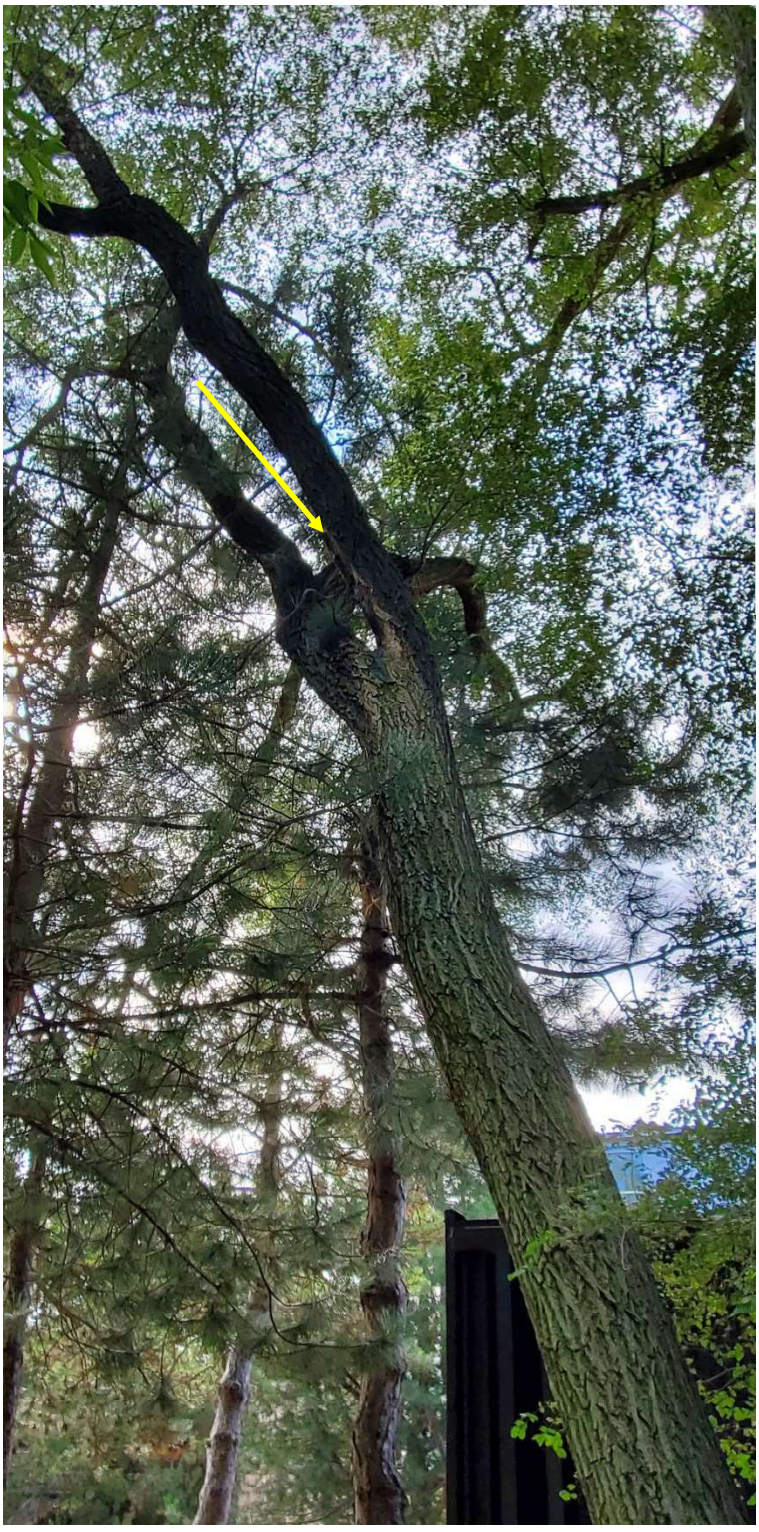

Photo 4 - South-facing view of canopy of tree 706 (proposed for removal). Note strong east lean and rot in canopy (yellow arrow).

Tree Inventory Photographs

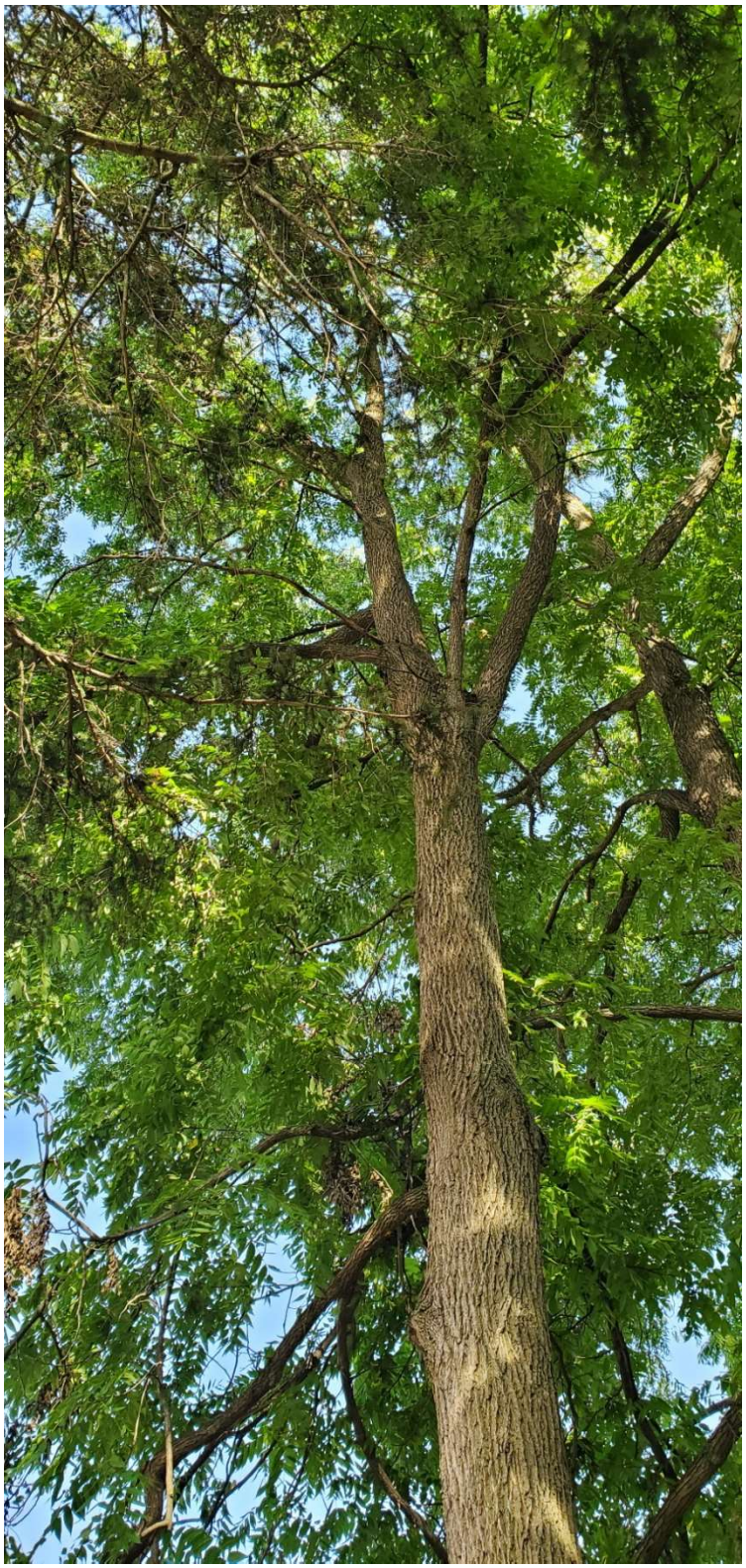

Photo 5 - Northwest-facing view of canopy of tree 708 (proposed to be retained).

Tree Inventory Photographs

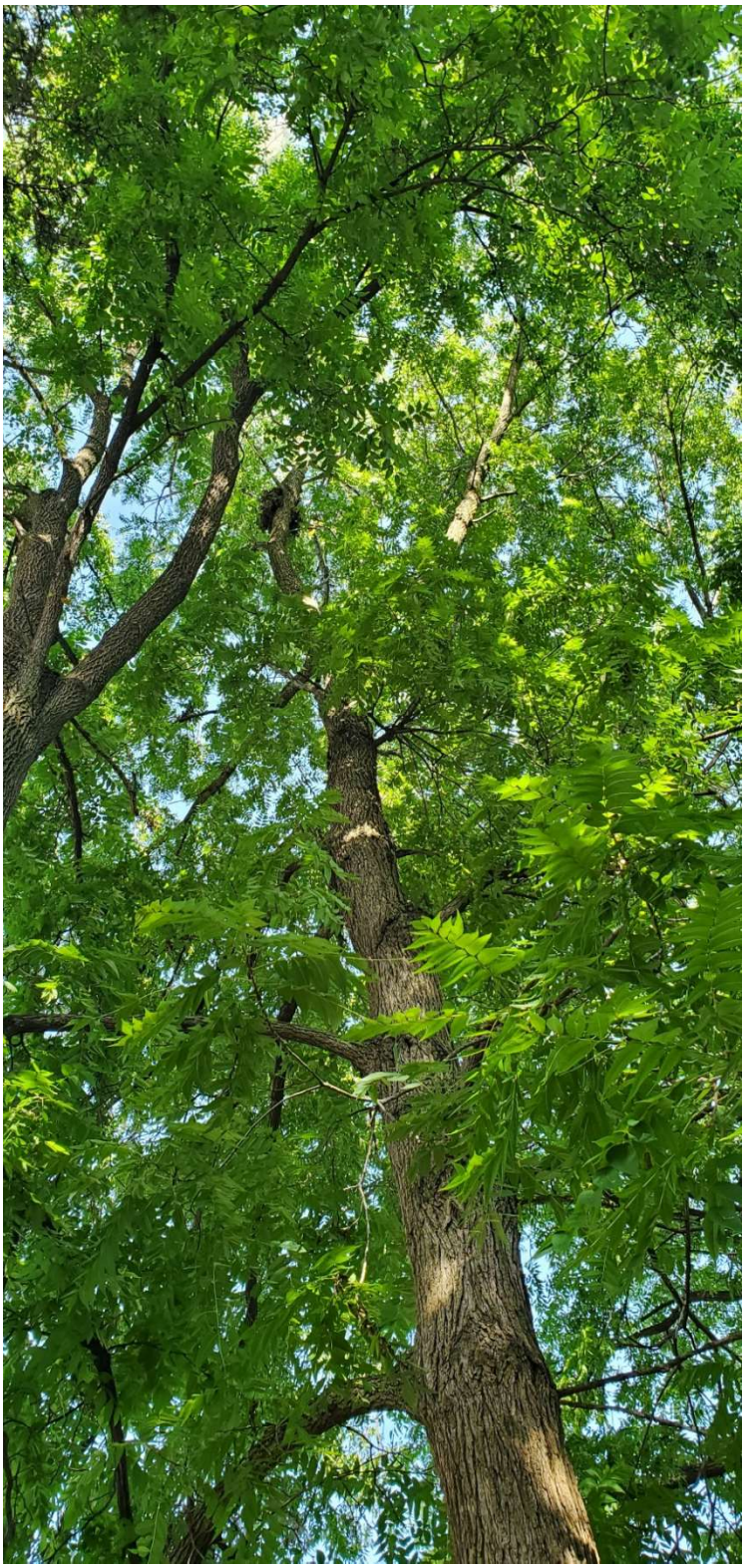

Photo 6 - North-facing view of canopy of tree 709 (proposed to be retained).

Tree Inventory Photographs

Photo 7 - Northwest-facing view of trunk of tree 711 (proposed for removal). Note strong lean in north stem.

Tree Inventory Photographs

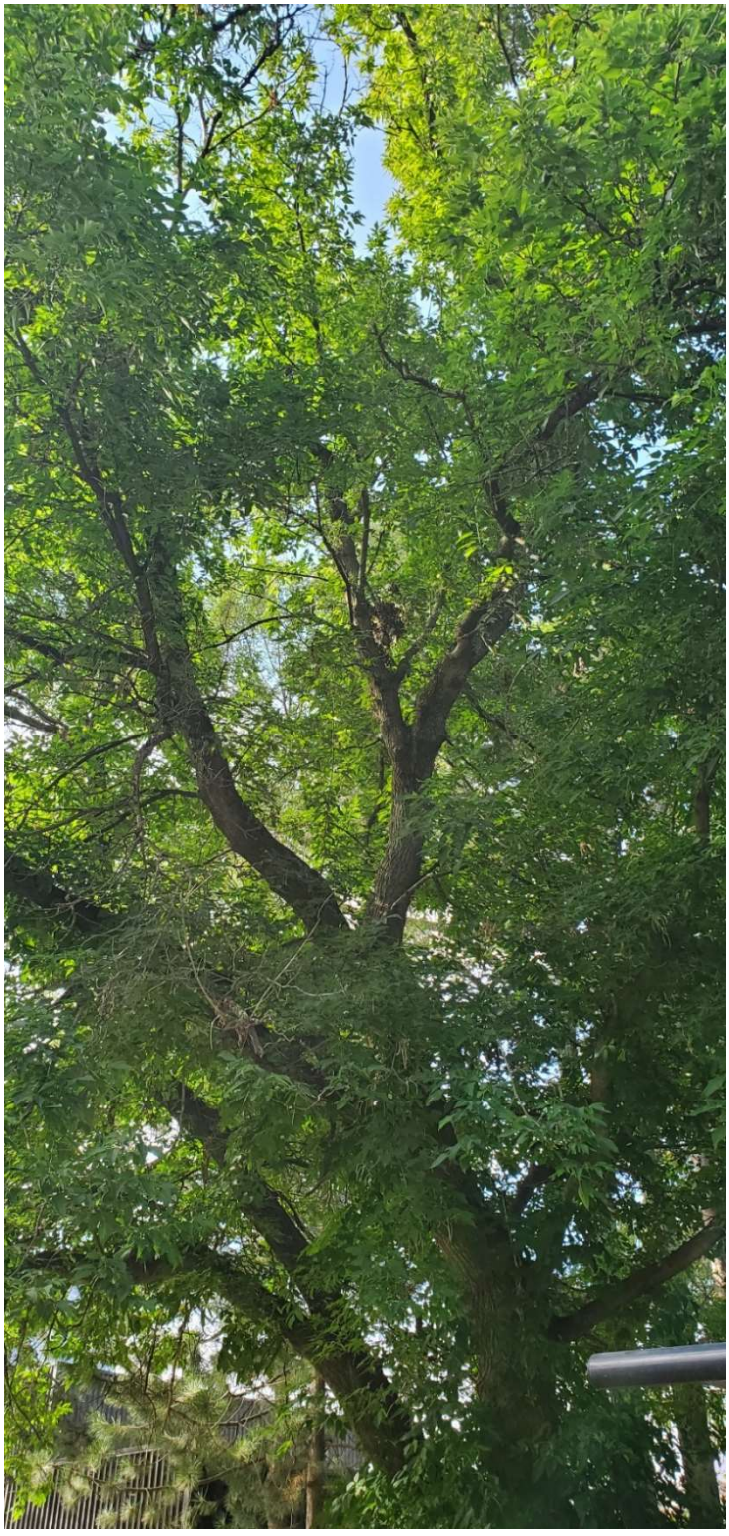

Photo 8 - Southwest-facing view of canopy of tree 711 (proposed for removal). Note presence of deadwood in canopy and included bark in unions.

Tree Inventory Photographs

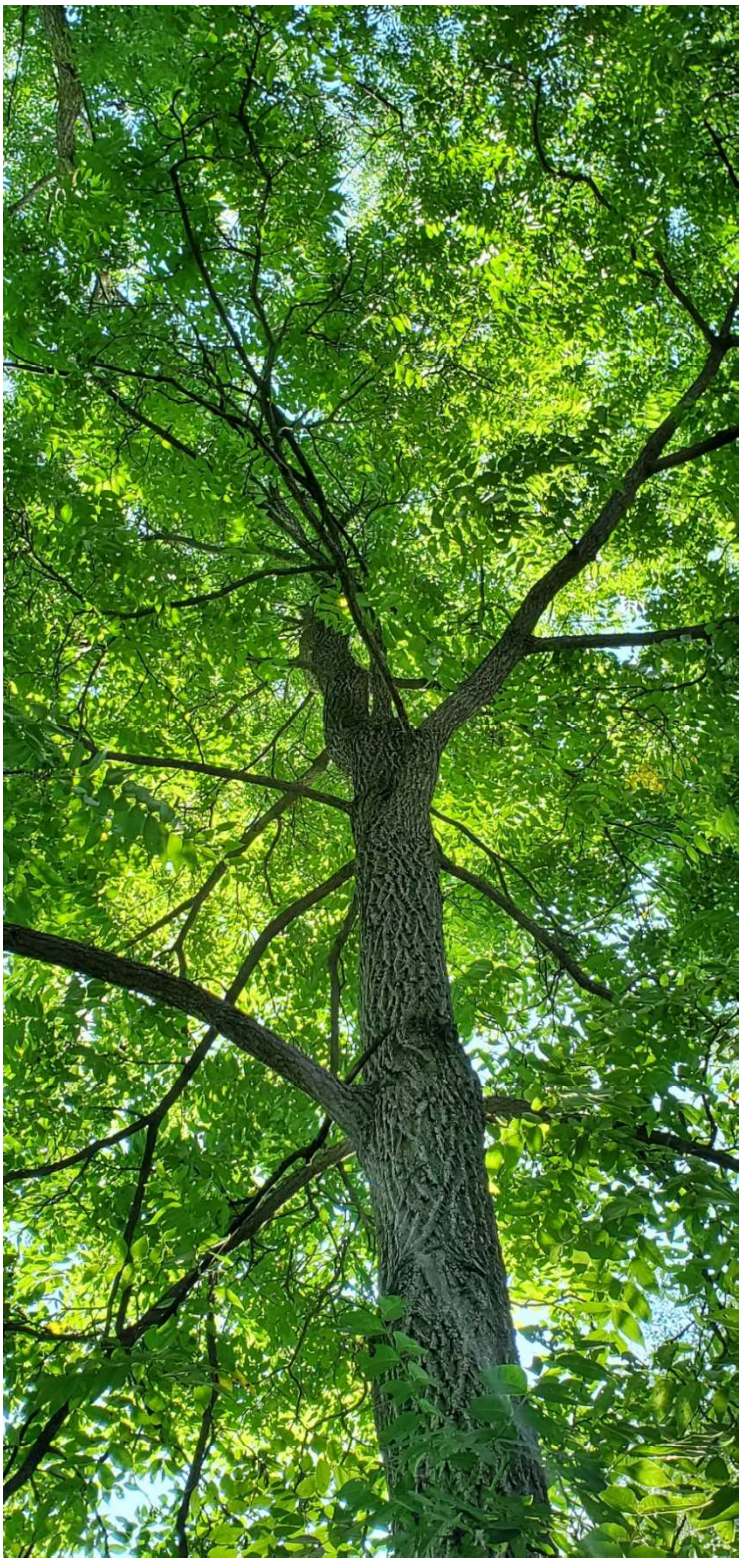

Photo 9 - North-facing view of canopy of tree 712 (proposed to be retained).

Tree Inventory Photographs

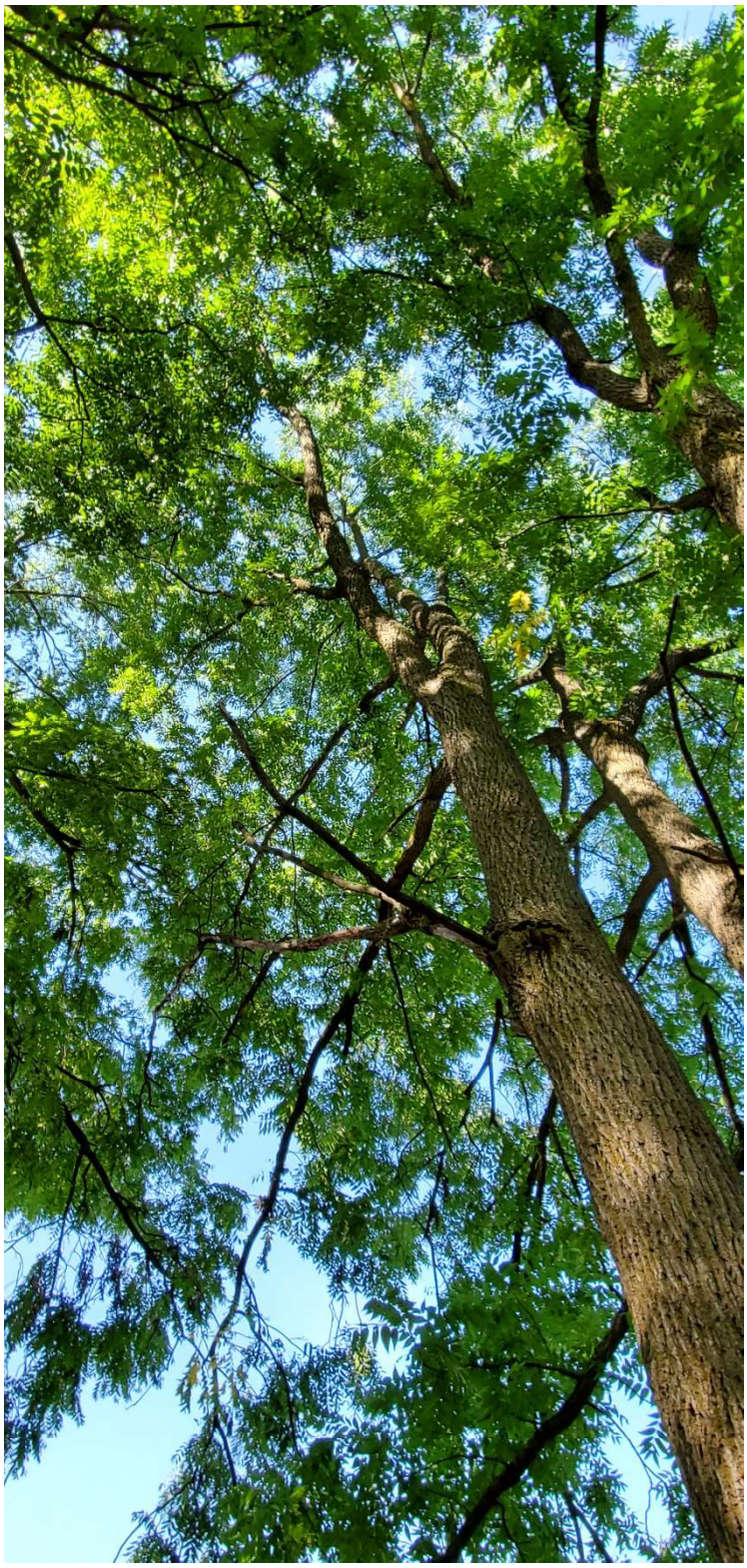

Photo 10 - North-facing view of west canopy of tree 713 (proposed to be retained).

Tree Inventory Photographs

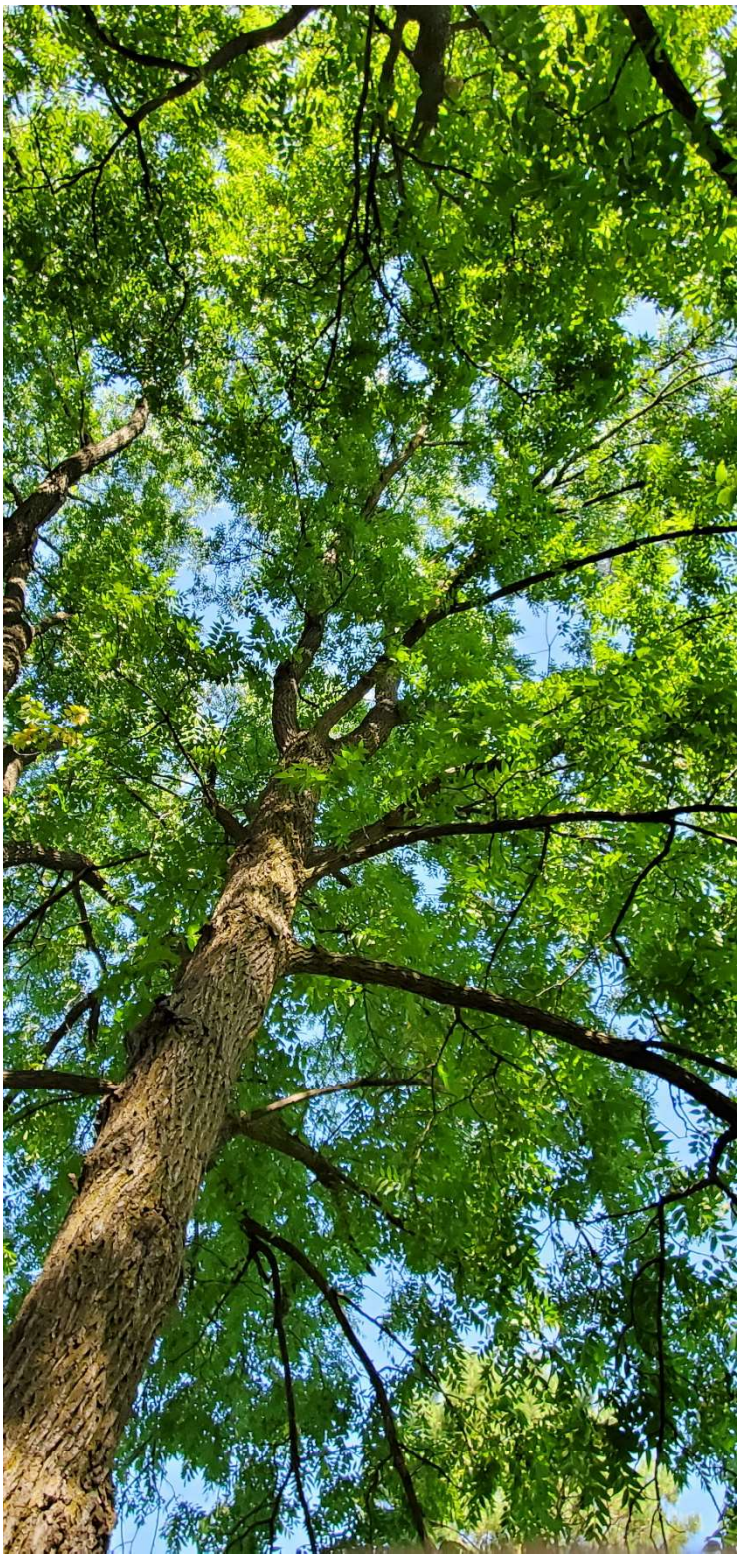

Photo 11 - North-facing view of east canopy of tree 713 (proposed to be retained).

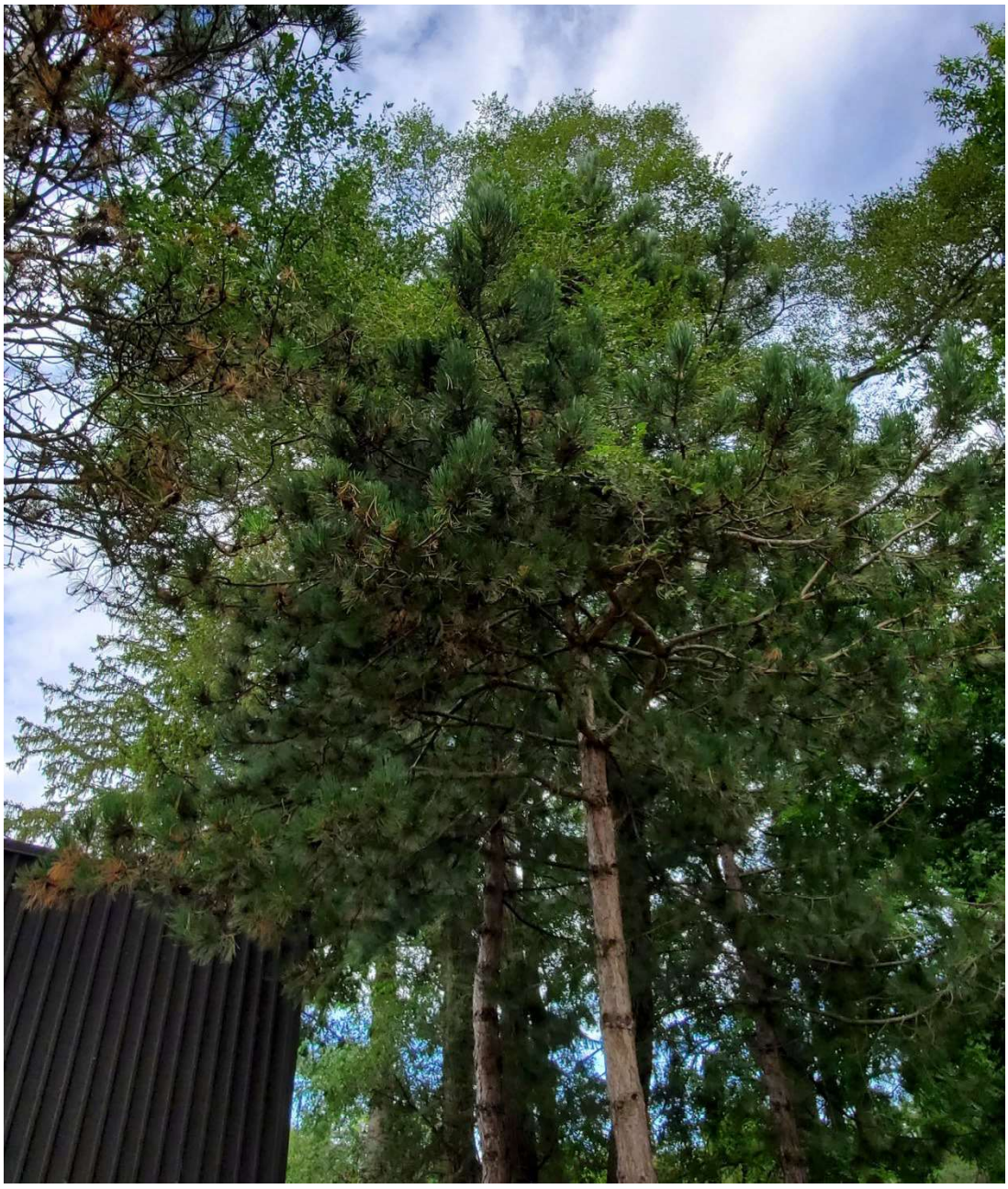

Photo 12 - Northwest-facing view of canopy of tree 714 (proposed to be retained).

Photo 13 - West-facing view of canopy of tree 715 (proposed to be retained). Note *Diplodia* tip blight and leaf death throughout north (photo right) canopy.

Photo 14 - West-facing view of canopy of tree 716 (proposed to be retained). Note high leaf density and relatively sparse presence of *Diplodia* tip blight in the lower canopy

Photo 15 - Northwest-facing view of canopy of tree 722 (proposed for removal). Note *Diplodia* tip blight of moderate density in lower canopy.

Tree Inventory Photographs

Photo 16 - Northwest-facing view of canopy of tree 723 (proposed for removal). Note low leaf density and presence of *Diplodia* tip blight throughout canopy.

Tree Inventory Photographs

Photo 17 - West-facing view of canopy of tree 724 (proposed for removal). Note low leaf density throughout canopy.

Tree Inventory Photographs