COMMONWEALTH

A Heritage Impact Assessment
1200 Baseline Road, Ottawa, ON

Prepared for: Zena Investment Corporation.

Prepared by: Commonwealth Historic Resource Management.

May 2026

Cover Image: The proposed landscape plan using bermed landforms and dense tree plantings establishes a distinct, unified character across both public and private spaces. Landforms and planting are strategically placed to channel views, circulation, and delineate spaces without the need for formal barriers or fencing. Source: Fotenn

Aerial view of the proposed 2 phased development viewed from the south at 1200 Baseline Road. The development consists of 7 mixed use residential towers and two 6-storey units, planned over two phases. Source: Hobin Architecture 2026.

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1.0 BACKGROUND AND SUMMARY

1.1 Introduction

Initiated by Zena Investment Corporation, the proposed Zoning By-law Amendment seeks a new urban exception to permit the development of the seven buildings across the 1200 Baseline Road site. Amendments sought are intended to increase building heights and address setbacks. The Arterial Mainstreet Zone, Subzone 10 (AM10) is proposed to remain. As part of this application, a Heritage Impact Assessment (HIA) is submitted in response to the City of Ottawa's request to document potential measures that mitigate impacts of the proposed development in the neighbourhood and on the agricultural research fields of the Central Experimental Farm (CEF).

Myers Automobile dealership on Merivale is the site of a two-phased development. Phase 1 will see the western portion (200 m) of its lands developed with a 30 and a 25-storey mixed use tower fronting onto Merivale Road. The eastern part of the site (60 m) fronting on Baseline Road will continue as a car dealership and will require rezoning in the short term. Phase 2, fronting onto Baseline Road, will involve the demolition of the automotive dealership and construction of three towers (34, 25, and 14-storeys, with two 6-storey units).

Figure 1: Aerial view looking south to the Myers Automobile Dealership, known municipally as 1200 Baseline Road. The Myers Dealership site is in a predominantly low-rise neighbourhood with residential, commercial, and institutional uses. Source: Aerial view, Fotenn 2025.

Heritage Planning Requirements acknowledge that the property is not designated under the Ontario Heritage Act and there are no designated buildings adjacent to or in the vicinity of the dealership. As such, a heritage permit application is not required to facilitate this proposal. However, due to the adjacency to the Central Experimental Farm (CEF), heritage review is required in consultation with the National Capital Commission (NCC) and Agriculture and Agri-Foods Canada (AAFC.)

1.2 Scope

The development site is an irregular polygonal form of 1.6 acres (0.63ha) with frontage onto Merivale Road (phase 1) and on Baseline Road (phase 2). The proposed development is subject to Site Plan Control and Zoning By-law Amendment applications. The potential for impacts stems from the potential differential shading of the research plots that would result from the towers that will be positioned southwest of the Farmlands.

The Central Experimental Farm (CEF), a National Historic Site of Canada, is located centrally in the City of Ottawa. Agriculture and Agri Food Canada (AAFC) manages the CEF through a management plan completed circa 2005. A key heritage value of the cultural landscape is the preservation of the agricultural research function. The National Capital Commission's role is to manage federal lands located within the City of Ottawa and represent the AAFC's interests. A review meeting with city, NCC staff, and AAFC was held April 2, 2026 outlining the findings and the conclusions, and a draft was submitted for review. No formal comments were received.

The AAFC's primary concerns relate to shadowing of the research fields and the ability of the AAFC to conduct agricultural research on the affected fields, which are key heritage attributes of the CEF. The most easterly portion of these lands being discussed are not part of the research fields due to past historical use (see Figures 8 and 9). AAFC is proposing to develop a 'western gateway' to the CEF incorporating the headquarters and a 4-acre (1.6ha) parcel of land across the street. A path extending from the corner of Merivale and Baseline Roads appears to be the first element of the proposed 'western gateway.' It leads to a large circular looped pathway located within this portion of the agricultural lands. (See Figure 1). At present, the existing buildings, including the AAFC headquarters, cast afternoon shadow on the western gateway lands.

1.3 A Summary of Sun Shadow Analysis and Conclusions

The Sun-Shade Analysis identifies sensitive areas throughout and adjacent to the development site. Sensitive areas within the sun shadow analysis' study area include Merivale Road and Baseline Road and secondary streets, public spaces (parks and capital greenspaces), communal amenity areas (daycare outdoor play area, and the Farm's research fields to the north of Baseline Road). Conclusions are drawn from the Hobin Sun Shade Analysis as follows:

1. The Shade Analysis considers the site for both Phase 1 and Phase 2. And concludes that the impact to the CEF is negligible during all three test dates. This is discussed in more detail in Chapter 4,

Impact and Mitigation. Figure 4 documents the shadow pattern for December 21st at 3:00pm as an intermittent shadow pattern on the western part of the research fields. The shadowing occurs for less than an hour and is the only time throughout the year the research fields are impacted.

2. The public spaces including parks and capital green spaces (Experimental Farm) are **not** impacted by the OP criteria, which states that the new net shadow must not result in an average of 50 percent of any public space being cast in shadow for 5 or more hourly interval times during the September test date.
3. The arterial Mainstreets (Merivale Rd. and Baseline Rd.) are **not** impacted by the criteria: no new net shadow in any one location for more than 3 consecutive hourly test times of the sidewalk on the opposite side of the street, being cast in shadow during the September test date. In fact, the December shadow extends along Baseline Road after 3:30, which will be a benefit to drivers travelling west into the setting sun.
4. The communal area (a daycare outdoor play area) is **not** impacted by the criteria of the new net shadow, must allow for an average of 50 percent of any communal amenity area being exposed to sunlight during two consecutive hourly interval times per day between 11 am and 3 pm (both are inclusive) during all three test dates.
5. The CEF 2005 Management Plan acknowledges a "western gateway" at the Farm is in the early stages of development. These lands have not been part of the active research lands due to past historical use (see Figures 8 and 9).
6. The combination of the Western Gateway as well as proposed shelter belts (5m along Merivale Road and 25m (7m + 18m) extending along all of Baseline Road) will reduce the lands potentially impacted by shadowing from the proposed Phase 1 and Phase 2 development.
7. Based on the height and the positioning of the planned towers, it has been determined that there will be minimal shadowing of the southwestern corner of the CEF Gateway Lands, as documented with the March, June, and September solstice sun/shade analysis. The sun/shade studies for June, September/March indicate there is no shadow impact on the research fields. The December equinox shows differential shading extending onto the research fields between 2pm and 3pm (see Figure 4). Given the time of year with the lands' dormant period, there should be no impact on CEF research fields.[1]

1.4 References

This HIA follows the content outline recommended by the City of Ottawa for assessing Heritage Impact. The following documents were reviewed in the preparation of this report:

- Recognition Statute: Central Experimental Farm Historic Sites and Monuments Act (R.S.C., 1985, c. H-4) (we note that this is not a Heritage Designation within Federal or Provincial law)
- Statement of Significance for the Central Experimental Farm National Historic Site of Canada, online at: www.historicplaces.ca/en/rep-reg/place-lieu.aspx?id=13811&pid=0. (we note that this is not a Heritage Designation within Federal or Provincial law)
- Standards and Guidelines for the Conservation of Historic Places in Canada, Second Edition, 2010;

[1] The peer review prepared by Miller Associates Appendix E. in response to the Appendix D (CEF) letter supports this conclusion.

- Cultural Heritage Impact Statement 1110 Fisher Avenue, Ottawa, ON Prepared by Julie Harris Contentworks Inc., October 22, 2019.
- Revised Heritage Impact Assessment 1085 Carling Avenue, Carling Avenue 2019 Co-tenancy Taggart Realty August 2023
- Baseline Road Bus Rapid Transit and Complete Street Planning and Environmental Assessment Study (Bayshore Station to Heron Station—Recommendations, Transportation Planning Services, February 2017.
- 1200 Baseline Road, Ottawa Fotenn Planning & Design Background Policy, and Regulatory Review Update March 3, 2026.
- City of Ottawa Subject: Central Experimental Farm Working Group Update, File Number: ACS2024-PDB-PS-0081, Report to Planning and Housing Committee on 19 June 2024 and Council 26 June 2024 Planning, Building and Development Services Department.
- Phase 1 and Phase 2 Sun-Shadow Analysis. Hobin Architecture 2026.
- 780 Baseline Road. Letter from Agri-Food Canada to City of Ottawa Planning, including comments from the NCC, and shadow studies prepared by Agri-Food, dated February 13, 2023.
- 1200 Baseline Road Urban Design Panel Presentation, Hobin Architecture, December 2025.
- 780 Baseline Road, Phase 1 and 2 Heritage Impact Assessment prepared by Commonwealth Historic Resource Management, 2023.
- Miller Engineering Inc. Expert Opinion Potential A Review of the Effects of Structural Sunlight Obstruction on AAFC Research Plots. James Miller, PE, PhD, and Helen Miller, EIT, M.S. Ag & Biosystems Engineering, December 19, 2023.
- Miller Engineering Inc., Experimental Farm, Summary Conclusions Report 780 Baseline Road. 121823, December 19, 2023 JJS Edit.
- 1200 Baseline Road, UDRP Presentation Hobin Architecture 2025, & UDRP Recommendations Informal Pre-Consultation Review, Zoning Bylaw Amendment December 5, 2025.
- 1200 Baseline Response to UDRP Recommendations, Fotenn 18, 2, 2026
- Design Intent 1200 Baseline Road Hobin, Fotenn March 2026

Figure 2: Aerial view of the proposed Phase 1 development located in the southwest corner of the lot known municipally as 1200 Baseline Road. The development consists of 30 and 25-storey high-rise towers fronting onto Merivale Road.

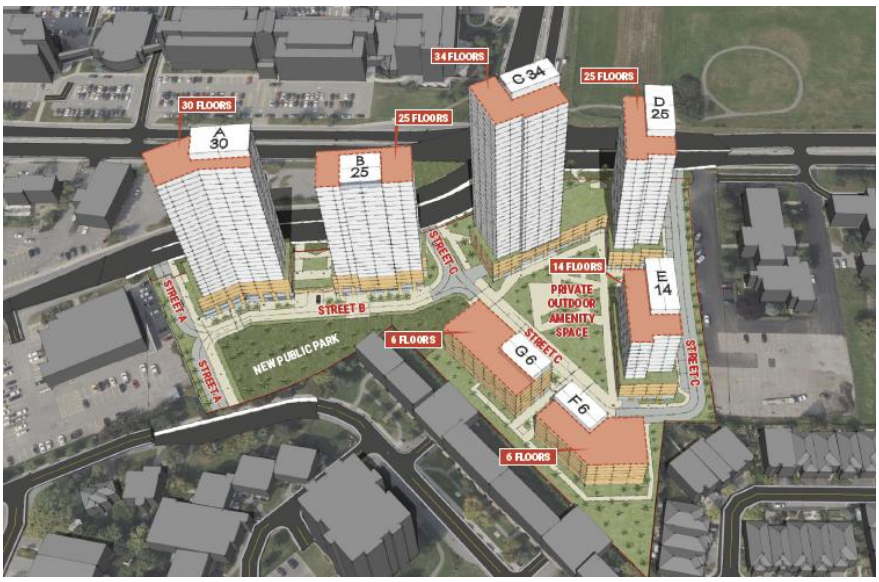


Figure 3: Aerial view of the proposed Phase 2 development with 5 new buildings ranging from 34, 25 and 14-storeys with two 6-storey units fronting onto Street C. The agricultural fields of the Central Experimental Farm (CEF) (upper right) and the Agriculture and Agri-Foods Canada (AAFC) headquarters (upper left) are located to the north of Baseline Road. The planned Western 'Gateway lands' located within a 4-acre (1.6ha) area were ***not*** *part of the active research lands due to past historical uses.*

Owner and Contact Information

Address: 1200 Baseline Road – PC2024-0140
Owner: Zena Investment Corporation
Contact Name: David Johnston Myers Automotive Group
Address: 1200 Baseline Road
Ottawa, ON. K2C 0A6
Email Address: djohnston@myers.ca

1.5 Site Location, Current Conditions, and Context

The property known municipally as 1200 Baseline Road is a 2.6 ha (6.5acre) polygonal site located in Ward 9 Knoxdale Merivale. A portion of the larger site that constitutes Phase 1 is an irregular polygonal form with a 120m frontage onto Merivale Road. The Phase 1 site is vacant and consists of a large asphalt parking lot. The Phase 1 site is bound by Merivale Road to the north, Burris Lane to the west, Elanor Drive to the south, and the car dealership (the remainder of the 1200 Baseline Road property) to the east. Phase 2 will be developed fronting onto the northeastern property line of the development site, extending 62m along Baseline Road. A large one-storey car dealership located in the eastern portion of the polygonal lot, surrounded by an asphalt parking lot extending to the limits of the site.

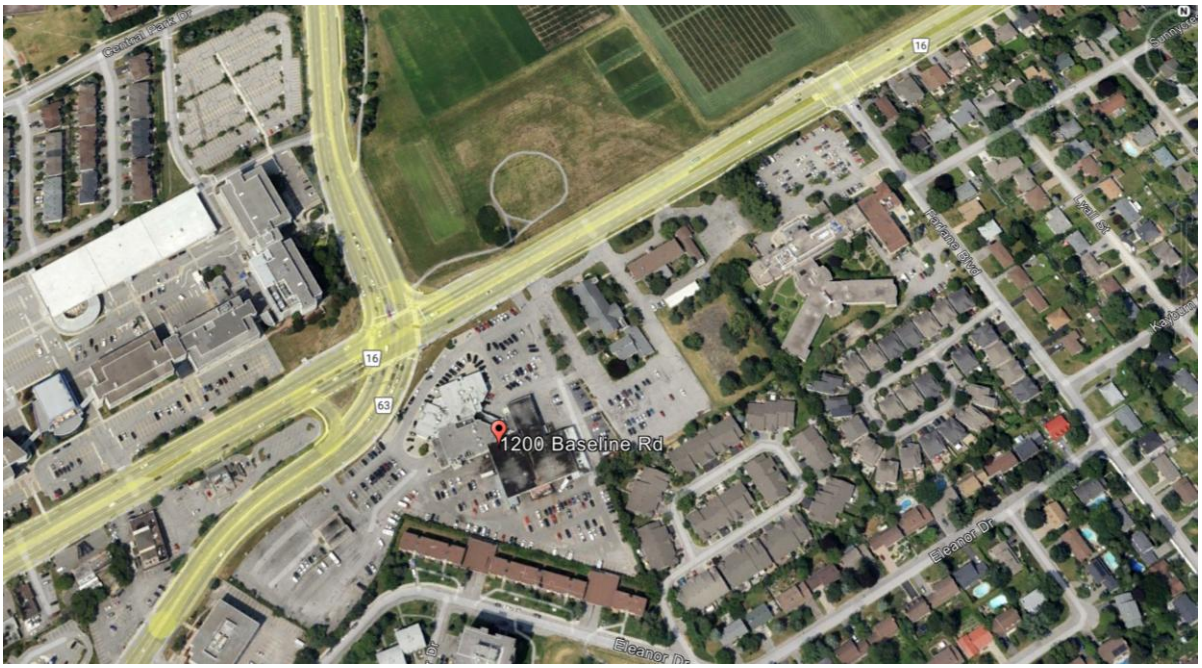


Figure 4: Aerial view illustrating the existing context adjacent to the larger development site. The northeastern property line of the development site extending 62m along Baseline Road is located across from the CEF National Historic Site of Canada. The Agriculture and Agri-Foods Canada (AAFC) headquarters is located to the west of the agricultural fields with frontage onto Merivale Road north of Baseline Road, where a western gateway to the CEF is proposed in the CEF Management Plan. The circular pathway on the CEF lands is the first element of a proposed western gateway to the CEF. Source: Geoottawa 2022.

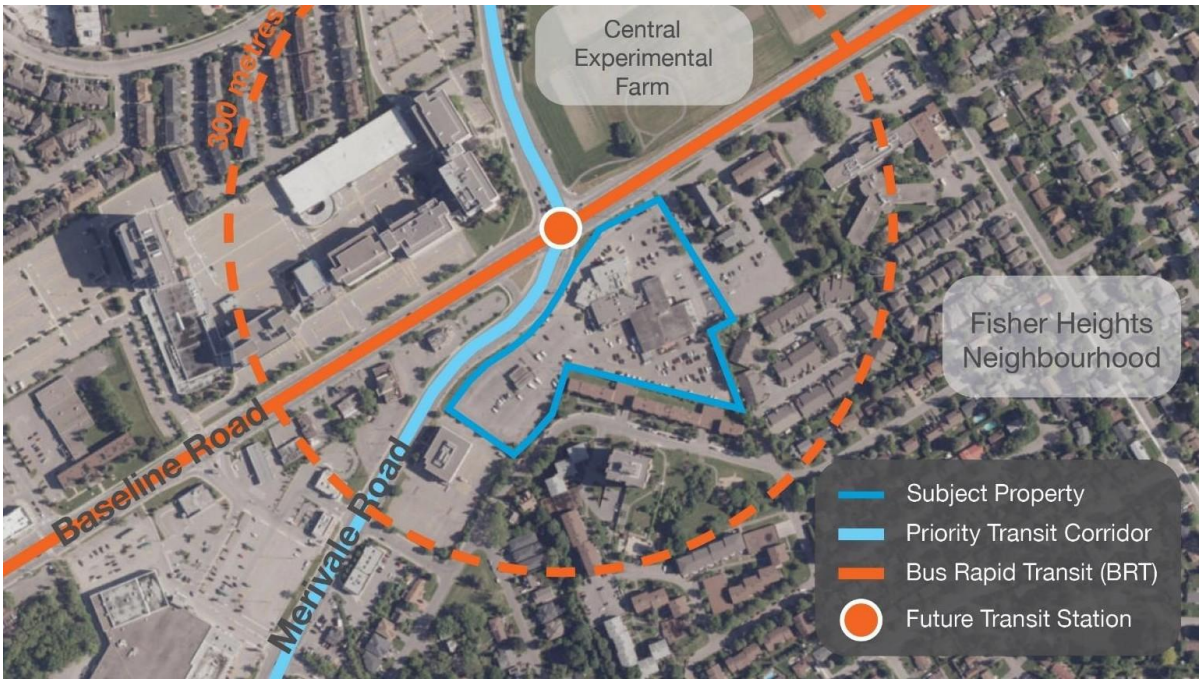


Figure 5: Contextual view fronting onto Merivale Road and its relationship to the larger site known municipally as 1200 Baseline Road. Source: Fotenn, 2025.

1.6 Surrounding Context and Neighbourhood Character

The surrounding context includes low-rise commercial, office, residential, and institutional uses.

North: The subject property abuts Baseline Road to the north at the intersection of Baseline Road and Merivale Road. Northeast is the Central Experimental Farm, which is a National Historic Site that occupies approximately 4 square kilometres of land. Northwest of the subject property is a federal office complex. Further north at Central Park Drive, there are two, 10-storey residential high-rise buildings with a low-rise residential neighbourhood consisting of single detached, semi-detached, and townhouse dwellings.

East: The property abuts St. Agustine Catholic Church to the East. Further east is a long-term care home and Fisher Heights neighbourhood consisting of predominantly single and semi-detached dwellings.

South: Immediately south of the subject property is a low-rise apartment building on Eleanor Drive. A 13-storey high-rise apartment building fronts onto Elanor Drive, adjacent to Elanor Park. Further south there are a series of townhouse dwellings.

West: The Phase 1 development has 200m of frontage on Merivale Road. West of it, there is a low-rise office building with associated surface parking. Further west there is a shopping plaza including a grocery store, banks, and a gas station. Merivale Road is characterized by low-rise, automobile oriented commercial buildings.

Figure 6: Context street view looking east on Baseline Road to the intersection with Merivale Road. The agricultural fields of the CEF and landscaping associated with the AAFC headquarters are to the left. The church property (right background) that forms the east side of the property known municipally as 1200 Baseline Road and is not part of the Phase 1 development site is visible in the right background to the east of Merivale Road. Source: Google Earth

Figure 7: View looking northeast on Merivale Road, with the portion of the property known municipally as 1200 Baseline Road that is not part of the Phase 1 development site to the right. Source: Google Earth

Figure 8: Street view looking west on Baseline Road, with the fields of the CEF and the AAFC Headquarters on the north side of Baseline Road. Note the copse of trees in the centre of the image that delineates the large circular pathway located at the southwest corner of the CEF visible in Figure 5. Source: Google Earth

1.7 Relevant Information from Council Approved Documents

CEF Management Plan & 2025 Working Group

The CEF NHS of Canada Management Plan (2005) acknowledged that there would be anticipated impacts on the scientific research conducted on the agricultural fields due to shadowing from future urban development. The CEF Plan acknowledges anticipated impacts from the development of the 'Western Gateway' and the proposed shelter belts extending along Merivale and Baseline Roads. It also anticipated that potential mitigation measures could include reorganization of the research plots.

The Central Experimental Farm (CEF) is designated as Open Space within the Greenspace Designation in Section 7 of the Ottawa Official Plan, and policy 7(c) identifies that these lands are to remain for scientific, educational, and cultural purposes only and are not to be used for non-CEF development. Furthermore, policy 4.5.2(4) states that development on or adjacent to National Historic Sites shall have regard for their cultural heritage value, as defined in the Federal designation documentation, and the City may require demonstration that development does not adversely impact these resources.

The Official Plan designation is consistent with the designation of the Central Experimental Farm (CEF) in the National Capital Commission's Capital Urban Lands Plan which applies an Agricultural and Horticultural Research Designation to the farm, and notes that it holds National Historic Value. Neither plan provides discussion on the manner in which the CEF lands are to interact with development external to the CEF, and there are no comments regarding minimizing adverse impacts associated with development external to these lands. Further, there are no City policies or guidelines that provide additional differentiation to the review of shadow impacts on the CEF apart from those generally applied towards shadow impacts associated with development on Open Space Lands.

The Management Plan illustrates a re-invigorated research option that allows the AAFC (Agriculture and Agri-Food Canada) to expand and develop its research activities, while respecting and reinforcing the Farm's value as described in the Parks Canada Commemorative Integrity Statement. The Plan creates a physical form that makes research activities more public and interactive, thus returning the Farm closer to its original design intentions.

The 2025 Working Group

Recent high-rise development proposals that front onto the CEF including 1081 Carling Avenue, 1110 Fisher Avenue, and 780 Baseline Road have raised concerns about the potential of shadowing and resulted in the formation of a working group consisting of the City and AAFC represented by the NCC to develop terms of reference for a plan to assess and mitigate potential impacts of future development as permitted by the Official Plan surrounding the CEF on the scientific and heritage values associated with the Farm as a National Historic Site of Canada and research institution. The recommendations of the joint City of Ottawa, Agriculture and Agri-Food Canada, and National Capital Commission Working Group, including any changes to City policies, guidelines, or procedures, were anticipated in late June 2025.

In response to a request to Heritage staff for an update on the group's progress, the author was informed that findings would be submitted later this year or early 2027.

Terms of reference for the working group include:

- The City will fund and hire independent consultants to prepare objective development scenarios on lands surrounding the Central Experimental Farm (CEF) at several timeframes, considering the City's planning framework and market conditions, and to recommend mitigation strategies that could minimize development impacts on the CEF. The funding for the consulting assignment, estimated at up to $50,000, can be accommodated from existing budgets as a result of the re-prioritization of planned studies.
- Agriculture and Agri-Food Canada (AAFC) was to map Central Experimental Farm research activities and study timelines and provide geometric support.
- The City, with support from Agriculture and Agri-Food Canada, were to have geometric team(s) use development scenarios prepared by the consultants to create digital 3D models, conduct shadow analyses, and show shadow impacts on specific research activities on the Central Experimental Farm.

- Following the identification of potential impacts on the Central Experimental Farm, all stakeholders in the Working Group will collaborate on the development and evaluation of options and recommendations to implement the Vision of this Working Group.
- Options may include but are not limited to city policy and/or guideline revisions or procedural changes and considerations by Agriculture and Agri-Food Canada regarding the future use of impacted Central Experimental Farmlands.

The Baseline Bus Rapid Transit (BRT) Planning Report, 2017

The Portion of Corridor along Baseline Road Between Clyde and Prince of Wales/Experimental Farm

The 45m right-of-way extending along Baseline Road for the BRT corridor will require a 7m strip of land within the Central Experimental Farm to accommodate median BRT lanes. In addition, the Agriculture and Agri-Food Canada staff requested a buffer "shelterbelt" along the frontage of the Experimental Farm. The shelterbelt, which is a specific arrangement of trees, and shrubs, will extend into the fields an additional +/- 18m. and is intended to reduce the effects of snowdrift, salt spray, and discourage access onto the Farm's fields. The report concludes that the shelterbelt is a positive inclusion that will improve the long-term health of the Central Experimental Farm and provide a pleasant vista for users of the pedestrian and cycle facilities.

Baseline BRT is currently in the draft design phase and is subject to some changes. To ensure sufficient right of way is protected, Baseline Road has a City-protected right of way of 47m between Marson Street and Fisher Avenue. In the case that the BRT draft design exceeds the OP limits, further discussion between the City and the AAFC should occur.

City of Ottawa Official Plan

The City of Ottawa Official Plan includes provisions for Cultural Heritage Resources in Section 4.5.

4.5.3 Where development is proposed on a property that is adjacent to or within 35 metres of the boundary of; a property containing an individually designated heritage building (Part IV of the Ontario Heritage Act), a heritage conservation district (Part V of the Ontario Heritage Act) or a federally recognized heritage property, the City may require that a Heritage Impact Assessment be conducted by a qualified professional with expertise in cultural heritage resources. The assessment will do the following: [Amendment #96, February 22, 2012][2]

Heritage Values of the Central Experimental Farm

The HIA is concerned with the impact of the proposed development on the heritage value of the Central Experimental Farm from shadowing of the research fields due to structural obstruction of light due to the built form on external lands. The Farm, recognized as a National Historic Site in 1997, is identified in Ottawa's Official Plan as a heritage property. Two documents outline the heritage value of the Central

[2] It should be noted that the Farm is not adjacent within the meaning of the law, due to the intervening ownership of Baseline Road by the City, which is a position that the City of Ottawa has supported in other situations.

Experimental Farm and guide its conservation – the Commemorative Integrity Statement (CIS) and the Statement of Significance (SOS). Section 3.3 (4) of the Official Plan asks the HIA to address the Commemorative Integrity Statement (CIS). Pertinent sections of the CIS are included in the HIA as Appendix A. The Statement of Significance, is provided as Appendix B.

The summary of the heritage value of the CEF, as stated in the SOS, is:
The Central Experimental Farm was designated a national historic site of Canada in 1997 because:

- as a cultural landscape, the more than 400-hectare farm in the heart of the Nation's Capital reflects the 19th-century philosophy of agriculture and carefully integrates an administrative core and a range of other buildings with an arboretum, ornamental gardens, display beds and experimental fields in a picturesque composition;
- since its establishment in 1886, the farm has made significant scientific contributions to agriculture in Canada by uniting scientific experimentation with practical verification, as exemplified by the development of the hardy strains of wheat that were so influential in expanding Western Canadian agriculture.
- a rare example of a farm within a city, the Central Experimental Farm has become a symbol of the central role agriculture has played in shaping the country.

2.0 STATEMENT OF CULTURAL HERITAGE VALUE

The following Statement of Cultural Heritage Value identifies the primary heritage values and attributes of the Central Experimental Farm NHS. Source: Parks Canada National Historic Sites of Canada

2.1 Statement of Cultural Heritage Value

Recognition Statute: Historic Sites and Monuments Act (R.S.C., 1985, c. H-4)
Designation Date: 1997-09-22
Dates: • 1886 to 1980 (Construction)
Event, Person, Organization: • Thomas Fuller (Person) • James Fletcher (Person) • William Saunders (Person) • Sir John Carling (Person)
Other Name(s): • Central Experimental Farm (Designation Name)
Research Report Number: 1997-043 DFRP Number: 08625 00 Plaque(s)
Existing plaque: 930 Carling Avenue, Ottawa, Ontario

A rare example of a farm within a city, this outstanding cultural landscape brings together two strong 19th century interests: agricultural improvement and picturesque design. Established by the federal government in 1886, the Farm has supported Canadian agriculture by undertaking critical scientific research and by developing and demonstrating good farming methods. Its 426 hectares are organized into three distinct areas: a central core of science and administration buildings, an arboretum and ornamental gardens, **and the experimental fields and plots**. The Main Dairy Barn, with its attached stables laid out around a barnyard, was at the heart of the model farm. The individual parts of the

landscape are orchestrated into an organic whole intended to enhance nature's inherent beauty. Adopting picturesque features of the British country estate, the Farm combines large stretches of lawn and field, winding paths, and pleasing water vistas. This site is a symbol of the crucial role agriculture has played in shaping Canada.

Description of Historic Place

The Central Experimental Farm National Historic Site of Canada, located in urban Ottawa, Ontario, comprises various structures and buildings embedded within a large rural landscape. Flanked by broad expanses of farmland, its central area consists of the administrative core, housed in a variety of eclectic and picturesque structures, and encompasses an arboretum, specimen plantings, and intricate ornamental gardens. Official recognition refers to the cultural landscape with its natural, built, and landscaped components at the time of designation.

Heritage Value

The Central Experimental Farm was designated a national historic site of Canada because: as a cultural landscape, the more than 400-hectare farm in the heart of the Nation's Capital reflects the 19th-century philosophy of agriculture and carefully integrates an administrative core and a range of other buildings with arboretum, ornamental gardens, display beds and experimental fields in a picturesque composition; since its establishment in 1886, the farm has made significant scientific contributions to agriculture in Canada by uniting scientific experimentation with practical verification, as exemplified by the development of the hardy strains of wheat that were so influential in expanding Western Canadian agriculture; a rare example of a farm within a city, the Central Experimental Farm has become a symbol of the central role agriculture has played in shaping the country.

Eager to introduce profitable new agricultural methods and products, the federal government created the Central Experimental Farm in 1886. The Department of Agriculture selected a rectangular parcel of land, over 400 hectares in area, approximately 3 kilometres from Parliament Hill. Located on a desirable site, due to its variety of soil types and access to land, water, and rail transport, the farm would serve both Ontario and Québec. **As the city of Ottawa grew, the Farm was gradually absorbed into the urban environment and is now situated well within the city limits.**

The plan of the Farm is based on three clearly defined zones: a central core of administrative, scientific, and functional farm buildings and spaces; **the experimental fields, plots, and shelterbelts**; and the arboretum, ornamental gardens, and experimental hedges. The Farm’s Picturesque landscape is the result of a movement promulgated by an 18th-century English aesthetic theorists and practitioners who sought to bring landscape design closer to an idealized nature. One convention of this movement was the adoption of certain standard features of the British country estate, including large stretches of lawn and fields, use of water, masses of trees and shrubbery, and winding pathways. These features, designed to enhance nature’s inherent beauty by emphasizing its irregularity, variety, and intricacy in form, colour, and texture, integrate harmoniously with the administrative, scientific, and functional farm buildings. The Picturesque qualities of the Farm are a significant aspect of the 19th-century philosophy of agriculture.

This philosophy also recommended the use of chemistry and genetics to make farm life more productive and appealing. Its proponents sought to develop better farming methods by applying a new scientific methodology to farming. Since its establishment, the Central Experimental Farm has contributed substantially to the development of Canadian agriculture through scientific research, experimentation, and practical verification. The Farm has addressed issues such as human and animal health, the importation of plants and livestock, the identification and control of imported insect pests, and soil fertility. It also contributed to the expansion of agriculture in western Canada through the development of hardy strains of wheat, and in eastern Canada through research on forages and grasses. The Farm soon became the headquarters of a national system of experimental farms, as its central location and administration served to address a range of national agricultural issues.
Source: Historic Sites and Monuments Board of Canada, Minutes, June 1997.

Character-Defining Elements
Key elements contributing to the heritage value of this site include its location in the urban centre of Ottawa, encompassing a variety of soil types, cleared fields, and various buildings; its pastoral appearance, as well as the orderliness and neatness critical to the Farm's scientific pursuits; its plan, made up of three clearly defined zones: the central core of the functional farm, science and administration buildings; the experimental fields and plots with their bordering shelterbelts; and the arboretum, ornamental gardens and experimental hedges; the buildings, which illustrate the Picturesque character with their compatible scale, varied volumes and silhouettes.

Key elements contributing to the heritage value of the central core include: the intimate scale of the interior of the zone, and the campus-like atmosphere; the compatible scale and design of both Prince of Wales Drive and the Driveway, which have evolved from the main north-south and east-west roads in the original 1880s plan and link the Farm to the city; the placement and design of the core administration buildings with their wood-clad exteriors, and their relationships to each other and to their landscape setting, which reveal their original functions and the orderly development of the original 1880s Picturesque plan; the associations of the buildings with key figures in the development of Canadian agriculture, such as William Saunders, Charles Saunders, and Sir John Carling; the buildings' small, single-storey board and batten style, conveying their continued role as part of a complex of support buildings; the model farm, intended to demonstrate the most efficient and orderly layout of farm buildings.

Key elements contributing to the heritage value of the experimental fields, plots, and shelterbelts include:

- the orderly organization of the fields based on a grid system reinforced by a regular system of roadways and access lanes, and distinctive internal fencing of red "pencil posts" with white tops;
- the open cultivated fields, with their variable sizes, colours, textures, and seasonal variations;
- the relationship between the open fields and the heavily screened Driveway with its parkway characteristics of curbs and streetlights, which emphasize the integration of a farm within a city;
- the shelterbelts, made up of hardy trees which protect the fields;
- the core brick-clad science and administration buildings;

- the viewscapes including the view from the corner of Baseline and Fisher, the view southwest from Carling Avenue across the fields, the framed view looking east from Fisher along Cow Lane, and the view from any point along the periphery into the open fields.

Key elements contributing to the heritage value of the arboretum and ornamental gardens include: the Picturesque nature of the site, evidenced in the skilful use of topography and water, and the incorporation of the shoreline of the Rideau Canal, Dow's Lake, and the lagoons into the visual composition; the circulation pattern in the arboretum, laid out in a typically Picturesque design of curving promenades and constantly changing views; the glass and metal frames of the greenhouses; the arboretum itself, including a wide variety of specimen trees and shrubs, planted to test and demonstrate suitable tree species for various hardiness zones of Canada.

2.2 Western Gateway Lands

The approximate area of the lands forming the gateway feature is in the order of 16,500m^2 or 1.6ha (4.0 acres + -). The agricultural fields of the Central Experimental Farm (CEF) (east) and the Agriculture and Agri-Foods Canada (AAFC) headquarters (west) are located to the north of Baseline Road. AAFC is proposing to develop a 'western gateway' to the CEF incorporating the headquarters and portions of the agricultural lands. The path extending from the corner of Merivale and Baseline Roads appears to be the first element of the proposed 'western gateway'. It leads to a large circular pathway located within a 4-acre (1.6ha) area. As the two illustrations Figure 8 and 9 show, these lands were not part of the active research lands due to past historical use. The lands were previously developed with an L shaped agricultural building, barnyards, and lanes.

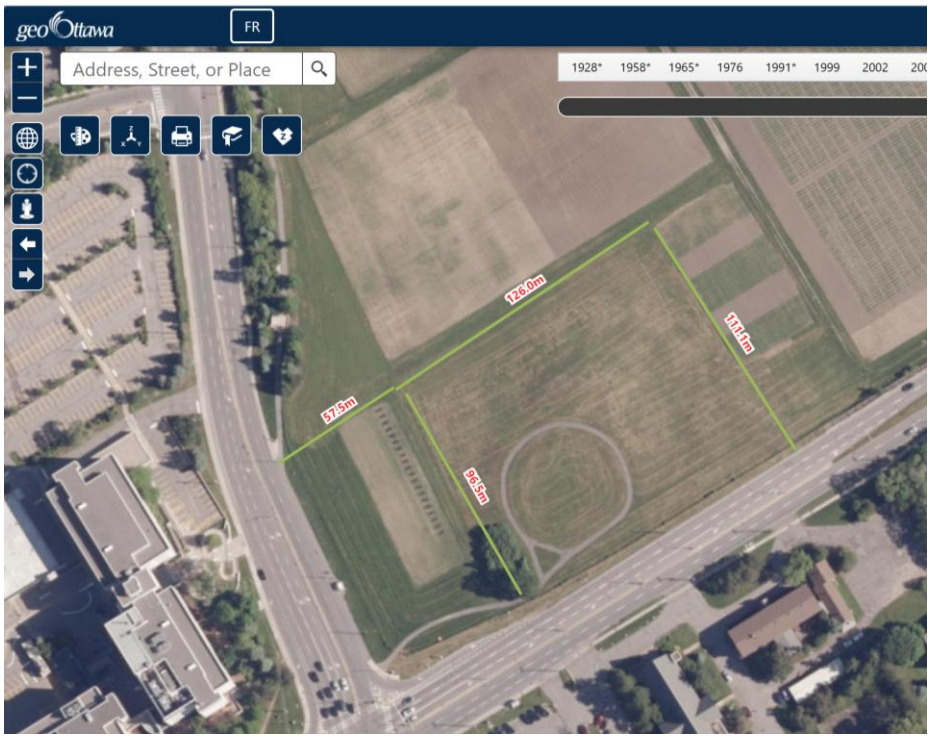


Figure 9: An aerial view of the southwest corner of the CEF agricultural fields with a pathway extending east from the Merivale Baseline intersection to a circular pathway located on lands that have not been used for agricultural research due to past historical use. Source: Geoottawa

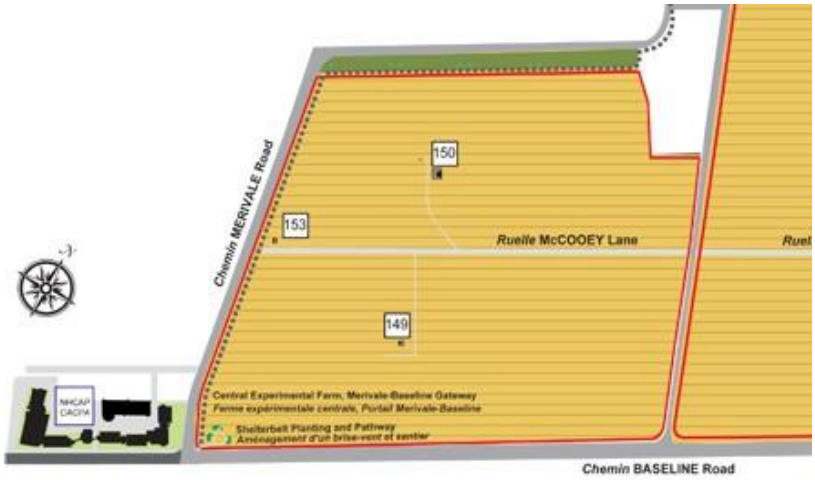


Figure 10: A portion of the Farm map from the AAFC's 2007 management plan illustrating the Merivale Baseline Gateway with shelter belt planting along Baseline.

Figure 11: 1965 Aerial view of the CEF lands at the intersection of Merivale and Baseline Road with the barn and sheds illustrated (circled in red) and source: Geoottawa and Figure 12: A 1963 photograph of the Booth barns and sheds that were located in the southwest corner of the CEF and demolished prior to 1976. Source: Collections Canada.

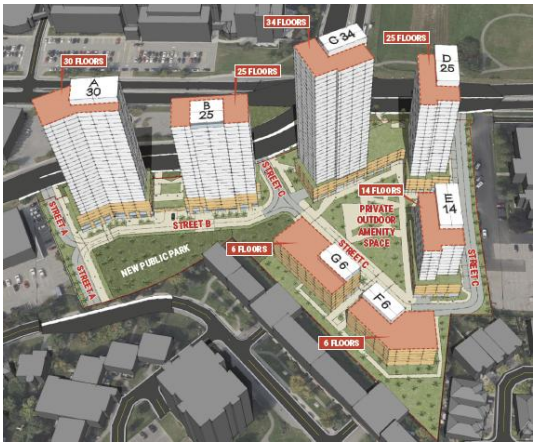
3.0 DEVELOPMENT PROPOSAL

3.1 Description of the Proposed Phased Development

The redevelopment of 1200 Baseline Road envisions the transformation of an existing car dealership into a mixed-use residential community delivered in two phases. The master plan introduces a total of four high-rise mixed-use towers, one high-rise residential building, and two mid-rise residential buildings, organized around a new public park, a pedestrian-first internal street network, and active, animated edges along Baseline Road and Merivale Road.

Phasing Strategy

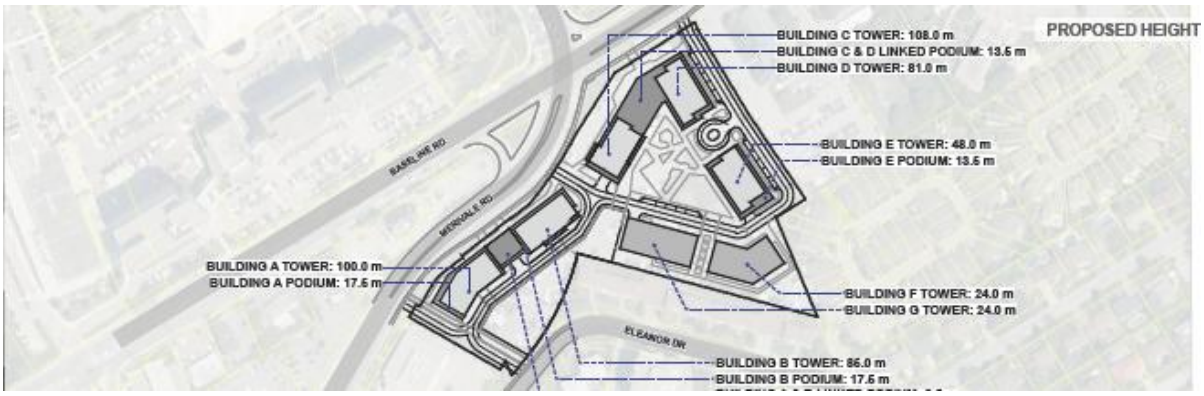
Phase 1 introduces two high-rise mixed-use towers of 30 and 25 storeys, designed to coexist with the existing dealership, which remains operational during this initial phase. The site layout, servicing, and circulation patterns are configured to maintain dealership access while establishing the first components of the new public realm.



Phase 2 completes the transformation by removing the dealership and introducing three additional towers (34, 25, and 14 storeys) along with two 6-storey mid-rise buildings. This phase finalizes the internal street network, completes the public and private open-space system, and delivers the full residential community envisioned in the master plan.

Massing and Height Distribution

The massing strategy organizes the tallest buildings along the Baseline Road and Merivale Road frontages—two major arterial corridors—where height is most appropriate, and transit access is strongest. This strategy also limits the shading of the research fields to the north.



This approach:

• Concentrates density along the arterial edges.

• Minimizes visual and shadow impacts on the Central Experimental Farm.

• Provides a graduated transition toward the adjacent low-rise neighbourhood by stepping down to mid-rise forms along the interior and eastern edges of the site.

• Assures a coherent skyline that frames the intersection while respecting surrounding context.

Figure 13: Aerial view of the proposed development, documenting the planned heights and relationship to Baseline and Merivale Roads. Source: 2026 Hobin

Architectural and Urban Design Vision

The architectural character across the master plan is unified expression that emphasizes clarity of form, high-quality materials, and a consistent approach to massing articulation. Each building follows a base–middle–top design strategy, ensuring a coherent skyline while reinforcing a clear pedestrian experience at grade.

The base or podium is four storeys, using warmer, tactile, and pedestrian-scaled materials to define the public realm. Masonry, textured panels, and transparent glazing are used to articulate retail frontages,

residential lobbies, and amenity areas, creating an active and welcoming streetscape along Baseline Road, Merivale Road, and the internal pedestrian network.

The middle portions of the towers introduce a shift in materiality and rhythm, using a combination of contrasting elements to break down the vertical massing and provide visual interest. This zone incorporates a balanced mix of solid and transparent surfaces, with articulated balcony patterns, vertical piers, and subtle material transitions that reinforce slender tower proportions.
The top of each tower is distinguished through lighter, contrasting materials such as glass, aluminum, and light-coloured masonry, creating a visually lighter skyline expression. This approach reduces perceived bulk, enhances daylight reflectivity, and contributes to a cohesive architectural identity across both phases of development.

Together, these strategies ensure that the buildings contribute positively to the evolving urban fabric, support a comfortable pedestrian environment, and maintain an anchor relationship with the surrounding neighbourhood and the Central Experimental Farm.

Figure 14: a graphic rendering of the exterior palette of materials for the buildings' bases, towers, and tops. Source: Hobin 2026

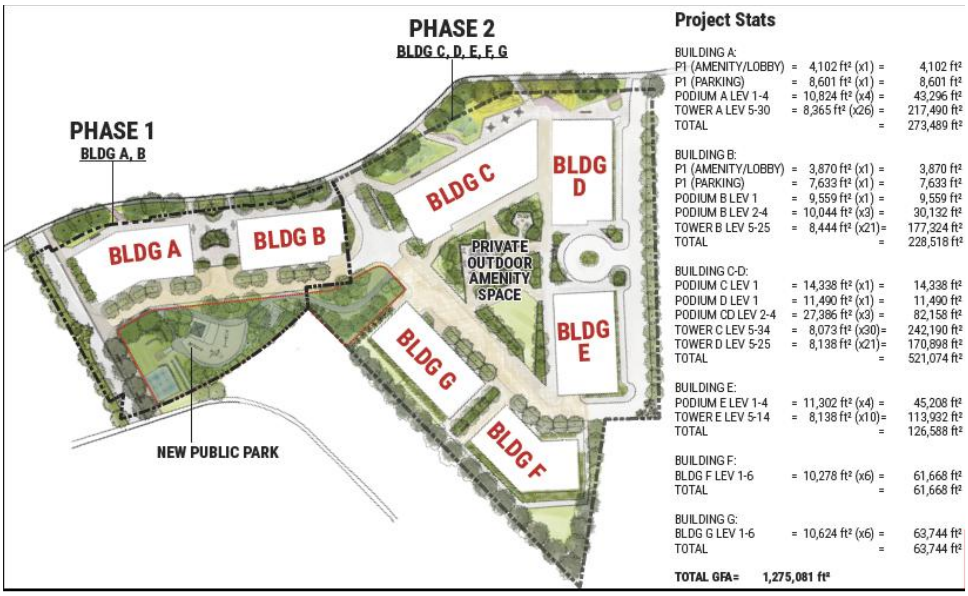


Figure 15: Project Stats for the proposed development illustrating both the Phase 1 and 2 developments on the site known municipally as 1200 Baseline Road. The plan illustrates the inclusion of 10% parkland dedicated public park in phase 1 and private outdoor amenity space planned for Phase 2; access points from Merivale Road and Eleanor. Source: 2026 Hobin

3.2 Massing Studies Options

Throughout the design process, there has been a concerted effort to consider building massing improvements that mitigate shade. These are discussed in section 4 Impact and Mitigation.

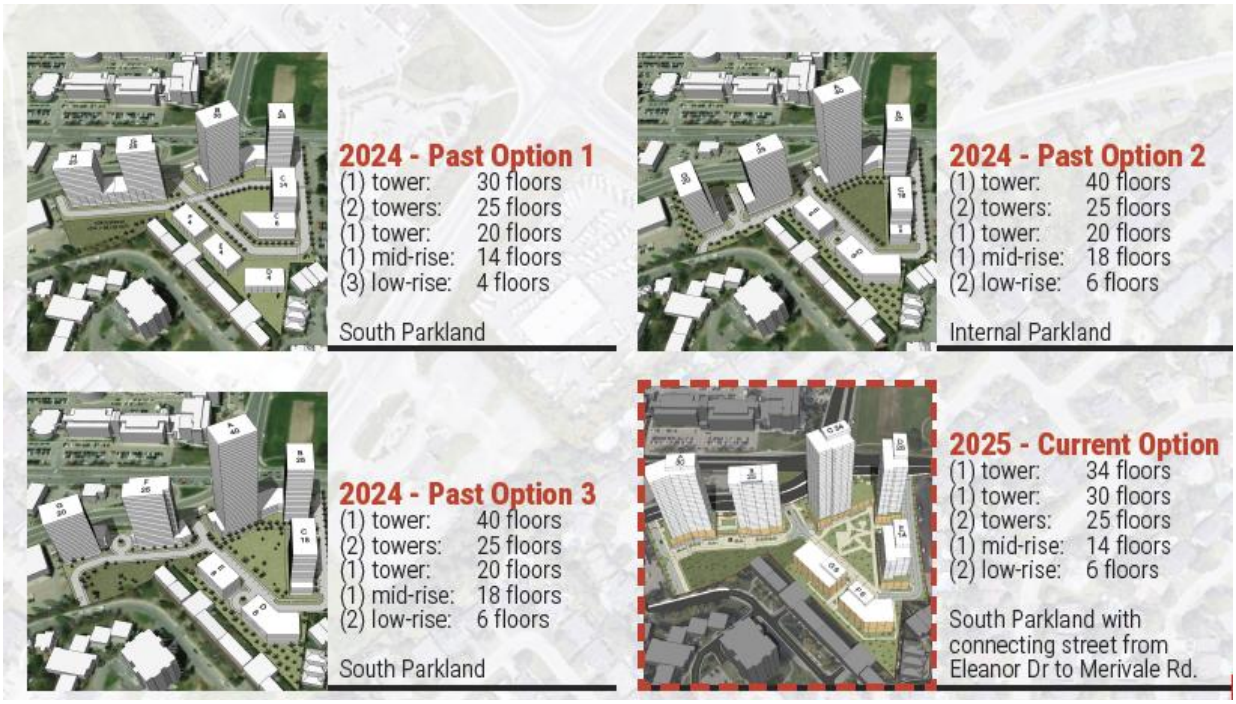
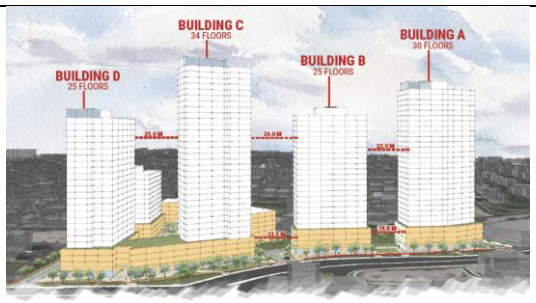


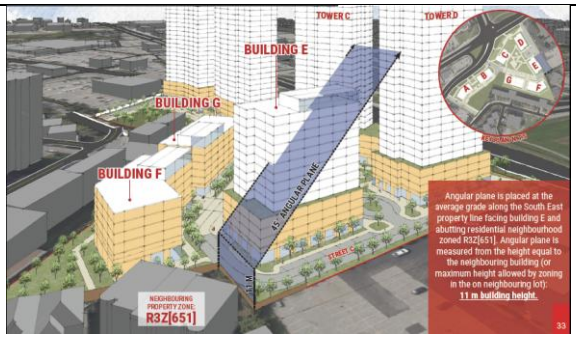
Figure 16: Past and current Massing Study Options. Source: Hobin 2026

Phase 1 from the north



Phase 1 & 2 from the north

Separations, Setbacks & Angular planes



Angular planes addressing southern neighbours

Figure 17: Massing, angular planes, and separations. Hobin 2026

3.3 Site Plan

The landscape design for 1200 Baseline Road establishes a distinctive, cohesive language that complements and softens the architecture, integrates the site into the broader neighbourhood context, and provides spaces that enrich the site experience for residents, visitors, and park users. Bermed landforms and dense tree plantings are strategically placed to channel views and circulation, as well as delineate spaces without the need for formal barriers or fencing.

Figures 18 & 19: Illustrated the phase 1 & 2 site plans. Note the revised plan for phase 2 where The 10% Parkland dedication establishes a public park that serves both the development residents and the wider community. The park design is informed by the tower architecture, site forms, grading, and materiality to create a cohesive site wide pedestrian realm.

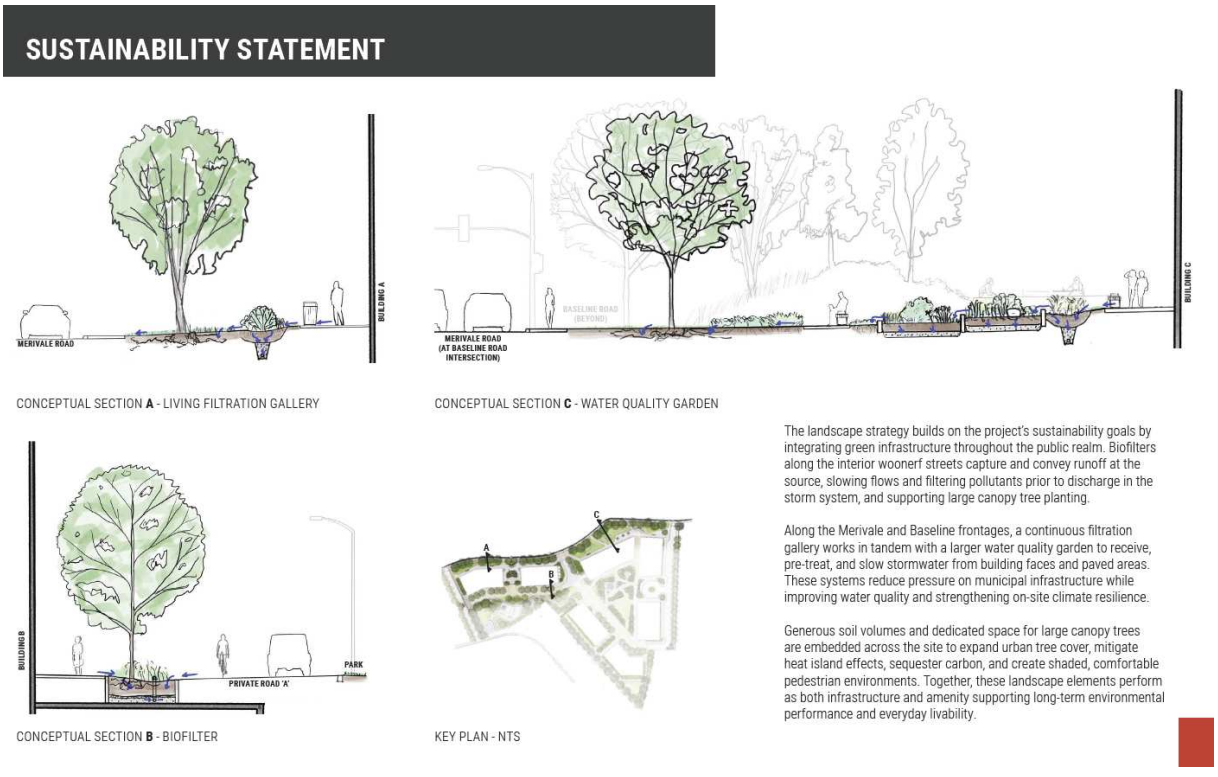


Figure 20: Sustainability is an essential strategy that integrates green infrastructure throughout the public realm. Fotenn 2026.

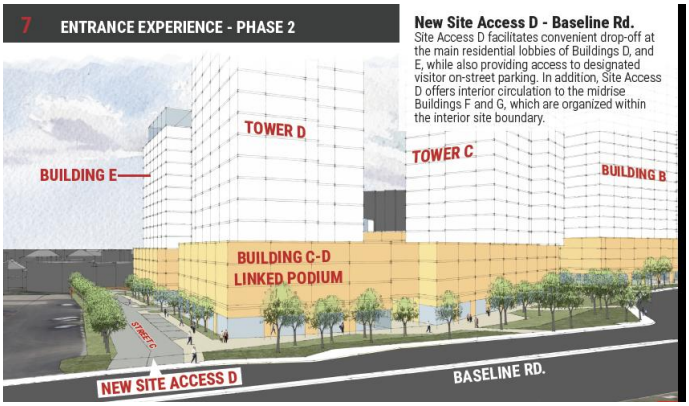
The interface with Baseline Road and Merivale Road is defined by generous boulevard tree plantings, while a secondary pedestrian route runs along the retail frontages, providing an alternative circulation

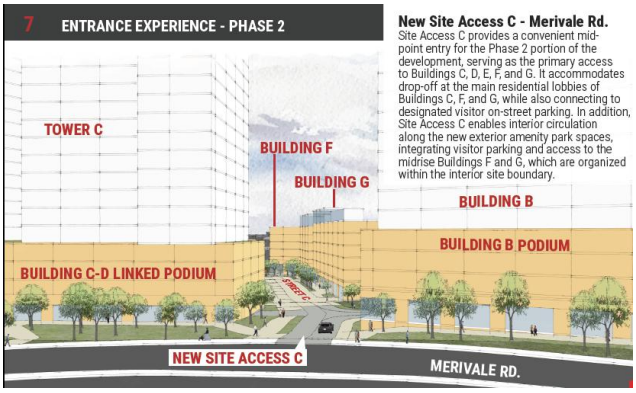
option and seating areas setback from the activity of the main streets. The proposed public park fronts onto Eleanor St. and features fun, welcoming amenities set into the site's natural topography and sitewide tree planting palette. The proposed private roadway provides resident access and incorporates an inset jog to discourage cut-through traffic. A multi-use pathway, proposed to be secured by an access easement, establishes a welcoming, direct route for cyclists and pedestrians, linking Eleanor Street to Merivale Road and activating the adjacent park.

Public Realm, Site access

Primary site access for buildings A and B offers convenient drop-off for the main entrance, visitor surface parking, and access to below grade parking. A new front entrance plaza along Merivale Street will provide pedestrian connection to the residential lobbies of the two towers, while framing the new public park on Elainor Drive.

Figure 20: Phase 1 & 2 aerial views illustrating new site access A, B, C, & D.





The public realm will be enhanced to include mid-block pedestrian pathways, a dedicated municipal park, extensive landscaping with plantings throughout the site in outdoor amenity areas, parking lots, and along required yard setbacks. The public realm is designed to provide accessibility to the site and surrounding neighbourhood. Along Merivale at-grade retail will promote an urban pedestrian realm that is animated and visible from the street. Street trees and landscape plantings will be provided along Baseline Road, and Merivale Road as a buffer from the street and softening the transition between the street and building façade.

3.4 Sun/Shade Studies

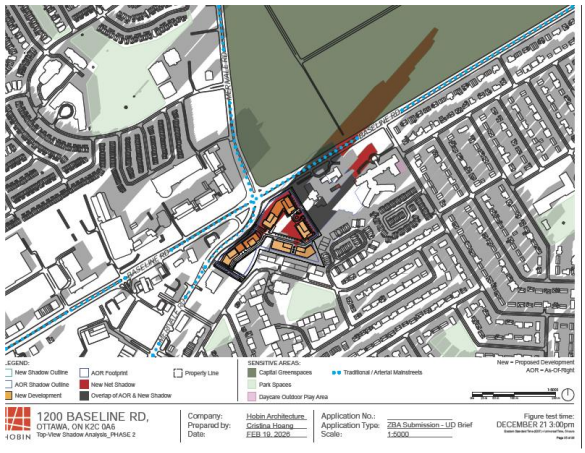
The HIA has reviewed the information addressing the impact of shadows on the agricultural fields along Baseline Road. This information includes:

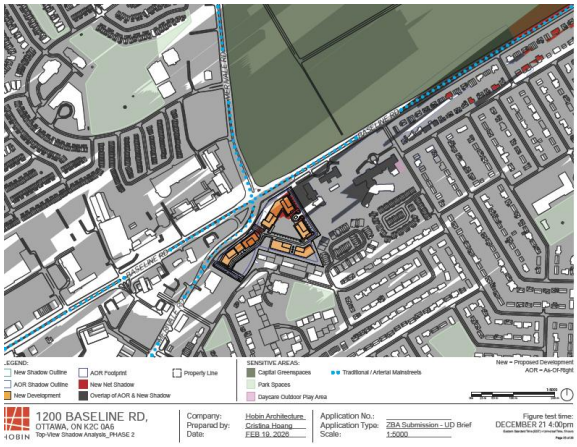
- The shadow analysis was prepared by Hobin Architecture in 2026. for both the Phase 1 development and for the Phase 2 site.

- The Agri-Food Analysis, AAFC letter to the City of Ottawa, and the peer-reviewed Miller Engineering Inc. report, *"A Review of the Effects of Structural Sunlight Obstruction on AAFC Research Plots," are* provided as a separate submission. The area impacted by structural light obstruction from the development, according to that report and for 780 Baseline Road, is shown in Figure 21. It provides a comparative analysis and context.
- The Ottawa Official Plan designates the Central Experimental Farm as 'Greenspace with a sub-designation of 'Open Space,' which is consistent with the shadowing terms of reference of impacts on a public space and therefore the City interprets this land as "Open Space" as it relates to the City's shadow Terms of Reference. The results of the shade analysis are guided by these TOF in arriving at a determination of impact, which identifies that:
  - The new net shadow must not result in an average of 50 percent of any public space being cast in shadow for 5 or more hourly interval times during the September Solstice test date only.

Figures 21 & 22: Sunshade analysis for June, September/March, and December confirms that there will be no issue from shading as it pertains to the Farm's research fields. The December shadow pattern extends onto the fields for less than an hour and by 3:30pm has shifted to shade Baseline Road. The two enlarged images provide a clearer view of the shadowing for December at 3pm and 4pm. Refer to Figure 22 below, Shadow Study for visual context.

- *Summer Months: no shadow impact observed.*
- *September/March: Very light shadowing between 11:00 AM and 1:00 PM at the corner area, which is part of the Merivale/Baseline Western Gateway and outside the research crop growth fields.*
- *December (Winter Solstice): No impact on crops. Light shadowing on experimental farmlands is documented, with shadow movement occurring over a one-hour increment across the impact zone between 2:00 pm and 3:00 pm.*





4.0 IMPACT OF THE PROPOSED DEVELOPMENT, ALTERNATIVES, AND MITIGATION MEASURES

The City and the AAFC agree that the impacts on the Central Experimental Farm (CEF) are focused on the scientific and heritage values associated with the farm as a National Historic Site of Canada and research institution. The shadowing of lands from new high-rise buildings will have an impact on the research activities, including long-term scientific experiments, by adding additional variables and introducing fluctuations in annual solar exposure.

This section specifically addresses the potential impacts of the development proposal on the cultural heritage values of the Central Experimental Farm National Historic Site. The impacts are assessed in accordance with the Official Plan and National Standards. The heritage attributes and character-defining features of the Central Experimental Farm NHS are itemized in Section 2.0.

4.1 Quantitative Impact: Sunlight Reduction of a Comparable Development

A study (Potential Effects of Structural Sunlight Obstruction on AAFC Research Plots) prepared by Miller Engineering (APPENDIX E) for 780 Baseline Road delineates the estimated shadowing impact at the autumn equinox from three proposed high-rise towers: two 32- and 24-storey towers with frontage onto Baseline Road and one 24-story tower set behind on the west side of Fisher Avenue. The 780 Baseline site is directly across from the Experimental Farm on Baseline Road. It can be considered analogous in regard to longitude and latitude to the 1200 Baseline Road site.

The Miller report outlines the percentage (1% to 20%) reduction in solar radiation at the autumnal equinox on the CEF lands to the north; the area impacted extended approximately 600m to the west and 400m to the east of the towers with a depth of 200m into the CEF lands with an aggregate area of 0.2km^2 (ca. 20 ha acres/20ha). The area impacted by a 10% to 20% reduction (350m × 100m) was in the neighbourhood of 8.6 acres or 3.5ha (Figure 15). The growing season extends from April 1st to November 1st, and it is anticipated that an additional area of the research fields will be shadowed between the period from the fall equinox September 21/22 to the November 1 period. The additional shadowing would potentially have an impact on crops such as winter/spring wheat, which, is the only crop with a growing season that extends beyond the autumnal equinox.

The proposed development at 1200 Baseline Road is similar in form and height to the 780 Baseline Road development; however, the proposed development is west of the farm with a total of 5 towers setback 50 m further from the CEF property line (Figure 24).

Understanding Sunlight Reduction: The main concern is how much sunlight the new buildings could block from reaching the CEF's research fields. According to the Miller peer-review, which considered the high-rise towers at a nearby site (780 Baseline Road), shadows from the high-rises would reduce sunlight in certain areas by anywhere from 1% to 20% during the fall equinox (around September 21). To put this in perspective, a 10% reduction in sunlight is like having 10 out of every 100 rays of sunshine blocked. difference you might notice as slightly longer periods of shade on the ground, much like standing near a row of trees instead of in the open. Most grass crops can experience up to 20% reduction of sun without compromising the yield.

Applying These Findings to 1200 Baseline Road: The planned development at 1200 Baseline Road is west of the Farm and is set back farther from the CEF than the previously studied site, which means the actual area and intensity of shadowing will be less. For most of the year—spring, summer, and fall—the research fields will receive the same amount of sunlight as they do now. Only during a brief period as documented at December 21, winter solstice analysis will there be some additional shade. However, crops like winter wheat that grow later in the season will be dormant by this time.

Key Finding: The estimated average reduction in sunlight across the affected area during the growing season is less than 4%. This is similar to the effect of a few partly cloudy days spread over several months, and should not have measurable impacts on the Farm's ongoing research or crop yields.

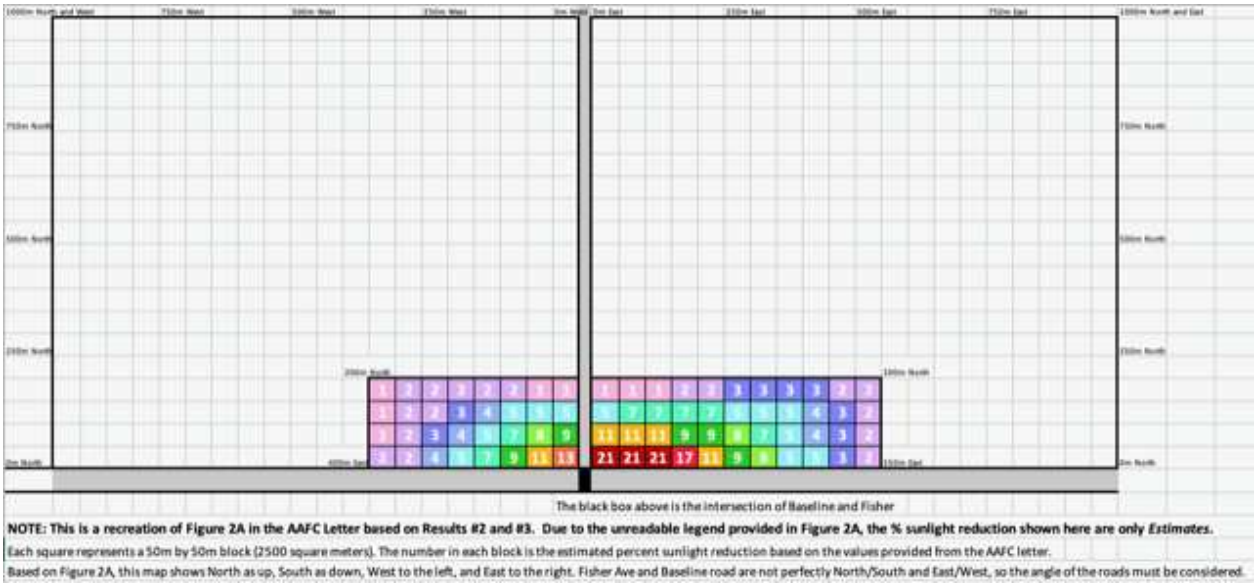


Figure 23: Block diagram illustrating the estimated percentage of sunlight obstruction at the autumnal equinox on areas of the CEF lands due to the completion of two residential high-rises of 32 and 24 storeys with frontage on 780 Baseline Road and a 24-storey tower set behind fronting onto Fischer Avenue. The squares represent a 50m × 50m grid, and the number within the squares is the estimated percentage of sunlight obstruction at the September 21 equinox. The area impacted from a 1% to 21% reduction in sunlight extends 1 km (0.4 km east & 0.6km west) along Baseline Road and extends 0.2km (200m) into the CEF lands. The shaded area extending along the base of the graph represents the 50m right of way for Baseline Road. Source: Miller Engineering 780 Baseline Road Analysis

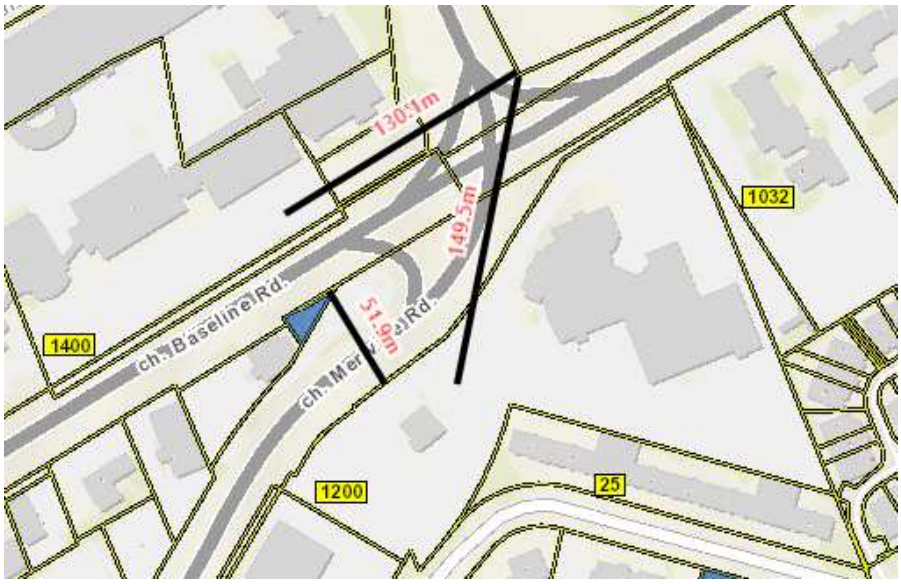


Figure 24: Block diagram illustrating the location and geometry of the Phase 1 development in relation to the CEF lands and the Baseline Road ROW. Source: Geoottawa.

1. Based on the block diagram (Figure 23), the estimated percentage of sunlight obstruction on CEF lands shadowed at the autumnal equinox due to structural light obstruction from the development with frontage on (780) Baseline Road is between 1-20%.
2. According to planning documents, the area impacted will be reduced by the proposed western gateway feature, the 7m strip of land required for the BRT and the 18m shelterbelt within CEF lands. These modifications along Baseline will significantly reduce the lands being impacted.
3. Based on the location of the land parcel at 1200 Baseline Road (Figure 17) in relation to the CEF lands, one can infer the approximate area of land within the CEF that will be impacted by structural light obstruction will be marginal and will only occur during the winter months.

The reduction in light will extend north-south approximately 150m into the CEF lands and extend to the east approximately 450m (600m – 150m) along Baseline Road. Based on Figure 15 the estimated sunlight obstruction is limited to the Winter equinox and in the order between 1%-4%. By the spring solstice there is no shading on the farm research lands and none at the June equinox and September solstice.

4.2 Impact of the Development Proposal

The CEF is identified as a separate designation and land-use in the City of Ottawa's *Official Plan*. As per the Ottawa Official Plan, the relevant policy is *4.5.2.4 which states:*

> *"Ottawa is the site of the Rideau Canal World Heritage Site, many National Historic Sites, and both privately- and publicly owned buildings designated by the Federal Heritage Buildings Review Office. Development including or adjacent to these sites shall have regard for their cultural heritage value, as defined in Federal designation documentation, and the City may require demonstration that development does not adversely impact these resources[3].*

[3] *It should be noted that in accordance with case law in the Southminster case PL180075-APR-09-2020 (in which the City concurred) it was concluded that both the 780 Baseline lands and the Carling Avenue lands are not considered*

1. Describe the positive and adverse impacts on the heritage resource or heritage conservation district that may reasonably be expected to result from the proposed development;

Positive impacts of the proposed development on the cultural heritage values of the Central Experimental Farm NHS include:

- The towers are set back approximately 100m to the south and 150m to the west of the CEF lands, creating no shading of research lands. (Figures 22 & 23). A similar pattern occurs with the phase 2 development but extends onto the research fields between 2:30 and 3:30 pm in the winter equinox creating shadowing between 1-4% resulting in no impact.

Adverse impacts of the proposed development on the cultural heritage values of the Central Experimental Farm NHS include:

- AAFC management acknowledges the fields adjacent to Baseline and Merivale Roads will be impacted by the built form on external lands as a result of urbanization.
- Appendix C is a chronology of Aerial Photographs extending over 65 years. The photos support that test plots have been replaced with acreage crops and a grass buffer of untilled land next to the road.
- The proposed BRT, where a 7m strip of land will be required for road widening and an 18m strip of land will be set aside for a proposed shelterbelt, further reduces the net area impacted by the obstruction of light caused by the development.

4.3 Alternatives and Mitigation Measures

Urban Design Review Panel (UDRP) Assessment & Recommendations

At the December 2025 UDRP meeting, a series of recommendations were suggested to help integrate the planned development within its setting. The team has explored alternatives that mitigate most of these concerns and has resulted in a major redesign of the development. Key recommendations include exploration of the massing distribution, will mitigate impacts to the CEF.

- **Phase 1 Height Transfer from Phase 2.** Specifically, building heights were revised to minimize shading impact on surrounding neighbourhoods and the Experimental Farm, with a better transition for the-low rise neighbourhood to the south.
- In response to **the site plan**, the design team has collaborated with the city's parks department to create a more linear green space that extends the internal park experience and supports connections. Along Merivale and Baseline, the street plantings and landscape will carry the idea of shelter belt buffer planting being planned along Baseline in front of the fields.

adjacent. The distinction is important in terms of applicability to the policy. More importantly, the policy, does not direct the City to not support the ZBLA. It simply requires to have regard to the heritage implications. These implications have been addressed as part of the mitigation efforts in the HIA.

- **Minimizing vehicular traffic movement** across the site with reduction in the overall driveway width, reducing the number of internal streets, and reducing the lay-by lanes, the introduction of pavers and curbless driveways.
- **Movement Networks** In response to a need to distinguish pedestrian and bicycle networks, the interior roads have been redesigned to prioritize cyclists and pedestrians with additional connections and clearer links within the development and existing neighbourhood.
- **Sustainability** was flagged as an important strategy that will integrate as the project advances including storm water management, microclimates, grading and integration with natural systems, lighting, and potentially wind energy opportunities.
- **Architectural Framework** including setbacks, and tower placement have been simplified.
    - A podium height of 4 storeys.
    - The towers are set back 100m north-south and 150m to the west of CEF lands.
    - The taller towers are aligned to the west-south-west of the CEF lands which would reduce the shadowing impact on CEF lands, and the 14-storey tower is positioned next to the low rise neighbourhood to the south.
- The proposed Western Gateway feature will help to integrate the CEF with the AAFC Headquarters and provide an opportunity to bring the public into the Farm.
- The re-introduction of shelterbelts along the edge of the Experimental Farm will be a positive inclusion that will improve the long-term health of the Central Experimental Farm and provide a pleasant vista for users of the pedestrian and cycle facilities. The concept of public paths and plantings along the Merivale and Baseline frontages complements and visually extends the shelter belt treatment.

4.4 Central Experimental Farm NHS

Cultural Heritage Attributes

The CIS and SOS for the Central Experimental Farm National Historic Site of Canada organize the cultural landscape into three parts:

- a central core of administrative, scientific, and functional farm buildings and spaces;
- the experimental fields, plots, and shelterbelts; and
- the arboretum, ornamental gardens, and experimental hedges.

Objectives for the Designated Place

The CIS states that the designated place will be unimpaired and not under threat when:

- *the present boundaries and spatial balance of the Farm, which enhance understanding of the historic and ongoing agricultural research function, are safeguarded, and maintained;*

The development of the two towers will not alter boundaries and spatial balance. Views outward from the CEF are not identified as defining features.

The surviving 19th century landscape plan, including the core administration, scientific and farm buildings, plus the arboretum, lawns, ornamental gardens and display beds, experimental fields,
plots and shelterbelts, and circulation patterns set in a picturesque composition, are safeguarded, and maintained in accordance with recognized heritage conservation principles.

According to the Miller shade study for 780 Baseline Road, the light reduction caused by structural obstructions aligns with the latitude of the two phased developments at 1200 Baseline Road and their connection to the CEF lands. This allows for a rough estimate of the shadow impact CEF lands (see section 4.1). The impacted area will be reduced further by the planned western gateway feature, a 7-meter-wide strip for the BRT, and an 18-meter shelterbelt within the CEF lands. On average, the reduction in sunlight across the 16 acres during the growing season for most crops is expected to be well below percentages affecting research crops. Source: Miller Engineering Inc. Report

- *The development does not alter the 19th century landscape plan. The CIS and SOS also recognize that: "The Farm is now bounded on all sides by urban development, with plans to accommodate high volumes of traffic and pollutants such as road salts.*

A sufficiently large area to carry out and support the scientific research function is maintained. Since the late 1950s, the farmland next to Baseline Road has not been used for test plots. The photos suggest AAFC has over time introduced management stewardship to mitigate the impact of urbanization with no impact on the historic plan.

- *The character of a "farm" as defined by fields, utilitarian buildings, and circulation patterns is recognized;*

The character defining features of the Farm will continue to be recognized.

- *The "farm within a city" remains sufficiently large to provide a contrast to the scale of urban development.*

Intermittent shade along the perimeter already exists at these research fields and will become more prevalent given the construction of a similar high-rise building developed or proposed. Despite being exposed to these many variabilities for many years, the CEF has continued to operate effectively, as evidenced by over forty publications and presentations in 2023. The Miller report questions why "the additional effects from the proposed structures would be anything but "de minimis" (of little significant further influence)."

4.5 Alignment with the City of Ottawa Official Plan

The CEF is designated as 'Greenspace' and 'Open Space' in the City of Ottawa's Official Plan, which sets specific criteria for evaluating shadow impacts on public spaces. Section 4.5.2.4 of the OP requires that any new development "have regard for" the cultural heritage value of adjacent historic sites, and Section 4.5.3 stipulates that a Heritage Impact Assessment (HIA) must describe both the positive and adverse impacts of the project, propose mitigation actions, and demonstrate that the Farm's heritage value will not be compromised.

The City requires a HIA to consider the impacts of a proposed intervention to a heritage property (which does not exist in this case) in the context of the *Standards and Guidelines for the Conservation of Historic Places in Canada* (hereafter cited as *Standards and Guidelines.*) The *Standards and Guidelines* include

process steps, treatment categories, and general and specific guidelines to conserve the attributes of heritage resources.

4.6 Standards and Guidelines for the Conservation of Historic Places in Canada

The assessment also follows the *Standards and Guidelines for the Conservation of Historic Places in Canada*, particularly sections addressing evidence of land use and visual relationships (Sections 4.1.1 and 4.1.5). These guidelines emphasize documenting interventions, protecting defining landscape features, and ensuring that new developments do not overwhelm or obscure the site's historic character.

Key Finding: The regulatory framework requires consideration of both scientific and heritage impacts. This analysis demonstrates that the project meets these standards by minimizing shadow effects and preserving the Farm's defining features.

- The introduction of the rapid transit corridor along Baseline with additional right-of -way and a buffer zone/windbreak will reduce the size of usable experimental fields and mitigate the impacts from urbanization.
- Despite being exposed to these many variabilities for many years, the CEF continues to operate effectively, as evidenced by over forty publications and presentations in 2023.

The proposed project is considered in the context of its potential to affect the preservation of heritage attributes of the historic place, including farm fields, through impacts on the cultural landscape's heritage value and physical attributes. The *Standards and Guidelines* divide physical attributes into several categories, such as Land Patterns, Visual Relationships, Water Features, etc. The most relevant categories are Evidence of Land Uses (section 4.1.1 of the *Standards and Guidelines*) and Visual Relationships (section 4.1.5.)

Section 4.1.1 Evidence of Land Use offers pertinent guidelines for determining the impact of the proposed development:

- Documenting all interventions that affect land use and ensuring that this documentation will be available to those responsible for future interventions.

See Appendix C, which provides a chronology of aerial photographs between 1955 and 2010. —

- Not introducing a new feature that is incompatible in function with the past or continuing land use.

The city has surrounded the Farm for a long time; views of the fields from key vantage points, such as along Baseline Road, Carling Avenue, Prince of Wales Drive, Merivale Road, and Fisher Avenue, and the fields themselves as landscape elements will not change with new development on Baseline Road.

In dealing with a cultural landscape, it is important to recognize its ethereal nature and provision to accommodate change seasonally and over time. As well, agricultural practices have changed. For example, shelter belts are one of the defining features; however, along Carling Avenue they were removed in 1956 and not replaced, as were the large coniferous plantings that lined the Driveway. Appendix C

Aerial Photographs illustrates the changes that have taken place incrementally to fields, experimental plots, and circulation.

4.7 Conclusions & Summary of Findings

This HIA has reviewed the development proposal using both municipal and national heritage policies, ensuring that the Farm's scientific and historic significance remains protected.
Based on the above, it is the HIA's opinion the development will have a no impact on the cultural heritage values associated with the research function of the CEF. The Commemorative Integrity Statement, the recognition of the farm within the city, and the farm's heritage significance will remain. Further, the character-defining spatial elements of the fields, plots, and shelter belts and research will be maintained, although a reorganization of the plots may be required within the area impacted.

The CEF fields are subjected to exhaust from cars and chemicals that are used on the roadway and adjacent properties. Vandalism, public use, are increasingly factors to be considered. The city of Ottawa is planning to build a transit line along Baseline Road with a major transit stop at the intersection of Baseline and Merivale Roads, and the AAFC is planning a western gateway feature. This line will incorporate farmland running along Baseline Road, impacting the farm through construction dust, increased traffic, and drainage. The Miller overview findings specifically address sunlight obstructions; they also suggest the need for more comprehensive management strategies.

The new development will create some additional shading on a small portion of the CEF's research fields during the winter when plant material is dormant. The overall reduction in sunlight is minor—comparable to a few extra cloudy days per year. Careful planning and policy integration have ensured that the proposed development at 1200 Baseline Road will have no perceivable managed impact on the Central Experimental Farm, safeguarding both its scientific mission and its historic legacy for future generations.

All design and mitigation measures are aligned with the City of Ottawa's Official Plan and the *Standards and Guidelines for the Conservation of Historic Places in Canada*, ensuring that the Farm's heritage character and research function are preserved. It is the author's opinion that one can reasonably infer the shadowing impact from the 1200 Baseline Road planned development will not undermine the CEF's ability to conduct research or erode the Farm's heritage attributes.

5.0 Authors Qualifications

Commonwealth Historic Resource Management offers professional services related to conservation, planning, research, design, and interpretation for historical and cultural resources. A key focus of the practice is assessing the impact of development on heritage resources. The firm was incorporated in 1984.

John J. Stewart, B.L.A., O.A.L.A., C.S.L.A., CAHP, a principal of Commonwealth is a specialist in the planning and design of cultural resources, building conservation, and commercial area revitalization. A graduate of the University of Guelph, he received additional training at Cornell University (USA) and Oxford University (UK) and holds a diploma in the Conservation of Monuments from Parks Canada, where he worked as Head, Restoration Services Landscape Section. Before Commonwealth's formation, Stewart served for four years as the first director of Heritage Canada's Main Street Program.

Stewart is a founding member of the Canadian Association of Heritage Professionals. He has served as the Canadian representative of the Historic Landscapes and Gardens Committee of ICOMOS and the International Federation of Landscape Architects. Over 15 years, Stewart served as a panel member with the Ottawa Urban Design Review Panel, retiring in 2025. He continues to serve as a board member of Algonquin College Heritage Trades Program.

APPENDIX A: CEF COMMEMORATIVE INTEGRITY STATEMENT

4.1 Character of the Designated Place

The Central Experimental Farm is characterized as a planned, designed and evolved cultural landscape whose national significance lies in part in its physical manifestations of the 19th century philosophy of agriculture and the Picturesque landscape linked by the 1880s design. Incorporated into this are administrative, scientific, and agricultural buildings which respect the original design. Implicit in the Picturesque design are the relationships between the core zones, between buildings and the outdoor spaces, including the well-established system of paths and roadways, the long vistas across fields and water, and the intangible, life-giving qualities of light. All are still legible on the landscape, all enhance the aesthetic character of the Central Experimental Farm, and all reinforce the sense of historic place. The original plan divides the Farm into three clearly defined primary zones, each representing an area of concentration and specialization: the central core of functional farm, science, and administration buildings; the experimental fields and plots with their bordering shelter belts; and the arboretum, ornamental gardens, and experimental hedges.

4.1 a Within the first zone, the central core is organized around the Driveway. To the north of the Driveway, the science and administration buildings are arranged around an expanse of lawn, south of the Saunders Building. Trees and shrubs are laid out in a gardenesque manner so that each plant is displayed to its best advantage. To the south of the Driveway is situated the model farm. The model farm was intended to demonstrate the most efficient and orderly layout of farm buildings, although its primary functions included pure and applied scientific agricultural research and practical farming. The task of directing the entire network of Dominion Experimental Farms, as well as the Central Experimental Farm, was carried on from the administration buildings. Originally, many of the residences for senior Farm personnel were grouped in this central core.

4.1 b The second zone of experimental fields and plots is located to the south and west of the central core. Planted with a variety of crops for testing, these are well laid out in a highly -9- ordered pattern, with an orderly system of laneways for easy access, and protective fencing.

Within the fields are clusters of small buildings which serve as field laboratories, supporting the active research projects. The Booth barn complex, in part predating the establishment of the farm, is located at the south end of the fields, near Baseline Road.

The Farm's development of hardy trees for shelterbelts is illustrated by the remaining stands of trees at the west side of the Farm, along the north end of Fisher Avenue. The shelterbelts serve the practical agronomic function of protecting the fields. Extensive research was formerly carried out on the design and establishment of shelterbelts, as well as the tree species which were most suitable; such information was particularly important to prairie farmers.

4.1 c In the third zone, the arboretum is laid out on the easternmost side of the Farm. Planned as a means of testing and demonstrating suitable tree species for various hardiness zones of the country, this site is characterized by its wide variety of specimen trees and shrubs. Together with the experimental hedge collection, located north of the Saunders Building lawn, and the ornamental beds west of Prince of Wales Drive, the arboretum illustrates the scope of the Farm's scientific activity, as well as the view that beautification schemes enhance farm life. These primary zones are orchestrated into a unified plan that is characterized by its pastoral appearance. It incorporates such features as long stretches of lawn and fields, gently rolling land, pleasing water vistas, a core of buildings attractively set among groups of mature trees and clumps of shrubbery, and winding pathways that encourage outdoor enjoyment and provide leisurely changes of experience.

The orderliness and neatness which are so characteristic of the Farm are not only pleasing to the eye but are also critical to the Farm's scientific pursuits. The Picturesque character of the core farm buildings is illustrated by their compatible scale, varied massing, and silhouettes, as well as by the variety and application of their wood cladding. The same vocabulary is applied to the core science and administration buildings, but these are distinguished from the farm buildings by brick cladding. The glass and metal framed greenhouses exhibit similar qualities. Buildings of the 1920s and 1930s adhere to the established design vocabulary but are modified to suit the more functional taste of the period.

The Picturesque quality of the Central Experimental Farm is further enhanced by the manner in which the core buildings are frequently set off by flower beds, shade trees, shrubbery, and lawn. The Sir John Carling Building, situated at the northeast comer of the property, respects the underlying organization of the 1880s plan through its location in the central core, and its setting of lawns and flower beds. As the headquarters of the Department of Agriculture and Agri-food Canada, it speaks to the pivotal role of the department in the agricultural history of Canada.

Although not linked to agricultural research, the Observatory complex at the north end of the property likewise reflects the historic character of its surroundings as a "scientific campus" and contributes to the character of the Central Experimental Farm.

The Farm is now bounded on three sides by urban development, characterized by major roadways carrying high volumes of traffic, and mature residential and institutional areas. This provides a strong sense of contrast and juxtaposition, emphasizing the rural qualities of the Farm: it is possible to drive along a multi-lane urban roadway and suddenly come across a view of wide fields bordered by leafy green lanes to the cluster of barns in the central core.

The parkways which now run through the Farm, the Driveway which is owned by the National Capital Commission and Prince of Wales Drive which is owned by the Regional Municipality of Ottawa-Carleton, are scenic roadways which link the Farm to the city and reinforce the distinctive character of the historic place.

4.2 Objectives for the Designated Place

The designated place will be unimpaired and not under threat when:
the present boundaries and spatial balance of the Farm, which enhance understanding of the historic and ongoing agricultural research function, are safeguarded, and maintained;
the surviving 19th century landscape plan, including the core administration, scientific and farm buildings, plus the arboretum, lawns, ornamental gardens and display beds, experimental fields, plots and shelterbelts, and circulation patterns set in a Picturesque composition, is safeguarded, and maintained in accordance with recognized heritage conservation principles;
— a sufficiently large area to carry out and support the scientific research function is maintained;
— the character of a "farm" as defined by fields, utilitarian buildings and circulation patterns is recognized; and
— the "farm within a city" remains sufficiently large to provide a contrast to the scale of urban development. the historic values of the designated place are communicated to the public.

5.1 Landscape Features that Symbolize or Represent the Site's National Historic Significance

As previously noted, this cultural landscape is manifested by its division into three primary zones. Each zone comprises patterns and features which, together, give each its unique character. These character-defining elements can be categorized as either landscape elements or buildings.

5.1 b *The Experimental Fields, Plots and Shelterbelts*

The cultural landscape within this zone is characterized by the following elements which, as they visually express both the Picturesque composition and the activity of scientific agricultural research and practical verification, are level 1 resources: the orderly organization of the fields based on a grid system reinforced by a regular system of roadways and access lanes, many of which are tree-lined, and distinctive internal fencing: red "pencil posts" with white tops; within the parameters of the grid system the variable sizes, colours, textures and seasonal variations of the fields and of the plots into which they are subdivided, which reflect ongoing agricultural research needs; the presence of clusters of small research support buildings in the fields; the relationship between the open fields and the heavily screened Driveway with its parkway characteristics of curbs and street lights and; the remaining shelterbelts on the western perimeter of Fisher Avenue at the north end of the Farm.

5.2 Historic Values of the Cultural Landscape

Taken as a whole, the Central Experimental Farm is valued as a distinctive cultural landscape which: symbolizes the central role agriculture has played in shaping the country; portrays the 19th century philosophy of agriculture, within a Picturesque composition; reflects its function of agricultural research and practical verification in its layout and design; reflects the key role of the Central Experimental Farm in testing agricultural techniques and selecting varieties of crops and horticultural plants suitable for a wide range of climatic zones and soil types; and which represents a rare example of a farm within a city.

5.2 b The *experimental fields, plots and shelterbelts* are valued for the open fields which underscore the agricultural character of the place, and which are essential to an understanding of both the historic and the ongoing function of scientific agricultural research, and to the understanding of' a farm within the city'; the distinctive landscape features such as the orderly circulation system, the allées of trees, the

fences, the divisions of fields into experimental plots, and the changing patterns of colours and textures which enhance an understanding of the ongoing research function; the shelterbelts, which are valued for their role in research directed towards expanding agriculture in western Canada; and
- their distinctive views, including, but not limited to - the view from the comer of Baseline and Fisher, looking northeast to the central core, with the Booth barn complex in the foreground;
- the view southwest from Carling Avenue across the fields;
- the framed view looking east from Fisher along Cow Lane; and
- the view from any point along the periphery into the open fields.

APPENDIX B: STATEMENT OF SIGNIFICANCE

Description of Historic Place

The Central Experimental Farm National Historic Site of Canada, located in urban Ottawa, Ontario, is comprised of various structures and buildings embedded within a large rural landscape. Flanked by broad expanses of farmland, its central area consists of the administrative core, housed in a variety of eclectic and picturesque structures, and encompasses an arboretum, specimen plantings, and intricate ornamental gardens. Official recognition refers to the cultural landscape with its natural, built, and landscaped components at the time of designation.

Heritage Value

The Central Experimental Farm was designated a national historic site of Canada in 1997 because: - as a cultural landscape, the more than 400-hectare farm in the heart of the Nation's Capital reflects the 19th-century philosophy of agriculture and carefully integrates an administrative core and a range of other buildings with arboretum, ornamental gardens, display beds and experimental fields in a picturesque composition;
- since its establishment in 1886, the farm has made significant scientific contributions to agriculture in Canada by uniting scientific experimentation with practical verification, as exemplified by the development of the hardy strains of wheat that were so influential in expanding Western Canadian agriculture;
- a rare example of a farm within a city, the Central Experimental Farm has become a symbol of the central role agriculture has played in shaping the country.

Eager to introduce profitable new agricultural methods and products, the federal government created the Central Experimental Farm in 1886. The Department of Agriculture selected a rectangular parcel of land, over 400 hectares in area, approximately 3 kilometres from Parliament Hill. Located on a desirable site, due to its variety of soil types and access to land, water, and rail transport, the farm would serve both Ontario and Québec. As the city of Ottawa grew, the Farm was gradually absorbed into the urban environment and is now situated well within the city limits.

The plan of the Farm is based on three clearly defined zones: a central core of administrative, scientific, and functional farm buildings and spaces; the experimental fields, plots, and shelterbelts; and the

arboretum, ornamental gardens, and experimental hedges. The Farm's Picturesque landscape is the result of a movement promulgated by an 18th-century English aesthetic theorists and practitioners who sought to bring landscape design closer to an idealized nature. One convention of this movement was the adoption of certain standard features of the British country estate, including large stretches of lawn and fields, use of water, masses of trees and shrubbery, and winding pathways. These features, designed to enhance nature's inherent beauty by emphasizing its irregularity, variety, and intricacy in form, colour, and texture, integrate harmoniously with the administrative, scientific, and functional farm buildings. The Picturesque qualities of the Farm are a significant aspect of the 19th-century philosophy of agriculture.

This philosophy also recommended the use of chemistry and genetics to make farm life more productive and appealing. Its proponents sought to develop better farming methods by applying a new scientific methodology to farming. Since its establishment, the Central Experimental Farm has contributed substantially to the development of Canadian agriculture through scientific research, experimentation, and practical verification. The Farm has addressed issues such as human and animal health, the importation of plants and livestock, the identification and control of imported insect pests, and soil fertility. It also contributed to the expansion of agriculture in western Canada through the development of hardy strains of wheat, and in eastern Canada through research on forages and grasses. The Farm soon became the headquarters of a national system of experimental farms, as its central location and administration served to address a range of national agricultural issues.

Character-Defining Elements

Key elements contributing to the heritage value of this site include:

- its location in the urban centre of Ottawa, encompassing a variety of soil types, cleared fields, and various buildings;
- its pastoral appearance, as well as the orderliness and neatness critical to the Farm's scientific pursuits;
- its plan, made up of three clearly defined zones: the central core of the functional farm, science, and administration buildings; the experimental fields and plots with their bordering shelterbelts; and the arboretum, ornamental gardens, and experimental hedges;
- the buildings, which illustrate the Picturesque character with their compatible scale, varied volumes, and silhouettes.

Key elements contributing to the heritage value of the central core include:

- the intimate scale of the interior of the zone, and the campus-like atmosphere;
- the compatible scale and design of both Prince of Wales Drive and the Driveway, which have evolved from the main north-south and east-west roads in the original 1880s plan and link the Farm to the city;
- the placement and design of the core administration buildings with their wood-clad exteriors, and their relationships to each other and to their landscape setting, which reveal their original functions and the orderly development of the original 1880s Picturesque plan;
- the associations of the buildings with key figures in the development of Canadian agriculture, such as William Saunders, Charles Saunders, and Sir John Carling;
- the buildings' small, single-storey board and batten style, conveying their continued role as part of a complex of support buildings;

- the model farm, intended to demonstrate the most efficient and orderly layout of farm buildings.

Key elements contributing to the heritage value of the experimental fields, plots, and shelterbelts include:
- the orderly organization of the fields based on a grid system reinforced by a regular system of roadways and access lanes, and distinctive internal fencing of red "pencil posts" with white tops;
- the open cultivated fields, with their variable sizes, colours, textures, and seasonal variations;
- the relationship between the open fields and the heavily screened Driveway with its parkway characteristics of curbs and streetlights, which emphasize the integration of a farm within a city;
- the shelterbelts, made up of hardy trees which protect the fields; - the core brick-clad science and administration buildings;
- the viewscapes including the view from the corner of Baseline and Fisher, the view southwest from Carling Avenue across the fields, the framed view looking east from Fisher along Cow Lane, and the view from any point along the periphery into the open fields.

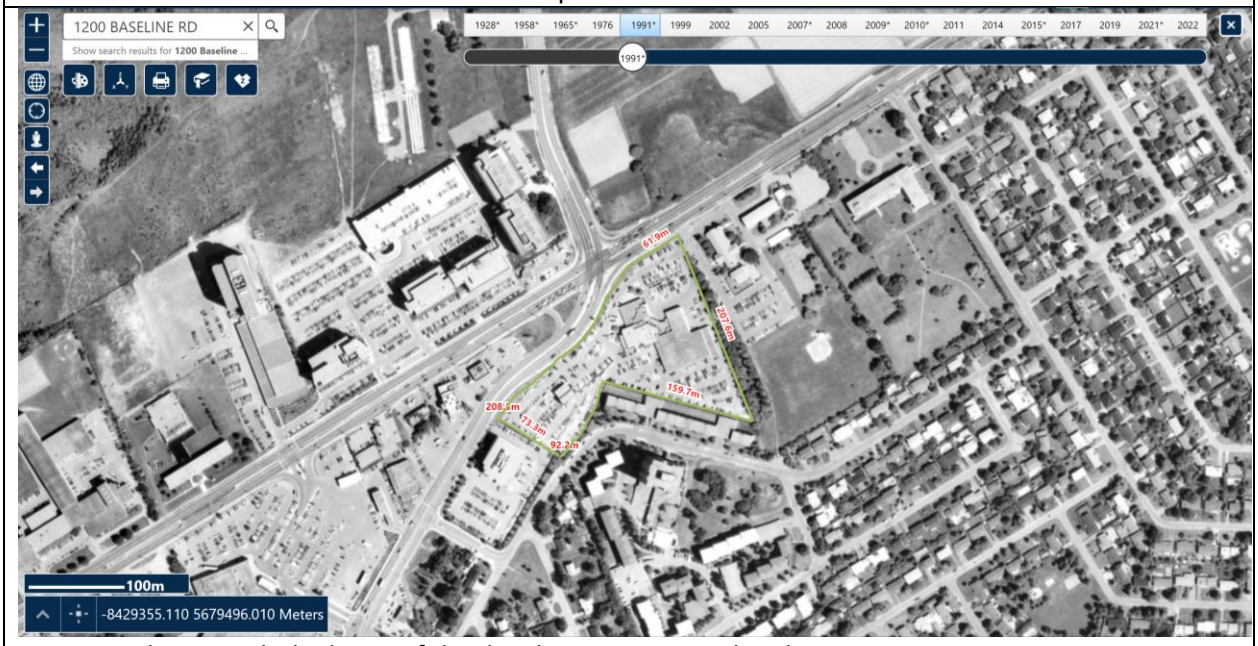
Key elements contributing to the heritage value of the arboretum and ornamental gardens include:
- the Picturesque nature of the site, evidenced in the skillful use of topography and water, and the incorporation of the shoreline of the Rideau Canal, Dow's Lake, and the lagoons into the visual composition;
- the circulation pattern in the arboretum, laid out in a typically Picturesque design of curving promenades and constantly changing views;
- the glass and metal frames of the greenhouses;
- the arboretum itself, including a wide variety of specimen trees and shrubs, planted to test and demonstrate suitable tree species for various hardiness zones of Canada.

APPENDIX C: 1958 - 2022 CHRONOLOGY OF AERIAL PHOTOS DOCUMENTING THE CEF FIELDS

1958 Aerial view with limits of the development site outlined. Source: Geoottawa

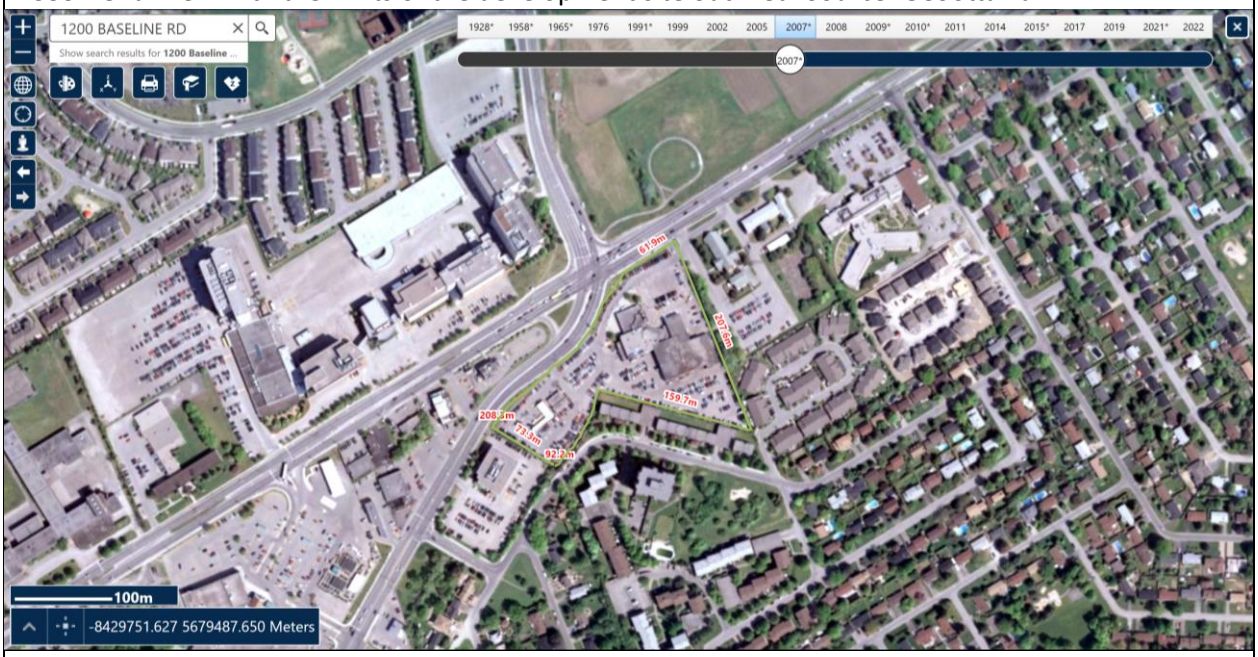
1965 Aerial view with limits of the development site outlined. Source: Geoottawa

1976 Aerial view with the limits of the development site outlined. Source: Geoottawa

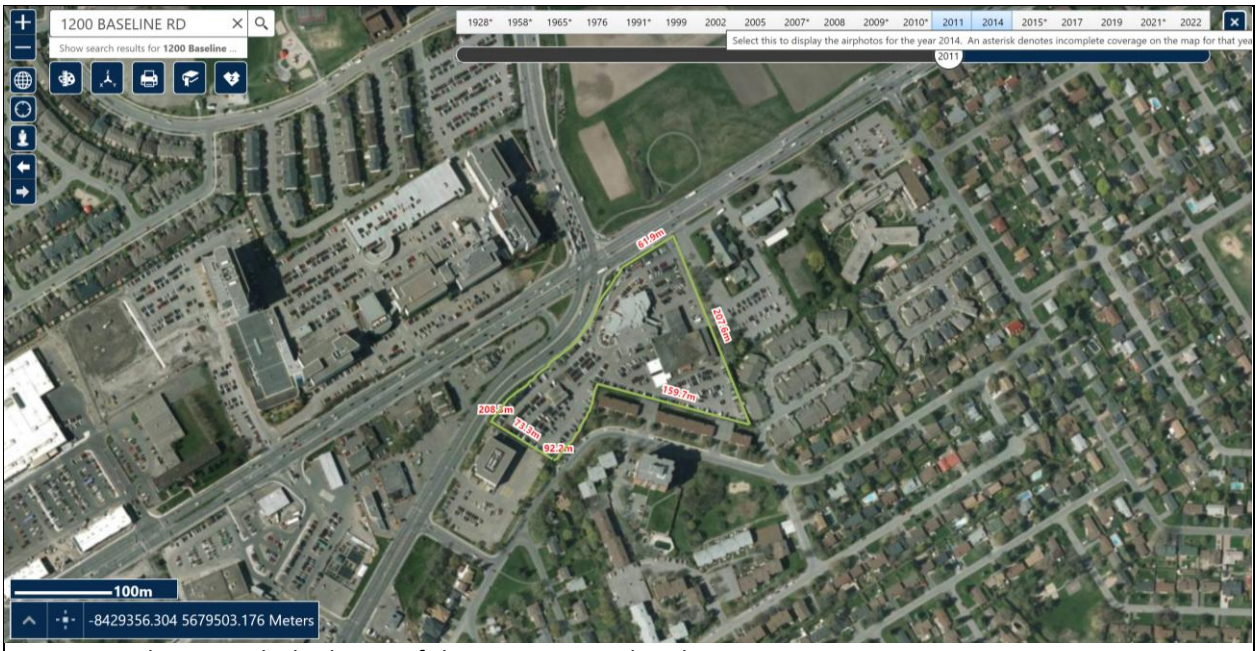


1991 Aerial view with the limits of the development site outlined. Source: Geoottawa

1999 Aerial view with the limits of the development site outlined. Source: Geoottawa



2007 Aerial view with the limits of the development site outlined. Source: Geoottawa



2011 Aerial view with the limits of the property outlined. Source: Geoottaw
2011
2015
2019
2022

A selection of aerial photographs starting in 1958 document the use of the fields along the southern portion of the farm. After 1965 it would appear that the experimental test plots shift north away from the lands next to Baseline Road. Source: geo Ottawa. 1958, 1965, 1991, 2002, 2005, 2007, 2011, 2015, 2019 and 2022.

APPENDIX D: LETTER TO THE CITY OF OTTAWA FROM AAFC FEBRUARY 2023.

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

February 13, 2023

Kelly Livingstone
Planner, City of Ottawa
kelly.livingstone@ottawa.ca

RE: New Development Application for Apartment Towers at 780 Baseline Road in Ottawa

Dear Mr. Livingstone,

Thank you for the meeting on February 2, 2023 to discuss Agriculture and Agri-Food Canada's (AAFC) concerns related to the new development application for apartment towers at 780 Baseline Road, which is adjacent to AAFC's Central Experimental Farm (CEF) property. As mentioned, the proposed development raises some serious concerns for AAFC with regards to risks to our agricultural science integrity and impacts to our best research fields. AAFC has done an internal assessment of the proposed towers development and the impacts/risks to the CEF; for your consideration please refer to Annex A for those details.

AAFC, through the National Capital Commission (NCC) Municipal Liaison, previously provided comments on the proposed towers design, in which we asked the City to seek a design that limits and minimizes the shadowing on the CEF. The revised design has increased the building height and rotated one of the towers (Tower C) making it wider which will further exasperate the shadowing impact to our land. In addition to shadow, the construction of underground parking for the apartments may affect water table levels in the area, and potentially causing drainage issues on the CEF land.

AAFC is requesting that the City strongly consider the irreversible impacts to the CEF (as described in Annex A), and seek an approach that supports preserving our research land as you move forward with your assessment of the development application. AAFC has proposed an alternative option in Annex A and, with the City, can work together in determining height and design parameters of the proposed towers that would limit shadow impacts to the CEF. We are also requesting the City to have the proponent prepare a groundwater impact study by a professional qualified in hydrology and agrology to ensure there are no impacts to the water table that will affect the CEF.

Canada

Thank you for considering our concerns and we look forward to working with the City on addressing the impacts the new development will have on the CEF.

Sincerely,

Michel, Pascal
2023.02.15
07:55:10-05'00'

Pascal Michel
Director General
Ontario and Quebec Region
Science and Technology Branch

Digitally signed by
DurnfordMcIntosh, Karen
Date: 2023.02.17 09:08:19
-04'00'

Karen Durnford-McIntosh
Director General
Real Property and Asset Management
Corporate Management Branch

Cc: Ted Horton, Senior Planner & Municipal Liaison, National Capital Commission

Attachment:

Annex A – Risk to the Central Experimental Farm Lands by Proposed Apartment Towers at 780 Baseline Road.

Annex A

Risk to the Central Experimental Farm Lands by Proposed Apartment Towers at 780 Baseline Road.

Background:

1. The lands owned by Agriculture and Agri-Food Canada's Historic Central Experimental Farm (CEF) are responsible for creating new varieties of crops in support of Canadian agriculture. The land west of Fisher Avenue and north of Baseline Road (adjacent to the proposed 780 Baseline Road development), are the best research lands on the Central Experimental Farm (CEF). The land is a fertile clay loam, flat, tile drained and used by research scientists to produce new varieties of wheat, oat, soybean, corn and barley.
2. These fields are used to test over 36,000 potential varieties of spring and winter wheat, soybean, barley, corn and oats per year. Farm organizations have invested over $3 million since 2018 in collaborative research done on these lands to incrementally improve the disease resistance, climatic stress tolerance, and yield of their crops.
3. Research is also done on management practices to reduce the carbon footprint of agriculture. Climate change will bring with it many new stresses on crop production, which will only be mitigated using adaptive research techniques and modern trait selection practices. The fields of the CEF are our laboratories for the varieties of the future that farming will depend on.
4. It is recognized that Baseline Road is a Mainstreet Corridor in the City's new Official Plan, and that the City's Transportation Master Plan includes a proposal for the eventual development of a Bus Rapid Transit lane. This will bring further development in proximity to the CEF. We encourage the City to consider holistically the impacts of development on the CEF, and to use its development review processes to limit the impacts on its research lands.

Shade study

5. A shade study was done to examine the patterns and cumulative amounts of solar radiation reduction cast by the proposed development at 780 Baseline Road. The building and rezoning applications calls for one 32 storey tower and one 29 storey tower situated on Baseline Road and one 29 storey tower situated south of Baseline and west of Fisher Avenue. The shade study was designed for an entire growing season which occurs from April 01 through to November 30.
6. The model to calculate the amount of shade was based on the sun's position in the sky at one minute intervals over each day during the growing season and the height and footprint of the towers. Cloudless conditions were assumed. A day started and ended when the sun elevation was one degree above the horizon.
7. The attached Figure 1. shows a four square km block centred on the proposed towers at 780 Baseline Road. The coloured areas correspond to the amount of shading with dark green being the greatest amount followed by yellow, light blue and then dark blue. The units are cumulative minutes of shade during the growing season on a log scale. The figure shows that the proposed towers will result in significant shade cast on the CEF research lands.

8. The research lands for 200 m north and 200 m west from the proposed towers will have total seasonal radiation reduced by 27 percent. Travelling west, solar radiation reduction is reduced by one half with every 100 m until at 600 m there is only a 1% reduction in total seasonal radiation. Moving north from the proposed towers, solar radiation reduction is 4.3 percent of total seasonal radiation in the second 100 x 100 m grid, and less than 1 percent of total seasonal radiation at 300 m.
9. The area of the CEF most profoundly affected by the proposed towers extends 600 m west on Baseline road and 300 m north from the proposed towers.

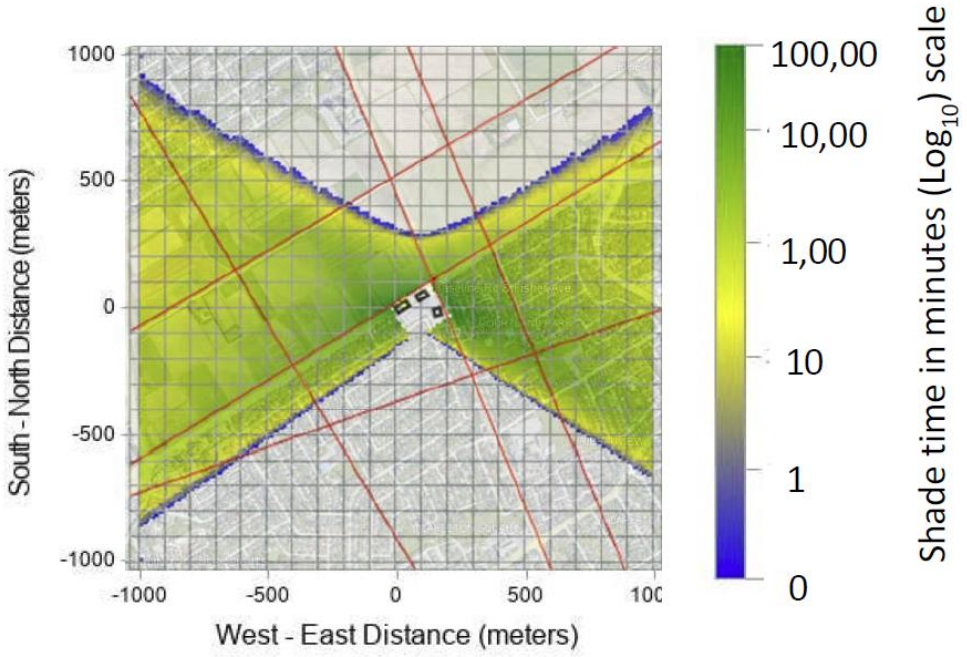


Figure 1. Shadow cast over a four square km area during the growing season (April 01 to November 30) by the proposed development at 780 Baseline Road. The heat map colours correspond to the magnitude of shade duration with blue being the lowest, yellow being medium and dark green the highest amount of cumulative shade. The red lines correspond to streets and are used for overlaying the heat map on the Google Earth image of the area. The squares are 100 m x 100 m polygons used to calculate reduction in solar radiation caused by shade. Shade is a logarithmic scale with 1= 10 minutes, 2 = 100 minutes, 3 = 1000 minutes and so on. The area surrounding the apartments was removed from the heat map because it is greater than 100,000 minutes per year.

10. Attenuating the total amount of light reaching the research lands will reduce total photosynthesis, reducing yield and delaying harvest. Light is a combination of many different wavelengths and plants use them differently. For example, early morning and late dusk light red light stimulates plants to flower.
11. The most devastating effect is the increased variability in sunlight caused by differentially shading of the fields throughout the growing season. This will increase the variability of

the research lands and make them unusable for most field experiments. Increased light variability adds an additional factor to research experiments that will make results impossible to interpret.

12. Fall seeded crops, such as winter wheat, grow extensively during the fall, remain dormant under the snow, and then regrow early in the spring months to be harvested in late July. Therefore, sunshine in the fall and spring are a requirement for winter crops and the shade in the fall and spring is greater due to the angle of the sun above the horizon.
13. Solar radiation in the spring melts and evaporates snow cover, and dries and warms the soil. Dry soils are required to cultivate the land and plant crops. Increased shade will delay spring planting resulting in a shift in flowering to a hotter period of the year, delayed maturity and harvest, and lower yields.
14. Sunlight is used by microorganisms responsible for nutrient cycling on a yearly basis. Nitrogen, phosphorous and carbon cycles are among some of the necessary natural processes mediated by microorganisms in the soil that are affected by sunlight and soil temperatures.
15. A comparison of Figures 2 shows the shadows cast by 14 storey towers. While tower style apartments at 780 Baseline Road of any height will cast shade on research lands, there is much less reduction in total solar energy as the height of the buildings decreases. Three 45 m towers will affect the research lands less than the proposed tower heights of two 90 m and one 102 m tower.
    - **Request:** We request the City consider the effects that this application and future development along Baseline, (e.g. design elements orientation, floorplate size and height) to limit shadowing on the CEF.

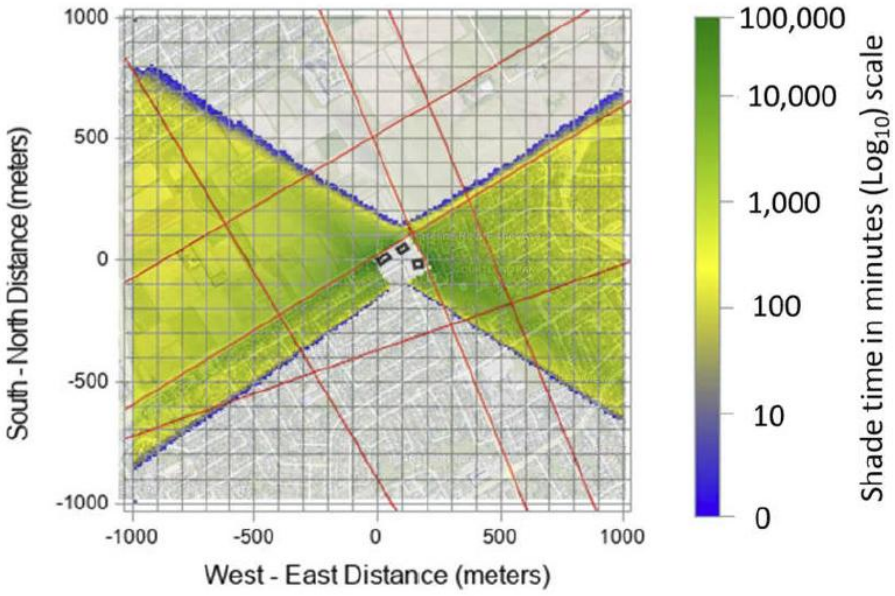


Figure 2. Shadow cast over a four square km area during the growing season (April 01 to November 30) by 14 storey towers at 780 Baseline Road. The heat map colours correspond to the magnitude of shade duration with blue being the lowest, yellow being medium and dark green the highest amount of

cumulative shade. The area surrounding the apartments was removed from the heat map because it is greater than 100,000 minutes per year.

APPENDIX E: MILLER ENGINEERING REPORT

Potential Effects of Structural Sunlight Obstruction
On AAFC Research Plots
Theberge Homes Proposed Buildings

Prepared for:
Theberge Homes
205-1600 Laperriere Avenue
Ottawa, Ontario K1Z 8P5

Prepared by:
James Miller, PE, PhD Engineering
Helen Miller, EIT, MS Ag & Bio Engineering
On behalf of Miller Engineering, Inc.
Ann Arbor, MI
December 19, 2023

Table of Contents

Theberge Homes
205-1600 Laperriere Avenue
Ottawa, Ontario K1Z 8P5

Potential Effects of Structural Sunlight Obstruction on AAFC Research Plots
Theberge Homes Proposed Buildings

I. Introduction

Overview

Miller Engineering was asked on behalf of Theberge Homes to review the circumstances surrounding an application for a high-rise at 780 Baseline Road in Ottawa, Ontario, which is adjacent to the Central Experimental Farm (CEF).
The height of the proposed building is such that during certain periods of time, the adjacent research plots will be shadowed under various conditions of full and partial sunlight. Questions from Agriculture and Agri-Food Canada (AAFC) have arisen in regard to the potential impact of shadowing and reduced sunlight affecting the conditions under which certain plants would be grown, and the attributes of adult plants and soil in that area.

Scope

Theberge Homes has requested that Miller Engineering, as an outside party, review the potential impact of the proposed development adjacent to the agronomy research station located within the city of Ottawa, Ontario. The Agriculture and Agri-Food Canada (AAFC) claims that the proposed structures will result in reduction in sunlight and the increased variability of sunlight could make its farmland "unusable for most field experiments."

II. Background

Proposed Structures

The proposed development includes three structures to be located at 780 Baseline Road in Ottawa, Ontario. The proposed design consists of one tower that is 32 stories tall and two towers that are 24 stories tall. The buildings will be used for apartments as part of the City of Ottawa's effort to provide more housing for its growing population.

Testing Facility

Ottawa Research and Development Centre is located at 960 Carling Avenue in Ottawa, Ontario. It includes the Central Experimental Farm (CEF), spanning 1,055 acres a few kilometres from downtown Ottawa (AAFC, 2021). The CEF studies barley, oats, corn, soybean, spring wheat, and winter wheat (AAFC, 2022).

III. Potential for Sunlight Obstruction Shade Study

Miller Engineering was provided a letter from Agriculture and Agri-Food Canada (AAFC), addressed to the city planner of Ottawa, which outlined its concerns regarding the impact of the proposed structures on the CEF at Ottawa Research and Development Centre. The letter included the results of a Shade Study ("AAFC study") done to quantify the potential reduction of sunlight that the proposed structures would impose on the CEF.

Conditions of Shade Study

The AAFC commissioned a graphical shade study relative to the proposed buildings and them location next to the AAFC plots. The conditions and assumptions associated with this shade study included:

- The growing season of April 1st to November 30th
- Cloudless conditions (full sunlight every day)
- Used the sun's position in the sky at one-minute intervals

• Created models using height and other exterior dimensions of the proposed structures
• The area of study was a four-kilometre squared block (400 hectares) centred on the location of the proposed structures
• The four square-kilometre block was divided into smaller 4 m^2 polygons

Conclusions from Shade Study
• 189,387 theoretical minutes of potential cloudless sunlight could be received at that latitude during the growing season.
• The shadowing would affect an area of the test plots that equalled about 0.19 km^2 of land (19 hectares) out of the 4 km^2 block (400 hectares) that was modelled.
• The amount of sunlight reduction varied from about 1% to about 20% depending on location in the plot and sun angles.
• Based on completely cloudless conditions, the theoretical lost minutes of sunlight would be in the range of 1,893 to 37,877 minutes during the growing season.

Miller Analysis of Cloud Considerations

Considering the expected cloud coverage from local Ottawa data, the following table was developed.

Table 1. Shade study adjusting for typical cloud coverage in Ottawa, Ontario

Variable	Calculation	Value
Unobstructed sunlight per season (AAFC study)	A	189,387 minutes
Cloud coverage per season (Canada Weather Stats, n.d.)	B	66,620 minutes
Estimated actual Sunlight per season adjusted for cloud coverage	A - B	122,767 minutes
"Shade Study" stated Sunlight reduction (AAFC study)	0.20 x 189,387	37,877 minutes
Actual Sunlight reduction (Miller Engineering)	0.20 x 122,767	24,553 minutes

Based on Miller analysis, the amount of sunlight reduction would be about 1/3 less than the value noted in the Shade Study itself. The significance of that loss will be explored in the following sections; however, the studies cited utilize a percent reduction rather than a particular quantitative value of loss in minutes. These studies will be utilized after a short overview of the Ottawa Research Development Centre.

IV. Ottawa Research and Development Centre

The Ottawa Research Development Centre is one of four research and development centres in Ontario and one of 21 research and development centres in Canada.
We appreciate the role that the Central Experimental Farm (CEF) must serve to the province and country and are interested if there are unique roles it is serving which might not be duplicatable through other research centres. We do recognize that a small portion (~ 47 acres out of about 1000 acres) is involved in the present matter, and a portion of those acres would see minimal effect on their sunlight.

The national picture for research facilities and crop production in Canada is presented in the following tables. The commodities researched at the various centres are summarized in Table 2. The commodities researched in funded projects at Ottawa Research and Development Centre are summarized in Table 3, to the best that we were able to discover online.

Table 2. Overview of Focus Areas of AAFC Research and Development Centres (AAFC, 2022)

Table 2. Overview of Focus Areas of AAFC Research and Development Centers (AAFC, 2022)

	Research Commodity	Number of Research Centers That Mention This Area on Their Website
Areas of Research at Ottawa Research and Development Center	Wheat (Durum)	7
	Corn	5
	Oats	4
	Barley	3
	Soybeans	2
	Cereal (wheat, oats, barley)	2
	Oilseeds (canola, soybean, etc)	6
	Dairy/Manure	3
Areas of Research Not Emphasized at Ottawa Research and Development Center	Beef	8
	Fruits	6
	Vegetables	5
	Pulse (legumes -chickpeas, lentils, and peas)	4
	Swine	4
	Potatoes	3
	Peas	2
	High value crops	2
	Dry beans	1
	Rye	1
	Triticale (hybrid wheat and rye)	1
	Nuts	1
	Tomatoes	1
	Poultry	1

Table 3. Focus Areas of Funded Projects at Ottawa Research and Development Centre with End

Table 3. Focus Areas of Funded Projects at Ottawa Research and Development Center with End Dates Ranging from 2022-2027 (AAFC, 2022)

Research Commodity / Focus Area	Number of On-going Funded Projects at Ottawa Research and Development Center
Barley	4
Wheat	3
Cereal (wheat, oats, barley)	3
Fungi	3
Pest Management	3
Sustainability	3
Crop response	3
Soil	2
Insects	2
Oats	1
Soybeans	1
Vegetables	1
Legumes	1
Weeds	1
Manure	1
Invasive Species	1
Fertilizer	1
Drought	1

Output from research centers is sometimes measured by publications. The list of publications from the Ottawa Center is shown in Table 4.

Table 4. Number of publications and presentations from Ottawa Research and Development Center by Focus Area (AAFC, 2023)

Research Commodity / Focus Area	Number of Publications/Presentations from Ottawa Research and Development Center in 2023
Soybeans	11
Manure	6
Wheat	5
Dairy	5
Methane	5
Fungi	4
Flax	3
Barley	2
Oilseeds (canola)	1
Livestock	1
Sustainability	1

We have not tried to correlate research centre activity by quantity of production per province, but that could be done. However, interesting data from 2017-2021 was available for the primary province production areas. We see Ontario is a very substantial producer nationally in corn, soybeans, and winter wheat (USDA, n.d.). Southern Ontario, between Lake Huron and Lake Erie, dominate the production in that province. Production maps are available through United States Department of Agriculture Foreign Agriculture (Appendix A & B).

A study of the above data would reveal that multiple research and development centres throughout Canada are studying the same commodities as that of the CEF. Unique to the Ottawa facility funding is the emphasis on barley, but their publications emphasize soybeans, in one major project, as we read it. There are two other research and development centres in Ontario (e.g., London and Harrow) that undoubtedly contribute to the research of Ontario's primary crops as well.

Findings Based on Above Analysis of Canadian Agriculture Data

- Multiple research and development centres throughout Canada are studying the same crops that Ottawa Research and Development Centre studies.
- Ontario contributes less than 1% of the national production of barley and oats.
- Ontario contributes over 50% of the national production of corn, soybeans, and winter wheat.
- Ontario's production of corn, soybeans, and winter wheat is concentrated in the southwest region of Ontario.

Application of Analysis to Ottawa Research and Development Centre

- The Ottawa Research and Development Centre does not appear to be unique in its areas of study.
- It is unclear why Ottawa Research and Development Centre emphasizes barley and oats when Ontario does not contribute significantly to Canada's production of these crops.
- There are two research and development centres located in southwest Ontario (London and Harrow) that are more geographically appropriate for the study of corn, soybeans, and winter wheat.

V. Scientific / Agronomy Implications

Non-Crop Specific Studies

Touil et al., 2019

In a review of several studies evaluating the effect of partial shade caused by agrivoltaics, up to 25% sunlight reduction was found to have no significant effects on crop yield. Inhibitory effects on the production of crops occurred when sunlight reduction ranged from 50% to 100%.

Gommers et al., 2013

When plants are exposed to shade, they exhibit tactics known as "shade avoidance" and "shade tolerance" to mitigate the effects of the shade. All plants that experience a reduction in sunlight will adapt to the change by optimizing photosynthesis. Shade avoidance is displayed through stem elongation and reduced branching while shade tolerance is displayed through increased leaf area, lowered chlorophyll ratios, and higher photosystem ratios.

Crop Specific Studies

Corn – *Riska et al., 2022*

When studying four hybrid varieties of corn, shade had no statistically significant differences in dry weight, height, and leaf area for those grown with 25% sunlight reduction than those grown

with 0% sunlight reduction. For the corn grown with 50% sunlight reduction, there was a significant difference in stem diameter than corn grown with 0% sunlight reduction. Two varieties of corn were able to produce high yields under a 50% reduction in sunlight.

Corn – *Ramos-Fuentes et al., 2023*
The partial shade of solar panels from the application of agrivoltaics can reduce the irrigation inputs of corn production by 19-47%, compared to unshaded plots of land.

Grass Species - *Semchenko, et al., 2011*
In a study of the effect of partial shading on grass species, grass species grown with 25% reduction in sunlight had no significant differences in dry mass than the grass species grown with no reduction in sunlight. When the reduction in sunlight was greater than 50%, there was a net facilitative effect on plant mass. At a reduction in sunlight of 90%, there was significantly lower dry mass than of that grown under full sunlight.

Soybean – *Fan et al., 2018*
When exposed to 8.7% and 31.1% reduction in sunlight due to intercropping with corn, the yield of soybeans decreased significantly. The soybeans showed many changes in features such as stem height, stem biomass, and leaf biomass to acclimate to the shaded environment.

Winter Wheat – *Weselek et al., 2021*
In southwest Germany, the impact of 30% sunlight reduction from being grown under a solar array was evaluated. The yield of winter wheat ranged from -19% to +3%. However, during a hot, dry summer, the yield of winter wheat increased by 2.7%.

Winter Wheat – *Tromsdorff et al., 2011*
During a hot, dry summer in Germany, a study of 40% sunlight reduction resulted in a 3% increase in yield for winter wheat.

Wheat – *Lakshmanakumar, 2018*
During winter in India, a study of four varieties of wheat where evaluated based on sunlight reduction. Conditions of 33% and 66% sunlight reduction here did result in a decreased grain yield.

Wheat and Barley – *Arenas-Corraliza et al., 2019*
The impact of 0%, 10%, and 100% sunlight reduction on wheat and barley was studied under Mediterranean conditions. A factor of 10% and 50% light reduction resulted in a 19% increase in yield for barley. Wheat had no significant change in yield at 10% reduction but a 19% increase in yield at 50% light reduction.

Specialized New Uses of Shaded Areas - Agrivoltaics
In the event of partial shading on the Ottawa research plots, the opportunity for novel research in the
agrivoltaics sector and urban farming areas exists in the future. Agrivoltaics is the use of land for both agriculture purposes and energy generation through photovoltaics (i.e., solar panels). Ontario has about 94% of Canada's total cumulative installed capacity for photovoltaics

(Baldus-Jeursen, 2019). Additionally, research has been ongoing to evaluate the potential for agrivoltaics in Ontario (Pearce, 2022).

Conclusions Based on Literature

• Corn and grasses (e.g., wheat and barley) were not significantly affected by 25% or less sunlight reduction.
• Soybean were significantly affected by as little as 8.7% sunlight reduction.
• For wheat grown in hot, dry climates, 30% sunlight reduction can have a positive effect on the yield of wheat. For wheat grown in cold climates, over 30% sunlight reduction can have an inhibitory effect on yield.

Application of Literature to Ottawa Research and Development Centre

• Corn and grasses (e.g., wheat and barley) exposed to up to 20% reduction in sunlight, will not be significantly affected in terms of yield and other attributes.
• Soybean will be affected even by small amounts of sunlight reduction. Therefore, management practices should prevent soybeans from being grown in the potentially affected plots.
• With good management practices recognizing potential diminishing effects on certain crops, lightly shaded areas can be used to the benefit of various crop programs (e.g., agrivoltaics).

VI. Other Factors Affecting Experimental Plots

The factor of intermittent shade already exists at these research fields. Portions of its fields are exposed to shade from the tree belt along Fisher Road, as well as from developments that have already been built. The factor of intermittent shade will actually become more prevalent given the recent approval of a similar high-rise building development at 1081 Carling Avenue. Many of the fields adjacent to the CEF are even currently subjected to exhaust from cars that use the four-lane road that runs through and along the CEF, and chemicals that are used on the roadway and adjacent properties.

Finally, the city of Ottawa is planning to build a transit line along Baseline Road. This line will run along the CEF, impacting the farm through construction dust, increased traffic, and drainage. Despite being exposed to these many variabilities for many years, the CEF has apparently continued to operate effectively, as evidenced by over forty publications and presentations in 2023. One can question why the additional effects from the proposed structures anything would be but “de minimis” (of little significant further influence).

VII. Opinions

1. Ottawa Research and Development Centre is not unique in terms of the crops that they study. Many other research facilities throughout Ontario and Canada would seem capable of conducting similar research, and such research may be located closer to where most production is occurring, i.e., research regarding oats and barley.

2. The AAFC shade study estimated a range of 1% to about 20% reduction in sunlight caused by the proposed structures. The potential area of concern appears to be about 47 acres out of an approximate 1000 acres for the CEF site. Within the potentially affected area, the ~20% reduction would likely be limited to less than two acres. The average expected impact across

the 47 acres would likely be about 5% reduction in sunlight.

3. We acknowledge within the AAFC October 24, 2023, Development Application response, that the points made under #5-#11 of the Results section indicate reasonable concerns. Research reported again below indicates sunlight obstructions on certain crops can be a positive or negative influence. Our overview findings suggest the effects across this acreage can be minimal. Additional tall structures on the perimeter or even planned in-field structures, which limit lighting, can be positive under the right management strategies, i.e., agrivoltaics.
4. In review, there has been substantial research relative to the effects of reduced sunlight on certain
crops. Example findings are:
• Corn and wheat are not significantly affected by 25% sunlight reduction.
• Soybean is significantly affected by as little as 8.7% sunlight reduction.
• For wheat grown in hot, dry climates, a 30% sunlight reduction can increase yield.
• For wheat grown in cold climates, a 30% sunlight reduction can have a negative effect on yield.

5. One can conclude from the example studies that:
• Corn and grasses (e.g., wheat and barley) exposed to up to 20% reduction in sunlight, will not be significantly affected in terms of yield and other attributes.
• Soybean will be affected even by small amounts of sunlight reduction. Therefore, management practices should prevent soybeans from being grown in the potentially affected shaded plots.
• Under certain management strategies, lightly shaded areas can be used to the benefit of various crop programs (e.g., study of agrivoltaics).

6. A number of plantings and buildings have already been allowed adjacent to the Central Experimental Farm. Given other tall structures in the area, there has been no evidence presented by AAFC that suggests shading from these other obstruction structures and plantings nearby have impacted the AAFC's programs at the CEF.

7. Test plots in urban areas will have the potential for sunlight obstruction and contaminants such as vehicle exhaust, road salt seepage, and manufacturing and process plant fumes. While less advantageous for crops intended for rural farming, there is a trend to promote "urban farming." In which case, these variations in conditions might be representative of what such urban farmers will experience, and which should be further researched. Should the CEF then focus some efforts on urban farming research, where partial sunlight obstruction will be a desired variable?

8. In the short term, the proposed structures would have little effect on future crop tests, given optimal management strategies for AAFC. In the long term, the various others
potential urban influences on the AAFC may cause concern regarding use of this location and choice of crops to test here, versus a more remote facility.
9. We would conclude that the impact of the proposed high structures relative to AAFC can be of a de minimis nature, and even of a benefit. Such benefit will depend on management's recognition that reduced sunlight can be a potential positive factor for some crop projects.

Respectfully submitted,
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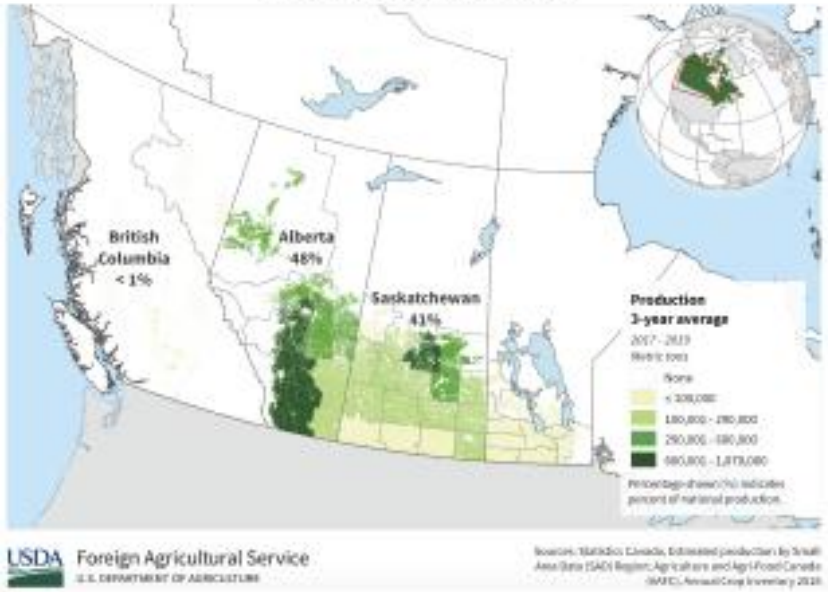
IX. Appendix

A. Three-year average of crop production by province in Canada ranging from 2017-2021 (USDA, n.d.)

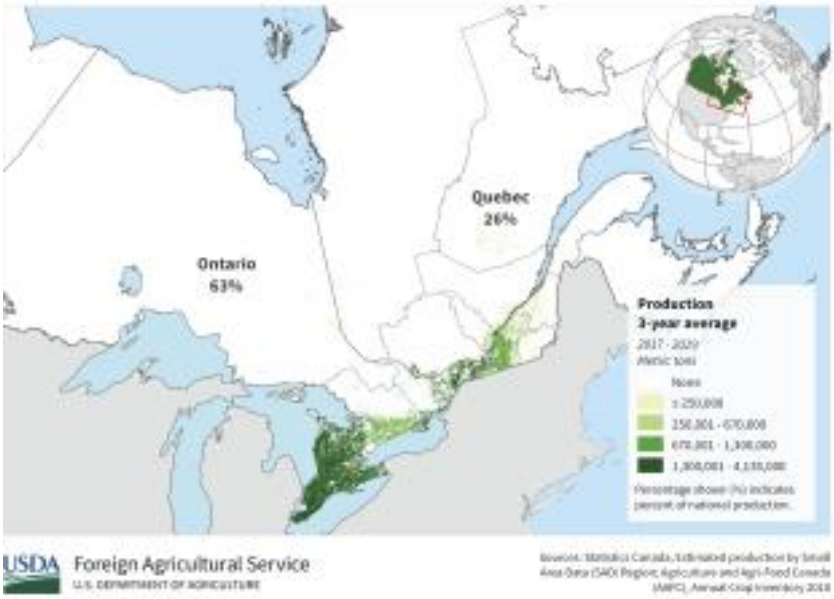
Commodity	Province	Percent of Production
Barley	Alberta	48%
	Saskatchewan	41%
	British Columbia	<1%
Corn	Ontario	63%
	Quebec	26%
Oats	Saskatchewan	52%
	Manitoba	20%
	Alberta	19%
	British Columbia	<1%
Rapeseed	Saskatchewan	55%
	Alberta	28%
	Manitoba	16%
	British Columbia	<1%
Soybean	Ontario	55%
	Manitoba	24%
	Quebec	16%
	Saskatchewan	4%
Spring Wheat	Saskatchewan	41%
	Alberta	37%
	Manitoba	18%
Sunflower Seed	Manitoba	97%
	Alberta	2%
	Saskatchewan	1%
Wheat	Saskatchewan	45%
	Alberta	42%
	Manitoba	15%
	Ontario	6%
	Quebec	<1%
	Ontario	83%
	Saskatchewan	6%
Winter Wheat	**Alberta**	**5%**
	Manitoba	**3%**
	Quebec	**2%**

B. Production Maps of Canada (USDA, n.d.)

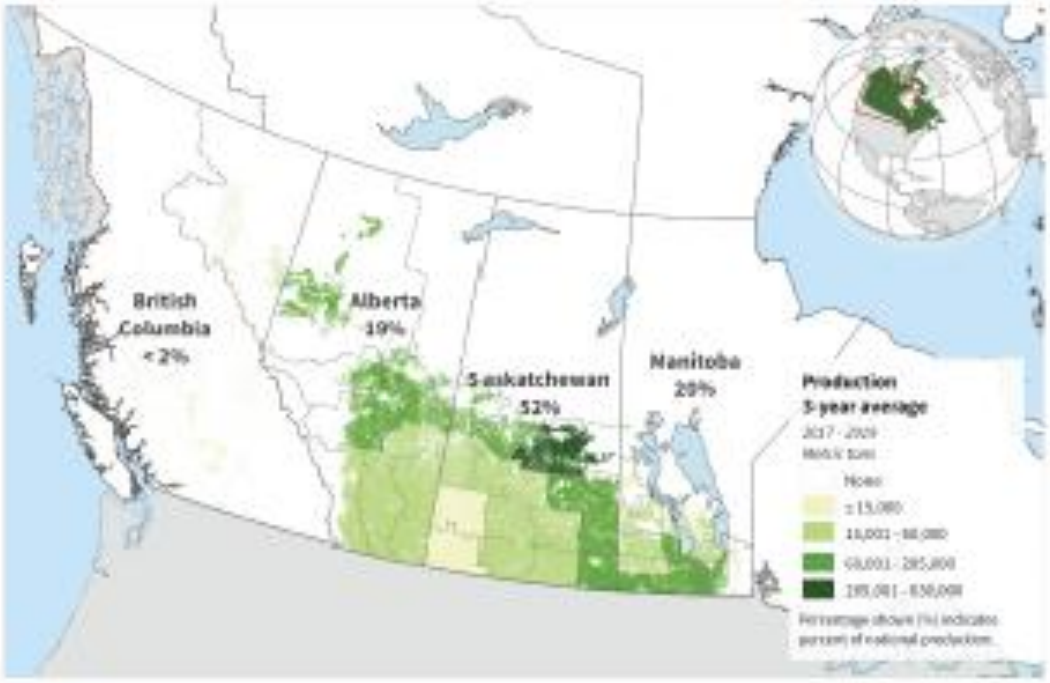
Canada: Barley Production



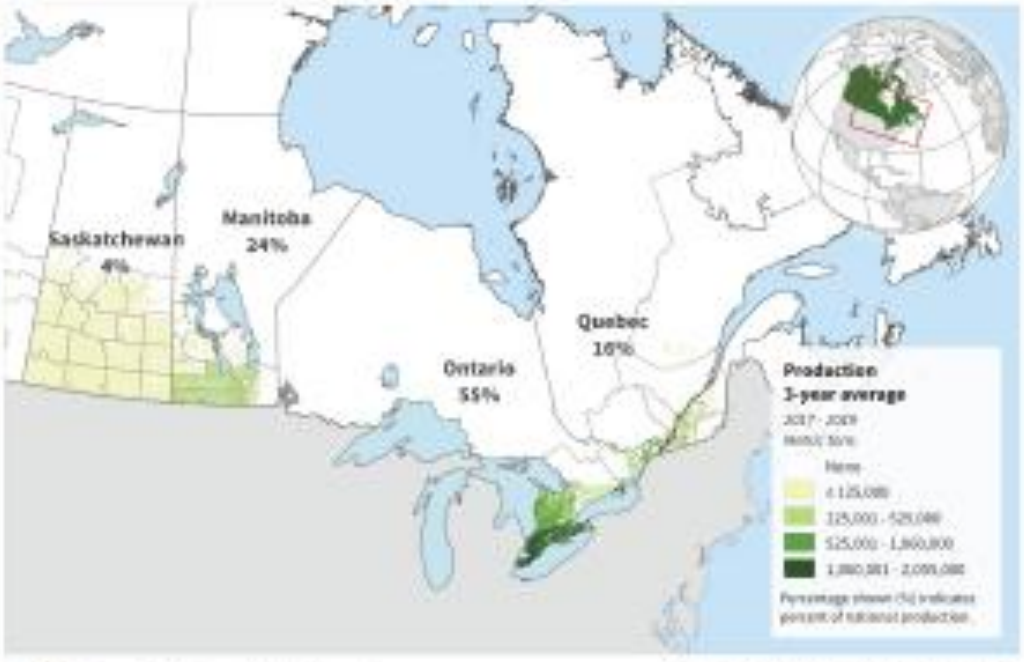
Canada: Corn Production



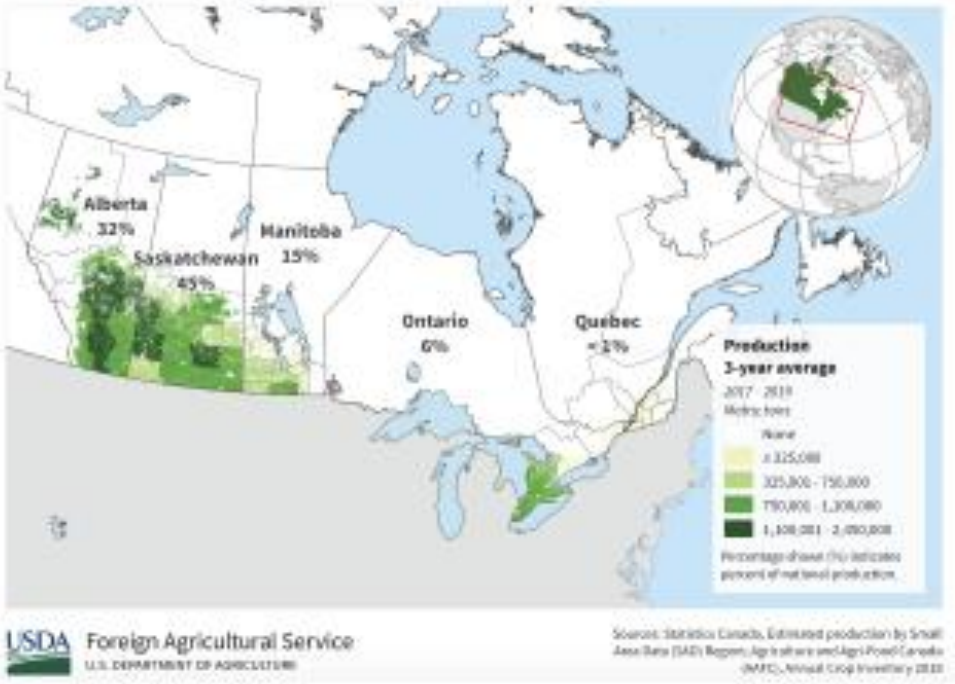
Canada: Oat Production



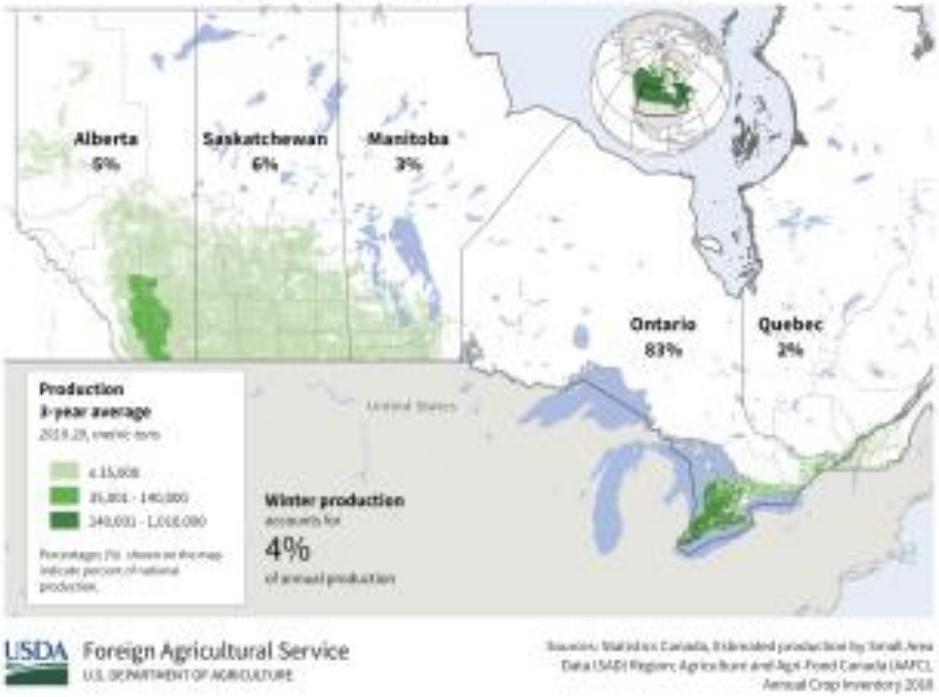
Canada: Soybean Production



Canada: Wheat Production



Canada: Winter Wheat Production



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Helen Miller, EIT

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Education

M.S. in Biosystems and Agricultural Engineering, Michigan State University, East Lansing, MI

Thesis: *A Decision Support System to Evaluate the Economic Feasibility of Solar Technology on Dairy Farms*
B.S. in Mechanical Engineering, Michigan State University, East Lansing, MI
Additional major in Psychology, minor in Agribusiness Management
Engineering Certification: Passed initial Engineer In Training examination December 2020

Relevant Experience

Project Engineer - Miller Engineering, Inc., Ann Arbor, MI (2019 – Present)
• Case experience regarding fermentation, farm vehicle road safety, agricultural equipment, generator testing, recreational
vehicles, cranes, product recalls, etc.
• Studied lawsuits regarding product failure, warnings & regulations, and human factors engineering.
• Researching OSHA standards, applying engineering principles, and authoring reports.
Research Assistant – Michigan State University, East Lansing, MI (5/21 – 5/23)
• Tractor newly converted to electric motor: Prepared formal plan for obtaining performance metrics.
• Tractor metrics: Included but not limited to tractor slip, hydrostatic pressure, and drawbar force.
• Agricultural Mechanization: Assisted with development of course.
Teaching Assistant – Michigan State University, East Lansing, MI (1/21 – 5/23)
• Over 50 biosystems & agricultural engineering undergraduates.
• Agricultural and biosystems engineering junior design: Supervised and assisted creation of ag & bio design projects.
• Agricultural and biosystems engineering remote learning model: Developed for professor as well as ag and bio students.
• Agricultural engineering electronics lab: Set up agricultural related electrical and sensor components for monitoring.
• Instrumentation: Oscilloscopes, data acquisition systems, sensors, circuit boards, etc.
• Provided clear and effective feedback on technical writing to develop students into stronger technical writers.
ASABE International Conference, Volunteer Student Coordinator *(*7/21)
• Alliance for Modernizing African Agriculture: Lead the construction of the formal report, delegated tasks to a group of 12
agricultural engineering graduate students from other land-grant universities across the United States
Research Assistant – Mid-Michigan Research, LLC, East Lansing, MI (1/20 – 4/21)
• Internal combustion engine modelling of cylinder fluid flow.
• For the above model: Compiled data for various variables and mended computer aid design (CAD) modelling errors on
Converge CFD Software.
Property Management Intern - Kalajoki Farms, Clatskanie, OR (5/16 – 8/16)
• Rural Energy for America Program (REAP) government funded solar plant supervision of the installation.
• Prepared a home for rent through restoration, creative decision-making, and appliance installation.
• On farm equipment operation; tractors; irrigation systems; manual labor; weed control; electronic land surveying.

Presentations

*ASABE International Conference: Alliance for Modernizing African Agriculture (*7/21)
Title: The Potential of Solar Energy to Modernize African Agriculture
*ASABE Global Initiative Conference: Sustainable Energy for a Sustainable Future (*10/22)
Title: A Decision Support System to Evaluate the Economic Feasibility of Solar Technology on Dairy Farms

Relevant Skills

• Extensive experience with MS Office Suite, Slack, and other professional tools
• Extensive experience using: Camtasia, CONVERGE CFD, and Rstudio
• Moderate experience using: CSS, HTML, JavaScript, Matlab, NX 11 CAD, Altaire Inspire, SPSS, Minitab, Qualtrics
• Proven track record of effective time management with multiple projects, strong communication through several mediums to

different groups, and systematic problem-solving of complex tasks.

Affiliations

American Society of Agricultural and Biological Engineers 2021 – Present
American Society of Mechanical Engineers 2020 – Present
Engineers Without Borders, Michigan State University *2019 – Present*
Tau Beta Pi, Engineering Honors Fraternity, Michigan State University *2018 – Present*
4H – Rabbitry, Western and English Horsemanship 2010 – 2016

ABOUT MILLER ENGINEERING AGRICULTURAL EXPERTISE

We are more than engineering consultants as we actually manage the farming of 1000 acres of land in Idaho and Oregon. Furthermore, we have designed and operate a hydroelectric plant on the Snake River and designed and built a solar farm to operate pressured pivot irrigation systems under a US Government Grant (REAP). The agricultural, academic, publications and forensic experience of our engineers in the allow us to act as experts in many of the warning, labelling, toxic material, vehicular accidents, animal safety, and other types of issues and incidents confronted in agricultural operations. We can assist with everything from agricultural accident analysis to systems design from simple individual pieces of equipment to complicated automatic irrigation, solar and the hydroelectric systems.

On staff, we also have a licensed applicator for herbicides, fertilizer, pesticides, insecticides, and restricted use chemicals. Below are examples of areas we have provided agricultural engineering expertise:

- Agricultural Safety Engineering
  - Tractor, Farm Implement, and Harvesting Safety (OSHA 29 CFR 1929)
  - Dairy and Food Processing Safety and Health
  - Cannabis and Hemp Processing Safety
  - Machine Guarding, Entrapment, & Entanglement
- Farm Tools, Vehicles, Equipment, and Machinery
  - Tractor Overturns/Rollovers
  - Irrigation & Hydroelectric Power Systems
  - All-Terrain Vehicle (ATV) Usage
- Farm Accident Analysis/Reconstruction
  - Hay, Crop and Grain Harvesting Accidents
  - Grain and Crop Conveyor and Elevator Storage and Accidents
  - Horse (Equine) and Cattle (Bovine) Accidents
- Agricultural Chemical Safety, Applications, and Exposure
  - Pesticide Use, Compliance, Disposal, and Contamination
  - Licensed Restricted Use and Chemigation Applicators
  - Wastewater

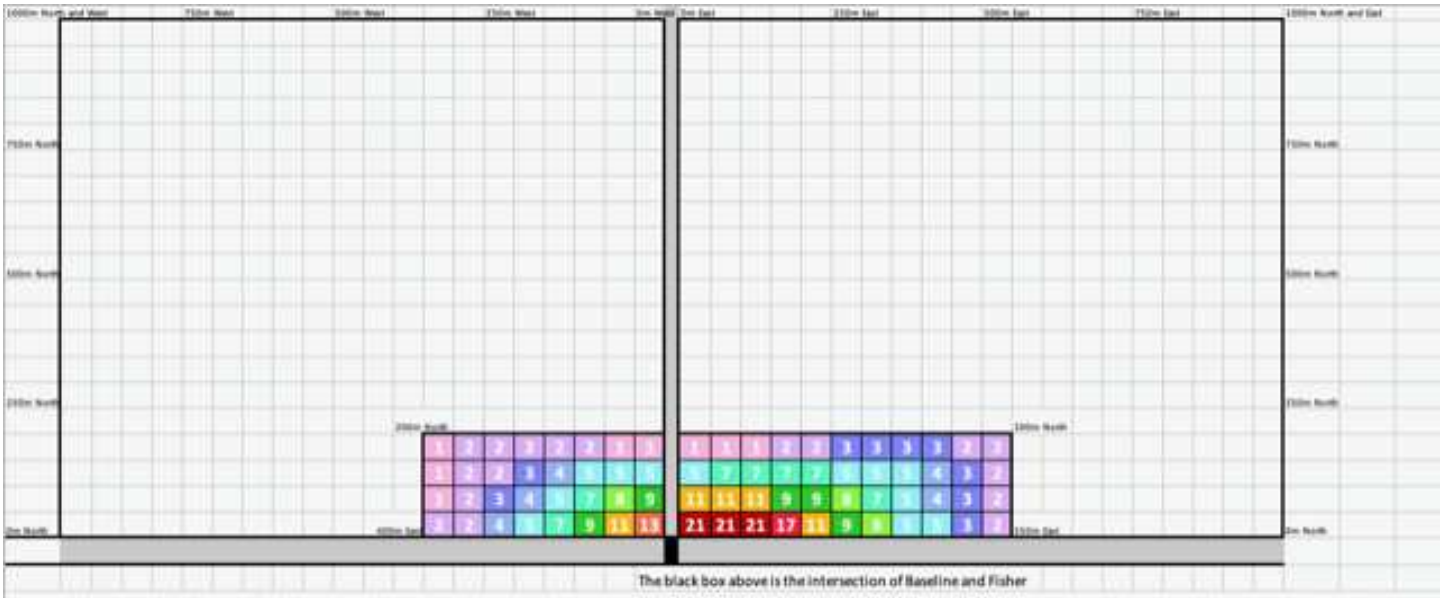
- Construction Safety, Training, and Accidents (OSHA 29 CFR 1926)
  - Building Materials
  - Building Codes

Our Working Farms and Ranches

Our 1,000 acres of ranch, farm, and timberlands in Idaho and Oregon, as well as our solar farm and hydroelectric power plant on the Snake River (shown below), have the usual pieces on farm equipment: tractors, swathers, balers, rakes, planters, harvesters, tilling equipment, backhoes, skid steers, and ATVs. Crops produced include potatoes, alfalfa, sugar beets, barley for Coors and Budweiser, winter wheat, beans, carrots, and three types of corn: sweet, field, and silage corn. The ranch is also home to 300 registered black Angus cattle.
These properties are available for various test or demonstration purposes of crops and equipment, and they are available for use by clients. We also use our contacts with our many local farmers to gather data about the equipment they buy and use. We are happy to make this connection to our farms available.

Interpretation of Graph Helen Miller
Helen Miller <helen@millerengineering.com>
Attached is a screenshot of the graph for your visualization purposes.
Note that these values are **only estimates** based on the yellow rectangle in Figure 2A from the AAFC letter.

Furthermore, I believe Figure 2A is perfectly North/South and East/West, and Fisher and Baseline do not run N/S and E/W - so it's not quite as it appeared yesterday. However, the Black rectangle is approximately at the intersection of Fisher and Baseline.



NOTE: This is a recreation of Figure 2A in the AAFC Letter based on Results #2 and #3. Due to the unreadable legend provided in Figure 2A, the % sunlight reduction shown here are only *Estimates*.

Each square represents a 50m by 50m block (2500 square meters). The number in each block is the estimated percent sunlight reduction based on the values provided from the AAFC letter.

Based on Figure 2A, this map shows North as up, South as down, West to the left, and East to the right. Fisher Ave and Baseline road are not perfectly North/South and East/West, so the angle of the roads must be considered.

Figure 2a. Percent daily reduction in solar radiation April 01 to November 30 for Tower A, B and C at 780 Baseline Road. Polygon colours correspond to percentage daily amount of solar radiation reduction