PARSONS

New Campus Development

Hospital and Central Utility Plant

Environmental Effects Evaluation

Environmental Impact Statement and Tree Conservation Report Update

November 2022

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Prepared by:

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Prepared for:

Public Services and Procurement Canada

National Capital Commisson

The City of Ottawa

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SECTION A: PROJECT IDENTIFICATION

Project Title	New Campus Development: Hospital and Central Utility Plant
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SECTION B: PROJECT DESCRIPTION AND DESCRIPTION OF THE ENVIRONMENT

1.0 INTRODUCTION

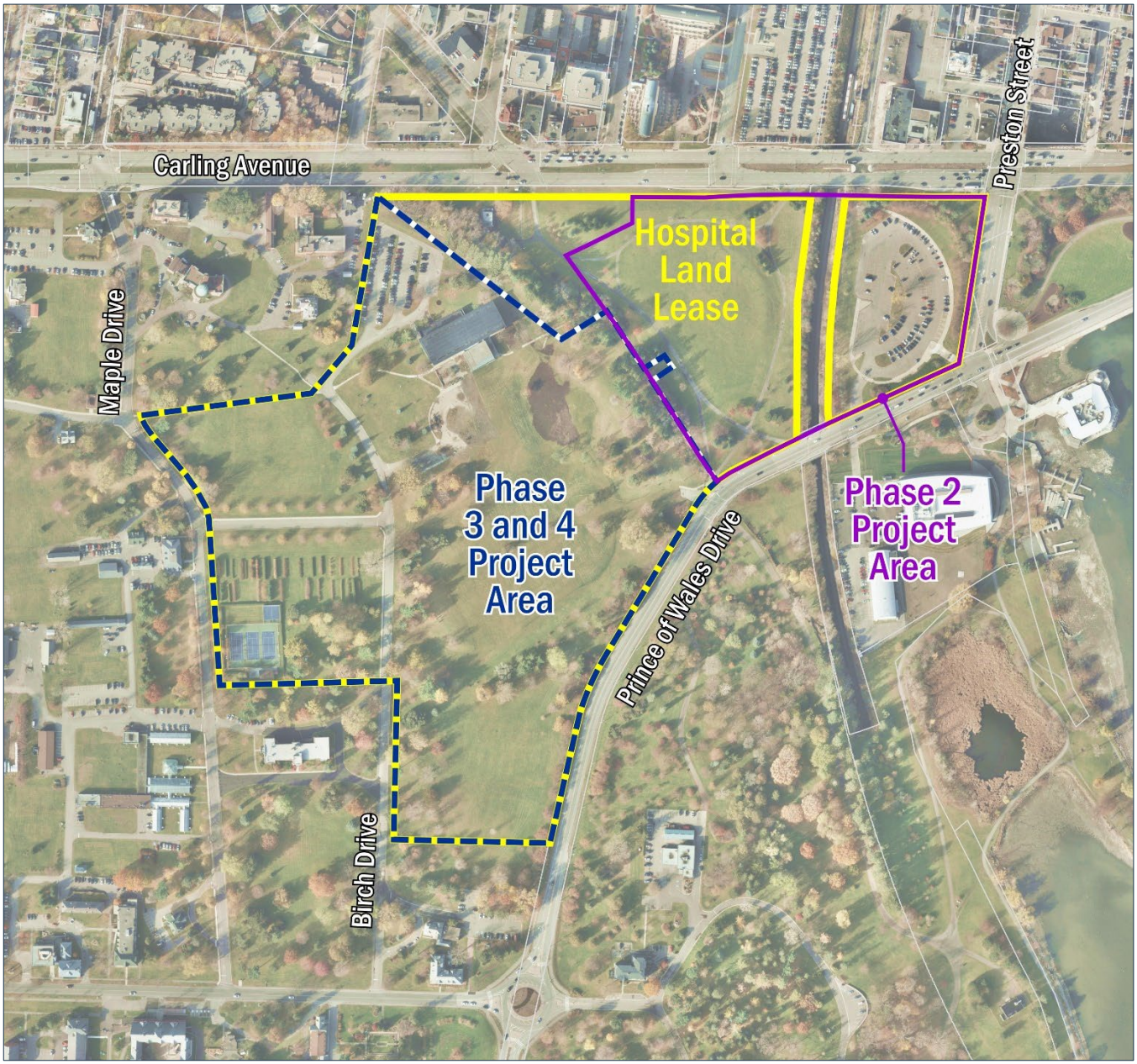
In June 2017 a Federal Land Use Design and Transaction Approval was granted making an approximately 20-hectare property of federal land available for a new campus of The Ottawa Hospital (TOH). Municipal land use planning policy documents were brought into alignment with this federal land use decision. The land lease was enacted in February 2018.

TOH is undertaking a phased Site Plan process for establishing a New Campus Development (NCD) and replacing the ageing Civic Campus located at 1053 Carling Avenue. The NCD site is a diverse area located at the southwest intersection of Carling Avenue and Preston Street. The new site will have strong ties to transit (Trillium LRT Line), Dow's Lake and the Rideau Canal and the Central Experimental Farm (CEF).

The NCD site (Master Site Plan Boundary/Ottawa Hospital Lease Area) is an approximately 20-hectare (ha) property located to the south and west of the intersection of Carling Avenue and Preston Street, on two parcels that are separated by the City's existing Trillium LRT Line right-of-way. The larger property is to the west of the LRT line and is largely open space and includes a treed escarpment and is referred to as the westerly parcel. The smaller property to the east of the LRT line currently hosts a surface parking lot and is referred to as the easterly parcel.

The Phase 3 and 4 Project Area (Central Utility Plant and Hospital) is approximately 13.88 ha and occupies the southwest portion of the overall Hospital site, on lands to the west of the Phase 2 Parking Garage site (**Figure 1**).

Figure 1: New Campus Development Site for The Ottawa Hospital



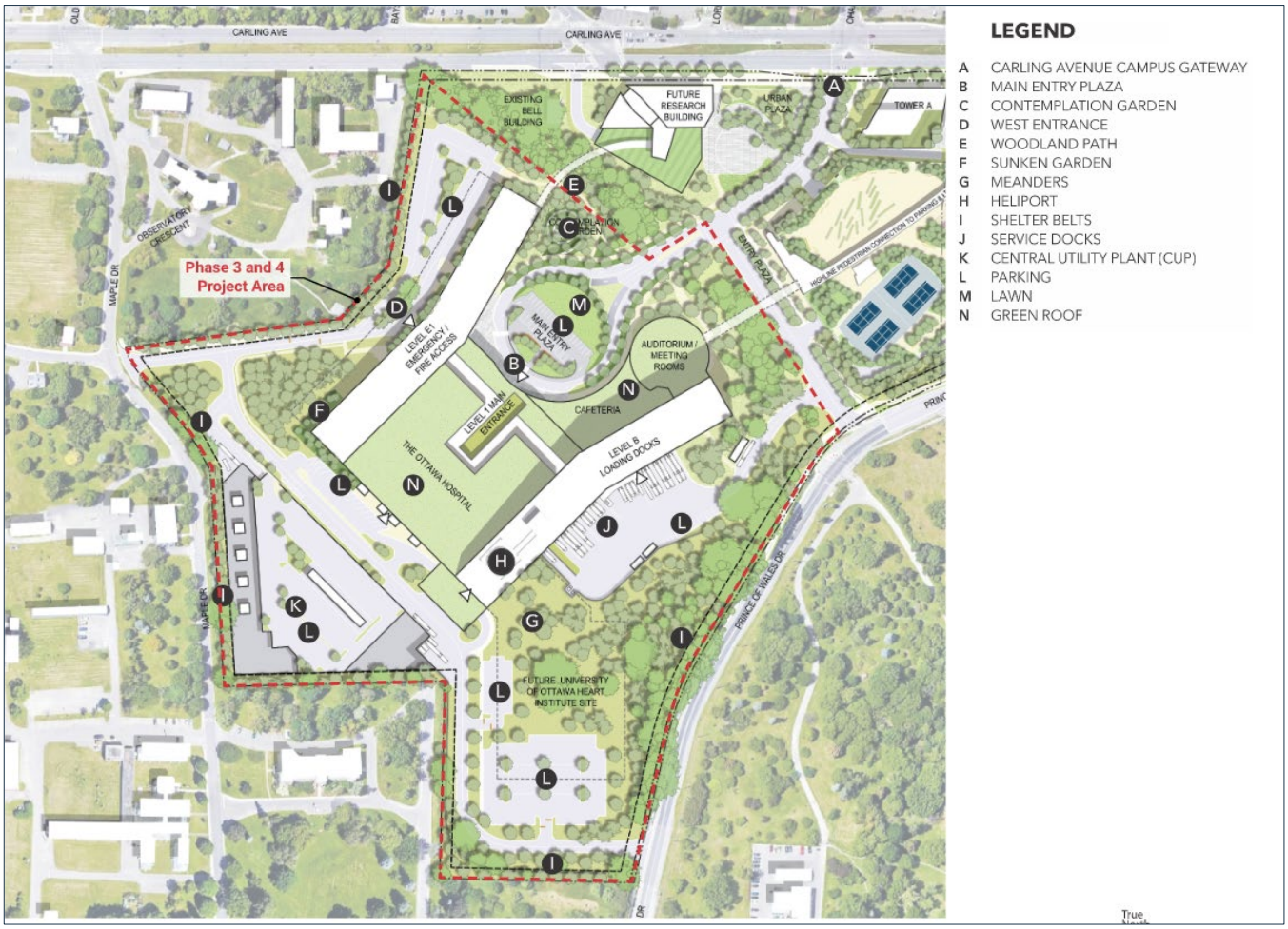
In May 2021, TOH submitted a Federal Land Use and Design Approval (FLUDA) to the National Capital Commission (NCC) and Master Site Plan Control Application to the City of Ottawa for approval of a Master Site Plan for the NCD site (**Figure 2**) and was approved by the NCC Board of Directors on October 5th, 2021 and Ottawa City Council on October 13th, 2021. Additionally, in January 2022, the NCC Board approved the Schematic Design of the Phase 2 project. A phased approach to construction of the NCD is planned and will require separate FLUDAs and Site Plan Control Approvals for each phase, to be constructed as shown in the project phasing plan illustrated on **Figure 3**. Note the Phase 3 and 4 Project Area is outlined by the blue dashed line.

A FLUDA from the National Capital Commission is required to implement the Phase 3 and 4 project. This report has been prepared in accordance with the requirements and guidance outlined in sections 81 to 91 of the *Impact Assessment Act* (IAA), where an Environmental Effects Evaluation (EEE) is required of Federal Authorities with a role/interest in the project in order to determine the likelihood of significant environmental effects prior to issuing project approval or other decision in order for the project to proceed. Public Services and Procurement Canada (PSPC), as the landowner, and the NCC are

considered lead and secondary federal authorities, respectively. A Project Description will be posted on the Impact Assessment Agency of Canada's Registry (https://iaacaeic.gc.ca) for a 30-day public review and comment period. All comments received will be considered in making a determination of significance.

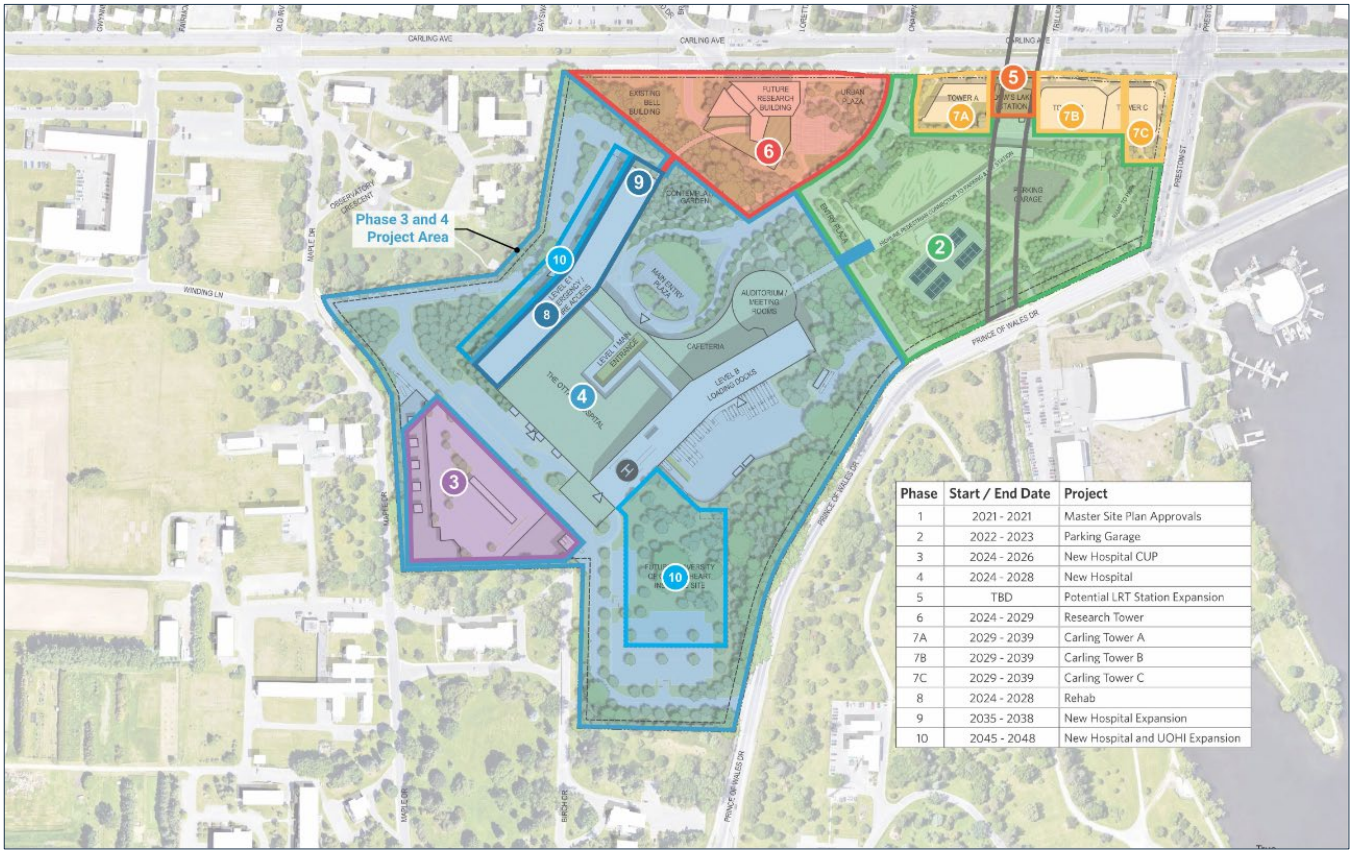
This EEE report is intended to meet the requirements for a federal Environmental Effects Evaluation (EEE) under Section 82 of the Impact Assessment Act of Canada (IAAC) and also as an update to the Environmental Impact Statement (EIS) and tree conservation recommendations (that was prepared for the Master Site Plan applications (Parsons, 2021a)) to meet the EIS requirements as it applies to the Phase 3 and 4 Project Area. The project will be undertaken as a "non-basic" EEE as it is anticipated that there is potential for residual impacts following the implementation of mitigation.

Figure 2: Master Site Plan, Open Space, Landscape, and Grading Concept



Source: Modified from HDR, 2022c

Figure 3: Master Site Plan, New Campus Development Phasing Plan, Ultimate Build Out



Source: HDR, 2022c

1.1 General Project Scope

The Phase 3 and 4 Project is considered the second phase of implementation of the Master Site Plan for the NCD. Major components of the design include Central Utility Plant, Hospital, Access, Connections and the Public Realm, and Landscaping, which have been described below. The overall Site Development Plan is illustrated on **Figure 4**.

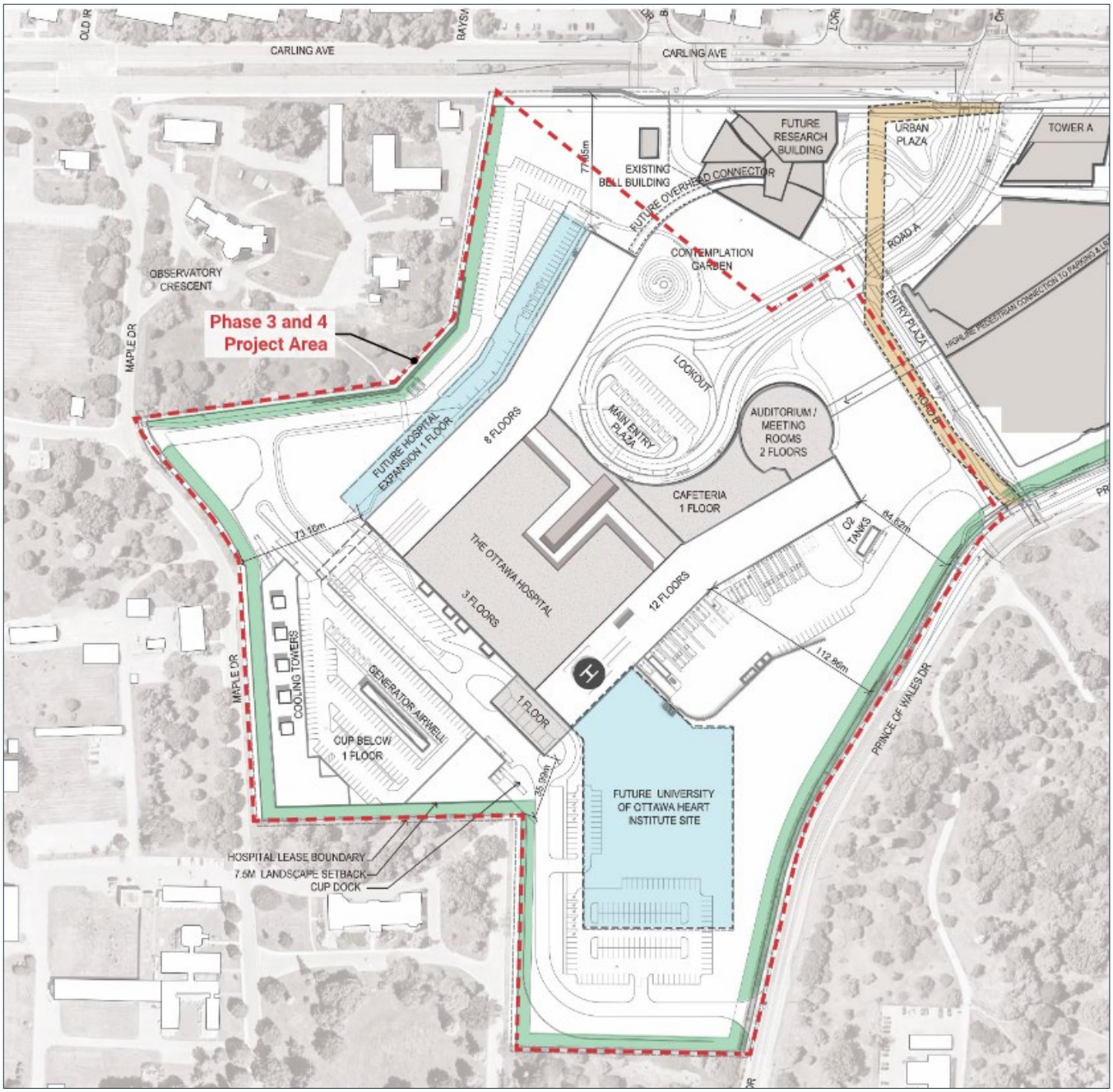
The Design Brief prepared by the project architects, HDR, and the accompanying drawing sets also assists in defining the project for the purposes of this EEE.

Central Utility Plant: The Central Utility Plant (CUP) is Phase 3 on the phasing plan and will contain electrical, heating and cooling equipment which will provide services to the Hospital. The CUP will be constructed prior to the construction of the Hospital in order to provide electricity, water and other services to the site during the construction phase. The CUP is sunken into the landscape below the grade of Maple Drive. Landscaped buffers at minimum 7.5 meters in width will be included between the CUP and the adjacent property line with the Central Experimental Farm. Access to the CUP will be provided from Prince of Wales Drive, along Road E. The building will include its own loading areas as well as limited surface parking of the roof of the building. Areas of the CUP (darker grey areas on Figure 2) are open to the sky with the area on the western edge of the CUP, containing the cooling towers. Exhaust stacks are located centrally within the surface parking area and extend approximately 3 metres from the surface of the parking deck.

Hospital: The Hospital ultimately will include approximately 230,000 square meters of gross floor area, with approximately 155,000 square metres included as this first phase of the Hospital, configured via a two-storey podium, two towers which will house the majority of the patient rooms, and a Pavilion flanking the Main Entrance. The emergency level is provided one level below grade. “Tower A” on the north/west portion of the site is 8 storeys, and “Tower B” on the south/east side of the site is 12 storeys. A helipad for air ambulances transporting patients to and from the Hospital will be located on the roof of Tower B. The main entrance to the Hospital includes welcome and registration areas, cafes, and a lightwell to create a welcoming first impression. The Pavilion, to be constructed using mass timber, will contain meeting

and conference rooms, an auditorium, retail spaces, a cafeteria, as well as the connection to the weather-protected highline pathway providing access from the green roof of the parking garage and ultimately Dow's Lake LRT station. While the majority of the parking required for the Hospital was provided as part of the Phase 2 (Parking Garage and Green Roof) Project, the Phase 3 and 4 Project include some additional surface parking for staff and large-scale emergency situations at strategic locations to the northwest of Tower A and to the south of Tower B on the site of the future Heart Institute footprint. Short-term and barrier free parking spaces for the public will also be provided at the main entrance and emergency entrance levels for convenient drop-off and pick-ups. The Emergency level will also include non-emergency ambulance transfers to the Hospital.

Figure 4: Site Development Plan



Source: Modified from HDR, 2022c

Access, Connections and Public Realm: Vehicular access to the Hospital for the public will be provided via the development's internal road network – Roads A and B. This private road network intersects with Carling Avenue at Road A and Prince of Wales Drive either directly to the Parking Garage or via Road B. Access to the surface parking areas for staff to the south, west and north of the Hospital will be directed to Prince of Wales Drive and Road E.

These accesses as described above to the Hospital will be developed as part of the Phase 2 Parking Garage Project, Phase 3 and 4 Project and their enabling (early) works. While the design, rough grading and initial construction of the Hospital site's internal roads formed part of the Phase 2 Project for the Parking Garage and Green Roof, the Phase 3 and 4 Project will complete the construction of separated pedestrian and cycling facilities through the site on the east side of Roads A and B, and these phases will provide pedestrian and bicycle access to the main entrance of the Hospital via a multi-use pathway on the south side of the main entrance and a sidewalk on the north side. A multi-use pathway is also provided from Maple Drive, around the north Tower of the Hospital to the Main Entrance. A connection across the Green Roof of the Parking Garage and through the Pavilion will also be constructed as part of this phase of the project, to provide weather-protected pedestrian access to the Hospital from the Dow's Lake LRT station.

Landscaping Approach: The landscape approach for the NCD is based on knowledge of the ecozone that the site is within and its surrounding context. The concept provides large planting areas where native mixed wood species used in combination with lawn, plaza and pathways to create habitat, ornament and place. The planting areas are designed to frame and shape people spaces including the main entrance plaza, the contemplation garden and the woodland path, while providing visual interest throughout the seasons. Landscaping is also designed to buffer and shield the development from the surrounding landscapes of the Central Experimental Farm, Dow's Lake and the Rideau Canal and the Scenic Entry of Prince of Wales Drive.

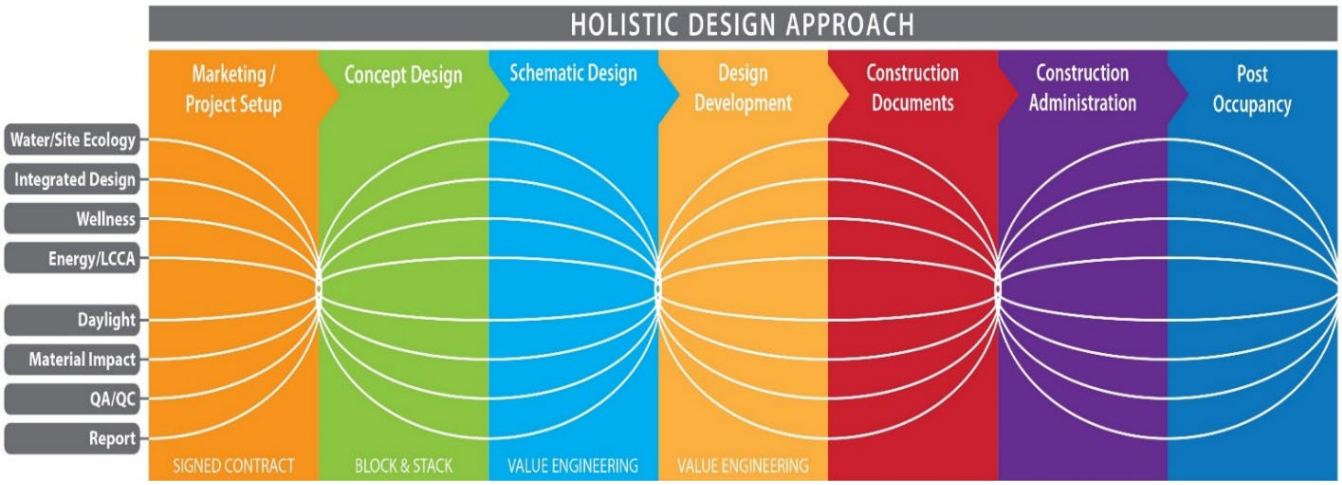
The site has a large number of existing trees that have been inventoried to assess their retention value which vary from non-native planted species to invasives and unhealthy specimens. Preservation of the highest value trees is a central goal of the design team as well as building an appropriate plant association around them.

TOH is committed to working with approval authorities to achieve a 40% tree canopy cover over 40 years following build out of the Master Site Plan. Where this cannot be achieved, TOH will work with adjacent federal and municipal landowners to coordinate off-site plantings to provide a combined contribution to this tree canopy target.

1.2 Sustainable Development Strategy

As a leading healthcare provider, The Ottawa Hospital is in a position to develop a new paradigm for sustainability in hospital design with the New Campus Development. The first step is to create a vision balancing the highest quality of patient care woven within a building that has positive impacts for the environment, the community and the people who use it. To reach that goal, core sustainable design values and principles have been developed, around which a holistic sustainable design strategy will unfold. The process is important to the outcome and starting to plan sustainable principles early is critical.

TOH, with its project architects, have already begun a holistic, sustainable design approach. The design team undertook a comparative analysis of relevant regulatory frameworks (Federal and NCC Sustainable Development Strategies), internationally recognized 3rd party certification systems (One-Planet Living, LEED and WELL), Owner priorities and benchmark projects and have developed a synthesized project framework, to act as an organizational scaffold for these core sustainable design values.



Core principles that will drive the sustainability approach include:

1. The Patient and Staff Experience: The quality of the built environment has a profound impact on the overall patient experience as well as staff wellness and productivity. This principle seeks to build a health promoting, nourishing environment that supports our well-being and aids in maximizing the patient experiences. Potential strategies include:
    - Natural light and daylighting, access to views of nature and biophilic design, quality acoustics and patient privacy, thermal comfort, healthy materials, access to nature.
2. Building Performance: A high-performance building not only is less costly to operate and maintain but provides a myriad of environmental benefits in reduced demand for energy and reduced waste. Potential strategies include:
    - Early energy benchmarking, target setting and modeling to inform envelope and systems design, robust building envelope, passive design strategies to minimize peak solar loads, highly efficient comfort delivery systems and plant design, design for easy conversion to low-carbon technologies at the end of original plant equipment life cycle, operational performance optimization through energy metering and monitoring.
    - The Ministry of Health and Long-Term Care will require a LEED Silver rating for the new hospital development within a traditional public-private partnerships procurement model.
3. Environmental and Community Benefits: A project of this scale, and on this unique Site, has the potential to have a major impact on the local and regional community and the environment. Upholding principles of social equity and restorative ecology, this project can not only mitigate negative impacts, but provide net benefits to the community and the biosphere. Potential strategies include:
    - Low-impact development, habitat protection and restorations, downstream waterbody protection, reduced emissions, reduced waste, community amenities, direct light rail and bicycle connections within a transit-oriented development area;
    - Trees not only are carbon sinks, but when they shade paved surfaces, they help to reduce solar reflectivity, which in turn helps to reduce the urban heat island effect. The objective in the Master Site Plan was to save large numbers of trees along the existing wooded ridgeline, running north-south through the Site, and plant more trees to aid in this pursuit. In similar fashion, the use of high albedo pavement and/or open celled pavers do the same, by reducing the amount of solar radiation reflected into the atmosphere.
    - By providing low maintenance planting zones strategically around the perimeter of the NCD, the overall maintenance regime can be reduced and a high quality, natural landscape aesthetic can be provided using native plants. Native plants typically also have the lowest irrigation requirement, a key factor in reducing water requirements campus wide. Additionally, pollinator habitats are an integral part of native plant communities to provide habitat for bees and butterflies, among others.
    - The project proposes green roofs on the Hospital podium and pavilion to help reduce storm water run-off and mitigate the heat island effect; and

- Finally, the plan is to provide a series of bioswales, sunken gardens, and infiltration galleries on-site to assist with requirements for improving storm water quality before it is discharged. Both systems encourage infiltration and help to filter out impurities.

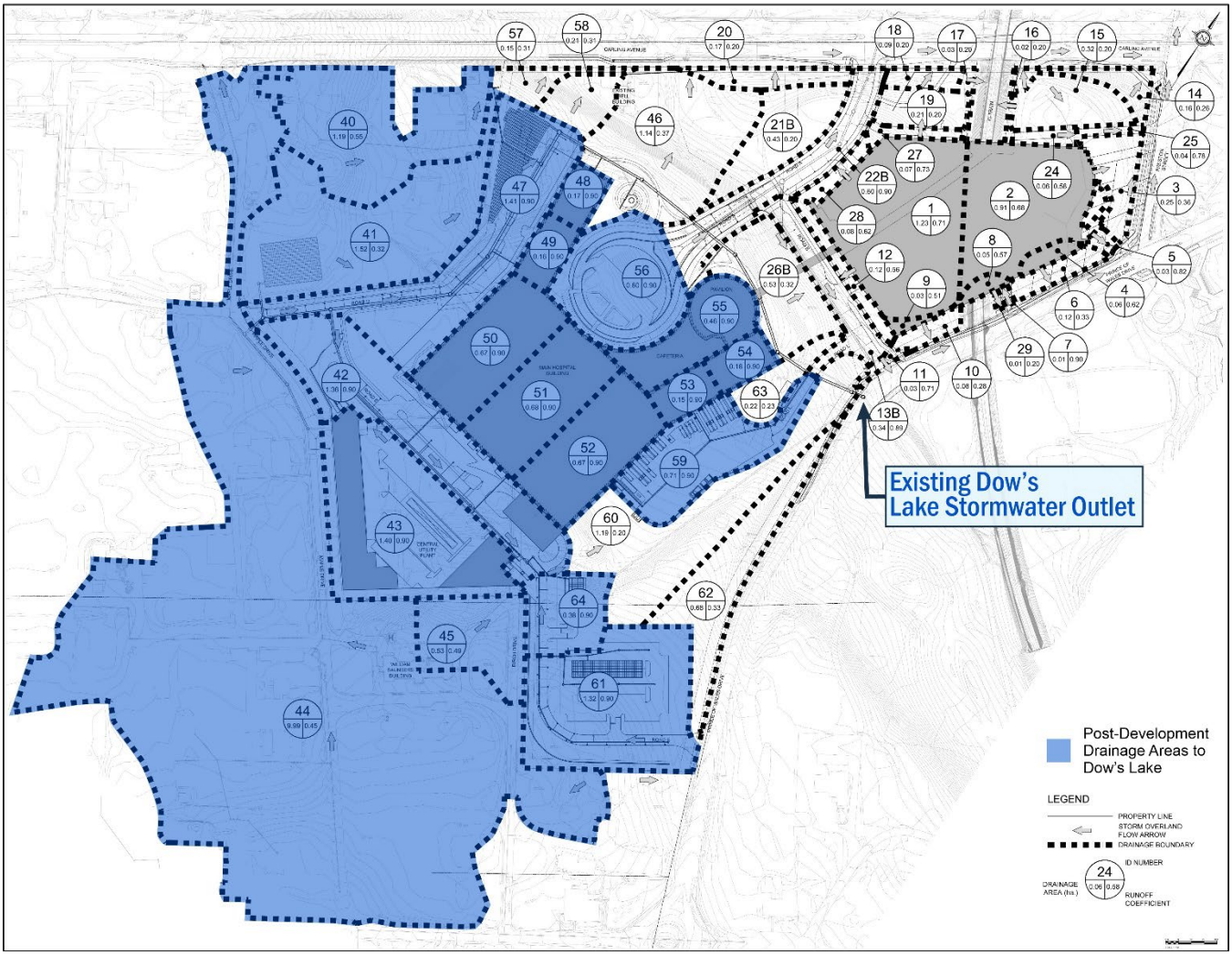
1.3 Stormwater Management Approach

A quantity control design will ensure that storm flows in excess of the 2-year/5-year storm release rate, up to and including the 100-year storm event, are detained on Site. The total development area has been divided into four (4) main drainage areas, with one (1) drainage area located on the east side of the LRT corridor, one (1) drainage area located on the west side of the LRT corridor and adjacent to Carling Avenue, one (1) drainage area on the northwest side of Prince of Wales Drive, and one (1) drainage area to the southwest of the LRT corridor, including external areas from Maple Drive. The eastern area will outlet to the Preston Street Trunk Sewer, the area northwest of Prince of Wales Drive will continue flowing to Prince of Wales Drive, the western area will outlet to the Carling Avenue storm sewer which ultimately outlets to the Nepean Bay Trunk Sewer, and the southwestern area will outlet to Dow's Lake. Please note the storm flows to Dow's Lake, which are uncontrolled today, will be controlled to the existing 5-year pre-development flow rate of 2,533.33L/s. Proposed stormwater servicing, including post-development drainage has been included on **Figure 5** below. No changes physical changes to the Dow's Lake Outlet itself are anticipated.

A quality control design will ensure that 80% total suspended solid (TSS) removal. Best management practices are incorporated into the design to provide enhanced levels of quality treatment. The design adheres to the new Canadian Environmental Technology Verification (ETV) testing protocol land ETV verification protocol for oil and grit separators. A combination of oil and grit separators and low impact development measures are required to achieve 80% total suspended solids removal.

Several stormwater management quality treatment features are anticipated to be implemented. These include: Green Roofs; Curbside Detention (i.e., Silva Cells); Sunken Gardens; Infiltration galleries and other Subsurface Storage (i.e. Cisterns); Permeable Pavement; and Storm Sewer Systems.

Figure 5: Post Development Conditions



Source: Modified from Parsons, 2022b

1.4 Site Lighting Approach

A primary goal of the lighting design is to create a welcoming destination that transitions the urban built environment to the natural and scenic vistas. Additionally, the lighting design will limit sky glow and light trespass- onto adjacent sites as well as into the Hospital itself. Site lighting is designed to be directed downwards in support of a dark night sky and bird-friendly practices. All site lighting will utilize warm white LED technology to further mitigate sky glow and support circadian rhythms (HDR, 2022b).

Parking Areas and Roadways

Full cut-off pole mounted LED luminaires will be utilized. Lighting will utilize photometric distributions to minimize quantity while maximizing illumination uniformity at grade. Height of fixtures will help keep the light source out of normal viewing angles and improve uniformity. Poles will utilize raised concrete bases for car, snow removal, and lawn maintenance protection. Luminaires will be controlled dusk-to-dawn by photocell with the ability to dim by time clock between midnight and 5am. Dimming protocols will be coordinated and approved by site security but will never dim greater than 50%.

Sidewalks

Full cut-off pole post top mounted LED luminaires will be utilized. The luminaire will utilize a flat diffuse lensed bottom to obscure direct view of LED sources. Height of fixtures will help keep light source out of normal viewing angles and improve

uniformity. Poles will utilize raised concrete bases for snow removal, and lawn maintenance protection.

Main Entrance

Lighting will be utilized to assist way-finding by providing accent lighting along the architectural colonnade at the main entry. Recessed down lights in the canopy and architectural soffit will include full cut-off 4 m tall luminaires along the sidewalk to extend the arc along the roadway approach. The drop-off sidewalk area will be illuminated to an average maintained value of 53 lux with a max/min target ratio of 10:1. Crosswalks leading to surface parking will be illuminated by the post top pedestrian scaled fixtures used along sidewalks. Lighting will be controlled dusk-to-dawn by photocell.

1.5 Transit Connectivity, Active Mobility, Site Access and Circulation Approach

The Phase 3 and 4 Project will consist of new multiuse paths on Road A to connect to Carling Avenue and to Road B and Prince of Wales Drive. Both connections lead to the Trillium Pathway (HDR, 2022b).

Bicycle parking is planned for the new parking garage, but also at public and staff entrances to the Hospital building, including the north and west entrances.

Roads A and B on-site are designed to allow local transit / buses and coordination with OC Transpo is on-going, related to the location of future priority service and bus stops on Carling Avenue and for potential service on Roads A and B interior to the Hospital site.

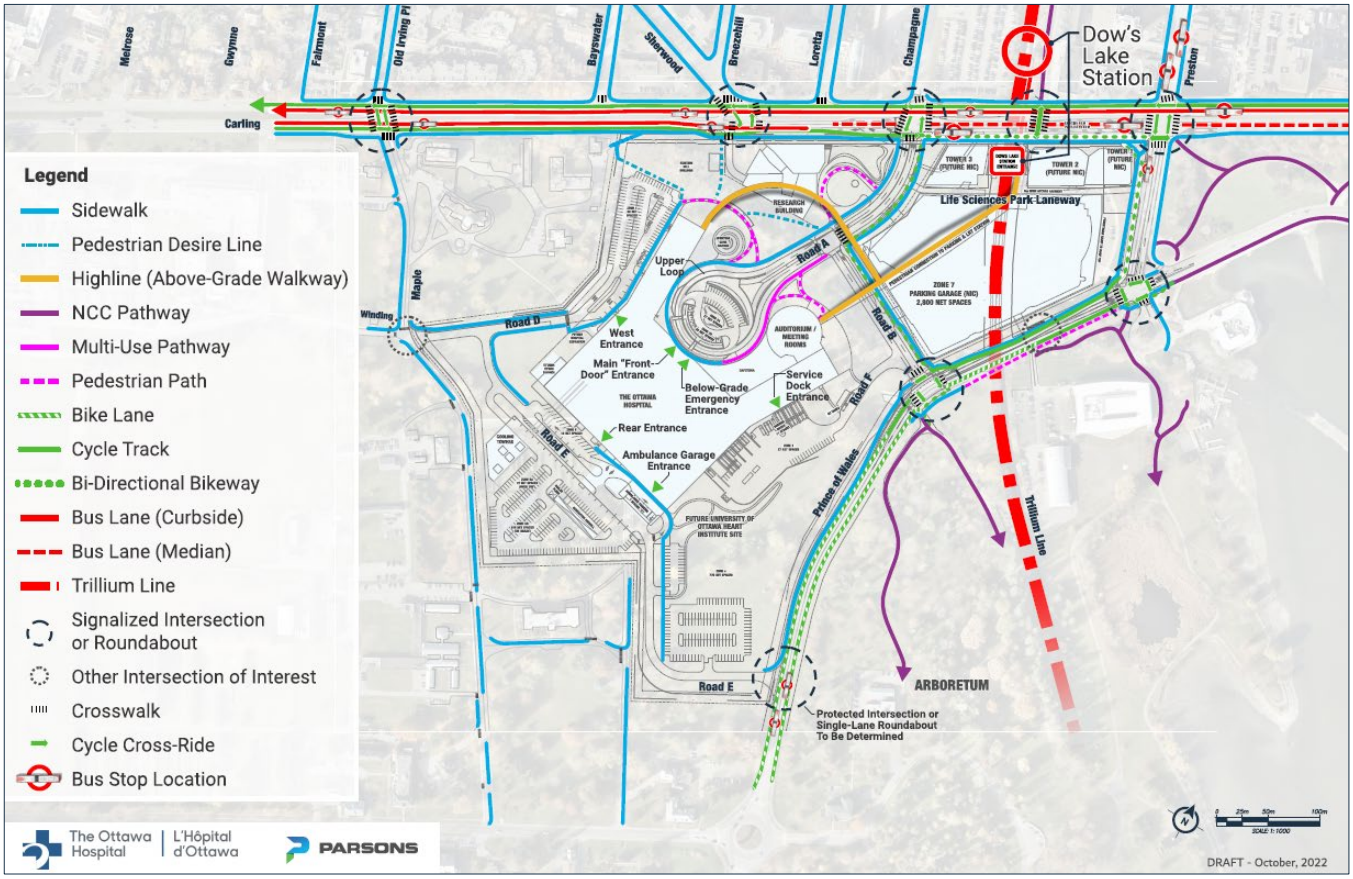
Additionally, the Hospital is planned to connect directly to the new parking garage and rooftop park, leading pedestrians through an enclosed, weather protected link from level 1 of the Hospital to the new Dow's Lake LRT Station south of Carling Avenue.

A list of key strategies related to active transportation are included below (Parsons, 2022c). These have also been illustrated on **Figure 6.**

- The Prince of Wales Drive intersections at Preston Street and Road B will be designed as protected intersections, as per the City's Protected Intersection Design Guidelines (PIDG). The proposed Prince of Wales Drive/Road E intersection design is still being discussed by the project team, NCC, Agricultural and Agri-Food Canada (AAFC) and the City of Ottawa. As a signalized intersection, it will be designed to a protected intersection standard.
- A new multi-use pathway (MUP) has been proposed from the southwest quadrant of Road A/Road B intersection that leads to the main front door entrance of the Hospital. The MUP would follow the south side of Road A.
- The sidewalk on Road D has been relocated to the opposing side, providing connectivity to the Maple Drive/Road D intersection, and crossing to the NCD side of the road using a crosswalk, A new pedestrian path has been proposed that connects the sidewalk along the west building face around to the Road A sidewalk near the front of the main building.

In general, sidewalks are 2m wide or wider, Multi-Use Pathways (MUPs) are 3m wide, and cycle tracks are 1.8m wide or wider for each direction, all meeting or exceeding minimum widths required.

Figure 6: Site Access and Circulation and Active Transportation



Source: Parsons, 2022c

1.6 Universal Accessibility and Inclusivity Strategy

Universal Accessibility is a key principle for the TOH. The Site is being designed to achieve universal accessibility that improves the experience for all hospital users including people with disabilities and functional limitations. The design will achieve connectivity of accessible spaces, facilities, control and communications, ensuring complete access for all people accessing the NCD.

The objective for the NCD is to surpass to the greatest extent possible, the minimum technical requirements of the Ontario Building Code (OBC), the *Accessibility for Ontarians with Disabilities Act* (AODA) Integrated Accessibility Standards Regulations (IASR), the City of Ottawa Accessibility Design Standard (COADS), as well as the CSA B651 Accessibility of the Built Environment Standard. The NCD project team will look towards leading best practices in Universal Accessibility of the built and virtual environments to ensure the facility meets the needs of the greatest number of users. In addition, the NCD project team will ensure the Site Plan addresses the approach and access needs of the greatest number of users, including people with a wide range of disabilities, seniors and elderly persons, families and children – whether they are arriving on foot or by bike, via public transit, ParaTransit, private car services (e.g., taxi, Uber, Lyft, etc.), volunteer driver organizations (e.g., Sunshine Coach, etc.) or by personal vehicle.

The Universal Accessibility strategy applies to all elements of the NCD project; it applies to IT and technology, ensuring the needs of people with a range of information and communication disabilities are addressed through the inclusion of assistive listening systems and video relay technologies are available wherever communications are integral (i.e., information, registration, admitting, etc.).

Universal Accessibility applies to all common facilities such as washrooms; all public and staff individual washrooms, will all be accessible to all users, including people using wheeled mobility devices, eliminating the need to 'find' the accessible

facilities. Patient rooms and facilities are designed taking into consideration the needs of all patients, including those with a pre-existing disability, staff, advocates and visitors. Universal Accessibility considers users needs holistically, including addressing the mental health needs of staff and patients equally through the provision of ample access to natural light and viewpoints throughout the building. Common spaces will utilize the use of colour, materials and acoustics to assist in wayfinding and navigation, reinforcing a signage program that will enable independent navigation and wayfinding (HDR, 2022b).

Two of the seven key planning and design principles for the development of the Phase 3 and 4 project are to "Provide a welcoming space for people of all backgrounds and cultures" and "Ensure universal access for people living with a wide range of abilities" and cultures. The design of the Hospital Building provides a welcoming environment that is inclusive and supports the linguistic, religious, cultural and gender diversity of TOH's patients, family members and staff. Patient and Family Advisors, including from the hospital's Rainbow Patient and Family Advisory Council, which work to create a supportive and inclusive environment for people of all genders, have been engaged throughout the planning process.

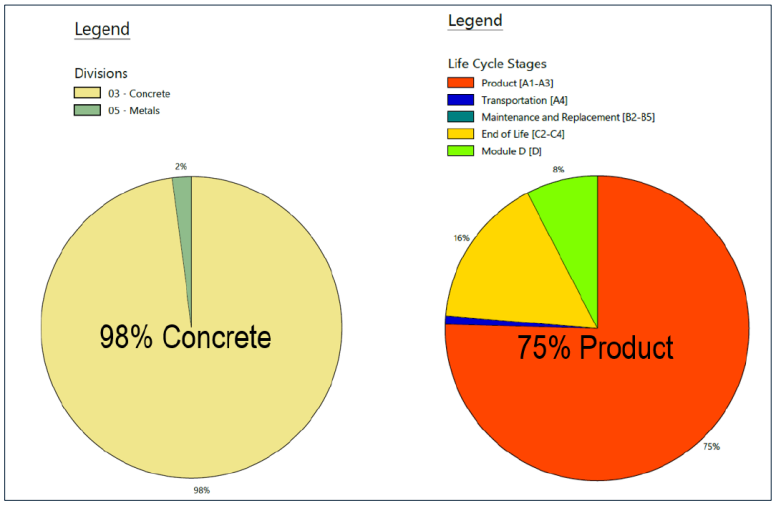
1.7 Carbon Reduction Analysis and Strategies

HDR (2022d) undertook a Carbon Intensity Analysis for the Main Hospital Building with the focus on "Embodied Carbon". Embodied Carbon are the emissions associated with materials and construction process throughout the building's life cycle. The analysis was undertaken using industry-accepted Life Cycle Assessment (LCA) computer modeling tools to quantify life cycle assessment of building materials for the analysis. Two analysis scenarios were undertaken: the first is a "baseline" Embodied Carbon Intensity model that represents the project as designed, using industry- standard materials. The baseline provides a picture of the project's Embodied Carbon Intensity (ECI) allowing comparison to industry benchmarks and suggesting where the opportunities for carbon reduction may be found. The second "improved" Embodied Carbon Intensity model, using the same design model, but with recommended lower embodied carbon materials, is then compared to the baseline to validate the proposed low-carbon strategies. It is note worthy to mention that specific attention was paid to the Treasury Board's Greening Government Strategy: A Government of Canada Directive which requires the reduction of "the embodied carbon of the structural materials by 30%" and ECCC's Quantification of net greenhouse gas (GHG) emissions.

Baseline Embodied Carbon Intensity

The baseline model results utilizing an industry-standard Cast-in-Place Concrete structure (with GU Portland Cement and reinforcing steel) and Structural Steel yielded a total Life Cycle Embodied Carbon Intensity (ECI) of 344.42 kg CO_2eq/m^2; and a Product [A1-A3] of 259.8 kg CO_2eq/m^2. The baseline model highlighted the bulk of the ECI was related to the Concrete (98%) and during the Product [A1-A3] Life Cycle Stage (75%). Therefore, the strategies for reductions were focused on Concrete during the Product [A1-A3] Life Cycle Stage (**Figure 7**).

Figure 7: Baseline Embodied Carbon Intensity



Source: HDR, 2022d

Primary Embodied Carbon Reduction Strategies

There are a number of options to limit the embodied carbon emissions from the structure including replacing steel or concrete with mass timber, where possible. For the "improved" case, a mass timber structure has been used to replace some of the steel structure for the "conference center" areas. It was possible to use mass timber in these areas as these are non-clinical and thus are not subject to the same fire rating requirements. The primary concrete structure, however, remains the driver of the carbon emissions for this type of structure, and although it's not possible due to fire issues to replace concrete with an alternative structural system, there are several carbon reduction strategies that can be taken with a concrete structure.

After review of best practices and working with material scientists at the Canadian Ready Mix Association, a new formulation of the cement was developed replacing clinker with 40% to 50% slag, a by-product from steel blast furnaces. Re-running the computer model with this modified mix reduced the ECI of the entire structure by 30% to a Stage A1 – A3 carbon intensity of 166.8 kg CO_2eq/m^2. Further, an additional 10% reduction is expected by replacing the Portland Cement with Portland Limestone Cement. Please note that as the project is only in the design stage the computer modeling is based only on regional average values for ECI and would need to be re-evaluated once the specific supplier is selected as the location of the supplier's batching plants, location, the carbon intensity of the local electrical grid and proprietary cement mixes would all have impacts on the embodied carbon numbers. As the regional average values are by nature conservative and the industry is making significant strides to reduce CO_2 emissions, all expectations are that final values will improve over the design stage model.

Additional Embodied Carbon Reduction Strategies

Although not included in the computer modeling software database other important strategies are being employed to reduce the ECI of the project even further than the modeled numbers. These include the following:

Build Less

The first strategy should always be to right-size the structure. The planning for the hospital has been intensive ensuring every square meter of space is utilized. Beyond reducing area, the structure has been designed with a repetitive structural grid for the most efficient structural system possible thus reducing material use, the number of beams and columns, and in this way reducing the carbon intensity.

Emissions

Emissions not related to the functional use of the structure would come from transportation to and from the site, waste, pharmaceuticals, equipment, and materials. Transportation to the site is an influenceable and major emissions source. To address these emissions several steps have been taken to reduce the carbon emissions that are associated with vehicle use. First, by providing convenient and accessible alternative transportation options such as walking, cycling, and rapid transit - private vehicle use will be reduced. Second, the emissions impact of the vehicles themselves has also been considered through the provision of 25 electrical vehicle charging stations and priority parking given to carpooling, and through these measures reduce emissions associated with private automobile use.

End of Useful Life

Extending the structure's useful life, allowing for adaptive reuse, and ultimately planning for low-carbon material reuse/ recycling at end of life all reduced the structure's emissions intensity. For this structure, the 9 x 9 m structural grid and 5 m floor-to-floor height allow for low carbon repurposing. In the eventuality of the complete demolition of the structure, the mass timber and steel elements can be disassembled and reused on another structure and the pour-in-place concrete structure can be crushed and reused as aggregate in future construction projects in this way contributing to a circular economy approach and thus avoid emissions.

Carbon Sinks

The mass timber structure has been accounted for in the computer model. Other carbon sinks include the additional trees planting on the site. The average tree will sequester 10 kg/CO_2/ yr, however, this kind of sequestration is typically left out of calculations as the sequestering is dependent on maintenance (ie are trees kept healthy or are replaced when they die) and that dead material is harvested in a way that ensures the carbon is not released into the atmosphere (ie

not left to rot or burned). Neither condition can be assured over the useful life of the structure and therefore is not included in the calculations.

There will likely be a short-term reduction of sequestration by trees on site due to the initial clearing. For example, a 20-year-old slow growing Hardwood (eg Sugar Maple) can have an Annual Sequestration Rate 4 times that of a 4-year-old tree of the same species. Many factors impact the amount of carbon a tree will absorb from the atmosphere as the uptake of carbon is directly related to the tree's growth, however, mass seems to be the most critical. It is anticipated that over the next 60 years, the significant number of trees proposed to be planted will mature to become larger carbon absorbers and thus could balance the short-term loss with long-term gains over the period.

Based on the computer modeling, and consultation with local suppliers, the specification of a 30% reduction in embodied carbon in the structure, as per the Greening Government Strategy, is feasible, in fact, it is expected a 40% reduction is possible once the product specific EPD are utilized in the computer model, using the following modifications to a typical concrete specification:

- replace GU Portland Cement with 30% slag ash
- and replace remaining GU Portland Cement with GUL Portland Limestone Cement
- utilize Carboncure or other CO_2 sequestering technology to inject CO_2 into the cement mix to permanently sequester carbon into the concrete. Note as the CO_2 is chemically bonded and thus mineralized (becomes solid) into the concrete the CO_2 is no longer a gas and therefore cannot be rereleased into the atmosphere.

1.8 Early Works

Early works in preparation for the Hospital and CUP are expected to commence in the summer of 2023. Below is a brief description of the anticipated early works.

1.8.1 Tree Removals

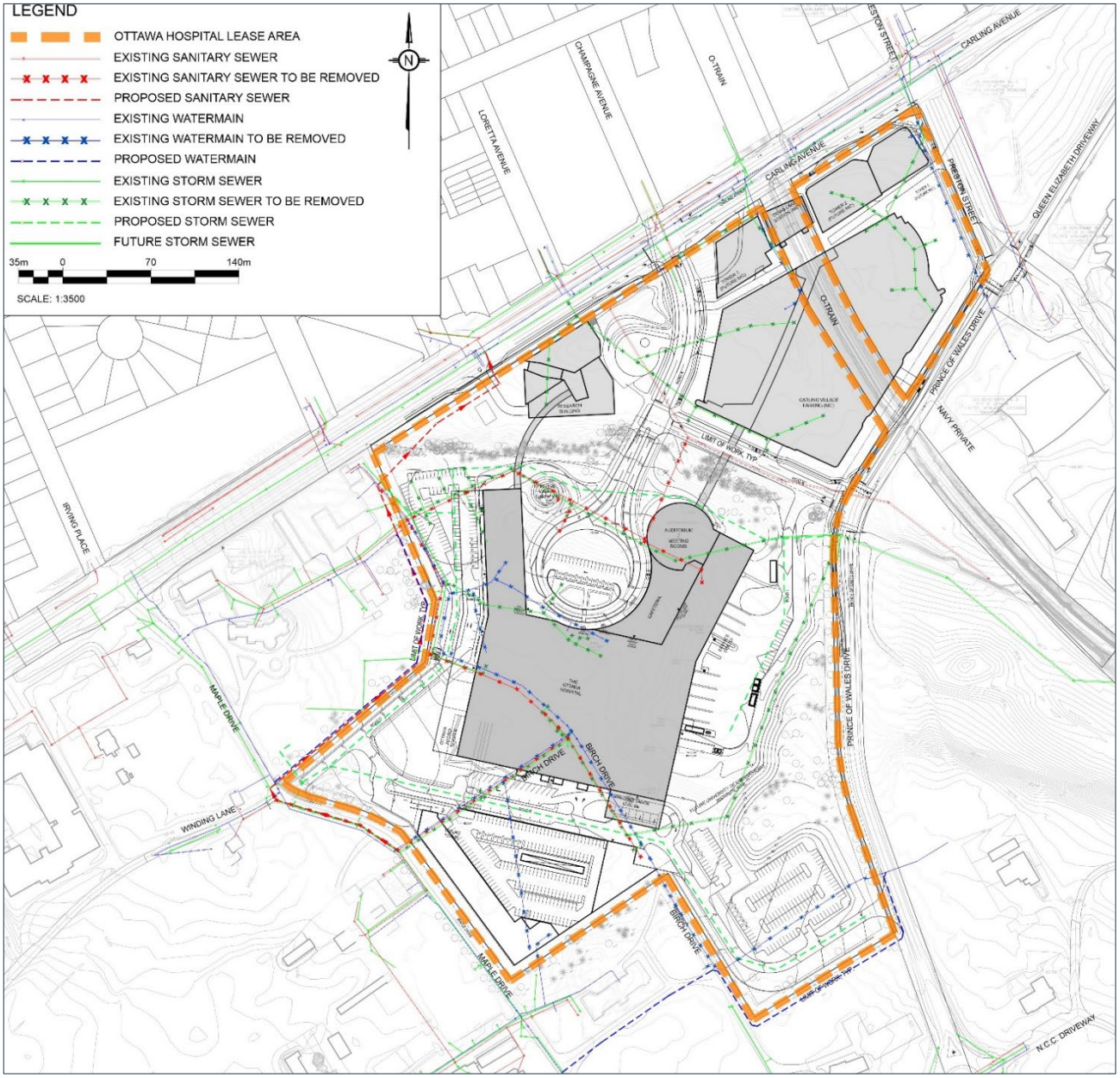
Tree removals will be undertaken as the first stage of early works. The requirement for tree removals during this stage is to allow for and accommodate other project components associated with early works including the relocation of existing PSPC owned infrastructure, construction access road building, and modifications to Prince of Wales Drive to accommodate site access.

Based on the results of the tree inventory, including updates in 2022, a total of 271 living trees within the NCD site (greater than 10 cm dbh), will be removed as part of Phase 3 and 4 works which includes 122 trees - 10 cm to 29 cm dbh) and 149 large diameter trees (30 cm DBH or greater). Off site, a total of 22 trees will be removed which includes 5 trees - 10 cm to 29 cm dbh and 17 large diameter trees (30 cm DBH or greater).

1.8.2 Relocation of Existing PSPC Owned Services

Existing PSPC owned and operated "private" infrastructure is currently located on the NCD site and is either abandoned or still in operation. As part of the early works, all existing PSPC infrastructure on the NCD site requires relocation to accommodate the new development which also includes the provision for some off-site works. Please note that the relocation of existing infrastructure that is currently active will be undertaken with minimal service interruptions to existing users and no change in the current level of service will occur following the completion of the work. The sequencing of infrastructure relocations has yet to be determined at this time and is still being developed. A high-level schematic of the infrastructure early works is identified on **Figure 8.** It includes a combination of existing infrastructure, infrastructure to be removed and proposed new infrastructure.

Figure 8: NCD Infrastructure Early Works



Source: Modified from Parsons 2022b

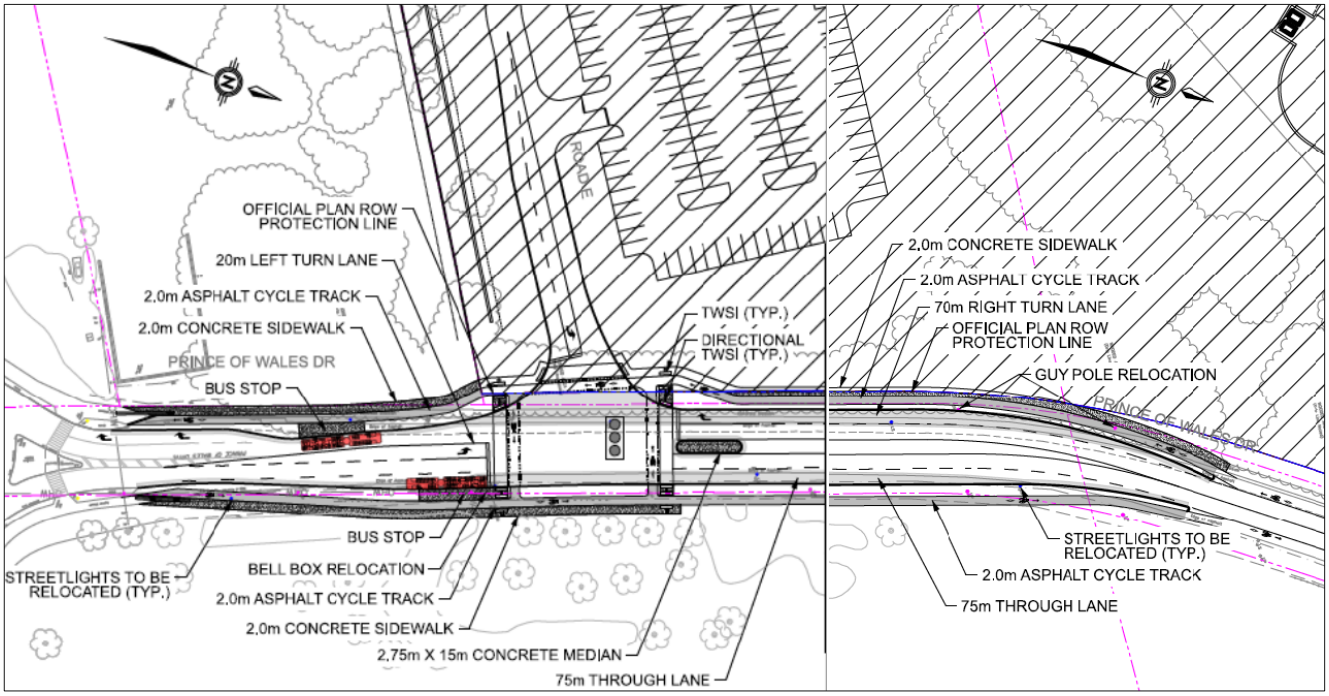
1.8.3 Construction Road

While the details related to the development of the construction access road to enable the Phase 3 and 4 Project have yet to be fully developed at this time, it is expected that "Road E" will be partially constructed as a temporary construction road to service the development during construction. Please note that additional details are forthcoming and will be better understood as the project develops.

1.8.4 Modifications to Prince of Wales Drive

Early works for the Phase 3 and 4 Project includes off-site intersection improvements to facilitate access to the site from Prince of Wales Drive during construction. While part of the early works, the proposed modifications will serve as the ultimate intersection design for the TOH. The proposed intersection works at Prince of Wales Drive and Road E are illustrated on **Figure 9.** As previously noted, the design for this intersection is still under discussion with the impacted authorities.

Figure 9: Modifications to Prince of Wales Drive at Road E



Source: Modified from, Parsons. 2022d

1.9 Supporting Studies and Reports

A number of studies and drawings provided under separate covers have been prepared and submitted to the City of Ottawa and Federal Authorities as part of the Master Site Plan Application for the NCD Site, including the Phase 2 Parking Garage. Drawings and Studies specific to the Phase 3 and Phase 4 Project have been prepared and submitted in support of the Site Plan Control and Federal Land Use and Design Approval Applications. Plans and reports prepared to date specific to the NCD in support of land use approvals are listed in **Table 1**.

Table 1: Drawings and Studies

Master Site Plan Application Submission	Phase 2 Parking Garage Submission	Phase 3 and 4
Parsons. August 2021. Design Brief and Planning Rationale – Master Site Plan. Applications for: Site Plan Control, Master Site Plans and Lifting of Holding Zone. HDR. August 2021. Site Plan Control Drawing Package, Master Site Plan.	Parsons. January 2022. Design Brief and Planning Rationale. Application for Site Plan Control – Phase 2 Project, Parking Garage and associated drawings. HDR. February 2022. Site Plan Control Drawings.	Parsons. September 2022. Site Plan Control and Federal Land Use Approval Hospital and Central Utility Plant, Planning Rationale, Preliminary Draft. HDR, September 2022. Site Plan Control Design Brief - Hospital, Pre-Consultation Draft. HDR, September 2022. Site Plan Control Drawings Package – Hospital and Central Utility Plant. HDR, September 2022. Architectural Drawing Set. HDR, September 2022. Landscape Drawing Set. HDR, October 2022. The Ottawa Hospital Main Building Carbon Intensity Analysis. Smith and Anderson, September 2022. Electrical Drawing Set.

Master Site Plan Application Submission	Phase 2 Parking Garage Submission	Phase 3 and 4
Parsons. July 2021. Transportation Impact Assessment and Mobility Study, New Civic Development for the Ottawa Hospital.	Parsons. February 2022. Transportation Impact Assessment, Addendum #1, New Civic Development for the Ottawa Hospital.	Parsons. September 2022. Site Plan Application for the Hospital Transportation Impact Assessment Addendum #2. New Campus Development for The Ottawa Hospital.
Parsons. July 2021. Master Servicing Plan, New Civic Development for the Ottawa Hospital.	Parsons. February 2022. Site Servicing and Stormwater Report. The New Civic Development - The Ottawa Hospital Phase 2 Parking Garage Development and associated drawings.	Parsons. September 2022. Site Servicing and Stormwater Management Report, New Civic Development for The Ottawa Hospital. Phase 3: Central Utility Plant Project, Phase 4: Main Hospital Project.
Parsons. August 2021. Environmental Impact Statement and Tree Conservation Report – Master Site Plan	Parsons, March 2022. Environmental Effects Analysis/Environmental Impact Statement and Tree Conservation Report Update, Phase 2 Parking Garage and Green Roof. Parsons, August 2022, New Civic Development, Phase 2 Project: Parking Garage and Green Roof Addendum # 1.	Current Report
Golder. July 2021. Cultural Heritage Impact Statement – New Civic Development for the Ottawa Hospital, Carling Avenue at Prince of Wales Drive and Preston Street, City of Ottawa Ontario	Golder. November 2021. Addendum: Cultural Heritage Impact Statement for the New Civic Development for the Ottawa Hospital, Carling Avenue at Prince of Wales Drive and Preston Street, City of Ottawa, Ontario.	Golder. October 2022. Addendum #2: Cultural heritage Impact Statement for the New Campus Development, City of Ottawa, Ontario.
Golder. March 2021. Phase one Environmental Site Assessment - The New Ottawa Hospital – New Civic Campus	Golder. December 2021. Phase 2 Environmental Site Assessment, Ottawa Hospital New Civic Campus Parkade.	Golder. September 2022. Phase Two Environmental Site Assessment, New Civic Development for the Ottawa Hospital. Paterson Group. September 14, 2022. Remedial Program for Impacted Areas Proposed New Hospital Campus, Former Sir John Carling Building Area - Central Experimental Farm – Ottawa.
Golder. March 2021. Preliminary Geotechnical Overview, Ottawa Hospital.	Golder. December 2021. Geotechnical and Hydrogeological Investigation. New Ottawa Hospital Development, Phase 2 - New Parkade Structure.	Golder. September 6, 2022. Geotechnical and Hydrogeological Investigation, New Ottawa Hospital (Phase 2). WSP Golder. June 30, 2022. Preliminary Groundwater Inflow Estimate, Ottawa Hospital Expansion Memo.
Golder. November 2020. Stage 1 Archaeological Assessment. Ottawa Hospital, Part of Lots I and K, Broken Front B Geographic Township of Nepean, City of Ottawa, Ontario	Golder. December 2021. Stage 2 Archaeological Assessment, Ottawa Hospital, Part of Lots I and K, Broken Front B, Geographic Township of Nepean, City of Ottawa, Ontario.	N/A
Gradient Wind. April 2021. Pedestrian Level Wind Study, The Ottawa Hospital New Civic Development, Ottawa Ontario		Gradient Wind. September 30, 2022. Pedestrian Level Wind Study and Snow Drift Assessment, New Campus Development of The Ottawa Hospital.
Gradient Wind. May 2021. Environmental Noise and Vibration Assessment, 930 Carling Avenue and 520 Preston Street Ottawa, Ontario		Gradient Wind, September 30, 2022 The Ottawa Hospital New Campus Development, Addendum to Environmental Noise and Vibration Assessment. Gradient Wind. September 30, 2022. Air Quality Study, New Campus Development of The Ottawa Hospital.
	Parsons. September 2021. TOH Parking Garage Facility Proximity Study Preliminary Report.	

2.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

The following section describes the Valued Components identified within the NCD Site with particular focus on the Phase 3 and 4 Project Area and associated off-site works. The information provided in this section of the report was obtained from a variety of existing background sources and primary studies completed as part of the NCD Project, including the Phase 3 and 4 Project. The Valued Components (VCs) have been identified in order to determine existing environmental conditions against which the project effects can be compared.

2.1 Applicable Acts

This section provides context on environmental legislation that applies to the Site and is current to the timing of publishing the report.

2.1.1 Impact Assessment Act, 2019

The Impact Assessment Act (IAA) came into force on August 28, 2019. The IAA includes requirements for non-designated projects on federal lands and lands outside of Canada. For projects occurring on federal lands, where the authority is the proponent, or the authority provides financial assistance, provides land (sell or lease federal land), or exercises any power or performs a duty or function under any Act of Parliament (issue a permit, authorization), the authority has a responsibility under Section 82 (or Section 83) of IAA to make a determination of significance prior to a project proceeding. The level of analysis required to make a determination is dependent upon project complexity and the severity of the potential environmental effects on the environment that may result from a project. Additional considerations for determination include but are not limited to, other federal expert knowledge, public comments received during the 30-day comment period and indigenous consultation. This analysis is typically documented in an Impact Assessment which predicts project impacts and proposes mitigation.

2.1.2 Species at Risk Act, 2002

Species at Risk (SAR) status for federally listed species is legislated by the Government of Canada, based on scientific information provided by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC provides a recommendation that is reviewed by Environment and Climate Change Canada (ECCC). Species can be listed as Schedule 1, 2, or 3, under the Species at Risk Act (SARA). Endangered or Threatened species on Schedule 1 are afforded protection of critical habitat on federal lands. However, prohibitions on the destruction of critical habitat does not automatically apply once critical habitat is identified but rather if the federal government has taken the appropriate measures to bring the SARA prohibitions into force. For all species, the critical habitat prohibitions of SARA apply on federal lands only through an order under Section 58 of the SARA, and on non-federal lands through an order under Section 61.

The SARA also provides protection of individuals and residences of aquatic species and migratory birds protected under the *Fisheries Act* and *Migratory Birds Convention Act* (MBCA), if they are listed as either Extirpated, Endangered, or Threatened and whether these species occur on federal and/or non-federal lands. Individuals and residences of all other species listed as Extirpated, Endangered, or Threatened only receive protection on federal lands. Environmental Assessment projects are required under Subsection 79(2) of the SARA to identify SAR or critical habitat that is likely to be affected by the project and ensure that measures are taken to avoid, reduce, or monitor those adverse effects. The measures taken must be consistent with any applicable recovery strategy or action plan issued under the SARA. Section 79 protection applies to all species listed on Schedule 1, including those listed as Special Concern.

If it is known that an activity may contravene the SARA, a permit will be required but only issued if the purpose of the proposed activity is for; a) scientific research relating to the conservation of the species and conducted by qualified persons; b) the activity benefits the species or is required to enhance its chance of survival in the wild; or c) affecting the species is incidental to carry out the activity. Permit pre-conditions must also be met to ensure that all reasonable alternatives have been considered, all feasible measures will be taken to minimize impacts and the activity will not jeopardize the survival or recovery of the species.

2.1.3 Fisheries Act, 2019

The *Fisheries Act* is managed by Fisheries and Oceans Canada (DFO). Changes to the federal *Fisheries Act* proposed in 2018 and implemented in 2019 focused on restoring lost protections and incorporating modern safeguards for fish and fish habitat. Its goal was also to provide enhanced compliance and protection tools to enable cross-agency partnerships and better protection of fisheries in Canada (DFO 2018).

The updated *Fisheries Act* includes a prohibition against causing the *death of fish* or the *harmful alteration, disruption, or destruction of fish habitat* (Section 35 of the Act).

The importance of fisheries within Canadian culture spans generations and continues to provide significant economic, environmental, and cultural value. Fish have been affected by anthropogenic activities and continue to be impacted by human activities which destroy or degrade habitat, alter water flow regimes, introduce invasive species, cause over harvesting of fish, and pollution of the waters needed to support healthy fish and fish habitat.

If the proposed project may affect fish or fish habitat, the City of Ottawa is responsible under the *Fisheries Act* to:

- Understand the potential impacts of the project on fish and fish habitat.
- Avoid and mitigate potential impacts to fish and fish habitat the extent possible.
- Seek authorization from the Minister of Fisheries and Oceans when avoidance and mitigation do not sufficiently reduce the projects likelihood to cause serious harm to fish.

The 2012 updates to the *Fisheries Act* included the development of guidance materials and an online self-assessment process for understanding the potential project-related impacts on fish and/or fish habitat (e.g., Fisheries Protection Policy Statement, Request for Review, Pathways of Effects for routine activities) and determining whether the project will cause serious harm to fish (DFO 2012). These guidance materials are being phased out and replaced with Standards and Codes of Practice which are in current development. The 2012 guidance materials continue to act as a format with which to evaluate the potential impacts of projects on fish and/or fish habitat, and to initiate contact and advice from the DFO in the interim while the new Standards and Codes of Practice are being developed.

Projects that cannot avoid causing the death of fish or the harmful alteration, disruption, or destruction of fish habitat will require *Fisheries Act Authorization* from DFO prior to undertaking the work. Under the updated *Fisheries Act* any project requiring Authorization must provide site-specific details with respect to habitat losses and must offset those losses through a mutually agreed upon Habitat Offsetting Plan (e.g., creation/improvement of fish habitat).

2.1.4 Migratory Birds Convention Act, 1994

The *Migratory Birds Convention Act* (MBCA) is legislation administered by Environment and Climate Change Canada (ECCC), which provides protection and management direction for migratory birds, their eggs, and their nests listed in the Act. The Act prohibits the disturbance, destruction, take and killing of migratory birds listed in the Act. To protect nesting migratory birds, no work is permitted to proceed that would result in the wounding or killing of bird species protected under the MBCA and/or Regulations under the MBCA, which includes activities that would result in the destruction of active nests (nests with eggs or young birds).

Permits may be issued by ECCC under the MBCA allowing the disturbance, destruction, take and killing of migratory birds or their nests for scientific or agricultural purposes. Allowable purposes for issuing a permit under the MBCA do not include industrial or construction activities.

2.1.5 Canadian Wildlife Act (1985)

The Canadian Wildlife Act was implemented in 1985 with the last update coming into effect on July 12, 2017 and is administered by the Canadian Wildlife Service (CWS) (CWS 2017). The act governs the protection of wildlife species in Canada. Under the act, provisions are made for the extension of federal protections to any species listed under provincial acts as being in danger of extinction (i.e. Threatened or Endangered under the Ontario ESA), as deemed necessary by the Minister.

In addition, the act outlines the management of lands for the research, conservation, and interpretation of wildlife including SAR, migratory birds, and other wildlife, and grants the Minister the authority to prescribe measures for the

conservation of wildlife on lands under the administration of the Minister.

No National Wildlife Areas or other designated lands under the management of the CWS are located within the project area, however mitigations are provided for both federally and provincially designated Species at Risk.

2.1.6 Provincial Policy Statement

The province of Ontario updated the previous version of the Provincial Policy Statement (PPS) issued under Section 3 of the *Planning Act*. The PPS update came into effect May 1, 2020 (Ministry of Municipal Affairs and Housing (MMAH) 2020).

The natural heritage policies of the PPS (Section 2.1) indicate that natural features shall be afforded long term protection such as maintenance, restoration, and improved function of diversity, connectivity, ecological function, and biodiversity of natural heritage systems as noted below. Ottawa is located in Ecoregion 6E:

2.1.4 Development and site alteration will not be permitted in:

a. significant wetlands in Ecoregions 5E, 6E and 7E; and,
b. significant coastal wetlands.

2.1.5 Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and site alteration will not be permitted in:

a. significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E;
b. significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
c. significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);
d. significant wildlife habitat;
e. significant areas of natural and scientific interest; and,
f. coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).

2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements;

2.1.7 Development and site alteration will not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements;

2.1.8 Development and site alteration will not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions; and,

2.1.9 Nothing in policy 2.1 is intended to limit the ability of agricultural uses to continue.

Avoidance or minimization of impacts on natural heritage features is considered an objective when planning, designing, and constructing infrastructure projects. The objective of this report is to identify features and values where impacts may occur and to minimize or avoid these features where possible during the site design process.

2.1.7 Ontario Endangered Species Act, 2007

The Ontario *Endangered Species Act* (ESA) prohibits the killing or harming of species identified as Endangered or Threatened on the SAR in Ontario (SARO) List in Ontario under Regulation 230/08.

Unless a permit or other authorization has been issued, Section 10 of the ESA prohibits the damage or destruction of the habitat of species classified as Endangered or Threatened.

Under the ESA, "habitat" is defined as either an area on which a species depends directly or indirectly to carry on its life processes based on the general definition in clause 2(1)(b) of the ESA or the area prescribed for the species in a habitat regulation [clause 2(1)(a)]. A habitat regulation can prescribe an area as the habitat of the species through the description of boundaries, features of an area, or by describing the area in any other manner.

2.1.8 Environmental Protection Act, 1990 and Ontario Water Resources Act, 1990

The purpose of Environmental Protection Act, R.S.O. 1990 (EPA) is to provide protection and conservation of the natural environment. The purpose of the Ontario Water Resources Act, R.S.O. 1990 (OWRA), is to provide for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use. Section 53 (1) of the OWRA requires that "no persons shall operate, establish, alter, extend, or replace new or existing sewage works (in this case a storm system) except in accordance with an Environmental Compliance Approval. The environmental compliance approval is required for any development that proposes stormwater or sanitary discharge to a combined sewer system which is located on the east side of the site.

2.2 Social Conditions

This section describes the societal or social conditions of the site including a description of the applicable land use policy that applies to the Site, existing land use, pedestrian and cycling networks, noise and vibration, cultural heritage values and landscapes, and information on indigenous land claims.

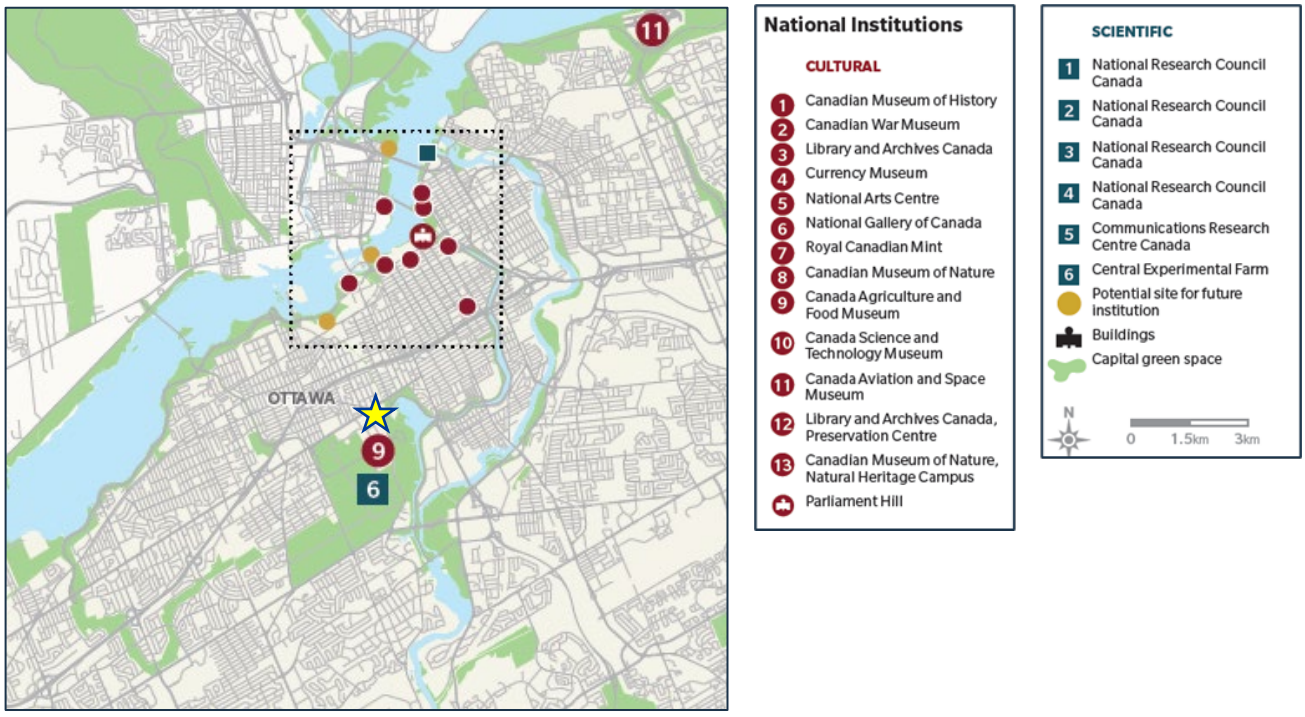
2.2.1 National Capital Commission's Plan for Canada's Capital

The Plan for Canada's Capital (PFCC) (NCC, 2017a) uses a tactical place-making strategy to ensure that "the nature and character of the seat of the Government of Canada is in accordance with its national significance". As such, the PFCC has three strategic pillars: a Meaningful Capital, a Picturesque and Natural Capital, and a Thriving and Connected Capital. The NCC focuses on monuments and symbolic boulevards; public institutions; parks and open spaces; and public shorelines. Concentrating long-term planning efforts on these elements promotes the PFCC's vision of a Capital that is a symbol of Canada's values.

The PFCC describes the Central Experimental Farm (CEF) as a unique working farm; an active research facility; a 400-hectare National Historic Site; and a taste of rural Canada in the centre of an urban region (**Figure 10**).

The PFCC's focus on scientific research as a feature and asset of the Central Experimental Farm suggests that the scientific and medical research capabilities of The Ottawa Hospital could be in line with the PFCC's direction for the area. A revitalization of scientific research in the area are in line with the NCD, and the subsequent dedicated Research Facility, can be seen as a reference to this traditional utilization of some areas of the CEF.

Figure 10: National Institutions (Excerpt), Plan for Canada's Capital



Source: NCC, 2017a

The PFCC also emphasizes the biodiversity benefits and natural elements of the Experimental Farm. The PFCC refers to the Experimental Farm as a "green linkage" to other pathways in the Capital, together forming a discovery circuit.

The Plan focuses on National Institutions (such as the National Gallery, the Canadian Museum of History, and more) and on these Institutions' impact on the identity, pride, and signature of the nation's Capital. The Ottawa Hospital, with its location at the intersection of main roads, near Dow's Lake and adjacent Carling Station, is an opportunity to showcase landmark architecture and to improve the place-making experience in the Dow's Lake/Preston-Carling area.

2.2.2 National Capital Commission's Capital Urban Lands Master Plan

The Capital Urban Lands Plan (CULP) (NCC, 2017b as amended in October 2021) "provides detailed direction and guidance for the use and stewardship of federal lands for which the NCC has jurisdiction". The Urban Lands area refers to the federal lands inside the Greenbelt on the Ontario side and within the urban perimeter on the Québec side, excluding Gatineau Park.

The CULP is a land use plan providing detailed policy guidance; information on day-to-day property management; support of a shared, long-term vision; and long-range policy statements, "to ensure that project proposals, land-use and activities are consistent with the vision for the future of Canada's Capital".

The CULP outlines several land designations and corresponding descriptions, objectives, policies, and complementary uses. The entire NCD site is designated as a Non-Federal Facility as shown on **Figure 11** in an amendment to the CULP in October 2021.

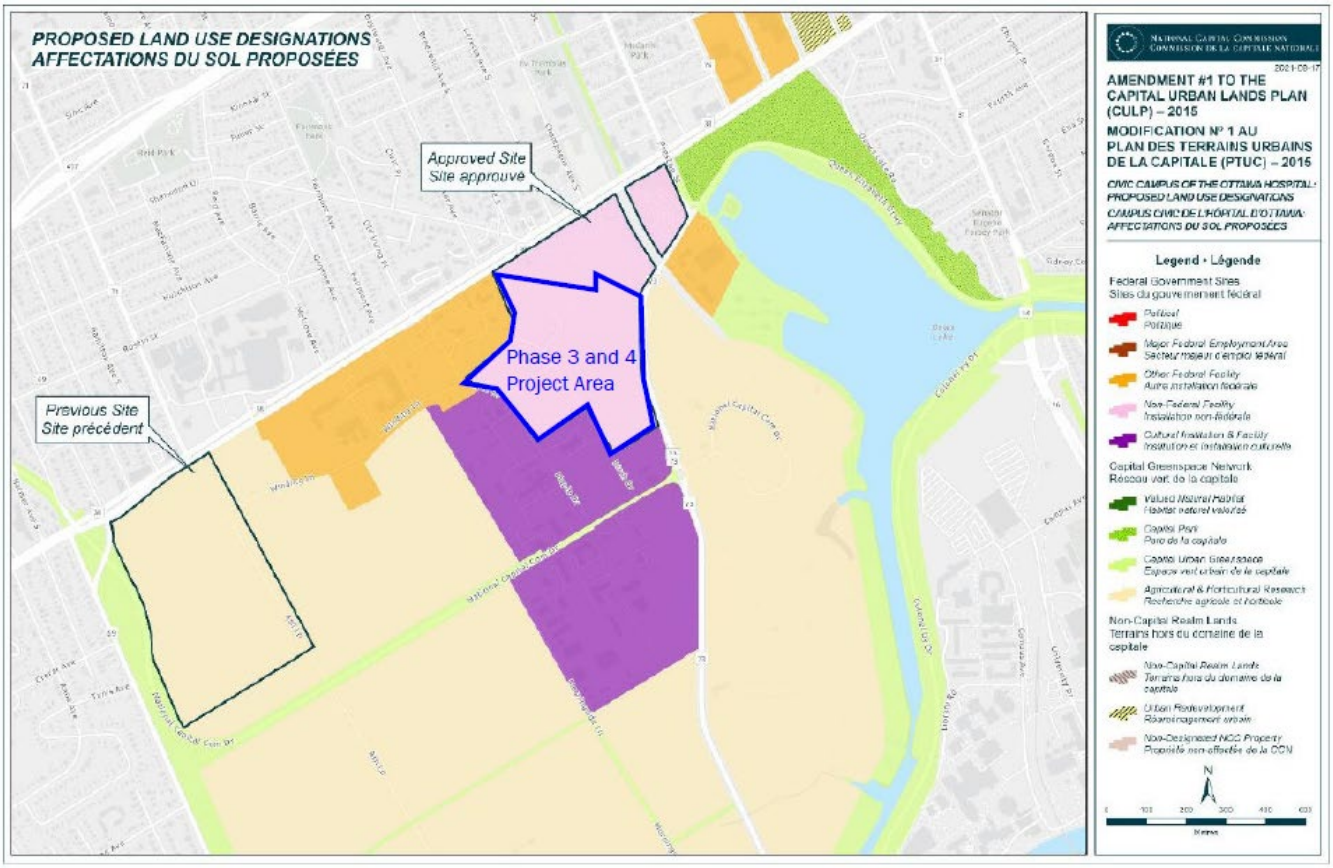
The objective of the designation on this site is to "*permit the establishment of a public health care facility on federally owned lands at the Central Experimental Farm*" and permits the hospital and its associated ancillary uses as well as parking, multi-use pathways, and passive and active greenspaces. Policies that guide development on the site include:

- Ensure that the non-federal facility contributes positively to the Capital and cultural landscape of the Central Experimental Farm and Dow's Lake.
- Ensure site capacity is respected and that development occurs in a manner compatible with the character and vocation of its surroundings.

- Ensure the future facility is developed in a manner that is compatible with National Historic Site's continued contribution to the Capital experience and to the Capital Greenspace Network
- Any significant expansions and/or newly proposed non-federal facility areas will be subject to review through the plan amendment process.

Site specific development performance criteria developed for the New Campus Development as part of the Master Site Plan process are applied to the site at each phase of development that include the following elements: project integration with the urban, natural and heritage context, design excellence and innovation, and sustainable site development.

Figure 11: Capital Urban Lands Plan



Source: NCC, 2017b

2.2.3 Agriculture and Agri Food Canada's Central Experimental Farm National Historic Site Management Plan

The Central Experimental Farm was designated as a National Historic Site of Canada in 1997 (AAFC, 2019). This designation confirmed and reinforced the historical and cultural significance of the NCD site. The Farm was designated in recognition of five key features:

- Its cultural landscape distinctiveness
- Its reflection of 19th century agricultural philosophy in the heart of the Nation's Capital, with a range of facilities such as administrative headquarters, the Arboretum, and Ornamental Gardens, all in picturesque condition
- Its significant scientific contributions to agriculture
- Its rare exemplification of a farm within a city
- Its symbolism of the central role agriculture played in shaping Canada

The National Historic Site Management Plan (NHSMP) puts forward an historical overview of the Central Experimental Farm, its more recent history, and previous planning studies such as the Canada Agriculture Museum Master Plan and the Dominion Observatory Campus Master Plan. The NHSMP uses heritage, cultural identity, and cultural landscape

frameworks and terminology from UNESCO and related organizations and puts forward a simplified version of the Central Experimental Farm's history. In a more future-oriented sense, The NHSMP describes the current conditions of the Central Experimental Farm, including the broad categories of challenges facing the Farm which require a refreshed/innovative Management strategy and defines its purpose as understanding and strengthening the relationship between cultural landscape and cultural identity. The NHSMP aims to restore unity and states that "a centralized vision to the site would be achieved by introducing more integrated research program across the site and into adjacent urban areas". The NHSMP's recommendation commits to a primary research identity for the Central Experimental Farm for the foreseeable future, which means "reversing a long-standing tendency to reduce research activity on the Farm and to delay upgrades of equipment and facilities, that provided mixed signals to the public". It also recommends that adjacent properties "might be developed as compatible research parks for research not only in agriculture and agri-food but also in life sciences, health, and other related areas.

2.2.3.1 Commemorative Integrity Statement

The conceptual framework of commemorative integrity was originally developed to help manage and report on the state of National Historic Sites administered by Parks Canada. Today, the concept has been successfully applied to National Historic Sites owned by others, to facilitate and focus the site's planning and decision-making.

The commemorative intent of the Central Experimental Farm includes the following historic values: its distinctiveness as a cultural landscape, the size of the Site in heart of the Nation's Capital that includes an administrative core surrounded by the Arboretum, ornamental gardens, display beds and experimental fields in a picturesque composition, its scientific contributions to agriculture in Canada since its inception, the rare example of a farm in the heart of a city, and its symbolism of the role agriculture has played in shaping the country. In addition to describing the important features of the Farm, the Commemorative Integrity Statement also includes a number of important views to be considered.

2.2.4 National Capital Commission Capital Realm Design Principles for the New Civic Development

Attached to the 2017 Federal Land Use Design and Transaction Approval for the transfer of lands from the NCC and Agriculture and Agri-Food Canada to Public Services and Procurement Canada that enabled the long-term lease of the Site to The Ottawa Hospital, are a set of Capital Realm Planning and Design Principles specific to the NCD. The design principles are intended to guide the design and review of the NCD during subsequent federal approvals. The Capital Realm Design Principles include:

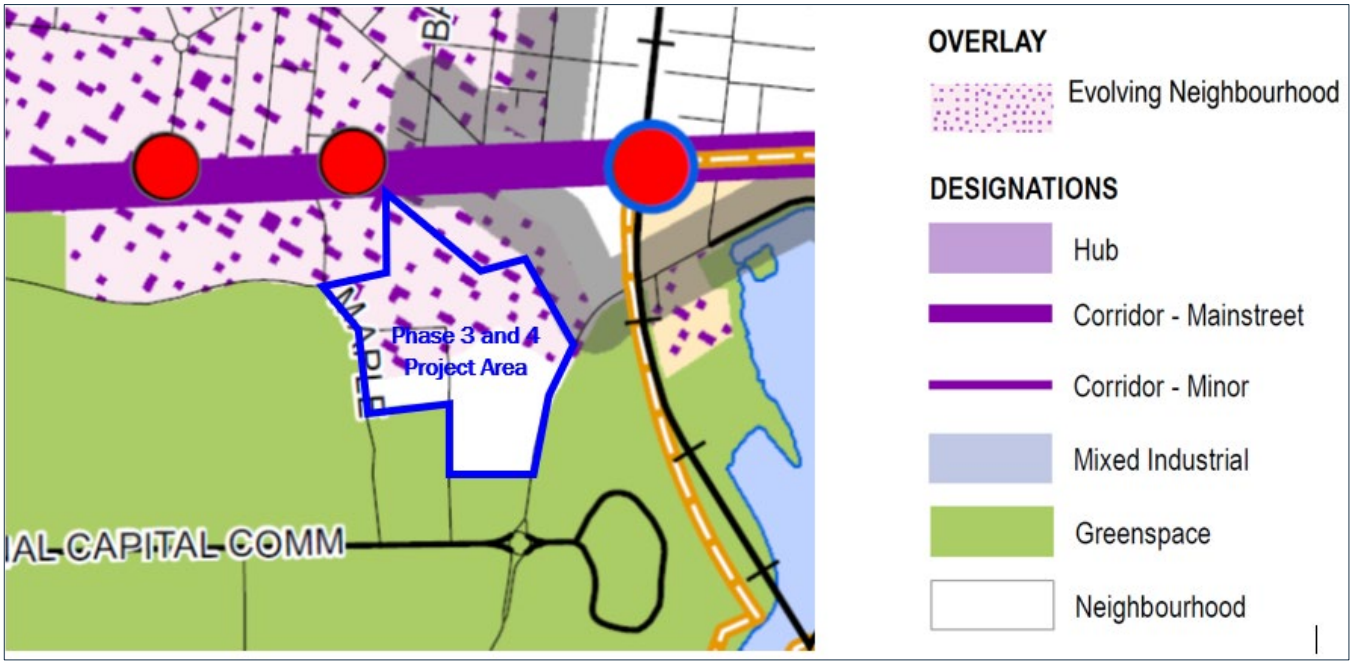
1. **Capital Planning framework.** *enhance the Capital's symbolism, dignity and prestige* and *protect nearby capital landscapes including Dow's Lake and UNESCO World Heritage Site, Commissioners Park, Prince of Wales Drive scenic entry, and Central Experimental Farm National Historic Site.*
2. **Design Excellence.** *maintain a high level of quality, innovation, and design appropriate to the location and that reflect the best practices in urban planning, architecture, landscape architecture, urban design, sustainability, accessibility and heritage conservation.*
3. **Heritage Conservation.** *protect and enhance the character of the Site and its surroundings and explore opportunities to create cultural experiences based on agriculture, archaeological, historical, and other cultural resources to be enjoyed, while ensuring their protection for future generations.*
4. **User/Visitor Experience and Universal Accessibility.** *create the quality visitor experience, and the sense of place for the public realm.*
5. **Environmental Sustainability.** *meet leading standards of sustainability.*

2.2.5 City of Ottawa Official Plan

In 2019, the City of Ottawa began a multi-year process to develop a new Official Plan (OP). The new OP was recommended for approval at a joint meeting of the City's Planning Committee and Agriculture and Rural Affairs Committee on October 14th, 2021 and was approved by Ottawa City Council on October 27th, 2021. The revised version was adopted by Council on November 24th, 2021, as By-law 2021-386. The new OP was approved by the province on November 4, 2022. The new OP directs how the city will grow over time and sets out policies to guide the development and growth of the city to the year 2046 and beyond.

The Phase 3 and 4 Project site is designated Neighbourhood with an Evolving overlay (**Figure 12**). The Neighbourhood designation permits a mix of building forms and densities. The Evolving overlay signals evolution over time that will see a change in character to support intensification. Carling Avenue is designated as a Corridor – Mainstreet.

Figure 12: New Official Plan, Schedule B2 (Inner Urban Transect)



2.2.6 Property Ownership

The NCD site, is owned by PSPC, with the exception of the rail corridor, which is owned by the City of Ottawa. NCC and Parks Canada ownership exists to the east side of the Phase 3 and 4 Project Area (**Figure 13**)

Figure 13: Property Ownership

Source: Modified from City of Ottawa, 2021a

2.2.7 Existing Land Use

The Phase 3 and 4 Project site is surrounded by the transitioning mixed-use neighbourhood within the Dow's Lake Station District (formerly referred to as the Preston-Carling District) to the north, the open space network of Dow's Lake and the Rideau Canal to the east, and the Central Experimental Farm to the west and south:

- North: Lands to the north of the site include historical low-rise commercial and mid-rise institutional buildings associated with the Natural Resource Canada Booth Street Campus. Redevelopment of these lands includes high-rise residential and mixed-use buildings. An existing Bell Canada structure, with its own service access to Carling Avenue is located adjacent to the wooded ridgeline and the Site to the north.
- East: The lands east of the site are occupied by Prince of Wales Drive, Dow's Lake and the Rideau Canal. Existing vegetation extends along the majority of the eastern edge of the site, on the west side of Prince of Wales Drive.
- West and South: The Central Experimental Farm abuts the site to the west and south.

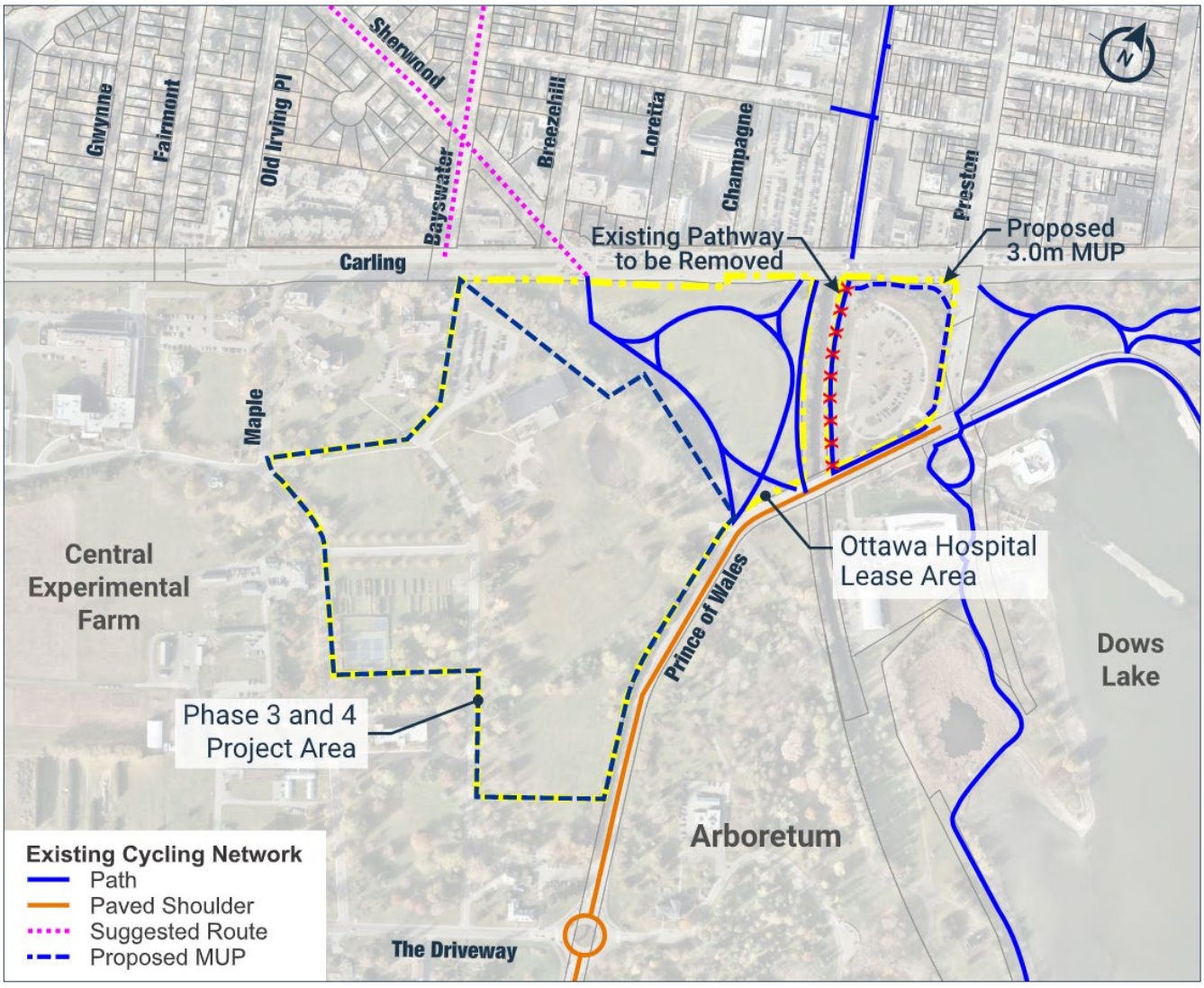
2.2.8 Pedestrian and Cycling Networks

Numerous pathways are present within the NCD site, with the majority occurring in the eastern portion. The majority of these pathways will be replaced with the facilities proposed as part of the Phase 2 Parking Garage Project, including:

- Realignment of the Trillium Pathway (east side of the LRT Trench) to separated sidewalk and cycle tracks along Carling Avenue and Preston Street (following construction of the parking garage). In the interim, during construction of the parking garage, a temporary multi-use pathway will be provided in addition to the existing sidewalks along the curbs.
- New sidewalk and cycle track on the east side of Roads A and B;
- New sidewalk on the west side of Road A.
- New Sidewalk and southbound cycle track on the north side of Prince of Wales Drive to connect into the existing on-road facility south of Road B.

These facilities will connect with new protected intersections with separated crossings for pedestrians and cyclists at Preston Street and Prince of Wales Drive and Road B and Prince of Wales Drive. No existing pathways have been identified within the Phase 3 and 4 Project Area. (**Figure 14**).

Figure 14: Existing Cycling Networks and Pathways



Source: Modified from City of Ottawa, 2021a

2.2.9 Existing Transportation Network

The NCD will be centrally located in the City of Ottawa, adjacent to the Experimental Farm. The NCD abut three arterial roadways: Carling Avenue, Preston Street, and Prince of Wales Drive (Parsons, 2021b) (**Figure 15**).

Carling Avenue: A major east-west arterial with a 6-lane urban cross section. Carling fronts the NCD site and extends from Bronson Avenue to March Road in Kanata. The road provides connection to Highway 417 with full movement ramps. The posted speed limit is 60km/h. A small portion of the Phase 3 and 4 Project Area abuts Carling Avenue.

Preston Street: A north-south arterial with a 2-lane urban cross section and on-street parking. Preston Street extends from Prince of Wales in the south to Albert Street in the north. The unposted speed limit is assumed 50km/h.

Prince of Wales Drive: A north-south arterial with a 2-lane urban/rural cross section. Prince of Wales Drive extends from Preston Street in the north to Fourth Line in the south. Prince of Wales Drive is a major connector to southern neighborhoods. The posted speed limit is 60km/h. The entire southeastern portion the Phase 3 and 4 Project Area abuts Prince of Wales Drive.

Maple Drive: A north-south 2 lane local road located at the western extent of the NCD site and Phase 3 and 4 Project Area. It. The posted speed limit is 30km/h.

Figure 15: Existing Road Network

2.2.10 Noise

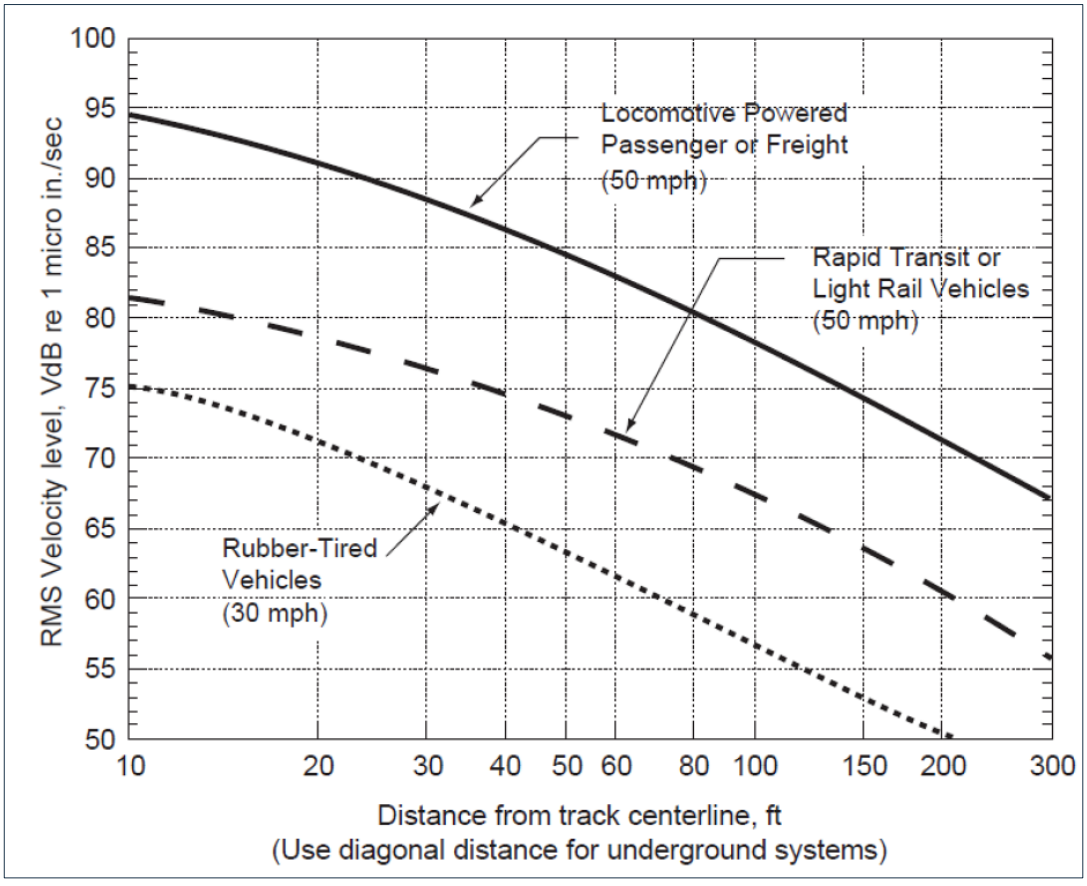
A stationary noise assessment was completed for the NCD site, including the Phase 3 and 4 Project Area. The scope includes assessing exterior noise levels generated by the stationary noise sources onto the neighbouring residential properties, observatory, and the hospital itself. The major sources of stationary noise included in the assessment are air handling units, generators, cooling towers, kitchen/lab exhausts and loading bays. The assessment is based on theoretical noise prediction methods that conform to the MECP NPC-300 guideline and the City of Ottawa's Environmental Noise Control Guidelines (ENCG). It is important to note that noise associated with emergency activities, such as sirens and helicopter air lifts are not considered to be stationary noise sources as outlined in MECP's NPC-300 guideline.

The results of the current study indicate that noise levels at nearby points of reception are expected to fall below the City of Ottawa ENCG noise criteria and the proposed development is expected to be compatible with the existing noise-sensitive land uses (GWE, 2022c).

2.2.11 Vibration

A vibration assessment was completed by (GWE, 2021a) during the Master Site Plan process. Potential vibration impacts of the future Trillium Line LRT were predicted using the Federal Transportation Authorities (FTA's) Transit Noise and Vibration Impact Assessment protocol. The FTA general vibration assessment is based on an upper bound generic set of curves that show vibration level attenuation with distance (**Figure 16**). Vibration levels at points of reception are adjusted by various factors to incorporate known characteristics of the system being analyzed, such as operating speed of vehicle, conditions of the track, construction of the track and geology, as well as the structural type of the impacted building structures. Based on the setback distance of the closest building, initial vibration levels were deduced from a curve for light rail trains at 50 miles per hour (mph) and applying an adjustment factor of -1.3 dBV to account for an operational speed of 43.4 mph (70 km/h).

Figure 16: Federal Transportation Authority Generalized Curves of Vibration Levels Versus Distance



Source: GWE, 2021a

Based on an offset distance of 19 metres between the Trillium Line LRT and the nearest building foundation (Tower B), the estimated vibration level at the nearest point of reception is expected to be 0.025 mm/s RMS (60 dBV) based on the FTA protocol. Since predicted vibration levels are below the criterion of 0.10 mm/s RMS no mitigation is required. Similarly, as the Hospital building will be greater than 75 m away from the LRT track, it would also fall below the FTA criterion. No additional vibration mitigation is required.

2.2.12 Cultural Heritage Resources

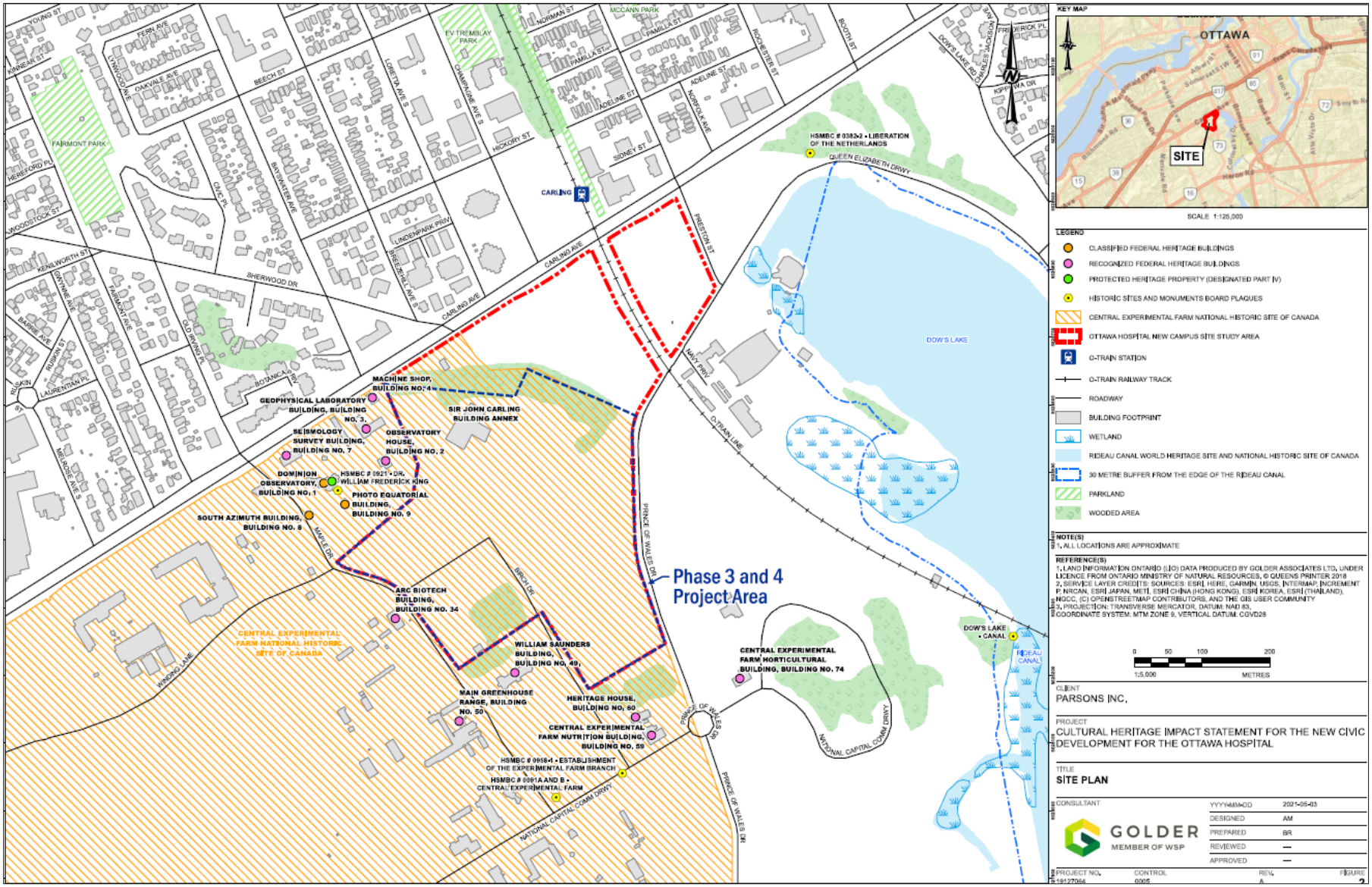
A Cultural Heritage Existing Conditions Overview and Cultural Heritage Impact Statement (CHIS) and CHIS Addendum were prepared for the NCD site (Golder, 2020 and Golder, 2021a). Two cultural heritage resources are located within the NCD site and 14 directly adjacent to it. These are listed in **Table 2** and illustrated on **Figure 17**. A portion of the NCD site is presently part of the Central Experimental Farm (CEF), designated a National Historic Site of Canada in 1997. The Farm was established by the Government of Canada in 1886 to support Canadian agriculture through research and development of good farming methods. The Farm has three clearly defined zones: a central core consisting of administrative and scientific buildings; experimental farm fields; and an arboretum, ornamental gardens and experimental hedges. The NCD site includes portions of its administrative and scientific core. The southwest corner of the NCD site contains a portion of the ornamental gardens which includes the Old Hedge Collection which contains plantings dating back to 1891. The Rideau Canal World Heritage Site and National Historic Site of Canada, exist 50 m east of site.

Table 2: Known and Potential Cultural Heritage Resources within and Adjacent to the NCD Site

Name #	Type of Resource	Relationship to the NCD site
Located Within the NCD Site		
Central Experimental Farm	National Historic Site of Canada	The western three-quarters of the site is on the Central Experimental Farm.
Sir John Carling Building Annex	Recognized Federal Heritage Building	Now demolished, the Sir John Carling Building Annex was located within the northwest corner of the site, approximately 100m south of Carling Avenue and 250m east of Maple Drive.
Located Adjacent to the NCD Site		
Rideau Canal	UNESCO World Heritage Site and National Historic Site of Canada	The northwest corner of Dow's Lake on the Rideau Canal is approximately 55 m east of the NCD Site. The canal is separated from the Site by Preston Street, and Prince of Wales Drive/ Queen Elizabeth Drive.
Dominion Observatory, Building No.1	Classified Federal Heritage Building	Approximately 110 m west of the northwest corner of the NCD Site.
Observatory House, Building No. 2	Recognized Federal Heritage Building	Approximately 35 m northwest of the NCD Site.
Geophysical Laboratory Building, Building No. 3.	Recognized Federal Heritage Building	Approximately 45 m northwest of the NCD Site.
Machine Shop, Building No. 4	Recognized Federal Heritage Building	Approximately 15 m northwest of the Site.
Seismology Survey Building, Building No. 7	Recognized Federal Heritage Building	Approximately 150 m west of the northwest corner of the NCD Site.
South Azimuth Building, Building No. 8	Classified Federal Heritage Building	Approximately 72 m northwest of the NCD Site.
Photo Equatorial Building, Building No. 9	Classified Federal Heritage Building	Approximately 60 m northwest of the north and west boundaries of the NCD Site.
Arc Biotech Building, Building No. 34	Recognized Federal Heritage Building	Approximately 24 m west of the NCD Site.
William Saunders Building, Building No. 49.	Recognized Federal Heritage Building	Approximately 56 m south of the NCD Site.
Main Greenhouse Range, Building No. 50	Recognized Federal Heritage Building	Approximately 76 m southwest of the NCD Site.
Central Experimental Farm Nutrition Building, Building No. 59.	Recognized Federal Heritage Building	Approximately 100 m south of the NCD Site.
Heritage House, Building No. 60	Recognized Federal Heritage Building	Approximately 101 m south of the NCD Site.
Central Experimental Farm Horticultural Building, Building No. 74	Recognized Federal Heritage Building	Approximately 115 m southeast of the southeast corner of the NCD Site.

Source: Modified from Golder, 2020

Figure 17: Known and Potential Cultural Heritage Resources



Source: Modified from Golder, 2021a

No listed or designated buildings exist on the NCD site. Note that the Sir John Carling Annex building demolition has been completed. Continued deconstruction of the Sir John Carling Building and associated soil remediation activities are currently underway.

The NCD site is within and adjacent to cultural heritage landscapes and features of national importance. The NCD Project Team understands that design efforts will be required to pursue a new hospital campus that does not detract from the cultural heritage value of those landscapes, and ideally, strengthens those values.

2.2.13 Cultural Heritage Landscapes

An addendum (WSP Golder, 2022) to the existing Cultural Heritage Impact Assessment completed for the NCD Site (Golder, 2021a) was prepared in support of the Phase 3 and 4 Project. The following has been considered as it relates to potential cultural heritage impacts (**Table 3**):

Table 3: Cultural Heritage Considerations and Potential Impacts

Cultural Heritage Considerations	Analysis
Landscaping	
Consider how the proposal impacts the Central Experimental Farm's (CEF) rural picturesque character and value as a 'farm within the city' through its landscaping on its east, west and south borders using trees or other landscape features to reduce the impact to existing views of the CEF National Historic Site of Canada (NHSC) from the Rideau Canal NHSC and World Heritage Site (WHS), Prince of Wales Drive section of the Queen Elizabeth Driveway cultural landscape, and the William Saunders Building Recognized Federal Heritage Building.	Minor impact. The proposed landscape treatment for the Phase 3 and 4 Project has taken cues from the existing vegetation within the CEF NHSC and reflects and protects the CEF NHSC's rural picturesque character to enhance the "farm in the city".
Transportation Planning and the use of Maple Drive	
Consideration of potential impacts from use of Maple Drive as an ambulance route.	Potential for major impacts to the South Azimuth buildings' masonry. The proximity of Maple Drive to the buildings and the increased use of de-icing salts required to maintain Maple Drive as an ambulance route on Maple Drive. Additionally, due to the proximity of Maple Drive and the Azimuth Building there is potential for accidents when roads are wet.
Dominion Observatory Complex	
Potential construction impacts.	Potential for major impacts. The adjacent Federal Heritage Buildings within 60 m of the west and south boundaries of the site may be subject to major adverse impacts as a result of construction from fugitive dust or construction vibration.
Isolation of the Dominion Observatory Complex from its surroundings.	Minor Impact and minor change to views compared to when the 11-storey Sir John Carling Building was standing on the Site between 1967 and 2014. There is no evidence in the heritage character statements of the William Saunders Building, Dominion Observatory, and Dominion Observatory Complex, as well as the CEF NHSC Management Plan and Commemorative Integrity Statement (CIS), to suggest the buildings in these two locations share a significant relationship, nor that developing the area between them represents isolation of either building or the Campus from its surrounding environment or context.
Obstruction or diminishment of significant views of the Dominion Observatory dome as a landmark.	Minor impact. Views looking towards the Dominion Observatory Dome from the north and west will be unobscured by the Hospital and CUP, however views looking towards the Dominion Observatory from Carling Avenue will include the Hospital in the background. Currently views from the William Saunders building to the Dominion Observatory Dome are obscured by trees and while the proposed CUP which is located below and at grade will result in removal of trees, it will not result in additional obstruction of views.
Obstruction or impact to views of the night sky from the Dominion Observatory Dome.	Minor impact. The overall magnitude of the Hospital's impact on the night sky is considered minor, indirect and site-specific since the dome will retain a considerable range of view of the night sky toward the south.
Impact of the lighting plan.	Minor impact. While the Dominion Observatory Dome telescope is no longer in use and there are no known plans to replace the telescope at this time, the Hospital which will require lighting at all times of the day may have an impact on views to the night sky. The lighting plan has sought to reduce the overspill of lighting as much as possible with the use of downward facing light fixtures. The site security team will work with the Hospital to dim lights where safe to do so to further reduce light pollution

Cultural Heritage Considerations	Analysis
	between midnight and 5 am.
Impacts to Existing Views	
Views from Prince of Wales Scenic Entry.	Minor impact. The Queen Elizabeth Cultural Landscape's Statement of Significance (SOS) identifies the view facing east and then south when traveling east and southbound from Commissioners Park as significant. Views from the intersection of Prince of Wales Drive and Road B illustrate Tower B is visible, but that the parking and loading area is fully obscured by the existing and proposed plantings along Prince of Wales Drive. The proposed hospital will have an impact on the park-like space on the west side of Prince of Wales Drive. Impacts will be mitigated to the extent possible by maintaining existing mature trees and planting additional trees.
Views from entrance to Queen Elizabeth Drive/Dows Lake (at Preston / Prince of Wales).	Minor impact. The Queen Elizabeth Cultural Landscape's SOS identifies the view facing east and then south when traveling east and southbound from Commissioners Park as significant. From the intersection of Prince of Wales Drive and Preston looking south, the upper stories of Tower B are visible and the lower levels are obscured by the existing and proposed plantings along Prince of Wales Drive. The proposed hospital will have an impact on the park-like space on the west side of Prince of Wales Drive. Impacts will be mitigated to the extent possible by maintaining existing mature trees and planting additional trees.
Views from Dows Lake to main hospital building.	Negligible impact. The CEF NHSC SOS identifies views towards the farm from Dow's Lake as significant. The modeled views identify that Tower B, 12-stories in height, will be visible above the tree canopy and above HMCS Carleton buildings. The Sir John Carling Building that existed on the site in the vicinity of the Hospital existed between 1967 and 2014 was 11-stories in height, as such, the visual impact of the views towards this area from Dow's Lake are considered negligible.
Views from Carling Avenue both east and west of the main hospital building.	No impact. The view from Carling Avenue west of the Hospital from the intersection of Maple Lane illustrates Tower A in the background of the Dominion Observatory complex. The view from Carling Avenue east of the Hospital depicts the hospital's primary public entrance, flanked by the two towers and the shows the landscape screening along Carling Avenue. Neither of these views are identified in the Heritage Character Statement for the Dominion Observatory Complex nor the CEF NHSC Management Plan and CIS, as such no heritage attributes or character-defining elements are impacted.
Views identified in Commemorative Integrity Statement for Central Experimental Farm.	Minor impact. The view north across the lawn to the Saunders Building will be impacted. Views of the Hospital towers will be visible in the background of the Saunders building. Given the Hospital will not obstruct or block views to the Saunders building from the front lawn or Maple Drive, the impact is considered minor
Views from adjacent CEF heritage buildings (e.g. Dominion Observatory Complex, Saunders Building, along Commissioners Drive / and or Maple Drive.	No impact. The view from the Dominion Observatory Complex toward the Hospital depict views of Tower A, the bottom portion of which is obscured by the existing and enhanced vegetation in the foreground. The view from the Saunders building toward the Hospital illustrates views to the Hospital are largely obscured by existing vegetation, but views of Tower B extend beyond the tree canopy. Views from Maple Drive show the length of Tower A, the bottom of which is obscured by existing and proposed plantings. None of these views are identified as significant in the Heritage Character Statement for the Dominion Observatory Complex, the CEF NHSC Management Plan and CIS, as such no heritage attributes or character-defining elements will be impacted.
Views identified in NCC Visual Assessment Views Analysis (2009 and 2013).	No impact. After consultation with the NCC, it was determined that views identified in the NCC visual assessment views analysis were already addressed by the identified views with the exception of a view along National Capital Commission Scenic Driveway west of Maple Drive. Upon further consideration, views toward the hospital from this location along National Capital Commission Scenic Driveway would be obscured by the buildings along the north side of National Capital Commission Scenic Driveway and this is not identified as a significant view in the CEF NHSC Management Plan and CIS.

Cultural Heritage Considerations	Analysis
Views from/along the Rideau Canal including from Commissioner's Park, Hartwells Lockstation and Colonel By Drive (that were assessed for the Campus Master Plan and parking garage applications).	Negligible impact. View along the Rideau Canal from Commissioner's Park will be directed south to Dow's Lake, and as such will not be impacted by the proposed Hospital. Views from Hartwells Lockstation along Rideau Canal will be located north and may include views of the Hospital in the west and distant periphery, as such these impacts are considered negligible. Views from Colonel By Drive along Rideau Canal may include the Hospital Towers in the distant background, but these impacts are considered negligible given that between 1967 and 2014 the John Carling building that was 11 stories in height would have been similarly visible above the tree line in this area.

Source: Modified from WSP Golder, 2022

2.2.14 Archaeological Resources

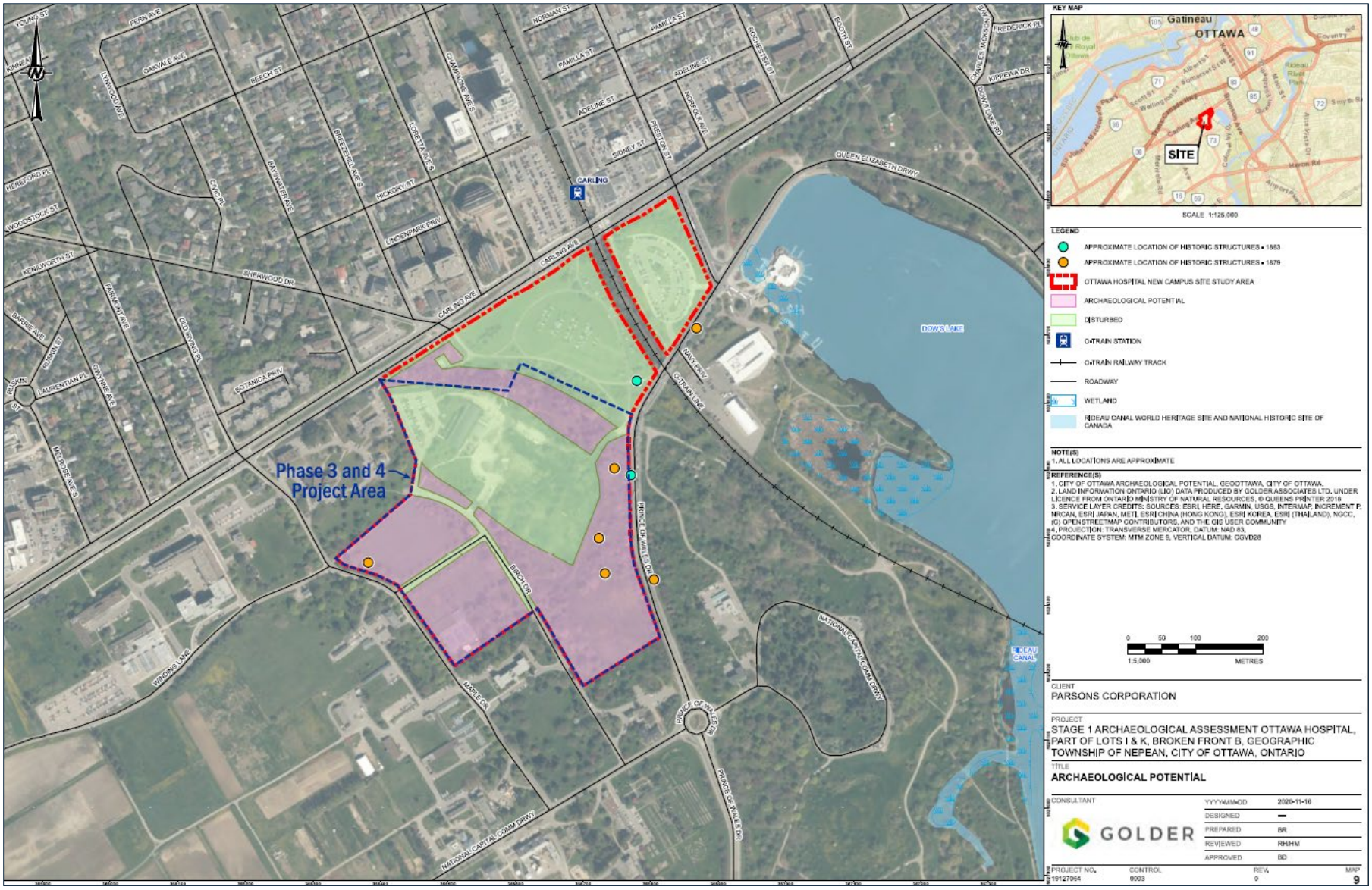
Both a Stage 1 and Stage 2 Archaeological Assessment has been completed for the NCD Site (Golder, 2021c and Golder, 2021d). The Stage 1 Archaeological Assessment consisted of a review of available previously completed reports, historical, archaeological and environmental research relevant to the local area and a site visit. Areas of archaeological potential are generally limited to the wooded ridgeline and the southwestern portion of the NCD site, including areas within the Phase 3 and 4 Project Area **(Figure 18).**

A subsequent Stage 2 archaeological assessment was completed within the areas identified as having archaeological potential. The Stage 2 archaeological assessment, consisting of a test pit survey at 5 m intervals, was completed in nine days between May 4 and May 14, 2021. A total of 549 artifacts were recovered from 83 positive test pits. The majority of artifacts date to the early to mid-20th century during the period when the land was part of the Central Experimental Farm. One large scatter of artifacts is located in the vicinity of a 19th century farmstead. However, few artifacts in this area date to the 19th century and the assemblage is characteristic of an early 20th century date. Therefore, none of the find spots associated with the Stage 2 assessment are considered to have further cultural heritage interest or value (**Figure 19**). No further archaeological work is recommended for the NCD site.

2.2.15 Aboriginal Treaty Rights

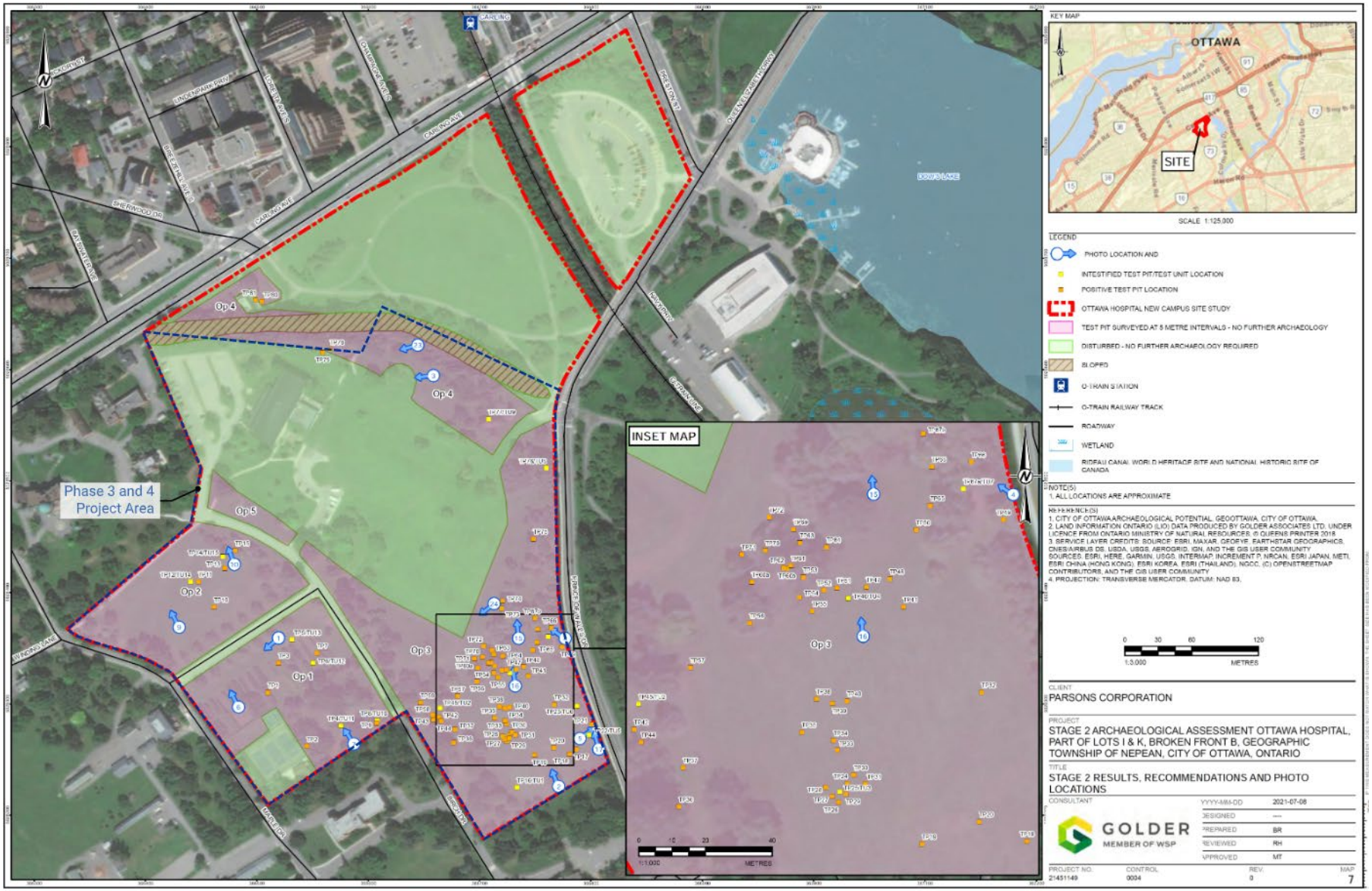
The Aboriginal and Treaty Rights Information System (ATRIS) (Government of Canada, 2021) and the Algonquins of Ontario Interactive Mapping system was consulted (Algonquins of Ontario, 2013). While much of eastern Ontario is within a land claim area (including the entire City of Ottawa municipal boundary), no settlement lands or lands included in the Algonquins Agreement-in-Principle is found on the NCD site.

Figure 18: Archaeological Potential for the Site



Source: Modified from Golder, 2021c

Figure 19: Stage 2 Archaeological Assessment Areas



Source: Golder, 2021d

2.3 Physical Conditions

This section describes the bio-physical conditions with the Phase 3 and 4 Project Area including site servicing and drainage, geotechnical and hydrogeological conditions, environmental contamination, air quality, wind and snow, and natural environmental values.

2.3.1 Site Servicing

Watermains

The NCD is located within the 1W and 2W2C pressure zones, south of the Lemieux Island Water Treatment Plant.

The existing municipal and federally owned private watermain infrastructure within and in the vicinity of the NCD site are as follows (Parsons, 2022b) (**Figure 20**):

Municipal Water Infrastructure

- Carling Avenue: 1067mm diameter watermain
- Carling Avenue : 406mm diameter watermain
- Preston Street : 152mm diameter watermain (east)
- Preston Street : 152mm diameter watermain (west)

Federally Owned Water Infrastructure

- Maple Drive: 406mm diameter private watermain
- Birch Drive: 305mm diameter private watermain
- National Capital Commission Driveway: 406mm/305mm diameter private watermain

Sanitary Sewers

The NCD site is located within an area of the City of Ottawa that contains a complex network of hydraulic sewer structures including the Mooney's Bay Collector (a sanitary sewer system).

The existing municipal and federally owned sanitary sewer infrastructure within the vicinity of the NCD site as follows (**Figure 21**).

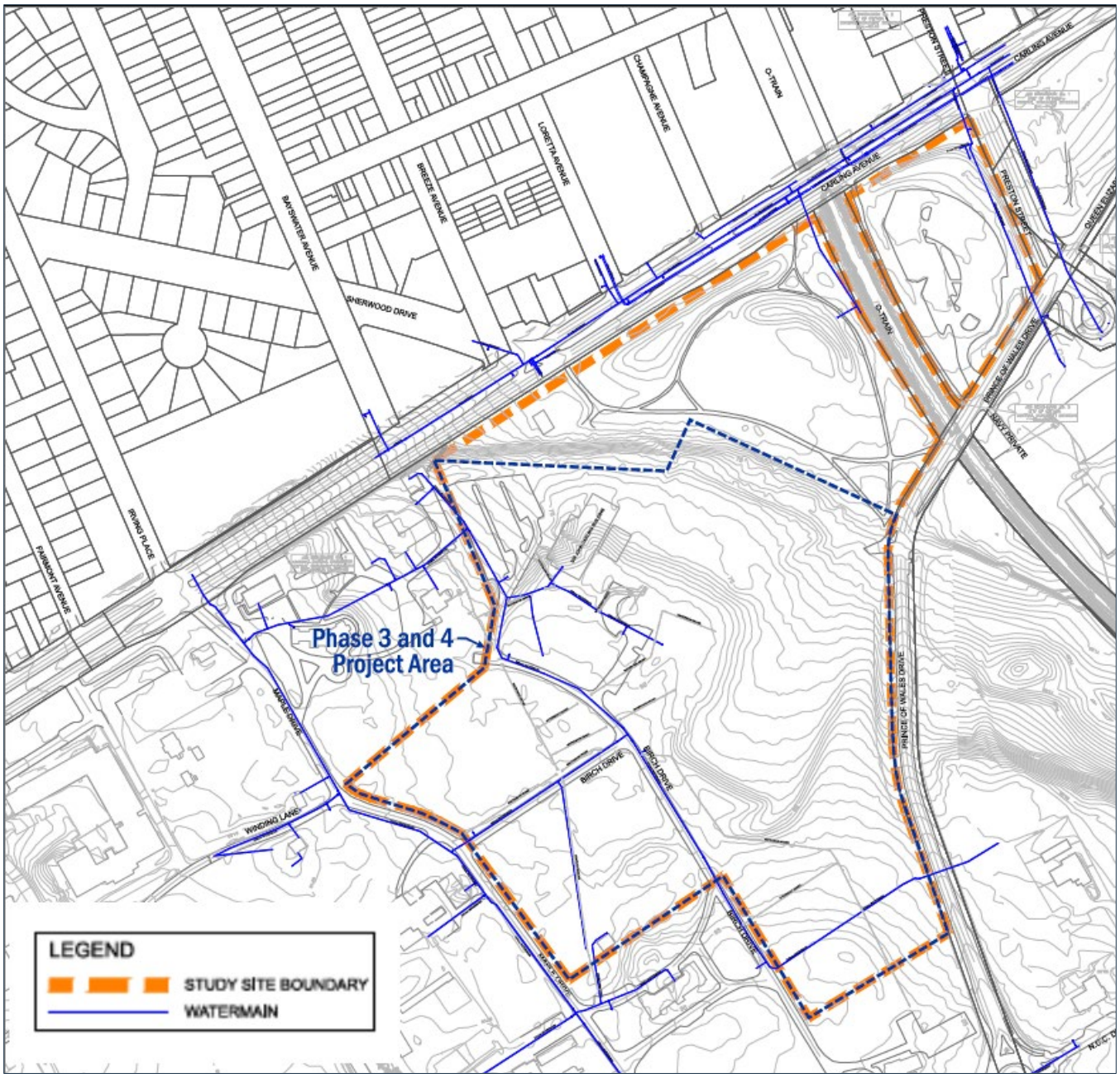
Municipal Sanitary Sewer Infrastructure

- Mooney's Bay Collector: 1050mm diameter sanitary sewer. The Mooney's Bay Collector is a 1050mm diameter concrete sewer that cuts through the westerly parcel (within an existing easement). This easement borders the western edge of the proposed Parking Garage
- Carling Avenue: 225mm/300mm diameter sanitary sewer

Federally Owned Sewer Infrastructure

- Maple Drive: 250mm diameter private sanitary sewer
- Birch Drive: 250mm diameter private sanitary sewer
- National Capital Commission Driveway: 250mm diameter private sanitary sewer

Figure 20: Existing Watermains



Source: Modified from Parsons, 2022b

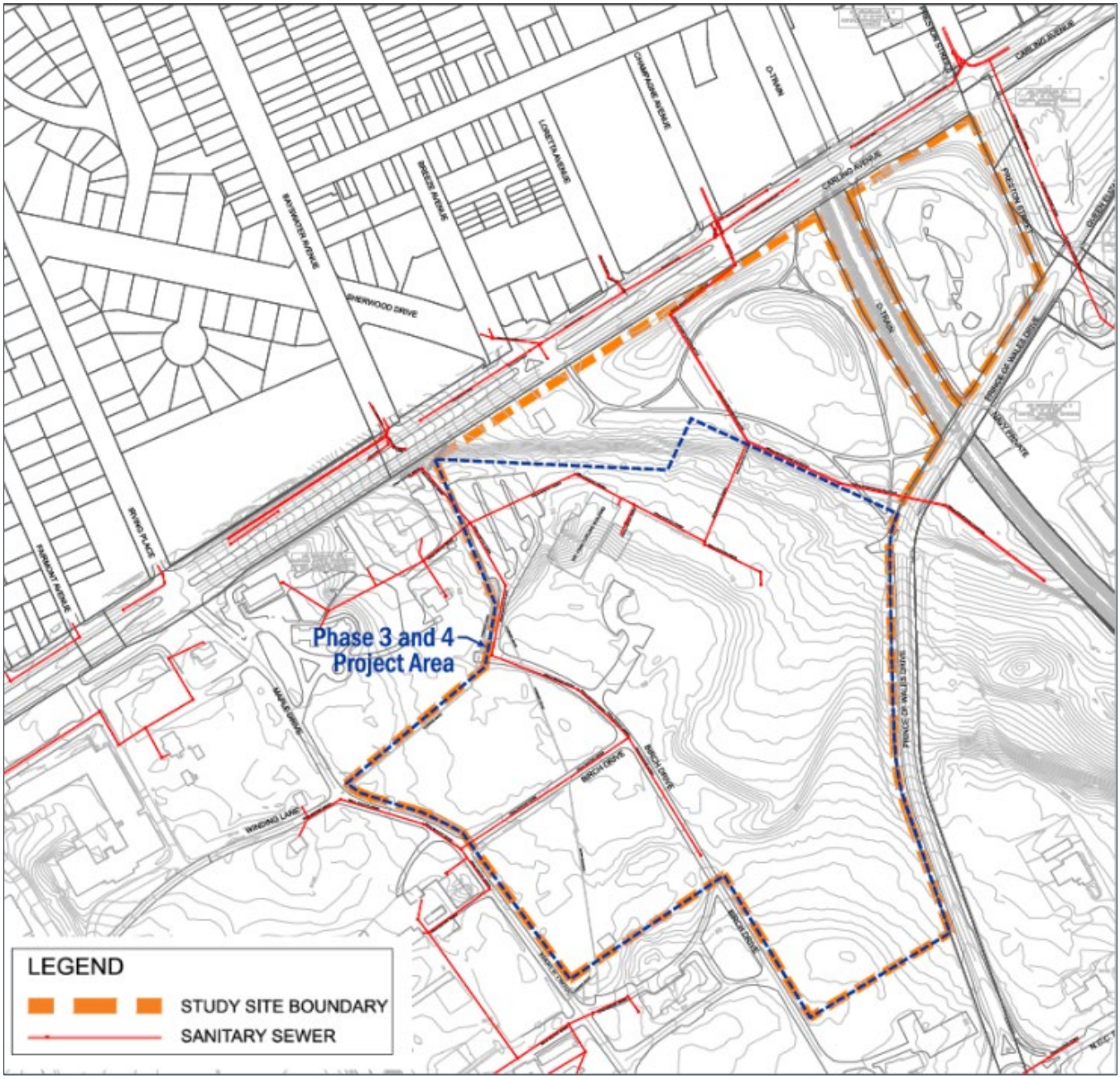
Combined Sewers

The NCD is located within an area of the City of Ottawa that contains a complex network of hydraulic sewer structures including the Preston-Booth Trunk (a combined sewer system) (Parsons, 2022b).

The existing combined sewer infrastructure within and in the vicinity of the NCD site as follows:

- Preston-Booth Trunk: 1800mm diameter combined sewer. The Preston Trunk is diverted to the Booth Street sewer at Spruce Street. The Preston Trunk north of Spruce Street was converted to a storm sewer years ago which eventually discharges to the Tailrace
- Preston Street: 300mm diameter combined sewer

Figure 21: Existing Sanitary and Combined Sewers



Source: Modified from Parsons, 2022b

Storm Sewers

The western parcel of the NCD site is located within the most upstream point of the major tributary drainage area for the Nepean Bay Trunk within the City of Ottawa. The stormwater sewers on the east side of the Phase 3 and 4 Project Area convey runoff to the Carling Avenue stormwater sewers which discharge into the Champagne Avenue stormwater sewer. The Champagne stormwater sewer continues along Loretta Avenue, north of Gladstone Avenue. This stormwater sewer discharges into the Nepean Bay Trunk before ultimately discharging to the Ottawa River.

The eastern parcel (located within the Phase 2 Parking Garage area) conveys runoff into an onsite stormwater sewer drainage system that discharges to the Preston Trunk (combined system), located at the intersection of Carling Avenue and Preston Street.

The overland flow, flows towards Carling Ave and is part of the Mooney's Bay major tributary drainage (Parsons, 2022b).

The existing and private stormwater sewer infrastructure within and in the vicinity of the NCD site as follows **(Figure 22)**:

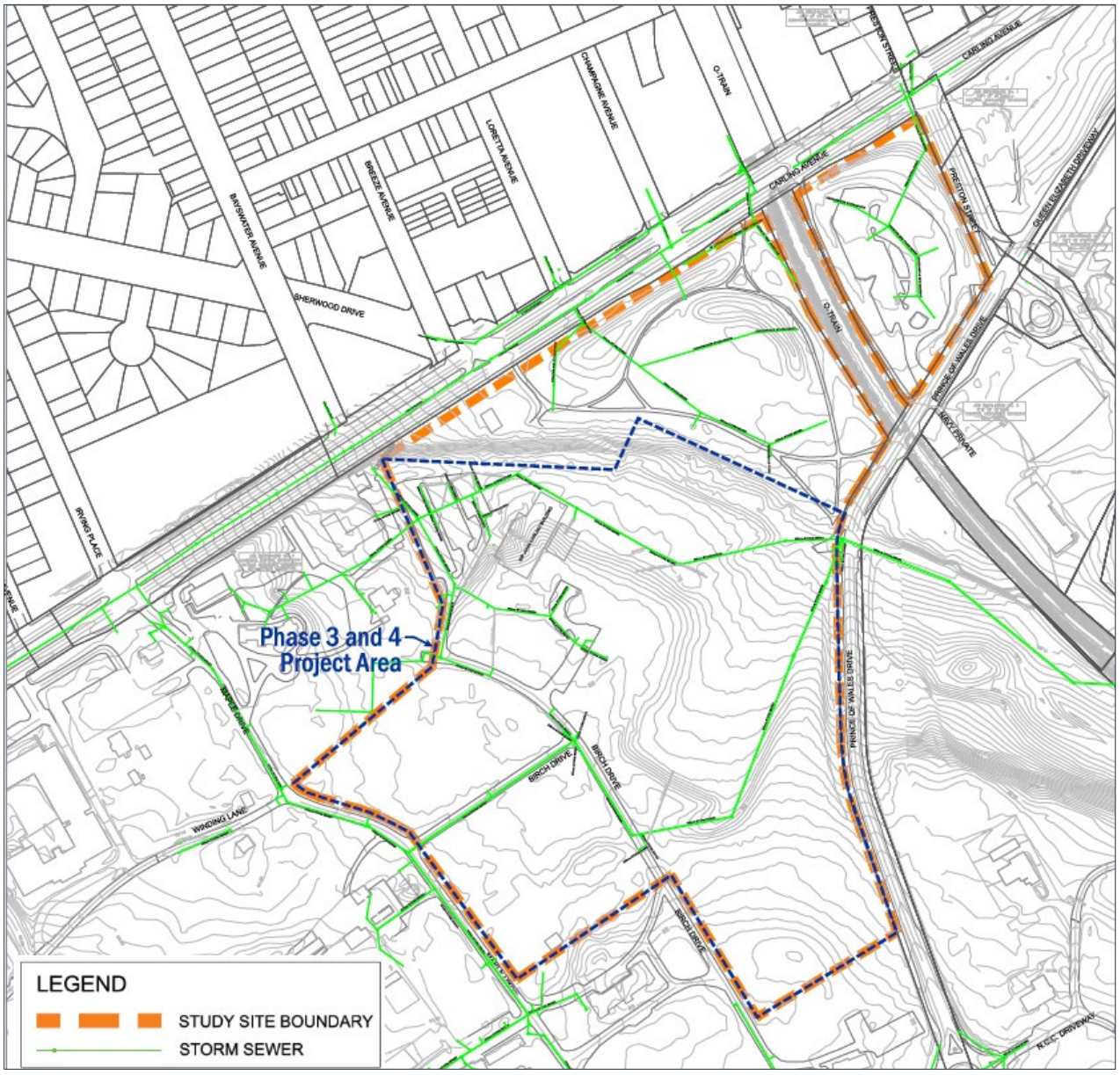
Municipal Stormwater Infrastructure

- Carling Avenue: 300mm/375mm/450mm/525mm diameter storm sewers;
- Nepean Bay Trunk: 1800mm diameter storm sewers
- Federal (PSPC) Land (Prince of Wales Drive): 300mm/450mm/600mm diameter private stormwater sewer

Private Stormwater Infrastructure

- Maple Drive: 300mm/525mm/600mm diameter private stormwater sewer
- Birch Drive: 900mm diameter private stormwater sewer
- Federal Land: 300mm/450mm/600mm diameter private stormwater sewer

Figure 22: Existing Storm Sewers

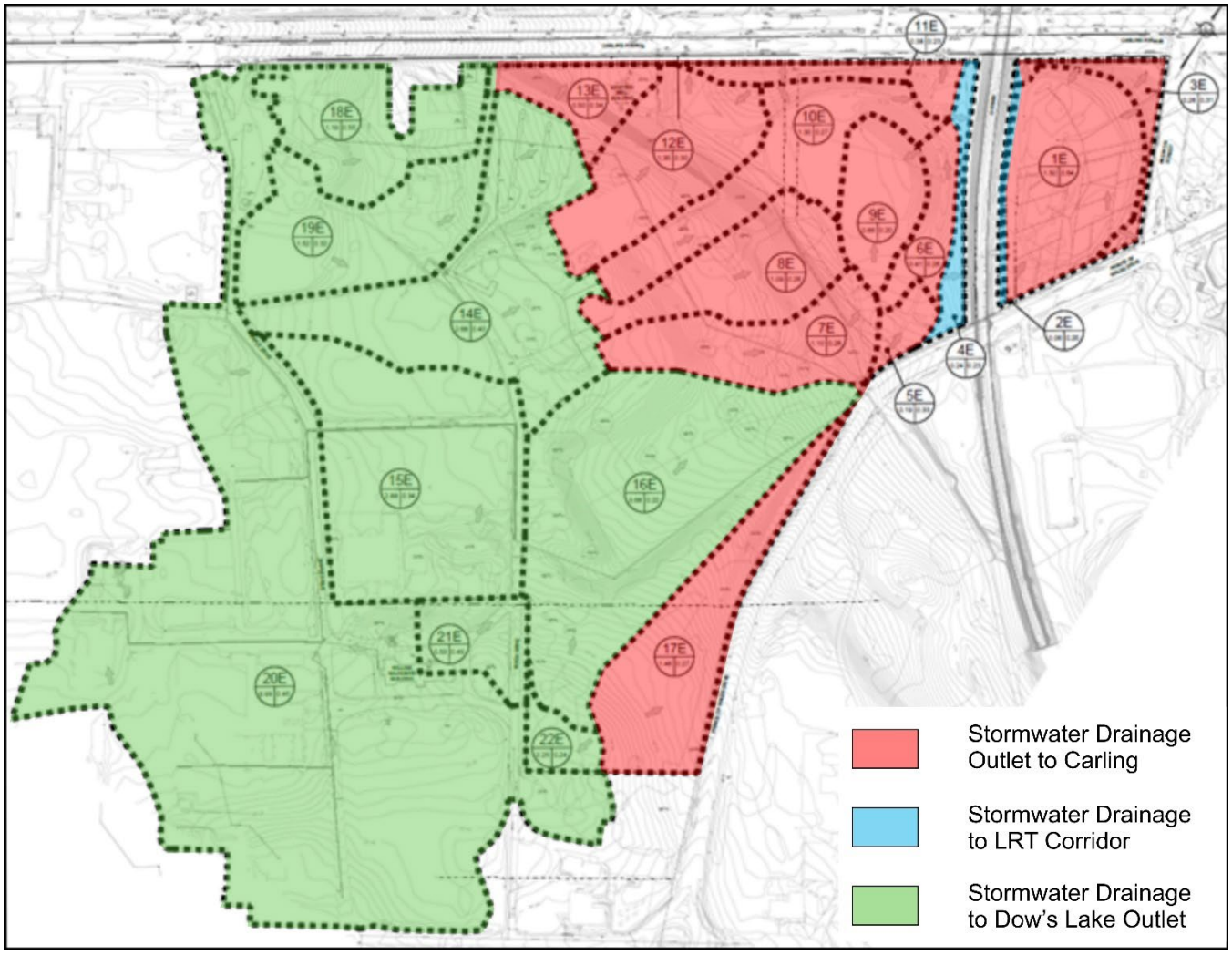


Source: Modified from Parsons, 2022b

2.3.1.1 Pre-development Drainage Areas

The pre-development drainage areas for the Phase 3 and 4 Project Area consists of drainage areas STM-7E, STM-8E, STM-10E, STM-12E – STM-18E, and STM 19E - STM-22E. The majority of this land within the NCD drains through the Agriculture and Agri-Food Canada (AAFC) privately owned storm sewer system that outlets to Dow's Lake. The AAFC is responsible for the operation of the federally owned servicing within the site. Pre-development drainage areas are shown on **Figure 23**.

Figure 23: Pre-Development Drainage Areas



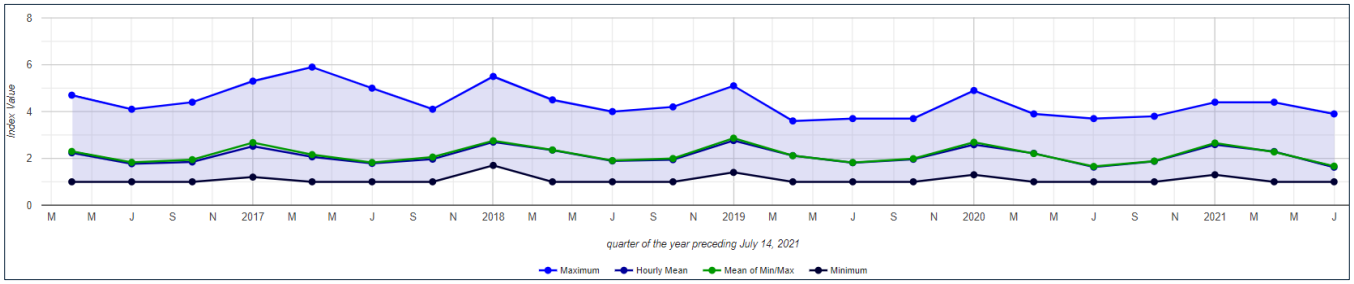
Source: Modified from Parsons, 2022b

2.3.2 Air Quality

Roadway vehicle traffic is the primary source of air-borne pollutants. Emissions from roadway vehicles Carbon Monoxide (CO), Hydrocarbons (HC), Oxides of Nitrogen (NOx) and Particulate Matter (PM), among other volatile organic compounds (VOC), which contribute to ambient air quality levels (GWE, 2020). The Air Quality Health Index, which reports on air quality at city-wide level, over the last 5 years, on a quarterly basis, is depicted. Any measurement less than 3 on the index value indicates low risk to health. With some exceptions, the average air quality as it relates to impacts on health have been low for the City of Ottawa which would indicate good air quality. No known air quality issues have been reported for the NCD site (**Figure 24**).

It is important to note that the NCD places an emphasis on alternative modes of transportation will have a benefit of reducing site-generated emissions.

Figure 24: Quarterly Air Quality Health Index over the Last 5 Years for Ottawa



Source: Environment Canada, 2021

2.3.3 Predicted Air Quality – Operation

An air quality assessment was undertaken for the NCD site, including the Hospital and CUP to document the expected air quality conditions as a result of the proposed equipment to be used during operation, including generators, boilers, laboratory and kitchen exhausts (GWE, 2022a) Generally, the air quality analysis included the modeling of the site and surrounding area, exhaust characteristics of the potential pollutant sources, simulating pollutant dispersion and comparing the pollutant concentration results to provincial criteria, including MECP Ambient Air Quality Criteria (AAQC).

The results of the analysis indicate favourable air quality conditions within TOH property (and beyond), inclusive of all fresh air intakes, building access points, and outdoor amenity spaces. The predictions show that pollutant concentrations will be within acceptable levels, as outlined by the MECP AAQC and industry standards (GWE, 2022a).

2.3.4 Wind and Snow

A pedestrian level wind (PLW) study and grade-level snow drift and accumulation study was completed for the NCD site, including for the Hospital and CUP (GWE, 2022b). The purpose was to investigate determine pedestrian level wind conditions at key areas within and surrounding the site; to identify areas where wind conditions may interfere with outdoor spaces; and estimate snow drifting patters around key building access points.

An analysis of wind comfort conditions at grade-level, terraces and courtyards and snow drifting at grade was completed for various areas within the Phase 3 and 4 Project Area, including:

Wind Comfort Conditions - Grade Level

- Walkways and building access points along north elevation of Hospital
- Parking lot along north elevation of the Hospital
- Walkways and building access points along east elevation of Hospital
- Walkways and building access points along south elevation of Hospital
- Walkways and building access points along west elevation of Hospital
- Walkways, loading zone, and building access points at northeast corner of CUP
- Walkways and building access points at northwest corner of CUP
- Sidewalks along Maple Drive

Wind Comfort Conditions – Terraces and Courtyards

- Sidewalks along Maple Drive
- Level 1 stone garden

Snow Drifting at Grade

- Main entrance of Hospital
- Parking lot north of Hospital
- Loading area east of Hospital
- Loading area at northeast corner of CUP

- Entrances and walkways south of Hospital
- Entrances at northwest corner of CUP
- Entrances and walkways west of Hospital

The results of the study found that all grade-level areas within and surrounding the subject site are predicted to experience conditions that are considered acceptable for the intended pedestrian uses throughout the year. Specifically, conditions over surrounding sidewalks, walkways, surface parking, loading zones, and in the vicinity of building access points, are considered acceptable. The study found that in order to extend sitting conditions during the typical use period over the mental health courtyard serving the Hospital at Level 5, it is recommended that tall wind screens, rising at least 1.6-m above the terrace, be installed along the perimeter of the amenity; all other terraces and courtyards serving the Hospital are predicted to be suitable for sitting during the typical use period.

Regarding grade-level snow drifting, the results of the study found that many of the locations considered are likely to experience regular drift accumulations during the winter period. Of particular importance, moderate snow drift accumulations are expected to occur in the vicinity of the main entrance of the Hospital and the loading area at the northeast corner of the CUP. Although frequent, the amount of accumulation is not expected to be problematic beyond typical local conditions. It is anticipated however, provided a regular snow removal program is followed for the noted areas, it is not expected that snow drift accumulations will hinder the day-to-day operations of the proposed development. The snow removal program is anticipated to be similar to other snow removal programs in Ottawa.

2.3.5 Landforms

The NCD site is located within the Ottawa Clay Plain, which is a flat, glacial till plain with predominantly limestone and shale bedrock (Chapman and Putnam, 1984). Soils and landforms within the study area have been historically disturbed by development including commercial, transportation, recreational trails and manicured open space.

2.3.6 Paleontological Resources

The NCD site is underlain by limestone and shale of the Bobcaygeon and Lindsay formations, both part of the Ottawa Group, formed during the Ordovician period approximately 450 to 480 Ma. During this period seas covered much of the landscape which were occupied by primitive marine life such as brachiopods, crinoids, bryozoans, and mollusks. Today, many of these organisms have been preserved in the sedimentary rock types. Based on the ubiquitous geological history of these formations in the area, these fossils are extremely common and abundant across the region (Ottawa Gatineau Geoheritage, 2022).

2.3.7 Geotechnical and Hydrogeological Conditions

Preliminary and detailed geotechnical and hydrogeological investigations have been completed for the NCD and Phase 3 and 4 Project Area (Golder, 2021e, Golder, 2022a).

Surficial geology mapping for the NCD site indicates it is underlain by several soil types. The southwestern portion of the is overlain by marine deposits (silt and clay), while the northern and eastern portions are underlain by shallow bedrock and glacial till. Surficial geology within the Phase 3 and 4 Project Area consists primarily of bedrock, clay and silt and glacial till. The NCD site is underlain by limestone and shale of the Bobcaygeon and Lindsay formations (**Figure 25 and Figure 26**). Drift thickness (depth to bedrock) mapping varies considerably. Bedrock is indicated to be relatively shallow in a central portion of the site, becoming deeper to the northeast. A fault line connected to the Gloucester Fault crosses throughout the northeast portion of the site in a northwest-southeast direction. These historical faults are not active faults but are more commonly what are known as healed faults; they are planes of movement where large sections of rock have experienced relative movement in the past but have usually in-filled with intact rock material.

Subsurface conditions were confirmed within the Phase 3 and 4 Project Area through previous borehole information as well as 23 confirmatory boreholes (Golder, 2022a) (**Figure 27**). Boreholes in this area encountered topsoil, variable deposits of fill, overlying localized areas of silty clay, glacial till and silty sand/sand and gravel deposits over bedrock; bedrock was encountered between 2.7m and 16.9 m meters below the ground surface. Additionally, groundwater levels were obtained through the installation of 14 monitoring wells and through previous investigations undertaken. Groundwater levels generally ranges from 1 m to 9.25 m below the ground surface. A technical Memorandum prepared

by Golder 2022b provided preliminary estimates of groundwater inflow to the excavations related to the Main Hospital and CUP. Given the depth of the proposed excavations and the existing elevation of ground water levels, it is expected that significant groundwater dewatering will be required and it will be necessary to temporarily lower the groundwater table below the depth of excavation during construction.

Anticipated dewatering volumes as follows:

- Hospital – 400,000 to 900,000 liters per day (L/day) (steady-state inflow) and 5,000,000 to 7,000,000 L/day (initial flow).
- Central Utility Plan – 180,000 L/day (steady-state inflow) and 1,900,000 L/day (initial flow).

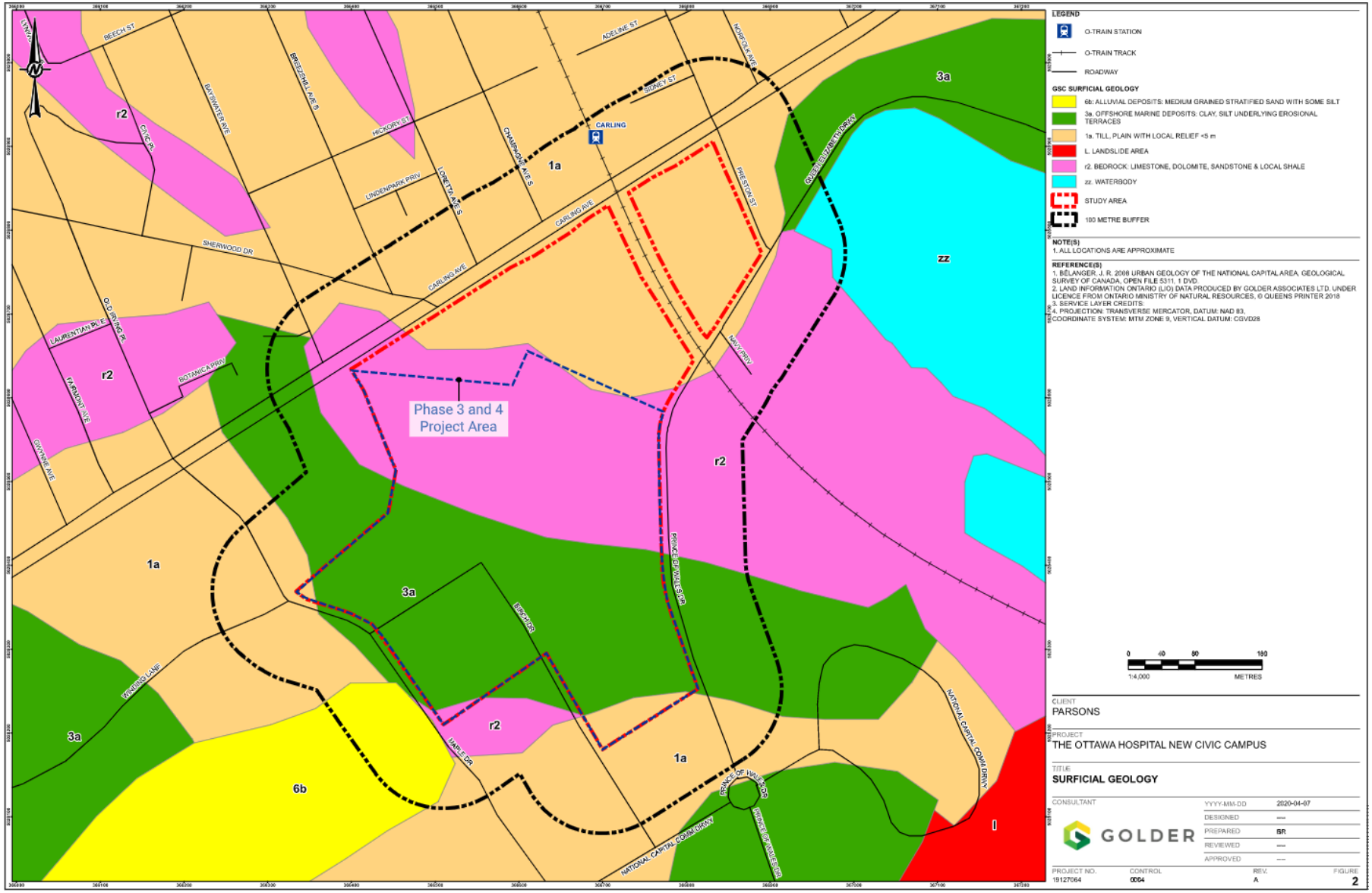
The estimated radius of influence of dewatering is anticipated to be in the range of 25 – 75 m for the Hospital and 40 for the CUP (**Figure 28**).

2.3.7.1 Liquefaction Assessment

A preliminary seismic liquefaction assessment was completed for the site (Golder, 2022a). Liquefaction is a phenomenon whereby seismically induced shaking generates shear stresses within silty or sandy soils under undrained conditions. In loose soil deposits, these stresses may have the potential to densify the soil (leading to potentially large surface settlements) and may generate excess pore pressures. The excess pore pressures can lead to sudden temporary losses in shear strength.

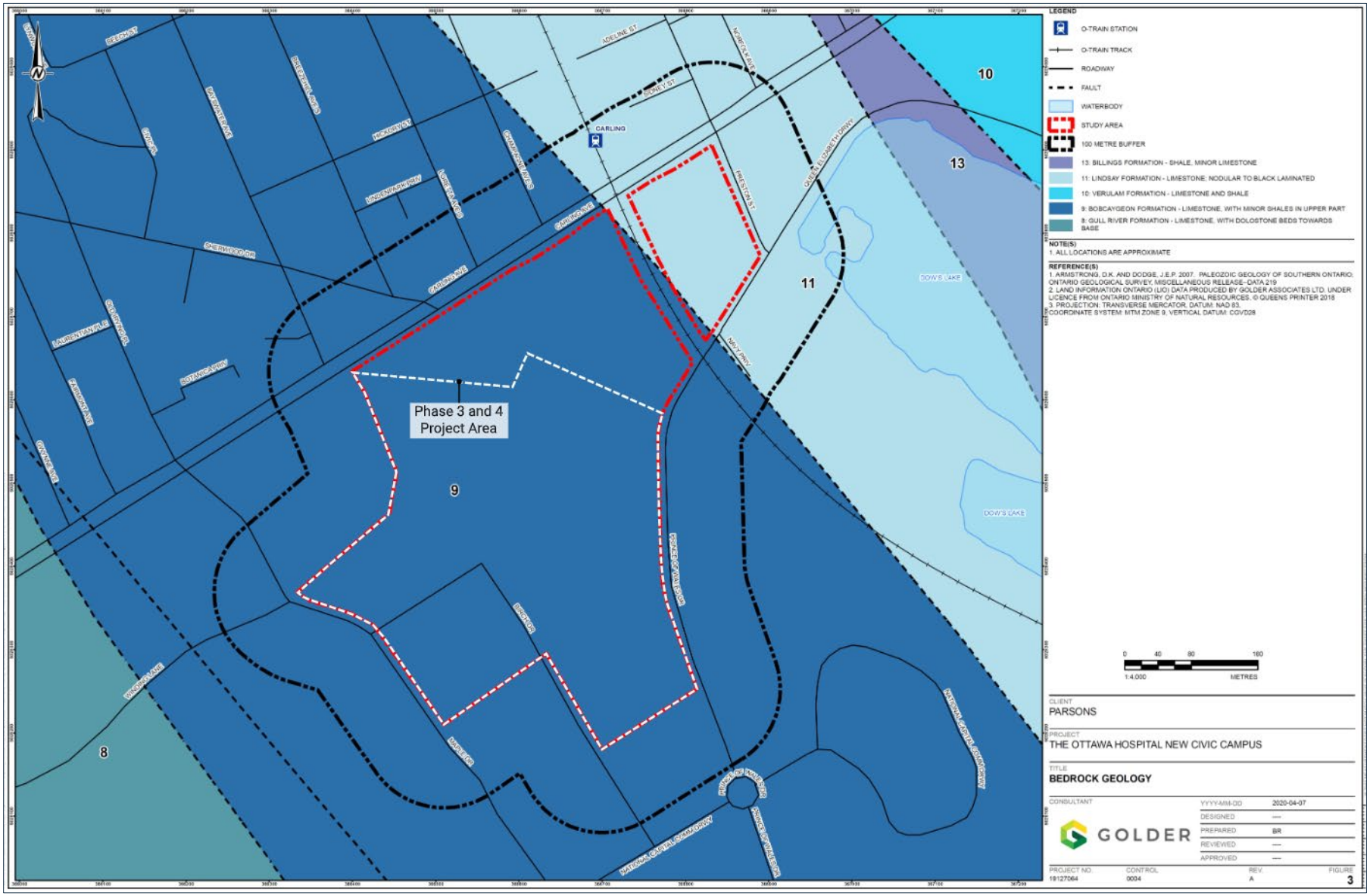
The liquefaction assessment was carried out using the in situ Standard Penetration Test (SPT) data collected at the various borehole locations. The design groundwater level was based on the measured groundwater levels in the monitoring wells installed in boreholes closest to the building location during the current investigation. The results of the assessment indicate that based on the typical range of SPT 'N' values, the site is not considered to be at large-scale risk of seismic liquefaction. Although there are low SPT 'N' values recorded throughout the soil strata, they are relatively uniformly distributed throughout the site (i.e., they are not indicative of a particular zone or layer of very loose soil and are more likely indicative of drilling and testing disturbance or random variations in the soil). Similarly, the very high values are not considered representative of the site as they are likely a result of cobbles and boulders (which also affect the test results) distributed more or less randomly through the soil.

Figure 25: Surficial Geology



Source: Modified from, Golder, 2021e

Figure 26: Bedrock Geology

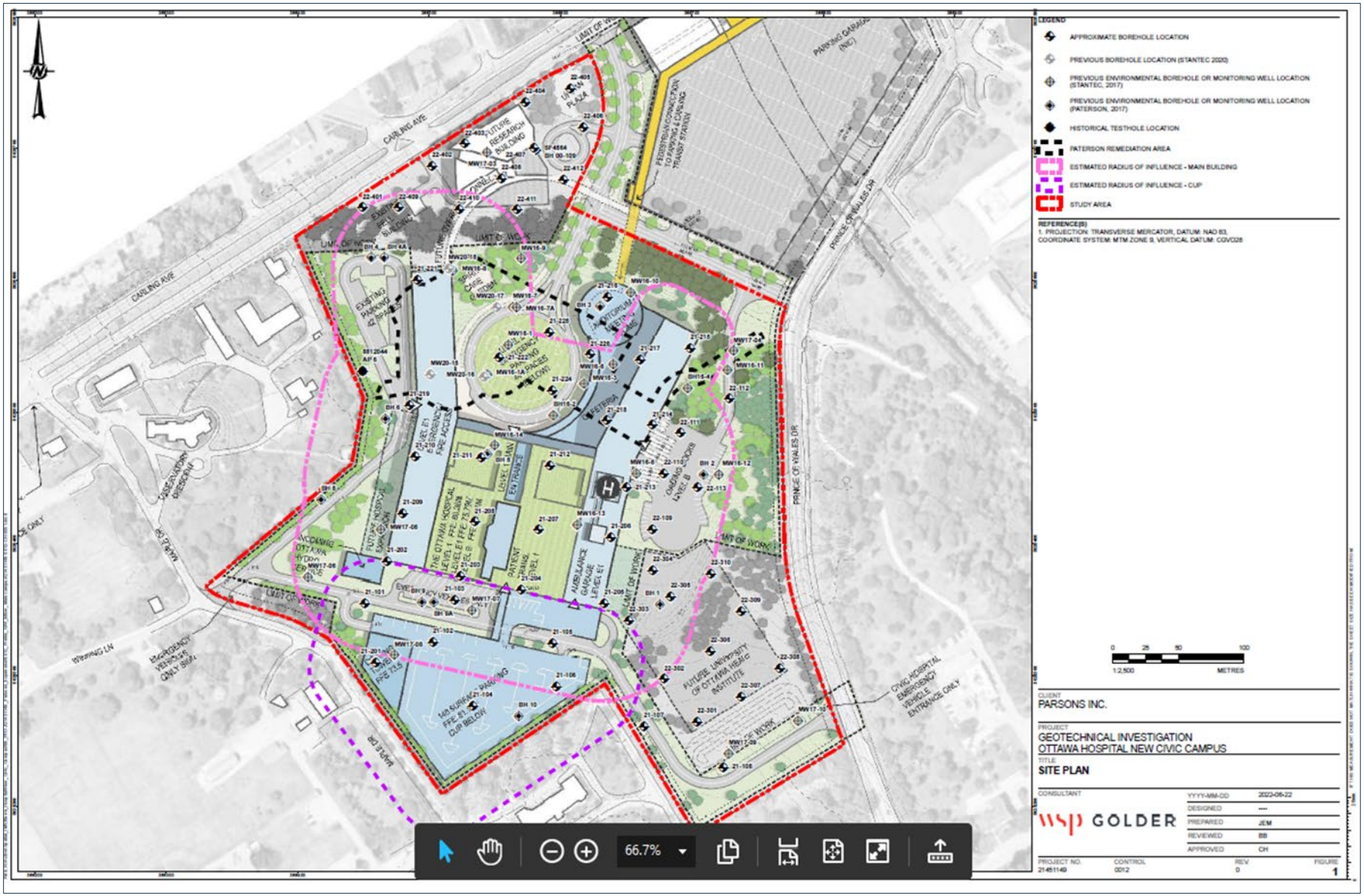


Source: Modified from Golder, 2021e

Figure 27: Borehole Locations

Source: Golder, 2022a

Figure 28: Dewatering Estimated Area of Influence



Source: Modified from Golder, 2022b

2.3.8 Potential Contamination

A Phase 1 Environmental Site Assessment (ESA) was completed for the NCD site (Golder, 2021f). The purpose of a Phase 1 ESA is to identify, based on readily available information and without an intrusive investigation, actual or potential issues of environmental concern which have the potential to impact the soil and/or groundwater related to former activities and to identify the need for further ESA activities (i.e., Phase Two ESA). Nine individual areas of potential environmental concern (APEC) were identified. Note APEC 1* identified in the Golder Phase One ESA is related to an APEC located entirely on Parcel A and is therefore not considered to be an APEC for the Phase 3 and 4 Project Area and not considered in the subsequent Phase 2 ESA (Golder, 2022c). A description of the APEC and their location can be found in **Table 4** and on **Figure 29** below.

Table 4: Areas of Potential Environmental Concern (APEC)

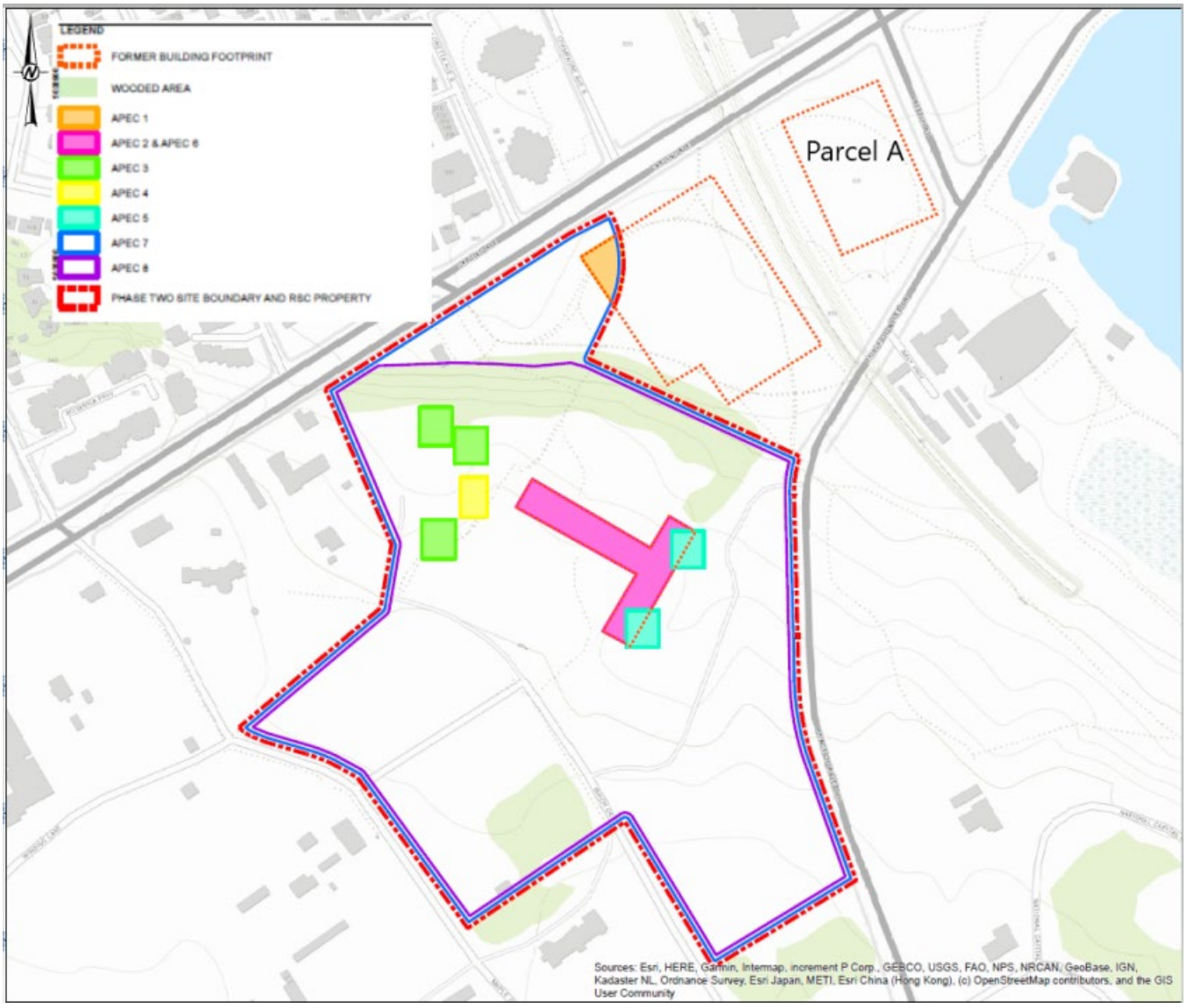
Area of Potential Environmental Concern	Location of APEC on Phase One Property	Potentially Contaminating Activity	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC 1*: PCA ID # A – Former Dow's Lake landfill	Entire Parcel A of the Site	PCA 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners	On-Site	PHCs, BTEX, VOCs, PAHS, Metals and Inorganics	Soil and Groundwater
APEC 1: PCA ID # D – Demolition debris from former office building on Parcel B.	Former building footprint on Parcel B	Demolition debris from office building on Parcel B	On-Site	PHCs, BTEX, PAHS, Metals and Inorganics	Soil and Groundwater
APEC 2: PCA ID # C – Building demolition debris in fill at the location of the former SJCB building.	Former SJCB building footprint on Parcel C	Building demolition debris in fill layer associated with former SJCB building footprint	On-Site	PHCs, BTEX, VOCs, PAHS, Metals, Inorganics and Phenol	Soil and Groundwater
APEC 3: PCA ID # B – Concrete Pad-mounted transformers	Adjacent north and west of SJCB West Annex	PCA 55: Electricity Generator, Transformation and Power Station (Hydro Ottawa Sub-Station	On-Site	PCBs	Soil and Groundwater
APEC 4: PCA ID # E – Former hydraulic oil elevator located in West Annex of SJCB.	SJCB West Annex on Parcel C	PCA 28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil and Groundwater
APEC 5: PCA ID # F1 and F2 – Reported glycol leak from parking ramp system of SJCB	East portion of former SJCB East Annex	Reported glycol leak from parking ramp system of SJCB	On-Site	Glycol	Soil and Groundwater
APEC 6: PCA ID # G1, G2 and G3 – Three former diesel ASTs reportedly associated with SJCB.	Former SJCB on Parcel C	PCA 28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil and Groundwater
APEC 7: PCA ID # not applicable – Imported fill materials associated with various building construction and site development activities across the Site (all three parcels).	Entire Site (Parcels A, B and C)	PCA 30: Importation of Fill Material of Unknown Quality (not indicated on Figure 2)	On-Site	PHCs, BTEX, PAHS, Metals and Inorganics	Soil and Groundwater

Area of Potential Environmental Concern	Location of APEC on Phase One Property	Potentially Contaminating Activity	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC 8: PCA ID # 40 – Application of pesticides associated with former farming activities on Parcel C	Entire area of Parcel C	PCA 40: Pesticides (including Herbicides, Fungicides, and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	On-Site	Pesticides	Soil

APEC 1* identified in the Golder Phase One ESA is related to an APEC located entirely on Parcel A and is therefore not considered to be an APEC to the Phase Two Property.

Source: Modified from Golder, 2021f and Golder, 2022c

Figure 29: Areas of Potential Environmental Concern

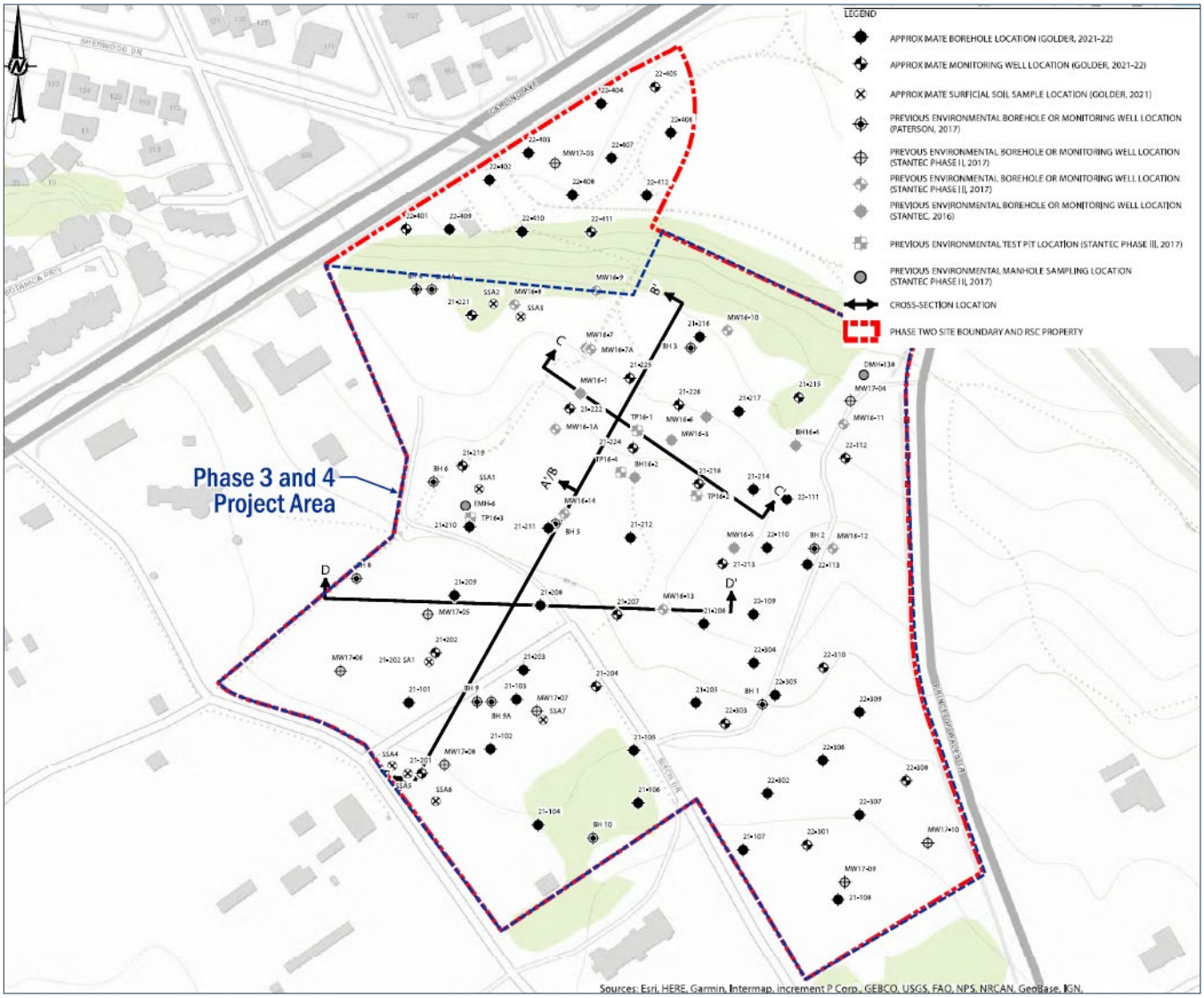


Source: Modified from Golder, 2022c

2.3.9 Phase 2 Environmental Site Assessment

A Phase 2 Environmental Site Assessment (ESA) was completed at the NCD and the Phase 3 and 4 Project Area (Golder, 2021g, Golder, 2022c). The Phase 2 sampling and analysis program included the installation of 34 boreholes in 2021 and 27 boreholes in 2022; 23 boreholes were installed with groundwater monitoring wells. Additionally, historical soil and groundwater sampling results were analysed from previous environmental monitoring undertaken for the site (**Figure 30**). A summary of the soil and groundwater exceedances (from samples collected during primary investigations undertaken in 2021 and 2022) when compared to MECP Table 3 Site Standards is provided below.

Figure 30: Phase 2 ESA Borehole and Monitoring Well Locations



Source: Modified from Golder, 2022c

2.3.9.1 Summary of Soil Exceedances from 2021 and 2022 Investigations

22-111: Concentrations of barium, cobalt and vanadium were detected in soil from the borehole between depths of 1.52 to 2.13 m bgs collected on March 29, 2022, in exceedance of MECP Table 3 Site Standards. Barium, cobalt and vanadium are of natural origin in natural marine clays of the Ottawa region, and therefore are not considered to be exceedances.

22-303: Concentrations of barium, cobalt and vanadium were detected in soil from the borehole between depths of 0.76 to 1.37 m bgs collected on April 5, 2022, in exceedance of MECP Table 3 Site Standards. Barium, cobalt and vanadium are of natural origin in natural marine clays of the Ottawa region, and therefore are not considered to be exceedances.

22-310: Concentrations of barium, cobalt and vanadium were detected in soil from the borehole between depths of 0.76 to 1.37 m bgs collected on March 29, 2022, in exceedance of MECP Table 3 Site Standards. Barium, cobalt and vanadium are of natural origin in natural marine clays of the Ottawa region, and therefore are not considered to be exceedances.

22-404: Concentrations of lead were detected in soil from the borehole between depths of 0 to 0.61 m bgs collected on March 1, 2022, in exceedance of MECP Table 3 Site Standards.

22-405: Concentrations of fluoranthene, benzo(a)anthracene, benzo(b)fluoranthene, and benzo(a)pyrene were detected in soil from the borehole between depths of 1.52 to 2.13 m bgs collected on February 25, 2022, in exceedance of MECP Table 3 Site Standards.

22-406: Concentrations of anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, and dibenzo(a,h)anthracene were detected in soil from the borehole between depths of 1.52 to 2.13 m bgs collected on March 1, 2022, in exceedance of MECP Table 3 Site Standards.

22-407: Concentrations of lead were detected in soil from the borehole between depths of 1.52 to 2.13 m bgs collected on March 7, 2022, in exceedance of MECP Table 3 Site Standards.

22-410: Concentrations of lead were detected in soil from the borehole between depths of 0.76 to 1.37 m bgs collected on March 7, 2022, in exceedance of MECP Table 3 Site Standards.

22-412: Concentrations of benzene were detected in soil from the borehole between depths of 0.76 to 1.37 m bgs collected on March 1, 2022, in exceedance of MECP Table 3 Site Standards.

21-201: Concentrations of arsenic, lead and mercury were detected in soil from the borehole 21-201 between depths of 0 to 0.6 m bgs and of thallium between 3.8 to 4.4 m bgs collected on June 8, 2021 in exceedance of MECP Table 3 Site Standards.

21-202: Concentrations of mercury was detected in a soil sample from the borehole 21-202 between depths of 0 to 0.6 m bgs collected on May 25, 2021 in exceedance of MECP Table 3 Site Standards. The concentration of mercury analyzed in a soil sample collected between depths of 6.1 to 6.9 m bgs at borehole 21-202 on May 25, 2021 and methyl mercury analyzed in the surficial soil between depths of 0 to 0.6 m bgs from a soil sample collected manually on June 16, 2021 in the vicinity of borehole 21-201 (labelled 21-202 SA1) were both detected at concentrations below Table 3 standards.

21-210: Concentrations of cobalt and vanadium were detected in soil from the borehole 21-210 between depths of 0.8 to 1.4 m bgs on June 2, 2021, in exceedance of MECP Table 3 Site Standards. Cobalt and vanadium are of natural origin in natural marine clays of the Ottawa region, and therefore are not considered to be exceedances.

SSA4: Concentrations of arsenic, lead and mercury were detected in soil from the surficial sample SSA4 between depths of 0 to 0.6 m bgs on June 25, 2021, in exceedance of MECP Table 3 Site Standards.

SSA6: Concentrations of mercury was detected in soil from the surficial sample SSA6 between depths of 0 to 0.6 m bgs on June 25, 2021, in exceedance of MECP Table 3 Site Standards.

BH8: Concentration of vanadium was detected in soil from the borehole BH8 between depths of 0.3 to 0.6 m bgs on July 26, 2017, in exceedance of MECP Table 3 Site Standards. Vanadium is of natural origin in natural marine clays of the Ottawa region, and therefore are not considered to be exceedances.

2.3.9.2 Summary of Groundwater Exceedances from 2021 and 2022 Investigations

21-218: Concentrations of lead were detected in groundwater in the sample collected on May 25, 2021 from monitoring well, 21-218, in exceedance of MECP Table 3 Site Standards. This well was resampled on June 9, 2021 and the concentration of lead was below the detection limit in groundwater. Accordingly, this result is not considered to represent an exceedance of MECP Table 3 Site Standards.

MW16-1: Concentrations of copper and lead were detected in groundwater in the sample collected on March 17, 2016, from monitoring well, MW16-1, in exceedance of MECP Table 3 Site Standards. The well was reportedly destroyed due to construction in 2016 and replaced with MW16-1A. Monitoring well 21-222S was installed during the present investigation to assess soil and groundwater quality in the vicinity of MW16-1. Groundwater samples collected at monitoring wells in the vicinity of the former MW16-1 including 21-222 and MW16-1A as part of the present investigation showed no exceedances in groundwater. Accordingly, this result is not considered to represent an exceedance of MECP Table 3 Site

Standards. In addition to the numerical standards, the MECP sets out aesthetic standards relating to the presence of petroleum hydrocarbon product. Specifically, a property does not meet the site condition standards if there is evidence of free product, including but not limited to, visible petroleum hydrocarbon film or sheen present on groundwater, surface water or in any groundwater or surface water samples. Monitoring for free phase product was conducted during groundwater sample collection. No evidence of free product in groundwater was observed during groundwater sampling between May 25, 2021, and June 9, 2021.

2.3.10 Groundwater Management During Construction

Golder (2022d) completed a review of available groundwater quality information from the site of the future Ottawa Hospital against the City of Ottawa Sewer Use Bylaw 2003-514 for both storm sewer and sanitary sewer discharge. The objective is to identify any exceedances that may have indicated a concern with respect to groundwater management during construction.

The review included 62 distinct groundwater samples collected from the NCD site between 2016 and 2021. The samples collected were for the purpose of ongoing Phase II Environmental Site Assessments or other specific purposes. The groundwater results compared to both City of Ottawa sewer discharge criteria. The analysis results are as follows:

- There were no exceedances of any of the analysed parameters compared to the applicable sanitary/combined sewer discharge criteria.
- The concentration of manganese in several samples including the average of all results was in excess of the storm sewer discharge criteria. The average concentration of manganese was189 ug/L, compared to the discharge criteria of 50 ug/L. Manganese is known to be naturally elevated regionally.
- With one exception, total suspended solids (TSS) were in excess of the storm sewer criteria with an average concentration of 84 ug/L vs the criteria of 15 ug/L. The TSS is a reflection of the amount of solids in the sample and can be reduced by filtration or settlement. Slightly elevated TSS is most likely due to the method of sample collection from a monitoring well.
- Copper in monitoring well 16-01 within the former John Carling Building exceeded the storm sewer criteria (177ug/L vs the criteria of 40 ug/L). It is understood that this location has been excavated as part of the ongoing remediation work in that area.
- Toluene in monitoring well 17-10 at the southern limit of the site exceeded the storm sewer criteria (4.1 ug/L vs the criteria of 2 ug/L). Although present at other locations, none exceeded the storm sewer concentration, and the average toluene concentration was less than half of the discharge criteria.

2.3.11 Remedial Program

Paterson Group (2022) prepared a remedial action program required for a Record of Site Condition for three areas associated with the former Sir John Carling Building Area (and adjacent areas) that will site the future location of the Hospital (**Figure 31**). It is important to note that all soil remediation activities for the Phase 3 and 4 Project Area anticipated to be completed by spring 2023.

Figure 31: Remedial Program for Impacted Areas

Source: Modified from Paterson, 2022

The Phase 1A impacted area is located to the east of the main, Phase 1 impacted area, located in the area overlying the former Sir John Carling Building. Based on the Phase II Environmental Site Assessment completed by Golder associates (noted above), as well as a recent test pit program by Paterson, PAHs and metals were detected. Impacted soil within the Phase 1A that exceeded MECP Table 3 standards have been removed from the Phase 1A area and disposed of at an approved waste facility. Additional soils within the Phase 1 and Phase 2 area will be excavated, tested and compared to MECP Table 3 standards. Impacted soil exceeding MECP Table 3 standards will be disposed of at an approved facility.

2.4 Ecological Conditions

In support of the Master Site Plan process, Parsons undertook ecological investigations for the NCD site in order to characterize the natural environment, collect tree inventory data and undertake targeted surveys. The results of the investigations were documented in the Environmental Impact Statement and Tree Conservation Report – Master Site Plan (Parsons, 2021a). Information contained in this report serves as the basis for the following Ecological Conditions with focus on the Phase 3 and Phase 4 project area.

Background information on the natural environment features was retrieved through a review of publicly available records including species observations and geospatial resources. Species at Risk (SAR) records are provided for the general area, as spatial accuracy of records are reduced to protect sensitive data. SAR observation records were accessed through in 1 km grids [Natural Heritage Information Centre (NHIC)], 10 km grids [Ontario Breeding Bird Atlas (OBBA), Ontario Reptile and Amphibian Atlas (ORAA), Ontario Butterfly Atlas (OBA)] or as reduced accuracy points within a 1km area (iNaturalist).

Resources reviewed include:

- Department of Fisheries and Oceans Canada (DFO) SAR Mapping (DFO, 2021)
- Ontario Ministry of Natural Resources and Forestry
  - Natural Heritage Information Centre (NHIC, 2021)
  - Land Information Ontario (LIO, 2017) Geospatial Open Data (MNRF, 2021)
- SARA, Schedule 1 (ECCC, 2002)
- Species at Risk in Ontario (SARO) List (MECP, 2021)
- Environment and Climate Change Canada (ECCC) Critical Habitat Mapping for Species at Risk (ECCC, 2016)
- The 2nd Ontario Breeding Bird Atlas (OBBA, 2007)
- Ontario Reptile and Amphibian Atlas (ORAA, Various Dates)
- Ontario Butterfly Atlas (OBA, Various Dates)
- iNaturalist
  - Rare Plants of Ontario; (iNaturalist, 2021; NHIC, 2021)
  - Herps of Ontario (iNaturalist 2021; ORAA, (Various Dates)
- Ebird (Ebird 2021)
  - Records may not be peer reviewed and were included as appropriate, based on available range and habitat
- Atlas of the Mammals of Ontario (AMO, 1994)
- RVCA Mapping (RVCA, 2021)
- City of Ottawa
  - Urban Natural Areas Environmental Evaluation Study (Muncaster and Brunton, 2005, Muncaster and Brunton, 2006)
  - Greenspace Master Plan: Strategies for Ottawa's Urban Greenspaces (City of Ottawa, 2006)
  - New Official Plan (City of Ottawa, 2022b)
  - GeoOttawa Mapping database (City of Ottawa, 2021a)
  - SAR in Ottawa – as of September 1, 2019 (MacPherson, 2019)
  - Wildlife Species Lists (City of Ottawa, 2021c)
  - Bird-Safe Guidelines (City of Ottawa, 2020b)
- National Capital Commission (NCC)
  - The Plan for Canada's Capital (NCC, 2017)
  - Bird-Safe Guidelines (NCC, 2021)
  - Remarkable Trees of Canada's Capital (NCC, 2020)

In addition to background literature reviews, numerous site visits took place at the NCD site in order to characterize the natural environment, collect tree inventory data, undertake snake habitat, breeding bird and bat exit and transect surveys. The site visit schedule is shown in **Table 5**.

Table 5: Ecological Site Visits

Date	Time	Personnel Involved	Weather Conditions	Purpose of Visit
April 14, 2020	10AM – 1PM	Nicole Nolan	10°C, Overcast	Natural Environment Characterization
March 8, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	-3°C, Overcast	Tree Inventory
March 10, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	5°C, Overcast	Tree Inventory
March 11, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	13, Overcast	Tree Inventory
March 12, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	5 °C, Overcast	Tree Inventory
March 15, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	-10°C, Overcast	Tree Inventory
March 16, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	1°C, Partly Sunny	Tree Inventory
March 17, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	6°C, Sunny with scattered clouds	Tree Inventory
March 18, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	3°C, Overcast	Tree Inventory
March 19, 2021	9AM – 5PM	Nicole Nolan, Cale Hartin	-1.°C, Sunny	Tree Inventory
March 23, 2021	3PM – 5PM	Nicole Nolan	16°C, Partly Sunny	Tree Inventory
May 3, 2021	8AM – 10AM	Nicole Nolan	16°C, Sunny	Snake Habitat Survey
May 21, 2021	7AM – 10AM	Nicole Nolan	17°C, Overcast	Breeding Bird Survey
June 2, 2021	7AM – 10AM	Nicole Nolan	18°C, Sunny	Breeding Bird Survey
June 16, 2021	7AM – 10AM	Nicole Nolan	17°C, Scattered clouds	Breeding Bird Survey
June 2, 2021	8:30PM-11:30PM	Nicole Nolan, Cale Hartin	22°C, Scattered clouds	Bat Exit and Transect Survey
June 10, 2021	8:30PM-10:30PM	Nicole Nolan, Cale Hartin	19°C, Clear	Bat Exit Survey
June 16, 2021	8:45PM-11:30PM	Nicole Nolan, Cale Hartin	19°C, Scattered clouds	Bat Exit and Transect Survey
June 28, 2021	8:45PM-10:45PM	Nicole Nolan, Cale Hartin	27°C, Hazy	Bat Exit Survey
June 29, 2021	8:45PM-11:30PM	Nicole Nolan, Cale Hartin	23°C, Overcast	Bat Exit and Transect Survey
August 10, 2022	1:00PM – 4:00PM	Nicole Nolan, Maria Ning	27°C Sunny	Buttemut Health Assessment, Wetland Assessment
November 2, 2022	9:00AM – 3PM	Nicole Nolan, Maria Ning	22°C Sunny	Tree Inventory
November 4, 2022	9:00AM – 2PM	Nicole Nolan, Maria Ning	22°C Sunny	Tree Inventory

2.4.1 Wetlands

No wetlands were identified within the NCD site or Phase 3 and 4 Project Area, however a number of small unevaluated wetland communities are identified within the surrounding lands along Dow's Lake. These mapped wetland communities are located on lands under federal jurisdiction, and are protected under the Canadian Wetland Policy, which requires no net loss of wetland function in relation to impacts from proposed development.

Wetland communities mapped at the northeast corner of Dow's Lake are located 50 m from the lease area boundary, and are presumed to be temporary, submerged aquatic vegetation, as no emergent wetland vegetation was observed during site visits, and no riparian communities are present. These communities are impacted by the annual flooding and draining of the Rideau Canal and Dow's Lake. Additionally, emergent wetland vegetation associated with the edges of Dow's Lake is highly limited and does not provide interior wetland habitat. A constructed wetland is located 250 m from the Phase 3 and 4 Project limits and is not connected to Dow's Lake through any outlets, culverts, or pipes, and is not impacted by the annual flooding and draining of the Rideau Canal and Dow's Lake, therefore is unlikely to be impacted by any changes in storm water discharge to Dow's Lake. This wetland is a robust emergent mineral marsh, with an open water community in the center, and bordered by a narrow deciduous swamp community. The wetland is known to provide breeding habitat for red-winged blackbird (*Agelaius phoeniceus*). Additionally, 3 midland painted turtles (*Chrysemys picta marginata*) and American redstart (*Setophaga ruticilla*) fledglings were observed during site visits. As this wetland is not within the project area and is not hydrologically connected to any identified stormwater outlets, no impacts to this feature are anticipated. In accordance with The Federal Policy on Wetland Conservation (Government of Canada, 1991) there will be no loss of wetland area or function associated with the project. **Figure 32** illustrates the location of the Dow's Lake constructed wetland and the associated vegetation community.

Figure 32: Dow's Lake Constructed Wetland

2.4.2 Urban Natural Features

No Urban Natural Features (UNF) occur within the NCD site or Phase 3 and 4 Project Area. One UNF was identified to the southeast. The wooded portion of this UNF is identified as part of the Natural Heritage System. The overall area of the UNF includes the Dominion Arboretum and the Arboretum Woods (UNF 133) which are considered to have an overall low sensitivity rating with predominantly introduced or planted species (Muncaster and Brunton, 2006). However, as a large greenspace within the urban core, it offers locally uncommon habitat. As an arboretum, this UNF also contains a number of trees that are significant in age, size, and/or species.

2.4.3 Areas of Natural and Scientific Interest

No Areas of Natural and Scientific Interest (ANSI) are present within the NCD site or Phase 3 and 4 Project Area. One ANSI, Earth Science ANSI 251213640 [Kippewa Drive (Eastview Limestone)], is located approximately 675 m northeast of the NCD site and is a Provincially Significant limestone feature.

2.4.4 National Capital Commission Natural Heritage

No NCC Natural Heritage designations are found within the NCD site or Phase 3 and 4 Project Area. Capital Urban Green Space is present adjacent to the NCD site, following along Prince of Wales Drive and Preston Street, including the Arboretum and Commissioners Park and connecting green spaces around Dow's Lake.

No Agricultural and Horticultural Research designations are present within the NCD site. These designations are associated with the Central Experimental Farm, located south of the NCD site.

2.4.5 Aquatic Environment

No surface water features are located within the NCD site or Phase 3 and 4 Project Area. Nearby surface water features include Dow's Lake and the Rideau Canal, home to a number of species of fish. Background resources for Dow's Lake and the Rideau Canal recorded a total of 22 species of fish representing seven families (**Table 6**). This includes one SAR, American eel (*Anguilla rostrata*), and one potential SAR that was not identified to species but was identified as a member of the Redhorse genus (*Moxostoma sp.*) which includes species found in Ontario that are listed as Threatened and Special Concern provincially and federally. No impacts to fish or fish habitat are anticipated as a results of the project, therefore no Request for Review is required.

Table 6: Fish Species Observed in Dow's Lake/ Rideau Canal

Common Name	Scientific Name	Source
American Eel	*Anguilla rostrata*	MNRF 2017
Black Crappie	*Pomoxis nigromaculatus*	MNRF 2017, Walker et. al. 2010
Bluegill	*Lepomis macrochirus*	MNRF 2017, Walker et. al. 2010
Bluntnose Minnow	*Pimephales notatus*	Walker et. al. 2010
Brook Silverside	*Labidesthes sicculus*	Walker et. al. 2010
Brown Bullhead	*Ameiurus nebulosus*	MNRF 2017, Walker et. al. 2010
Channel Catfish	*Ictalurus punctatus*	MNRF 2017
Common Carp	*Cyprinus carpio*	MNRF 2017, Walker et. al. 2010
Common Shiner	*Luxilus cornutus*	MNRF 2017
Emerald Shiner	*Notropis atherinoides*	MNRF 2017
Golden Shiner	*Notemigonus crysoleucas*	MNRF 2017, Walker et. al. 2010
Largemouth Bass	*Micropterus salmoides*	MNRF 2017, Walker et. al. 2010
Logperch	*Percina caprodes*	MNRF 2017, Walker et. al. 2010
Redhorse species	*Moxostoma sp*	MNRF 2017
Muskellunge	*Esox masquinongy*	MNRF 2017, Walker et. al. 2010
Northern Pike	*Esox lucius*	MNRF 2017, Walker et. al. 2010
Pumpkinseed	*Lepomis gibbosus*	MNRF 2017, Walker et. al. 2010
Rock Bass	*Ambloplites rupestris*	MNRF 2017, Walker et. al. 2010
Smallmouth Bass	*Micropterus dolomieu*	MNRF 2017, Walker et. al. 2010
Walleye	*Sander vitreus*	MNRF 2017, Walker et. al. 2010
White Sucker	*Catastomus commersonii*	MNRF 2017, Walker et. al. 2010
Yellow Perch	*Perca flavescens*	MNRF 2017, Walker et. al. 2010

2.4.6 Vegetation Communities

Vegetation communities were characterized using methods described in Ecological Land Classification for Southern Ontario (Lee, et. al, 1998) to the best available ecosite level. Due to the cultural nature of the NCD site and limited size of naturalized areas, no minimum size was applied to mapped communities where distinct changes in dominant canopy cover were observed.

The vegetation within the Phase 3 and 4 Project Area is comprised of a mixture of introduced, ornamental, and native species of planted deciduous and coniferous trees and shrubs located within maintained lawns. Naturalized communities are limited to a wooded ridgeline (WOMR1) along the northern edge of the project area. The naturalized portion of this wooded communities is primarily deciduous, however a number of mature planted conifers line the southern edge (**Table 7**).

Many of the noted vegetation communities contain high numbers of invasive plant species, particularly common buckthorn (*Rhamnus cathartica*) and dog-strangling vine (*Vincetoxicum rossicum*). These plants are especially established along the wooded ridgeline. Additionally, Norway maple (*Acer platanoide*s) and Manitoba maple (*Acer negundo*) are dominant species throughout the wooded ridgeline (**Figure 33**), both of which exhibit aggressive growth habits and are considered invasive. The removal of invasive tree species as a part of the project has the potential to provide a net environmental gain to the property, through reducing competition for native plant species and through replanting the area with a greater diversity of native canopy trees.

Table 7: Ecological Land Classification

ELC Ecosite	Description
Dry – Fresh Calcareous Bedrock Mixed Woodland (WOMR1)	Cultural woodland following ridgeline, with approximately 60% canopy cover. Dominated by Manitoba maple, Norway maple, and green ash along toe of slope (north), with planted white spruce (*Picea glauca*), Norway spruce (*Picea abies*), red pine (*Pinus rubra*) and white pine (*Pinus strobus*) along the crest of the ridge (south). common buckthorn and dog-strangling vine dominant in understory.
Constructed Green Lands (CGL_4)	Manicured lawn with clusters of planted trees and shrubs. Groundcover is dominated by turf grasses and occasional non-native wildflowers.
Transportation (CVI_1)	Paved roadways and parking lots.

Figure 33: Vegetation Communities

2.4.7 Tree Inventory and Conservation

A *Vegetation Management/Conservation Strategy and Education Program* has been prepared to guide decision-making and work involving trees, shrubs, and herbaceous vegetation on the NCD site. The strategy addresses and provides recommendations to enhance the ecological value and biodiversity of the NCD site, identifies criteria for design-based tree protection and tree and shrub relocation, provides revegetation recommendations, discusses vegetation management and maintenance objectives, and identifies best management practices for the protection and removal of vegetation during construction. This document's recommendations apply to Phase 3 and 4 and associated tree impacts, protection, and planting.

The *Vegetation Management/Conservation Strategy and Education Program* states that the results of the Tree Conservation Report completed at the Master Site Plan level will be updated at each subsequent phase of development as part of the Long-Term Adaptive Management Plan for tree canopy. Updates and recommendations based on the limits of the Phase 3 and 4 Project Area, are provided in the following sections.

2.4.7.1 Tree Inventory

Trees within the Phase 3 and 4 Project Area vary in age, from historic specimens to new plantings. Currently naturalized areas within the site (e.g. wooded ridgeline) are approximately 56 years of age, based on initial establishment in 1965. Older trees include tall conifers located on the south end of the wooded ridgeline, towards the crest of the slope, which are approximately 80 years of age, based on their planting as part of the construction of the government building west of the existing LRT trench beginning in 1941. These trees are mostly located at the northern limits of the Phase 3 and 4 Project Area, with long-term retention of the majority of these trees are intended as part of the final build-out.

Tree inventories were conducted in March 2021 with updates completed in 2022. A high-accuracy survey was completed in July, August and November 2022 for all trees located within 6 m of the edge of impacts in order to inform tree protection methods and potential design-based retention strategies. The purpose of the investigation was to inventory all existing trees and shrubs within NCD site, (and off site trees that may be impacted) and to assess the potential impacts following the City of Ottawa Tree Conservation By-law (City of Ottawa, 2020a). Additionally, all "remarkable trees" contained within NCC's document, Remarkable Trees of Canada's Capital (NCC, 2020) have been accounted for in the inventory and evaluated based on the criteria below.

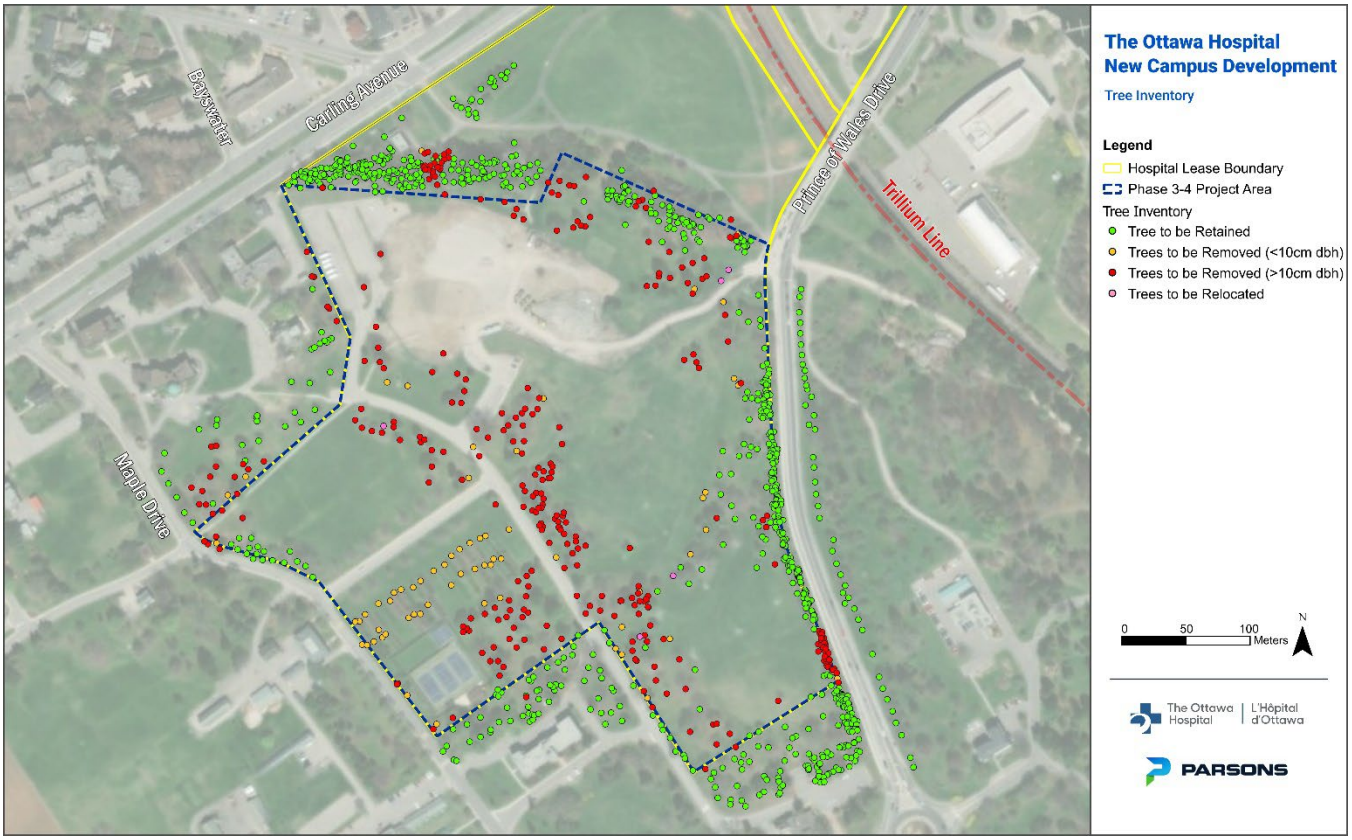
The following data were recorded for each tree and shrub:

- Location
- Species (common name and scientific name)
- Size measured in diameter at breast height (DBH)
- Number of stems
- Overall condition rating:
    1. Excellent
    2. Good
    3. Fair
    4. Poor
    5. Dead
- Condition notes including structural and biotic defects
- Critical root zone (CRZ) calculated as 10 cm for every 1 cm DBH

Living trees with a DBH >30 cm are considered to be large diameter trees, and are considered to be notable within the urban area, however all trees greater than 10 cm DBH are afforded the same permitting and protections (City of Ottawa, 2020). Trees with stems under 10 cm DBH, shrubs, and shrub groupings were also surveyed, however are not subject to the City of Ottawa's Tree By-Law protections or subject to typical NCC compensation requirements. The results of the inventory as well as planned removals for the Phase 3 and 4 Project Area is illustrated on **Figure 34**.

Please note that the total trees surveyed, proposed retention, removals and relocations have been accounted for in the current stage of the design process and totals may change as the design develops.

Figure 34: Trees Inventoried, Proposed Retention and Proposed Removals



2.4.7.2 Proposed Removals and Retention

Guided by the *Vegetation Management/Conservation Strategy and Contractor Education Program* a tree inventory was carried out to reconfirm the existing vegetation within the Phase 3 and 4 Project area (**Table 8**).

Based on the results of the tree inventory, including updates in 2022, a total of 271 living trees within the NCD site (greater than 10 cm dbh), will be removed as part of Phase 3 and 4 works (122 trees, 10 cm to 29 cm dbh) and 149 large diameter trees (30 cm DBH or greater). Off-site, a total of 22 trees will be removed (5 trees, 10 cm to 29 cm dbh) and 17 large diameter trees (30 cm DBH or greater).

In an effort to preserve as much of the on-site vegetation as possible, in advance of tree removals, the boundary of site impacts will be flagged in the field and the extent of tree injuries and removals, and the location and CRZ of trees to be injured and/or protected will be confirmed. Where feasible, construction limits may be offset to accommodate the CRZ of healthy, non-invasive retained trees to prevent injury. Trees identified as hazard trees may be removed as hazards are identified and will be subject to recommended mitigations if removal must occur during the breeding bird season (April 8 – August 31) or the bat active season (April 1 – September 30). Trees that are candidates for relocation are expected to be relocated during late spring and early summer and will be subject to recommended mitigations.

Table 8: Trees Removals: Phase 3 and 4 Project Area and Off Site

	On-Site Removals		Off-Site Removals	
Trunk Diameter (DBH)	**Living**	**Dead**	**Living**	**Dead**
10 cm to 29 cm	122	6	5	0
30 cm or Greater	149	2	17	1
Total > 10 cm	**271**	**8**	**22**	**1**

2.4.7.3 Tree Conservation and Replacement

Canopy cover has been identified as a key value of the NCD site, with trees providing ecosystem services including habitat for wildlife, contributing to air-quality, rainwater infiltration, noise-buffering, and mitigation of heat-island effect in an urban setting, as well as providing accessible urban greenspace for the public. The intention of the project design is to retain and enhance the edge conditions within the Central Experimental Farm as much as possible, and to maintain or improve the overall diversity of native tree species and canopy cover of the overall site. Canopy cover goals include one tree for every five surface-grade parking spaces in areas near surface-grade parking lots, as well as aiming to achieve the City of Ottawa's 40% in 40 years total urban canopy cover goal (City of Ottawa, 2021b) for the NCD site, including off-site plantings, which is a net increase from the pre-construction 23.4% canopy coverage of the NCD site. It is understood that this is a goal for the entire NCD site and not for each individual phase of development, and that off-site plantings of an equivalent area will be included to account for any percent cover that cannot be achieved onsite. The Canopy Cover Plan for the Phase 3 and 4 Project is shown in **Figure 35**.

New plantings include a diverse range of species that will grow and mature at different rates and are staggered throughout the site. Species selected also include native flowering and fruiting species, as well as evergreen trees and shrubs, species of indigenous significance and pollinator focused species which will provide social and wildlife values of forage, cover, and visual appeal, early after planting.

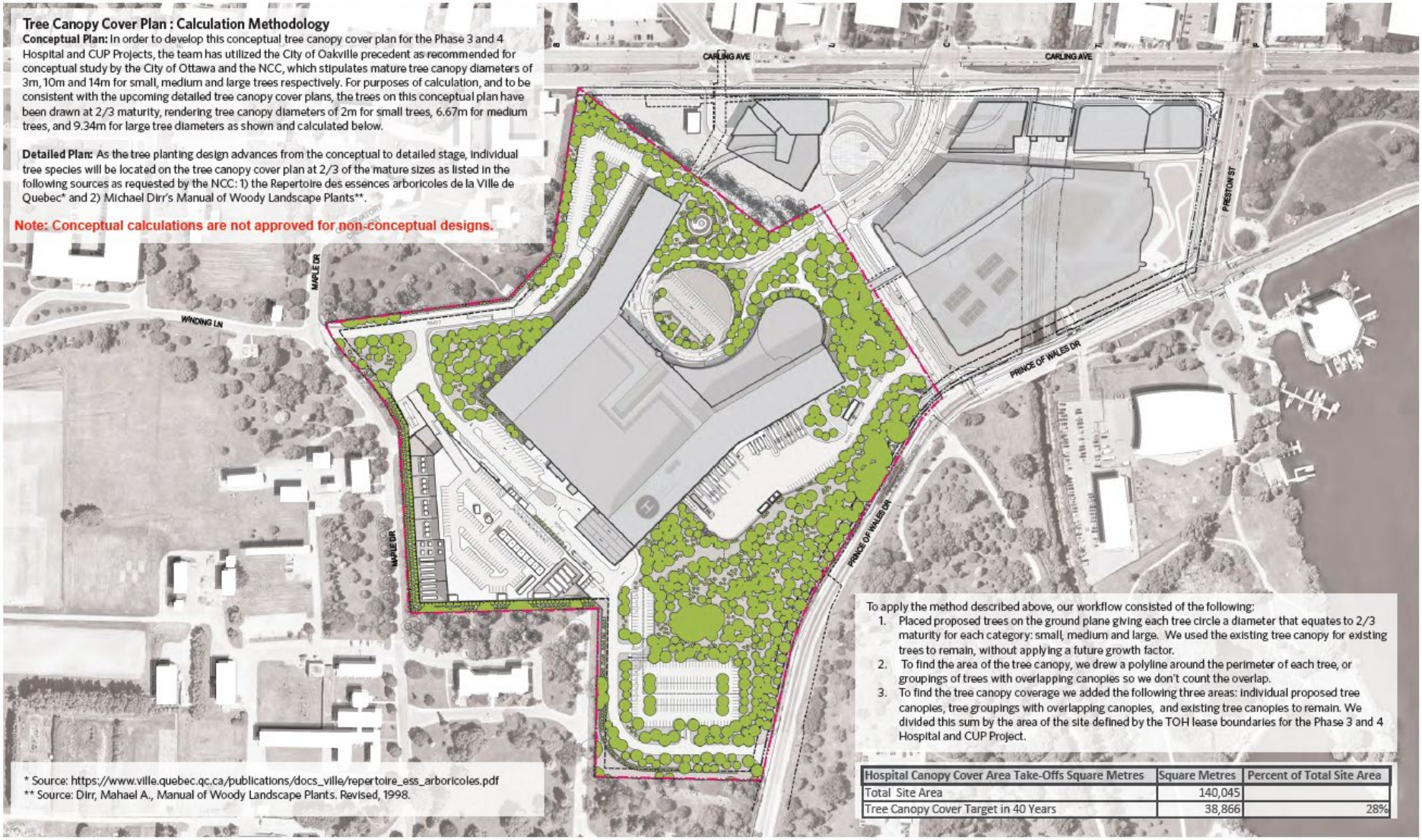
2.4.7.4 Old Hedge Collection

The Old Hedge Collection is a horticultural collection of 33 parallel rows of hedges planted by the CEF, dating as far back as 1891, and includes species and horticultural cultivars of woody vegetation, that may be used in landscaping as hedges. Specimens include varieties of both trees and shrubs, however trees within the collection are trained and pruned into hedge form, typically through topping and pruning back of leading stems, and do not function as standalone canopy trees. The CEF has undertaken efforts to preserve the genetic stock and unique cultivars of the Old Hedge Collection, as well as other unique specimens throughout the site. These efforts have included propagation from cuttings of the hedges, as well as transplanting select specimens to provide future stock for propagation. The CEF's preservation efforts outside of the Old Hedge Collection focused on rosybloom crabapple cultivars bred by Isabella Preston at the CEF between 1920 and 1946. While the Old Hedge collection is being removed from the site as part of the Phase 3 and 4 Project, the following species identified in **Table 9** have been preserved in advance of removals.

Table 9: Preserved Species within the Old Hedge Collection

Common Name	Taxonomic Name	Preservation Notes
Chermesina Willow	*Salix x fragilis* f. Vitellina 'Chermesina'	Variety is difficult to source in Canada.
Niedzwetzkyana Crab Apple	*Malus pumila* 'Niedzwetzkyana'	Variety is no longer in cultivation, historic value.
Carleton Honeysuckle	*Lonicera tataricum* 'Carleton'	Variety is no longer in cultivation, historic value.
Amur Privet	*Ligustrum amurense*	Species is difficult to source in Canada.
Variegated European Dogwood	*Cornus sanguinea* 'Variegata'	Variety is no longer in cultivation, historic value.
Cherry Prinsepia	*Prinsepia sinensis*	Species is difficult to source in Canada.
Eastern White-cedar 'Douglasii Aurea'	*Thuja occidentalis* 'Douglasii Aurea'	Variety is difficult to source in Canada.

Figure 35: Phase 3 and 4 Canopy Cover Plan



Source: HDR 2022c

2.4.7.5 Tree Relocation

In the effort to preserve as many trees as possible, relocation is being considered for trees that meet criteria outlined in the *Vegetation Management/Conservation Plan and Education Program* prepared for the NCD site. Relocation of suitable existing trees will maintain the carbon sequestration value of each tree that is relocated, as well as providing larger trees with more developed canopies for inclusion in landscaping than would typically be available through nursery stock.

The evaluation of candidate trees for relocation occurs in two stages. An initial desktop assessment will identify trees of suitable size, condition, species, and location in relation to landform features, infrastructure, and existing buildings. Five (5) trees have been identified as potential candidates for relocation through this desktop exercise. A second assessment will be carried out in the field to confirm tree location in relation to underground utilities, to assess soil suitability, and to confirm tree condition. The in-field assessment must be carried out during no snow conditions and when the ground is not frozen to allow for observation of root collar and soil conditions. These trees will be evaluated for proximity to underground utilities and assessed in the field in advance of construction.

While every effort will be made to relocate suitable trees, it is not expected that every tree identified at the desktop stage will be considered suitable candidates for relocation following the field assessment. Relocated trees will be planted in compatible locations based on the landscaping plan for the NCD site, or off-site where warranted.

2.4.7.6 Soil Health

Soil health is a key component to the long-term survivability of trees and will support the growth needed to achieve the 40% canopy cover target over 40 years. Soil health will be supported by the following:

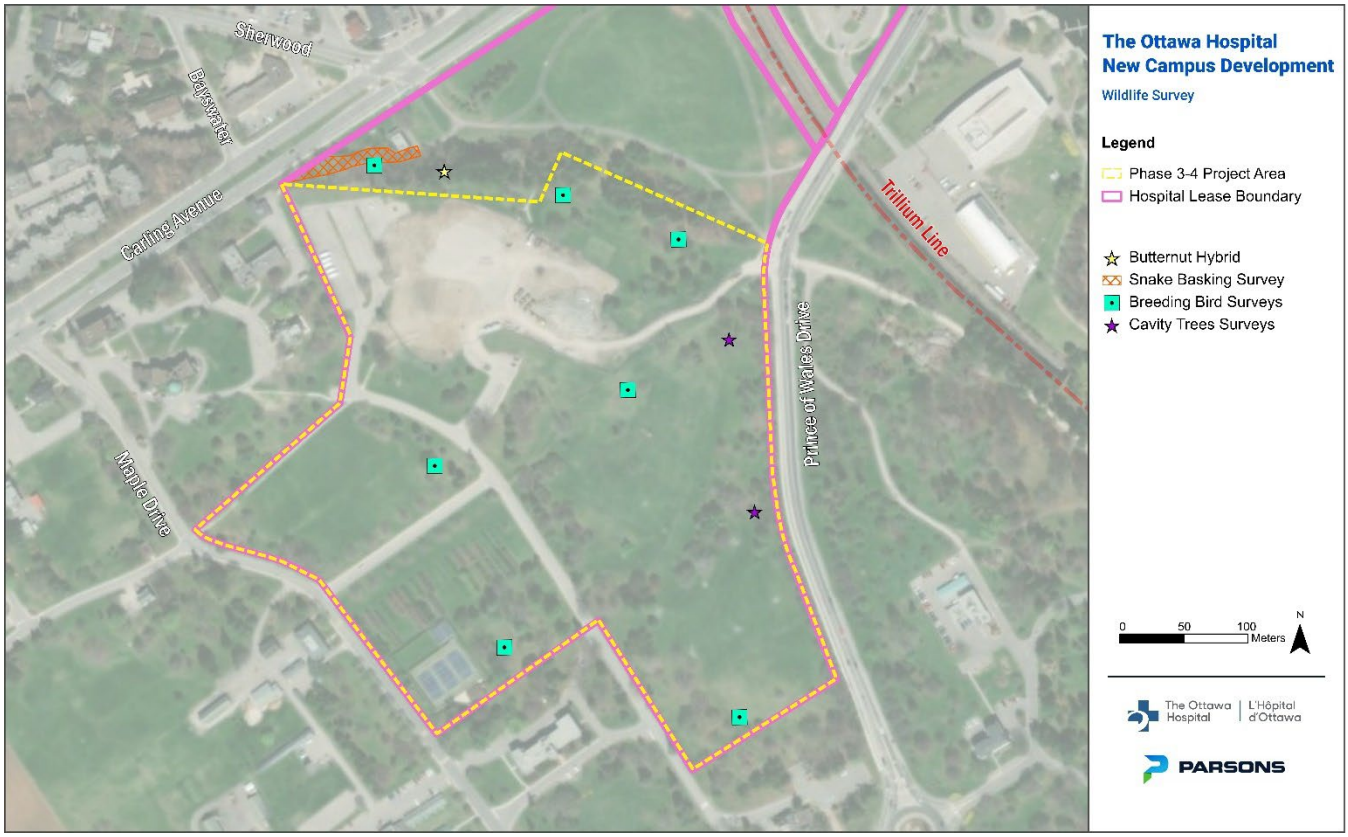
- Tree protection fencing will be installed to protect the CRZ of living retained trees from compaction
- Appropriate soil volumes will be provided for new plantings as per City of Ottawa standards (City of Ottawa, 2015)
- Soil amendments will be included in landscaping specifications and will contribute to healthy, microbially active soils
- Soil loosening/tilling will occur as required, in areas where compaction is identified as a concern to the health of future plantings
- The overall increase in tree canopy cover throughout the project area will contribute to improved rainwater infiltration and erosion prevention
- Organic matter within healthy soils contributes to carbon storage

Further detail on soil health is provided in the *Vegetation Management/Conservation Strategy and Contractor Education Program*, as well as in the Landscape Plan.

2.4.8 Wildlife

Wildlife on the NCD site was assessed through a combination of background review, targeted field studies, and incidental observations. Targeted wildlife surveys were undertaken in spring/summer 2021. Targeted surveys undertaken for the NCD site included Snake Basking Surveys, Breeding Bird Surveys, and Bat Exit Surveys. No additional wildlife surveys are required specific to the Phase 3 and 4 project. The targeted wildlife survey locations are shown on **Figure 36**.

Figure 36: Targeted Wildlife Survey Locations



2.4.8.1 Migratory Birds and Breeding Bird Surveys

All trees, shrubs, and areas of unmown herbaceous vegetation have the potential to provide bird nesting habitat. Open areas and isolated landscaping trees are most likely to provide habitat for birds adapted to human landscapes and disturbances.

The NCD site falls within Bird Conservation Region 13, for which priority bird species with specific population objectives have been established (ECCC, 2014). The bird species below were identified during targeted field surveys as well as incidental observations. Conservation priorities for these species are identified in **Table 10**.

Table 10: Conservation Priority Birds observed on New Campus Development Site

General Habitat	Species Observed	Comments	Breeding Evidence
Open Space	Baltimore Oriole	Population objective for Baltimore Oriole is "maintain"	Yes
Constructed	Chimney Swift* (foraging overhead)	Recovery objectives have been identified for Chimney Swift	No
Forest	Wood Thrush* (incidental foraging during April migration, no breeding evidence)	Population objective for Wood Thrush is "maintain"	No
Open Habitat	Killdeer	Population objective for Killdeer is "increase"	Yes
Wetland	Black-crowned Night-heron*, Green Heron* (flyovers, habitat not present)	Population objective for Black-crowned Night-heron is "assess/maintain", population objective for Green Heron is "increase"	No

*Incidental Observation, Breeding Habitat is not present within 3 and 4 Project Area

Breeding Bird Surveys were carried out in the spring of 2021, within the NCD Site. Surveys were conducted following the point-count methodology described in Ontario Breeding Bird Atlas Guide for Participants. A total of 19 species were observed during targeted surveys in 2021, and represent species common to open spaces, edge habitat, and urban woodlands. Additionally, breeding evidence for two species, Killdeer (*Charadrius vociferus*) and Cooper's Hawk (*Accipiter cooperii*) was observed outside of targeted breeding bird surveys (**Table 11**).

Table 11: Breeding Birds Observed or Heard within the New Campus Development Site

Common Name	Scientific Name
American Crow	*Corvus corax*
American Goldfinch	*Spinus tristis*
American Redstart	*Setophaga ruticilla*
American Robin	*Turdus migratorius*
Baltimore Oriole	*Icterus galbula*
Black-capped Chickadee	*Poecile atricapillus*
Blue Jay	*Cyanocitta cristata*
Chipping Sparrow	*Spizella passerina*
Cooper's Hawk	*Accipiter cooperii*
Eastern Phoebe	*Sayornis phoebe*
European Starling	*Sturnus vulgaris*
Grey Catbird	*Dumetella carolinensis*
House Finch	*Haemorhous mexicanus*
House Sparrow	*Passer domesticus*
Killdeer	*Charadrius vociferus*
Northern Cardinal	*Cardinalis cardinalis*
Red-eyed Vireo	*Vireo olivaceus*
Ring-billed Gull	*Larus delawarensis*
Song Sparrow	*Melospiza melodia*
Yellow Warbler	*Setophaga petechia*
Cedar Waxwing	*Bombycilla cedrorum*

2.4.8.2 Bat Exit Survey

Potential habitat for bats within the NCD site includes foraging habitat and roosting habitat of cavity trees, leaf/bark roosting trees, and limited potential for roosting in crevices of exposed bedrock. No suitable buildings or other hibernacula habitat are present within the NCD site. Cavity trees were recorded during detailed tree inventories and were evaluated based on size criteria and cavity height for their potential as bat roosting trees. Under provincial critical habitat definitions, a minimum density of 10 cavity trees of 25 cm DBH or greater per hectare is required for candidate critical habitat of maternity roost colonies, however federally, critical habitat definitions for SAR bats are limited to hibernacula. The wooded ridgeline has a density of 5 suitable cavity trees per hectare, therefore there is no critical habitat present on site, however trees that do not meet suitability for maternity roosts may still provide non-critical roosting habitat for male and non-breeding female bats. As a conservative approach, mitigation measures are recommended to protect all species of bats throughout the active season (April 1- September 30), and individual trees were assessed for roost suitability and use.

Within the NCD site a total of 12 cavity trees with diameter greater than 25 cm and cavities located at least 3 m above the ground, were identified. However, only two trees were identified as occasional bat rooting habitat.

Targeted surveys for bats were conducted in order to establish general observations of bat species presence and their use of features within the site, however are not sufficient to rule out the potential presence of SAR. Exit surveys were conducted on June 2, 10, 15, 28, and 29, 2021, following methods described in the Draft: Use of Buildings and Isolated Trees by Species at Risk Bats Survey Methodology (MNRF Guelph District, 2014). Potentially suitable cavities were observed on two separate evenings each from 1 hour before dusk, to one hour after dusk, using a 1000 lumen flashlight to improve visibility of the cavities, and an Echometer Pro 2 microphone paired with iPhone and Echometer version 2.8.3. Additionally, exit surveys were accompanied by walking transect recordings conducted three times over the course of survey, in order to capture an overall snapshot of the bat population and use of the site.

Cavity tree locations and bat survey results are illustrated on **Figure 37**. Bat exit survey results for the NCD site are shown in **Table 12.**

Figure 37: Bat Survey and Survey Results

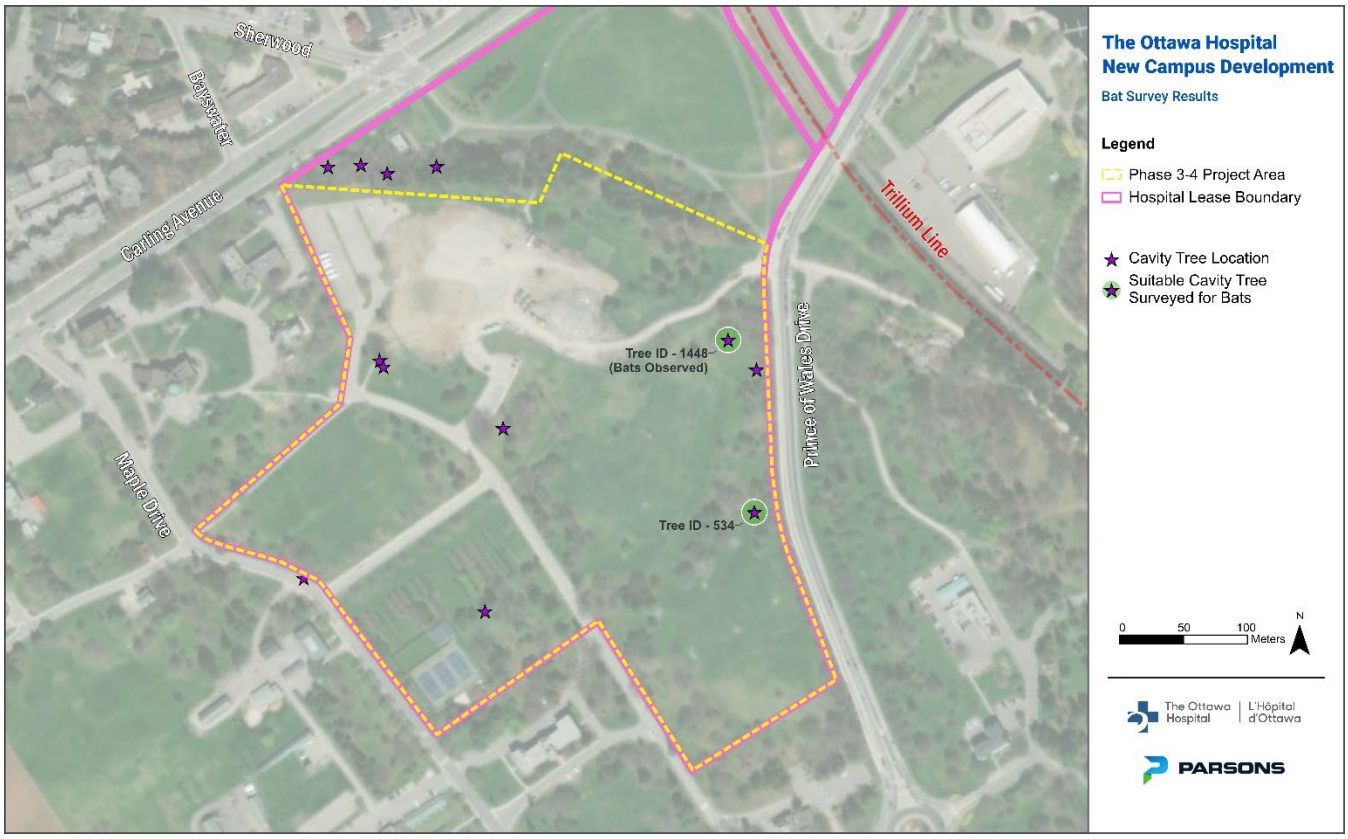


Table 12: Bat Exit Survey Results within the Phase 3 and 4 Project Area, June 2021

Tree ID #	Common Name	Scientific Name	DBH	# of Exits	Dates	Species Detected	Anticipated Action
1448	Silver Maple	*Acer saccharinum*	133	5	June 2, 2021 June 28, 2021	Big Brown Bat, Hoary Bat, Silver-haired Bat	Remove
534	Northern Catalpa	*Catalpa speciosa*	53	0	June 15, 2021 June 29, 2021	Big Brown Bat, Hoary Bat, Silver-haired Bat	Retain

A total of three (3) species of bat: Big Brown Bat (*Eptesicus fuscus*), Hoary Bat (*Lasiurus cinereus*), and Silver-haired Bat (*Lasionycteris noctivagans*) were detected on the NCD site. The majority of bat activity was observed within the open parkland between Birch Drive and Prince of Wales Drive, as well as immediately adjacent to the wooded ridgeline, including in the former Sir John Carling Building parking lot which currently remains on-site, where bats were observed foraging insects concentrated near outdoor lighting. No bats were detected during transects at the parking lot at Preston Street and Prince of Wales Drive, while a single Hoary Bat was recorded along the southeast edge of the LRT right-of-way.

The findings of the exit surveys and transects conducted in June 2021 indicate that there is potential for bat roosting within the site, however the low numbers observed suggest that roosting within the project area is likely to be limited to male bats and non-reproductive females who are more likely to roost in isolated or in small groups. The species detected include two species that typically roost in trees (Hoary Bat and Silver-haired Bat) and one species that is typically associated with buildings (Big Brown Bat). The project area provides foraging habitat for all three species, with preferred

foraging habitat being comprised of open areas including fields and parking lots that are bordered immediately by mature trees. No SAR bat species were detected during exit or transect surveys conducted, however there may still be potential for these species to occur within the project area, primarily as foraging adults as definitions for critical habitat are not met on site.

Hoary Bat and Silver-haired Bat were recorded during surveys and are known to roost in foliage, therefore there may be potential for roosting of these species in other trees not identified as suitable cavity trees. Tri-coloured Bat (*Perimyotis subflavus*) is also known to roost in foliage; while this species was not observed on the NCD site, a conservative approach is recommended as a lack of detection does not confirm absence. Mitigation measures have been recommended to address the potential for foliage-roosting bats as well as for cavity-roosting species. The site-wide increase in canopy cover as well as the planting of native species including preferred cavity and leaf roosting tree species will help to contribute to a long-term improvement of roosting habitat for bats. A snag management plan has been included in the *Vegetation Management/Conservation Strategy* to manage the long-term retention of dead trees, where compatible with human health and safety requirements of the site.

2.4.8.3 Snake Basking Survey

A Snake Basking Survey was conducted on May 3, 2021 in an area identified within the wooded ridgeline located on the northern boundary of the Phase 3 and 4 Project Area. While no snakes were observed, this area has large stone substrates with potential for crevices that lead below the frost line. Snake hibernacula are considered rare and will often have a high site-fidelity for snakes in the surrounding area, therefore are considered important habitat features. However, it was noted that this site is isolated from other naturalized habitats, and is heavily shaded with a northern aspect, therefore it does not represent ideal snake hibernation or basking habitat.

2.4.8.4 Other Wildlife and Wildlife Habitat

Overall, the Phase 3 and 4 Project Area is highly manicured and contains little natural habitat, however mature trees located within manicured open space, shrub plantings, and naturalized areas within the wooded ridgeline are likely to provide habitat for a variety of disturbance-tolerant wildlife including breeding birds and pollinators.

No wetland habitat is present within the NCD Site, nor is suitable habitat for turtle nesting (e.g. gravel shoulders, planting beds) present. The nearest surface water feature is Dow's Lake, located approximately 250 m east of Phase 3 and 4 project limits, and is separated from the by an arterial roadway and constructed pedestrian pathways, therefore there is a very low likelihood of wetland species (e.g. frogs, turtles) occurring.

An active Cooper's hawk (*Accipiter cooperii*) nest was identified during field investigations in March 2021, along the crest of the wooded ridgeline, facing the former Sir John Carling Building. The nest was occupied through the summer of 2021, however no activity was observed at the nest after fledging (July 2021) as identified in a follow up survey completed in 2022. To date, no additional active Cooper's hawk nests have been observed.

There is potential habitat for pollinators including bees and lepidoptera found in association with naturalized areas and unmaintained edges within the Phase 3 and 4 Project Area. Milkweed plants were observed along the wooded ridgeline. Additionally, nectaring and foraging habitat is provided for adults in the form of wildflowers, shrubs, and early flowering trees, with particular value in native species. Nesting habitat for native bee species may be found within bare soils, rocks, and wood/brush piles located within unmanicured patches throughout.

2.4.9 Species at Risk

The NCD site and Phase 3 and 4 Project Area is located entirely on federally owned property, therefore is subject to the *Species at Risk Act* (2002). Species protected under the *Migratory Birds Convention Act* and the *Fisheries Act* are protected on federal and provincially regulated lands. A conservative approach on federal lands may also include protections and mitigations for Species at Risk listed under the provincial Endangered Species Act (2007). Although there is no regulatory requirement to obtain ESA authorizations or permits for impacts, the federal government gives regard to provincial acts. Only naturally occurring individuals are considered to be Species at Risk, therefore cultivated Species of Conservation Concern (SoCC) trees are not protected under the SARA or the ESA, however, may meet other criteria for significance (e.g. Distinctive Tree Permit).

Species at Risk data were collected and analyzed from a wide variety of information sources including previous ecological

surveys, the Ontario Breeding Bird Atlas (OBBA), provincial databases, and government reports. Parsons conducted targeted field studies in spring and summer 2021 in order to identify potential SAR and habitat found within the NCD site, including the Phase 3 and 4 Project Area. Please note SAR lists for the NCD site were reviewed in 2022 to account for any designation changes that may have occurred since 2021. No changes in species designations were noted.

A Butternut Health and Hybridity Assessment following the Provincial Protocol (MECP, 2021) was completed for the individual tree on August 10, 2022. The results of the assessment indicate that while the tree is in good condition, the Hybridity Assessment concluded that this tree is a hybrid. Further DNA testing confirmed the results; the tree is a hybrid (cross between Butternut and Japanese Walnut (*J. ailantifolia Carr.*)) (Nature Metrics, 2022). Please note that Butternut hybrids do not receive protection under either ESA (2007) or SARA (2002).

The list of SAR identified from background sources, as well as field observations are included in **Table 13**. An analysis of the probability of occurrence based on suitable habitat within the NCD site and Phase 3 and 4 Project Area, including potential for impact is shown in **Table 14**.

Table 13: Species at Risk Identified through Background and Field Surveys

Common Name	Scientific Name	Source	S-Rank1	ESA Status2	SARA (Schedule 1) Status3
Plants					
American Ginseng	*Panax quinquefolius*	MECP 2020	S2	END	END
Butternut	*Juglans cinerea*	iNaturalist 2019, Site visit 2020, 2021	S2?	END	END
Kentucky Coffeetree	*Gymnocladus dioicus*	Site visit 2020, 2021 *all planted specimens	S2	THR	THR
Reptiles					
Blanding's Turtle	*Emydoidea blandingii*	NHIC 2008, iNaturalist 2017, ECCC 2016, ORAA 2019	S3	END	END
Eastern Musk Turtle	*Sternotherus odoratus*	ECCC 2016, ORAA 2016	S3	SC	SC
Midland Painted Turtle	*Chrysemys picta marginata*	NHIC 2018, iNaturalist 2018, ORAA 2019, NCC 2021	S4	NAR	SC
Snapping Turtle	*Chelydra serpentina*	NHIC 1988, iNaturalist 2019, ORAA 2017, NCC 2021	S4	SC	SC
Eastern Milksnake	*Lampropeltis triangulum*	ORAA 2018	S4	NAR	SC
Birds					
Bald Eagle	*Haliaeetus leucocephalus*	iNaturalist 2019	S2N, S4B	SC	NAR
Bank Swallow	*Riparia riparia*	OBBA 2008	S4B	THR	THR
Barn Swallow	*Hirundo rustica*	OBBA 2008	S4B	THR	THR
Bobolink	*Dolichonyx oryzivorus*	OBBA 2008	S4B	THR	THR
Canada Warbler	*Cardellina canadensis*	MECP 2020	S4B	SC	THR
Common Nighthawk	*Chordeiles minor*	OBBA 2008	S4B	SC	THR
Chimney Swift	*Chaetura pelagica*	Site Visit 2021, OBBA 2008	S4B,S4N	THR	THR
Eastern Meadowlark	*Sturnella magna*	OBBA 2008, iNaturalist 2017	S4B	THR	THR
Eastern Wood-pewee	*Contopus virens*	NHIC n.d., OBBA 2008	S4B	SC	SC
Evening Grosbeak	*Coccothraustes vespertinus*	EBird 2021	S4	SC	SC
Peregrine Falcon	*Falco peregrinus*	OBBA 2008	S3B	SC	SC
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	No records, suitable habitat present	S3	SC	THR (END as of January 1, 2021)
Wood Thrush	*Hylocichla mustelina*	Site Visit 2021, OBBA 2008	S4B	SC	THR
Mammals					
Little Brown Myotis	*Myotis lucifuga*	AMO 1994, MacPherson 2019	S3	END	END
Small-footed Bat	*Myotis leibii*	AMO 1994, MacPherson 2019	S2S3	NAR	END
Northern Myotis	*Myotis septentrionalis*	AMO 1994, MacPherson 2019	S3	END	END
Tri-coloured Bat	*Perimyotis subflavus*	AMO 1994, MacPherson 2019	S3?	END	END
Invertebrates					
Monarch	*Danaus plexippus*	OBA 2019, iNaturalist 2019	S2N, S4B	SC	SC
Yellow-banded Bumblebee	*Bombus terricola*	iNaturalist 2019	S3S5	SC	SC

Common Name	Scientific Name	Source	S-Rank1	ESA Status2	SARA (Schedule 1) Status3
Fish					
American Eel	*Anguilla rostrata*	LIO 2017	S1?	END	NAR
Redhorse species	*Moxostoma sp.*	LIO 2017	SNA	n/a	n/a

Status Source:
1S-Rank (NHIC 2021)
S1: Critically Imperiled – Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.
S2: Imperiled – Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.
S3: Vulnerable – Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4: Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors.
S5: Secure – Common, widespread, and abundant in the nation or state/province.
SNA: Not Applicable – A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#S#: Range Rank – A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4).
SR or ? - Recorded within a nation or subnation, but local status not available or not yet determined. When combined with a global rank of G1 to G3, local status is 'Indeterminate,' but the entity is nevertheless presumed vulnerable, if still extant.
N – rank for non-breeding populations in the province.
B – rank for breeding populations in the province.
2ESA (Endangered Species Act) Status (MECP 2021)
3SARA (Species at Risk Act) Status (federal status - listed) (ECCC 2021)
Extinct - A species that no longer exists anywhere.
Extirpated (EXT) - Lives somewhere in the world, and at one time lived in the wild in Ontario, but no longer lives in the wild in Ontario.
Endangered (END) - Lives in the wild in Ontario but is facing imminent extinction or extirpation.
Threatened (THR) - Lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it.
Special Concern (SC) - Lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats.
Not at Risk (NAR) - A species that has been evaluated and found to be not at risk.
Data Deficient (DD) - A species for which there is insufficient information for a provincial status recommendation.

The above noted observations are shown on **Figure 38** below.

Figure 38: Species Observations and Survey Results

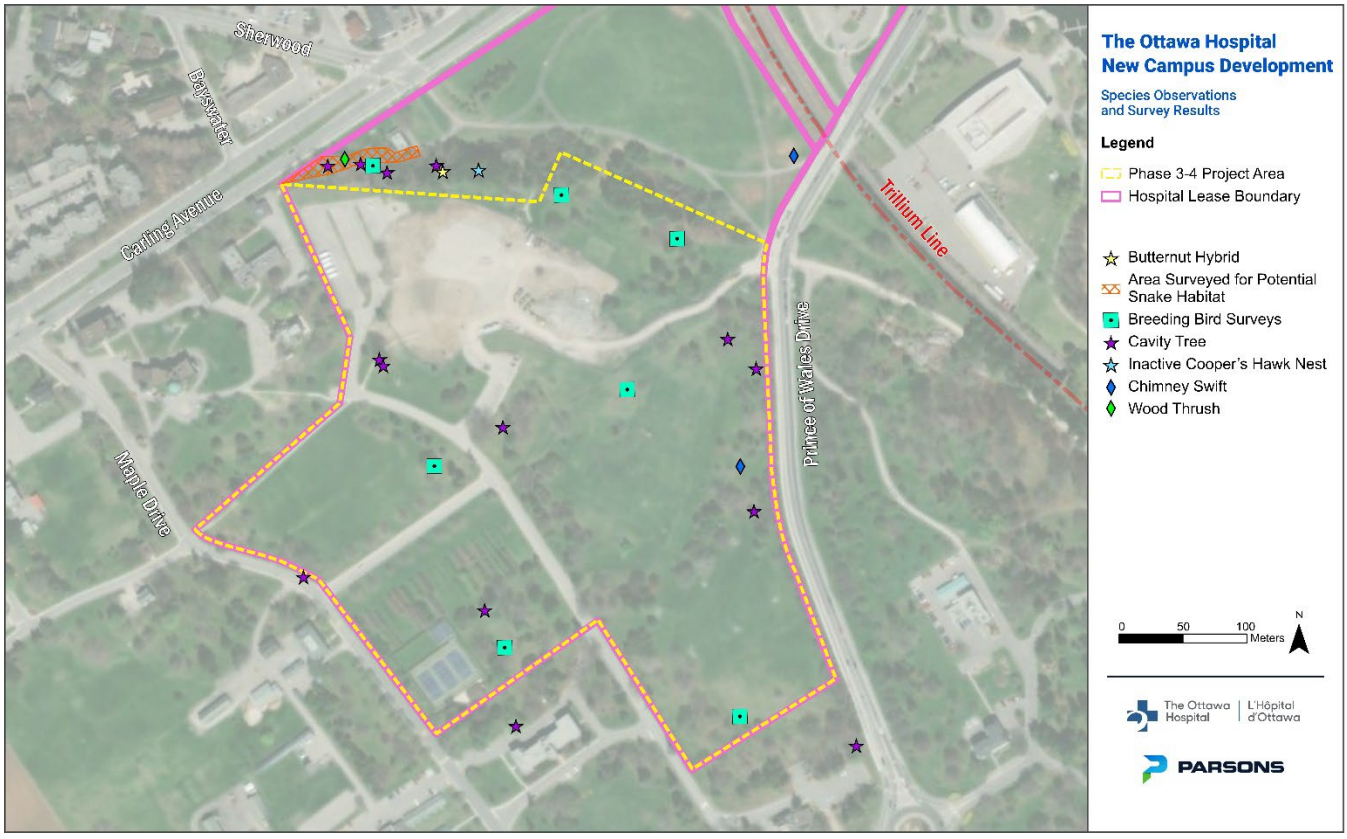


Table 14: Species at Risk Assessment

Common Name	ESA Status[1]	SARA Status[2]	Provincial S-Rank[3]	Record Source	Habitat Requirements[4]	Reasonable Likelihood of Presence in Project Area[5]	Critical Habitat Present	Potential Habitat within Project Area	Reasonable Likelihood of Interaction with Project	Rationale for Potential Impacts
American Ginseng *Panax quinquefolius*	END	END	S2	MECP 2020	Grows in rich, moist, undisturbed deciduous forest communities, typically dominated by Sugar Maple. Prefers warm microclimates and is usually found towards the base of south-facing slopes (MECP, 2021).	None	No	No suitable woodland habitat is present within the project area as the wooded communities present are highly disturbed with understory dominated by invasive species. No American Ginseng was observed during field investigations.	None	There is no potential for impacts to American Ginseng as no suitable habitat or individual plants occur within the project area.
Butternut *Juglans cinerea*	END	END	S2?	iNaturalist 2019, Site visit 2020, 2021	Grows alone or in groupings in deciduous forests and open woodlands. Prefers moist, well-drained soil and is often found along streams/watercourses (MECP, 2021).	None	No	One hybrid Butternut tree was observed within the project area during the site visit. This trees is planned to be retained.	None	One Butternut hybrid was observed within the project area. This tree is planned for retention.
Kentucky Coffeetree *Gymnocladus dioicus*	THR	THR	S2	Site visit 2020, 2021 *all planted specimens	Found in a variety of habitats, however, is typically associated with moist, rich soils, and along floodplains, though it may also tolerate shallow rocky and sandy soils. It's native range within Ontario is limited to far southwest Ontario near Lake Eerie, where 20 locations were documented in 2000 (MECP, 2021).	None	No	Kentucky Coffeetree occurs as an ornamental planted specimen throughout the NCD site. As planted specimens, these trees are not protected under the SARA or the ESA.	None	While the Kentucky Coffee Tree is designated as a Threatened species under the Species at Risk Act (SARA), as assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), only populations within suitable habitat in the species natural range (extreme Southwestern Ontario) are assessed and considered for designation under SARA. Plantings such as street trees or those planted in anthropogenic landscapes are excluded from COSEWIC's assessment. Please note that correspondence with the Central Experimental Farm has indicated that the trees at the Hospital Site are planted.
Blanding's Turtle *Emydoidea blandingii*	THR	END	S3	NHIC 2008, iNaturalist 2017, ECCC 2016, ORAA 2019	Shallow water marshes, bogs, ponds or swamps, or coves in larger lakes with soft, muddy bottoms and aquatic vegetation; basks on logs, stumps, or banks; surrounding natural habitat is important in summer as they frequently move from aquatic habitat to terrestrial habitats; hibernates in bogs; not readily observed (MECP, 2021).	None	No	No wetland features are located within or in proximity to the project area, and no suitable nesting areas (including gravel shoulders or planting beds) are present. The nearest surface water feature, Dow's Lake, is located over 250 m from the project limits, and is separated by high volume roadways, pedestrian pathways/boardwalk, and highly manicured landscaping.	None	There is negligible potential for impacts to Blanding's Turtle as it is unlikely to occur within the project area. Potential for turtles to interact with the project will be further mitigated through the application of standard erosion and sediment control measures and appropriate wildlife exclusion measures.
Eastern Musk Turtle *Sternotherus odoratus*	SC	SC	S3	ECCC 2016, ORAA 2016	Found in slow moving waters of ponds, lakes, marshes and rivers, preferring areas with emergent vegetation. They burrow into muddy bottoms to hibernate overwinter (MECP, 2021).	None	No	No wetland features are located within or in proximity to the project area, and no suitable nesting areas (including gravel shoulders or planting beds) are present. The nearest surface water feature, Dow's Lake, is located over 250 m from the project limits, and is separated by high volume roadways, pedestrian pathways/boardwalk, and highly manicured landscaping.	None	There is negligible potential for impacts to Eastern Musk Turtle as it is unlikely to occur within the project area. Potential for turtles to interact with the project will be further mitigated through the application of standard erosion and sediment control measures and appropriate wildlife exclusion measures.
Midland Painted Turtle *Chrysemys picta marginata*	NAR	SC	S4	NHIC 2018, iNaturalist 2018, ORAA 2019, NCC 2021	Found in wetlands and waterbodies with abundant basking spots, and in areas where organic substrates and submergent aquatic vegetation is present. Nesting occurs in sandy or gravel-based substrates in sunny, exposed areas. This species is moderately tolerant to human disturbance and may be found within, or in close proximity to urban areas (ECCC, 2021).	None	No	No wetland features are located within or in proximity to the project area, and no suitable nesting areas (including gravel shoulders or planting beds) are present. The nearest surface water feature, Dow's Lake, is located over 250 m from the project limits, and is separated by high volume roadways, pedestrian pathways/boardwalk, and highly manicured landscaping.	None	There is negligible potential for impacts to Midland Painted Turtle as it is unlikely to occur within the project area. Potential for turtles to interact with the project will be further mitigated through the application of standard erosion and sediment control measures and appropriate wildlife exclusion measures.

Common Name	ESA Status[1]	SARA Status[2]	Provincial S-Rank[3]	Record Source	Habitat Requirements[4]	Reasonable Likelihood of Presence in Project Area[5]	Critical Habitat Present	Potential Habitat within Project Area	Reasonable Likelihood of Interaction with Project	Rationale for Potential Impacts
Snapping Turtle *Chelydra serpentina*	SC	SC	S3	NHIC 1988, iNaturalist 2019, ORAA 2017, NCC 2021	Permanent, semi-permanent fresh water; marshes, swamps or bogs; rivers and streams with soft, muddy banks or bottoms; often uses soft soil or clean dry sand on south-facing slopes for nest sites; may nest at some distance from water; often hibernate together in groups in mud under water. They prefer shallow waters with dense vegetation, so they can hide under the soft mud and leaf litter, with only their noses exposed to the surface to breathe. They nest from early to mid-summer in gravelly or sandy areas near aquatic habitat (MECP, 2021).	None	No	No wetland features are located within or in proximity to the project area, and no suitable nesting areas (including gravel shoulders or planting beds) are present. The nearest surface water feature, Dow's Lake, is located over 250 m from the project limits, and is separated by high volume roadways, pedestrian pathways/boardwalk, and highly manicured landscaping.	None	There is negligible potential for impacts to Snapping Turtle as it is unlikely to occur within the project area. Snapping turtles were recently observed at Commissioner's Park, nesting in a planting bed, therefore there may be limited potential for this species to traverse the noted landscape barriers in an attempt to nest within excavated soils. Potential for turtles to interact with the project will be further mitigated through the application of standard erosion and sediment control measures and appropriate wildlife exclusion measures.
Eastern Milksnake *Lampropeltis triangulum*	NS	SC	S4	ORAA 2018	Generally found in open habitats including rock outcrops, and meadows, and are commonly found in agricultural areas in association with barns and sheds. May also be associated with woodlands bordering these habitats (ECCC, 2021). Rock piles and areas of exposed bedrock or old foundations may provide appropriate microhabitats for hibernacula.	Low	No	No preferred habitat is located within the project area, however occasional habitat may be present in the form of woodland edges as the NCD site is bordered by agricultural land uses. Rock piles and crevices were observed in the larger NCD site however are not expected to provide hibernacula habitat as no snakes were observed during targeted field investigations.	None	There is negligible potential for impacts to Eastern Milksnake as it is unlikely to occur within the project area.
Bald Eagle *Haliaeetus leucocephalus*	SC	NAR	S2N/S4B	iNaturalist 2019	Inhabits a variety of habitats and forest types, usually near a major waterbody, which provides hunting habitat. Generally, nest in large trees in forested areas (MECP, 2021).	Low	No	Dow's Lake and the Rideau Canal may provide limited foraging opportunities and large trees are present; however, the highly urbanized setting of the project area is unlikely to provide suitable nesting habitat as forested areas are limited in size. No signs of Bald Eagle nests were observed during field studies.	Low	There is very limited potential for use of large trees within the project area for perching or nesting. Impact to Bald Eagle is unlikely.
Bank Swallow *Riparia riparia*	THR	THR	S4B	OBBA 2008	Nests in burrows constructed in sandy or silty vertical faces, often along the banks of lakes and rivers, or in quarries and pits. Bank Swallows are colonial breeders, found in groups ranging from a few pairs to thousands (MECP, 2021).	Low	No	No preferred habitat is present within the project area and no known colonies are located within proximity. The OBBA record indicates presence within a 10 km radius. Likely to only occur incidentally as foraging adults/flyover of the project area.	Low	While potential for nesting habitat within the project area is unlikely under existing site conditions, there may be potential for suitable nesting habitat to be created temporarily in association with construction works (e.g. soil mounds/stockpiles).
Barn Swallow *Hirundo rustica*	THR	THR	S4B	OBBA 2008	Prefers farmlands or rural areas; cliffs, caves, rock niches; buildings or other man-made structures including bridges and culverts for nesting; typically feeds in open country near body of water (MECP, 2021).	Low	No	There is limited potential for Barn Swallow to occur as foraging adults or incidental flyovers within the project area as agricultural land uses and suitable structures for nesting are present on neighboring properties, and the project area lies between these agricultural areas and Dow's Lake. These features are, however, absent from the project area, and the quality of foraging habitat is limited due to the heavily manicured open spaces present.	Low	No impacts to buildings, culverts, or bridges are expected under the project scope, therefore impacts to Barn Swallow are unlikely.
Bobolink *Dolichonyx oryzivorus*	THR	THR	S4B	OBBA 2008	Generally, prefers open grasslands and hay fields, typically >50 ha. In migration and in winter uses freshwater marshes and grasslands (MECP, 2021).	None	No	No suitable habitat of open grassland, meadows or agricultural areas are present within the project area.	None	This species is unlikely to occur within the project area, therefore impacts to Bobolink are unlikely.

Common Name	ESA Status[1]	SARA Status[2]	Provincial S-Rank[3]	Record Source	Habitat Requirements[4]	Reasonable Likelihood of Presence in Project Area[5]	Critical Habitat Present	Potential Habitat within Project Area	Reasonable Likelihood of Interaction with Project	Rationale for Potential Impacts
Canada Warbler *Cardellina canadensis*	SC	THR	S4B	MECP 2020	Prefers wet/riparian forests with a dense shrub and understory layer and either deciduous, coniferous or mixed canopy. Generally nests on or near the ground on hummocks, mossy logs, or roots (MECP, 2021).	Low	No	Marginally suitable habitat is present within the project area in the form of forested communities featuring dense shrub layers, located along the wooded ridgeline. However, this area lacks association with riparian areas or wet forest as is typically preferred by Canada Warbler. No evidence of Canada Warbler was observed during the course of targeted Breeding Bird Surveys.	Low	While marginally suitable nesting habitat may be present, there is a low likelihood of impacts to Canada Warbler. Overall loss of potential nesting habitat is limited by the retention of forested habitat.
Common Nighthawk *Chordeiles minor*	SC	THR	S4B	OBBA 2008	Prefer open, vegetation-free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and riverbanks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat gravel roof-tops) (MECP 2021).	Moderate	No	Likely to only occur incidentally as foraging adults/flyover of the project area. Could potentially find nesting habitat in open areas.	Moderate	While potential for nesting habitat within the project area is unlikely under existing site conditions, there may be potential for suitable nesting habitat to be created temporarily in association with construction works (e.g. barren soils).
Chimney Swift *Chaetura pelagica*	THR	THR	S4B, S4N	Site Visit 2021, OBBA 2008	Historically found in deciduous and coniferous, usually wet forest types, all with a well-developed, dense shrub layer; now most are found in urban areas where they nest in large uncapped chimneys (MECP 2021). Often associated with historic buildings and/or neighbourhoods.	Moderate	No	Observed incidentally foraging within the NCD site. No suitable nesting habitat is located within the project area.	None	No impacts to buildings are expected under the project scope, therefore impacts to Chimney Swift are unlikely.
Eastern Meadowlark *Stumella magna*	THR	THR	S4B	OBBA 2008, iNaturalist 2017	Generally, prefers grassy pastures, meadows and hay fields. Nests are always on the ground and usually hidden in or under grass clumps (MECP 2021).	None	No	No suitable habitat of open grassland, meadows or agricultural areas are present within the project area.	None	This species is unlikely to occur within the project area, therefore impacts to Eastern Meadowlark are unlikely.
Eastern Wood-Pewee *Contopus virens*	SC	SC	S4B	NHIC n.d., OBBA 2008	Associated with deciduous and mixed forests. Within mature and intermediate age stands it prefers areas with little understory vegetation as well as forest clearings and edges (MECP 2021).	Low	No	Limited potential to occur as forested areas within the project area are limited in size and age, and feature dense understory vegetation. There may be potential for this species to occur incidentally as a migratory stopover.	Low	Preferred habitat features are absent from the project area and any occurrence of Eastern Wood-Pewee is likely to be limited to incidental stopovers, therefore impacts to Eastern Wood-Pewee are unlikely.
Evening Grosbeak *Coccothraustes vespertinus*	SC	SC	S4	EBird 2021	Breeds in open, mature mixed-wood forests in Northern Ontario, extending as far south as Georgian Bay, typically those dominated by White Spruce and Trembling Aspen. Spruce bud worm is a primary prey during breeding season, with seeds making up the bulk of the Evening Grosbeak's diet outside of breeding season. Commonly visits bird feeders in the winter (MECP 2021).	Low	No	Evening Grosbeak may occur as winter migrants in treed areas and along the edges of maintained green lands. The project area is located outside of the breeding range for this species.	None	This species is unlikely to occur within the project area, therefore impacts to Evening Grosbeak are unlikely.
Peregrine Falcon *Falco peregrinus*	SC	NS	S3B	OBBA 2008	Nests on tall, steep ledges, usually near large bodies of water. Peregrine Falcons have adapted to urban life and often use tall buildings for nesting (MECP 2021).	Low	No	Suitable nesting habitat of steep ledges and tall buildings are absent from the project area.	None	No impacts to buildings are expected under the project scope, therefore impacts to Peregrine Falcon are unlikely.
Red-Headed Woodpecker *Melanerpes erythrocephalus*	SC	THR (END as of January 1, 2022)	S3	No records, suitable habitat present	Found in open woodlands and woodland edges, including manicured green lands such as parks and golf courses. Red-headed Woodpeckers nest and perch in dead and cavity trees, and feed on insects as well as nuts including acorns and beechnuts (MECP 2021). In Ontario, known population occurrence is focused south of Brockville, however some records have been reported in the Ottawa area.	Low	No	Suitable nesting habitat of dead trees and cavity trees within open parkland are present on the site, however no records of this species were found for the project area or surrounding lands.	None	There is a low likelihood of impacts to Red-headed Woodpecker with the application of recommended mitigation measures. Overall loss of potential nesting habitat is limited by the retention of forested habitat outside the project area, and by the consideration of snag management in naturalized areas.

Common Name	ESA Status[1]	SARA Status[2]	Provincial S-Rank[3]	Record Source	Habitat Requirements[4]	Reasonable Likelihood of Presence in Project Area[5]	Critical Habitat Present	Potential Habitat within Project Area	Reasonable Likelihood of Interaction with Project	Rationale for Potential Impacts
Wood Thrush *Hylocichla mustelina*	SC	THR	S4B	Site Visit 2021, OBBA 2008	Carolinian and Great Lakes-St. Lawrence forest zones; nests mainly in second-growth and mature moist deciduous and mixed forests, with saplings and well-developed understory layers. Prefers large forest mosaics but may also nest in small forest fragments. Often found in association with ponds and swamps (MECP 2021).	Moderate	No	There is limited potential habitat for Wood Thrush in the form of forest communities within the wooded ridgeline;these communities are upland and highly disturbed fragments. One Wood Thrush was observed foraging incidentally within the NCD site during field investigations in April 2021, however no breeding evidence was observed during subsequent Breeding Bird Surveys, therefore the habitat within the project area is likely to serve only as occasional habitat for adults during migration.	Low	Preferred habitat features are absent from the project area and any occurrence of wood thrush is likely to be limited to incidental stopovers, therefore impacts to this species are unlikely.
Little Brown Bat *Myotis lucifugus*	END	END	S3	AMO 1994, MacPherson 2019	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in forests with trees [25-44 cm diameter at breast height (DBH)] (MECP 2021).	Moderate	No	Occasional roost habitat is present in the form of cavity trees/trees with peeling bark, however this species was not detected during exit surveys conducted by Parsons.	Low	Limited potential for interaction. Little brown bat roosts are typically associated with buildings which are absent from the project area. As a conservative approach, mitigation measures have been recommended to protect all species of bat during the active season.
Eastern Small-footed Bat *Myotis leibii*	END	NS	S2S3	AMO 1994, MacPherson 2019	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark (MECP 2021).	Moderate	No	Occasional roost habitat is present in the form of cavity trees/trees with peeling bark, as well as within crevices associated with exposed bedrock.. However, this species is uncommon throughout its range and was not detected during exit surveys conducted by Parsons.	Low	Limited potential for interaction. Eastern small-footed bat is typically associated with rock features which are absent within the project area.. As a conservative approach, mitigation measures have been recommended to protect all species of bat during the active season.
Northern Long-eared Bat *Myotis septentrionalis*	END	END	S3	AMO 1994, MacPherson 2019	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: Often associated with cavities of large diameter trees (25-44 cm DBH) in forested communities. Occasionally found in structures (attics, barns etc.) (MECP 2021).	Moderate	No	Preferred habitat of large, forested areas is absent from the project area. While potential roost habitat may be present in the form of an isolated cavity tree and trees with peeling bark, this species was not detected during exit surveys conducted by Parsons.	Low	Limited potential for interaction as Northern long-eared bats are typically associated with large areas of woodland which is not present within the project area. As a conservative approach, mitigation measures have been recommended to protect all species of bat during the active season.
Tri-coloured Bat *Perimyotis subflavus*	END	END	S3	AMO 1994, MacPherson 2019	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: Manmade structures or tree cavities. Foraging over still water, rivers, or in forest gaps (MECP 2020).	Moderate	No	Preferred habitat of large, forested areas is absent from the project area, and minimum size criteria for preferred breeding habitat is not met. While potential roost habitat may be present in the form of an isolated cavity tree, trees with peeling bark, or in clusters of leaves, this species was not detected during exit or transect surveys conducted by Parsons.	Low	Limited potential for interaction. Tri-coloured bats are typically associated with large areas of woodland which is not present within the project area. As a conservative approach, mitigation measures have been recommended to protect all species of bat during the active season.
Monarch *Danaus plexippus*	SC	SC	S2N, S4B	OBA 2019, iNaturalist 2019	Can be found in diverse habitats where nectaring flowers are present, however forb and mixed meadows provide important breeding and foraging habitat. Eggs are laid on Milkweed plants and caterpillars exclusively feed on them. During late summer, Monarchs from Ontario migrate to Central Mexico to overwinter (MECP, 2021).	Moderate	No	Can be assumed to occur in the area during migration and could also breed in the area as host plant, Common Milkweed (*Asclepias vulgaris*), is present along the edges of both manicured and naturalized plantings.	Low	Limited potential for impacts as the majority of vegetation removal is likely to occur outside of the Monarch butterfly's active breeding season.
Yellow-banded Bumblebee *Bombus terricola*	SC	SC	S3S5	iNaturalist 2019	May be found in woodlands where it nests and overwinters in abandoned rodent burrows or decomposing logs. It can also be found in various open habitats including agricultural fields, urban areas, and native meadows (MECP, 2021). A number of observations have been recorded in the Ottawa Area, including within urban parks (iNaturalist 2021).	Moderate	No	Woodland habitat featuring rodent burrows and decomposing logs is present within the wooded ridgeline, and recent iNaturalist observations indicate the presence of this species within the nearby Fletcher Wildlife Garden.	Moderate	Removal and excavation of a small portion of woodland habitat may have potential to impact nests and/or overwintering habitat for Yellow-banded Bumblebee if present. Segments of the woodlot are being retained within the larger NCD site, therefore there will be limited overall loss of this habitat type.

Common Name	ESA Status[1]	SARA Status[2]	Provincial S-Rank[3]	Record Source	Habitat Requirements[4]	Reasonable Likelihood of Presence in Project Area[5]	Critical Habitat Present	Potential Habitat within Project Area	Reasonable Likelihood of Interaction with Project	Rationale for Potential Impacts
American Eel *Anguilla rostrata*	END	NS	S1?	LIO 2017	Catadromous species migrates from freshwater lakes and tributaries to the Atlantic Ocean and Sargasso Sea to spawn. In Ontario the species prefers cool waters in lakes with gravel, sand and silt bottoms. Primarily nocturnal, hiding in soft substrate or submerged vegetation during the day (MECP 2020).	None	No	There is no aquatic habitat within the project area.	None	There is negligible potential for impacts to American Eel.
Redhorse species *Moxostoma* sp.	N/A	N/A	N/A	LIO 2017	The genus Moxostoma includes two SAR species: Black Redhorse (*Moxostoma duquesnei*), River Redhorse (*Moxostoma carinatum*). These species are typically associated with large rivers including the Ottawa River. Records of Moxostoma are present for Dow's Lake, however, are not identified to species, therefore this record is generally considered to be a potential SAR.	None	No	There is no aquatic habitat within the project area.	None	There is negligible potential for impacts to Redhorse species.

* SARA – Federal Species at Risk Act; ESA – Ontario Endangered Species at Risk Act; COSEWIC - Committee on the Status of Endangered Wildlife in Canada; SC - Special Concern; THR - Threatened; END - Endangered; NAR - Not at risk; S1, S2, S3, S4 - Standard Subnational Conservation Status Ranks (B/N to indicate breeding/non-breeding range where appropriate)

SECTION C: CONSULTATION AND ENGAGEMENT

Consultation and Engagement is an important component of the Federal Impact Assessment process as well as the planning of the NCD site. Significant consultation has been undertaken with many interested parties, including the public, indigenous peoples and experts from other jurisdictions. **Table 15** below provides a summary of the consultation undertaken. A Consultation Summary has been prepared to document the comments received and the project team's responses.

Table 15: Consultation and Engagement

Is there public concern accompanying this project?		
Yes	No	To be determined following formal public consultation for the Phase 3 and 4 Project
Was the public consulted beyond the Registry comment period?		
Yes	No	Consultation is underway specifically related to the Phase 3 and 4 Project Area.
Were Indigenous Peoples engaged and consulted?		
Yes	No	An Indigenous Peoples Advisory Circle has been assembled and will advise The Ottawa Hospital (TOH) about its new campus development and work to ensure that cultural awareness, inclusion, and safety are integrated in the planning and design of the new hospital and throughout TOH's operations. A wide variety of organizations representing or serving the health needs of Indigenous peoples have been invited to the Circle including: • Algonquins of Pikwakanagan • Mohawk Council of Akwesasne • Kitigan Zibi First Nation • Metis Nation of Ontario • Wabano • Akausivik Inuit Family Health Team • Ottawa Aboriginal Coalition • Tungasuvvingat Inuit • Inuit Tapiriit Kanatami • Odawa Native Friendship Centre • Pauktuutit Inuit Women of Canada • Metis National Council • Ottawa Region Metis Council Minwaashin Lodge • Ottawa Health Services Network • Healthcare Excellence Canada • Ontario Health • Government of Nunavut
Does the project have the potential to have any adverse impacts on the rights of the Indigenous peoples of Canada recognized and affirmed by section 35 of the Constitution Act, 1982?		
Yes	**No**	• No adverse impacts to s.35 treaty rights.
Were other experts/jurisdictions consulted?		
Yes	No	Throughout design and development of the site the following experts were consulted. • Public Services and Procurement Canada (Landowner) • National Capital Commission • Agriculture and Agri-Food Canada • Parks Canada • City of Ottawa • Rideau Valley Conservation Authority • Ministry of the Environment, Conservation and Parks
How have you addressed the concerns that were raised? To be completed following consultation related to the Phase 3 and 4 project		

SECTION D: IDENTIFY ENVIRONMENTAL EFFECTS

The following section identifies the potential environmental interactions by category for the project, based on the known and predicted effects (**Table 16 – Table 20**). Where an interaction has been identified, an assessment of the environmental effect, as well as proposed mitigation has been described (**Table 21**).

Table 16: Biophysical Effects

Does the project have the potential to:	NO	Yes, and can be managed through Effective and Established Mitigation Measures	Yes, but must be managed through other Mitigation Measures
Alter, disturb, or destroy vulnerable natural features?	✓		
Release a polluting substance into the land, water, or air?		✓	
Alter landscape features (e.g. resource extraction, deforestation, clearing of vegetation)?			✓
Affect birds, aquatic animals , and wildlife (flora and fauna), including species at risk and its critical habitat?		✓	
Result in alteration of water level, quality, flow or management regime in a water body, or result in other important changes to surface or groundwater resources (including well-water)?		✓	
Cause sensory disturbances, such as noise and/or vibrations?		✓	
Result in GHG emissions or impacts on carbon sinks above the threshold suggested by the application of the SACC to s. 82 and s. 83 tool?	✓		
Cause any other change to the environment on federal lands or incidental to a federal decision? If so, define:	✓		

Table 17: Socio-economic Effects (Indigenous Rights)

Does the project have the potential to result in changes to the environment that may affect Indigenous peoples, specifically?	NO	Yes, and can be managed through Effective and Established Mitigation	Yes, but must be managed through Other Mitigation Measures
Social, economic, and health conditions, including community health specific indigenous people (e.g. impact to an Indigenous fishery resulting from a change in fish population)	✓		
Physical and cultural heritage, use of lands and resources for traditional purposes, or anything of historical, archaeological, paleontological, or architectural significance	✓		
Indigenous culture	✓		
Indigenous knowledge	✓		

Table 18: Socio-economic Effects (Health)

Does the project have the potential to result in changes to the environment that may affect the following health factors:	NO	Yes, and can be managed through Effective and Established Mitigation	Yes, but must be managed through Other Mitigation Measures
Air quality		✓	
Noise exposure and effects of vibration		✓	
Current and future availability of country foods (traditional foods)	✓		
Current and future availability of water for drinking, recreational and cultural uses	✓		
Any other changes that could affect health conditions.	✓		

Table 19: Socio-Economic Effects (Social)

Does the project have the potential to result in changes to the environment that may affect the following social factors?	NO	Yes, and can be managed through Effective and Established Mitigation	Yes, but must be managed through Other Mitigation
Services and infrastructure	✓		
Land and resource use and recreation		✓	
Navigation	✓		
Community well-being	✓		
Structure, site, things of historical, archaeological, paleontological or architectural significance	✓		

Table 20: Socio-Economic Effects (Economic)

Does the project have the potential to result in changes to the environment that may affect the following economic factors:	NO	Yes, and can be managed through Effective and Established Mitigation	Yes, but must be managed through Other Mitigation
Forestry and logging operations	✓		
Commercial recreational and sport fishing, hunting, trapping	✓		
Commercial outfitters	✓		
Commercial recreation and tourism	✓		
Agriculture, including predicted effects to livestock health and productivity	✓		

SECTION E: ESTABLISHED AND EFFECTIVE MITIGATION MEASURES

The assessment of potential effects and recommended mitigation measures is provided in **Table 21** below.

Table 21: Potential Impacts and Mitigation

*B.P: Biophysical Effect, S.E: Socio-economic Effects (Indigenous rights (I.R.), and/or health (H), social (S) economic (E))

*Activity: Design (D), Site preparation / Construction (C), Operation (O)

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
Release a polluting substance into the land, water, or air						
a) Decarbonization strategies include transportation modal shifts towards transit, walking and cycling over private automobiles, bicycle parking spaces at main entrances, use of lower carbon intensity concrete and a target canopy cover to overtime increase carbon sinks on and adjacent to the NCD.	C,O	X		• Implement Transportation Demand Management Strategy. • Include low-carbon alternatives in construction specifications. • Development a Landscape Maintenance Plan. • Implement Landscape Plan and Long-Term Tree Canopy Adaptive Management Plan.	• Positive contribution to limiting greenhouse gas emissions.	• As noted in Transportation Monitoring Plan. • As noted in plans and specifications. • As per Landscape Maintenance Plan, and Long-Term Tree Canopy Adaptive Management Plan.
b) Disturbed or stockpiled materials may be eroded during rainfall events.	C	X		• Implement Erosion and Sediment Control Plan. • Store stockpiled material away from steep slopes. • If material is stored for prolonged periods, it should be tarped, or otherwise stabilized, to prevent erosion. • All surplus stockpiled material should be removed following construction. • See below mitigation c, *Release a polluting substance into the land, water, or air*.	• No anticipated negative residual effects following the implementation of mitigation.	• Monitoring of ESC measures.
c) Sediment caused by construction activities could enter onsite storm sewers and be delivered to the Canal via the existing outfall.	C	X		• See mitigation a, *Release a polluting substance into the land, water, or air*. • Implement monitoring plan at the outfall per CCME guidelines.	• No anticipated negative residual effects following the implementation of mitigation.	• Monitoring of ESC measures. • Monitoring of water quality at the Dow's Lake outfall (Rideau Canal) per CCME guidelines.
d) Vegetation removal and construction activities may increase the risk of erosion.	C	X		• Implement Erosion and Sediment Control Plan. • All exposed soil following the completion of the construction works shall be stabilized as soon as possible. • Silt fencing shall encompass stockpiled materials. • Prior to removal of Erosion and Sediment Control measures, all silt and sediment captured shall be removed.	• No anticipated negative residual effects following the implementation of mitigation.	• Monitoring of ESC measures to be carried out by a Certified Inspector of Sediment and Erosion Control (CISEC).

	Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
e)	There is the potential for spills/leaks during construction and may result in the degradation of surface water / groundwater quality.	C	X		• Implement Environmental Protection Plan. The proponent shall provide PSPC and the NCC with a copy of the Environmental Protection Plan (at least 10 business days) prior to construction commencement. • Implement Spill Response and Action Plan. The contractor will be responsible for keeping a Spill Kit on site during the entire duration of the works. The proponent shall provide PSPC and the NCC with a copy of the Spill Response and Action Plan (at least 10 business days) prior to construction commencement. • All machinery shall be in good working condition free of fluid leaks. Daily inspections shall be conducted to ensure this. • Activities including refueling, oil changes, and machinery lubrications are not permitted within 30m of any surface water feature (e.g. Dow's Lake). A designated refueling area shall be implemented for the site. • In the event of an accidental spill, the contractor will be responsible for containing, cleaning out and disposing the contaminants caused by the spill in accordance with existing regulations. Contractor will also report any spill on NCC property to the NCC Emergency line at 613-239-5353 and send a copy of the spill and clean up reports to Eric Soulard, Chief, NCC Environmental Projects Services, (613-239-5678 ext. 5418 /eric.soulard@ncc-ccn.ca) as well as PSPC representative Darragh Kilroy, Environmental Specialist (613-736-3222 / Darragh.kilroy@tpsgc-pwgsc.gc.ca).	• No anticipated negative residual effects following the implementation of mitigation.	• None required.
f)	Elevated concentrations of PAH's, Metals, Mercury and BTEX were found in soils collected during the Phase 2 ESA.	C	X		• Excavated soil exceeding applicable provincial regulation excavated from the site, should be disposed of off-site at an MECP approved facility. • If any evidence (visual or olfactory) of contamination is detected on federal property during excavation, all work must be halted and Eric Soulard, Chief, NCC Environmental Project Services (613.239.5678 ext. 5418 / eric.soulard@ncc-ccn.ca) and as well as PSPC representative Darragh Kilroy, Environmental Specialist (613-736-3222 / Darragh.kilroy@tpsgc-pwgsc.gc.ca) should be immediately notified. • Implement Soil Management Plan. The proponent shall provide PSPC and the NCC with a copy of the Soil Management Plan (at least 10 business days) prior to construction commencement.	• No anticipated negative residual effects following the implementation of mitigation.	• Monitoring requirements as per Soil Management Plan.

	Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
g)	Significant groundwater dewatering will be required in the Phase 3 and 4 project area during its construction. The results of the review of available groundwater quality information from the site of the future Ottawa Hospital against the City of Ottawa Sewer Use Bylaw 2003-514 for both storm sewer and sanitary sewer discharge indicates no widespread groundwater quality issues that would prevent sewer discharge.	C	X		• See mitigation c, *Result in alteration of water level, quality, flow or management regime in a waterbody, or result in other important changes to surface or groundwater resources*.	• No anticipated negative residual effects following the implementation of mitigation.	• Monitoring requirements as per Groundwater Management Plan.
h)	Remedial soil excavation required for the record of site condition related to the demolition of the Sir John Carling Building will require the removal of contaminated soil.	C	X		• As The Ottawa Hospital, the lands will remain federally owned, Federal land use standards will also be considered for the purposes of soil management. Soil standards from the Canadian Council of Ministers of the Environment (CCME) will be considered during remedial activities, and similarly, using residential land use standards. The purpose of the current program is to acquire a Record of Site Condition, and meeting provincial site standards will be the primarily goal. Any material remaining on-site exceeding CCME standards but following remediation to MECP standards will be managed later, during mass excavation for the Hospital construction.	• Positive, removal of impacted soil, managed in accordance with provincial and federal guidelines.	• Monitoring requirements as per Soil Management Plan.
i)	Increase of impervious surface areas and the requirement to accommodate stormwater including during high storm events.	D, C	X		• Implement stormwater management design. • Implement requirements of Environmental Compliance Approval for discharge to the Dow's Lake outfall. The proponent shall provide PSPC and the NCC with a copy of the Environmental Compliance Approval submission (at least 10 business days) prior to construction of these services.	• None anticipated.	• Maintenance requirements as per industry standards.
j)	Pre-development flows to the Rideau Canal are currently uncontrolled for the 100-year storm event. Additionally, there is no existing quality control of stormwater being delivered to the Canal.	O	X		• Installation of inlet control devices will control stormwater at 5-year pre-development flow rate, as well as oil and grit separators to achieve 80% TSS removal is proposed as part of the stormwater management design. • Implement Post Development Monitoring Plan for the Dow's Lake outlet.	• Positive. Controlled flows and enhanced TSS removed to the Canal.	• As per the requirements of the Post Development Monitoring Plan for the Dow's Lake outlet.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
Alter landscape features						
a) Direct impacts to vegetation including the removal of 271 living trees greater than 10cm DBH are required to complete project works associated with the Phase 3 and 4 Area and 22 outside of the NCD site area. b) Remaining vegetation may be indirectly impacted by the project.	C, O	X		• Overall increase in canopy cover on the NCD site from current to reduce heat island effect and assist with natural erosion and sediment control. • Tree removals will require a Tree Cutting Permit from the City of Ottawa that may introduce additional mitigation measures to be carried out on-site. Trees to be protected, removed, or candidates for relocation to be confirmed and identified on the site by a Certified Arborist prior to works. The proponent shall provide PSPC and the NCC with a copy of the Tree Cutting Permit from the City of Ottawa. • Implement Vegetation Management/ Conservation Strategy and Contractor Education Program. • Implement Landscape Plan. Landscape Architect, licensed in the Province of Ontario to be present to inspect and approve landscape material prior to installation. • Implement Tree Preservation and Removals Plan. The proponent shall provide PSPC and the NCC with a copy of the Tree Preservation and Removals Plan (at least 10 business days) prior to construction commencement. • Implement Long Term Tree Canopy Adaptive Management Plan and Landscape Maintenance Program. • Implement Wooded Ridgeline Management Plan.	• Overall positive impact. Loss of existing vegetation to be offset by compensation plantings and overall increase in tree canopy coverage for the site.	• Monitor health of new plantings as per Vegetation Management Strategy. • Monitoring per Long Term Tree Canopy Adaptive Management Plan and Wooded Ridgeline Management Plan.
c) Heavy equipment brought to the site may inadvertently bring and spread non-native plants and seeds.	C	X		• Heavy equipment must be cleaned and free of invasive species prior to entering and before leaving the construction site. Best Management Practices from the Invasive Ontario Plant Council (https://www.ontarioinvasiveplants.ca [ontarioinvasiveplants.ca]) should be applied to prevent the spreading of invasive species into and from federal property. The Ontario Clean Equipment Protocol can be found at (https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf).	• No anticipated negative residual effects following the implementation of mitigation.	• None required.
d) Removal of Buckthorn and Dog-Strangling Vine, identified as priority invasive species for the site will be required within the project area. e) Additional invasive species removed within the project area include Norway Maple, Amur Maple and Manitoba Maple.	C, O	X		• Where feasible and practical, remove all parts of the plant, including the roots. • Disposal of at Municipal land fill the accepts organic waste. • Implementation of Vegetation Management/Conservation Strategy and/or Woodland Management Plan to address invasive species and degraded understory within wooded areas.	• No anticipated negative residual effects following the implementation of mitigation.	• None required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
f) Removal of trees and soil may free carbon that is sequestered within vegetation and soils in the project area.	C	X		• The Canopy Cover plan outlines a goal to increase the total canopy cover on the site which would improve the long-term carbon sequestration potential of vegetation. • Consideration of incorporating suitable lumber from trees removed on the site in building features will contribute to the reduction of some upstream Greenhouse Gas emissions.	• No anticipated negative residual effects following the implementation of mitigation.	• None required.
g) Temporary loss of canopy cover in the immediate vicinity of tree removals and delay between tree planting and the time for trees to grow to mature canopy size.	O	X		• Intensive replanting with an overall increase of canopy cover on the Phase 3 and 4 site from current 16% to 23.7% within 40 years and 33.4% on the overall New Campus Development. • Relocation of 5 potential candidate trees. • Note: The total canopy cover of the entire NCD site is currently approximately 23% and is 16% within the Phase 3 and 4 area. The long-term 40% target canopy cover in the Phase 3 and 4 area includes intensive tree planting. Further some trees identified for removal are candidates for relocation to other areas of the site. Current projection giving consideration to relocations is 28%. To mitigate the time required for growth of a mature tree canopy, the quantity of trees and shrubs being planted, and the increase in regionally appropriate native species, is expected to quickly meet and exceed the current conditions within the Phase 3 and 4 site. A range of species recommended will grow and mature at different rates and are staggered throughout the site. Species selected also include native flowering and fruiting species as well as evergreen trees and shrubs which will provide social and wildlife values of forage, cover, and visual appeal, early after planting.	• Temporary loss of canopy cover in the immediate vicinity of tree removals. • Delay between tree planting and the time for trees to grow to mature canopy size. • Magnitude: Moderate • Geographic Extent: Small • Frequency: Once • Duration: Long • Reversibility: High • Timing: Dependent (Operation)	• Monitoring per, Detailed Canopy Plan; Landscape Plan; Long Term Tree Canopy Adaptive Management Plan; Landscape Maintenance Plan.
Affect birds, aquatic animals, and wildlife (flora and fauna), including species at risk and its critical habitat?						
a) Increased canopy cover over the site to introduce new opportunities for birds and wildlife.	O	X		• Implementation of Vegetation Management / Conservation Strategy • See mitigation a/b *Alter landscape features*.	• Positive. Overall increase in site habitat.	• Monitor health of new plantings as per Long-Term Tree Canopy Adaptive Management Plan. • See monitoring a/b *Alter landscape features*.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
b) Limited potential for Species at Risk to be encountered during the project works, with limited potential for turtles to cross into the project area in search of nesting habitat. c) Some potential for urban wildlife to be incidentally encountered during project works.	C	X		• Implement Environmental Protection Plan. The proponent shall provide PSPC and the NCC with a copy of the Environmental Protection Plan (at least 10 business days) prior to construction commencement. • Construction workers should be aware of the City of Ottawa Protocol for Wildlife Protection during Construction (August 2015). • Erosion and Sediment Control Fencing as well as construction site exclusion fencing will be installed around the construction area before the commencement of construction activities. Fencing will be in place before May 1st. • No mulch piles will be stored on site. If mulch must be stored temporarily, it must be located within site exclusion fencing, or otherwise secured to prevent access by nesting turtles. • The contractor must perform daily pre-work searches of the construction area to ensure no wildlife have entered the work area overnight. • Secure stockpiled materials, vehicles, and structures against wildlife entry. • Litter and other waste materials must be appropriately contained and disposed of. • Do not feed any wildlife or leave food out where it could attract them. • If one or more nests containing eggs or chicks of migratory birds protected under the MBCA, the ESA, and/or under SARA, or a Species at Risk (SAR) is/are observed within the work area during construction work, the works must be halted and Nicole Merkley, Environmental Specialist, PSPC, (613-946-9808/ Nicole.Merkley@ tpsgc-pwgsc.gc.ca) and Maya Moser, NCC Environmental Officer (Maya.Moser@ncc-ccn.ca / 613-239-5678 ext. 5553), and should be immediately notified so that subsequent actions with ECCC and PSPC/NCC biologist can be coordinated.	• No anticipated negative residual effects following the implementation of mitigation.	• None Required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
d) Nesting birds could be impacted by vegetation removal. Breeding Evidence was observed for two Conservation Priority Birds (ECCC, 2014), Baltimore Oriole (maintain), and Killdeer (increase). No breeding evidence was observed for any SAR species. e) The findings of the bat exit surveys and transects conducted in June 2021 indicate that there is potential for bat roosting within the site, however the low numbers observed and lack of critical habitat present suggest that roosting within the project area is likely to be limited to male bats and non-reproductive females who are more likely to roost in isolated or in small groups. No SAR bat species were detected, however there may still be potential for SAR bats to occur.	C	X		• See mitigation a/b, *Affect birds, aquatic animals , and wildlife (flora and fauna), including species at risk and its critical habitat.* • As a general precaution, tree and vegetation removals (including mowing of tall grass) shall be conducted outside of ECCC's bird nesting window for the Ottawa region (April 8 to August 31). • Removal of the isolated suitable cavity tree within the project area should occur outside the bat active season (April 1 to September 30) to protect bats. If removal must occur during this window, acoustic surveys / bat exit surveys are recommended. • Active nests of birds protected under the MBCA, ESA and/or the SARA discovered outside the core nesting windows for treed and open habitats must also be protected. • If a nest is identified and is currently inactive, compliance with the Act is still required. Resurvey for nesting activity may be required if the previous nest search occurred greater than 7 days before the work is to commence, if activities are still planned during the migratory bird window. • If vegetation removal is required during the nesting/roosting window, a bird nest/leaf roosting bat survey must be carried out by an avian expert 2 days (48 hours) before undertaking the tree and vegetation removals within the core nesting window and following a methodology approved by the Canadian Wildlife Service: https://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=8D910CAC-1[ec.gc.ca]. • Exclusion measures should be applied as warranted to prevent nesting/roosting in stockpiles or within any buildings/structures that are constructed. • See mitigation a/b *Alter landscape features.*	• Loss of bird nesting habitat, loss of mature trees suitable for bat roosting. • Magnitude: Moderate • Geographic Extent: Small • Frequency: Once • Duration: Long • Reversibility: High • Timing: Dependent (Construction)	• None Required.
f) Loss of migratory bird habitat as well as potential bat roosting habitat as a result of vegetation removals, however the low number of bats observed suggest that there are limited roosting opportunities and uses associated with the Project Area.	C	X		• Implement Landscape Plan. Landscape Architect, licensed in the Province of Ontario to be present to inspect and approve landscape material prior to installation. • See mitigation a/b *Alter landscape features*.	• Loss of bird nesting habitat, loss of mature trees suitable for bat roosting. • Magnitude: Moderate • Geographic Extent: Small • Frequency: Once • Duration: Long • Reversibility: High • Timing: Dependent (Construction)	• Monitor health of new plantings as per Vegetation Management Strategy.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
g) Potential for bird strikes with glazed features such as stairwells and other conflicts related to building design elements such as use of grates, lighting, and dead-end corridors.	O	X		• Incorporation of guidelines including the City of Ottawa Bird Safe Guidelines (2020), NCC Bird Safe Guidelines (2021) and/or CSA Standard A460:19 Bird-Friendly Building Design (2019) into the design.	• Potential for some bird strikes and entrapments. • Magnitude: Low • Geographic Extent: Small • Frequency: Rarely • Duration: Long • Reversibility: High Timing: Dependent (Operation)	• Monitoring of incidence during operation to identify residual risks and incorporate recommendations for further mitigation. • Monitor as per Bird Friendly Guidelines where warranted.
h) No active Coopers hawk nest were identified within the project area in 2022. There is the potential however, for new nests to be established in the future.	C	X		• Raptor nesting surveys should be carried out in advance of each construction phase to ensure that no active raptor nests are present. • Removal of trees within the forested habitat suitable for raptor nesting should occur outside of the breeding window for Cooper's Hawk from April 30 – July 31st (OBBA 2021) and should ideally follow the breeding bird timing restriction for the Ottawa region (April 8 – August 31) (see mitigation d, *Affect birds, aquatic animals , and wildlife (flora and fauna), including species at risk and its critical habitat).* • If active nests are present, they must not be disturbed, and chicks must be given time to fledge. If vegetation removal is required to take place in the vicinity of an active nest, MNDMNRF should be contacted to obtain advice on the establishment of protection buffers to avoid impacting the species.	• No anticipated residual effect following the implementation of mitigation.	• None required.
i) If not properly managed, the use of concrete, lime or mortar during construction that enters a watercourse is toxic to fish and aquatic life.	C	X		• Measures must be implemented to ensure all works involving the use of concrete, cement, mortar or lime containing construction materials do not enter any watercourse, directory or indirectly. • Concrete chutes should be cleaned away from storm sewers or surface water. • See mitigation b and d *Release a polluting substance into the land, water, or air.*	• No anticipated residual effect following the implementation of mitigation.	• None Required.
j) Disturbed or stockpiled materials may be eroded during rainfall events may flow into storm sewers and into watercourses delivering sediment into the aquatic environment.	C	X		• See mitigation a, b, c and d *Release a polluting substance into the land, water, or air.*	• No anticipated residual effect following the implementation of mitigation.	• Monitoring of ESC measures per ESC Plan.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
k) Sediment caused by construction activities could enter on-site storm sewers and be delivered to the Canal via the existing outfall, potentially affecting fish and fish habitat.	C	X		• See mitigation b *Release a polluting substance into the land, water, or air.*	• No anticipated residual effect following the implementation of mitigation.	• Monitoring per ESC Plan. • Monitoring of water quality at the Dow's Lake outfall (Rideau Canal) per CCME guidelines.
l) Increased stormwater drainage post development delivered to Dow's Lake (Rideau Canal) could potentially impact fish and fish habitat.	O	X		• Proposed stormwater management design that includes the release of stormwater to Dow's lake through the existing pipe is in line with DFO "Urban Stormwater Guidelines and Best Management Practices for the Protection of Fish and Fish Habitat, Rev 4, in that: the sites stormwater management approach includes Volume Reduction (Post development flows are controlled to the 5 year pre development flow rate. Please note that there are currently no quantity controls on the existing sewer outlet.) , Water Quality Control (LID's, and oil and grit separators are proposed to remove 80% TSS prior to entering the canal. Please note that there are currently no quality controls on the existing sewer outlet) and Runoff Control (significant landscaping, on-site storage and other LID's are proposed to mitigate run off).	• Positive Protection of fish and fish habitat.	• As per the requirements of the Post Development Monitoring Plan for the Dow's Lake outlet.
m) One Butternut hybrid was identified within the project area and is not anticipated to be impacted as part of the proposed work.	C	X		• Proposed retention of single butternut hybrid. Note, butternut hybrids are not protected under SARA (2002) or ESA (2007). • See mitigation a/b *Alter landscape features.*	• No impact to the butternut hybrid is anticipated as part of the proposed work.	• None Required.
n) Impacts to Monarchs as a result of construction.	C	X		• Limited potential for impacts as the majority of vegetation removal is to occur outside of the Monarch butterfly's active breeding season (June-September). • As part of the site Landscape Plan, pollinator-focused plantings could be used to enhance habitat for this species.	• Pollinator-focused plantings to enhance habitat for this species.	• Monitor health of new plantings as per Vegetation Management Strategy.
o) Reflective surfaces on proposed structures may increase the potential for bird collisions.	O	X		• Implement Bird Friendly Design Guidelines where warranted during the design of the new structure.	• Reduce interactions with birds and buildings.	• Monitoring of incidence during operation to identify residual risks and incorporate recommendations for further mitigation. • Monitor as per Bird Friendly Guidelines where warranted.
p) Impacts to light sensitive wildlife as a result of artificial lighting.	O	X		• Implement lighting principals and Guidelines in accordance with NCC's Capital Illumination Plan where warranted.	• Reduction of impacts to light sensitive wildlife.	• None required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
Result in alteration of water level, quality, flow or management regime in a waterbody, or result in other important changes to surface or groundwater resources						
a) As the required excavations for main hospital and CUP will be below the groundwater table, significant groundwater dewatering will be required. It is anticipated that active dewatering from wells and well point systems and from sumps within excavations. Additionally, temporary dewatering, in exterior areas where the grade is being permanently lowered below the groundwater level, permanent drainage works will be required.	C	X		• Implement Dewatering and Wastewater Management Plan. The proponent shall provide PSPC and the NCC with a copy of the Groundwater Management Plan Dewatering and Wastewater Management Plan (at least 10 business days) prior to construction commencement. • A hydrogeological study will be required, based on the proposed excavation depths and locations to support the application for a PTTW, refine estimated dewatering volumes and determine the potential extent of groundwater drawdown during construction. • Implement Erosion and Sediment Control Plan. The proponent shall provide PSPC and the NCC with a copy of the Groundwater Management Plan (at least 10 business days) prior to construction commencement. • To reduce the potential for groundwater pumping, excavations should be planned during dry periods.	• No anticipated residual effect following the implementation of mitigation.	• Monitoring as per Groundwater Management Plan / Dewatering and Wastewater Management Plan. • Erosion and Sediment Control Plan to be monitored for a Certified Inspector of Erosion and Sediment Control (CISEC).
b) The radius of influence from groundwater dewatering has been estimated from 25 m-75 m from the Hospital and 40 m from the CUP.	C	X		• Buildings west of the CUP intersect with the radius of influence, however the radius of influence is the distance at which 0 m of drawdown is expected to occur. As such the amount of groundwater drawdown in this area is expected to be minimal.	• None anticipated.	• Monitoring as per Groundwater Management Plan / Dewatering and Wastewater Management Plan.
c) Groundwater management and disposal during construction.	C	X		• The results of the review of available groundwater quality information from Phase 3 and 4 Project Area against the City of Ottawa Sewer Use Bylaw 2003-514 for both storm sewer and sanitary sewer discharge indicates no widespread groundwater quality issues that would prevent sewer discharge, subject to the following: ○ A dewatering monitoring program should be implemented to monitor groundwater quality during construction. ○ An exemption for the naturally elevated manganese would be required from the City to discharge to storm sewer. ○ Total metals analysis would be required to supplement the dissolved metals concentrations completed to date.	• None anticipated.	• Monitoring as per Groundwater Management Plan / Dewatering and Wastewater Management Plan.
d) Increased stormwater drainage (Quantity) post development delivered to Dow's Lake (Rideau Canal) could potentially impact fish and fish habitat	O	X		• See mitigation i, *Affect birds, aquatic animals , and wildlife (flora and fauna), including species at risk and its critical habitat.*	• Positive, Protection of fish and fish habitat.	• None required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
Cause sensory disturbances, such as noise and/or vibrations						
a) Construction activities associated with the project may cause sensory disturbances to adjacent uses.	C		X(H)	• Implement Vibration Monitoring Plan. The proponent shall provide PSPC and the NCC with a copy of the Vibration Monitoring Plan (at least 10 business days) prior to construction commencement. • Implement Complaints Resolution Plan. The Complaints Resolution Plan should include a community consultation process. • See mitigation b, *Health*.	• Temporary disturbance during construction. • Magnitude: Low • Geographic Extent: Small • Frequency: Rarely • Duration: Short • Reversibility: low • Timing: Dependent (Construction)	• Monitor complaints during construction per Complaints Resolution Plan.
b) Future LRT vibration impacts.	O		X(H)	• Based on an offset distance of >75 metres between the Trillium Line LRT and Hospital building foundation, the estimated vibration level is expected to be below the FTA criterion of 0.10 mm/s RMS. No vibration impacts are anticipated and no additional vibration mitigation is required.	• No anticipated residual effects.	• None required.
Health (Air Quality)						

a) Air quality degradation through dust and particulate emissions arising from construction activities and the operation of machinery.	C		X(H)	• The effects on air quality from construction activities are generally controlled by good construction practice and proper equipment function. To further avoid or reduce the potential for decreased ambient air quality from project activities, an Air Quality Management Plan to be developed that may include the following where appropriate:
				  ○ Minimize vehicle traffic on exposed soils.
				  ○ Stabilize soil and other material storage piles against wind erosion.
				  ○ Equipment to be kept in good working order and will not unnecessarily idle.
				  ○ Dust suppressants will be applied as warranted.
				  ○ Cover and contain fine particulate materials during transportation to and from the site.
				  ○ Locate storage piles in sheltered areas if feasible.
				  ○ Provide moveable windbreaks if feasible.
				  ○ Use new or well-maintained heavy equipment and machinery, preferably fitted with fully functional emission control systems/ muffler/ exhaust system baffles and engine covers.
				  ○ Select appropriately sized equipment for the job.
				  ○ Avoid unnecessary idling.
					• No anticipated residual effect following the implementation of mitigation.	• Monitor complaints during construction per Complaints. Resolution plan.
						• Monitoring per Air Quality Management Plan.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
b) The results of the air quality analysis during the operation phase of the hospital indicate generally favorable air quality conditions within TOH property (and beyond), inclusive of all fresh air intakes, building access points, and outdoor amenity spaces. The predictions show that pollutant concentrations will be within acceptable levels, as outlined by the MECP AAQC and industry standards.	O		X(H)	• The diesel generators shall be equipped with the appropriate exhaust scrubbers for peak shaving activities, in order to meet the MECP emission limits for non-emergency use. • The emission rates of chemical species out of the laboratory exhaust and hot lab exhaust should be verified, once a list of chemicals and usage is known, however target dilution ratios are generally anticipated to be achieved. • The kitchen exhausts shall be equipped with standard ecologizer units. • Hospital will be designed with fixed/non-operable windows. • An updated air quality study should be performed during the design / build stage of the project to ensure all source of emission are compliant with MECP standards.	• No anticipated residual effect following the implementation of mitigation.	• None Required.
Health (Noise and Vibration)						
a) Noise resulting from construction activities may impact nearby sensitive receivers.	C		X(H)	• Temporary impacts are anticipated to be short-term in duration and insignificant in magnitude, restricted to the project construction phase. • Contractor to adhere to the City By-laws (2017-255). • Keeping equipment well maintained, moving parts lubricated and restricting unnecessary idling. • Compliance with MECP NPC-115 and NPC-118. • Consider Health Canada's "Commonly applied noise Management Measures". (https://www.ceaa.gc.ca/050/documents/p80054/119378E.pdf). • Preparation of a Noise Monitoring Report.	• Temporary disturbance during construction. • Magnitude: Low • Geographic Extent: Small • Frequency: Rarely • Duration: Short • Reversibility: low • Timing: Dependent (Construction)	• Monitor complaints during construction per Complaints Resolution Plan.

b) The results of the stationary noise analysis `indicate that noise levels at nearby points of reception are expected to fall below the ENCG noise criteria and the hospital is expected to be compatible with the existing noise-sensitive land uses.	C		X(H)	• To ensure compliance with provincial and municipal noise guidelines, the following measures are recommended:
				  ○ Where fixed windows are used, the outdoor noise criteria do not apply, but windows should have a minimum STC of 35 to ensure acceptable indoor sound levels can be achieved.
				  ○ The sound power levels of the stationary noise sources should not exceed those identified in Table 2 of the Stationary Noise Assessment Report (GWE, 2022c).
				  ○ An acoustic louver or silencer bank will be required for the generator to reduce sound power levels identified in Table 2 of the Stationary Noise Assessment Report (GWE, 2022c).
				• A review of the final equipment selections and locations by a qualified acoustical engineer will be required prior to the installation of the equipment.
					• No anticipated residual effects following the implementation of mitigation.	• None required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
c) Construction activities associated with the project may cause sensory disturbances to adjacent uses.	C		X(H)	• See mitigation a), *cause sensory disturbances, such as noise and/or vibrations.*	• Temporary disturbance during construction. • Magnitude: Low • Geographic Extent: Small • Frequency: Rarely • Duration: Short • Reversibility: low • Timing: Dependent (Construction)	• Monitor complaints during construction per Complaints Resolution Plan.
d) Future LRT vibration impacts.			X(H)	• See mitigation b), *cause sensory disturbances, such as noise and/or vibrations.*	• No anticipated residual effects.	• None required.
Land and resource use and recreation						
a) New multi-use pathway along the south side and sidewalk on the north side of the main entrance to facilitate direction connections for pedestrians and cyclists to the main entrance of the hospital and the emergency room.	O		X(S)	• Multi-use pathway and sidewalk to be designed to be designed to accommodate all ages and abilities. • Implement Landscape Plan.	• Positive, provides direct connection to the main entrance of the hospital and emergency room.	• None required.
b) Consistency with plans and policy.	O		X(S)	• Implementation of the NCD development and associated components/phases in accordance with the approved Master Site Plan.	• Consistent plans and policies.	• None required.
c) Enhanced crossings for pedestrians and cyclists at Prince of Wales Drive and Roads E to include separated crossings.	C, O		X(S)	• Implementation of Construction Traffic Management Plan to direct pedestrian and cyclists during construction. • Implement Landscape Plan.	• Enhanced pedestrian and cycling crossings at new intersection.	• None required.
d) Changes to existing greenspaces, aesthetics and opportunities for recreation.	O		X(S)	• New opportunities for recreation for all ages and abilities included new pathways and contemplative garden.	• Positive outcome anticipated.	• None required.
Any structure site or thing that is of historical, archaeological, paleontological or architectural significance.						
• No archaeological sites or artifacts of cultural heritage value or interest have potential to present within the Phase 3 and 4 Project Area.	C		X(S)	• Archaeological Assessment may be required for works extending beyond the lease area boundary. • If unexpected archaeological resources are unearthed on federal property, all work must be halted and the NCC Archaeologist, Ian Badgley (ian.badgley@ncc-ccn.ca / 613-239-5678 ext. 5751), should be notified. • Work shall not be resumed at the location until measures for the protection of archaeological resources have been put in place.	• No residual effects anticipated.	• None required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
• Potential impact to Recognized, Classified and Protected federal heritage buildings identified adjacent to the lease area boundary.	C		X(S)	• Prepare and Implement a Heritage Protection Plan. The Plan shall include: ○ An evaluation of potential risks to nearby heritage buildings through the construction process and a detailed plan for protection and mitigation of these risks, including but not limited to: Pre-construction building condition survey and documentation (consider baseline 3D Laser scanning of all designated buildings) Vibration and crack monitoring and monitoring reports ○ Implementation of physical protection for designated buildings. ○ Management of construction dust, debris etc. ○ Post-construction building condition survey and documentation.	• No residual effects anticipated.	• Monitoring per requirements of Heritage Protection Plan.
• De-icing salt used on Maple Drive during winter maintenance has been identified as a potential major impact to the existing masonry of the South Azimuth Building.	O		X(S)	• Develop and Implement de-icing strategy in coordination with AAFC for Maple Drive.	• No residual effects anticipated.	• Monitoring per de-icing strategy.
• Impacts the Central Experimental Farm's rural picturesque character.	O		X(S)	• No mitigation recommended. The proposed landscape treatment has taken cues from the existing vegetation within the CEF NHSC and reflects and protects the CEF NHSC's rural picturesque character to enhance the "farm in the city".	• No residual effects anticipated.	• None required.
• Protection of South Azimuth Building from accidental collisions by emergency vehicles.	O		X(S)	• Installation of bollards around the South Azimuth Building.	• No residual effects anticipated.	• None required.
• Impact to historic values of the cultural landscape.	O		X(S)	• No mitigation recommended. The current proposal to maintain existing trees and supplement with new trees where required, will help to maintain the park-like setting between the Saunders Building and the Hospital, but will not completely mitigate the impact of the views of the towers in the background of the Saunders Building.	• Minor impact of the views of the towers in the background of the Saunders Building. • Magnitude: Low • Geographic Extent: Small • Frequency: Permanent • Duration: Long • Reversibility: low • Timing: Dependent (Operation)	• None required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
• Impact to views of the night sky from the Dominion Observatory dome.	O		X(S)	• Impacts to the night sky will be mitigated to some extent by the current plan to dim lights where possible between midnight and 5 am.	• Minor residual impact. Due to the function of the site as a Hospital which requires lighting 24/7, light impacts cannot be fully mitigated. • Magnitude: Low • Geographic Extent: Small • Frequency: Permanent • Duration: Long • Reversibility: low • Timing: Dependent (Operation)	• None required.
• Significant views to/from Dow's Lake and the Rideau Canal, Prince of Wales Drive and the Central Experimental Farm.	O		X(S)	• Implement recommendations of Cultural Heritage Impact Statement to screen the project using trees and other landscape elements to reduce impact to existing views. This has been accomplished by the use of a variety of vegetation of varying sizes and species.	• No residual effects anticipated.	• Monitor health of new plantings as per the Vegetation Management Strategy.
• Shadows created that obscure heritage attributes or change the viability of the associated cultural heritage landscape.	O		X(S)	• None proposed. Negligible and indirect impact that is site-specific and will occur infrequently over a short period of time each year. • Shadow study modelling was prepared that included four days of the year and indicates that the Project will create shadows that obscure the appearance of the Observatory House (Building No. 2) and Geophysical Laboratory Building (Building No. 3), both of which are Recognized Federal Heritage Buildings valued for their architectural design and connection to the Dominion Observatory Campus. However, this impact will be limited to the mornings in December through to March, and a shadow over 100% of the Observatory House (Building No. 2) building will only be cast in the mornings during the months of December to February.	• Shadows will occur infrequently over a short period of time each year. • Magnitude: Low • Geographic Extent: Small • Frequency: Permanent • Duration: Short • Reversibility: low • Timing: Dependent (Operation)	• None required.
• Primitive marine fossils contained within the limestone and shale bedrock are expected to be encountered during rock excavation.	C		X(S)	• Non-significant, very common and ubiquitous marine fossils across the region. No mitigation is proposed.	• No residual effects anticipated.	• None required.

Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
Other						
a) Wind impacts to pedestrian uses in the Phase 3 and 4 Project Area.	O		X(S)	• No mitigation proposed. The results of the study found that all grade level areas, within and surrounding the NCD conditions that are considered acceptable for the intended pedestrian uses throughout the year. Specifically, conditions over surrounding sidewalks, walkways, surface parking, loading zones, and in the vicinity of building access points, are considered acceptable.	• No residual effects anticipated.	• None required.
b) Impacts to Roadway users as a result of construction activities.	C		X(S)	• Temporary inconvenience during construction. • During construction of the Hospital, the majority of intersections are expected to perform similar to existing conditions during the peak hour periods with the proposed designs at Garage Access/Navy Private/Prince of Wales Drive, Road B/Prince of Wales Drive, Preston Street/Prince of Wales Drive, and Preston Street/Prince of Wales Drive. • Implementation of potential TDM measures during the construction phases will be limited given the primary workforce are trades-people/construction workers that historically have high auto-usage. TOH and the Contractor may consider rideshare/carpooling incentives to reduce auto-usage where possible.	• Temporary inconvenience during construction. • Magnitude: Low • Geographic Extent: Small • Frequency: Permanent • Duration: Short • Reversibility: low • Timing: Dependent (Construction)	• Monitor complains during construction per Complaints Resolution Plan.
c) The main entrance of the Hospital and the loading area at the northeast corner of the CUP (zones 1 and 4) are estimated to accumulate moderate amounts of snow. Although frequent, the amount of accumulation is not expected to be problematic beyond typical local conditions.	O		X(S)	• TOH to implement snow and ice removal program. • Implementation of Salt Management Plan prior to operation in accordance with industry standards.	• No residual effects anticipated.	• None required.
d) Numerous permits and approvals will be required to implement the Phase 3 and 4 Project.	D		X(S)	• Implement Regulatory Compliance Plan. • Obtain permits and approvals.	• No residual effects anticipated.	• Monitoring per requirements of Regulatory Compliance Plan.
e) Modifications to the existing Dow's Lake stormwater outlet are not planned. As, such no impacts to navigation within the canal are anticipated.	C		X(S)	• If modifications to the existing Dow's Lake outlet are proposed, approval under the *Canadian Navigable Waters Act* may be required prior to work proceeding.	• None anticipated.	• None required.

	Environmental Effect	*Activity	*B.P	*S.E	Effective and Established Mitigation Measures	Residual Effect	Monitoring
f)	Waste management during operation.	O	X	X(S)	• Ensure proper quantity and placement of waste receptacles during the operational phase of the hospital. • NCC to review waste receptacle location and design and greater garbage collection areas to ensure that the areas are screened and protected to minimize escaping solid waste matter.	• None anticipated.	• None required.
g)	Reductions in embodied carbon associated with materials and construction process throughout the building's life cycle.	D,C	X	X(S)	• Based on the computer modeling, and consultation with local suppliers, the specification of a 30% reduction in embodied carbon in the structure, as per the Greening Government Strategy, may be feasible using the following modifications: ○ Replace GU Portland Cement with 30% slag ash. ○ Replace remaining GU Portland Cement with GUL Portland Limestone Cement. ○ Utilize Carboncure or other CO_2 sequestering technology to inject CO_2 into the cement mix to permanently sequester carbon into the concrete.	• Positive. Reduction in CO_2	• None required.

SECTION G: FUTURE COMMITMENTS AND REFINEMENTS TO THE PLAN

The previous section has outlined a number of mitigation plans that have been prepared by the project designers that may require finalization or updating prior to construction and subsequent approval by the approval agencies as appropriate. The include:

Project Designers Responsibility:

- Landscape Plan
- Tree Preservation and Removals Plan
- Vegetation Management/Conservation Strategy and Contractor Education Program
- Wooded Ridgeline Management Plan
- Long-Term Tree Canopy Adaptive Management Plan

Contractor Responsibility:

- Erosion and Sediment Control Plan
- Environmental Protection Plan
- Spill Response and Action Plan
- Soil Management Plan
- Wildlife Mitigation and Monitoring Plan
- Groundwater Management and Dewatering Plan
- Construction Management and Logistics Plan
- Blast Management Plan/Strategy
- Vibration Monitoring Plan
- Construction Traffic Management Plan and Public Communications Plan
- Transportation Demand Management measures for Construction Personnel
- Air Quality Management Plan
- Noise Monitoring Reporting
- Complaints Resolution Plan
- Heritage Protection Plan
- Regulatory Compliance Plan

In addition, the previous section has identified the requirement or potential requirement for environmental permitting from approval agencies to enable construction as follows:

- Tree Cutting Permit, City of Ottawa
- Environmental Compliance Approval, Ministry of the Environment, Conservation and Parks
- Permit to Take Water, Ministry of the Environment, Conservation and Parks

The overall scope, construction details, and required mitigation measures of the Phase 3 and 4 Project have been outlined in this report and the accompanying supporting studies. In the next stages of project development (developed design), there may be some refinements to the project scope, construction details, and required mitigation, and new information that may require an amendment to this Environmental Effects Analysis/Environmental Impact Statement and Tree Conservation Report. This information may include:

- Refinements to the Landscape Plans and Architectural Details
- Updated Carbon Intensity Analysis
- Application of Bird-Friendly Guidelines to final architectural components
- Continued application of the lends of Accessibility Standards and Inclusivity through all stages of design and development
- Review and update as required of cumulative effects across the New Campus Development at each subsequent phase of development

As more detailed information becomes available, the proponent will review these items/elements and confirm the following in the updated documentation to be submitted to the approval authorities:

- Provide clear indications of any changes to the proposed scope of work that has been outlined in the EEE/EIS and include any pertinent maps and figures to highlight these changes.
- Provide any new or additional environmental effects expected
- Provide any new additional mitigation measures recommended to ensure there are no environmental effects resulting from the Developed Design and outstanding items
- Update to the cumulative effects evaluation
- The selected format of documentation (e.g., Record of Decision, Letter, Report) will be determined based on the review of the previous three items/requests and any additional discussions with the approval authorities.

The NCC does not expect there to be a need for a new project posting to the Impact Assessment Agency of Canada registry. The NCC does, however, reserve the right to do a re-posting should there be significant changes to project scope, as is recommended by the Impact Assessment Agency.

SECTION H: OTHER ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

It is anticipated that the potential environmental effects associated with this project are common and predicable and can be managed with effective and established mitigation (**Table 22**).

Table 22: Non-Effective and Established Mitigation

Potential Adverse Environmental Effect:			**Proposed Mitigation Measure:**	
N/A			N/A	
Magnitude of residual effect	**Reversibility of residual effect**	**Geographic Extent of residual effect**	**Duration of residual effect**	**Frequency of residual effect**
N/A	N/A	N/A	N/A	N/A
Residual Effects	N/A			
Monitoring	N/A			

SECTION I: DETERMINATION

Taking into account implementation of mitigation measures outlined in the analysis, this project is:

☑	**Not likely to cause significant adverse environmental effects**
☐	**Likely to cause significant adverse environmental effects**

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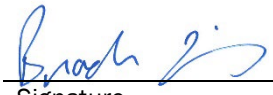
SECTION J: SIGN-OFF AND APPROVAL

Completed by:

Nicole Nolan
Ecologist
Parsons Inc.

Signature Date: November 30, 2022

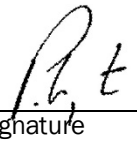
Brandon Jarvis
Senior Environmental Planner
Parsons Inc.



Signature Date: November 30, 2022

Reviewed by:

Pam Whyte MCIP, RPP
Manager of Planning, Ottawa
Parsons Inc.



Signature Date: November 30, 2022

Reviewed and Endorsed by:

Sean Moore, MCIP, RPP
Development Review South Branch
Planning, Real Estate and Economic
Development Department
City of Ottawa

Signature Date

Sign-off and Approval:

Nicole Merkley
Environmental Specialist
Public Services and Procurement Canada

Signature Date

Comments:

Isabelle Leclerc-Morin
Chief, Environmental Impact Assessment
National Capital Commission

Signature Date

Comments:

Maya Moser
Environmental Officer
National Capital Commission

Signature Date

ANNEX: RESOURCES AND REFERENCES

AAFC. 2019. Central Experimental Farm National Historic Site Management Plan. Retrieved from https://agriculture.canada.ca/en/contact-agriculture-and-agri-food-canada/central-experimental-farm/about-central-experimental-farm/central-experimental-farm-national-historic-site-management-plan

Algonquins of Ontario. 2013. Interactive mapping. Retrieved from http://www.tanakiwin.com/imap.html

Atlas of the Mammals of Ontario (AMO). Dobbyn, J. 1994. Don Mills: Federation of Ontario Naturalists.

Chapman, L.J., and Putnam, D.F. 1984: Physiography of Southern Ontario; Ontario Geological Survey, Map. P.2715 (colored). Scale 1:600 000.

Canadian Wildlife Service. 2017. Canadian Wildlife Act. Retrieved from https://www.canlii.org/en/ca/laws/stat/rsc-1985-c-w-9/latest/rsc-1985-c-w-9.html

City of Ottawa. 2021a. Geo Ottawa On-line mapping. Retrieved from https://maps.ottawa.ca/geoottawa/

City of Ottawa. 2006. Greenspace Master Plan. Retrieved 2021 from https://documents.ottawa.ca/sites/documents/files/greenspace_master_plan_en.pdf

City of Ottawa. 2015. DRAFT Street Tree Manual for Greenfield Neighbourhoods. Excerpt page 27-28 provided by City of Ottawa

City of Ottawa. 2022b. New Official Plan. Retrieved from https://ottawa.ca/en/planning-development-and-construction/official-plan-and-master-plans/official-plan

City of Ottawa. 2021c. Wildlife Species List. Retrieved from https://ottawa.ca/en/living-ottawa/environment/wildlife/species-list

City of Ottawa 2015. Protocol for Wildlife Protection during Construction. Retrieved from https://documents.ottawa.ca/sites/documents/files/documents/construction_en.pdf

City of Ottawa. 2003. Official Plan, consolidated.

City of Ottawa. 2020a. Tree Conservation Bylaw No. 2020-340. Retrieved from https://ottawa.ca/en/living-ottawa/laws-licences-and-permits/laws/law-z/tree-protection-law-no-2020-340

City of Ottawa. 2020b. Draft Bird-friendly Design Guidelines. Retrieved from https://documents.ottawa.ca/sites/documents/files/birdsafedesign_guidelines_en.pdf

Department of Fisheries and Oceans (DFO). 2021. Aquatic Species at Risk Map. Retrieved from https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html

Ebird. 2021. Species Search. Retrieved from https://www.ebird.org

Environment and Climate Change Canada. 2014. Bird Conservation Strategy for Bird Conservation Region 13 in Ontario Region: Lower Great Lakes/St. Lawrence Plain. Retrieved from https://www.canada.ca/en/environment-climate-change/services/migratory-bird-conservation/publications/strategy-region-13-boreal-hardwood.html

Environment and Climate Change Canada (ECCC). 2002. Species at Risk Act (SARA). Retrieved from https://laws.justice.gc.ca/eng/acts/S-15.3/

Environment and Climate Change Canada. 2016. Species at Risk Critical Habitat Mapping. Retrieved from http://data.ec.gc.ca/data/species/protectrestore/critical-habitat-species-at-risk-canada/

Environment and Climate Change Canada. 2021. Species at Risk Public Registry. Retrieved from https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html

Golder. 2020. Cultural Heritage Existing Conditions Review - New Ottawa Hospital Campus, Carling Avenue, City of Ottawa, Ontario

Golder. 2021a. Cultural Heritage Impact Statement New Civic Development for The Ottawa Hospital, Carling Avenue at Prince of Wales Drive and Preston Street, City of Ottawa, Ontario

Golder. 2021b. Phase One Environmental Site Assessment, the Ottawa Hospital - New Civic Campus

Golder. 2021c. Stage 1 Archaeological Assessment Ottawa Hospital, Part of Lots I and K, Broken Front B Geographic Township of Nepean, City of Ottawa, Ontario

Golder. 2021d. Stage 2 Archaeological Assessment Ottawa Hospital, Part of Lots I and K, Broken Front B Geographic Township of Nepean, City of Ottawa, Ontario

Golder. 2021e. Preliminary Geotechnical Review Ottawa Hospital.

Golder. 2021f. Phase 1 Environmental Site Assessment, the Ottawa Hospital - New Civic Campus

Golder. 2021g. Phase 2 Environmental Site Assessment, the Ottawa Hospital - New Civic Campus

Golder. 2022a. Geotechnical and Hydrogeological Investigation - New Ottawa Hospital (Phase 2)

Golder. 2022b. Preliminary Groundwater Inflow Estimate, Ottawa Hospital Expansion. Technical Memorandum

Golder. 2022c. Phase Two Environmental Site Assessment - New Civic Development for the Ottawa Hospital.

Golder. 2022d. Sewer Discharge Results Comparison - Future Ottawa Hospital Site. Technical Memorandum.

Government of Canada. 2021. Aboriginal Treaty Rights Information System. Retrieved from https://sidait-atris.aadnc-aandc.gc.ca/atris_online/Content/Search.aspx

Government of Canada. 1991. The Federal Policy on Wetland Conservation. Retrieved from: https://publications.gc.ca/site/eng/100725/publication.html

Gradient Wind Engineering. 2020. Preliminary Existing Conditions Assessment. The Ottawa Hospital New Campus, Ottawa, Ontario

Gradient Wind Engineering. 2021a. Environmental Noise and Vibration Assessment, The Ottawa Hospital New Campus Development, 930 Carling Avenue and 520 Preston Street, Ottawa, Ontario

Gradient Wind Engineering. 2022b. Air Quality Assessment, The Ottawa Hospital New Campus Development, 930 Carling Avenue and 520 Preston Street, Ottawa, Ontario

Gradient Wind Engineering. 2022b. Pedestrian Level Wind and Snow Drift Assessment, The Ottawa Hospital New Campus Development, 930 Carling Avenue and 520 Preston Street, Ottawa, Ontario

Gradient Wind Engineering. 2022c. Stationary Noise Assessment, The Ottawa Hospital New Campus Development, 930 Carling Avenue and 520 Preston Street, Ottawa, Ontario

HDR. 2022b. New Campus Development for The Ottawa Hospital. Application for Site Plan Control and Federal Land Use Approval Hospital & Central Utility Plant.

HDR. 2022c. Site Plan Control Drawings Package, New Campus Development for the Ottawa Hospital, Hospital and Central Utility Plant, PRE-CONSULTATION DRAFT. 930 Carling Avenue & 520 Preston Street, Ottawa, ON

HDR. 2022d. The Ottawa Hospital Main Building Carbon Intensity Analysis

Humphrey, C. 2017. Recovery Strategy for the Eastern Small-footed Myotis (Myotis leibii) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources and Forestry, Peterborough, Ontario. vii + 76 pp. Retrieved from: https://www.ontario.ca/page/eastern-small-footed-myotis-recovery-strategy

iNaturalist. Various Dates. Retrieved from https://www.inaturalist.org/

Ministry of Natural Resources and Forestry. 2017. Land Information Ontario. Geospatial Data Hub. Retrieved from https://geohub.lio.gov.on.ca/

Lee, et al. 1998. Ecological Lands Classification for Southern Ontario, SCSS field guide FG-02.

MacPherson, Amy. 2019. Email correspondence. Species at Risk in Ottawa – as of September 1, 2019.

Ministry of the Environment Parks and Conservation (MECP). 2021. Species at Risk in Ontario. Retrieved from: https://www.ontario.ca/page/species-risk-ontario.

Ministry of Natural Resources and Forestry Guelph District. 2014. Draft: Use of Buildings and Isolated Trees by Species at Risk Bats Survey Methodology.

Ministry of Natural Resources and Forestry. 2015. Significant Wildlife Habitat Criteria Schedules For Ecoregion 6E. Retrieved from http://greenspace-alliance.ca/wp-content/uploads/2017/09/Significant-Wildlife-Habitat-Criteria-Schedules-For-Ecoregion-6E.pdf

Ministry of Natural Resources and Forestry. 2014. Significant Wildlife Habitat Mitigation Support Tool. Retrieved from https://docs.ontario.ca/documents/4773/mnr-swhmist-accessible-2015-03-10.pdf

Muncaster and Brunton. 2005-2006. Urban Natural Areas Environmental Evaluation Study. Retrieved from https://app06.ottawa.ca/calendar/ottawa/citycouncil/pdc/2005/05-24/Final%20Report_UNAEES.htm

National Capital Commission. 2020. A Living Legacy: Remarkable Trees of Canada's Capital. Retrieved from: https://ncc-ccn.gc.ca/remarkable-trees

National Capital Commission. 2013. Canada's Capital Greenbelt Master Plan. Retrieved March 31, 2021, from https://ncc-ccn.gc.ca/our-plans/greenbelt-master-plan

National Capital Commission. 2020. A Living Legacy: Remarkable Trees of Canada’s Capital. Retrieved from https://ncc-ccn.gc.ca/remarkable-trees

National Capital Commission. 2021. Bird-Safe Design Guidelines. First Edition. Retrieved from https://ncc-website-2.s3.amazonaws.com/documents/NCC_Bird-Safe_Guidelines_EN_Mar26.pdf?mtime=20210419163519andfocal=none

National Capital Commission. 2017a. Plan for Canada's Capital 2017-2067. Retrieved from https://ncc-ccn.gc.ca/our-plans

National Capital Commission. 2017b. Capital Urban Lands Plan, 2017-2067. Retrieved from https://ncc-ccn.gc.ca/our-plans

Natural Heritage Information Centre (NHIC). Various Dates. Make a Natural Heritage Map. Retrieved from http://www.ontario.ca/environment-and-energy/make-natural-heritage-area-map

NHIC. 2021. Ontario Species Lists. Retrieved from https://www.sdc.gov.on.ca/sites/MNRF-PublicDocs/EN/ProvincialServices/ONTARIO_SPECIES_LISTS.zip

Ontario Breeding Bird Atlas (OBBA). 2021. Atlas 3 Safe Dates/Breeding Dates. Retrieved from https://www.birdsontario.org/wp-content/uploads/Atlas-3-Safe-Dates-English-taxonomic-2021-04-03.pdf

Ontario Breeding Bird Atlas (OBBA): Cadman, et.al. 2007. The Atlas of the Breeding Birds of Ontario, 2001-2005. Toronto: Bird Studies Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, Ontario Nature. Retrieved from http://www.birdsontario.org/atlas/index.jsp

Ontario Butterfly Atlas (OBA): Macnaughton, A., R. Layberry, R. Cavasin, B. Edwards, and C. Jones. (Various dates). Retrieved from http://www.ontarioinsects.org/atlas_online.htm

Ontario Reptile and Amphibian Atlas (ORAA). (Various dates). Retrieved from https://www.ontarioinsects.org/herp/index.html

Ottawa Gatineau Geoheritage. 2022. Sites. Retrieved from https://www.ottawagatineaugeoheritage.ca/sites

Parsons. 2021a. New Civic Development for The Ottawa Hospital Environmental Impact Statement and Tree Conservation Report Master Site Plan

Parsons. 2021b. New Civic Development for The Ottawa Hospital Transportation Impact Assessment and Mobility Study: TIA Strategy Report

Parsons. 2022b. Site Servicing and Stormwater Report. The New Civic Development - The Ottawa Hospital Phase 3 and 4, Central Utility Plant and Main Hospital, Ottawa Ontario.

Parsons. 2022c. New Campus Development for The Ottawa Hospital: Site Plan Application for the Main Hospital Building. Transportation Impact Assessment Addendum #2.

Parsons. 2022d. The Ottawa Hospital New Civic Development. Proposed Roadway Modifications: RMA-2021-TPD-XXX-B

Paterson Group. 2022. Remedial Program for Impacted Areas, Proposed New Hospital Campus, Former Sir John Carling Building Area - Central Experimental Farm - Ottawa

Rideau Valley Conservation Authority (RVCA). 2021. RVCA Geoportal. Retrieved from https://gis.rvca.ca/html5/?viewer=rvcageoportal

Walker, R., O'Toole, A., Whynot, Z., Hanson, K., Cooke, S. (2010). Evaluation of the Aquatic Habitat and Fish Assemblage in an Urban Reach of the Historic Rideau Canal, Ottawa, Canada: Implications for Management in an Engineered System. Retrieved from https://www3.carleton.ca/fecpl/pdfs/Urban%20Ecosyst%20-%20Walker%20et%20al%202010.pdf