CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

Report
32952-5.2.2

Former CFB Rockcliffe Master Servicing Study

Prepared for Canada Lands Company
by IBI Group
Revised May 2015
Revised August 2015

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1 Introduction

1.1 Background

The former Canadian Forces Base (CFB) Rockcliffe has a long and honourable history of service to the Canadian public. The base was originally established by the Department of Defence in 1898 and at its peak totalled more than 326 ha. Over the years, the base has provided a wide assortment of military support operations beginning originally as a rifle range and broadening into a permanent airbase and an experimental aerial photography station in the 1920s.

The base continued as the headquarters of the Air Marshal Command into the 1950s and during the period following the Second World War, 467 housing units were built on the site to accommodate the short-term housing needs of returning military personnel.

In the 1960s, air operations at the base were terminated and by 1984 the Department of National Defence (DND) had indicated that its operational facilities were to be vacated. The residential component of the base, however, was to be retained for a short period. Today, no DND buildings remain on the site.

Over the years, large portions of the original site have been transferred from DND to other departments and agencies including the Royal Canadian Mounted Police (RCMP), the National Research Council (NRC), the National Capital Commission (NCC) and the Canadian Aviation and Space Museum, among others. The remaining property owned by DND totalled approximately 135 ha.

By the mid-1990s, the former CFB Rockcliffe site was identified as a potential major land disposal candidate for transfer to Canada Lands Company (CLC). Negotiations continued between CLC, DND and the Treasury Board Secretariat (TBS) for the ultimate transfer of the lands to CLC for development. The transfer occurred in 2011.

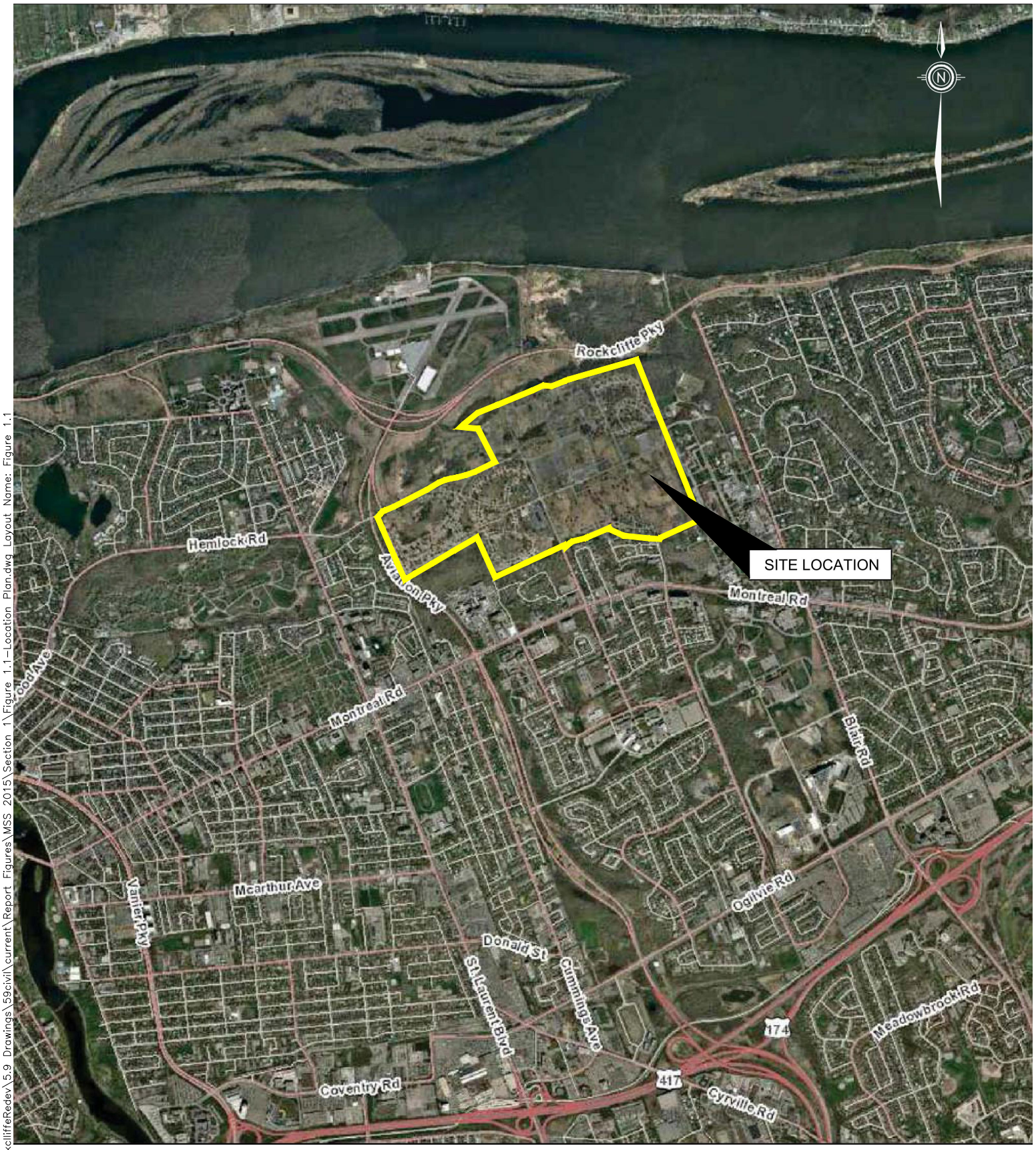
The acquisition of the decommissioned base by CLC offers the opportunity today to reconnect this site back into the urban fabric of the City and create a highly desirable mixed-use community for approximately 9,500 residents. The long-term development period to full build out is estimated to be 15-20 years. There is also the opportunity to provide space for a variety of employment uses providing up to 2,500 permanent jobs.

Due to the proximity to the downtown, the new community will allow for more intensive development than in the outer suburbs, yet at a lower scale than one would see closer to the core.

A variety of housing types will be built to provide a range of choices for people with different housing needs. A community core will have the greatest mix of land uses to provide amenities to the new neighbourhoods, and it will also have the most active and vibrant streets in the community.

1.2 Study Area

The study area measures 130.6 ha and is made up of 125.3 ha of CLC lands, and a 5.3 ha parcel of NRC lands located northeast of Montreal Road and Burma Road. The study area location is indicated on **Figure 1.1** and is situated on a plateau overlooking the Ottawa River and Gatineau Hills. It is bordered on the west by the Aviation Parkway; on the north by the Rockcliffe Parkway; on the east by the NRC Campus; and on the south by established residential communities (Thorncliffe Village, Fairhaven and Foxview) as well as the Montfort Hospital and



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Project Title	Drawing Title	Sheet No.
FORMER CFB ROCKCLIFFE MASTER SERVICING STUDY	LOCATION PLAN	FIGURE 1.1

Montfort Hospital Woods. The Rockcliffe Airport is also located in the vicinity of the site immediately to the north of the Rockcliffe Parkway.

There are currently three access points to the study area. Codd's Road extends north to the site from Montreal Road. From the west, access is from Hemlock Road, a two lane road which links with St. Laurent Boulevard and provides access to the Aviation Parkway. The third access point is through the NRC Campus to the east. Currently, this access is only open during business hours.

1.3 External Areas

Due to topography, existing drainage and municipal servicing, several adjacent areas external to the study area have been considered. They are summarized below and identified on **Figure 1.2**.

- Existing NRC Campus east of the study area;
- existing Thorncliffe Village, Foxview and Fairhaven residential developments south of the study area;
- portion of Codd's Road abutting study area to the south
- existing Montfort Hospital and Montfort Hospital Woods;
- existing NCC lands located between the study area and the Rockcliffe Parkway; and
- existing NCC lands identified as future museum site, abutting the study area to the northwest.

Each of the above is discussed in more detail in **Sections 2, 4, 5** and 6.

1.4 Objective

This Master Servicing Study is being completed in conjunction with the Community Design Plan (MMM Group and Meloshe & Associates, July 2015). The CDP is supported by an Existing Conditions Report, a Community Transportation Study, and by this Master Servicing Study (MSS). The MSS provides technical support to the CDP to develop a preferred municipal servicing alternative. The Terms of Reference for the MSS are enclosed in **Appendix A**.

The MSS is a high level study prepared based on the City's Water Master Plan (WMP) and Infrastructure Master Plan (IMP). A Design Brief to support the Plan of Subdivision approval must be prepared as per City guidelines such as the Water and Sewer Design Guidelines, the Fire Underwriters Survey (FUS), Related Technical Bulletins, etc.

The new infrastructure proposed for the site requires approval under the Ontario Environmental Assessment Act through the Municipal Class Environment Assessment. The MSS is prepared following the integration of the Municipal Class Environmental Assessment (EA) and Planning Act process as outlined in the Municipal Engineers Association (MEA) Municipal Class EA document. Specifically, the MSS has been completed to satisfy Phases 1 & 2.

1.5 Study Process

The process that has been followed in the development of this MSS is outlined below.

The existing conditions for water, wastewater, stormwater and shallow utilities were established based on review of as-built plans, historical drawings and reports, and field survey. Constraints and opportunities associated with the existing infrastructure and the natural environment that directly impact the development of the concept plan and municipal servicing alternatives were identified. The existing conditions data has been compiled in the "Existing Conditions Report Municipal Services" (IBI Group, July 2014).

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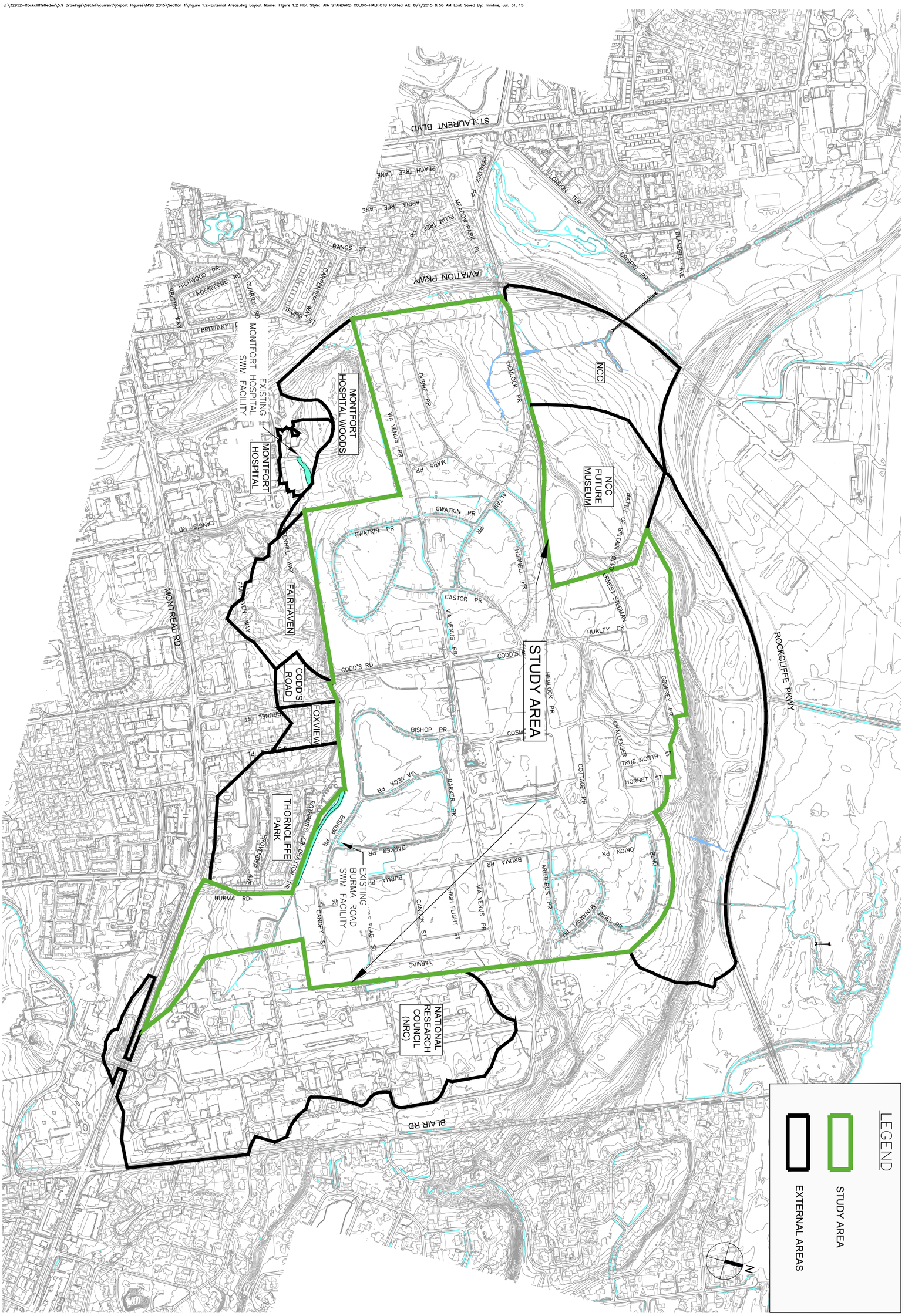

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FIGURE 1.2

EXTERNAL AREAS

FORMER CFB ROCKCLIFFE
MASTER SERVICING STUDY

IBI

Preliminary concept plans developed by the project's consulting team were evaluated through an extensive review process which included consultation with the Algonquins of Ontario, the public, and review agencies. The overall consultation process is documented in the 'Final Public Consultation Report' (Momentum, June 2014). Out of the process, a preferred development concept plan was established. That plan has been refined as part of the on-going planning process, and the latest version is presented on **Figure 1.3**. As part of this process, building heights and block densities have been established and are presented on **Figure 1.4**.

With the establishment of a preferred concept plan, criteria were established for water, wastewater and stormwater to evaluate municipal servicing requirements. Potential servicing design solutions have been identified and evaluated and a preferred solution identified. A summary of this process is provided in this document.

An integral component of this process is the City of Ottawa and CLC's desire to advance the Rockcliffe CDP as a pilot project for low impact development (LID). CLC's goal is for the development to be a model community for LID.

Since proposed LID elements are to be constructed as pilot projects for which the stormwater benefit's are presently unknown, at least the early developments of the subject site will include traditional stormwater management infrastructure based on current City and MOE criteria. LID measures will be incorporated into specific areas of the site as additional stormwater management elements with an aim of future monitoring to confirm potential benefits. CLC Aquafor Beech was retained by CLC to prepare the 'Stormwater Management Existing Conditions & LID Pilot Project Scoping' (May 2015). That report includes a detailed environmental review in the form of stormwater management existing conditions as part of the LID evaluation. That report should be read in parallel with this MSS document.

1.6 LID Stormwater Pilot Project

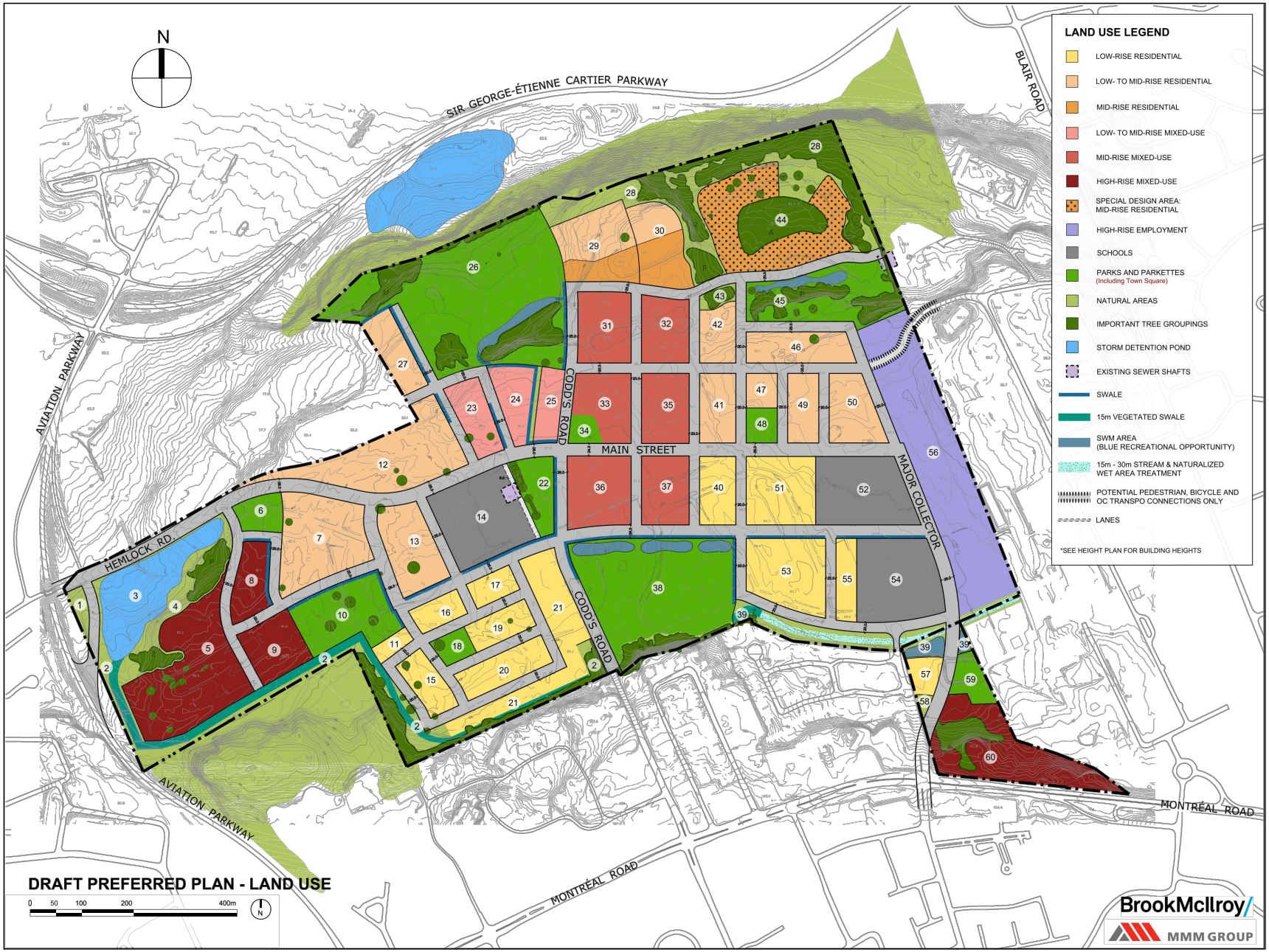
The City of Ottawa and CLC have agreed to pursue phased stormwater management demonstration projects for former CFB Rockcliffe using LID Best Management Practices (BMPs). As noted in **Section 1.5**, traditional stormwater servicing and LID stormwater alternatives were reviewed in parallel as two independent studies, namely, this MSS and the 'Former CFB Rockcliffe LID Stormwater (SWM) Pilot Project Study' (Aquafor Beech, May 2015).

The MSS has been completed using sound engineering principles in the development of the preferred stormwater solution applying conventional stormwater practices including, but not limited to, piped stormwater infrastructure and stormwater management facilities. The preferred stormwater solution using conventional stormwater practices has been developed in accordance with regulatory requirements to service the proposed development as a stand-alone system and to accommodate the potential LID practices identified in the independent study detailed below.

The 'Former CFB Rockcliffe LID Stormwater (SWM) Pilot Project Study' prepared by Aquafor Beech is intended to permit the implementation, monitoring, and evaluation of alternative stormwater management systems based upon the principles of low impact development. The work program for the LID Stormwater Pilot Project Study was developed in consultation with the City of Ottawa and will provide direction for the implementation of LID controls in parallel with the conventional storm servicing presented in this MSS.

A SWM Working Group was formed and consisted of key members of the City of Ottawa, CLC staff, and consultants engaged by CLC. The SWM Working Group will:

- Make recommendations to the City of Ottawa staff working on former CFB Rockcliffe
- Determine the information required to design the integrated LID SWM system
- Determine the information to be collected during the monitoring programs



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NTS	FORMER CFB ROCKCLIFFE MASTER SERVICING STUDY	PREFERRED CONCEPT PLAN	FIGURE 1.3

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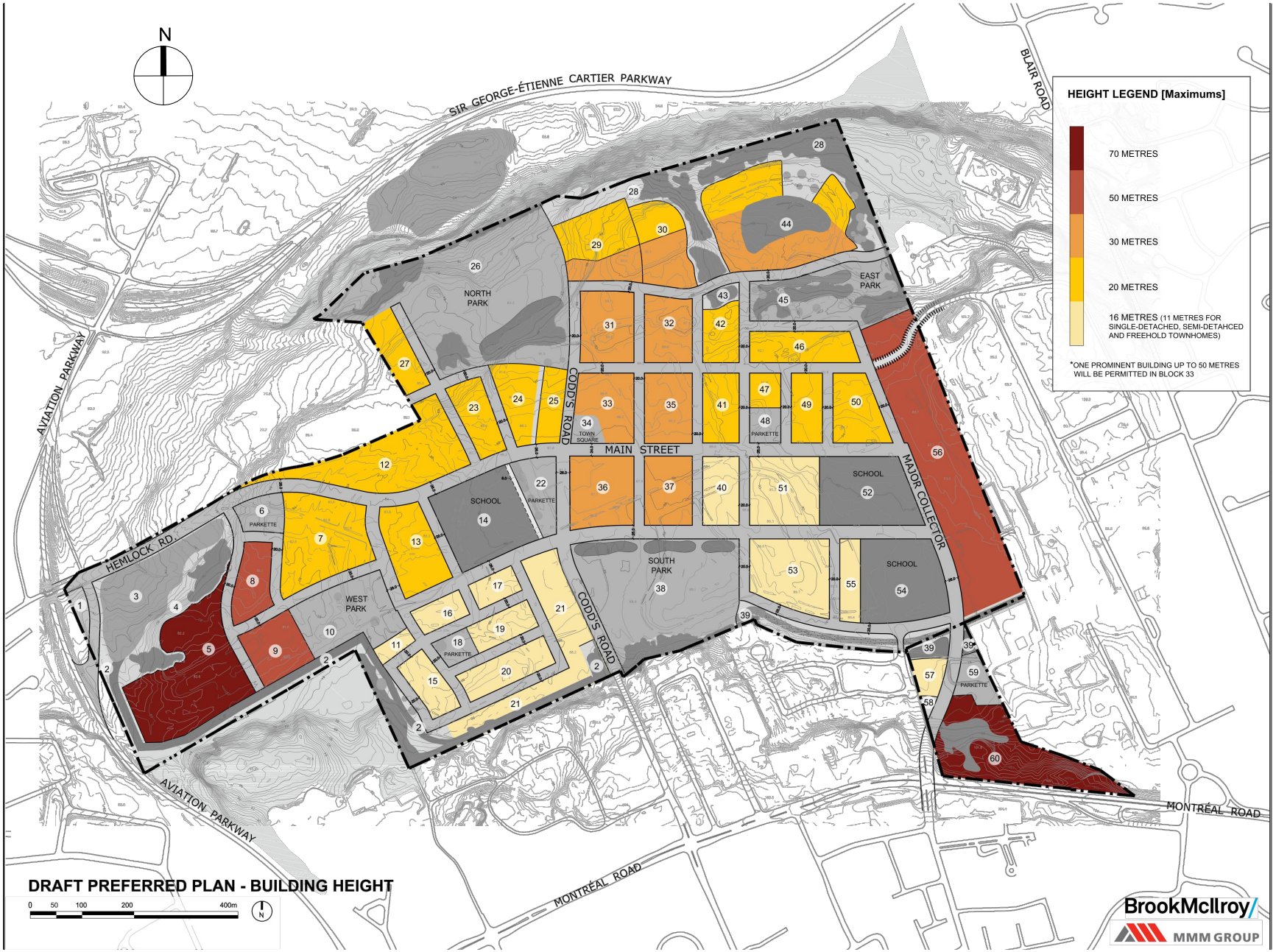

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NTS	FORMER CFB ROCKCLIFFE MASTER SERVICING STUDY	BUILDING HEIGHTS AND BLOCK DENSITY	FIGURE 1.4

- Determine the information to be collected during the monitoring programs
- Review the collected monitoring data from each successive phase of development
- Determine how and to what extent LID measures will be implemented beyond the initial phase based upon monitoring and whether accounting for some or all LID benefits in the design of the conventional storm servicing can be supported.

The proposed LID implementation process for former CFB Rockcliffe was developed using a phased Adaptive Management System (AMS) approach whereby a science-based methodology is developed and applied to understand and quantify the function, potential benefits and drawbacks from the proposed LID approaches. In this regard, each phase of potential LID implementation corresponding to the phases of development will involve the completion of six steps:

1. Planning (subject of the LID SWM Pilot Project Study)
2. Construction
3. Monitoring
4. Reporting
5. Quantification of benefits
6. Refinement of the LID approach prior to the subsequent phase of LID implementation

Steps 5 and 6 (Quantification of benefits and Refinement) are critical process elements, allowing 'real-world' results to be communicated to and vetted by City of Ottawa staff and agencies and subsequently translated into direction for both the refinement of future LID implementation and refinement of the conventional storm servicing presented in the MSS. In this manner, it is only the quantifiable benefits that will influence stormwater servicing of former CFB Rockcliffe.

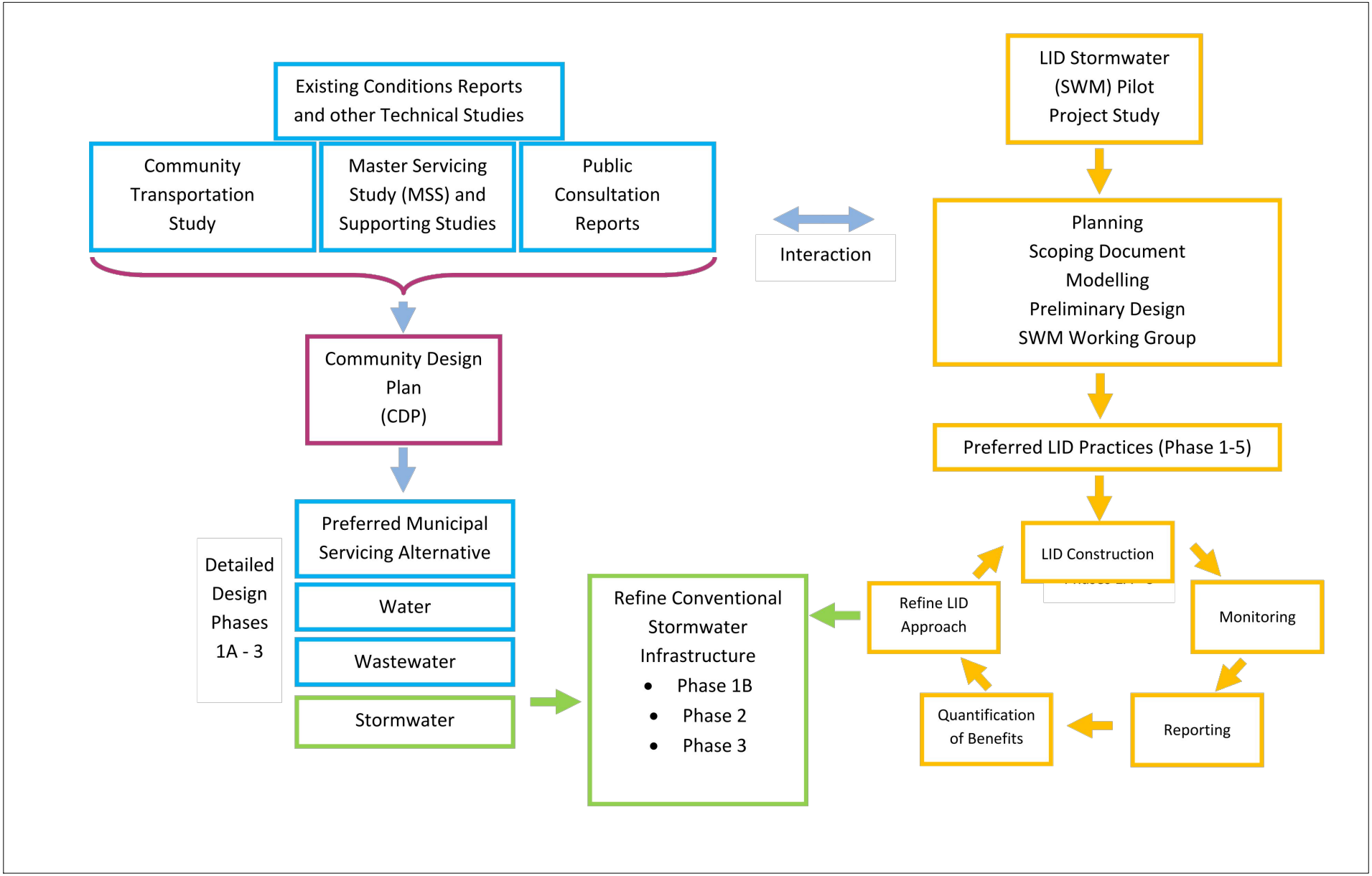
As discussed in the previous section, the LID SWM Pilot Project Study report should be read in parallel with this MSS document as it relates to storm sewer servicing. Furthermore, forthcoming monitoring reports which quantify the performance of LID practices as it relates to water quality, water balance, volume, and peak flows should also be considered and related to the aforementioned two independent documents. The implementation of stormwater servicing for the redevelopment of former CFB Rockcliffe will be flexible and realizes that stormwater BMPs, techniques and approaches will change as the knowledge base advances, that future phases and associated monitoring will refine the findings from the MSS and LID SWM Pilot Project Study and that this overall stormwater servicing approach is not static.

An overall study process is detailed in **Figure 1.5**. It summarizes the MSS, CDP, LID SWM Pilot Project Study and the proposed LID implementation process for former CFB Rockcliffe and uses the AMS approach.

1.7 Synopsis of Previous Studies

In addition to the above-noted studies, the following reports have been referenced in the preparation of this document.

The report "Stormwater Management Study – Burma Road Development, City of Ottawa" prepared by J.L. Richards (February 1991) outlined the design of the Burma Road Stormwater Management Facility providing water quantity control for the Thorncliffe Village development, located to the southeast of the Rockcliffe site off Burma Road. The report identified the drainage areas tributary to the SWM facility, which functions as a dry pond; described the downstream receiving storm sewers within the Rockcliffe lands; and, outlined the peak controlled discharge rate to each of the dual receiving outlet sewers.



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NTS	FORMER CFB ROCKCLIFFE MASTER SERVICING STUDY	OVERALL STUDY PROCESS	FIGURE 1.5

The report "Stormwater Management Report – Montfort Long Term Care Facility, City of Ottawa" prepared by Stantec (September 2002) outlined the design of the Montfort SWM Facility that provides water quantity control for a portion of the Montfort Hospital site.

The report "Alvin Heights/Rockcliffe Airbase Sanitary Sewer System Study Phase II" prepared for the former Regional Municipality of Ottawa Carleton (RMOC) by J.L. Richards and Associates Limited in 1998 was completed in recognition of the fact that the existing wastewater collection system in the vicinity of former CFB Rockcliffe contributed excess combined sewer flows to the Ottawa Interceptor Sewer (IOS) and Combined Sewer Overflows (CSOs) to the Ottawa River. In 1997, the RMOC developed a CSO policy to both decrease flows into the IOS sewer and decrease CSOs to the Ottawa River. It commissioned the 1998 study to review ways of achieving the new CSO policy performance objectives and to limit flows into the IOS to less than its locally allocated capacity, each in a cost effective manner. Among other items, the 1998 report recommended replacement and enlargement of the Alvin Heights, Blasdell and Airbase Pull-Back sewer system; construction of a separated sewer system when the former CFB Rockcliffe site is redeveloped; and replacement of the RCAF Pull-Back Sewer. The RMOC completed the first of these recommendations in 1999 and 2000.

The City of Ottawa Infrastructure Master Plan (September 2013) is a City-wide document that supports the Official Plan by ensuring there is enough infrastructure capacity to accommodate development until 2031. The 2013 IMP accomplishes this by taking high-level directions on infrastructure growth, operation and renewal from relevant long term planning documents. The 2013 IMP sets out a series of projects that will have to be undertaken in order to achieve the City infrastructure, land use and affordability goals, including redevelopment of CFB Rockcliffe.

The City of Ottawa Infrastructure Master Plan Wastewater Collection System Assessment (2013) documents the approach, assessment findings and recommendations stemming from the City's wastewater collection system assessment component of the 2013 IMP. The objective of the report is to identify growth-related upgrades to the trunk wastewater collection system. The report required the assessment of historical and recent sanitary sewer flow monitoring data to determine characteristic flow parameters throughout the City.

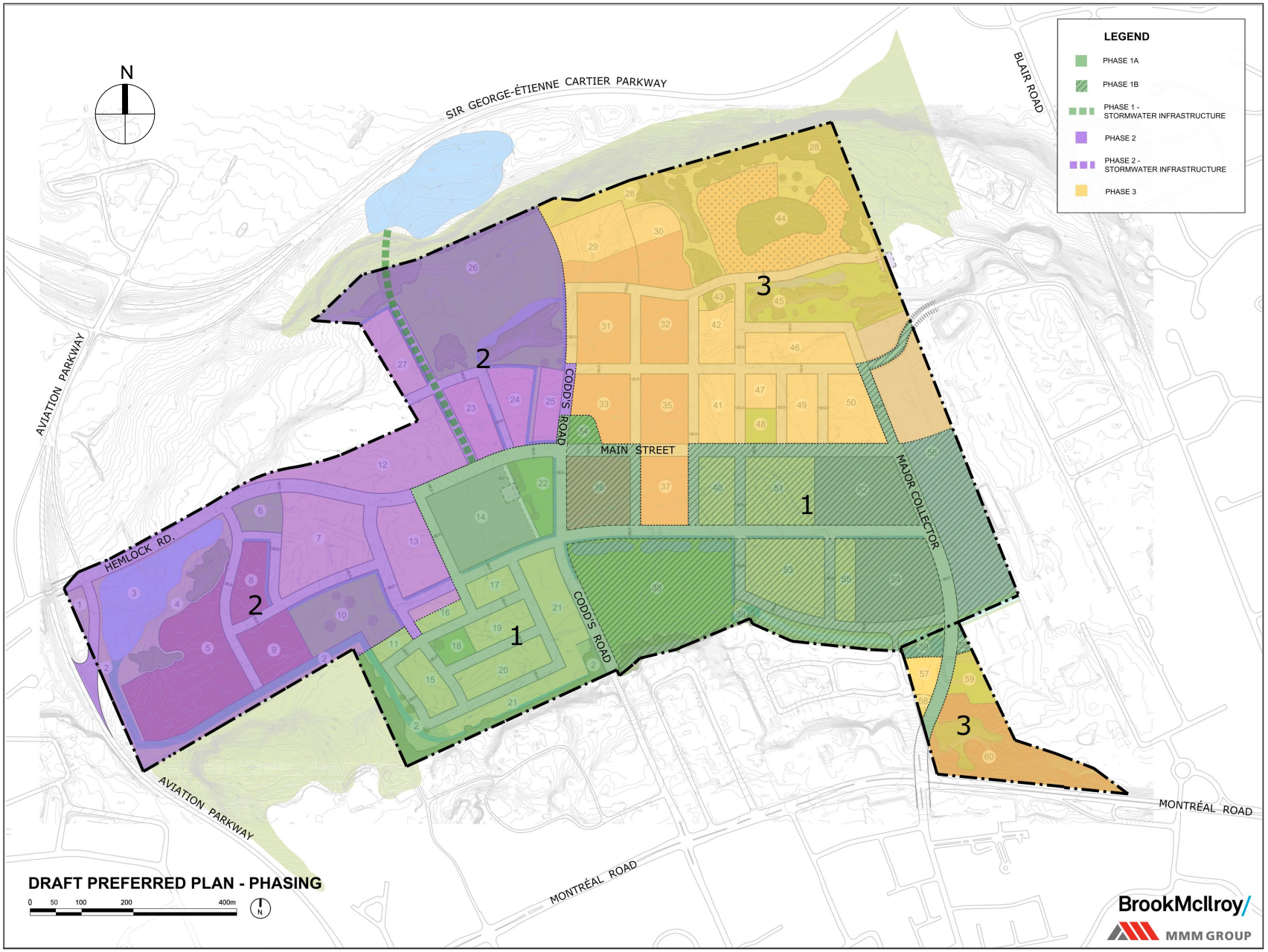
The City of Ottawa Water Master Plan (2013) documents the assessment of the City of Ottawa's water supply and distribution system infrastructure to determine the infrastructure upgrade requirements to meet growth, reliability and renewal needs in the medium (to 2031) and longer terms (to 2060). This WMP provides the City with a number of project recommendations to set the groundwork for long-term planning and timing requirements for the City's water supply and distribution system.

1.8 Development Phasing

The proposed development phasing plan for former CFB Rockcliffe is indicated on **Figure 1.6**. Phase 1 will include about 68 ha of the central and eastern portions of the study area and in time will be sub-phased into phase 1A and 1B. Phase 1A will include Codd's Road up to the Town Centre and most of the low density residential development areas west of Codd's Road; a school site and park. The approximate timing of phasing is summarized in **Table 1.1**.

Table 1.1 Timing of Construction Phasing

PHASE	CONSTRUCTION PERIOD	COMMENTS
Phase 1A	2015-2016	Servicing in 2015: sales in 2016
Phase 1B	2017-2018	Servicing in 2016: sales in 2017-2018
Phase 2	2019-2024	Servicing in 2018: sales in 2019-2024
Phase 3	Starting 2024	Sales starting in 2024



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NTS	FORMER CFB ROCKCLIFFE MASTER SERVICING STUDY	DEVELOPMENT PHASING PLAN	FIGURE 1.6

2 Existing Conditions and Background Studies

2.1 Topography

Most of the site is relatively flat, generally sloping from the south boundary downward to the north property line. The elevation across the study area ranges from about 100 to 70 m. Several small terraces bisect the plateau areas and provide additional grade downward from the southeast to the northwest; however the site is characterized by two distinct escarpments. One runs along the south property line and the second is adjacent to the north property line. To the north, the base of the escarpment descends to approximately 55 m at the Rockcliffe Parkway, and about 45 m at the Ottawa River.

Historical drainage patterns include a drainage swale which bisected the former CFB Rockcliffe site, originating in the southeast corner on NRC lands and discharging at the northwest limit crossing the Aviation Parkway via a culvert and outletting to the Ottawa River along the north limit of the RCMP Lands. Most of the plateau lands of the site naturally slope in this direction. A second drainage swale within the former CFB Rockcliffe site drains the northeast quadrant of the site northward over the north escarpment and crosses the Aviation Parkway via a culvert ultimately discharging to the Ottawa River. **Figure 2.1** shows the existing surface drainage patterns of the former CFB Rockcliffe site. These two original overland drainage routes remain the primary outlets for major storm events.

Due to the location of the southern escarpment, there are natural external drainage areas located to both the south and east of the Rockcliffe property. Surface drainage from these areas will have to be accommodated as part of the stormwater management plan during development.

Surface drainage from the NRC Campus, which is located to the east of the Rockcliffe site, routes onto the subject site. The southern portion of the NRC property discharges surface flow towards the existing Burma Road SWM Facility. However, the central portion of the NRC property directs surface runoff towards the subject site near Tarmac Street.

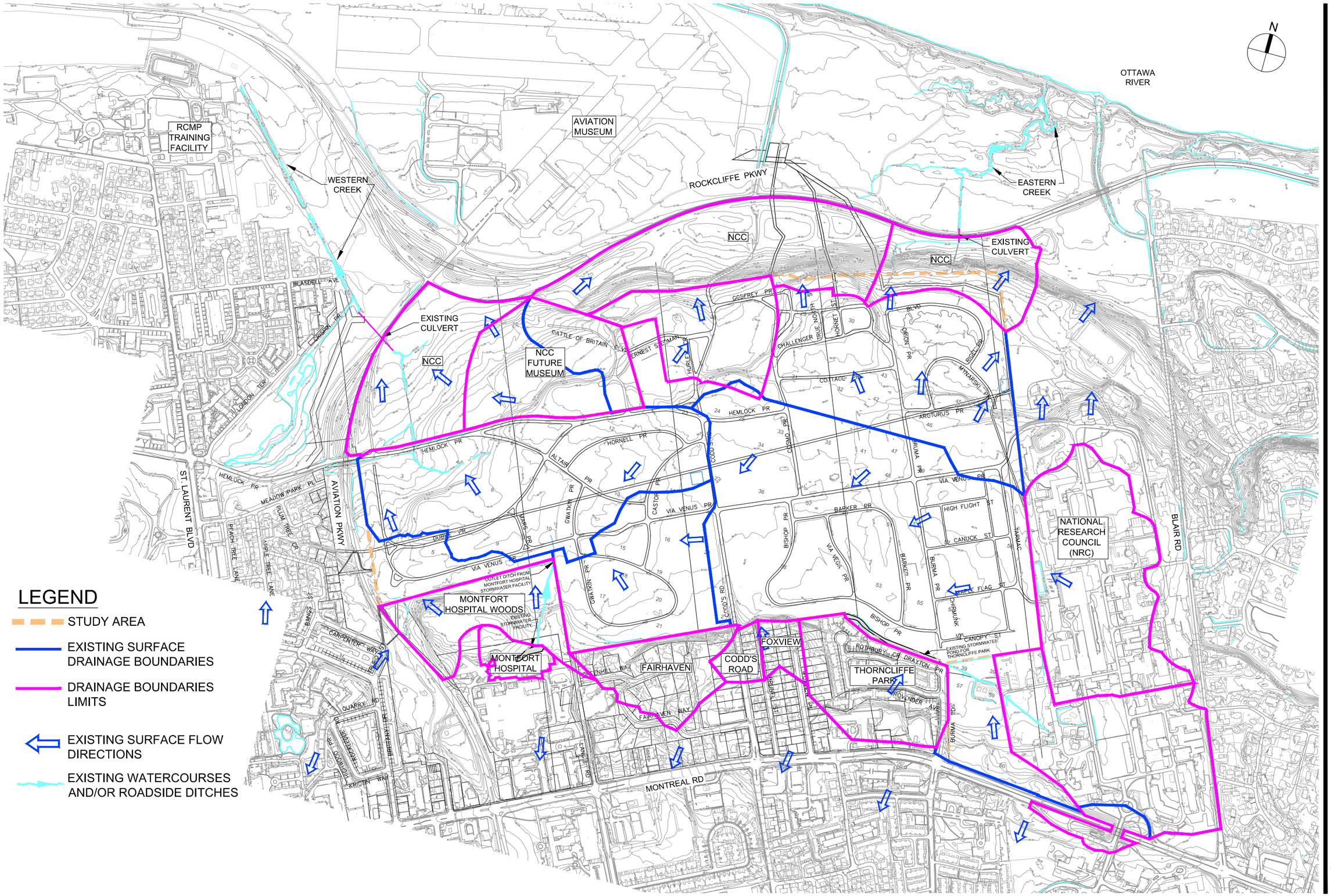
The natural topography through most of Thorncliffe Village is towards the north into the existing SWM facility. There is also surface drainage tributary to the subject site from existing developments located on top of the southern escarpment including Foxview, Fairhaven and the Montfort Hospital. The Foxview residential development, located at Codd's Road, includes a minor storm drainage system but major storm runoff flows over the escarpment onto the subject site. The Fairhaven community, which is a rural estate development located immediately east of the Montfort Hospital, does not have a piped storm sewer collection system but rather uses road side ditches to convey surface runoff. Surface drainage from the northern portion of that development is directed toward the subject site.

The northeastern portion of the Montfort Hospital site is provided with a SWM Facility that outlets to an existing swale through the adjacent Montfort Hospital Woods. Outflow from the SWM facility, as well as major system flow from the northeastern portion of the hospital site, and flow from the Montfort Hospital Woods all makes its way to the road side ditch system near Via Venus Private.

2.2 Geotechnical

2.2.1 General

The following section provides an overview of the geology of the former CFB Rockcliffe site and further describes the surficial and bedrock geology. Several geotechnical investigation reports for the subject site have been completed by DST Consulting Engineers Inc. (DST), including:



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EXISTING SURFACE
DRAINAGE PATTERNS

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FIGURE 2.1