Report
Project: 126884-6.04.01

ADEQUACY OF PUBLIC SERVICES REPORT
1470 HUNT CLUB ROAD

Prepared for LARGA BAFFIN C/O PHOENIX HOMES
by IBI Group
September 21, 2021

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APPENDICIES:

1 INTRODUCTION

IBI Group has been retained by Phoenix Homes to prepare a conceptual servicing of an assembly of parcels of land comprised of 1452, 1460, and 1470 Hunt Club Road and 1525, 1531 and 1545 Sieveright Avenue to support the proposed development plan by the Larga Baffin Group.

The subject parcel is approximately 2 ha and is bounded by Hunt Club Road to the North, and Sieveright Ave to the south, and existing commercial/residential lands to the east, and commercial lands to the west. Refer to **Figure 1** in **Appendix A** for site location.

The proposed development currently consists of one multi storey 354 bed rooming house type facility. A copy of the proposed Site Plan, prepared by DTAH Architects is included in **Appendix A**. The plan illustrates the building occupying the northerly section of the parcel and providing vehicular access to the site from both Hunt Club Road and Sieveright Ave. The proposed Site Plan configuration also allows for additional development of the southern section of the site, any such development would be under a separate SPA.

This report reviews whether the existing municipal water, sanitary and storm infrastructure is capable of servicing the proposed development to support the owner's application for a Zoning Bylaw Amendment. The conceptual servicing design conforms to current City of Ottawa and MOE design criteria. A pre-consultation meeting was held with the City and the meeting notes are included in **Appendix A**.

2 WATER DISTRIBUTION

2.1 Existing Conditions

The proposed development is located within the City of Ottawa pressure zone 2C. There is a 400 mm diameter watermain along Hunt Club and a 300mm diameter watermain along Sieveright, both mains service buildings within the subject parcel. Existing services within the project site will be disconnected and abandoned per City of Ottawa Standards. **Figure 2** in **Appendix B** illustrates the location of the existing water plant adjacent to the site.

2.2 Design Criteria

2.2.1 Water Demands

The proposed development plan includes a 354 bed facility. The Ottawa Design Guidelines – Water Distribution does not contain specific consumption rates for these usages, we assume the water demand would mimic the daily sewage flows contained in appendix 4-A of the Ottawa Sewer Design Guidelines and are summarized as follows:

- Rooming house 200 l per bed per day

A copy of the water demand calculation sheet is included in **Appendix B**, the City of Ottawa provided boundary conditions for the site which are also included in **Appendix B** and summarized below. The water demand calculation also included a nominal demand for a possible future building on the southern portion of the site to provide a more realistic demand for the parcel.

	Hunt Club Connection	Sieveright Connection
Minimum HGL	123.8	123.8
Maximum HGL	130.9	130.9
Max Day + FireFlow (233.3 L/s)	125.1	125.2

2.2.2 System Pressures

The 2010 City of Ottawa Water Distribution Guidelines states that the preferred practice for design of a new distribution system is to have normal operating pressures range between 345 kPa (50 psi) and 552 kPa (80 psi) under maximum daily flow conditions. Other pressure criteria identified in the guidelines are as follows:

Minimum Pressure	Minimum system pressure under peak hour demand conditions shall not be less than 276 kPa (40 psi).
Fire Flow	During the period of maximum day demand, the system pressure shall not be less than 140 kPa (20 psi) during a fire flow event.
Maximum Pressure	Maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi). In accordance with the Ontario Building/Plumbing Code the maximum pressure should not exceed 552 kPa (80 psi) in occupied areas. Pressure reduction controls may be required for buildings where it is not possible/feasible to maintain the system pressure below 552 kPa.

2.2.3 Fire Flow Rate

The Fire Underwriters Survey (FUS) method of calculating fire flow requirements is to be used in accordance with the Ottawa Design Guidelines – Water Distribution. The expected fire flow rating for Building A is 233.3l/s, and for the purpose of this assignment is assumed the future building would have a rating of 150 l/s. Preliminary FUS calculation for Building A is included in **Appendix B**, these values will be confirmed at detailed design.

2.3 Conceptual Water Plan

A conceptual servicing plan **Figure 5** in **Appendix B** illustrates the conceptual layout of the water network. A proposed 200mm diameter main will service the site and will be connected to both Hunt Club and Sieveright mains for redundancy. At detail design a Hydraulic Model of the water network will be developed using H20 MAP Software by MWH Soft Inc., to ensure both domestic and fire flows are achievable. For the purposes of this report assuming a minimal loss within the interconnecting main the pressures within the site can be estimated as follows:

Minimum Pressure (Peak Hour) – The minimum peak hour pressure on the site can be estimated as HGL 123.8m – meter elevation 90.95m = 32.85m or 322 kPa which exceeds the minimum requirement of 276 kPa. The pressure on the top floor can be estimated as 123.8m- 111.75m = 12.05m or 118.2 KPa which is below the minimum of 276 kPa and will require a water pump.

Fire Flow – The max day plus fire flow can be estimated as HGL 125.15 -93.75 = 31.4m or 308 KPa which exceeds the minimum of 140kPa.

Max HGL (High Pressure Check) – The high pressure check can be estimated as HGL 130.9 – 90.95 = 39.95m or 392 KPa which falls below the maximum of 552 kPa, therefore no pressure reducing valve is required.

The above results indicate the municipal infrastructure can support the proposed development, a detailed water model will be prepared at detail design and the conceptual design will be refined based on stakeholder input and designed in accordance with City of Ottawa and MOE requirements.

3 WASTEWATER SYSTEM

3.1 Existing Conditions

Municipal sanitary sewers abut the property along both Hunt Club Road and Sieveright Dr, which provide servicing to the existing properties. **Figure 3** in **Appendix C** illustrates the existing sanitary sewers along the adjacent streets.

3.2 Design Criteria

The sanitary flows for the development are based on the City of Ottawa design criteria which includes, but it not limited to the following:

- Rooming house 200 l per bed per day
- Institutional/Industrial/Commercial: 28,000l/d/Ha
- Peak Factor (ICI only) 1.5
- Extraneous Flow (Infiltration) 0.33l/s/Ha

3.3 Conceptual Wastewater Plan

The conceptual servicing plan **Figure 5** in **Appendix B** illustrates the conceptual layout of the sanitary sewers to service the development. It is proposed to mirror the existing conditions where both sewers are used, the north half of the site with the proposed building will connect to the adjacent Hunt Club sanitary sewer, and the south half of the site where a future building would connect to the existing Sieveright sanitary sewer. Conceptual sewer design sheet in **Appendix C** details the proposed service laterals to service the proposed building, and potential future building.

The existing municipal sewer system that services these parcels would have been designed based on commercial sewage loading of 50,000l/Ha/d and infiltration allowance of 0.28l/s/Ha, for the 2 Ha site would result in an average flow of 1.72l/s.

Avg commercial flow: 50,000l/Ha/d X 2Ha=100,000l/d = 1.157 l/s

Infiltration allowance: 2Ha X 0.28l/s/Ha = 0.56 l/s,

Original avg. design flow, 1.157 + 0.56 = 1.717 l/s

Based on the previously noted flow rates of 200l/d/bed, and 28,000l/Ha/d for the commercial portion the average flow plus infiltration flow would be 1.8l/s.

Avg pop flow: 354 X 200l/d= 70,800l/s = 0.819 l/s

plus 28,000l/Ha/d X 1Ha=28,000l/d = 0.324 l/s, avg flow = 0.819+0.324 = 1.143 l/s

Infiltration allowance: 2Ha X 0.33l/s/Ha = 0.66 l/s,

Rezoned avg flow, 1.143 + 0.66 = 1.803 l/s

The proposed redevelopment including an allowance for a future building results in a very minor theoretical increase in average flow to the downstream system. It is expected that the downstream system will have the capacity to accommodate the proposed redevelopment. The conceptual design will be refined based on stakeholder input and the onsite sewers will be designed to meet City of Ottawa and MOE requirements.

4 STORMWATER MANAGEMENT

4.1 Background

During the Pre-consult with the City it was noted the site may be within the Sawmill Creek Watershed. A review of the Sawmill Creek watershed study mapping reveals a very small portion of the site appears to be within the Sawmill Creek watershed boundary. However, after tracing the outlet for all of the adjacent storm sewer that services this site (as illustrated on the City of Ottawa Geomaps site) the storm sewers all discharge into the existing SWM facility located at Hunt Club and Hawthorne, and do not discharge into the Sawmill Creek system. Therefore, this site should not be subject to the Sawmill Creek watershed study requirements, As noted in the pre-consult meeting notes the site will be subject to Cities standard site plan requirements for infill sites serviced by existing storm sewer systems. **Figure 4** in Appendix illustrates the storm sewers adjacent to this site, a 1050mm diameter storm sewer is located in Sieveright, and along Hunt Club the site is at a highpoint and no storm sewer actually fronts the site, however any surface runoff to Hunt Club is accommodated by storm sewers commencing shortly downstream of the site (in both directions).

4.2 System Concept

The stormwater management system for the site incorporates standard urban drainage design and stormwater management features that can be summarized as follows:

- a dual drainage concept;
- routing of surface runoff; and,
- an end-of-pipe SWM facility (existing SWM pond).

The stormwater management system has been developed based on the MOE *Stormwater Management Planning and Design Manual* (March 2003) and the *City of Ottawa Sewer Design Guidelines* (October 2012). Additionally, the system has incorporated, wherever possible given the existing trunk sewer inlet capacity restrictions, the new guidelines set forth within the Technical Bulletin PIEDTB-2016-01.

4.2.1 Minor System

The minimum minor system capture of ICDs for the site will be based on 2-year SWMHYMO generated flows for individual areas. The subject site will be modelled using SWMHYMO to confirm minor and major system flows. Hydrographs from the site will be downloaded to XPSWMM hydraulic model to confirm hydraulic grade line within the proposed storm sewers.

4.2.2 Major System

Inlet control devices (ICDs) will be proposed to control the surcharge in the minor system during infrequent storm events and maximize the use of available on-site storage. Surface runoff in

excess of the minor system capture will cascade via overland towards the southern section with and emergency outlet to Sieveright.

4.3 Hydrological Analysis

Hydrological analysis of the proposed dual drainage system of the subject site will be conducted using SWMHYMO at detail design stage. This technique offers a single storm event flow generating and routing.

The primary focus of the hydrological analysis will be to evaluate surface flow and ponding conditions during the 100-year storm event in order to satisfy City of Ottawa Sewer Design Guidelines (2012) in terms of velocity x depth. The 2-year simulation will be performed to assure that after the storm is over there will be no ponding on the road surfaces. The parameters to be used to model the subject site are presented below.

4.3.1 Design Storms and Drainage Area Parameters

The following design parameters will be used in the evaluation of the stormwater management system for the subject site:

4.3.2 Design Storms

- 2, 5 and 100-year, 12-hour SCS type II storm event;
- 5 and 100-year, 3-hour Chicago storm event with a 10-minute time step, including a 100-year + 20% 3-hr Chicago storm per ISDTB-2012-1;
- July 1, 1979 and August 8, 1996 Historical storms as per the City of Ottawa Sewer Design Guidelines (2012);
- 100-year, 12-hour SCS type II storm event with a 20% increase in intensity, as per the Technical Bulletin ISDTB-2012-1

4.3.3 Run-Off Coefficients

The run-off coefficients for the minor system design will be derived from an analysis of a representative sample of the proposed development area. To be confirmed at detail design, it is anticipated the coefficients will be similar to the following:

	C^{Ave}
Roof top	0.90
Asphalt and concrete surfaces	0.90
Landscaped areas	0.2
Predevelopment	0.5

4.3.4 Time of Concentration

Inlet times of 10 min. for road segments and rear yard inlets will be utilized as per the City of Ottawa Sewer Design Guidelines (2012).

4.3.5 Area and Imperviousness:

The catchment areas and imperviousness values will be based on grading and proposed surface materials, all to be finalized at SPA.

4.4 Conceptual Storm Sewer System

The conceptual servicing plan **Figure 5** in **Appendix B** illustrates a conceptual layout of the storm sewer network to service the site. The storm sewers notes are estimated sizes and at detail design stage will be sized to meet City of Ottawa and MOE requirements for SPA.

The site will be restricted to a total peak design flow 212.89 l/s, which is equivalent to 2-year peak flow with a C=0.5. For the purposes of this report It is assumed a small portion (0.1Ha) of the site adjacent to the existing boulevards may discharge uncontrolled in to the municipal systems from the site, such an area would generate approximate 14.89l/s during a 100yr event, this flow would reduce the allowable discharge from the site to 198l/s . To achieve this, onsite SWM measures such as roof top storage, surface storage, and subsurface storage can be employed. Based on the current concept, and assuming roof top storage is available, the modified rational method calculation in **Appendix D** provides a preliminary calculation of the required storage volumes, which can be summarized as follow, all flow rates and storage volumes will be confirmed at detail design stage.

ICD AREA	TRIBUTARY AREA	AVAILABLE STORAGE (M^3)	100-YEAR STORM		2-YEAR STORM	
			RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M^3)	RESTRICTED FLOW (L/S)	REQUIRED STORAGE (M^3)
Roof Building 1	0.425	159.38	23.63	156.53	23.63	38.21
Roof Building 2	0.195	73.13	11.03	71.35	11.03	17.33
Landscape/parking	1.280	320.00	163.34	316.19	163.34	40.24
Uncontrolled	0.100		14.89		6.41	
TOTAL	**2.000**	**552.51**	**212.89**	**544.07**	**204.41**	**95.79**

5 SOURCE CONTROLS (LID's)

5.1 General

As noted, an existing stormwater management facility provides end of pipe quantity and quality treatment for captured stormwater. In addition to the stormwater management facility, on site level or source control management of runoff will be provided. Such controls or mitigative measures are proposed for the development not only for final development but also during construction and build out. Some of these measures are:

- flat lot grading;
- bio swales; and
- vegetation planting;

5.2 Lot Grading

In accordance with local municipal standards, all lot grading will be between 2.0 and 7.0 percent. The majority of landscaped areas will be directed to a swale drainage system. Typically, swales will have slopes between 1 and 2%, the low slopes will promote infiltration of runoff before being captured by the minor system. (swales with less than 1.5% slope will require subdrains per City Standards). A conceptual grading plan is illustrated on **Figure 6.1** in **Appendix D**, this conceptual plan illustrates how the site could be graded to tie into existing adjacent lands, municipal ROW and provide overland flow routing for major stormwater.

5.3 Bio Swales

It is possible to include bioswales within the proposed parking/landscape areas. The parking lot can be constructed such that runoff is directed to the bioswales, this will promote water quality treatment through settling, absorption, filtration and infiltration and a slow release rate to the conveyance network.

5.4 Vegetation

As with most site plan agreements, the developer will be required to complete a vegetation and planting program. Vegetation throughout the development including planting along drive isles, boulevards and within private gardens provides opportunities to re-create lost natural habitat.

6 CONVEYANCE CONTROLS

6.1 General

Besides source controls, the development also proposes to use several conveyance control measures to improve runoff quality. These will include:

- flat vegetated swales;
- catchbasin and maintenance hole sumps; and
- pervious swale drainage.

6.2 Flat Vegetated Swales

The site grading will make use of relatively flat vegetated swales where possible to encourage infiltration and runoff treatment.

6.3 Catchbasins

All catchbasins within the development, will be constructed with minimum 600 mm deep sumps. These sumps trap pollutants, sand, grit and debris which can be mechanically removed prior to being flushed into the minor pipe system. Both landscape and road catchbasins will be fabricated to OPSD 705.010 or 705.020. All storm sewer maintenance holes servicing local sewers less than 900 mm diameter shall be constructed with a 300 mm sump as per City standards.

6.4 Pervious Swale Drainage

Some of the swales will be constructed with filter wrapped perforated drainage pipe constructed below the swale. This perforated system is designed to provide some ground water recharge and generally reduce both volumetric and pollutant loadings that enter the minor pipe system.

Typically, a 250 mm diameter perforated pipe wrapped in filter sock is constructed in a crushed clear stone surround at an invert elevation of approximately 0.8 m below grade. These pipes are in turn directly connected to catchbasins at regular intervals as per City Standards.

7 SEDIMENT AND EROSION CONTROL PLAN

7.1 General

During construction, existing stream and conveyance systems can be exposed to significant sediment loadings. A conceptual sediment and erosion control will be detailed during the detailed design stages. Although construction is only a temporary situation, it will be proposed to introduce a number of mitigative construction techniques to reduce unnecessary construction sediment loadings. These may include:

- groundwater in trench will be pumped into a filter mechanism prior to release to the environment;
- bulkhead barriers will be installed at the nearest downstream manhole in each sewer which connects to an existing downstream sewer;
- seepage barriers will be constructed in any temporary drainage ditches;
- filter cloths will remain on open surface structure such as manholes and catchbasins until these structures are commissioned and put into use; and
- Silt fence on the site perimeter.

7.2 Trench Dewatering

Although little groundwater is expected during construction of municipal services, any trench dewatering using pumps will be discharged into a filter trap made up of geotextile filters and straw bales similar in design to the OPSD 219.240 Dewatering Trap. These will be constructed in a bowl shape with the fabric forming the bottom and the straw bales forming the sides. Any pumped groundwater will be filtered prior to release to the existing surface runoff. The contractor will inspect and maintain the filters as needed including sediment removal and disposal and material replacement as needed.

7.3 Bulkhead Barriers

At the first new manhole constructed within the development that is immediately upstream of an existing sewer a temporary ½ diameter bulkhead will be constructed over the lower half of the outletting sewer. This bulkhead will trap any sediment carrying flows thus preventing any construction-related contamination of existing sewers. The bulkheads will be inspected and maintained including periodic sediment removal as needed and removed prior to top course asphalt being laid.

7.4 Seepage Barriers

The presence of catchbasins and ditch inlets necessitate the installation of seepage barriers. These barriers will consist of both the Light Duty Straw Bale Barrier as per OPSD 219.100 or the Light Duty Silt Fence Barrier as per OPSD 219.110. The barriers are typically made of layers of straw bales or geotextile fabric staked in place. All seepage barriers will be inspected and maintained as needed.

7.5 Surface Structure Filters

All catchbasins, and to a lesser degree manholes, convey surface water to sewers. However, until the surrounding surface has been completed these structures should be covered in some fashion to prevent sediment from entering the minor storm sewer system. Until landscaped areas are sodded or until drive ilses and parking lots are asphalted and curbed, catchbasins and manholes will be constructed with geotextile filter bags or a geotextile filter fabric located between the structure frame and cover respectively. These will stay in place and be maintained during construction and build until it is appropriate to remove same.

7.6 Stockpile Management

During construction of any development similar to that proposed by the Owner, both imported and native soils are stockpiled. Mitigative measures and proper management to prevent these materials entering the sewer systems is needed. If excess material is generated from the subject lands, it will need to be disposed of off-site in a manner consistent with all MOE regulations. During construction of the deeper municipal services, water, sewers and service connections, imported granular bedding materials are temporarily stockpiled on site. These materials are however quickly used up and generally before any catchbasins are installed. Street catchbasins are installed at the time of roadway construction and rearyard catchbasins are usually installed after base course asphalt is placed.

Contamination of the environment as a result of stockpiling of imported construction materials is generally not a concern provided the above noted seepage barriers are installed. These materials are quickly used and the mitigative measures stated previously, especially the ½ diameter sewer bulkheads and filter fabric in catchbasins and manholes help to manage these concerns.

The roadway granular materials are not stockpiled on site. They are immediately placed in the roadway and have little opportunity of contamination. Lot grading sometimes generates stockpiles of native materials. However, this is only a temporary event since the materials are quickly moved off site.

To assist in the control of transporting sediment off-site into municipal roads, mud mats will be employed at the construction entrances.

8 RECOMMENDATIONS

Municipal water, wastewater and stormwater systems required to develop the proposed site plan are available. The onsite servicing is to be designed in accordance with MOE and City of Ottawa's current level of service requirements. In addition, confirmation of no negative impact on the downstream sanitary sewer system will be required.

Incorporating into the detail design lot level controls and conveyance controls will result in effective treatment of surface stormwater runoff from the site.

Final detail design will be subject to governmental approval prior to construction, including but not limited to the following:

- SPA: City of Ottawa
- Commence Work Order: City of Ottawa
- ECA (sewers): MOE
- Watermain Approval: City of Ottawa
- Commence Work Order (utilities): City of Ottawa

Report prepared by:

Demetrius Yannoulopoulos, P.Eng.
Director

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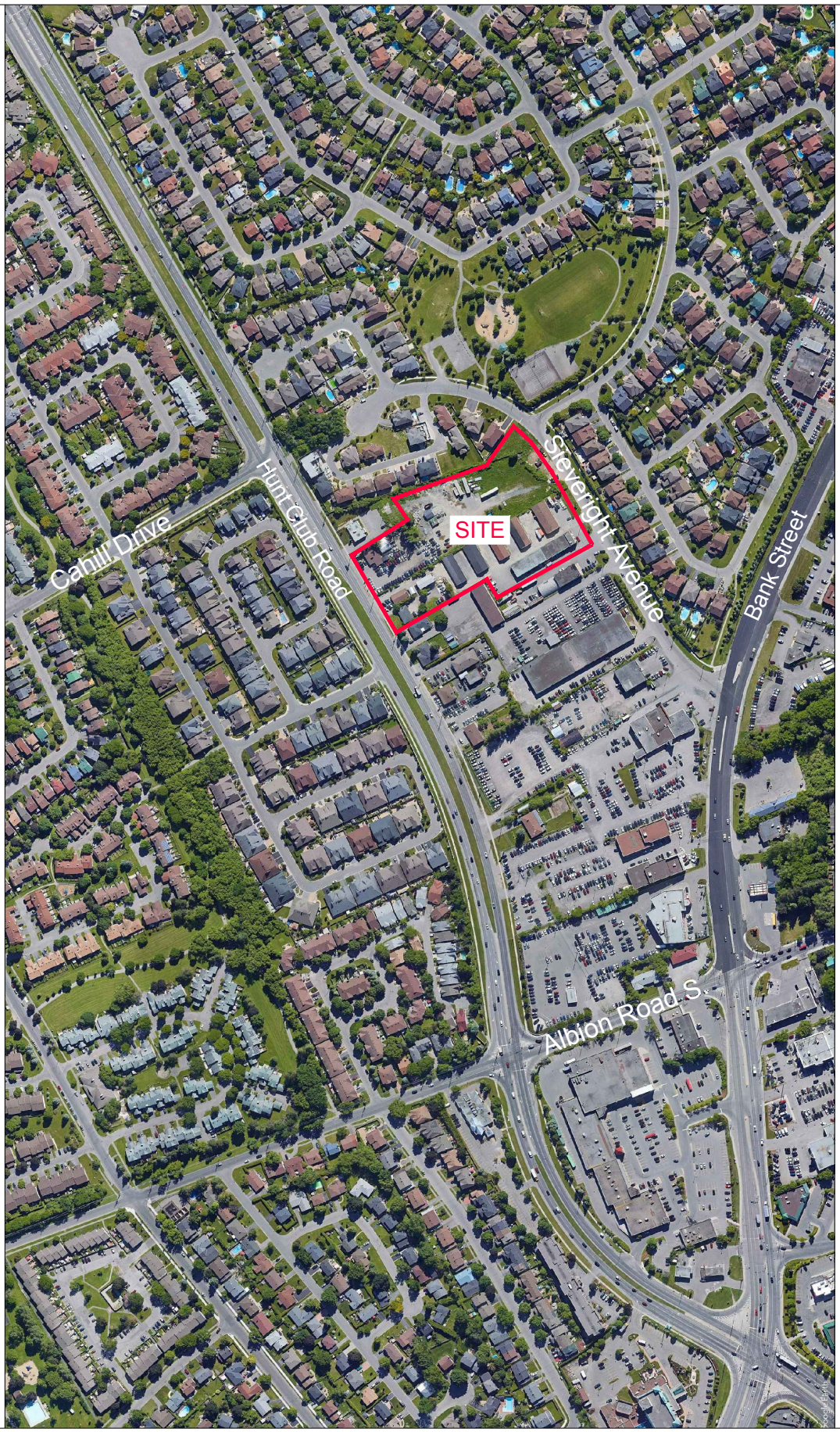
APPENDIX A



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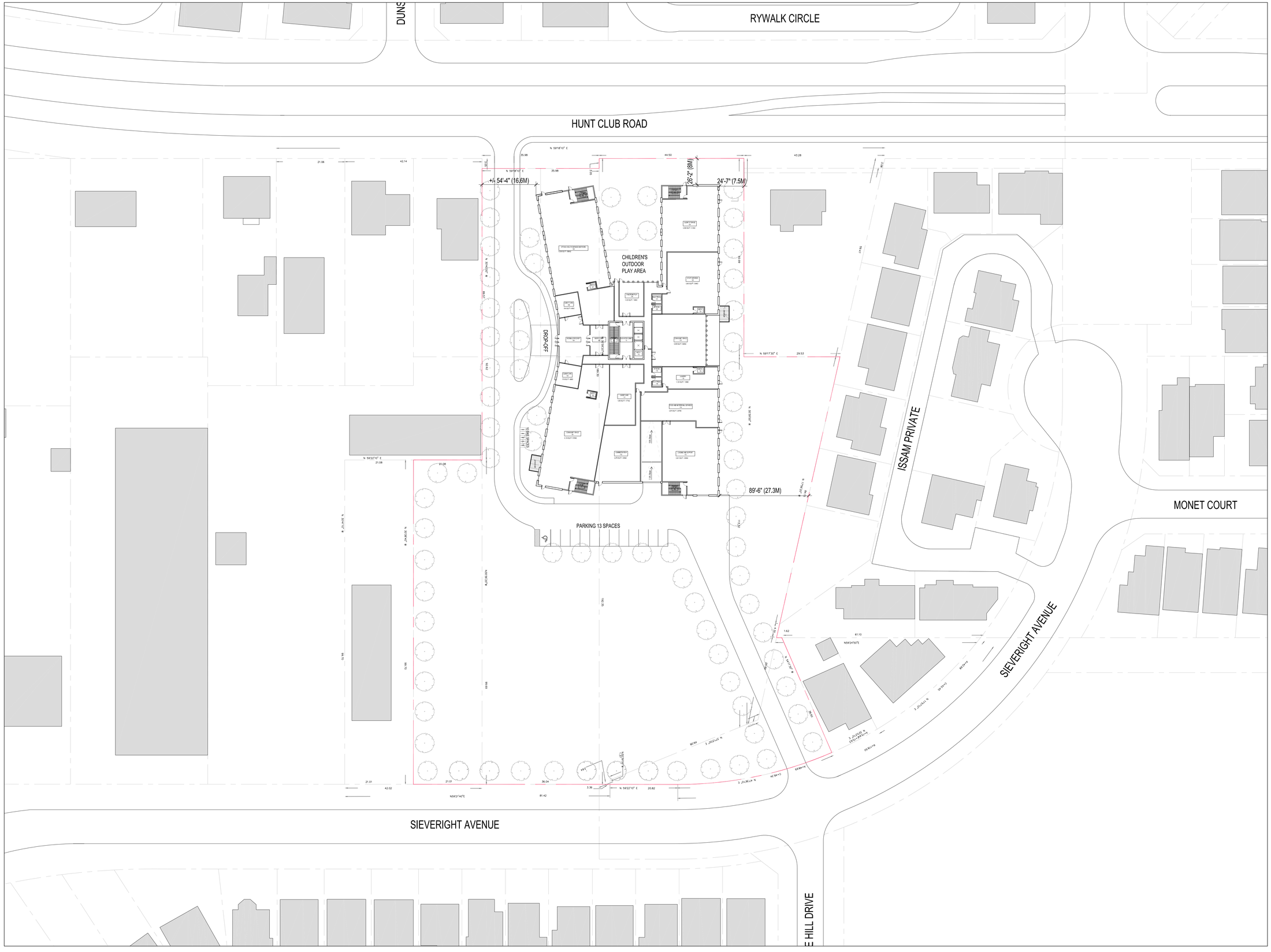
IBI

Project Title	Drawing Title	Sheet No.
1470 HUNT CLUB ROAD	LOCATION PLAN	FIGURE 1



NO.	DATE	DESCRIPTION

ISSUE RECORD

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LARGA BAFFIN
DESIGN STUDY

DRAWING TITLE:

SITE PLAN

PRINT DATE:	2021-08-26
SCALE:	1:500
PROJECT NO.	17-029
DRAWN BY:	NP
CHECKED BY:	MT

A100

Please refer to the below notes regarding the Pre-Application Consultation Meeting held on September 24, 2020 for the site at 1470 Hunt Club Road. During this meeting, a proposal to develop the site with two buildings, a six-storey medical boarding house on the southern portion of the site and a four storey commercial/office building on the north portion of the site was discussed. Associated parking will be provided by a surface level parking lot internal on the site.

Below are staff's preliminary comments:

Policies/Designations of the site

- Official Plan – designated General Urban Area (Section 3.6.1)
- Community Design Plan – The site is subject to the South Keys to Blossom Park – Bank Street Community Design Plan
    - A portion of the site abutting Hunt Club Road is designated General Mixed Use (building heights of 6 stories permitted)
    - A portion of the site abutting Sieveright Avenue is designated Future Land Use Study (height limit varies as per existing zoning)
- Secondary Plan- The site is subject to the South Keys to Blossom Park – Bank Street Secondary Plan. The land use designations and height limits are the same as those imposed by the CDP.
- Zoning:
    - A portion of the site abutting Hunt Club Road is zoned GM16[2294]
    - A portion of the site abutting Sieveright Avenue is zoned IL2H(14)
    - Required Parking Rates are as per Area C (Suburban)
    - Bicycle Parking Rates as per Section 111 of the Zoning By-law, calculations are to be broken down by land use
    - Zoning By-Law provisions for Rooming Houses apply, see Part 5, Section 132

Planning

- The CDP and SP policies are clear than an application in the Sieveright Future Land Use Study area would trigger the need for the entire area. The policy allows the applicant to lead the study, and sets out the objectives of the study:
    1. Determine locations that may be appropriate for higher or lower buildings compared to the existing zoned maximum permitted building height and in consideration of proximity to and the existing character of adjacent residential areas and to Bank Street.
    2. Determine the appropriate land use and zoning for the area and if light industrial uses should continue to be permitted,
    3. Determine appropriate first storey finishes (windows and doors) for building walls to create a human-scale along the roadway and to prevent blank facades facing residential areas.

4. Determine if parkland should be dedicated as land or cash-in-lieu in consideration of permitted uses of land.
5. Consider potential transportation impacts related to increased density and measures to mitigate such impacts, and
6. Implement any required changes to this Plan, to the Community Design Plan and to the Zoning By-law arising from the study.

The Land Use Study is a requirement for this proposal due to two reasons: the CDP and SP provide clear direction for the study, and the proposed six-storey building height along Sieveright is not permitted under OP policies for building heights in the General Urban Area (3.6.1, policy 4), and heights would require a Secondary Plan Amendment to support it. Planning Staff are happy to discuss scoping of this requirement further.

- The medical boarding house fits within the direction hinted at by the CDP: "*Light industrial area along Sieveright and Hunt Club offers an opportunity to update land use and zoning to be more compatible with surrounding residential neighbourhoods*"
- 6-storey building heights are more desirable along Hunt Club Road as the current zoning permits as-of-right. If proposed along Sieveright, the Land Use study will need to show why this area is appropriate and how heights will transition to uses at the rear of the site.
- This is a site that is well-located in respect to transit an existing community amenities, please ensure there are good opportunities for pedestrian circulation provided on the site and that there are walkway connections to existing sidewalks.
- Please provide street trees and landscaping along Sieveright to match the existing context of this street.
- At time of site plan submission, please provide the following on the plan:
    - A zoning matrix table showing required and proposed zoning provisions
    - Snow storage locations
    - Please provide accessible parking spaces as per AODA guidelines
    - Garbage enclosure details
- The proposed residential boarding use appears to fall under the by-law definitions of rooming units in a rooming house. Please confirm in the application submission, and note section 132 of the Zoning By-Law applies.
- When proposing the zoning for the site, please ensure that consideration is made to permit all proposed accessory uses to the medical boarding facility use (e.g. office, community centre, etc.)
- As per the CDP, a dense form of development with minimal setbacks from the street are preferred along Hunt Club, with parking at the rear of the building.
- It is recommended to discuss the details of the proposal with ward 10 Councillor, Diane Deans, as well as property owners of neighbouring sites, before submitting an application.
- We appreciate the project, and the use of the proposed development to provide access to healthcare to northern regions. Staff would be happy to facilitate future meetings as needed as development proposal progresses.

Engineering

- The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans
- Servicing and site works shall be in accordance with the following documents:
  - ⇨ Ottawa Sewer Design Guidelines (October 2012) and all the Technical Bulletins including, Technical Bulletin PIEDTB-2016-01 and ISTB-2018-01
  - ⇨ Ottawa Design Guidelines – Water Distribution (2010) and Technical Bulletins ISD-2010-2, ISDTB-2014-02 and ISTB-2018-02
  - ⇨ Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (2007)
  - ⇨ City of Ottawa Slope Stability Guidelines for Development Applications (revised 2012)
  - ⇨ City of Ottawa Environmental Noise Control Guidelines (January, 2016)
  - ⇨ City of Ottawa Park and Pathway Development Manual (2012)
  - ⇨ City of Ottawa Accessibility Design Standards (2012)
  - ⇨ Ottawa Standard Tender Documents (latest version)
  - ⇨ Ontario Provincial Standards for Roads & Public Works (2013)
- Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x.44455).
- The Stormwater Management Criteria, for the subject site, is to be based on the following:
  - i. The 2-yr storm or 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
  - ii. For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.
  - iii. The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
  - iv. A calculated time of concentration (Cannot be less than 10 minutes).
  - v. Flows to the storm sewer in excess of the 5-year storm release rate, up to and including the 100-year storm event, must be detained on site.
  - vi. For a combined sewer system the maximum C= 0.4 or the pre-development C value, whichever is less. In the absence of other information the allowable release rate shall be based on a 2 year storm event.
  - vii. There may be area specific SWM Criteria within SWM &/or Sub-watershed studies that may apply, please check.
- Deep Services (Storm, Sanitary & Water Supply)

i. A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:
    a. Hunt Club Road):
        i. Sanitary – 250 mm.
        ii. Storm – 300 mm (connection depend on the subwatershed boundary.
        iii. Water – 400 mm.
    b. Seiveright Ave (Preferred connections):
        i. Sanitary – 250 mm.
        ii. Storm – 525 mm (connection depend on the subwatershed boundary.
        iii. Water – 300 mm.

ii. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*
iii. *Connections to trunk sewers and easement sewers are typically not permitted.*
iv. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*
v. *Review provision of a high-level sewer.*
vi. *Provide information on the type of connection permitted*

Sewer connections to be made above the springline of the sewermain as per:

a. Std Dwg S11.1 for flexible main sewers – *connections made using approved tee or wye fittings.*
b. Std Dwg S11 (For rigid main sewers) – *lateral must be less that 50% the diameter of the sewermain,*
c. Std Dwg S11.2 (for rigid main sewers using bell end insert method) – *for larger diameter laterals where manufactured inserts are not available; lateral must be less that 50% the diameter of the sewermain,*
d. Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.
e. *No submerged outlet connections.*

- Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
  i. Location of service
  ii. Type of development and the amount of fire flow required (as per FUS, 1999).
  iii. Average daily demand: ___ l/s.
  iv. Maximum daily demand: ___l/s.
  v. Maximum hourly daily demand: ___ l/s.
  vi. Hydrant location and spacing to meet City's Water Design guidelines.
- Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.
- General comments –
  - Water supply redundancy will be required for more than 50 m3/day water demand. Provide watermain connection with isolation valve to meet this requirement.
  - All the stormwater and servicing requirements must follow the "Sawmill Creek Subwatershed Study", Please contact RVCA for specific water quality requirement.
  - Proposed area falls within the Sawmill Creek Subwatershed, therefore stormwater discharge must be investigated to proper outlet.
  - Should you have any questions or require additional information, please contact me directly by email at sharif.sharif@ottawa.ca.

Urban Design

With respect to **public realm,** please consider the following:

- Incorporating significant landscaping along Huntclub Road with a continuous tree canopy.
- Supporting the transformation of Sieveright into a more pedestrian friendly environment through the provision of sidewalk, street trees and appropriate design of the building.

With respect to **site organization:**

- Locating the office building on Huntclub Road and the residential building at the back is appropriate from an urban design perspective.
- Considerations should be given to the location of vehicular entrances to avoid potential through traffic. One possibility is to locate the south entrance to the east side of the site, potentially aligned with Apple Hill (see attached diagram).
- Consideration should also be given to incorporate a pedestrian/multiuse pathway through the site connecting Hunt Club Road and the neighbourhood through an easement (see attached diagram).

With respect to **built form design**, please consider:

- Appropriate built form transition. Consider the following if a 6-storey building is pursued:
    a. Locating the building to the west part of the site, as further away from the existing residential area as possible (see attached diagram);
    b. Articulating the building to comprise a base, a middle and a top. The base of the building should reflect the scale and rhythm of the adjacent low-rise residential buildings. The top floors should step back.
- Livability of for future residents. The preliminary design shows a small and potentially dark courtyard. Considerations should be given to re-orienting and enlarging the courtyard, and potentially articulating the building massing to have a lower portion on the south side and higher portion on the north side to maximize solar exposure (see attached diagram).

Environmental

- EIS not required
- Phase I ESA required, Phase II ESA and RSC also likely required due to the proposed change in land use, but this is dependent on the outcomes of the Phase I ESA.

Transportation

- Proceed to Step 2 (and eventually Step 3 forecasting) of the TIA prior to application.
- The access on Hunt Club will be a right-in/right-out and may require a right-turn auxiliary lane – this requirement may be based on volume and/or operating speeds and must be analyzed in the TIA.
- Current throat length at this site is significantly below standard – refer to TAC guidelines for appropriate length. No queueing of any kind will be permitted on Hunt Club.

- A Noise Study will be required.

Planning Forestry

- a Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City; an approved TCR is a requirement of Site Plan or Plan of Subdivision approval.
- any removal of privately-owned trees 10cm or larger in diameter requires a tree permit issued under the Urban Tree Conservation Bylaw; the permit is based on the approved TCR
- any removal of City-owned trees will require the permission of Forestry Services who will also review the submitted TCR
- the TCR must list all trees on site by species, diameter and health condition
- the TCR must list all trees on adjacent sites if they have a critical root zone that extends onto the development site
- If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained – please provide a plan showing retained and removed treed areas
- the City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.
- Please ensure newly planted trees have an adequate soil volume for their size at maturity. Here are the recommended soil volumes:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18
Conifer	25	15

- For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca

This proposal is subject to a **Site Plan Control, Complex (manager approval)** application, a **Major Zoning By-Law Amendment** application, and an **Official Plan Amendment** (Secondary Plan Amendment) application to permit proposed heights and implement required changes to the as a result of the future land use study. The required Plans & Study List for application submission is attached to this email.

Please refer to the links to "Guide to preparing studies and plans" and fees for general information. Additional information is available related to building permits, development

charges, and the Accessibility Design Standards. Be aware that other fees and permits may be required, outside of the development review process. You may obtain background drawings by contacting informationcentre@ottawa.ca.

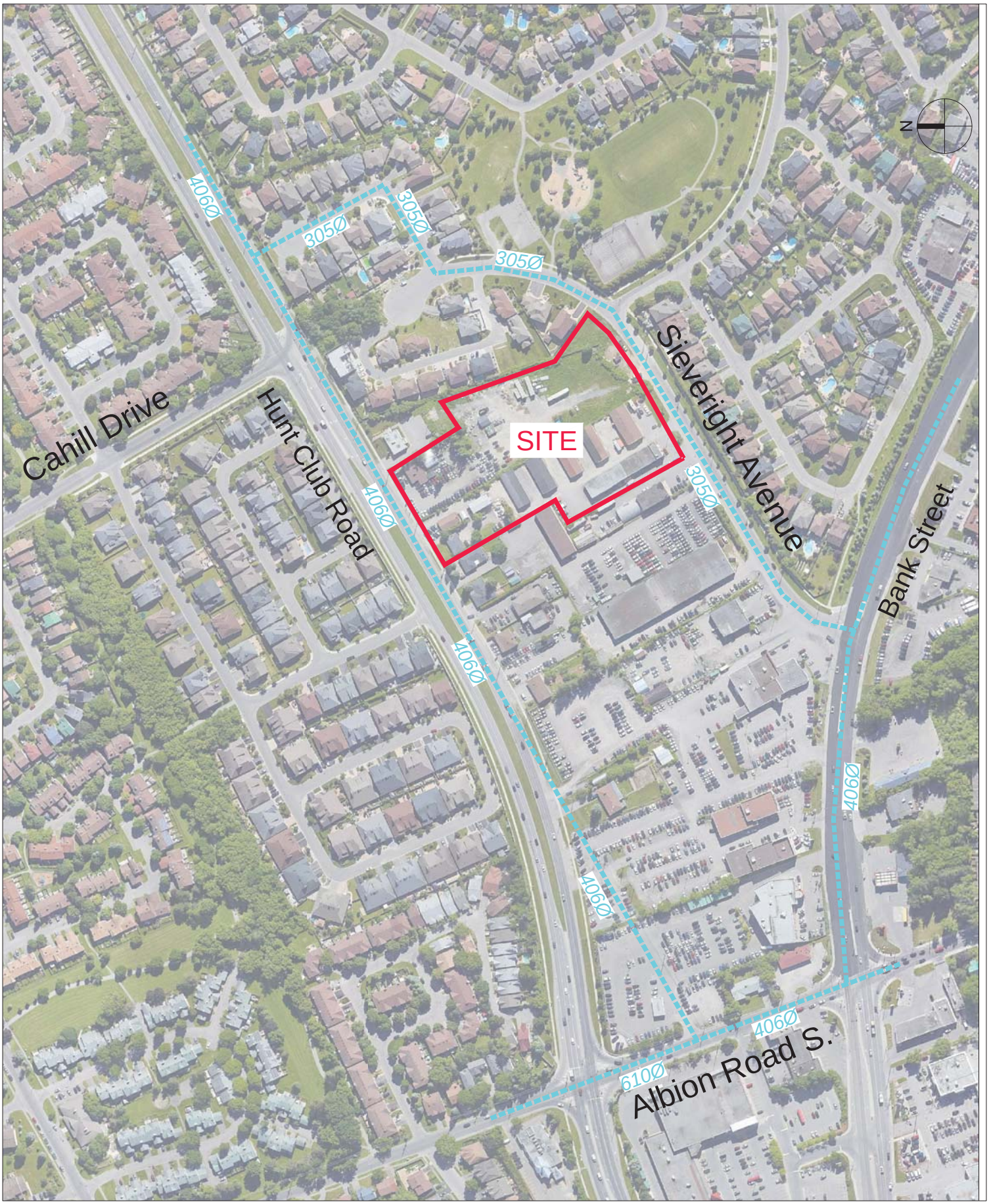
These pre-con comments are valid for one year. If you submit a development application(s) after this time, you may be required to meet for another pre-consultation meeting and/or the submission requirements may change. You are as well encouraged to contact us for a follow-up meeting if the plan/concept will be further refined.

I am happy to discuss any comments or requirements further, and would be happy to set up a meeting to do so as needed.

All the best,

Sarah Ezzio
Planner I | Urbaniste I
Development Review (South Services) | Examen des projets d'aménagement (services sud)
Planning, Infrastructure and Economic Development | Services de planification, d'infrastructure et de développement économique

APPENDIX B



J:\9999_Proposals\Proposals\2020 Proposals\Engineering\EP2020-065 1452, 1460, 1470 Hunt Club Road-1525, 1531,1545 Sieveright Avenue\WATERMAAIN.dwg Layout Name: EXISTING WATERMAIN

IBI

Project Title	Drawing Title	Sheet No.
1470 HUNT CLUB ROAD	EXISTING WATERMAIN	FIGURE 2

IBI GROUP
333 PRESTON STREET
OTTAWA, ON
K1S 5N4

WATERMAIN DEMAND CALCULATION SHEET

PROJECT : 1470 Hunt Club Road
LOCATION : 1470 Hunt Club Road
DEVELOPER : Phoenix Homes

FILE: 126884.6.04
DATE PRINTED: 24-Sep-21
DESIGN: SEL
PAGE : 1 OF 1

NODE	RESIDENTIAL UNITS SF	RESIDENTIAL UNITS APT	RESIDENTIAL UNITS ST	POP'N	NON-RESIDENTIAL INDTRL (ha.)	NON-RESIDENTIAL INST. (ha.)	NON-RESIDENTIAL COMM. (m^2)	AVERAGE DAILY DEMAND (l/s) Res.	AVERAGE DAILY DEMAND (l/s) Non-res.	AVERAGE DAILY DEMAND (l/s) Total	MAXIMUM DAILY DEMAND (l/s) Res.	MAXIMUM DAILY DEMAND (l/s) Non-res.	MAXIMUM DAILY DEMAND (l/s) Total	MAXIMUM HOURLY ` Res.	MAXIMUM HOURLY ` Non-res.	MAXIMUM HOURLY ` Total	FIRE DEMAND (l/s)
Building A				354				0.82	0.00	0.82	1.23	0.00	1.23	2.21	0.00	2.21	233.3
Rooming Facility																	
Building B				39			7800	0.03	0.25	0.28	0.05	0.38	0.43	0.09	0.68	0.77	150.0
Commercial Facility																	

ASSUMPTIONS

RESIDENTIAL DENSITIES
- Rooming House 1.0 p / p / u
- Commercial Facility 1.0 p / p / u

AVG. DAILY DEMAND
- Rooming House 200 l / bed / day
- Commercial Office Worker 75 l / cap / day
- Commercial Facility 2,800 l / 1000m^2 / day

MAX. DAILY DEMAND
- Rooming House 300 l / cap / day
- Commercial Office Worker 113 l / cap / day
- Commercial Facility 4,200 l / 1000m^2 / day

MAX. HOURLY DEMAND
- Rooming House 540 l / cap / day
- Commercial Office Worker 203 l / cap / day
- Commercial Facility 7,560 l / 1000m^2 / day

FIRE FLOW
- Rooming House 14,000 l / min
- Commercial 9,000 l / min

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Thursday, July 29, 2021 12:33 PM
To: Samantha Labadie
Subject: RE: 1470 Hunt Club - Boundary Condition Request
Attachments: 1470 Hunt Club Road July 2021.pdf

Hi Samantha,

Please see the following requested water boundary condition. If you need anything further, let me know. Thanks.

The following are boundary conditions, HGL, for hydraulic analysis at 1470 Hunt Club Road (zone 2W2C) assumed to be looped with a 203mm, connected to the 406mm on Hunt Club Road and 305mm on Sieveright Avenue (see attached PDF for location).

	Hunt Club Connection	Sieveright Connection
Minimum HGL	123.8	123.8
Maximum HGL	130.9	130.9
Max Day + FireFlow (233.3 L/s)	125.1	125.2

These are for current conditions and are based on computer model simulation.

Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation.

Regards,

Sharif

From: Samantha Labadie <samantha.labadie@ibigroup.com>
Sent: July 22, 2021 9:36 AM
To: Sharif, Golam <sharif.sharif@ottawa.ca>

Fire Flow Requirement from Fire Underwriters Survey

Building 'A' - 6 Storey Rooming Facility

Building Floor Area (2 largest adjoining floors plus 50% of floors above up to eight)

Floor 1 & 2	8,428	m^2
50% Floors 3 to 6	8,428	m^2
Total	16,856	m^2

Fire Flow

$F = 220C\sqrt{A}$

C	0.6		C =	1.5 wood frame
A	16,856	m^2		1.0 ordinary
				0.8 non-combustile
F	17,138	l/min		0.6 fire-resistive
Use	17,000	l/min		

Occupancy Adjustment

		-25%	non-combustile
		-15%	limited combustile
Use	-15%	0%	combustile
		+15%	free burning
Adjustment	-2550 l/min	+25%	rapid burning
Fire flow	14,450 l/min		

Sprinkler Adjustment

		-30%	system conforming to NFPA 13
		-50%	complete automatic system
Use	-30%		
Adjustment	-4335 l/min		

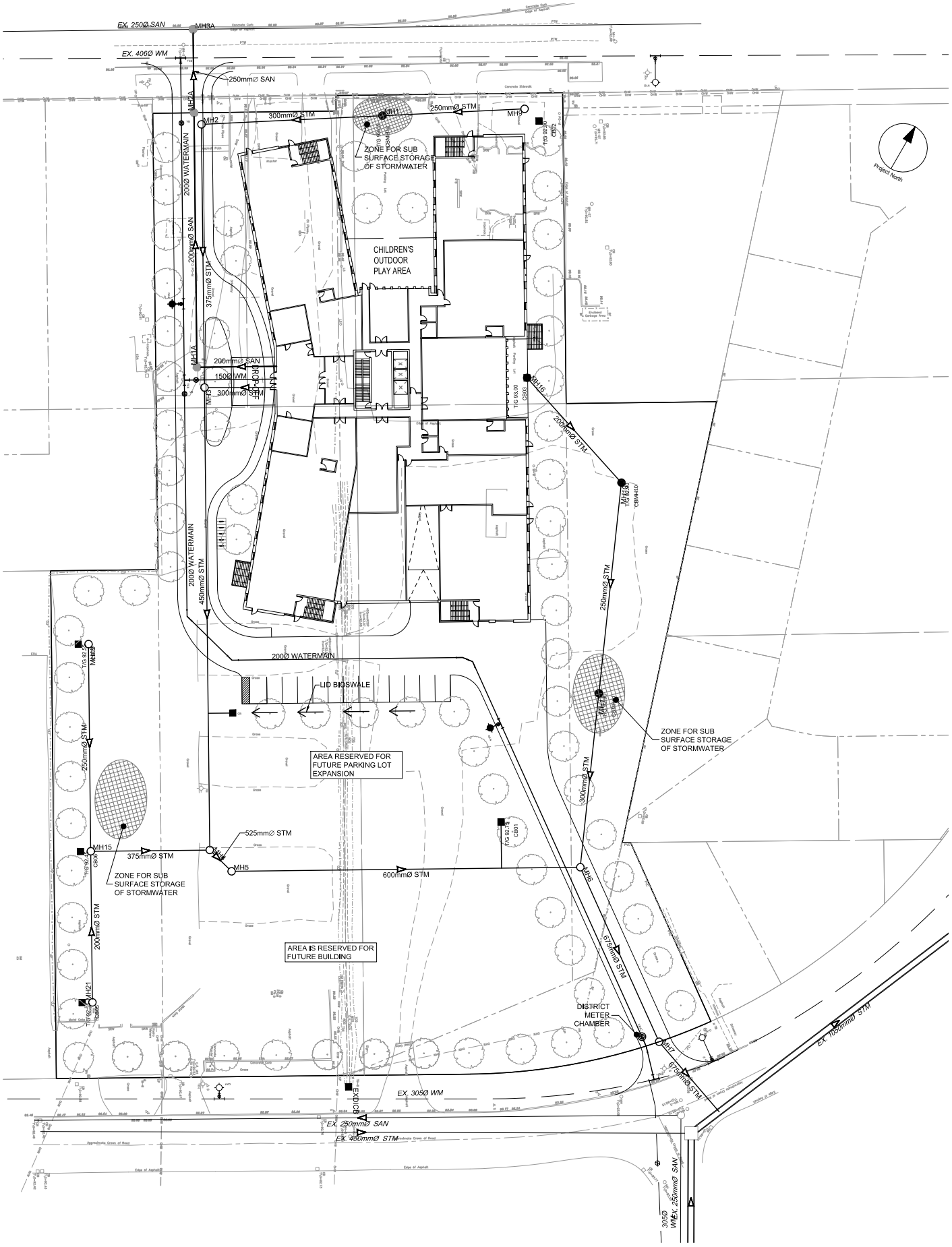
Exposure Adjustment

Building Face	Separation (m)	Adjacent Exposed Wall			Exposure Charge *
		Length	Stories	L*H Factor	
north	> 45			0	0%
east	16	11	1	11	15%
south	> 45			0	0%
west	18	12	2	24	15%
Total					30%

Adjustment 4,335 l/min

Required Fire Flow

Total adjustments	-	l/min
Fire flow	14,450	l/min
Use	**14,000**	**l/min**
	233.3	**l/s**



J:\126884_Phoenix_Home\7.0_Production\7.03_Design\04_Civil_Land_Figures\FIG 5 Proposed Services.dwg Layout Name: Figure 5

Project Title	Drawing Title	Sheet No.
1470 HUNT CLUB ROAD	PROPOSED SERVICES	FIGURE 5

APPENDIX C

J:\9999_Proposals\Proposals\2020 Proposals\Engineering\EP2020-065 1452, 1460, 1470 Hunt Club Road-1525, 1531,1545 Sieveright Avenue\Sanitary.dwg Layout Name: EXISTING SANITARY

IBI

Project Title	Drawing Title	Sheet No.
1470 HUNT CLUB ROAD	EXISTING SANITARY SEWERS	FIGURE 3

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

SANITARY SEWER DESIGN SHEET

1470 Hunt Club
CITY OF OTTAWA
Phoenix Homes

LOCATION				RESIDENTIAL										ICI AREAS								INFILTRATION ALLOWANCE			FIXED FLOW (L/s)		TOTAL FLOW	PROPOSED SEWER DESIGN						
				AREA w/ Units (Ha)	UNIT TYPES				AREA w/o Units (Ha)	POPULATION		RES PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)						ICI PEAK FACTOR	PEAK FLOW (L/s)	AREA (Ha)		FLOW				CAPACITY	LENGTH	DIA	SLOPE	VELOCITY (full)	AVAILABLE CAPACITY	
STREET	AREA ID	FROM MH	TO MH		SF	SD	TH	BEDS		IND	CUM			INSTITUTIONAL		COMMERCIAL		INDUSTRIAL				IND	CUM	(L/s)	IND	CUM	(L/s)	(L/s)	(m)	(mm)	(%)	(m/s)	L/s	(%)
														IND	CUM	IND	CUM	IND	CUM															
OUTLET TO HUNT CLUB																																		
		Bldg	1A	1.00				354				4.00	3.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.0	0.33	0.00	0.00	3.61	48.39	15.60	200	2.00	1.492	44.78	92.54%
		1A	2A									4.00	3.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.33	0.00	0.00	3.61	48.39	49.90	200	2.00	1.492	44.78	92.54%
		2A	3A									4.00	3.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.0	0.33	0.00	0.00	3.61	62.04	16.40	250	1.00	1.224	58.43	94.18%
OUTLET TO SIEVERIGHT																																		
		BLDING	5A											0.00	0.00	1.00	1.00	0.00	0.00	1.50	0.49	1.00	1.0	0.33	0.00	0.00	0.82	62.04	8.10	250	1.00	1.224	61.22	98.68%
		5A	Ex 250mm											0.00	0.00	0.00	1.00	0.00	0.00	1.50	0.49	0.00	1.0	0.33	0.00	0.00	0.82	62.04	8.30	250	1.00	1.224	61.22	98.68%

Design Parameters:

Residential			ICI Areas			
SF	3.4	p/p/u	INST	28,000	L/Ha/day	
TH/SD*	2.7	p/p/u	COM	28,000	L/Ha/day	
BED	200	L/BED/D	IND	28,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha				

Notes:

1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day 200 L/day/B
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+(P/1000)^0.5))0.8
   where K = 0.8 Correction Factor
5. Commercial and Institutional Peak Factors based on total area, 1.5 if greater than 20%, otherwise 1.0

Designed: R.M,

Checked: D.G.Y.

Dwg. Reference:

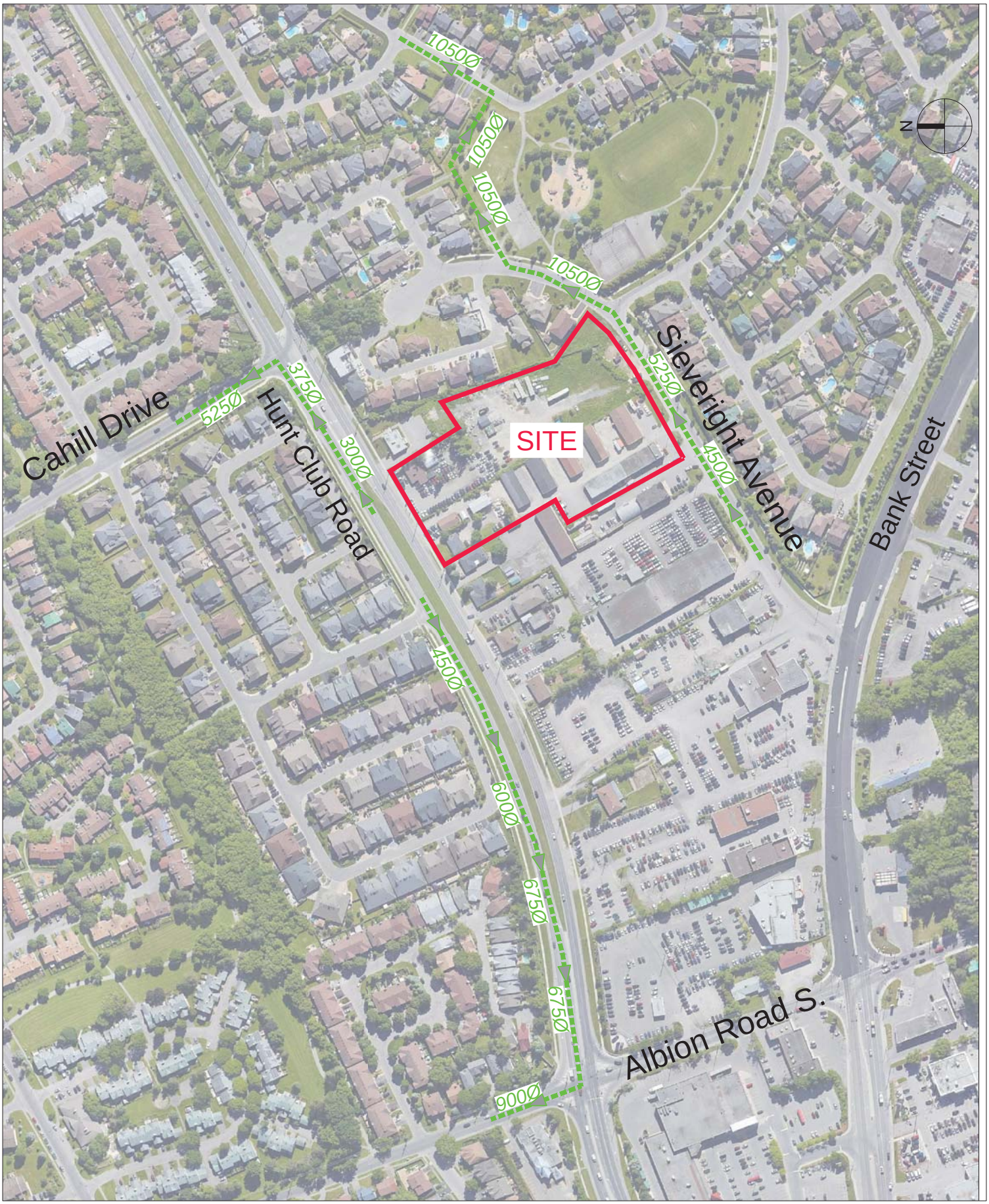
No.	Revision	Date
1.	Adequacy of Public Services Report	2021-09-18

File Reference: 126884.6.4.4.

Date: 2021-09-18

Sheet No: 1 of 1

APPENDIX D



J:\9999_Proposals\Proposals\2020 Proposals\Engineering\EP2020-065 1452, 1460, 1470 Hunt Club Road-1525, 1531,1545 Sieveright Avenue\Storm.dwg Layout Name: EXISTING STORM

IBI

Project Title	Drawing Title	Sheet No.
1470 HUNT CLUB ROAD	EXISTING STORM SEWERS	FIGURE 4

IBI GROUP
400-333 Preston Street
Ottawa, Ontario K1S 5N4 Canada
tel 613 225 1311 fax 613 225 9868
ibigroup.com

PROJECT: 1470 Hunt Club
DATE: 2021-09-18
FILE: 126884-6.2.4
REV #: -
DESIGNED BY: DY
CHECKED BY: D.G.Y.

STORMWATER MANAGEMENT

Formulas and Descriptions

i_{2yr} = 1:2 year Intensity = $732.951 / (T_c+6.199)^{0.810}$
i_{5yr} = 1:5 year Intensity = $998.071 / (T_c+6.053)^{0.814}$
i_{100yr} = 1:100 year Intensity = $1735.688 / (T_c+6.014)^{0.820}$
T_c = Time of Concentration (min)
C = Average Runoff Coefficient
A = Area (Ha)
Q = Flow = 2.78CiA (L/s)

Maximum Allowable Release Rate

Restricted Flowrate (2yr C=0.5 tc =10min)

A_{site} =	2.00	Ha
T_c =	10.00	min
C=	0.50	
I2yr =	76.81	mm/hr
$Q_{restricted}$ =	213.52	L/s

Uncontrolled Release ($Q_{uncontrolled} = 2.78*C*i_{100yr}*A_{uncontrolled}$)

C =	0.3	(C=0.2 increase by 25% for 100year storm, max C=1.0)
T_c =	10	min
i_{100yr} =	178.56	mm/hr
$A_{uncontrolled}$ =	0.10	Ha
$Q_{uncontrolled}$ =	14.89	L/s

Maximum Allowable Release Rate ($Q_{max\ allowable} = Q_{restricted} - Q_{uncontrolled}$)

$Q_{max\ allowable}$ =	198.63	L/s

MODIFIED RATIONAL METHOD (100-Year, 5-Year & 2-Year Ponding)

Drainage Area	Roof 1		
Area (Ha)	0.425	ICD Size (L/s)=	23.63
C =	1.00	Restricted Flow Qr (L/s)=	23.63

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 100yr (m^3)
40	75.15	88.78	23.63	65.16	156.38
42	72.57	85.74	23.63	62.12	156.53
44	70.18	82.92	23.63	59.29	**156.53**
46	67.96	80.29	23.63	56.67	156.41
48	65.89	77.85	23.63	54.22	156.16

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	156.53	159.38	0.00	0.00

overflows to: Parking Lot

Drainage Area	Roof 1		
Area (Ha)	0.425	ICD Size (L/s)=	23.63
C =	0.90	Restricted Flow Qr (L/s)=	23.63

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p=2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	Q_p-Q_r (L/s)	Volume 2yr (m^3)
16	59.50	63.27	23.63	39.65	38.06
17	57.42	61.05	23.63	37.43	38.18
18	55.49	59.00	23.63	35.38	**38.21**
19	53.70	57.10	23.63	33.47	38.16
20	52.03	55.33	23.63	31.70	38.04

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	38.21	159.38	0	0.00

overflows to: Parking Lot

Drainage Area	Roof 2		
Area (Ha)	0.195	ICD Size (L/s)=	11.03
C =	1.00	Restricted Flow Qr (L/s)=	11.03

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
39	76.51	41.48	11.03	30.45	71.26
41	73.83	40.02	11.03	29.00	71.34
43	71.35	38.68	11.03	27.66	**71.35**
45	69.05	37.43	11.03	26.41	71.30
47	66.91	36.27	11.03	25.25	71.19

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	71.35	73.13	0.00	0.00

overflows to: Parking Lot

Drainage Area	Roof 2		
Area (Ha)	0.195	ICD Size (L/s)=	11.03
C =	0.90	Restricted Flow Qr (L/s)=	11.03

2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
15	61.77	30.14	11.03	19.11	17.20
16	59.50	29.03	11.03	18.01	17.29
17	57.42	28.01	11.03	16.99	**17.33**
18	55.49	27.07	11.03	16.05	17.33
19	53.70	26.20	11.03	15.17	17.30

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	17.33	73.13	0	0.00

overflows to: Parking Lot

Drainage Area	Site		
Area (Ha)	1.280	ICD Size (L/s)=	163.34
C =	1.00	Restricted Flow Qr (L/s)=	163.34

100-Year Ponding

T_c Variable (min)	i_{100yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{100yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 100yr (m^3)
16	137.55	489.46	163.34	326.12	313.07
18	128.08	455.77	163.34	292.43	315.82
20	119.95	426.83	163.34	263.49	**316.19**
22	112.88	401.68	163.34	238.34	314.61
24	106.68	379.60	163.34	216.26	311.41

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	316.19	220.00	100.00	0.00

overflows to: Sieveright

Drainage Area	Site		
Area (Ha)	1.280	ICD Size (L/s)=	163.34
C =	0.80	Restricted Flow Qr (L/s)=	163.34

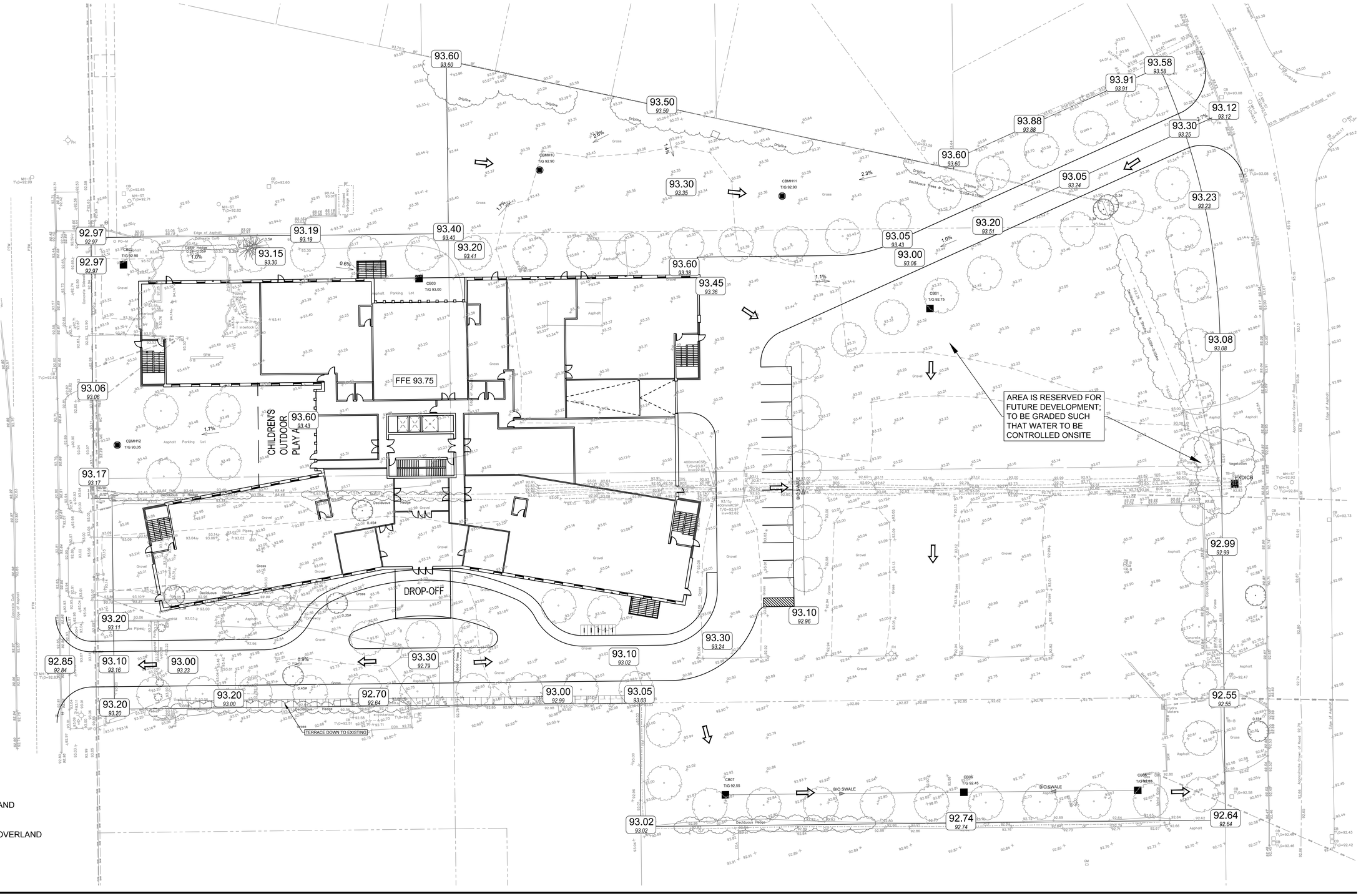
2-Year Ponding

T_c Variable (min)	i_{2yr} (mm/hour)	Peak Flow $Q_p = 2.78xCi_{2yr}A$ (L/s)	Q_r (L/s)	$Q_p - Q_r$ (L/s)	Volume 2yr (m^3)
4	111.72	318.04	163.34	154.70	37.13
5	103.57	294.84	163.34	131.50	39.45
6	96.64	275.10	163.34	111.76	**40.24**
7	90.66	258.10	163.34	94.76	39.80
8	85.46	243.27	163.34	79.93	38.37

Storage (m^3)

Overflow	Required	Surface	Sub-surface	Balance
0.00	40.24	220.00	100	0.00

overflows to: Sieveright



LEGEND:

93.40 / 92.90 — PROPOSED GRADE AND EXISTING GRADE

⇦ PROPOSED MAJOR OVERLAND FLOW ROUTE

Scale: 1:300

Project Title: 1470 HUNT CLUB ROAD

Drawing Title: CONCEPTUAL MACRO GRADING

Sheet No.: FIGURE 6.1