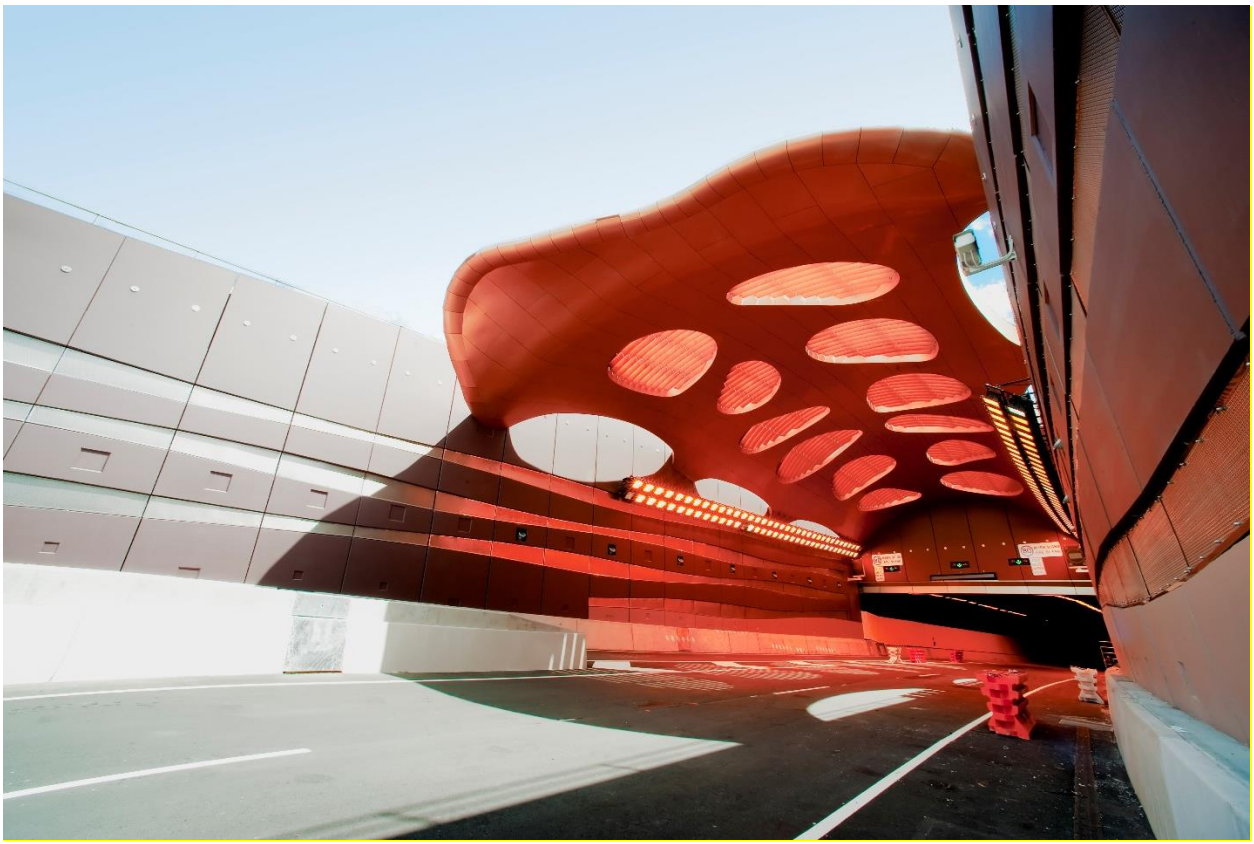
KERBEL GROUP INC.

WEST HOLLAND LANDING EMPLOYMENT LANDS

FUNCTIONAL SERVICING REPORT

JUNE 14, 2024



SIGNATURES

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1 INTRODUCTION

WSP Canada Inc. (WSP) has been retained to prepare a Functional Servicing Report in support of the Site Plan Application to assess the servicing requirements relating to the proposed West Holland Landing Employment Lands development for a commercial and industrial development located at the northeast corner of Highway 11 and Crimson King Way in the Town of East Gwillimbury. This report provides the conceptual framework for water distribution, sanitary sewage and storm drainage for the development of this site. A Stormwater Management Report outlining the proposed quality and quantity controls for stormwater on this site has been prepared under separate cover.

1.1 SITE DESCRIPTION

The Site is located east of Highway 11 and north of Crimson King Way in the Town of Gwillimbury. The Site consists of a total of 9.12 ha of land for the commercial/industrial development. There is an existing stormwater management pond located to the east of the Site, residential area to the southeast, and an undeveloped lot designated as a business park to the south. The site is currently undeveloped. The internal site topography generally slopes from the west to the east towards the existing pond. Please refer to **Figure 1** for the Site Location Plan and **Figure 2A** for the Existing Condition Plan.

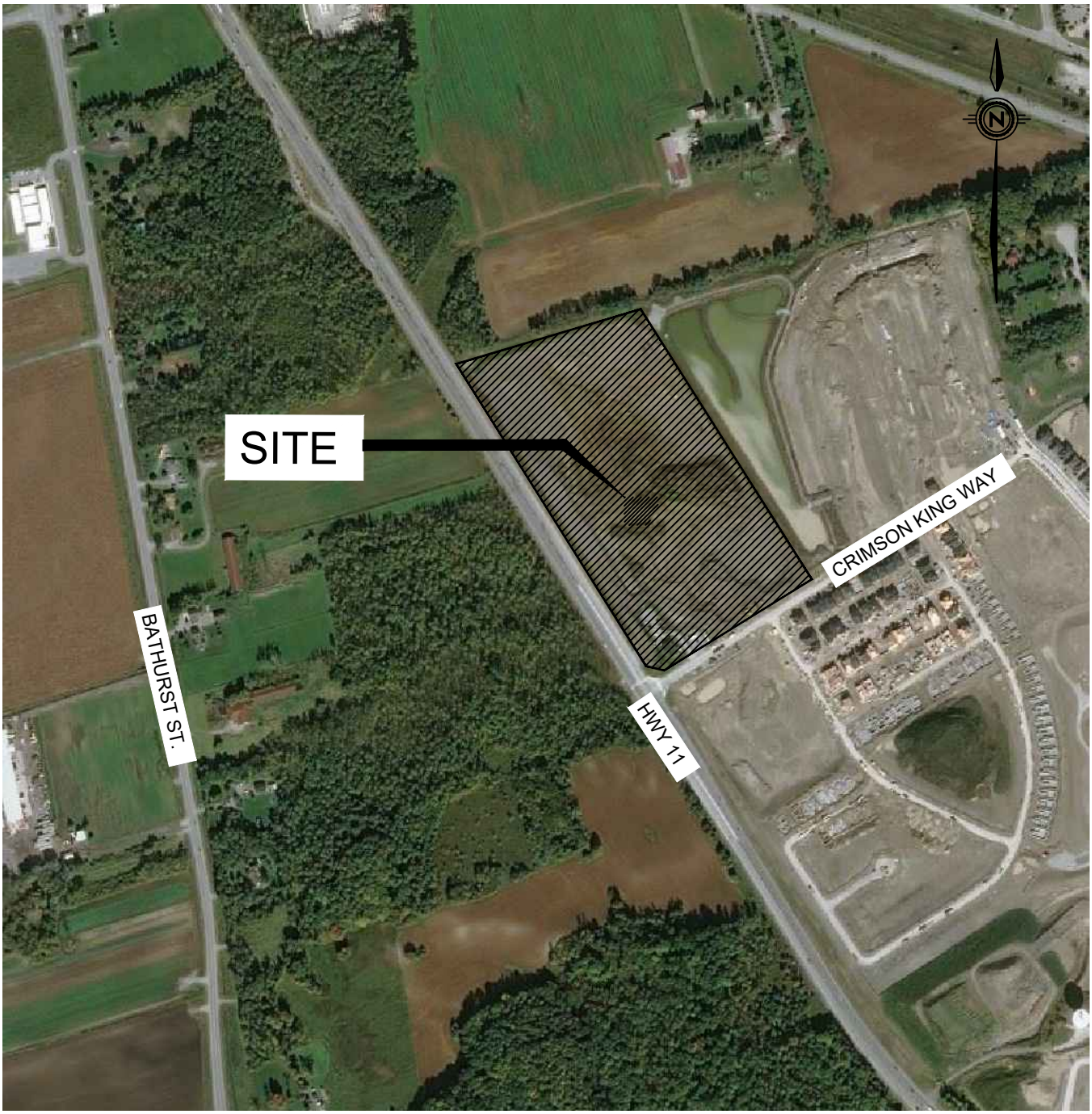
The proposed development is to be completed in two concurrent phases of construction based on the site plan prepared by Petroff Partnership Architects for Phase 1 received December 7, 2022, and the site plan for Phase 2 prepared by Baldassara Architects Inc received May 1, 2024. Phase 1 will encompass an area of 2.12 ha located in the northern portion of the site and will feature seven (7) self-storage buildings and an office, with at-grade parking. Phase 2 will encompass an area of 7.00 ha located in the southern portion of the site. Phase 2 will feature three buildings (Buildings A, B & C) with a total of 29,516 sq.m. of industrial space, truck unloading areas, and at-grade parking. Access will to be provided to the site from Highway 11 and Crimson King Way.

There is existing water, sanitary and storm lines running adjacent to the Site with existing connections to the property line. There is one existing sanitary connection from the 250mm diameter sanitary sewer on Crimson King Way and an existing 'H' style water service connection with a 100mm diameter domestic and 200mm diameter fire line from Crimson King Way. There is an existing OGS along the eastern property limits and a previously approved headwall that will be used to service the property. There is an existing 1200mm diameter storm sewer located along the western property limits, and 1500mm diameter storm sewer location along the north property limits which will be maintained during construction. Please refer to **Figure 2A** for the Proposed Development Plan and **Figure 2C** for the Construction Phasing Plan.

1.2 DESIGN GUIDELINES AND BACKGROUND DOCUMENTATION

The following documents were consulted, and the guidelines therein followed in the preparation of this report:

- Town of East Gwillimbury Engineering Standards and Design Criteria (September 2012);
- Stormwater Management Report – Holland Green Subdivision by Valdor Engineering Inc. dated August 2016; and
- Various record drawings over neighbouring developed lands provided by Valdor Engineering Inc;
- West Holland Landing Residential Subdivision As-Constructed Drawings prepared by WSP dated January 2017;
- West Holland Landing Kerbel and LRT As-Constructed Storm & Sanitary Sewer Design Sheets prepared by WSP dated Nov 23, 2020; and,
- Geotechnical Assessment for Proposed Commercial Development Highway 11 and Crimson King Way dated February 2024.



CLIENT

KERBEL GROUP INC.

TITLE

WEST HOLLAND LANDING EMPLOYMENT LANDS

LOCATION PLAN

wsp

100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.wsp.com

Checked ADR/SA	Drawn AS
Date JUNE 2024	Proj. No. 221-01973
Scale NTS	Figure No. 1

EXISTING
SWM POND

CRIMSON KING WAY

HIGHWAY 11

16m EASEMENT

4.0m EASEMENT

LEGEND

- PROPERTY LIMITS
- EASEMENT
- EX. WATERMAIN
- EX. SANITARY SEWER
- EX. HYDRANT
- EX. VALVE AND CHAMBER
- EX. SANITARY MANHOLE
- EX. STORM MANHOLE
- EX. STORM SEWER

CLIENT
KERBEL GROUP INC.

TITLE
WEST HOLLAND LANDING EMPLOYMENT LANDS

EXISTING CONDITIONS

wsp

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Date JUNE 2024	Proj. No. 221-01973
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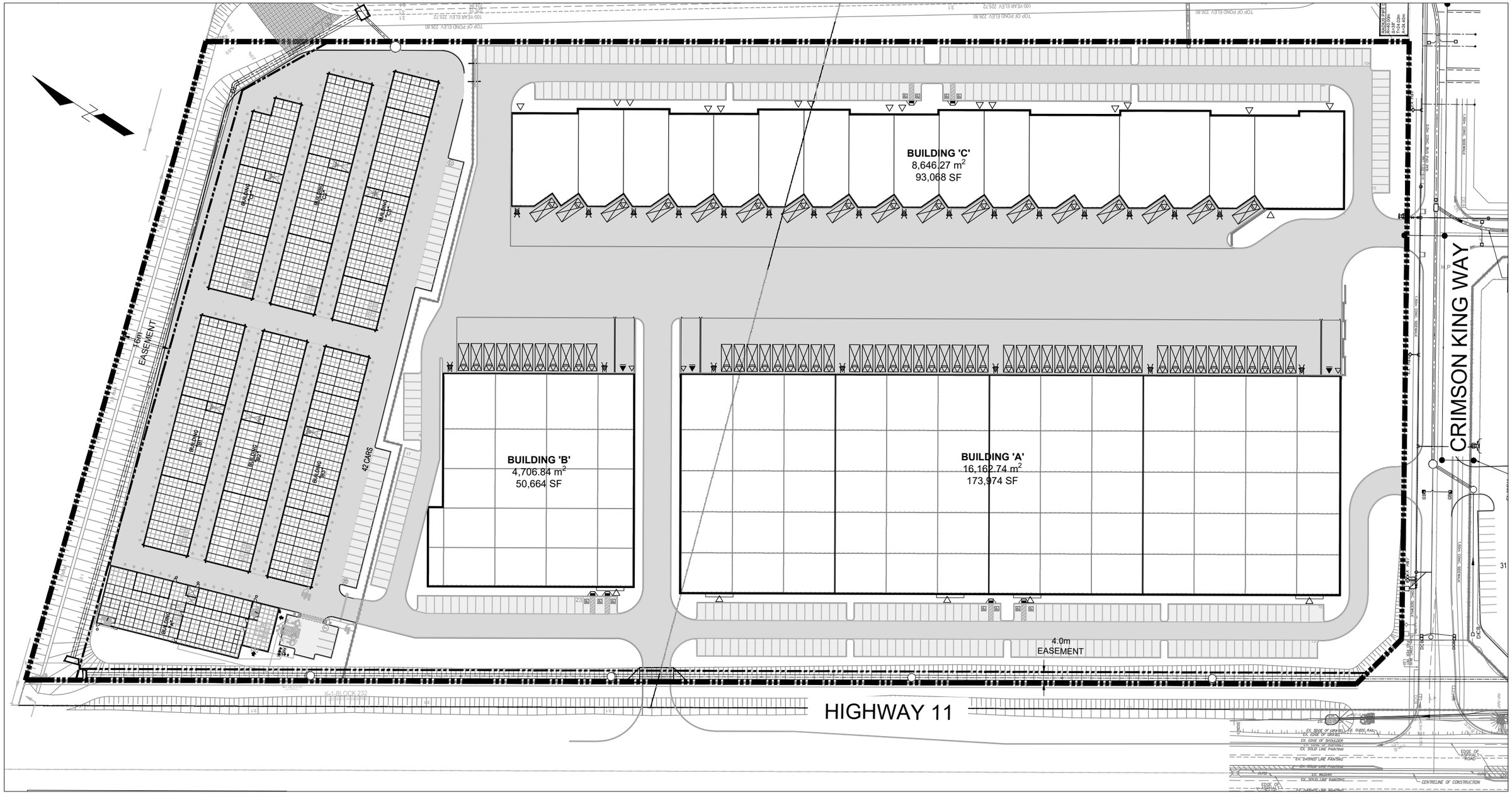

LEGEND

PROPERTY LIMITS

EASEMENT

HEAVY DUTY PAVEMENT

LIGHT DUTY PAVEMENT

CLIENT

KERBEL GROUP INC.

TITLE

WEST HOLLAND LANDING EMPLOYMENT LANDS

PROPOSED DEVELOPMENT

wsp

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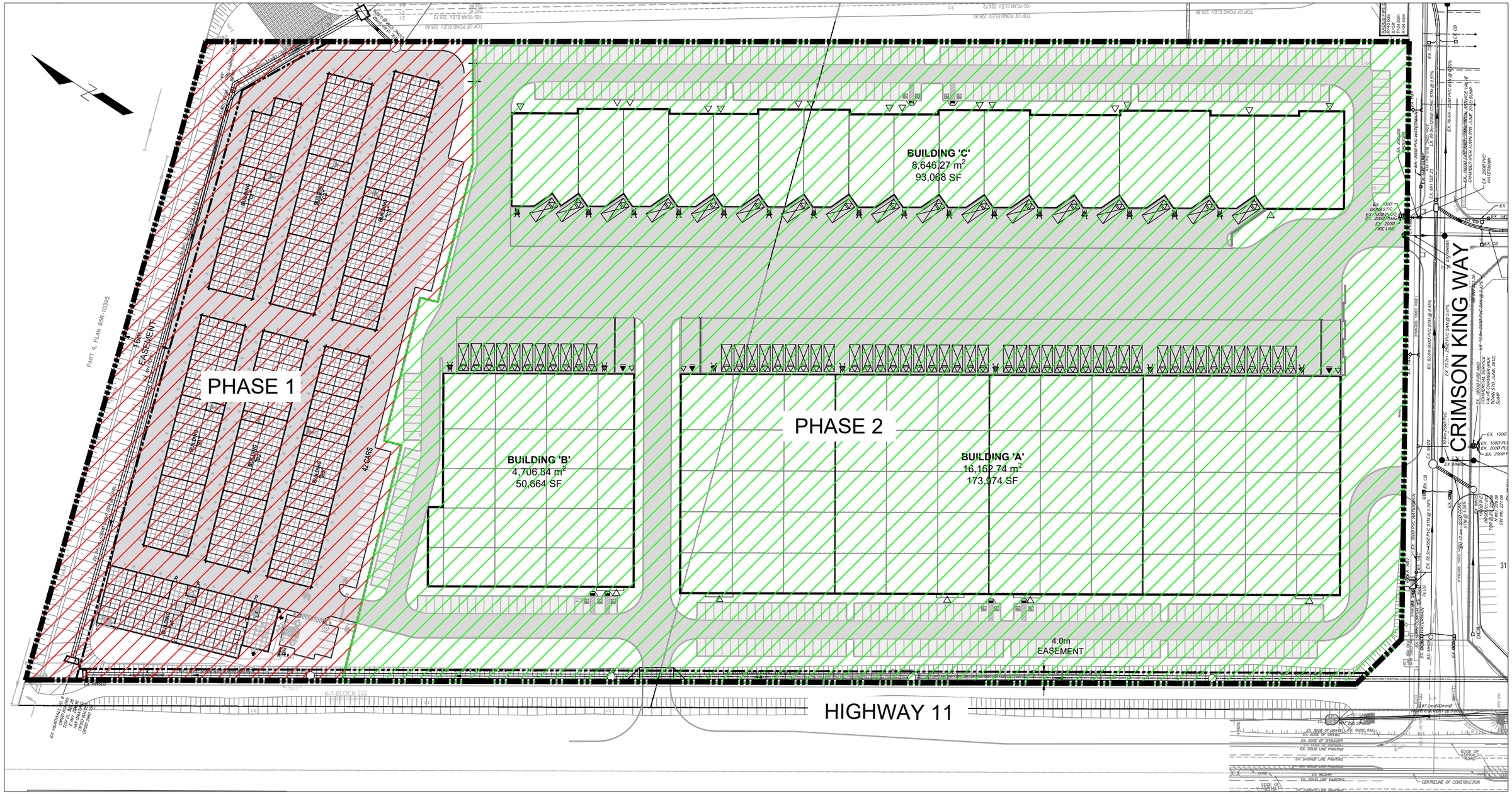
Date JUNE 2024	Proj. No. 221-01973
Scale 1: 1250	Figure No. 2B



LEGEND

- PROPERTY LIMITS
- PHASE 1
- PHASE 2
- HEAVY DUTY PAVEMENT
- LIGHT DUTY PAVEMENT

CLIENT: KERBEL GROUP INC.

TITLE: WEST HOLLAND LANDING EMPLOYMENT LANDS

CONSTRUCTION PHASING PLAN

wsp

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Date: JUNE 2024	Proj. No.: 221-01973
Scale: 1: 1250	Figure No.: 2C

2 WATER SUPPLY

2.1 EXISTING CONDITIONS

Water supply for the proposed development is available from the Town's existing water distribution system. The existing municipal watermain includes a 300mm diameter located within Crimson King Way, and a 300mm diameter located within Cloverridge Avenue Court.

There is an existing 200mm fire and 100mm domestic service connection to the site which connects to 300mm watermain on Crimson King Way. The existing water service connections are complete with an existing 1800mm diameter fire and commercial service valve chamber.

2.2 WATER SUPPLY

The domestic water demand for the proposed development has been evaluated using the *Town of East Gwillimbury Engineering Standards and Design Criteria* (September 2012). The following design parameters have been used to determine the water requirements for this project:

- Average Day Demand of 35,000 L/ha/day for Industrial;
- Average Day Demand of 28,000 L/ha/day for Commercial;
- Maximum Day Demand is 2.0 times the Average Day Demand;
- Peak Hour Demand is 2.75 times the Average Day Demand;
- Equivalent Population Density of 50 persons per hectare of GFA for commercial and institutional developments;
- Minimum Fire Flow Demand of 12,000 L/min. (or 200 L/s) for employment developments;
- Maximum Operating Pressure of 700 kPa (100 psi) for all demand scenarios;
- Minimum Pressure of 275 kPa (40 psi) for Maximum Hour Demand under normal conditions;
- Minimum pressure of 140 kPa (20 psi) for Maximum Day Demand and Fire Flow Demand;

The estimated domestic water demand for Phase 1 and Phase 2 of the development has been calculated using the Town of East Gwillimbury Criteria. The estimate domestic water demands are summarized in Table 1.

TABLE 1: DOMESTIC WATER DEMAND SUMMARY

	Total Industrial/Commercial Area	Total Population	Average Day Water Demand	Maximum Day Demand	Peak Hour Demand
Phase 1	139 m^2	1	0.01 L/s	0.02 L/s	0.03 L/s
Phase 2	29,516 m^2	149	1.20 L/s	2.39 L/s	3.29 L/s
Total		150	**1.21 L/s**	**2.41 L/s**	**3.32 L/s**

Note: The average day demand for the proposed office space in Phase 1 was computed using the commercial developments design criteria. The average day demand for Phase 2 was computed using the design criteria for industrial developments.

As seen in Table 1, the average demand for the Site is 1.21 L/s, the peak hour demand is 3.32 L/s and the maximum day demand is 2.41 L/s. The detailed domestic demand calculations are included in **Appendix A**.

A detailed fire flow calculation has been prepared for each building using the recommendations of the Water Supply for Public Fire Protection, 199 – Fire Underwriters Survey (FUS). The fire flow calculations are based on the proposed building being fire resistive with vertical opening and exterior vertical communications being adequately protected (one hour fire rating), complete automatic sprinkler protection (meeting NFPA 13 and other NFPA sprinkler standards), building separation distance and having a non-combustible occupancy. The calculations consider the ground floor area of the building.

The fire flow calculations indicate that the maximum recommended fire flow is governed by Building A in Phase 2, which requires a flow of 2,639 USGPM (9,990 L/min). This considers the worst-case scenario, and generates a flow rate greater than the Town of East Gwillimbury's fire flow demand of 4,800 L/min. Therefore, the demand calculated using the FUS will be the governing fire flow to be conservative. The fire flow calculations are included in **Appendix A**.

2.3 WATERMAIN APPURTENANCES

Phase 1 & 2 will be serviced by the existing H-style 100mm diameter domestic and 200mm diameter fire service connections from the 300mm diameter watermain on Crimson King Way. There is an existing 1800mm diameter fire and commercial service valve chamber per Town Standards at the existing watermain connection for the site. A looped 200mm diameter fire line is proposed to service Phase 1 & 2, while a 100mm diameter domestic line is proposed along the northern and southern driveways.

Based on discussions with the Client, the self storage buildings in Phase 1 will not require domestic water servicing. As such, a separate domestic and fire service connection is only proposed for the office space in Phase 1. A separate domestic and fire service connection is proposed for each building in Phase 2. The water service locations for each building will be coordinated with the Mechanical Engineer.

Water service connections to the proposed buildings will be in accordance with the Town of East Gwillimbury's engineering standards. A separate water meter is to be proposed for the office space in Phase 1, and for each building in Phase 2. As well, backflow preventers and double check valve assemblies will be provided within the mechanical room for the domestic water service, in accordance with Town standards.

Fire hydrants will be proposed along the driveway and parking lots with a maximum spacing of 90m as per the Town's requirements for industrial and commercial areas. There are two existing hydrants on Crimson King Way adjacent to the Site which will be utilized to provide the required coverage for Phase 2 of the development. Building code requirements stipulate that each building is to be serviced by a fire hydrant which is located no more than 45 m away from the building's siamese connection. The proposed and existing hydrants will be located within 45 m of the buildings proposed siamese connection. The location and size of the proposed watermain network is shown on the Site Servicing Plan **(Drawing SS1)** included in **Appendix F.**

2.4 HYDRANT FLOW TEST

A hydrant flow test was completed on June 3, 2022 indicating an available flow rate of 2500 USGPM (158 L/s) at 20psi. The Town's criteria indicates that the under normal conditions of maximum day and fire flow demands, the pressure should not drop below 275 kPa (40 psi).

As discussed in Section 2.2, the FUS fire flow rate for the site was calculated to be 2,639 GPM (166.50 L/s) and the maximum day flow for the site is 2.41 L/s. The maximum day flow plus fire flow demand for the proposed development is 168.91 L/s. As such, pressure booster systems will be provided internal to the proposed buildings to ensure adequate water pressure is provided under the fire flow condition to meet OBC requirements. The pressure booster system will be coordinated with the Mechanical Consultant to meet OBC. Based on the proposed design, there is sufficient water pressure within the existing water distribution network in the West Holland Landing residential subdivision to support the proposed development. Detailed results are included in **Appendix B**.

3 SANITARY SEWAGE SYSTEM

3.1 EXISTING CONDITIONS

The existing sanitary service connection to the site drains to an existing 250 mm diameter sanitary sewer within Crimson King Way. The existing 250mm sanitary sewer flows east along Crimson King Way and drains north to Holland Landing Road and continues north to Bradford Street and then east to the existing pumping station.

Based on the approved subdivision design prepared by WSP dated January 2017, a peak flow of 15.82 L/s was accounted for the Site.

3.2 DESIGN PARAMETERS

The sanitary demands for the proposed site are based on the following criteria as specified in the *Town of East Gwillimbury Engineering Standards and Design Criteria (*September 2012):

- Sanitary generation rate of 28,000 L/ha/day for commercial;
- Sanitary generation rate of 35,000 L/ha/day for industrial;
- Equivalent Population Density of 50 persons per hectare of GFA for employment areas;
- Infiltration flow rate of 0.286 L/s/ha;
- Harmon Peaking Factor as established by the Harmon Peaking Factor formula; with a minimum factor of 2.0 and maximum factor of 4.0.

3.3 PROPOSED SANITARY SERVICE CONNECTIONS

The internal sanitary network will generally follow the northern and southern driveways with a minimum pipe size of 200mm. Flows from Phase 1 & 2 will connect into the existing sanitary manhole on the property line along Crimson King Way, and will flow east along the sewer Crimson King Way. All flows are ultimately conveyed to the existing sanitary sewer on Holland Landing Road, which ends up at the existing pumping station on Bradford Street. The existing sanitary manhole along the property line will be maintained and will be used to service the proposed development. Refer to **the Site Servicing Plan (Drawing SS1) in Appendix F** for the Site Servicing Plan.

Based on discussions with the Client, the self storage buildings in Phase 1 will not require sanitary servicing. As such, a separate sanitary connection is only proposed for the office space in Phase 1. An individual sanitary service connection is proposed for each building in Phase 2.

Proposed sanitary sewage piping within the buildings will be designed by the site mechanical consultant to meet Ontario Plumbing Code Standards. All local sanitary sewers and service connections into the buildings will be per the Town of East Gwillimbury's standards.

3.4 POST DEVELOPMENT SANITARY FLOW

The estimated flows were derived based on the design criteria outlined in **Section 3.2** and the development statistics provided by the Architect. The estimated sanitary flows are summarized in Table 2.

TABLE 2: SANITARY DESIGN FLOW SUMMARY

	Total Industrial/ Commercial Area	Total Population	Site Area	Site Design Flow
Phase 1	139 m^2	1	2.12 ha	0.62 L/s
Phase 2	29,516 m^2	149	7.00 ha	6.78 L/s
Total		150	**9.12 ha**	**7.40 L/s**

Note:

1) The average daily flow for the proposed office space in Phase 1 was computed using the commercial developments design criteria. The average daily flow for Phase 2 was computed using the design criteria for industrial developments.

As seen in Table 2, the sanitary design flow for Phase 1 and 2 is 0.62 L/s and 6.78 L/s, respectively. The overall sanitary design flow for the site is 7.40 L/s. The detailed sanitary flow calculations are included in **Appendix C**.

3.5 DOWNSTREAM CAPACITY ANALYSIS & ALLOCATION ASSESSMENT

A sanitary sewer analysis was completed by WSP Canada as part of the approved West Holland Landing Residential Subdivision to assess the impact of the subdivision development on the downstream existing West Holland Landing Road trunk sewer. Based on the approved Sanitary Drainage Plan for the West Holland Landing Residential Subdivision prepared by WSP Canada dated January 2017, the Site falls within the sanitary drainage area for the West Holland Landing Road trunk sewer. The approved sanitary sewer analysis accounted for a total sanitary flow of 15.82 L/s from the Site. The approved Sanitary Drainage Plan is included in **Appendix E**.

The proposed development is expected is generate lower sanitary flows than the original flow accounted for the Site. As discussed in Section 3.4, the sanitary design flow for the proposed development is 7.40 L/s. As such, the original sanitary sewer analysis (as part of the subdivision design) estimated flows that are 8.42 L/s greater than the sanitary design flow for the Site. Therefore, there is downstream capacity to support to the proposed development.

A further study of the proposed sanitary flows has been completed to achieve a realistic understanding of the expected sanitary flows for sanitary sewer allocation purposes. Methodologies used to compute the sanitary design flows for the proposed development include the following:

- Town of East Gwillimbury Design Criteria
- City of Vaughan Design criteria
- Ontario Building Code (OBC) Table 8.2.1.3.A & 8.2.1.3.B

Detailed calculations are included in **Appendix D**. Table 3 summarizes the results of the three methodologies used.

TABLE 3: SANITARY DESIGN FLOW METHODOLOGY STUDY

	Total Ground Industrial/ Commercial Area	Sanitary Flow (L/s)		
		Town of East Gwillimbury	City of Vaughan & York Region	OBC
Phase 1	139 m^2	0.62	0.29	0.01
Phase 2	29,516 m^2	6.27	1.51	1.66
Total		6.89	1.80	1.67

The first approach used to calculate the sanitary flow for the proposed development was using the Town's design criteria. The Town's sanitary generation rate for commercial and industrial developments, and the Town's infiltration rate were used as part of this calculation. A maximum peaking factor of 4.0 was applied in calculating the sanitary flow for Phase 2 in Table 3 per the Town's criteria. However, based on review of the previously approved sanitary sewer analysis for the West Holland

Landing Residential Subdivision a peaking factor of 3.57 was found to be more practical given the size of the sanitary drainage area for the trunk sewer. In the approved sanitary sewer analysis, a peaking factor of 3.57 was used at the most downstream end of the sanitary sewer system. As such, a peaking factor of 3.57 was applied to Phase 2 the sanitary flow included in Table 3. The total sanitary design flow for the proposed development based on the Town's approach is 6.90 L/s.

The design criteria for similar commercial and industrial developments in nearby municipalities were also considered to assess the expected sanitary design flow. The second approach used to calculate the sanitary flow for the proposed development is based on the City of Vaughan criteria. The population density per City of Vaughan guidelines was used to determine the population of the Phase 1 & Phase 2, while the York Region Average Daily flow rate for commercial developments (160 L/c/d) was used to determine the sanitary flow for Phase 1, and the York Region Average Daily Flow rate targeted for future developments of 150 L/c/d was used to determine the sanitary flow Phase 2. Although the City of Vaughan has an infiltration rate of 0.26 L/s/ha, a more practical infiltration rate of 0.13 L/s/ha was used due to the scale of the development. The total sanitary design flow for the proposed development based on the City of Vaughan's design criteria is 1.80 L/s.

The third approach used to calculate the sanitary flow for the proposed development was based on the Ontario Building Code (OBC). The sanitary flow for Phase 1 was based on the office floor space, while the sanitary flow for Phase 2 was based on the number of estimated water closets and loading bays. A conservative approach was used for the flows and a peaking factor of 3.57 from the approved West Holland Residential Subdivision sanitary sewer analysis was applied to the sanitary flow. Based on the OBC approach, the total sanitary design flow for the proposed development is 1.67 L/s.

As seen in Table 3, the sanitary flows computed using these methodologies range from 1.67 L/s to 6.90 L/s. However, it should be noted that the sanitary flows computed using the Town's criteria is significantly higher than those computed using the City of Vaughan and OBC methodology. The sanitary flows computed using the City of Vaughan design criteria and OBC methodology results in flows ranging between 1.67 L/s to 1.80 L/s. Based on the results of this study, it is our opinion that the use of the Town's design criteria for sanitary flows is a conservative approach. The City of Vaughan design criteria and OBC methodology results in more realistic sanitary flows for the Site.

Therefore, the proposed development will have a minimal impact on the downstream sanitary sewer system and the existing municipal sanitary sewer system has sufficient capacity to support the flows from the proposed development

4 STORM SEWAGE SYSTEM

A Stormwater Management Report for this development has been prepared by WSP under separate cover. It identifies the stormwater quantity and quality controls under which this site will operate to comply with the above noted guidelines.

4.1 EXISTING CONDITIONS

The following list shows all the existing storm sewers available near the project site:

- 900mm / 1200 mm diameter storm sewer on Crimson King Way;
- 825mm diameter storm sewer on Clover Ridge Avenue;
- 1500mm diameter storm sewer within an easement along the northern limits of the site;
- 1200mm diameter storm sewer within a 4.0m easement along the western limits of the site;

Under existing conditions, the site is currently undeveloped and generally slopes from the west to the east towards the existing stormwater management pond. Based on the approved Storm Drainage Plan for the West Holland Landing Residential Subdivision prepared by WSP Canada dated January 2017, the existing site is divided into two drainage boundaries. The first is 4.26 ha of the northern half of the site which drains to the eastern property limit towards the stormwater management pond via an existing 975mm diameter storm sewer. The second is a 4.27 ha of the southern portion of the site which drains to the eastern property limit towards the sediment forebay of the stormwater management pond via an approved 975mm diameter storm sewer. The referenced approved Storm Drainage Plan is included in **Appendix E**.

4.2 PROPOSED STORM SERVICING

Phase 1 of the proposed development includes seven (7) self storage buildings with an office space and private driveways and at-grade parking. Storm flows from Phase 1 will be captured via storm sewers and will be directed to the existing OGS (HG10) and will outlet to the existing 975mm diameter storm sewer to the stormwater management pond. The OGS will provide water quality treatment to the stormwater flows prior to outletting to the stormwater management pond.

Phase 2 of the proposed development includes three buildings with at-grade parking and private driveways. Storm flows from the Phase 2 will be captures via storm sewers and will be directed to previously approved 975mm diameter storm sewer via previously approved HW3 to the sediment forebay of the stormwater management pond. The existing pond provides phosphorous removal, erosion control, water quantity and water quality treatment for the proposed development as part of the previously approved design.

Subsurface infiltration chambers have been proposed to achieve water balance requirements. Roof top controls and roof top storage is provided for the buildings proposed in Phase 2 to reduce peak flows entering the storm sewers. A total of 1067.6 cum of roof top storage is provided as part of Phase 2 for the 100 year event, with a release rate of 0.212 m^3/s. Rooftop flows will be captured and directed to the storm sewer system. For future details regarding the proposed storm servicing, refer to the Stormwater Management Report prepared by WSP under a separate cover.

It is proposed to have a storm sewer within the private roads to service the buildings and private roads. The storm sewer within the private roads will be constructed to Town of East Gwillimbury standards. Refer to the Site Servicing Plan (Drawing SS1) in **Appendix F** for the layout of the Site Servicing Plan.

4.3 MINOR/MAJOR STORM DRAINAGE SYSTEM

All storm flows will be collected by on site by catchbasins, catchbasin manholes and trench drain and directed to the existing stormwater management pond via storm sewers. The storm sewers are sized to convey storms up to the 100-year storm event. For storm events in excess of the storm sewers (100 year event), the grading design is prepared such that the surface (i.e. roads, and landscape area) will direct surface drainage away from the proposed and existing buildings to the approved outlets along the eastern property limits and to the Crimson King Way, which ultimately outlet to the existing stormwater management pond.

As per Approved Storm Drainage Plan for the West Holland Landing Residential Subdivision prepared by WSP Canada dated January 2017, the site has been divided into two drainage boundaries. The surface grading and storm sewers have been designed to convey drainage to the existing OGS (HG10), and to the sediment forebay of the pond via the previously approved headwall (HW3).

Refer to **Drawing SS1 in Appendix G** for the Site Servicing Plan for the storm sewer layout and refer to the Stormwater Management Report prepared by WSP under a separate cover.

5 ROADS AND SITE GRADING

5.1 ROAD LAYOUT

As shown on the **SG1 – Site Grading Plan** in **Appendix G,** the proposed development is serviced by private driveways roads. Access to the site is provided from via Crimson King Way to the south and from Highway 11 from the west.

The pavement design of the residential laneways follows a reverse "crowned" cross-section.

5.2 GRADING

The grading design will comply with Town of East Gwillimbury Standards and will be designed to achieve the following:

- Maintain existing overland flow routes through the site;
- Maintain perimeter grades;
- Optimize earthworks i.e. minimize the quantity of surplus materials to be exported;
- Minimize impact on building construction;
- Provide adequate cover for underground services;
- Accommodate stormwater management requirements;

The proposed grading for the site will, where possible, generally follow the existing grades to maintain drainage patterns. Minor storm drainage (5 year to 100-year storm event) is to be conveyed towards catch basins and catch basin manholes which conveys flows to adjacent stormwater management pond.

Major storm drainage (greater than the 100-year storm event) is provided to direct drainage away from proposed and existing structures to approved outlet points. Private roads will be designed with a minimum longitudinal grade of 0.5% and a maximum grade of 5.0%.

Three accesses are provided for the site, two accesses are provided along the southern property limits from Crimson King Way and one access is provided from Highway 11 along the western property limits.

During detail design, further coordination with the stormwater management consultant, landscape consultant and mechanical engineer will be necessary to ensure grading initiatives support stormwater management and landscape objectives and provide sufficient cover for the sewers within the private's roads.

6 CONCLUSION

6.1 WATER DISTRIBUTION

The proposed development will be serviced from the Town's existing watermain on Crimson King Way. FUS calculations and a domestic and fire flow calculation for the proposed development has been completed and is included in Appendix A. Sizing and location of the proposed water services to the proposed building will be coordinated with the mechanical consultant.

6.2 SANITARY SEWAGE

New local sanitary sewers are proposed within the private driveways. These new sewers will service the proposed office building in Phase A and the proposed Buildings A, B and C in Phase 2. The sewers will outlet to the existing 250mm sanitary sewer within Crimson King Way. The flows will flow east along Crimson King Way to the 200mm sanitary sewer on Holland Landing Road. The estimated post-development peak sanitary flow is calculated to be approximately 7.40 L/s (refer to **Appendix C** for sanitary design flow calculations). Based on the approved sanitary sewer analysis completed for the West Holland Landing Residential Subdivision and the sanitary design flow study demonstrate that the proposed development has minimal impact to downstream sanitary sewer.

6.3 STORM SEWAGE

Storm drainage 100-year storm event or smaller will be collected on-site via storm sewers and will be conveyed to the existing stormwater management pond via previously approved outlets. Emergency storm flows will be directed away from proposed buildings and overland to approved outlet points and ultimately to the pond. Roof top storage, roof control and subsurface infiltration chambers are proposed as part of the site servicing. The existing stormwater management pond fulfils the phosphorous removal, erosion control, water quantity and water quality requirements for the Site as part of the previously approved stormwater management pond design. Refer to the stormwater management report prepared for the Site by WSP under separate cover.

6.4 ROADS AND SITE GRADING

The grading design of the proposed development will generally follow existing drainage patterns. Minor storm drainage is to be conveyed towards catch basins and catch basin manholes. Major storm drainage (greater than the 100-year storm event) is provided to direct drainage away from proposed and existing structures to approved outlet points.

APPENDIX

A

WATER FLOW DEMAND CALCULATIONS

APPENDIX A

PROPOSED DOMESTIC WATER DEMAND

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Proposed Development

Phase 1

Building	Residential Units	Pop.[1] (1.76ppu)	Office (m^2)	(Pop.)[2]	Institutional (m^2)	(Pop.)[2]	Total Population
Office	0	0	139	1	0	0	1
TOTAL	**0**	**0**	**139**	**1**	**0**	**0**	**1**

Phase 2

Building	Residential Units	Pop.[1] (1.76ppu)	Industrial/Commercial (m^2)	(Pop.)[2]	Institutional (m^2)	(Pop.)[2]	Total Population
Buildings A	0	0	16,163	81	0	0	81
Buildings B	0	0	4,707	24	0	0	24
Building C	0	0	8,646	44	0	0	44
TOTAL	**0**	**0**	**29,516**	**149**	**0**	**0**	**149**

Proposed Water Demands

Phase 1

					Peak Hour		Max Day	
Building	Population (see above)	Area (m^2)	Demand Flow	Average Daily Demand (L/s)	Peaking Factor	Demand (L/s)	Peaking Factor	Demand (L/s)
Residential Units	0	-	350 L/c/d	0.00	2.75	0.00	2.00	0.00
Commercial	1	139	28,000 L/ha/d	0.01	2.75	0.03	2.00	0.02
Institutional	0	0	18,000 L/ha/d	0.00	2.75	0.00	2.00	0.00
TOTAL	**1**			**0.01**		**0.03**		**0.02**

Phase 2

					Peak Hour		Max Day	
Building	Population (see above)	Area (m^2)	Demand Flow	Average Daily Demand (L/s)	Peaking Factor	Demand (L/s)	Peaking Factor	Demand (L/s)
Residential Units	0	-	350 L/c/d	0.00	2.75	0.00	2.00	0.00
Industrial	149	29,516	35,000 L/ha/d	1.20	2.75	3.29	2.00	2.39
Institutional	0	0	18,000 L/ha/d	0.00	2.75	0.00	2.00	0.00
TOTAL	**149**			**1.20**		**3.29**		**2.39**

Overall Site

					Peak Hour		Max Day	
Building	Population (see above)	Area (m^2)	Demand Flow	Average Daily Demand (L/s)	Peaking Factor	Demand (L/s)	Peaking Factor	Demand (L/s)
Phase 1	1	139	28,000 L/ha/d	0.01	2.75	0.03	2.00	0.02
Phase 2	149	29,516	35,000 L/ha/d	1.20	2.75	3.29	2.00	2.39
TOTAL	**2**			**1.21**		**3.32**		**2.41**

Note

1) Unit count and floor areas per site plan prepared by Baldassarra Architects Inc. recieved December 7, 2021 for Phase 1 and per site plan prepared by Baldassara Architects Inc received November 28, 2022 .
2) Residential population densities of 1.76 persons per unit for apartments as per the Town of East Gwillimbury Engineering Standards and Design Criteria.
3) Retail population densities of 50 persons per hectre of GFA for employment as per the Town of East Gwillimbury Engineering Standards and Design Criteria.
4) The self-storage buildings will not be serviced by the domestic waterline, as such the self storage buildings have not been taken into account in the water demand calculations.

APPENDIX A

FIRE FLOW CALCULATIONS - PHASE 1

Project: West Holland Landing Employment Lands
Job No.: 221-01973

Fire Flow Calculation Procedure per Water Supply for Public Fire Protection, 1999 by Fire Underwriter Survey, p 20.

$$F = 220\ C\sqrt{A}$$

where

F = Fire flow in Litres per minute (Lpm)
C = coefficient related to the type of construction
A = total floor area in square metres

A. Determine Type of Construction
=> Fire-resistive construction (fully protected frame, floors, roof)
Therefore C = 0.6

B. Determine Ground Floor Area
=> Fire-resistive building with vertical openings and exterior vertical communications properly protected
Therefore A = Ground Floor Area

Table 1 GFA

Building	Ground Floor Area (m2)
A	2,211 m2
B	1,208 m2
C	1,208 m2
D	1,208 m2
E	1,301 m2
F	1,208 m2
G	985 m2
Office Space	139 m2

C. Determine Height in Storeys
=> All Buildings and Office Space are 1 Storey

D. Determined the Fire Flow
F = 220 x 0.6 x √1542

Table 2 Fire Flow

Building	Fire Flow (Lpm)
A	6,000
B	5,000
C	5,000
D	5,000
E	5,000
F	5,000
G	4,000
Office Space	2,000

E. Determine Increase or Decrease for Occupancy
=> Reduction for Limited Combustible Occupancies
Therefore 15% reduction

Table 3 Fire Flow with Decrease for Occupancy

Building	Reduction (Lpm)	Fire Flow (Lpm)
A	900	5,100
B	750	4,250
C	750	4,250
D	750	4,250
E	750	4,250
F	750	4,250
G	600	3,400
Office Space	300	1,700

F. Determine Decrease for Automatic Sprinkler Protection
=> Has Automatic Sprinkler Protection (Per NFPA 13 Standards)
Therefore 30% reduction

Table 4 Fire Flow with Decrease for Automatic Sprinkler Protection

Building	Fire Flow (Lpm)
A	1,530
B	1,275
C	1,275
D	1,275
E	1,275
F	1,275
G	1,020
Office Space	510

G. Determine the Total Increase For Exposures

Table 5 Exposures Distance

Face	Distance (m)							
	Building A	Building B	Building C	Building D	Building E	Building F	Building G	Office Space
West Side	-	9.00	9.00	9.00	9.00	9.00	9.00	-
East Side	9.00	9.00	9.00	9.00	-	-	-	9.00
North Side	-	6.00	6.00	-	6.00	6.00	-	0.00
South Side	0.00	25.40	6.00	6.00	26.70	6.00	6.00	49.50

Table 6 Fire Flow Charge

Face	Charge							
	Building A	Building B	Building C	Building D	Building E	Building F	Building G	Office Space
West Side	-	20%	20%	20%	20%	20%	20%	-
East Side	20%	20%	20%	20%	-	-	-	20%
North Side	-	20%	20%	-	20%	20%	-	25%
South Side	25%	10%	20%	20%	10%	20%	20%	0%
Total	45%	70%	75%	60%	50%	60%	40%	45%
Increase for Exposure	516 Lpm	669 Lpm	717 Lpm	574 Lpm	478 Lpm	574 Lpm	306 Lpm	172 Lpm

Note: The maximum charge may not exceed 75%

H. Req'd Fire Flow = D - F + G

Table 6 Required Fire Flow

Building	Required Fire Flow (Lpm)	Rounded Fireflow (Lpm)	Rounded Fireflow (US GPM)
A	4,086	5,000	1,319
B	3,644	4,000	1,055
C	3,692	4,000	1,055
D	3,549	4,000	1,055
E	3,453	4,000	1,055
F	3,549	4,000	1,055
G	2,686	3,000	792
Office Space	1,362	2,000	528

(4,800 Lpm < F < 45,000 Lpm; OK)

Therefore, the governing fire flow for Phase 1 will be based on Building A. 1,319 US GPM (5,000 Lpm)

Notes:
1) The following assumptions have been made regarding the construction of the proposed buildings in Phase 1. These assumptions will be confirmed by the Architect later in the design process.
- Fire-resistive construction
- The ground floor area is based on the Site Plan prepared by Baldassara Architects Inc received Nov 28, 2022
- The occupany of the storage building and office space will be limited combustible
- The self storage buildings and office space will have automatic sprinkler protection

APPENDIX A

FIRE FLOW CALCULATIONS - PHASE 2 BUILDING A

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Fire Flow Calculation Procedure per Water Supply for Public Fire Protection, 1999 by Fire Underwriter Survey, p 20.

$$F = 220\ C\sqrt{A}$$

where

F = Fire flow in Litres per minute (Lpm)
C = coefficient related to the type of construction
A = total floor area in square metres

A. **Determine Type of Construction**
=> Fire-resistive construction (fully protected frame, floors, roof)
Therefore C = 0.6

B. **Determine Ground Floor Area**
=> Fire-resistive building with vertical openings and exterior vertical communications properly protected
Therefore A = Ground Floor Area
A = 16,163 m2

C. **Determine Height in Storeys**
=> Building D: 1 Storeys

D. **Determined the Fire Flow**
F = 220 x 0.6 x √16162.74
F = 17,000 Lpm

E. **Determine Increase or Decrease for Occupancy**
=> Reduction for Limited Combustible Occupancies
Therefore 15% reduction
15% reduction of 17000 Lpm = 2,550 Lpm
17000 - 2550 = 14,450 Lpm

F. **Determine Decrease for Automatic Sprinkler Protection**
=> Has Automatic Sprinkler Protection (Per NFPA 13 Standards)
Therefore 30% reduction
30% reduction of 14450 Lpm = 4,335 Lpm

G. **Determine the Total Increase For Exposures**

Face	Distance (m)	Charge
West Side		0%
East Side	55.00	0%
North Side	15.80	15%
South Side		0%

Total 15% of 2,168 = 1,626 Lpm

H. **Req'd Fire Flow = D - F + G**
F = 11,741 Lpm
F = 12,000 Lpm (4,800 Lpm < F < 45,000 Lpm; OK)
F = 3,166 US GPM

APPENDIX A

FIRE FLOW CALCULATIONS - PHASE 2 BUILDING B

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Fire Flow Calculation Procedure per Water Supply for Public Fire Protection, 1999 by Fire Underwriter Survey, p 20.

$$F = 220\ C\sqrt{A}$$

where

F = Fire flow in Litres per minute (Lpm)
C = coefficient related to the type of construction
A = total floor area in square metres

A. **Determine Type of Construction**
=> Fire-resistive construction (fully protected frame, floors, roof)
Therefore C = 0.6

B. **Determine Ground Floor Area**
=> Fire-resistive building with vertical openings and exterior vertical communications properly protected
Therefore A = Ground Floor Area
A = 4,707 m2

C. **Determine Height in Storeys**
=> Building D: 1 Storeys

D. **Determined the Fire Flow**
F = 220 x 0.6 x √4706.84
F = 9,000 Lpm

E. **Determine Increase or Decrease for Occupancy**
=> Reduction for Non-Combustible Occupancies
Therefore 25% reduction
25% reduction of 9000 Lpm = 2,250 Lpm
9000 - 2250 = 6,750 Lpm

F. **Determine Decrease for Automatic Sprinkler Protection**
=> Has Automatic Sprinkler Protection (Per NFPA 13 Standards)
Therefore 30% reduction
30% reduction of 6750 Lpm = 2,025 Lpm

G. **Determine the Total Increase For Exposures**

Face	Distance (m)	Charge
West Side		0%
East Side	55.00	0%
North Side	25.40	10%
South Side	15.80	15%

Total 25% of 1,688 = 1,266 Lpm

H. **Req'd Fire Flow = D - F + G**
F = 5,991 Lpm
F = 6,000 Lpm (4,800 Lpm < F < 45,000 Lpm; OK)
F = 1,583 US GPM

APPENDIX A

FIRE FLOW CALCULATIONS - PHASE 2 BUILDING C

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Fire Flow Calculation Procedure per Water Supply for Public Fire Protection, 1999 by Fire Underwriter Survey, p 20.

$$F = 220\ C\sqrt{A}$$

where

F = Fire flow in Litres per minute (Lpm)
C = coefficient related to the type of construction
A = total floor area in square metres

A. **Determine Type of Construction**
=> Fire-resistive construction (fully protected frame, floors, roof)
Therefore C = 0.6

B. **Determine Ground Floor Area**
=> Fire-resistive building with vertical openings and exterior vertical communications properly protected
Therefore A = Ground Floor Area
A = 8,646 m2

C. **Determine Height in Storeys**
=> Building D: 1 Storeys

D. **Determined the Fire Flow**
F = 220 x 0.6 x √8646.27
F = 12,000 Lpm

E. **Determine Increase or Decrease for Occupancy**
=> Reduction for Non Combustible Occupancies
Therefore 25% reduction
25% reduction of 12000 Lpm = 3,000 Lpm
12000 - 3000 = 9,000 Lpm

F. **Determine Decrease for Automatic Sprinkler Protection**
=> Has Automatic Sprinkler Protection (Per NFPA 13 Standards)
Therefore 30% reduction
30% reduction of 9000 Lpm = 2,700 Lpm

G. **Determine the Total Increase For Exposures**

Face	Distance (m)	Charge
West Side	55.00	0%
East Side		0%
North Side	26.70	10%
South Side		0%

Total 10% of 900 = 675 Lpm

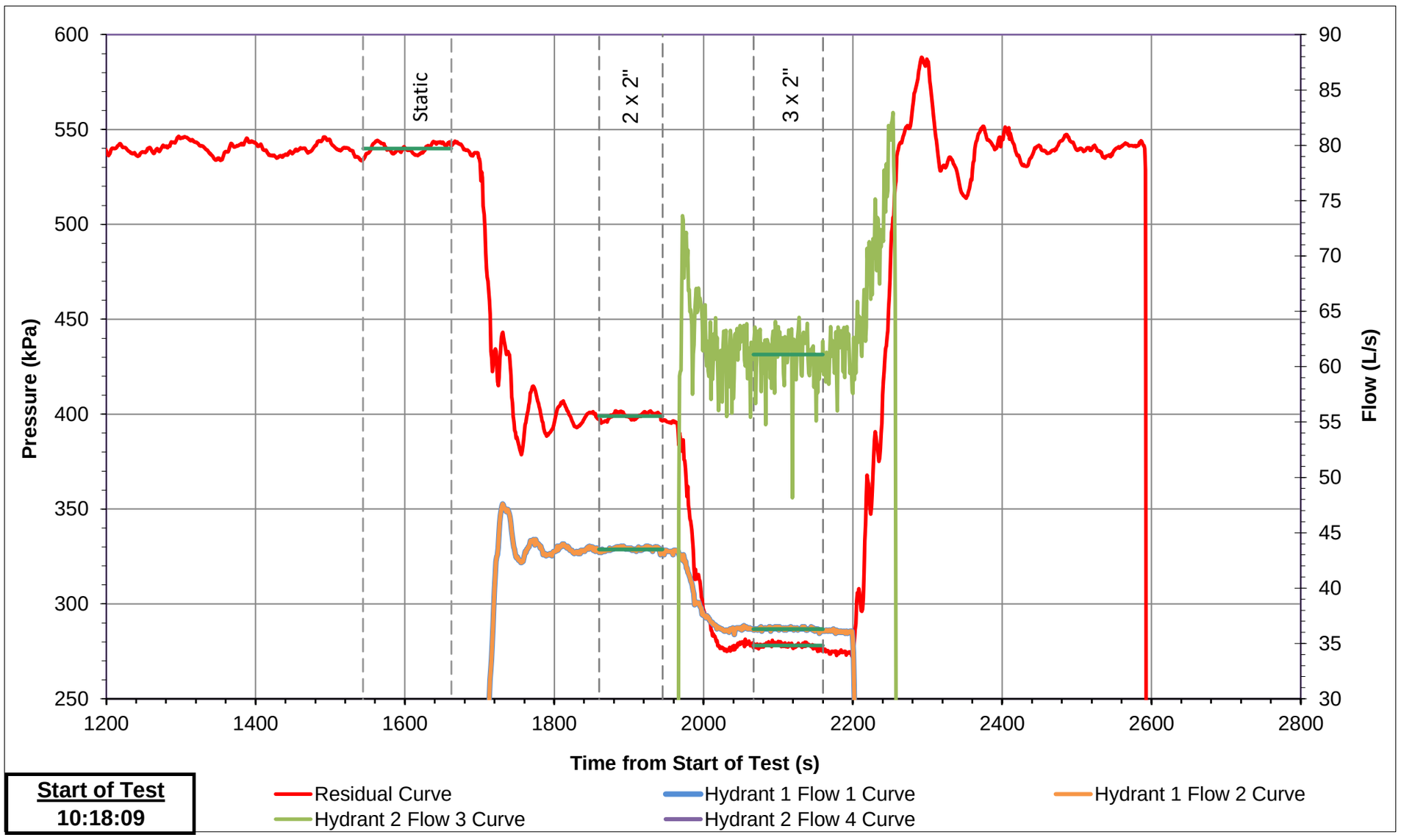
H. **Req'd Fire Flow = D - F + G**
F = 6,975 Lpm
F = 7,000 Lpm (4,800 Lpm < F < 45,000 Lpm; OK)
F = 1,847 US GPM

APPENDIX

B

HYDRANT FLOW TEST RESULTS

Test 1 - HWY 11 & Crimson King Way



Subject Watermain Details

Diameter:	300 mm	**Material:**	PVC
Area:	0.071 m2		

Subject Hydrant & Valve Details

Residual Hydrant:	
Flow Hydrant 1:	
Flow Hydrant 2:	

TABLE A: TESTED PRESSURES AND FLOWS

Point	Time		Residual Hydrant		Flow Hydrant 1				Flow Hydrant 2				Total Flow		Velocity
			Residual (S1)		Flow 1 (S2)		Flow 2 (S3)		Flow 3 (S4)		Flow 4 (S5)				
	Start	Finish	(kPa)	(psi)	(L/s)	(GPM)	(L/s)	(GPM)	(L/s)	(GPM)	(L/s)	(GPM)	(L/s)	(GPM)	(m/s)
Static	1544	1662	540	78.3	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1 x 2"			0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
2 x 2"	1860	1945	399	57.9	43.5	689	43.5	689	0.0	0	0.0	0	87.0	1379	1.2
3 x 2"	2067	2160	278	40.3	36.3	575	36.3	575	61.1	968	0.0	0	133.7	2119	1.9
4 x 2"			0	0.0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

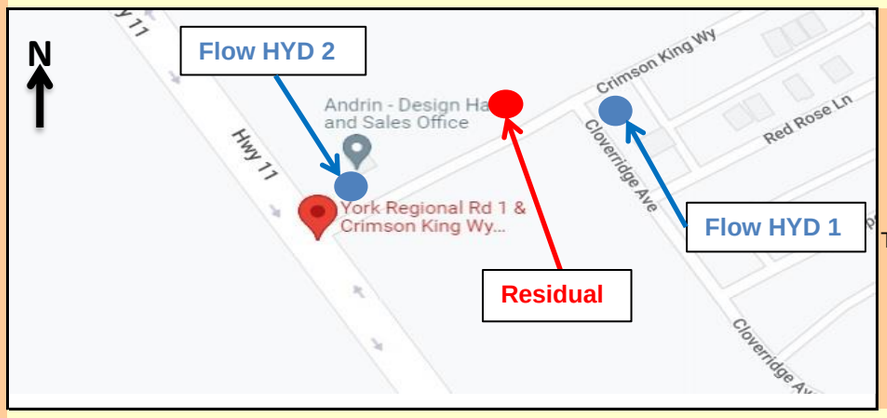
HWY 11 & Crimson King Way

HYDRANT FLOW TEST RESULTS

Date: 03-Jun-22 Time: 10:18 (hh/mm) Municipality: East Gwillimbury

Operator:

Tested By: Sen, Jack Test No: 1



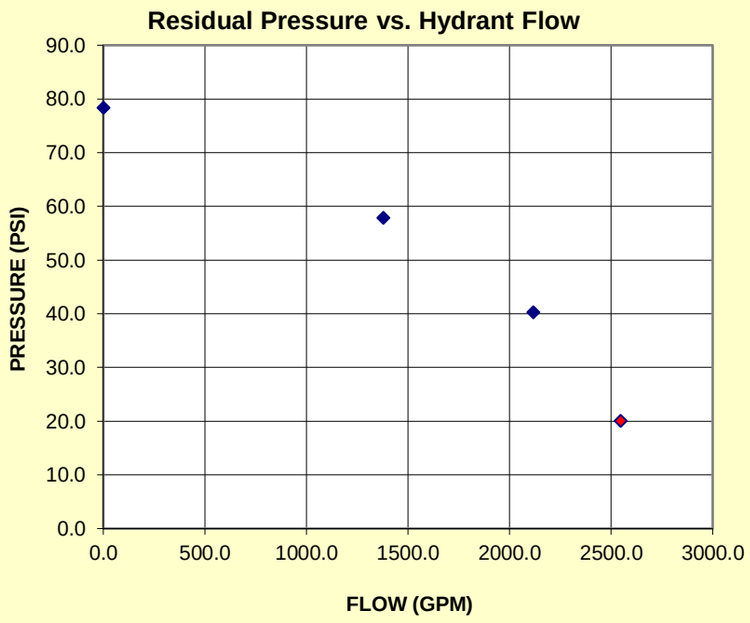
Conditions before Test (STATIC)

Residual Hydrant:	78.3 psi	540 kPa
Hydrant that will Flow:	78.3 psi	540 kPa
Δ pressure:	0.0 psi	0 kPa
Elevation Difference: (Flow El. - Residual El.)	0.0 ft	0.0 m

Test Notes:

TEST		TEST FLOW		RESIDUAL PRESSURE (psi)		Minimum Residual P_r (psi)	Fire Flow at Minimum Residual, Q_r (USGPM)	Fire Flow at Minimum Residual, Q_r (L/s)	10% Pressure Drop Achieved?
Port Size (in)	Nozzle Pressure (psi)	(USGPM)	(L/s)	Monitoring Hydrant	Flow Hydrant (Corrected) *				
STATIC	n/a	0	0	78.3	78.3				
Single Hydrant Test									
1 x 2"									
2 x 2"	19.5	1378.0	87.0	57.9	57.9	20	2429	153	YES
3 x 2"									
Hydrant 1	13.6	1150.0	72.6	40.3	40.3	20	2668	168	YES
Hydrant 2	33.5	968.0	61.1						
4 x 2"									
Hydrant 1									
Hydrant 2									

* Pressure correction is equal to the elevation difference. Column 2 (and Table A) show the nozzle pressure while flowing.



Results			
Static Pressure		Flow at 20 psi (140kPa)*	
(psi)	(kPa)	(gpm)	(L/s)
78.3	540	2500	158

* Results carried to nearest 50 gpm or 100 gpm if over 1000 gpm

Hydrant Classification as per NFPA 291			
Class	AA	Color	BLUE

Water Discharged During Test:	30100 L

Rounded up to closest 100L

APPENDIX

C

THEORETICAL SANITARY SEWAGE FLOWS

APPENDIX C
PROPOSED SANITARY FLOW GENERATION

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Proposed Development

Phase 1

Building	Residential Units	Pop.[1] (1.76ppu)	Office (m^2)	(Pop.)[2]	Institutional (m^2)	(Pop.)[2]	Total Population
Office	0	0	139	1	0	0	1
TOTAL	**0**	**0**	**139**	**1**	**0**	**0**	**1**

Phase 2

Building	Residential Units	Pop.[1] (1.76ppu)	Industrial/Commercial (m^2)	(Pop.)[2]	Institutional (m^2)	(Pop.)[2]	Total Population
Buildings A	0	0	16,163	81	0	0	81
Buildings B	0	0	4,707	24	0	0	24
Building C	0	0	8,646	44	0	0	44
TOTAL	**0**	**0**	**29,516**	**149**	**0**	**0**	**149**

Design Flows

Phase 1

	Population (see above)	Area (m^2)	Average Daily Flow (L/c/d)	Population Flow (L/s)[2]	Peaking Factor[5]	Peak Population Flow (L/s)
Residential Units	0	-	350 L/c/d	0.00	4.00	0.00
Commercial	1	139	28,000 L/ha/d	0.01	1.00	0.01
Institutional	0	0	18,000 L/ha/d	0.00	1.00	0.00
Phase 1 Total	**1**			**0.01**		**0.01**

Phase 1 Site Area = 2.12 ha
I/I = 0.61 L/s (0.286 L/s/ha)
Phase 1 Design Flow = 0.62 L/s

Phase 2

	Population (see above)	Area (m^2)	Average Daily Flow (L/c/d)	Population Flow (L/s)[2]	Peaking Factor[6]	Peak Population Flow (L/s)
Residential Units	0	-	350 L/c/d	0.00	4.00	0.00
Industrial	149	29,516	35,000 L/ha/d	1.196	4.00	4.78
Institutional	4	4	18,000 L/ha/d	0.000	1.00	0.00
Phase 2 Total	**153**			**1.20**		**4.78**

Phase 2 Site Area = 7.00 ha
I/I = 2.00 L/s (0.286 L/s/ha)
Phase 2 Design Flow = 6.78 L/s

Total Site Design Flow = 7.40 L/s

Notes:

1) Unit count and floor areas per site plan prepared by Baldassarra Architects Inc. recieved December 7, 2021 for Phase 1 and per site plan prepared by Baldassara Architects Inc received November 28, 2022 .

2) Residential population densities of 1.76 persons per unit for apartments as per the Town of East Gwillimbury Engineering Standards and Design Criteria.

3) Retail population densities of 50 persons per hectre for employment as per the Town of East Gwillimbury Engineering Standards and Design Criteria.

4) The self-storage buildings will not require sanitary servicing and so have not been taken into account in the water demand calculations.

5) It is assumed that the peaking factor is included in the commerical average daily flow.

6) The peaking factor for industrial developments was computed as per the Town of East Gwillimbury design standards (Section 26.3). However, based on the Town criteria, the maximum peaking factor is 4.00. As such, a peaking factor 4.00 was utilized as part of this calculation.

APPENDIX

D

SANITARY DESIGN FLOW METHODLOGY STUDY

APPENDIX D
SANITARY FLOW GENERATION STUDY

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Proposed Development Sanitary Design Flows

Development Statistics
Phase 1

Building	Residential Units	Pop.[1] (1.76ppu)	Office (m)	(Pop.)[3]	Institutional (m^2)	(Pop.)[2]	Total Population
Office	0	0	139	1	0	0	1
TOTAL	**0**	**0**	**139**	**1**	**0**	**0**	**1**

Phase 2

Building	Residential Units	Pop.[1] (1.76ppu)	Industrial/Commercial (m^2)	(Pop.)[3]	Institutional (m^2)	(Pop.)[2]	Total Population
Buildings A	0	0	16,163	81	0	0	81
Buildings B	0	0	4,707	24	0	0	24
Building C	0	0	8,646	44	0	0	44
TOTAL	**0**	**0**	**29,516**	**149**	**0**	**0**	**149**

Methodology #1 - Town of East Gwillimbury Design Criteria

Phase 1

	Population (see above)	Area (m^2)	Average Daily Flow (L/c/d)	Population Flow (L/s)[2]	Peaking Factor[5]	Peak Population Flow (L/s)
Commercial	1	139	28,000 L/ha/d	0.01	1.00	0.01
Phase 1 Total	**1**			**0.01**		**0.01**

Phase 1 Site Area = 2.12 ha
I/I = 0.61 L/s (0.286 L/s/ha)
Phase 1 Design Flow = 0.62 L/s

Phase 2

	Population (see above)	Area (m^2)	Average Daily Flow (L/c/d)	Population Flow (L/s)[2]	Peaking Factor[6]	Peak Population Flow (L/s)
Industrial	149	29,516	35,000 L/ha/d	1.196	3.57	4.27
Phase 2 Total	**149**			**1.20**		**4.27**

Phase 2 Site Area = 7 ha
I/I = 2.00 L/s (0.286 L/s/ha)
Phase 2 Design Flow = 6.27 L/s

Total Site Design Flow = 6.89 L/s (Phase 1 Flow + Phase 2 Flow)

Notes:

1) Unit count and floor areas per architectural drawings prepared by Baldassarra Architects Inc. recieved August 5, 2021.
2) Residential population densities of 1.76 persons per unit for apartments as per the Town of East Gwillimbury Engineering Standards and Design Criteria.
3) Retail population densities of 50 persons per hectre for employment as per the Town of East Gwillimbury Engineering Standards and Design Criteria.
4) The self-storage buildings will not require sanitary servicing and so have not been taken into account in the water demand calculations.
5) It is assumed that the peaking factor is included in the commerical average daily flow.
6) A peaking factor of 3.57 was used at the most downstream end of the sanitary sewer system as part of the sanitary sewer design of the West Holland Landing Residential Subdivision. Since the proposed development outlets into the West Holland Residential Sudivision sanitary sewer system, this peaking factor was used in the calculation.

APPENDIX D
SANITARY FLOW GENERATION STUDY

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Proposed Development Sanitary Design Flows

Methodology #2 - City of Vaughan & York Region Design Criteria

Phase 1

	Area (m^2)	Population (115 pp/ha of floor)	York Region Average Daily Flow for Commercial (L/c/d)	Population Flow (L/s)[2]	Peaking Factor[5]	Peak Population Flow (L/s)
Commercial	139	2	160	0.01	1.00	0.01
Phase 1 Total		**2**		**0.01**		**0.01**

Phase 1 Site Area = 2.12 ha
I/I = 0.28 L/s (0.13 L/s/ha)
Phase 1 Design Flow = 0.29 L/s

Phase 2

	Area (m^2)	Population (58 pp/ha of floor)[2]	York Region Average Daily Flow[6] (L/c/d)	Population Flow (L/s)[2]	Peaking Factor[7]	Peak Population Flow (L/s)
Industrial	29,516	172	150	0.30	2.00	0.60
Phase 2 Total		**172**		**0.30**		**0.60**

Phase 2 Site Area = 7.00 ha
I/I = 0.91 L/s (0.13 L/s/ha)
Phase 2 Design Flow = 1.51 L/s

Total Site Design Flow = 1.80 L/s (Phase 1 Flow + Phase 2 Flow)

Notes

1) Unit count and floor areas per architectural drawings prepared by Baldassarra Architects Inc. recieved August 5, 2021.
2) A population density of 115 persons/ha of floor for office commercial was assumed based on the City criteria Design Criteria (December 2020). A population density of 58 ppl/ha was used for the industrial, this is based on a previously approved similar development within the City of Vaughan.
3) An infiltration rate of 0.13 L/s/ha was used for the site based on a previously approved similar development within the City of Vaughan.
4) The self-storage buildings will not require sanitary servicing and so have not been taken into account in the water demand calculations.
5) It is assumed that the peaking factor is included in the commerical average daily flow.
6) Based on review of water records and the York Region Wastewater Masterplan, the target water consumption flow is 150 L/c/d for the year 2051. It is assumed that Phase 2 of the development will achieve a similar water consumption rate.
7) The minimum peaking factor for sanitary flow is 2.0 per the Ctiy of Vaughan Design Criteria (December 2020).

APPENDIX D
SANITARY FLOW GENERATION STUDY

Project: **West Holland Landing Employment Lands**
Job No.: **221-01973**

Proposed Development Sanitary Design Flows

Methodology #3 - Ontario Building Code (OBC) Table 8.2.1.3.A & 8.2.1.3.B

Phase 1

	Area (m^2)	Population	Average Daily Flow (L/p/d)	Population Flow $(L/s)^2$	Average Sanitary Flow (L/s)
For Office Building					
a) Per employee per 8 hr Shift, or		1	75	0.001	0.001
b) Per 9.3m2 of floor space	139	15	75	0.013	0.013

Based on the OBC, where multiple calculations of sanitary sewage volume is permitted, the calculation resulting in the highest flow shall be used in determining the design daily sanitary sewage flow. As such, the sanitary flow is based on the floorspace.

Phase 1 Average Design Flow = 0.01 L/s
Peaking Factor[4] = 3.57
Total Phase 1 Design Flow = 0.05 L/s

A conservative approach was used for the total design flow calculation.A peaking factor of 3.57 from the approved West Holland Landing Residential Subdivision development has been applied.

Phase 2

Based on the OBC, the sanitary flow for waterhouses is computed based on the number of water closets and on the number of loading bays

	No. Water Closets / Loading Bays	Average Daily Flow (L/d)	Sanitary Flow (L/s)
For Warehouses			
a) Per water closet			
Building A	12	950	0.132
Building B	3	950	0.033
Building C	15	950	0.165
Total Water Closet Flow			**0.330**
b) Per loading bays			
Building A	42	150	0.073
Building B	11	150	0.019
Building C	17	150	0.030
Total Water Closet Flow			**0.122**
Total Sanitary Flow			0.45

Phase 2 Design Flow = 0.45 L/s

Peaking Factor[4] = 3.57
Total Design Flow = 1.61 L/s

A conservative approach was used for the total design flow calculation. A peaking factor of 3.57 from the approved West Holland Landing Residential Subdivision development has been applied.

Total Site Design Flow = 1.66 L/s (Phase 1 Flow + Phase 2 Flow)

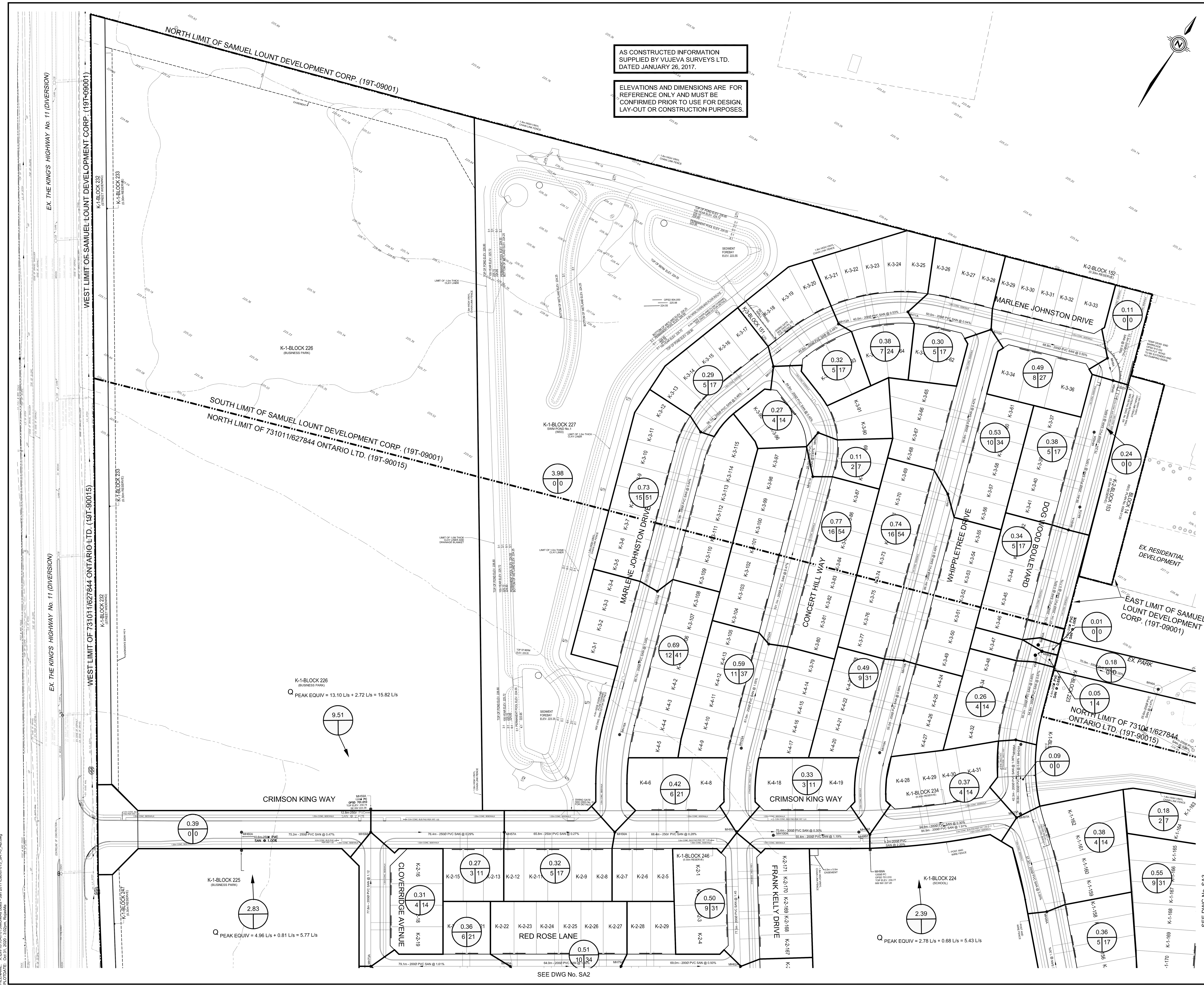
Notes:

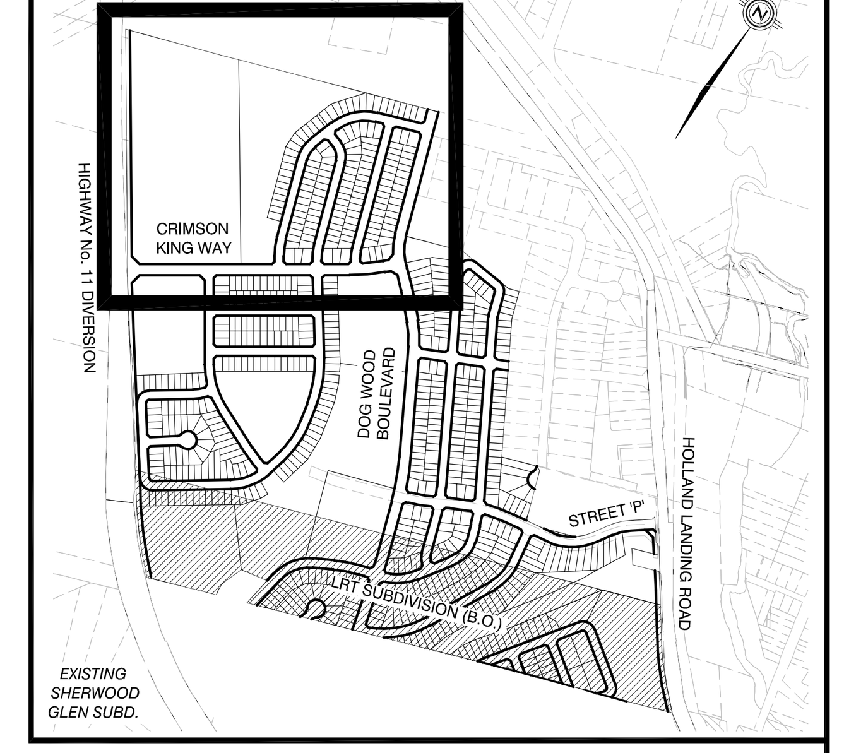
1) Unit count, number of loading bays and floor areas per architectural drawings prepared by Baldassarra Architects Inc. recieved August 5, 2021.
2) The number of water closets for each building Phase 2 have been estimated. They will be confirmed at a later stage in the design process.
3) The self-storage buildings will not require sanitary servicing and so have not been taken into account in the water demand calculations.
4) A peaking factor of 3.57 was used at the most downstream end of the sanitary sewer system as part of the sanitary sewer design of the West Holland Landing Residential Subdivision. Since the proposed development outlets into the West Holland Residential Sudivision sanitary sewer system, this peaking factor was used in the calculation.

APPENDIX

E

BACKGROUND DRAWINGS


NORTH LIMIT OF SAMUEL LOUNT DEVELOPMENT CORP. (19T-09001)
AS CONSTRUCTED INFORMATION SUPPLIED BY VUJEVA SURVEYS LTD. DATED JANUARY 26, 2017.
ELEVATIONS AND DIMENSIONS ARE FOR REFERENCE ONLY AND MUST BE CONFIRMED PRIOR TO USE FOR DESIGN, LAY-OUT OR CONSTRUCTION PURPOSES.
EX. THE KING'S HIGHWAY No. 11 (DIVERSION)
WEST LIMIT OF SAMUEL LOUNT DEVELOPMENT CORP. (19T-09001)
WEST LIMIT OF 731011/627844 ONTARIO LTD. (19T-90015)
SOUTH LIMIT OF SAMUEL LOUNT DEVELOPMENT CORP. (19T-09001)
NORTH LIMIT OF 731011/627844 ONTARIO LTD. (19T-90015)
EAST LIMIT OF SAMUEL LOUNT DEVELOPMENT CORP. (19T-09001)
K-1-BLOCK 226 (BUSINESS PARK)
K-1-BLOCK 227 SWM POND No.1
Q PEAK EQUIV = 13.10 L/s + 2.72 L/s = 15.82 L/s
Q PEAK EQUIV = 4.96 L/s + 0.81 L/s = 5.77 L/s
Q PEAK EQUIV = 2.78 L/s + 0.68 L/s = 5.43 L/s
K-1-BLOCK 225 (BUSINESS PARK)
K-1-BLOCK 224 (SCHOOL)
MARLENE JOHNSTON DRIVE
CONCERT HILL WAY
WHIPPLETREE DRIVE
DOG WOOD BOULEVARD
CRIMSON KING WAY
CLOVERRIDGE AVENUE
RED ROSE LANE
FRANK KELLY DRIVE
EX. RESIDENTIAL DEVELOPMENT
EX. PARK
SEE DWG No. SA2
SEE DWG No. SA3



KEY PLAN N.T.S.

LEGEND

- SANITARY DRAINAGE AREA (ha.) / POPULATION / UNITS
- SANITARY DRAINAGE AREA BOUNDARY
- EXTERNAL SANITARY DRAINAGE AREA BOUNDARY
- SANITARY MANHOLE
- EXTERNAL SANITARY DRAINAGE AREA (ha.) / POPULATION / UNITS
- LIMIT OF SUBDIVISION
- FUTURE PHASE BY LRT TECHNOLOGIES INC.

RESIDENTIAL	= 350 L/c/d
COMMERCIAL	= 0.32 L/s/ha
PARK	= 0.21 L/s/ha
INSTITUTIONAL	= 0.21 L/s/ha
INFILTRATION	= 0.286 L/s/ha

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
9	AS CONSTRUCTED	B.T.B.	JAN 2017	
8	REVISED PER ROY COMMENTS	MEO	JUN 15/16	
7	REVISED PER ROY COMMENTS	MEO	MAY 13/16	
6	APPROVED BY TOWN	MEO	MAR 20/15	
5	FINAL SUBMISSION	MEO	MAR 19/15	
4	FOURTH SUBMISSION	MEO	NOV 7/14	
3	THIRD SUBMISSION	MEO	SEP 17/14	
2	SECOND SUBMISSION	MEO	MAY 9/14	
1	FIRST SUBMISSION	MEO	FEB 5/14	

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
KERBEL GROUP INC.

MUNICIPALITY
Town of East Gwillimbury

PROJECT TITLE
WEST HOLLAND LANDING
Residential Subdivision

SHEET TITLE
SANITARY DRAINAGE PLAN

MMM GROUP
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.mmm.ca

REVIEWED BY TOWN OF EAST GWILLIMBURY

Originally Stamped and Signed by M. E. Oldham, P. Eng. on February 17, 2016

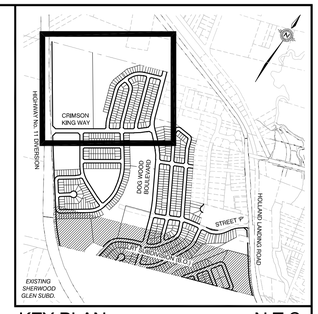
DATE:

DESIGNED	DRAWN	CHECKED
K.L.	10/12 CAD	M.E.O.
SCALE 1:1000	DATE JANUARY 2014	
PROJECT NUMBER 10-07013	DWG. NUMBER SA1	

19T-09001/19T-90015/19T-89112

AS CONSTRUCTED INFORMATION SUPPLIED BY VUJEVA SURVEYS LTD. DATED JANUARY 26, 2017.

ELEVATIONS AND DIMENSIONS ARE FOR REFERENCE ONLY AND MUST BE CONFIRMED PRIOR TO USE FOR DESIGN, LAY-OUT OR CONSTRUCTION PURPOSES.



KEY PLAN N.T.S.

LEGEND

- 0.20 / 0.59 — STORM DRAINAGE AREA (ha.) / RUN-OFF COEFFICIENT
- 0.14 / 0.59 — EXTERNAL DRAINAGE AREA (ha.) / RUN-OFF COEFFICIENT
- STORM DRAINAGE AREA BOUNDARY
- EXTERNAL STORM DRAINAGE AREA BOUNDARY
- STORM MANHOLE
- 255 — ORIGINAL GROUND CONTOUR
- OVERLAND FLOW
- CATCHBASIN
- DOUBLE CATCHBASIN
- CATCHBASIN WITH INLET CONTROL RELEASE RATE = 28.3 L/S
- LIMIT OF SUBDIVISION
- FUTURE PHASE BY LRT TECHNOLOGIES INC.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
9	AS CONSTRUCTED	B.T.B.	JAN 2017	
8	REVISED PER ROY COMMENTS	MEO	JUN 15/16	
7	REVISED PER ROY COMMENTS	MEO	MAY 13/16	
6	APPROVED BY TOWN	MEO	MAR 20/15	
5	FINAL SUBMISSION	MEO	MAR 19/15	
4	FOURTH SUBMISSION	MEO	NOV 7/14	
3	THIRD SUBMISSION	MEO	SEP 17/14	
2	SECOND SUBMISSION	MEO	MAY 9/14	
1	FIRST SUBMISSION	MEO	FEB 5/14	

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
KERBEL GROUP INC.

MUNICIPALITY
Town of East Gwillimbury

PROJECT TITLE
WEST HOLLAND LANDING
Residential Subdivision

SHEET TITLE
STORM DRAINAGE PLAN

MMM GROUP
100 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.mmm.ca

REVIEWED BY TOWN OF EAST GWILLIMBURY

Originally Stamped and Signed by M. E. Oldham, P. Eng. on February 17, 2016

DATE:

DESIGNED	DRAWN	CHECKED
K.L.	10/12 CAD	M.E.O.

SCALE	DATE
1:1000	JANUARY 2014

PROJECT NUMBER	DWG. NUMBER
10-07013	ST1

SEE DWG No. ST3

SEE DWG No. ST2

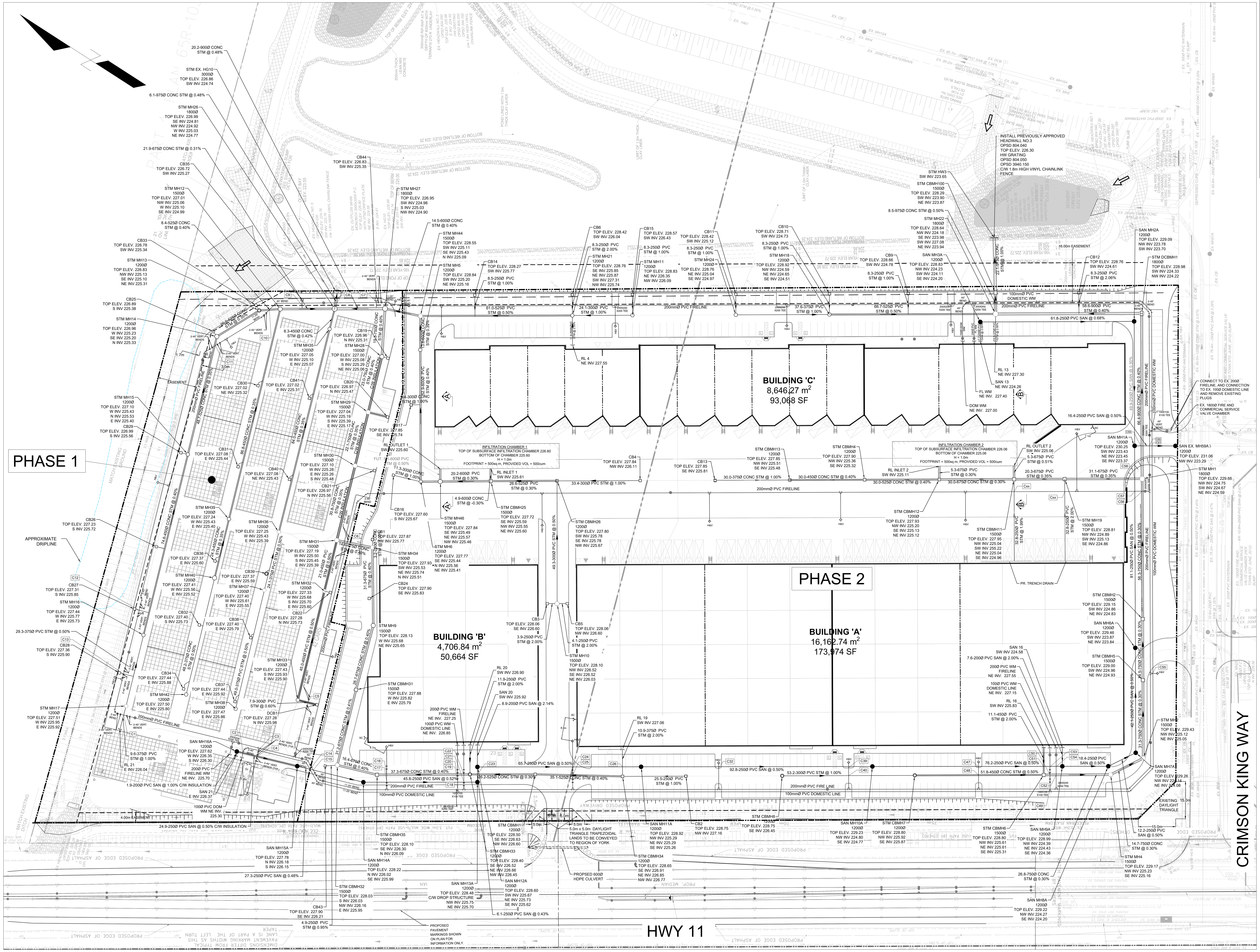
FILENAME: K:\DRV\10-07013\SMM\As Built - Jan 2017\10-07013_ST1-5_AB.dwg
PLOTDATE: Oct 31, 2020 - 2:49pm, RobinMa

19T-09001/19T-90015/19T-89112

APPENDIX

F

ENGINEERING DRAWINGS



WATERMAIN NOTE
WATERMAIN & WATER SERVICES SHALL HAVE A MINIMUM DEPTH OF 1.8m AND SHALL HAVE A MINIMUM OUTSIDE BARREL VERTICAL SEPARATION OF 0.5m & HORIZONTAL SEPARATION OF 2.5m BETWEEN THE WATER PIPE AND SEWERS PIPES. IN CASE OF CONFLICT BETWEEN THE PROPOSED WATERMAIN AND PROPOSED SEWERS, CONTRACTOR TO LOWER THE PROPOSED WATERMAIN TO ENSURE 0.5M CLEARANCE BETWEEN WATERMAIN PIPE AND SEWERS PIPE PER DETAIL ON DRAWING DET1.

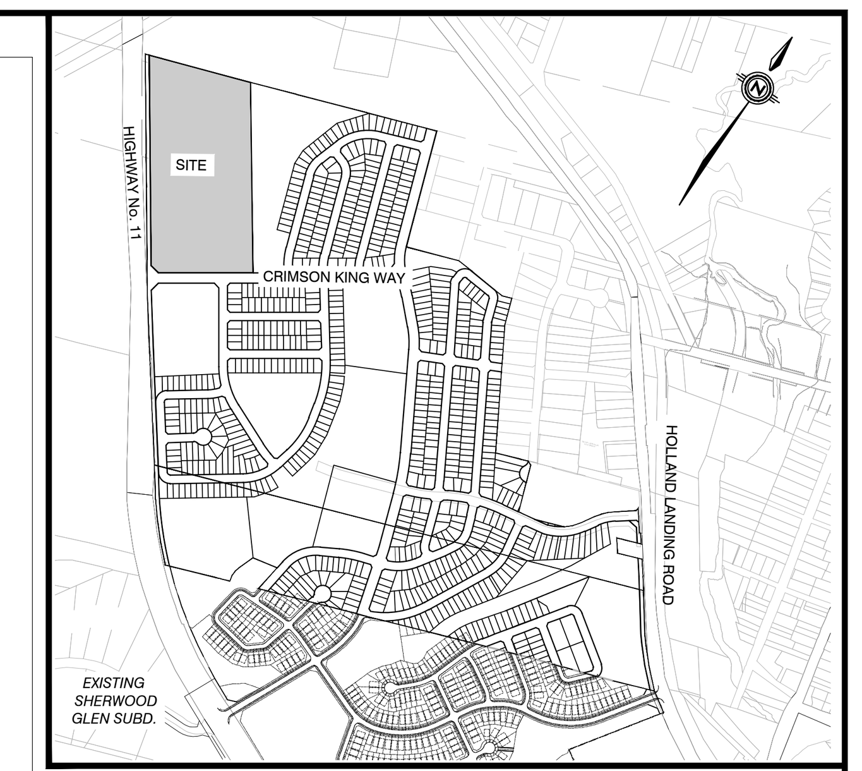
REFER TO DRAWING NT1 FOR GENERAL NOTES AND DRAWINGS DET1, FOR DETAILS.

STORM SEWER NOTE
1) ALL MANHOLES TO BE INSTALLED PER OPSD 701.010 FOR 1200Ø MHs, OPSD 701.011 FOR 1500Ø MHs & OPSD 701.012 FOR 1800Ø MHs.
2) ALL STORM SEWERS 450mmØ OR LARGER TO BE COMPRISED OF REINFORCED CONCRETE. MINIMUM CLASS FOR REINFORCED CONCRETE STORM SEWER WILL BE 65-D PER TOWN OF EAST GWILLIMBURY STANDARDS.

NOTE
1) CONTRACTOR TO COORDINATE THE EXACT HORIZONTAL AND VERTICAL LOCATION OF THE PROPOSED BUILDING SERVICE CONNECTIONS WITH THE INTERNAL MECHANICAL DESIGN PRIOR TO COMMENCING CONSTRUCTION.
2) THE EXISTING MUNICIPAL SERVICE AND UTILITIES ARE SHOWN FOR COORDINATION PURPOSES ONLY. CONTRACTOR TO VERIFY LOCATION OF THE EXISTING MUNICIPAL SERVICES USING A LOCATES COMPANY AND ADVISE THE ENGINEER REGARDING ANY DISCREPANCIES PRIOR TO THE BEGINNING OF CONSTRUCTION.

BENCH MARK AND LAYOUT INFORMATION

TOPOGRAPHIC INFORMATION PER J.D.BARNES LTD. DATED SEPTEMBER 29,2020. ELEVATIONS SHOWN ON ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM BENCHMARK NO.848150 HAVING A PUBLISHED ELEVATION OF 251.574 METERS.



KEY PLAN NTS

LEGEND

- PROPERTY LINE
- PHASE 2
- PROP. STORM MANHOLE
- PROP. STORM CATCHBASIN MANHOLE
- PROP. CATCHBASIN
- PROP. SANITARY MANHOLE
- PROP. HYDRANT
- V&C PROP. VALVE AND CHAMBER
- SC PROP. SIAMESE CONNECTION
- PROP. STORM SEWER
- PROP. SANITARY SEWER
- PROP. WATERMAIN
- PROPOSED RETAINING WALL
- STEEP SLOPE
- APPROXIMATE EXISTING DRIPLINE

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.

PIPE SIZES ARE IN MILLIMETRES.

FOR BENCHMARKS, GENERAL NOTES AND LIST OF DRAWINGS SEE DRAWING NT1.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
2	FIRST ZBA - PHASE 2	A.D.R.	2024-06-14	
1	FIRST SPA SUBMISSION	A.D.R.	2023-06-28	

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT
KERBEL GROUP INC.

MUNICIPALITY
Town of East Gwillimbury

PROJECT TITLE
WEST HOLLAND LANDING EMPLOYMENT LANDS

SHEET TITLE
SITE SERVICING PLAN

CONSULTANT
WSP
150 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.wsp.com

STAMP

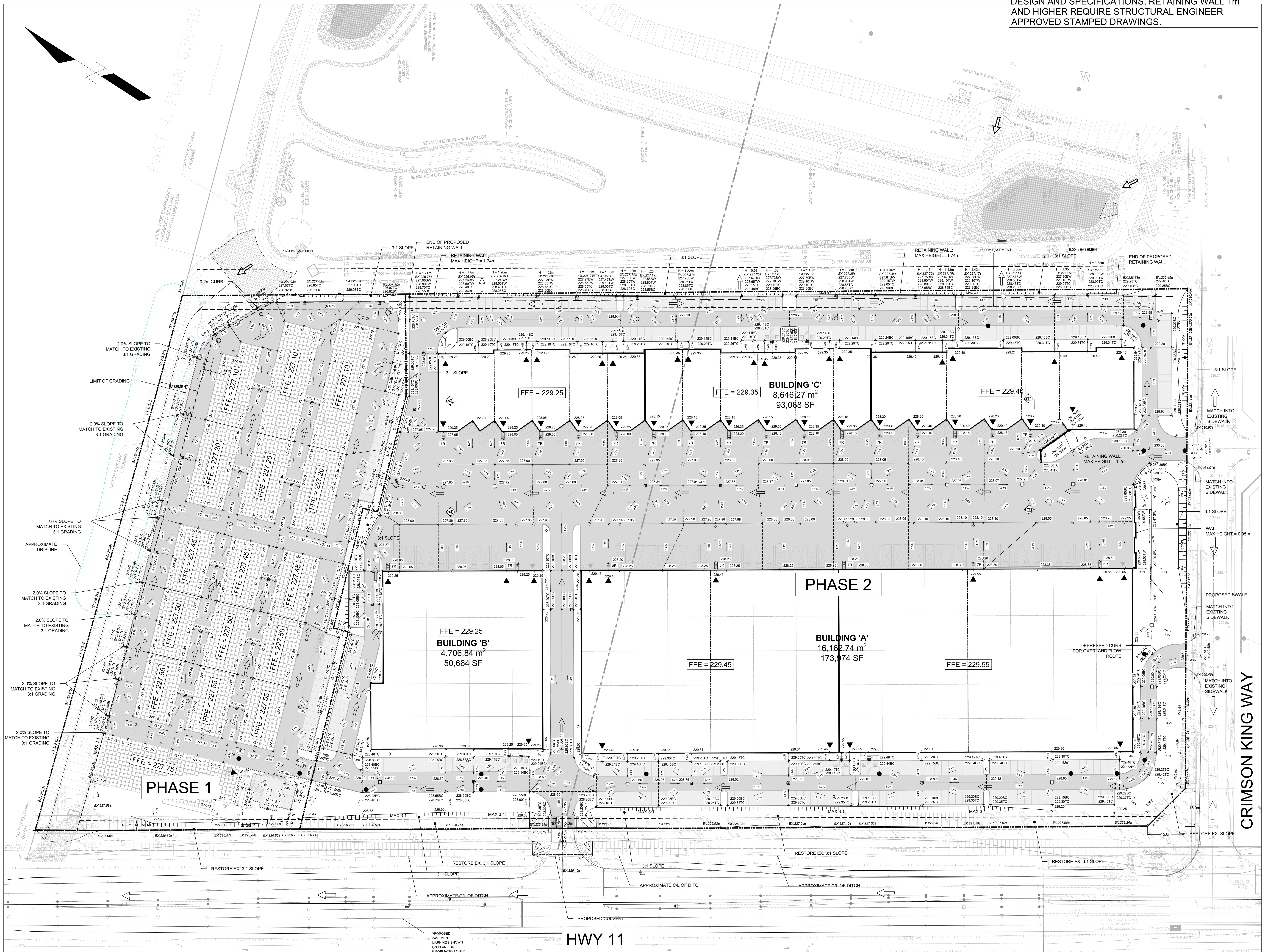
APPROVAL

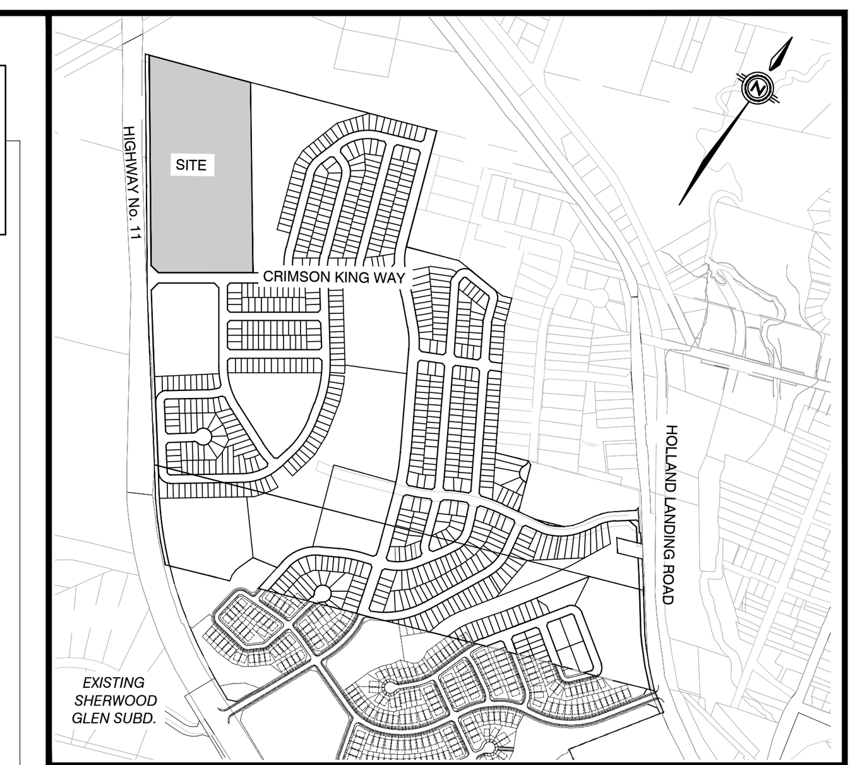
DESIGNED	DRAWN	CHECKED
SA/AS	10/12 CAD	A.D.R

SCALE	DATE
1:750	JUNE 2023

PROJECT NUMBER	DWG. NUMBER
221-01973	SS1

PROPOSED RETAINING WALL PER MANUFACTURERS DESIGN AND SPECIFICATIONS. RETAINING WALL 1m AND HIGHER REQUIRE STRUCTURAL ENGINEER APPROVED STAMPED DRAWINGS.





KEY PLAN NTS

LEGEND

- PROPERTY LINE
- PHASE 2
- HEAVY DUTY ASPHALT (FIRE ROUTE)
- LIGHT DUTY ASPHALT
- 162.00 — PROPOSED ELEVATION
- 162.00 TC/BC — TOP/ BOTTOM OF CURB ELEVATION
- 162.00 TW/BW — TOP/ BOTTOM OF WALL ELEVATION
- EXISTING ELEVATION
- FFE=162.00 — PROPOSED FLOOR ELEVATION
- DRAINAGE DIRECTION
- OVERLAND FLOW DIRECTION
- PROP. CATCHBASIN / MANHOLE
- PROPOSED DEPRESSED CURB
- PROPOSED RETAINING WALL
- STEEP SLOPE
- HIGH POINT
- APPROXIMATE EXISTING DRIPLINE
- BUILDING ENTRANCES

ALL DIMENSIONS AND ELEVATIONS ARE IN METRES UNLESS OTHERWISE NOTED.

PIPE SIZES ARE IN MILLIMETRES.

FOR BENCHMARKS, GENERAL NOTES AND LIST OF DRAWINGS SEE DRAWING NT1.

No.	REVISIONS TO DRAWING	BY	DATE	APPR.
2	FIRST ZBA - PHASE 2	A.D.R.	2024-06-14	
1	FIRST SPA SUBMISSION	A.D.R.	2023-06-28	

ALL PREVIOUS ISSUES OF THIS DRAWING ARE SUPERSEDED

CLIENT

KERBEL GROUP INC.

MUNICIPALITY

Town of East Gwillimbury

PROJECT TITLE

WEST HOLLAND LANDING EMPLOYMENT LANDS

SHEET TITLE

SITE GRADING PLAN

CONSULTANT

wsp

150 Commerce Valley Dr. West, Thornhill, ON Canada L3T 0A1
t: 905.882.1100 f: 905.882.0055 www.wsp.com

STAMP | APPROVAL

BENCH MARK AND LAYOUT INFORMATION

TOPOGRAPHIC INFORMATION PER J.D.BARNES LTD. DATED SEPTEMBER 29,2020. ELEVATIONS SHOWN ON ARE RELATED TO GEODETIC DATUM AND ARE DERIVED FROM BENCHMARK NO.848150 HAVING A PUBLISHED ELEVATION OF 251.574 METEERS.

DESIGNED	DRAWN	CHECKED
SA/AS	10/12 CAD	A.D.R
SCALE	DATE	
1:750	JUNE 2023	
PROJECT NUMBER	DWG. NUMBER	
221-01973	SG1	