# The Hangar District (Taxiway West) Application Resubmission

July 2023

Northcrest

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1. **Hangar District Application Resubmission Form**

# Development Approval Resubmission

| ☐ **Toronto and East York** | ☒ **North York** | ☐ **Scarborough** | ☐ **Etobicoke York** |
|---|---|---|---|
| Toronto City Hall<br>100 Queen Street West<br>Toronto, Ontario M5H 2N2<br>416-397-5330 | North York Civic Centre<br>5100 Yonge Street<br>Toronto, Ontario M2N 5B7<br>416-397-5330 | Scarborough Civic Centre<br>150 Borough Drive<br>Toronto, Ontario M1P 4N7<br>416-397-5330 | 2 Civic Centre Court<br>Toronto, Ontario<br>M9C 5A3<br>416-397-5330 |

## Application(s) for:

Check all applicable boxes

☐ Official Plan Amendment ☒ Zoning By-law Amendment ☐ Site Plan Control ☐ Part Lot Control Exemption
☒ Draft Plan of Subdivision ☐ Rental Housing Demolition & Conversion
☐ Telecommunication Tower ☐ Condominium Application

## Public Record Notice

The information collected on this form is considered to be a public record as defined by section 27 of the Municipal Freedom of Information and Protection of Privacy Act.

## Acknowledgement of Public Information

The applicant grants the City permission to reproduce, in whole or in part, any document submitted as part of a complete application for internal use, inclusion in staff reports or distribution to the public for the purpose of application review. The applicant agrees to provide a reasonable number of copies of any such document, or parts thereof, in paper and/or electronic form, to the City for internal use and distribution to the public for the purpose of application review.

## Sign Requirements

Prior to the scheduling of a Public Meeting ensure that the posted sign reflects the current proposal.

File Number(s) 22 148540 NNY 06 OZ & 22 148583 NNY 06 SB

Date of Resubmission**(yyyy-mm-dd)** 2023-07-07

Address of subject land (Street Number/Name)
123 Garratt Boulevard, North York, ON M3K 1Y5

| Applicant Name(First, Last) | E-mail |
|---|---|
| Downsview Metro Devco Inc. (o/a Northcrest Developments) | kshortall@northcrestdev.ca |

Applicant is: ☐ Owner ☐ Planner ☐ Architect ☐ Lawyer ☒ Agent ☐ Contractor

| Mailing Address | City | Postal Code |
|---|---|---|
| Unit 1305, 161 Bay Street | Toronto | M5J 2S1 |
| **Fax (area code + number)** | **Telephone (area code + number)** | |
| | 647-220-8976 | |

## Submission

The submission of the following will allow a more efficent and comprehensive review of your proposal and avoid any processing delays.

**Required:**

☑ Completed Resubmission/Revision Form ☑ USB/CD/DVD* ☑ Detailed Revision List*

**As Applicable:** (Confirm with the Planner the number of copies required)

☒ Plans/Drawings ☒ Information/Studies ☒ Project Data Sheet

*Refer to page 3 – Submission Requirements

## Submitted Plans/Drawings

List all plans/drawings submitted with this resubmission. Drawing types with multiple drawing numbers can be grouped together. ie Landscape Plan Drawing Number L1-L10.

| Drawing Type | Drawing Number(s) | Date (yyyy-mm-dd) |
|---|---|---|
| Survey Plans - Draft Plan of Subdivision | n/a | 2023-06-28 |
| Landscape & Lighting Plans - Concept Site an | L-100, L-500, L-501 | 2023-07-06 |
| Civil & Utilities Plans - Site Grading Plan | C-101-C-105 | 2023-07-05 |
| Civil & Utilities Plan - Public Utilities Plan | C-201-C-205 | 2023-07-05 |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
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| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |
| Select One: | | |

Please refer to the Resubmission Cover Letter for a full list of drawings and studies enclosed with the resubmission.

## Information/Studies

List all information/studies and project data sheet submitted with this resubmission.

| Type | Date (yyyy-mm-dd) |
|---|---|
| City Planning - Housing Issues Report | 2023-06-23 |
| City Planning - Pedestrian Level Wind Study | 2023-07-07 |
| City Planning - Noise Impact Study | 2023-07-04 |
| City Planning - Project Data Sheet | 2023-07-07 |
| City Planning - Sun/Shadow Study | 2023-07-07 |
| Engineering & Construction Services - Servici | 2023-07-07 |
| Engineering & Construction Services - Transp | 2023-07-07 |
| Engineering & Construction Services - Stormw | 2023-07-06 |
| Toronto Green Standards | 2023-07-07 |
| Select One: | |

This section for Office Use Only

DATE STAMP



Please refer to the Resubmission Cover Letter for a full list of drawings and studies enclosed with the resubmission.

# 2. Architectural Drawings





# The Hangar District

**123 Garratt Boulevard, Toronto, Ontario**

Prepared for: **Northcrest Developments**
Date: **July 2023**

Issued for:

## Zoning By-Law Amendment and Draft Plan of Subdivision Resubmission

### Drawing List


| | |
|---|---|
| **A-000** | **Cover Page** |
| **A-001** | **Context Plan** |
| **A-002a** | **Project Statistics** |
| **A-002b** | **Project Statistics - Toronto Green Standards** |
| **A-003** | **Concept Site and Landscape Plan** |
| **A-004** | **Draft Plan of Subdivision** |
| **A-005** | **Subdivision Concept Plan** |
| **A-006** | **Concept Elevations** |
| **A-007** | **Demonstration Massing** |
| **A-008** | **Demonstration Massing - Uses** |
| **A-009** | **Concept Phasing Plan** |
| **A-010** | **District Floor Plans** |



**Architect**
Perkins Eastman
115 Fifth Avenue, New York, NY 10003, USA

**Planner**
Urban Strategies Inc
197 Spadina Avenue, Suite 600, Toronto, Ontario, M5T 2C8,Canada

**Landscape Architect**
DTAH
50 Park Rd, Toronto, Ontario, M4W 2N5,Canada

**Transportation**
WSP
100 Commerce Valley Drive West, Thornhill, Ontario, L3T 0A1, Canada

**Civil**
ARUP
Suite 900, 121 Bloor Street East, Toronto, Ontario, M4W 3M5, Canada

**Survey**
JD Barnes Limited
411 Richmond St. East, Unit 107, Toronto, Ontario, M5A 3S5, Canada

**Draft Plan**
WSP
100 Commerce Valley Drive West, Thornhill, Ontario, L3T 0A1, Canada


| NO. | DATE | REVISION |
|---|---|---|
| 1 | May 5, 2022 | Issued for ZBA/ DPS Application |
| 2 | July 6, 2023 | Issued for ZBA/ DPS Resubmission |



PERKINS — EASTMAN
115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:
The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:
Cover Page

SCALE:

NOT FOR CONSTRUCTION

**A-000**




| NO. | DATE | REVISION |
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115 Fifth Avenue
New York, NY 10003
T: +1 212 353 7200
F: +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

Context Plan

SCALE:

1:2000

NOT FOR CONSTRUCTION

A-001

| Area Summary | sm | ha | ac |
|---|---|---|---|
| Gross Site Area | 224,402 sm | 22.4 ha | 55.5 ac |
| Public Roads | 40,873 sm | 4.1 ha | 10.1 ac |
| Net Site Area | 183,529 sm | 18.4 ha | 45.4 ac |
| Total Open Space | 24,288 sm | 2.4 ha | 6.0 ac |
| Dedicated Parkland | 11,923 sm | 1.2 ha | 2.9 ac |

| Stats by Character Areas | District Area (sm) | District Area (sf) | Gross Floor Area (sm) | Gross Floor Area (sf) | Studio | 1 BR+ | 2 BR+ | 3BR+ | Total Units | FSI |
|---|---|---|---|---|---|---|---|---|---|---|
| The Hangars | 87,109 sm | 937,633 sf | 87,793 sm | 945,000 sf | - | - | - | - | - | |
| The Village | 84,740 sm | 912,196 sf | 191,608 sm | 2,062,450 sf | 94 | 946 | 662 | 189 | 1,891 | |
| Ancaster West | 52,553 sm | 565,673 sf | 88,964 sm | 957,600 sf | 41 | 465 | 321 | 132 | 959 | |
| Total | 224,402 sm | 2,415,442 sf | 368,365 sm | 3,965,050 sf | 135 units | 1,411 units | 983 units | 321 units | 2,850 units | 1.64 |

| Car Parking Supply (spaces) |
|---|
| 1,068 |
| 1,520 |
| 856 |
| 3,044 |

| Bike Parking Req (from ZBL 569-2013) (Short Term) | Bike Parking Req (from ZBL 569-2013) (Long Term) |
|---|---|
| 449 | 2,129 |

| Bike Parking Supply |
|---|
| 2,578 |

| Stats by Use Type | Gross Floor Area (sm) | Gross Floor Area (sf) |
|---|---|---|
| Residential | 207,406 sm | 2,232,500 sf |
| Employment | 132,656 sm | 1,427,900 sf |
| Retail/ Services | 27,862 sm | 299,900 sf |
| Community | 441 sm | 4,750 sf |
| Parking Deck | excluded | excluded |
| Total | 368,365 sm | 3,965,050 sf |

| Character Area Breakdown by Block | | Use | Gross Floor Area (sm) | Gross Floor Area (sf) |
|---|---|---|---|---|
| The Hangars | | | | |
| | Block A | | | |
| | | Employment | 81,290 sm | 875,000 sf |
| | | Retail/ Services | 6,503 sm | 70,000 sf |
| | Block A (P) | Parking Deck | excluded | excluded |
| The Hangars Total | | | 87,793 sm | 945,000 sf |

| Character Area Breakdown by Block | | Use | Gross Floor Area (sm) | Gross Floor Area (sf) | Studio | 1 BR+ | 2 BR+ | 3BR+ | Total Units |
|---|---|---|---|---|---|---|---|---|---|
| The Village | | | | | | | | | |
| | Block B | | | | | | | | |
| | | Residential | 17,648 sm | 295,450 sf | 19 | 190 | 133 | 38 | 380 |
| | | Retail/ Services | 1,383 sm | 25,650 sf | | | | | |
| | | Total | 29,831 sm | 321,100 sm | | | | | |
| | Block C | | | | | | | | |
| | | Residential | 12,444 sm | 133,950 sf | 9 | 86 | 60 | 17 | 172 |
| | | Employment | 18,534 sm | 199,500 sf | | | | | |
| | | Retail/ Services | 2,824 sm | 30,400 sf | | | | | |
| | | Total | 33,803 sm | 363,850 sf | | | | | |
| | Block D | | | | | | | | |
| | | Residential | 39,037 sm | 513,550 sf | 20 | 201 | 141 | 40 | 402 |
| | | Employment | 13,269 sm | 164,350 sf | | | | | |
| | | Retail/ Services | 883 sm | 9,500 sf | | | | | |
| | | Total | 45,188 sm | 486,400 sm | | | | | |
| | Block E | | | | | | | | |
| | | Residential | 38,218 sm | 411,350 sf | 26 | 264 | 185 | 53 | 529 |
| | | Total | 38,216 sm | 411,350 sf | | | | | |
| | Block F | | | | | | | | |
| | | Residential | 18,687 sm | 203,300 sf | 13 | 131 | 93 | 26 | 261 |
| | | Retail/ Services | 14,563 sm | 156,750 sf | | | | | |
| | | Total | 33,450 sf | 360,050 sf | | | | | |
| | Block G | | | | | | | | |
| | | Residential | 10,679 sm | 114,950 sf | 7 | 74 | 52 | 15 | 148 |
| | | Community | 441 sm | 4,750 sf | | | | | |
| | | Total | 11,120 sf | 119,700 sf | | | | | |
| The Village Total | | | 191,608 sm | 2,062,450 sf | 95 units | 946 units | 662 units | 189 units | 1,892 units |

| Character Area Breakdown by Block | | Use | Gross Floor Area (sm) | Gross Floor Area (sf) | Studio | 1 BR+ | 2 BR+ | 3BR+ | Total Units |
|---|---|---|---|---|---|---|---|---|---|
| Ancaster West | | | | | | | | | |
| | Block H1 | | | | | | | | |
| | | Employment | 8,296 sm | 89,300 sf | | | | | |
| | | Total | 8,296 sm | 89,300 sf | | | | | |
| | Block H2 | | | | | | | | |
| | | Employment | 9,267 sm | 99,750 sf | | | | | |
| | | Total | 9,267 sm | 99,750 sf | | | | | |
| | Block I | | | | | | | | |
| | | Residential | 26,036 sm | 280,250 sf | 18 | 180 | 126 | 36 | 360 |
| | | Retail | 265 sm | 2,850 sf | | | | | |
| | | Total | 26,301 sm | 283,100 sf | | | | | |
| | Block J | | | | | | | | |
| | | Residential (Apt) | 20,113 sm | 216,600 sf | 14 | 139 | 97 | 28 | 278 |
| | | Residential (TH) | 8,649 sm | 93,100 sf | - | 42 | 28 | 37 | 105 |
| | | Total | 28,772 sm | 309,700 sf | 14 | 181 | 124 | 65 | 384 |
| | Block K | | | | | | | | |
| | | Residential (Apt) | 12,821 sm | 138,000 sf | 9 | 87 | 61 | 17 | 175 |
| | | Residential (TH) | 3,266 sm | 35,150 sf | | 16 | 10 | 14 | 40 |
| | | Retail | 441 sm | 4,750 sf | | | | | |
| | | Total | 16,328 sm | 175,750 sf | 9 | 103 | 71 | 31 | 214 |
| Ancaster West Total | | | 88,964 sm | 957,600 sf | 41 units | 465 units | 321 units | 132 units | 959 units |

| Unit Mix | Studio | 1 BR+ | 2 BR+ | 3BR+ | Total Units |
|---|---|---|---|---|---|
| Avg Net Apt Size (sf) | 383 sf | 580 sf | 800 sf | 1,080 sf | 696 sf |
| % of Unit Mix | 5% | 50% | 35% | 10% | |
| Avg Net TH Size (sf) | | 585 sf | 815 sf | 1,080 sf | 790 sf |
| % of Unit Mix | | 40% | 25% | 35% | |
| Block A | - | - | - | - | - |
| Block B | 19 | 190 | 133 | 38 | 380 |
| Block C | 9 | 86 | 60 | 17 | 172 |
| Block D | 20 | 201 | 141 | 40 | 402 |
| Block E | 26 | 264 | 185 | 53 | 529 |
| Block F | 13 | 131 | 91 | 26 | 261 |
| Block G | 7 | 74 | 52 | 15 | 148 |
| Block H | - | - | - | - | - |
| Block I | 18 | 180 | 126 | 36 | 360 |
| Block J (Apt) | 14 | 139 | 97 | 28 | 278 |
| Block J (TH) | | 42 | 28 | 37 | 105 |
| Block K (Apt) | 9 | 87 | 61 | 17 | 175 |
| Block K (TH) | | 16 | 10 | 14 | 40 |
| TOTAL | 135 units | 1,411 units | 983 units | 321 units | 2,850 units |
| | 5% | 50% | 34% | 11% | 100% |




| Parkland Dedication | Name | Area (sm) | Gross Area (ha) | Area (ac) |
|---|---|---|---|---|
| | Studio Gate Park | 613 sm | 0.06 ha | 0.15 ac |
| | Central Square | 4,001 sm | 0.40 ha | 0.99 ac |
| | Garratt Blvd Park | 6,040 sm | 0.60 ha | 1.49 ac |
| | Robert Leek Park Expansion | 1,269 sm | 0.13 ha | 0.31 ac |
| | Total | 11,923 sm | 1.19 ha | 2.95 ac |

| POPS | Name | Area (sm) | Gross Area (sf) | Area (ac) |
|---|---|---|---|---|
| | Downsview Park Bridge | 5,154 sm | 0.52 ha | 1.27 ac |
| | The Plaza | 1,247 sm | 0.12 ha | 0.31 ac |
| | The Courtyard | 1,060 sm | 0.11 ha | 0.26 ac |
| | Hangar Court | 1,840 sm | 0.18 ha | 0.45 ac |
| | Rail POPS | 934 sm | 0.09 ha | 0.23 ac |
| | Total | 10,235 sm | 1.02 ha | 2.53 ac |

| Other Private Open Space | Name | Area (sm) | Gross Area (sf) | Area (ac) |
|---|---|---|---|---|
| | The Atrium | 2,141 sm | 0.21 ha | 0.53 ac |
| | Total | 2,141 sm | 0.21 ha | 0.53 ac |

| Total Parks and Open Spaces | 24,289 sm | 2.43 ha | 6.00 ac |
|---|---|---|---|

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PERKINS — EASTMAN
113 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:
The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:
Project Statistics

SCALE:

NOT FOR CONSTRUCTION

A-002a

TORONTO

Statistics Template – Toronto Green Standard Version 4.0

## Mid to High Rise Residential and all New Non-Residential Development

The Toronto Green Standard Version 4.0 Statistics Template is submitted with Site Plan Control Applications and stand-alone Zoning Bylaw Amendment applications. Complete the table and copy it directly onto the Site Plan submitted as part of the application.

For Zoning Bylaw Amendment applications: complete General Project Description and Section 1.
For Site Plan Control applications: complete General Project Description, Section 1 and Section 2.
For further information, please visit www.toronto.ca/greendevelopment

| General Project Description | Proposed |
|---|---|
| Total Gross Floor Area | 368,365 |
| Breakdown of project components (m²): | |
| Residential | 207,406 |
| Retail | 27,862 |
| Commercial | 98,653 |
| Industrial | 34,003 |
| Institutional/Other | 441 |
| Total number of residential units | 2,850 |

**Section 1: For Stand Alone Zoning Bylaw Amendment Applications and Site Plan Control Applications**

| Low Emissions Transportation | Required | Proposed | Proposed % |
|---|---|---|---|
| Number of Parking Spaces | N/A | 3,044 | - |
| Number of parking spaces with EVSE (residential) | 1,135 | 1,135 | 100% |
| Number of parking spaces with EVSE (non-residential) | 477 | 477 | 100% |

| Cycling Infrastructure | Required | Proposed | Proposed % |
|---|---|---|---|
| Number of long-term bicycle parking spaces (all uses) | 2,129 | 2,129 | 100% |
| Number of long-term bicycle parking located on: | - | TBD | - |
| a) first storey of building | - | - | - |
| b) second storey of building | - | - | - |
| c) first level below-ground | - | - | - |
| d) second level below-ground | - | - | - |
| e) other levels below-ground | - | - | - |



TORONTO

Statistics Template – Toronto Green Standard Version 4.0

Mid to High Rise Residential and all New Non-Residential Development

| Cycling Infrastructure | Required | Proposed | Proposed % |
|---|---|---|---|
| Number of short-term bicycle parking spaces | 449 | 449 | 100% |
| Number of shower and change facilities (non-residential) | TBD | TBD | 100% |

| Tree Canopy | Required | Proposed | Proposed % |
|---|---|---|---|
| Total Soil Volume (40% of the site area × 66 m2 x 30 m³) | 29,235 | 29,235 | 100% |
| Soil volume provided within the site area (m³) | | | |
| Soil Volume provided within the public boulevard (m³) | | | |

**Section 2: For Site Plan Control Applications**

| Cycling Infrastructure | Required | Proposed | Proposed % |
|---|---|---|---|
| Number of short-term bicycle parking spaces (all uses) at-grade or on first level below grade | | | |
| Number of publicly accessible bicycle parking spaces | | | |
| Number of energized outlets for electric bicycles | | | |

| Tree Canopy | Required | Proposed | Proposed % |
|---|---|---|---|
| Total site area (m²) | | | |
| Total Soil Volume (40% of the site area × 66 m² x 30 m³) | | | |
| Total number of trees planted | | | |
| Number of surface parking spaces (if applicable) | | | |
| Number of shade trees located in surface parking area | | | |

| Landscaping & Biodiversity | Required | Proposed | Proposed % |
|---|---|---|---|
| Total non-roof hardscape area (m²) | | | |
| Total non-roof hardscape area treated for Urban Heat Island (minimum residential 75% or non-residential 50%) (m²) | | | |
| Area of non-roof hardscape treated with: (indicate m²) | | | |
| a) high-albedo surface material | | | |
| b) open-grid pavement | | | |
| c) shade from tree canopy | | | |



TORONTO

Statistics Template – Toronto Green Standard Version 4.0

Mid to High Rise Residential and all New Non-Residential Development

| Landscaping & Biodiversity | Required | Proposed | Proposed % |
|---|---|---|---|
| d) shade from high-albedo structures | | | |
| e) shade from energy generation structures | | | |
| Percentage of Lot Area as Soft Landscaping (non-residential only) | | | |
| Total number of plants | | | |
| Total number of native plants and % of total plants | | | |
| Available Roof Space (m²) | | | |
| Available Roof Space provided as Green Roof (m²) | | | |
| Available Roof Space provided as Cool Roof (m²) | | | |
| Available Roof Space provided as Solar Panels (m²) | | | |

| Bird Collision Deterrence | Required | Proposed | Proposed % |
|---|---|---|---|
| Total area of glazing of all elevations within 16m above grade | | | |
| Total area of treated glazing (minimum 85% of total area of glazing within 16m above grade) (m²) | | | |
| Percentage of glazing within 16m above grade treated with: | | | |
| a) Visual markers | | | |
| b) non-reflective glass | | | |
| c) Building integrated structures | | | |



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PERKINS — EASTMAN

115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Project Statistics - Toronto Green Standards

SCALE:

NOT FOR CONSTRUCTION

**A-002b**




| NO. | DATE | REVISION |
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PERKINS —
EASTMAN
115 Fifth Avenue
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F: +1 212 353 7676

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PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Concept Site and Landscape Plan

SCALE:

1:1000

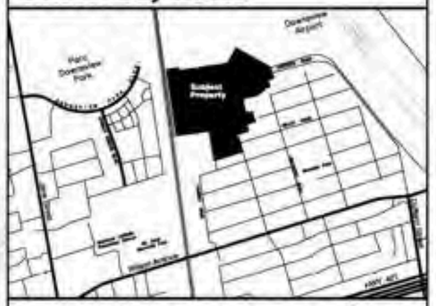
NOT FOR CONSTRUCTION

**A-003**

# DRAFT PLAN OF SUBDIVISION

for
PART OF LOTS 12 AND 13
CONCESSION 3, WEST OF YONGE STREET
AND,
ALL OF LOTS 12 TO 24 (ALL INCLUSIVE), 51 TO 56 (ALL INCLUSIVE), 84 TO 90 (ALL INCLUSIVE), AND 120 TO 123 (ALL INCLUSIVE)
AND PART OF LOTS 25, 48, 49, 50 AND 57
AND PART OF BLOCK A
(FORMERLY POWELL ROAD, REGISTERED PLAN 1764, CLOSED AND RENAMED BY JUDGE'S ORDER)
AND PART OF HOME ROAD, GILLEY ROAD, POWELL ROAD, HANOVER ROAD, REGAL ROAD (ALSO KNOWN AS GARRATT BOULEVARD), AND ANCASTER ROAD (CLOSED BY EXPROPRIATION PLAN 3409)
REGISTERED PLAN 1764
CITY OF TORONTO

**June 28, 2023**




Park
Residential
Employment
Block 13
Downsview Bridge Park
Privately-Owned Publicly Accessible Space (POPS)
0.55 ha
Block 15
Park
Block 1
Mixed-use
(Commercial/Residential)
0.67 ha
STREET A
STREET B
Block 14
Park
0.13 ha
STREET K
TAXIWAY STREET (PRIVATE ROW) STREET O
Block 3
Mixed-use
(Commercial/Residential)
0.64 ha
Block 2
Mixed-use
(Commercial/Residential)
0.72 ha
STREET L
Block 5
Mixed-use
(Commercial/Residential)
2.18 ha
STREET C
Park Block 4
Mixed-use
(Commercial/Residential)
0.26 ha
Block 19
(56 Powell Rd. future conveyance)
<0.01ha adjustment
POWELL ROAD
Block 12
Employment
(Commercial/Industrial)
8.79 ha
Block 16
Park
0.40 ha
STREET D
STREET M
STREET N
Residential
Residential
Block 10
(Employment
(Commercial/Industrial)
Block 11
(Employment
(Commercial/Industrial)
STREET E
HOME ROAD
ANCASTER ROAD
Block 8
Future Murray Rd.
Extension Reserve
0.07 ha
Block 7
Mixed-use
(Commercial/Residential)
Block 17
Park
Block 6
Mixed-use
(Commercial/Residential)
Block 20
(334 Gilley Rd. future conveyance)
<0.01ha adjustment
GILLEY ROAD
Employment
STREET F
STREET G
Residential
Block 9
Residential
PLEWES ROAD
Block 18
Corner rounding
<0.01ha
Residential

Scale 1 : 1,500
(24 x 36)

## ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O., 1990

[ a ] AS SHOWN ON DRAFT PLAN
[ b ] AS SHOWN ON DRAFT AND KEY PLANS
[ c ] AS SHOWN ON DRAFT AND KEY PLANS
[ d ] THE LAND IS TO BE USED ACCORDING TO THE SCHEDULE OF LAND USE
[ e ] AS SHOWN ON DRAFT AND KEY PLANS
[ f ] AS SHOWN ON DRAFT PLAN
[ g ] AS SHOWN ON DRAFT AND KEY PLANS
[ h ] MUNICIPAL WATER SUPPLY TO BE MADE AVAILABLE
[ i ] SOIL IS SANDY CLAYEY SILT
[ j ] AS SHOWN ON DRAFT PLAN
[ k ] FULL MUNICIPAL SERVICES TO BE MADE AVAILABLE
[ l ] AS SHOWN ON THE DRAFT PLAN

| LAND USE | BLOCK | AREA (ha) | AREA (ac) |
|---|---|---|---|
| Mixed-use (Comm./Res.) | Blocks 1 to 7 | 5.82 | 13.8 |
| Future Murray Rd. Ext. Reserve | Block 8 | 0.07 | 0.17 |
| Residential | Block 9 | 1.15 | 2.8 |
| Employment | Blocks 10 to 12 | 9.39 | 23.2 |
| Downsview Park Bridge (POPS) | Block 13 | 0.55 | 1.36 |
| Park | Blocks 14 to 17 | 1.19 | 2.94 |
| Corner Rounding | Block 18 | <0.01 | <0.1 |
| 56 Powell Rd. Future Conveyance | Block 19 | <0.01 | <0.1 |
| 334 Gilley Rd. Future Conveyance | Block 20 | <0.01 | <0.1 |
| Public ROW* | STREETS A-G & K-N | 4.01 | 9.91 |
| Private ROW | STREET O (TAXIWAY STREET) | 0.44 | 1.09 |
| | | 22.44 | 55.4 |

*Streets HJ,J not assigned

## OWNER'S AUTHORIZATION

I AUTHORIZE WSP CANADA LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF TORONTO FOR APPROVAL.

Kristy Shortall — June 30, 2023
Kristy Shortall, Senior Vice President, Development Northwest (Development) — DATE

## SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

June 29, 2023
Sabir Akhwehs, O.L.S. — DATE
JDBarnes

THIS DRAFT PLAN OF SUBDIVISION IS APPROVED UNDER SECTION 51 OF THE PLANNING ACT THIS ____ DAY OF ____, 20__,
SUBJECT TO THE CONDITIONS, SET FORTH IN LETTER DATED ____

CHIEF PLANNER AND THE EXECUTIVE DIRECTOR,
CITY PLANNING DIVISION, CITY OF TORONTO

## PLANNER'S CERTIFICATE

PLAN PREPARED BY

John Tzaalopoulos, MCIP, RPP
June 28, 2023
DATE

211-13527-00 P01

| NO. | DATE | REVISION |
|---|---|---|
| 1. | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2. | July 6, 2023 | Issued for ZBA/ OPS Resubmission |




PERKINS — EASTMAN

115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676


Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

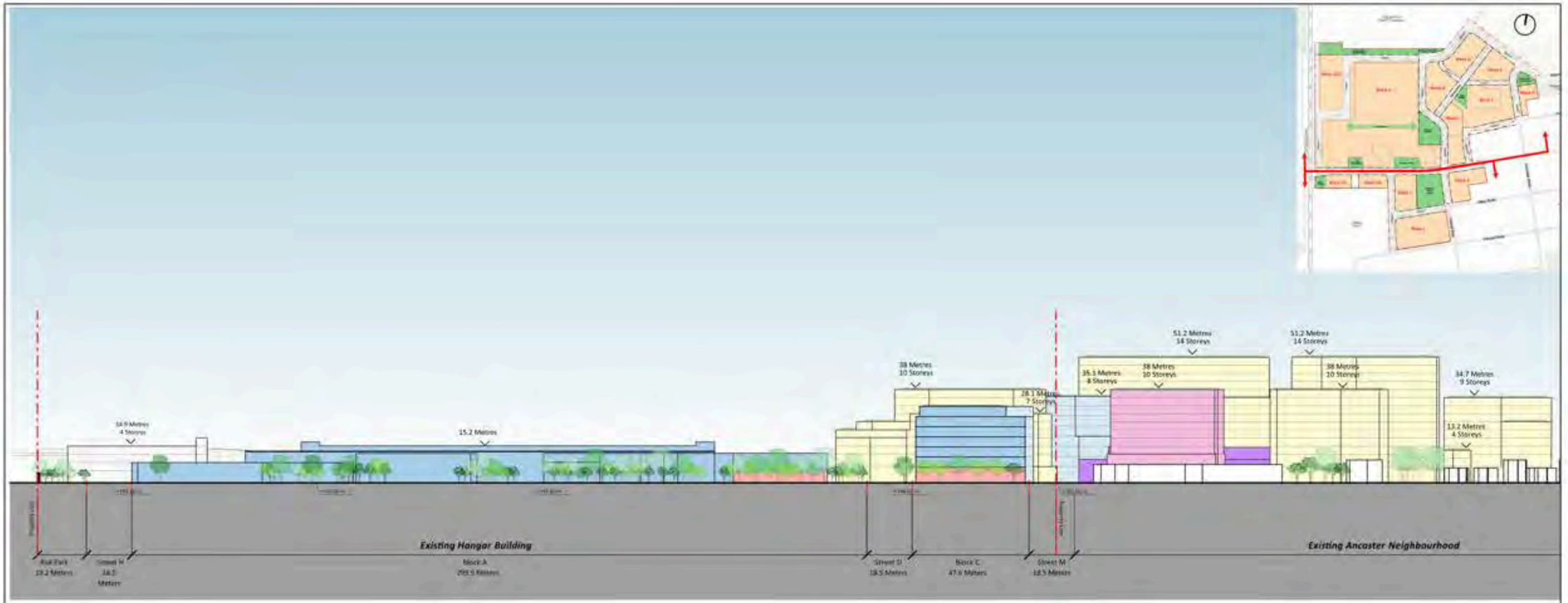
## Subdivision Concept Plan

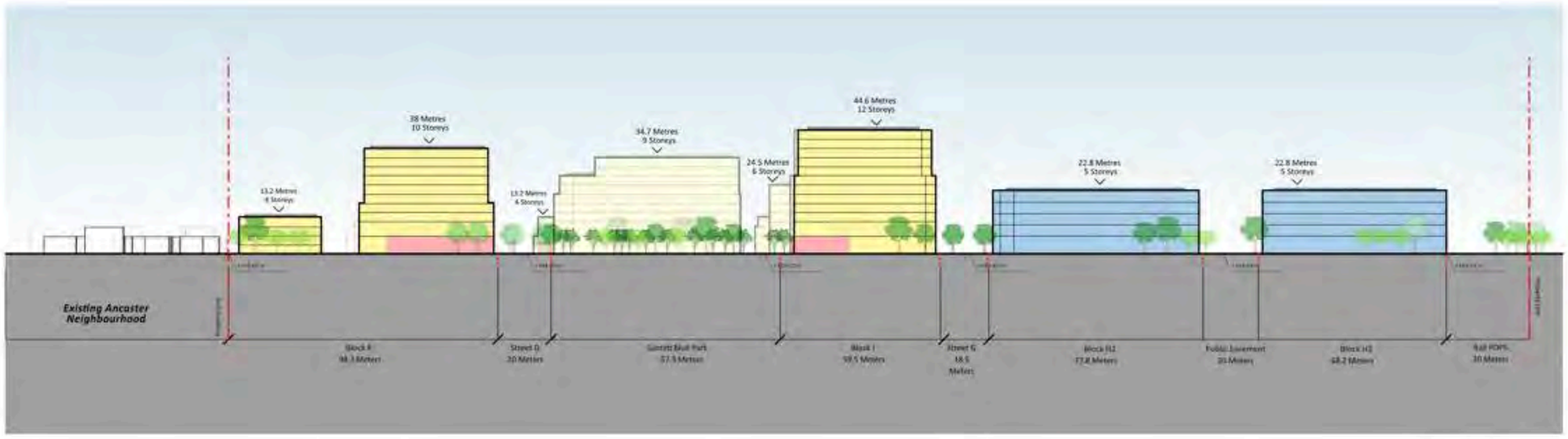
SCALE:

- Sub-District Boundary
- Parks
- Private Open Space/POPS
- Development Parcels

NOT FOR CONSTRUCTION

**A-005**




0 METERS 12 24 36 48 60

| NO. | DATE | REVISION |
|---|---|---|
| 1 | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2 | July 6, 2023 | Issued for ZBA/ OPS Resubmission |



PERKINS — EASTMAN
115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Concept Elevations (Street E)

SCALE:

1:600

- Sub-District Boundary
- Residential
- Employment
- Retail
- Hotel
- Other
- Parking

NOT FOR CONSTRUCTION

**A-006a**

| NO. | DATE | REVISION |
|---|---|---|
| 1 | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2 | July 6, 2023 | Issued for ZBA/ OPS Resubmission |




0 METERS 8 16 24 32 40




PERKINS — EASTMAN

115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676


Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Concept Elevation (Taxiway Street)

SCALE:

1:400

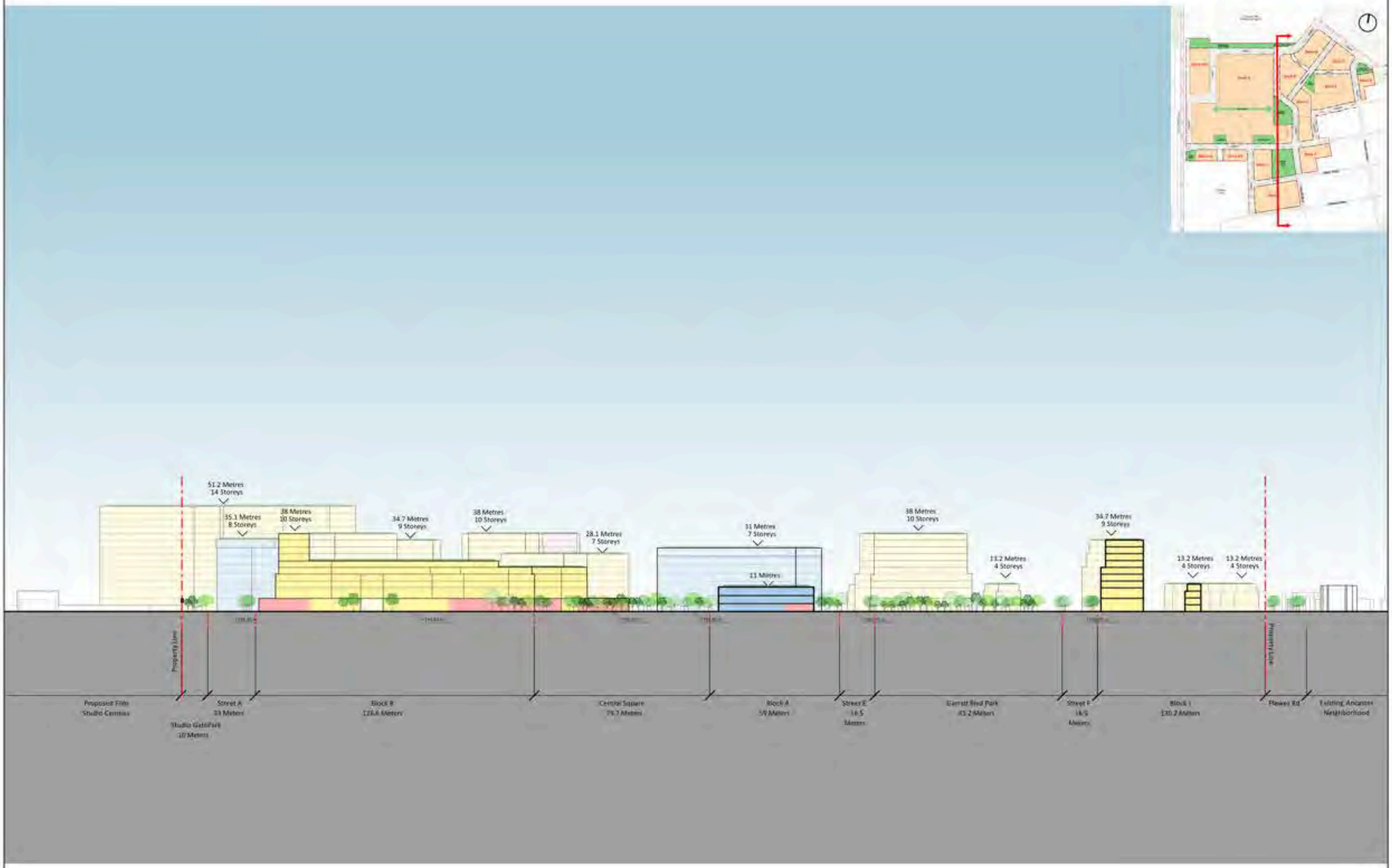
- Sub-District Boundary
- Residential
- Employment
- Retail
- Hotel
- Other

NOT FOR CONSTRUCTION

**A-006b**

| NO. | DATE | REVISION |
|---|---|---|
| 1 | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2 | July 6, 2023 | Issued for ZBA/ OPS Resubmission |






0 METERS 12 24 36 48 60


PERKINS — EASTMAN

115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676


Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Concept Elevation (Street D)

SCALE:

1:600

- Sub-District Boundary
- Residential
- Employment
- Retail
- Hotel
- Other

NOT FOR CONSTRUCTION

**A-006c**




| NO. | DATE | REVISION |
|---|---|---|
| 1. | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2. | June 30, 2023 | Issued for ZBA/ OPS Resubmission |



PERKINS — EASTMAN
115 Fifth Avenue
New York, NY 10003
T: +1 212 353 7200
F: +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Demonstration Massing

SCALE:

Sub-District Boundary

Existing Buildings

NOT FOR CONSTRUCTION

**A-007**




| NO. | DATE | REVISION |
|---|---|---|
| 1 | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2 | June 30, 2023 | Issued for ZBA/ OPS Resubmission |



PERKINS — EASTMAN
115 Fifth Avenue
New York, NY 10003
T: +1 212 353 7200
F: +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Demonstration Massing- Uses

SCALE:

- Sub-District Boundary
- Residential (Apartment)
- Residential (Townhouse)
- Employment
- Retail
- Hotel
- Other
- Parking

NOT FOR CONSTRUCTION

**A-008**

| NO. | DATE | REVISION |
|---|---|---|
| 1. | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2. | July 6, 2023 | Issued for ZBA/ OPS Resubmission |



PERKINS — EASTMAN

115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Concept Phasing Plan

SCALE:

- Sub-District Boundary
- Future Film Studio Campus
- Phase I
- Interim Use (Phase C)
- Phase II

NOT FOR CONSTRUCTION

**A-009**

| NO. | DATE | REVISION |
|---|---|---|
| 1 | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2 | July 6, 2023 | Issued for ZBA/ OPS Resubmission |

Future Film Studio Campus

Block A(P)

Block A

Block B

Block C

Block D

Block E

Block F

Block G

Block H1

Block H2

Block I

Block J

Block K

Street A

Street B

Street C

Street D

Street E

Street F

Street G

Street H

Street I

Street J

Street K

Street L

Street M

Street N

Downsview Park Bridge

Studio Gate Park

Robert Leek Park Expansion

Taxiway Street

The Plaza

The Atrium

Central Square

The Courtyard

Hangar Court

Rail POPS

Garratt Blvd Park

Hanover Road

Robert Leek Park

Powell Road

Home Road

Ancaster Road

Gilley Road

Garratt Blvd

Plewes Road

Works Yard

GO Barrie Line

0 METERS 16 32 48 64 80



PERKINS — EASTMAN

115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

Supplementary Plan (Block Dimensions)

SCALE:

1:800

Sub-District Boundary

Development Block

NOT FOR CONSTRUCTION

A-010

| NO. | DATE | REVISION |
|---|---|---|
| 1. | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2. | July 6, 2023 | Issued for ZBA/ OPS Resubmission |




PERKINS — EASTMAN

115 Fifth Avenue
New York, NY 10003
T: +1 212 353 7200
F: +1 212 353 7676


Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Ground Floor Plan

SCALE:

1:800

- Sub-District Boundary
- Residential Lobby
- Employment
- Office Lobby
- Retail, Food and Beverage
- Hotel
- Residential Amenity/ Townhouse
- Theater/ Conference
- Loading/ Parking and Service

NOT FOR CONSTRUCTION

**A-010a**

0 METERS 16 32 48 64 80

| NO. | DATE | REVISION |
|---|---|---|
| 1. | May 5, 2022 | Issued for ZBA/ OPS Application |
| 2. | July 6, 2023 | Issued for ZBA/ OPS Resubmission |




PERKINS — EASTMAN
115 Fifth Avenue
New York, NY 10003
T. +1 212 353 7200
F. +1 212 353 7676

Client: Northcrest Developments

PROJECT TITLE:

# The Hangar District

123 Garratt Boulevard
Toronto, Ontario

DRAWING TITLE:

## Typical Floor Plan

SCALE:

1:800

- Sub-District Boundary
- Residential
- Office
- Hotel
- Townhouse
- Parking/ Core

NOT FOR CONSTRUCTION

**A-010b**

# 3. Civil Drawings

ARUP

# NORTHCREST DEVELOPMENTS

# THE HANGAR DISTRICT
# (FORMERLY TAXIWAY WEST SOUTH SUB-DISTRICT)
# 123 GARRATT BOULEVARD

## CIVIL - GRADING AND UTILITIES

## MILESTONE: DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW AMENDMENT RESUBMISSION
## DATE: 2023/07/06

NOT FOR CONSTRUCTION

| DRAWING NUMBER | DRAWING TITLE | REVISION | DATE | DESCRIPTION |
|---|---|---|---|---|
| C-000 | COVER SHEET | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-001 | DRAWING INDEX | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-002 | KEY PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-003 | GENERAL NOTES AND LEGEND | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-101 | GRADING PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-102 | GRADING PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-103 | GRADING PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-104 | GRADING PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-105 | GRADING PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-201 | PUBLIC UTILITIES PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-202 | PUBLIC UTILITIES PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-203 | PUBLIC UTILITIES PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-204 | PUBLIC UTILITIES PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-205 | PUBLIC UTILITIES PLAN | 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-211 | COMPOSITE LANDSCAPE AND UTILITIES PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-212 | COMPOSITE LANDSCAPE AND UTILITIES PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-213 | COMPOSITE LANDSCAPE AND UTILITIES PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-214 | COMPOSITE LANDSCAPE AND UTILITIES PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-215 | COMPOSITE LANDSCAPE AND UTILITIES PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-301 | SANITARY SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-302 | SANITARY SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-303 | SANITARY SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-304 | SANITARY SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-305 | SANITARY SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-311 | SANITARY CATCHMENT MAP - PROPOSED | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-401 | WATER SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-402 | WATER SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-403 | WATER SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-404 | WATER SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-405 | WATER SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-501 | STORM SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-502 | STORM SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-503 | STORM SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-504 | STORM SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-505 | STORM SERVICING PLAN | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| C-602 | TYPICAL UTILITY ARRANGEMENTS | 3 | 06-07-23 | REISSUED FOR ZBA/DPS |




| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

ARUP

121 Bloor Street East, Suite 900
Toronto ON M4W 3M5 Canada
t: +1 (416) 515 0915
www.arup.com

Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

DRAWING INDEX

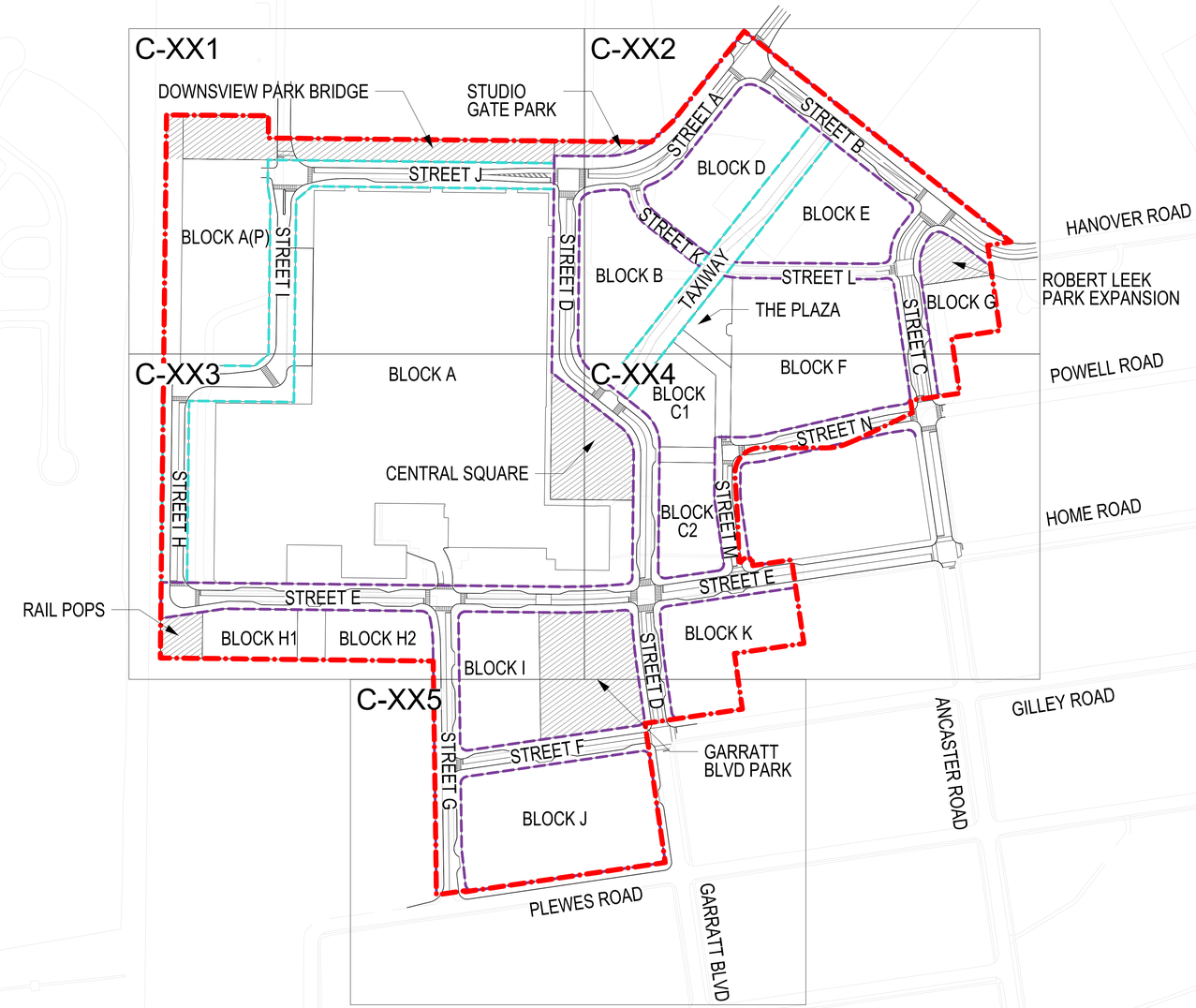
Scale NOT TO SCALE

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PC | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-001 | 3 |




NOTES:

1. ALL DRAWING SERIES FOLLOW THIS KEY PLAN WITH THE EXCEPTION OF THE FOLLOWING:

C-311 - SANITARY CATCHMENT MAP

C-60X SERIES - UTILITY SECTIONS

2. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

ARUP

121 Bloor Street East, Suite 900
Toronto ON M4W 3M5 Canada
t: +1 (416) 515 0915
www.arup.com

Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



Drawing Title
KEY PLAN

Scale SCALE: 1:2000 (0 50 80m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PC | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-002 | 3 |

22x34

# LEGEND:

## GENERAL:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

## GRADING PLAN :

- xxx.xx — EXISTING GRADE
- xxx.xx — PROPOSED GRADE
- xxx.xx — EXISTING CONTOUR LINES
- xxx.xx — PROPOSED CONTOUR LINES
- MAJOR OVERLAND FLOW DIRECTION
- 2% — SLOPE DIRECTION

## UTILITIES PLAN:

- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN
- PRIVATE STORM INFRASTRUCTURE
- PROPOSED JOINT USE TRENCH (HYDRO & TELECOMS)
- PROPOSED WATERMAIN
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED GAS MAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- EXISTING UTILITIES TO BE ABANDONED
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN

# GENERAL NOTES:

## EROSION AND SEDIMENT CONTROL

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED OR REPLACED WITHIN 48 HOURS OF INSPECTION OR BOTH.
2. ALL DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
3. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREA. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS AND A TORONTO REGION CONSERVATION AUTHORITY ENFORCEMENT OFFICE SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
4. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE AND REFUELING WILL BE CONDUCTED A MINIMUM OF 30 M FROM THE WATER.
5. ALL GRADES WITHIN THE REGULATORY FLOOD PLAN WILL BE MAINTAINED OR MATCHED.

## ADDITIONAL GENERAL NOTES - GRADING AND DRAINAGE

1. ALL ELEVATIONS ARE OF EDGE OF PAVEMENT, UNLESS OTHERWISE NOTED.
2. ALL COORDINATES ARE IN METER AND REFERENCED TO ZONE 10 OF THE ONTARIO COORDINATE SYSTEM NAD-27.
3. CONNECTION TO EXISTING NETWORKS IS SUBJECT TO AGREEMENT WITH STATUTORY AUTHORITIES AND APPROVING BODIES.
4. LOCATION AND EXTENT OF EXISTING SERVICES IS INDICATIVE ONLY AND IS INTENDED TO IDENTIFY APPROXIMATE LOCATION OF MAIN SERVICE CORRIDORS. FOR FULL DETAILS REFER TO UTILITY PROVIDERS RECORD DRAWINGS OR TOPOGRAPHICAL SURVEY.
5. CONFLICTS WITH EXISTING UTILITIES AND OTHER PROPOSED WORKS SHOULD BE NOTIFIED TO THE ENGINEER OF RECORD.
6. CONTRACTOR SHALL CONFIRM EXACT LIMITS OF GRADING AND PROVIDE SMOOTH TIE-IN TO EXISTING SURFACES IN THE FIELD.
7. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SURFACES TOWARDS CATCHBASINS OR DRAINAGE FEATURES AT TIE-INS TO EXISTING SURFACES AND ALL LOCATIONS WITHIN PROJECT LIMITS. CONTRACTOR SHALL NOTIFY CONTRACT ADMINISTRATOR PRIOR TO COMMENCING WORKS IF SITE CONDITIONS DO NOT ACHIEVE POSITIVE DRAINAGE.
8. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SUB-GRADE TOWARDS SUBDRAINS AND A MINIMUM 0.5% SLOPE FOR SUBDRAIN AND ITS OUTLET PIPE.
9. CROSSFALLS AND ELEVATIONS PROVIDED IN TYPICAL SECTIONS DRAWINGS ARE FOR INFORMATION ONLY. REFER TO GRADING AND DRAINAGE DRAWINGS FOR DETAILS AND PROPOSED ELEVATIONS.

## ADDITIONAL GENERAL NOTES - REMOVALS

1. LIMITS OF WORK WILL INCLUDE REMOVALS OF AREAS AND OTHER INFRASTRUCTURE (RAILINGS, FURNITURE, ETC.) ON PRIVATE PROPERTY. EXACT LIMITS AND REQUIREMENTS WILL BE DETERMINED ON-SITE. CONTRACTOR TO COORDINATE WITH AFFECTED PROPERTY OWNERS ON REINSTATEMENT OF REMOVED PRIVATE ELEMENTS DISTURBED DURING PROJECT CONSTRUCTION.
2. UNLESS OTHERWISE NOTED, SALVAGE MATERIALS REMOVED FROM PRIVATE PROPERTY FOR REUSE / DISPOSAL BY OWNER.
3. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SITE FURNITURE (TRASH RECEPTACLES, BENCHES, SIGN POSTS, INFORMATION PILLARS, ETC.) WITHIN THE LIMITS OF WORK TO BE REMOVED BY THE CITY OF TORONTO (OR ITS AGENT).
4. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SIGNAGE WITHIN THE LIMITS OF WORK TO BE REMOVED FOR REUSE / RETURN TO THE CITY.
5. ALL REFUSE, DEBRIS AND MISCELLANEOUS ITEMS TO BE REMOVED, THAT ARE NOT TO BE STOCKPILED FOR LATER USE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF-SITE BY THE CONTRACTOR.
6. CONTRACTOR RESPONSIBLE FOR IDENTIFICATION, MAINTENANCE, PROTECTION, ETC. OF ANY PRIVATE IRRIGATION, ELECTRICAL AND LIGHTING SYSTEMS WITHIN THE PUBLIC AND PRIVATE RIGHT-OF-WAY THAT MAY BE ENCOUNTERED WHICH ARE NOT SHOWN ON THE DRAWINGS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND SHRUBS DESIGNATED TO REMAIN FOR THE LENGTH OF THE CONSTRUCTION PERIOD. REFER TO ARBORIST REPORTS FOR TREE REMOVAL AND PROTECTION. THE PLACEMENT OF PROTECTION DEVICES ADDITIONAL TO THOSE SPECIFIED SHALL, HOWEVER, BE AT THE CONTRACTORS DISCRETION.

## EXISTING UTILITIES GENERAL NOTES:

1. EXISTING UTILITIES SHOWN ARE BASED ON BACKGROUND INFORMATION SUPPLED BY CLIENT, UTILITY COMPANIES AND CITY OF TORONTO. INFORMATION INCLUDES BUT NOT LIMITED TO RECORD DESIGN DRAWINGS, AS-BUILT DRAWINGS, AND SUBSURFACE UTILITY ENGINEERING (SUE) INVESTIGATION INFORMATION BY CLIENT.
2. LOCATIONS AND SIZES OF ALL UTILITY SERVICE CONNECTIONS ARE BASED ON AVAILABLE RECORDS AND MUST BE FIELD VERIFIED PRIOR TO ANY CONSTRUCTION ACTIVITIES.

## SANITARY AND STORM SEWERS:

1. MAIN LINE PVC PIPE SHALL BE DR 35 UNLESS NOTED OTHERWISE.
2. SANITARY SERVICE CONNECTIONS SHALL BE SINGLE, 200 mm DIAMETER MINIMUM, PVC DR 28 INSTALLED AT 2 PERCENT.
3. BEDDING MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A NATIVE OR GRANULAR A RCM ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
4. BEDDING FOR RIGID PIPE SHALL BE CLASS B BEDDING MATERIAL ACCORDING TO OPSD 802.031 AND USING GRANULAR A NATIVE OR GRANULAR A RCM BEDDING MATERIAL ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98 % OF MAXIMUM DRY DENSITY.
5. MAINTENANCE HOLES SHALL BE ACCORDING TO T-701.010 (1200 mm), T-701.011 (1500 mm), T-701.012-1 (1800 mm) OR T-701.013 (2400 mm). FRAME AND COVER SHALL BE ACCORDING TO OPSD 401.010 TYPE A CLOSED (SANITARY AND STORM).
6. MAINTENANCE HOLE CHAMBER OPENINGS MUST BE LOCATED ON THE UPSTREAM SIDE OF THE MAINTENANCE HOLE UNLESS OTHERWISE SPECIFIED.
7. BENCHING DETAILS SHALL BE ACCORDING TO T-701.021 OR AS SHOWN ON THE DRAWINGS.
8. SANITARY MAINTENANCE HOLES SHALL HAVE WATERTIGHT FRAMES AND COVERS IN PONDING AREAS ACCORDING TO OPSD 401.030.
9. SINGLE CATCHBASINS SHALL BE ACCORDING TO T-705.010 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED. FRAME AND COVER SHALL BE ACCORDING TO OPSD 400.070.
10. SINGLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.010-1. DOUBLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.020-1.
11. DOUBLE CATCHBASINS SHALL BE ACCORDING TO T-705.020 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED.
12. CATCHBASIN LEADS TO BE 250 mm PVC DR 35 FOR SINGLE CATCHBASINS AND 300 mm PVC DR 35 FOR DOUBLE CATCHBASINS.
13. CONNECTION DETAIL FOR SEWER PIPE AT CATCHBASINS AND MAINTENANCE HOLES SHALL BE ACCORDING TO T-708.020.

## WATERMAINS

1. REMOVAL AND ABANDONMENT OF EXISTING TORONTO WATER INFRASTRUCTURE PER CITY OF TORONTO SPECIFICATION TS 510.
2. BACKFILLING IN PAVEMENT PER CITY OF TORONTO SPECIFICATION TS 4.60.07.02.03.
3. PVC WATERMAINS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPES RANGING IN SIZE FROM 100 mm TO 300 mm IN DIAMETER PRESSURE CLASS 235 AWWA C909-09. PVC PIPES RANGING IN SIZE FROM 350 mm THROUGH 600 mm IN DIAMETER, SHALL BE PRESSURE RATING 235, DR 18, ACCORDING TO AWWA C905-10.
4. EMBEDMENT MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
5. MINIMUM COVER ON WATERMAINS SHALL BE 1.8 m.
6. ALL HYDRANTS SHALL BE CONSTRUCTED ACCORDING TO T-1105.01.
7. HYDRANT LEADS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR PRESSURE CLASS 235 AWWA C909-09.
8. ALL SERVICE CONNECTIONS SHALL BE CONSTRUCTED ACCORDING TO T-1104.01, T-1104.02-1, T-1104.02-3, T-1105.02-1 AND T-1105.02-2.
9. SINGLE WATER SERVICE CONNECTIONS SHALL BE A MINIMUM OF 19mm DIA. TYPE "K" SOFT COPPER ACCORDING TO T-1104.01. WHEN SERVICE LENGTH EXCEEDS 30 m, THE DIAMETER SHALL BE 25 mm DIA.
10. ALL CURB AND VALVE BOXES TO BE LOCATED AT STREET LINE.
11. MECHANICAL THRUST RESTRAINTS SHALL BE INSTALLED AT ALL FITTINGS, BENDS, TEES, CROSSES, REDUCERS AND VALVES FOR ALL WATERMAIN SIZES. MECHANICAL RESTRAINTS AT JOINTS SHALL BE INSTALLED AT EVERY PIPE JOINT 6.1 m OF EITHER SIDE OF THE VALVE FOR WATERMAINS 100 mm DIAMETER OR LARGER UNLESS OTHERWISE NOTED.
12. ALL TEES, PLUGS, HORIZONTAL, VERTICAL BENDS, REDUCERS AND HYDRANTS USED WITH WATERMAIN DIAMETER UP TO 300mm TO HAVE CONCRETE THRUST BLOCKS ACCORDING TO T-1103.01 AND T-1103.020 UNLESS OTHERWISE NOTED.
13. WATERMAINS MUST FOLLOW THE ONTARIO MINISTRY OF THE ENVIRONMENT PROCEDURE F-6-1 THAT GOVERN THE SEPARATION OF SEWERS AND WATERMAINS. A MINIMUM VERTICAL CLEARANCE OF 0.30 m WHEN CROSSING OVER AND 0.5 m WHEN CROSSING UNDER SEWERS AND ALL OTHER UTILITIES IS REQUIRED. MUST ALSO MAINTAIN 2.5 m HORIZONTAL SEPARATION WITH SEWERS.
14. CITY IN-SERVICE WATER VALVES, CURB STOPS, FIRE HYDRANTS CAN ONLY BE OPERATED BY TORONTO WATER STAFF.
15. ALL NEW WATERMAINS SHALL BE INSULATED WHERE THE COVER IS LESS THAN 1.65 m ACCORDING TO T-708.01-4.
16. ALL SERVICE CONNECTIONS SHALL BE REPLACED UP TO PROPERTY LINES.

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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
GENERAL NOTES AND LEGEND

| Scale | | | |
|---|---|---|---|
| NOT TO SCALE | | | |
| Drawn | Designed | Checked | Approved |
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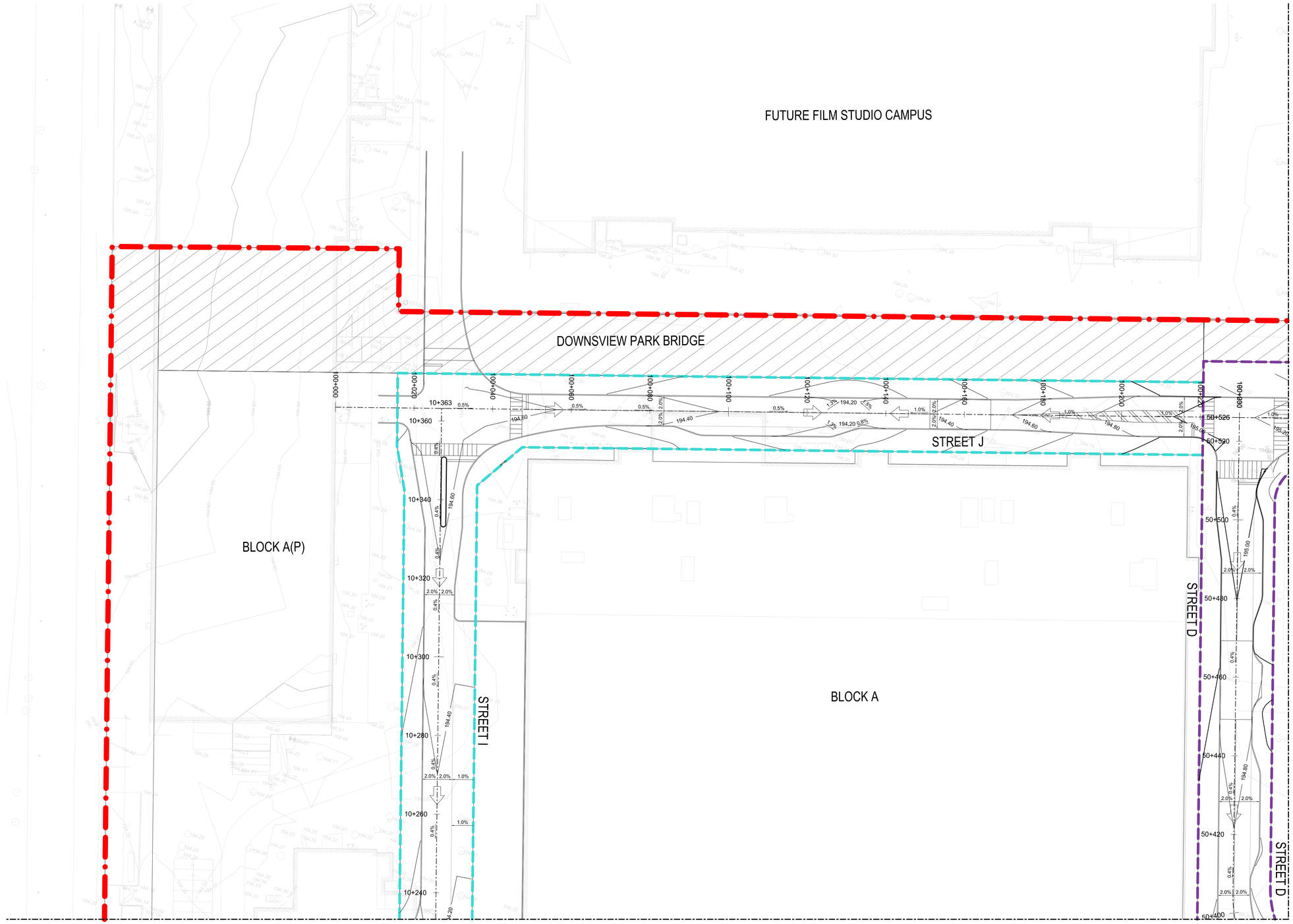
Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-003 | 3 |


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22x34




GRADING PLAN
NORTHWEST SIDE
1
C-101

MATCHLINE
C-102
FOR CONTINUATION SEE DWG.

MATCHLINE
C-103
FOR CONTINUATION SEE DWG.

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

2. PROPOSED GRADING IS ONLY PROVIDED WITHIN PUBLIC RIGHTS OF WAY AND PRIVATE STREETS. GRADING WITHIN PARKS AND DEVELOPMENT BLOCKS WILL BE COMPLETED OUTSIDE OF THIS APPLICATION.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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Job Title
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FORMERLY TAXIWAY WEST
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123 GARRATT BOULEVARD

Key Plan




Drawing Title
GRADING PLAN
SHEET 1 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PC | PP | HJ |

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|---|---|---|
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FOR CONTINUATION SEE DWG.
MATCHLINE
C-101

STUDIO GATE PARK
STREET A
STREET B
STREET K
STREET L
STREET C
TAXIWAY
TAXIWAY
BLOCK B
BLOCK D
BLOCK E
BLOCK F
BLOCK G
THE PLAZA
ROBERT LEEK PARK EXTENSION
HANOVER ROAD
PROP. GRADING TO TIE INTO EXISTING

MATCHLINE
C-104
FOR CONTINUATION SEE DWG.

## GRADING PLAN
NORTHEAST SIDE
1
C-102

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

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GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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Job Title
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123 GARRATT BOULEVARD

Key Plan

Drawing Title
GRADING PLAN
SHEET 2 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
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| TI | PC | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-102 | 4 |

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FOR CONTINUATION SEE DWG.
MATCHLINE
C-101

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GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

BLOCK A

CENTRAL SQUARE

STREET H

10+140
10+120
10+100
10+080
10+060
10+040
10+020
10+000
10+180
10+200
10+220
50+380

120m TOE WALL
0.75m MAX.
RETAINED
HEIGHT

THE COURTYARD

HANGAR COURT

STREET E

RAIL POPS

BLOCK H1

BLOCK H2

STREET G

BLOCK I

GARRATT
BLVD PARK

20+000
20+020
20+040
20+060
20+080
20+100
20+120
20+140
20+160
20+180
20+200
20+220
20+240
20+260
20+280
30+180
30+200
30+220
30+222

MATCHLINE
C-104
FOR CONTINUATION SEE DWG.

MATCHLINE
C-105
FOR CONTINUATION SEE DWG.

GRADING PLAN
SOUTHWEST SIDE
1
C-103

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Key Plan

Drawing Title
GRADING PLAN
SHEET 3 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PC | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
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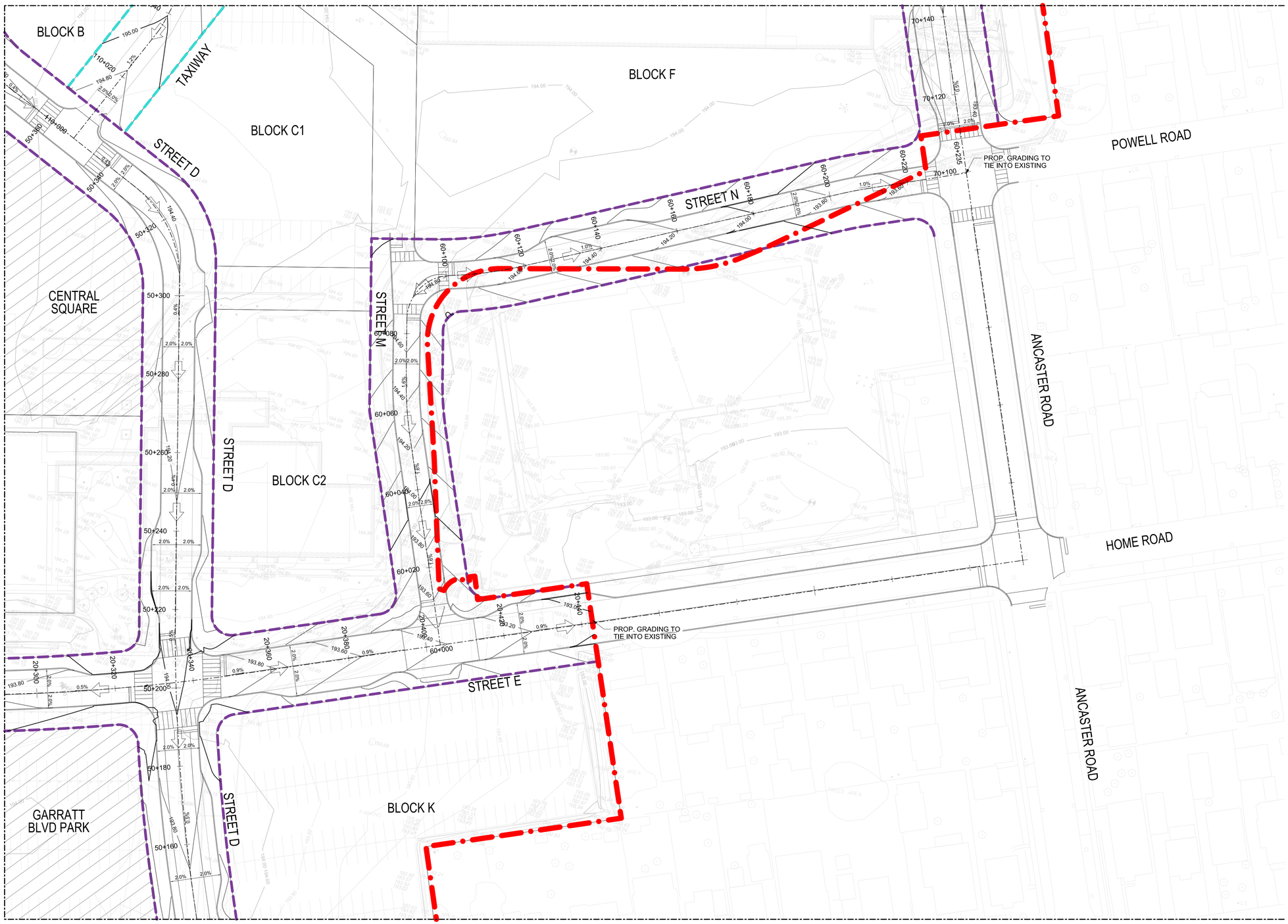

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FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-103

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-102




**MATCHLINE**
C-105
FOR CONTINUATION SEE DWG.

# GRADING PLAN
SOUTHEAST SIDE

1
C-104

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

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GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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Key Plan




Drawing Title
GRADING PLAN
SHEET 4 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

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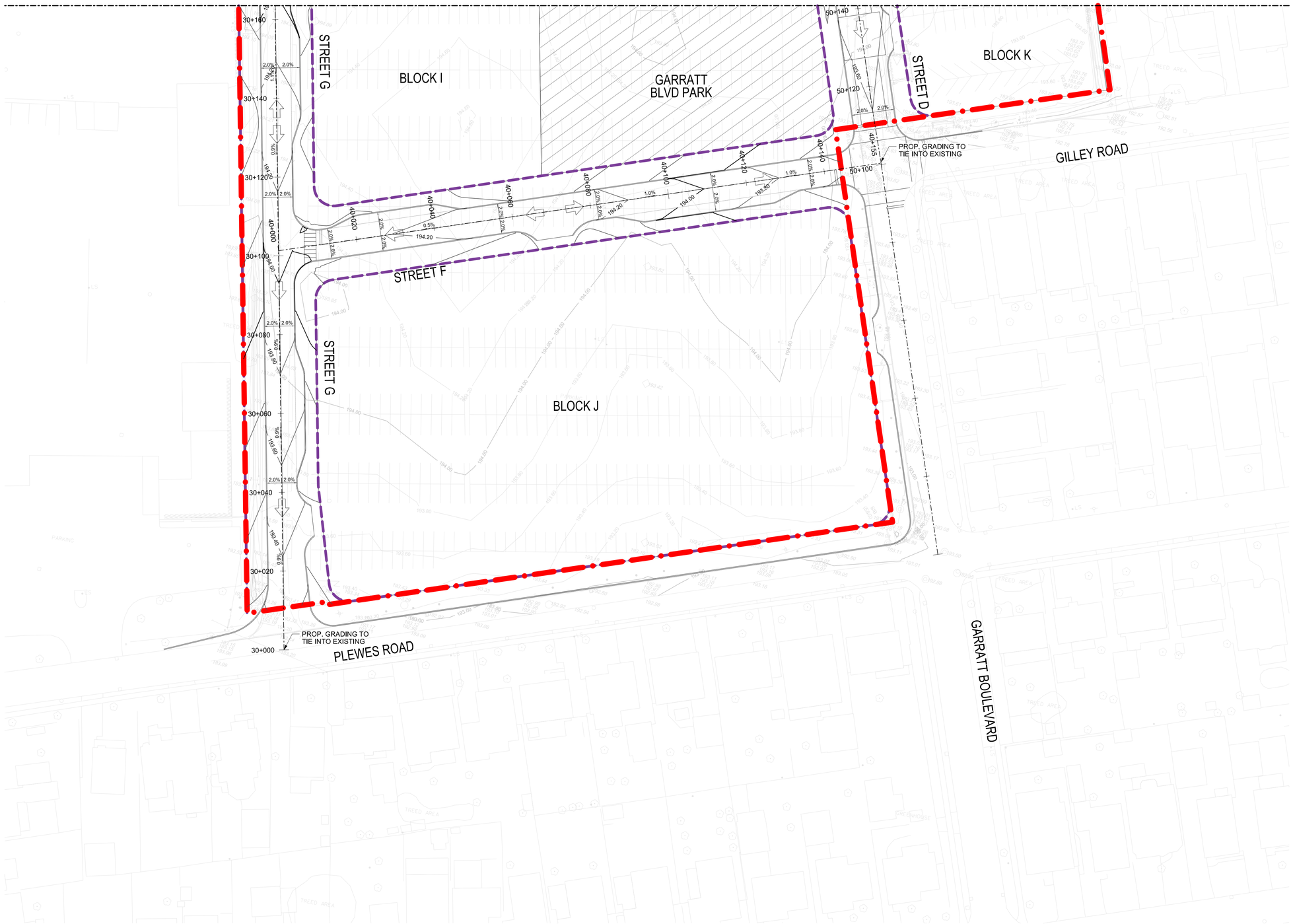
Drawing Status
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| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-104 | 4 |

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FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-103

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-104




## GRADING PLAN
SOUTH SIDE

1
C-105

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

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GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
GRADING PLAN
SHEET 5 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

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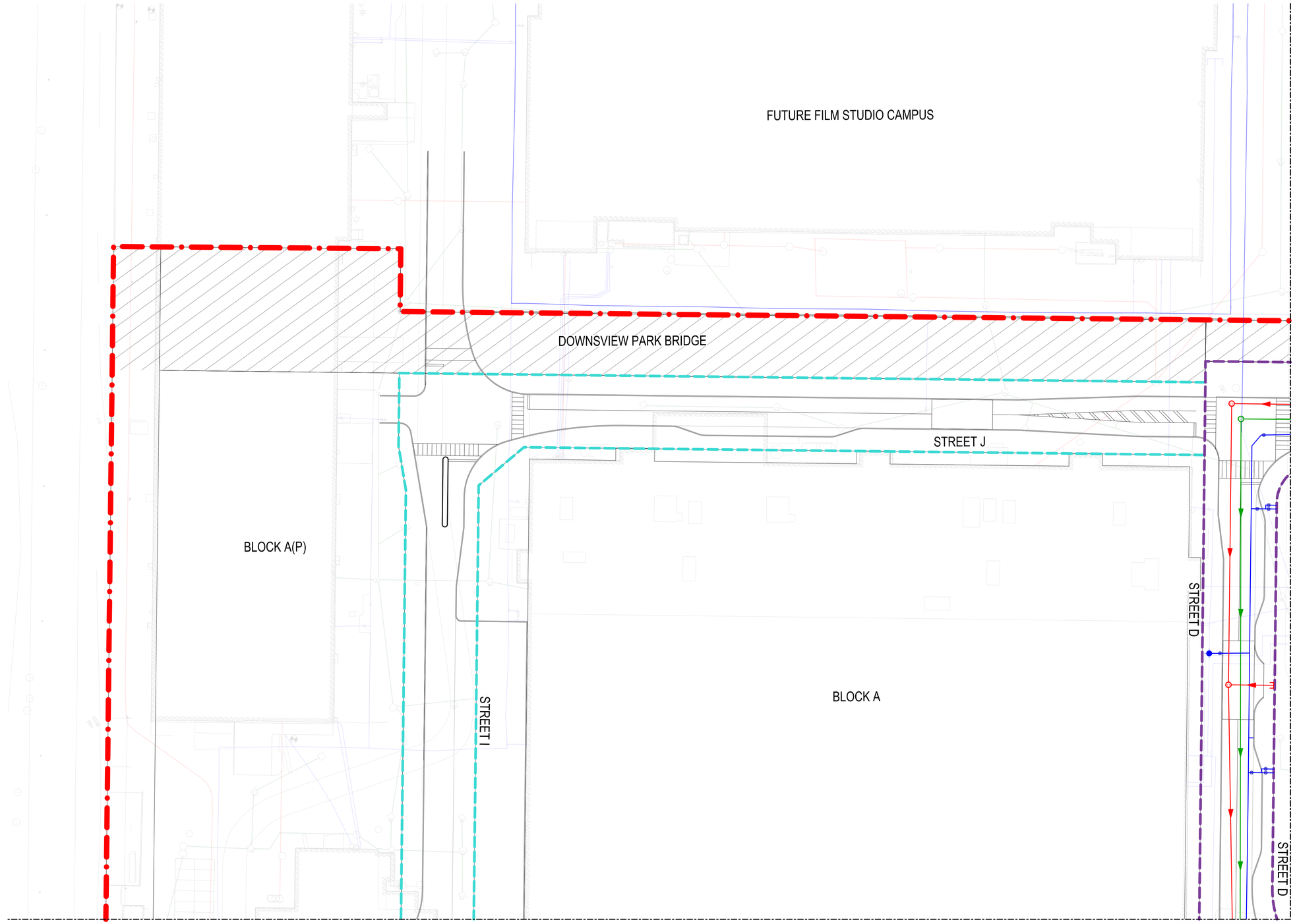
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PUBLIC UTILITIES PLAN
NORTHWEST SIDE
1
C-201

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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| 1 | 17-01-22 | DRAFT SUBMISSION |

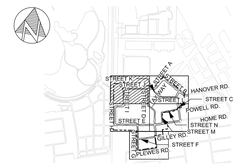
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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 1 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
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| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
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FOR CONTINUATION SEE DWG. **MATCHLINE** C-201

STUDIO GATE PARK

STREET A

STREET B

BLOCK D

BLOCK E

TAXIWAY

STREET K

STREET L

BLOCK B

TAXIWAY

ROBERT LEEK
PARK EXTENSION

HANOVER ROAD

STREET C

BLOCK G

THE PLAZA

BLOCK F

**MATCHLINE** C-204
FOR CONTINUATION SEE DWG.

# PUBLIC UTILITIES PLAN
NORTHEAST SIDE

1
C-202

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

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| 2 | 14-03-22 | DRAFT SUBMISSION |
| 1 | 17-01-22 | DRAFT SUBMISSION |

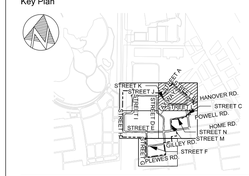

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Client
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Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 2 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

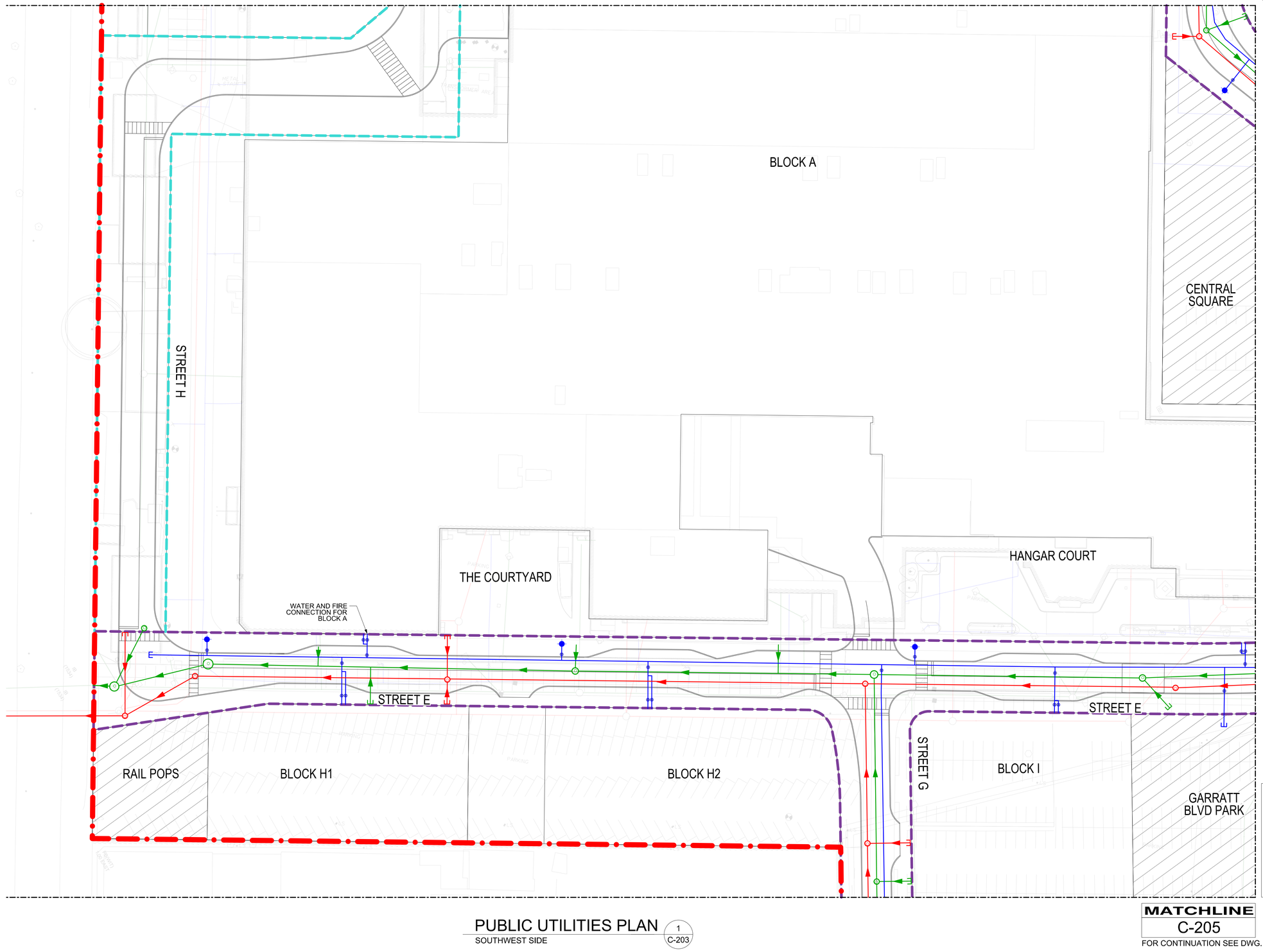
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PUBLIC UTILITIES PLAN
SOUTHWEST SIDE
1
C-203

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

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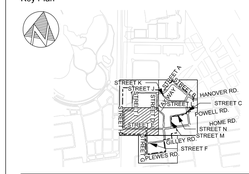
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Client
NORTHCREST DEVELOPMENTS

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123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 3 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-203 | 4 |

PLOT BY:angus.wan PLOT TIME:2023-07-05 5:37:35 PM FILE:J:\TOR\270000\272777-00\3 Design\3-04 BIM\3-04-30 Civil\06 Sheets\D001_Taxiway West\260341-ARP-CV-DRN-HD03-0203.dgn

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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-203

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-202

BLOCK B
TAXIWAY
BLOCK C1
BLOCK F
STREET D
STREET N
POWELL ROAD
CENTRAL SQUARE
STREET M
ANCASTER ROAD
STREET D
BLOCK C2
HOME ROAD
STREET E
ANCASTER ROAD
GARRATT BLVD PARK
STREET D
BLOCK K

**MATCHLINE**
C-205
FOR CONTINUATION SEE DWG.

## PUBLIC UTILITIES PLAN
SOUTHEAST SIDE
1
C-204

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 3 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 2 | 14-03-22 | DRAFT SUBMISSION |
| 1 | 17-01-22 | DRAFT SUBMISSION |


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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan

Drawing Title
PUBLIC UTILITIES PLAN
SHEET 4 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-204 | 4 |


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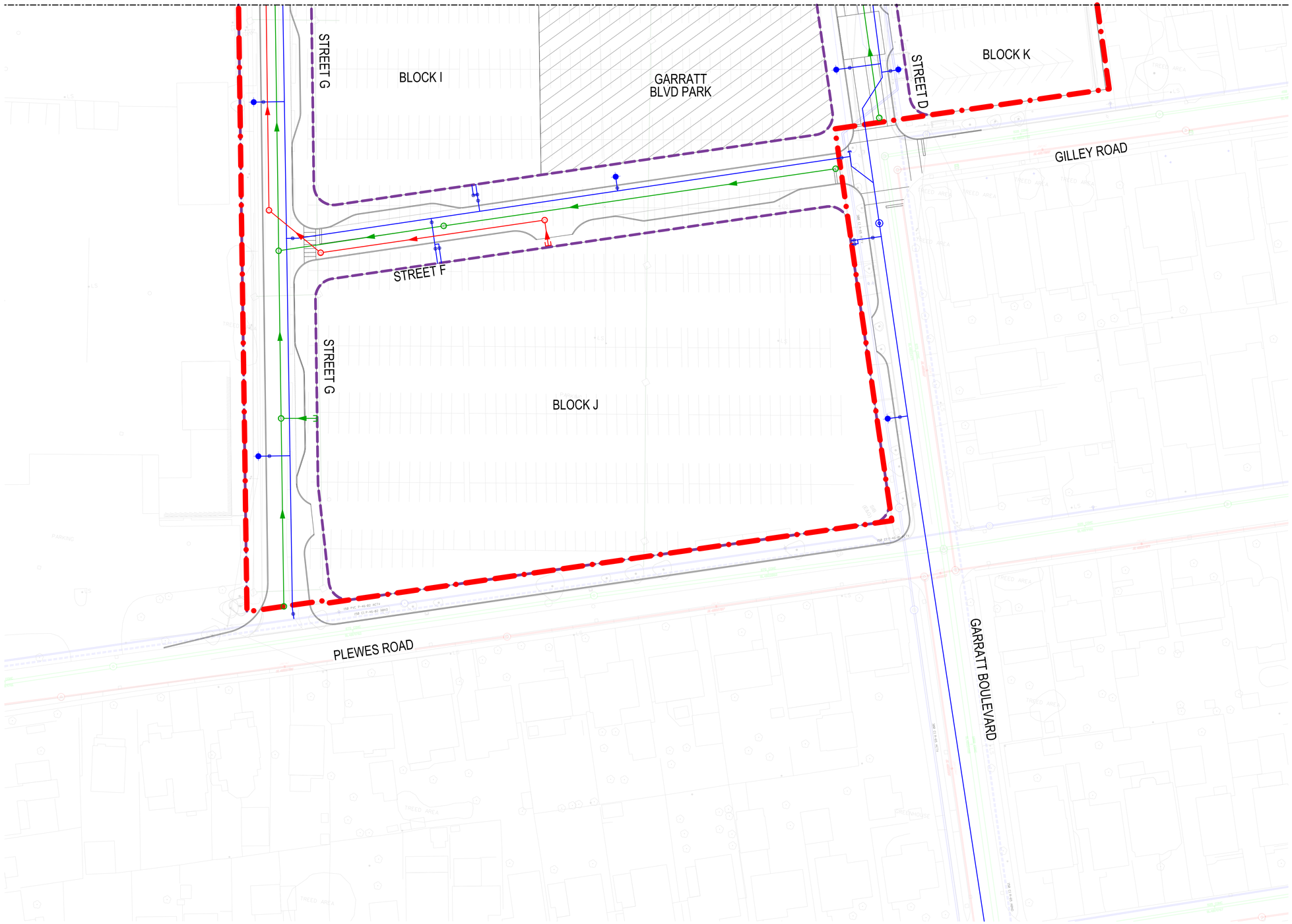


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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-203

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-204




## PUBLIC UTILITIES PLAN
SOUTH SIDE

1
C-205

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 3 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 2 | 14-03-22 | DRAFT SUBMISSION |
| 1 | 17-01-22 | DRAFT SUBMISSION |

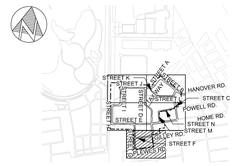

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Client
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Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

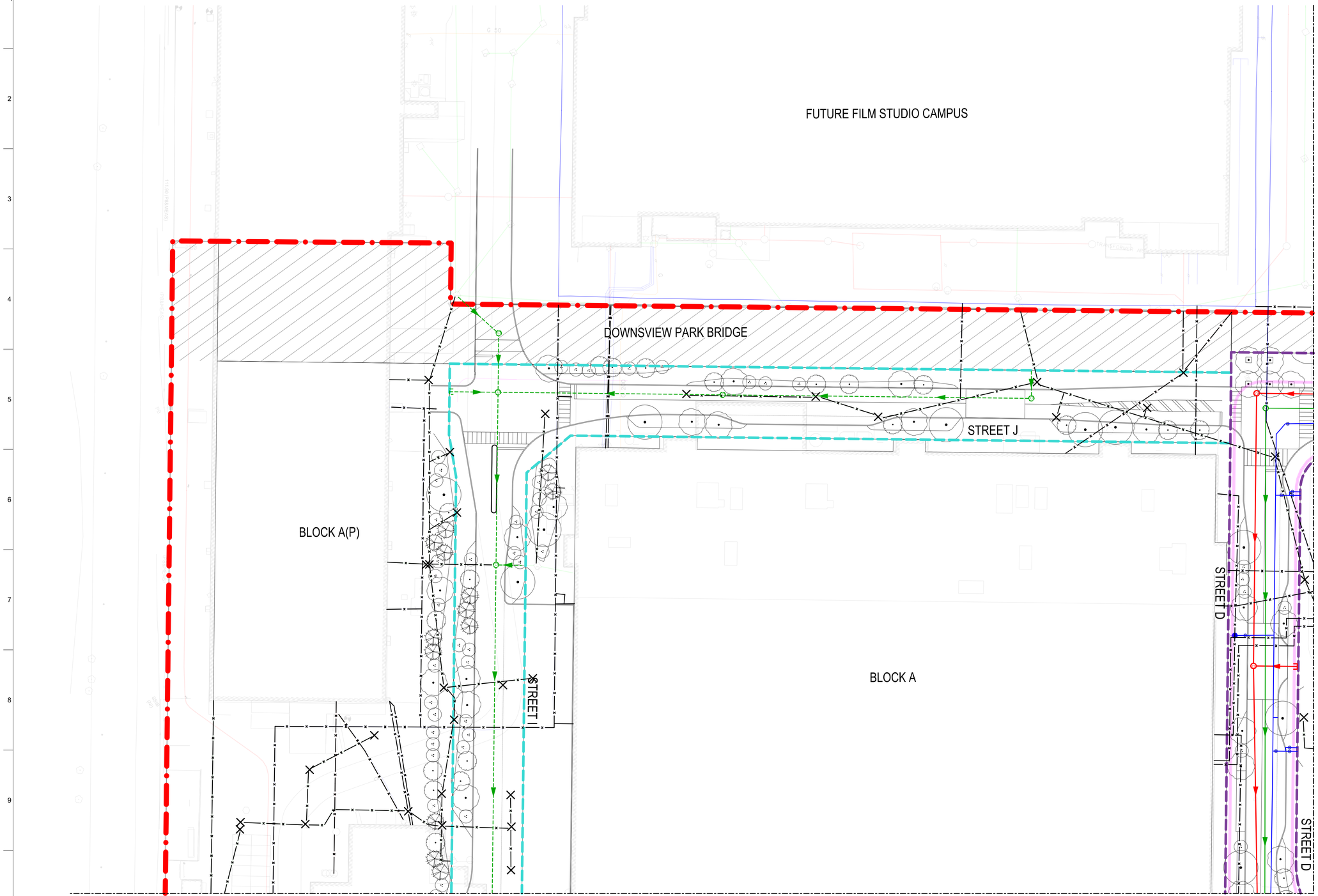
| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-205 | 4 |


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NOTES:

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- PARKS

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Key Plan




Drawing Title
COMPOSITE LANDSCAPE AND UTILITIES PLAN
SHEET 1 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-211 | 3 |

COMPOSITE LANDSCAPE AND UTILITIES PLAN
NORTHWEST SIDE
1
C-211

MATCHLINE
C-212
FOR CONTINUATION SEE DWG.

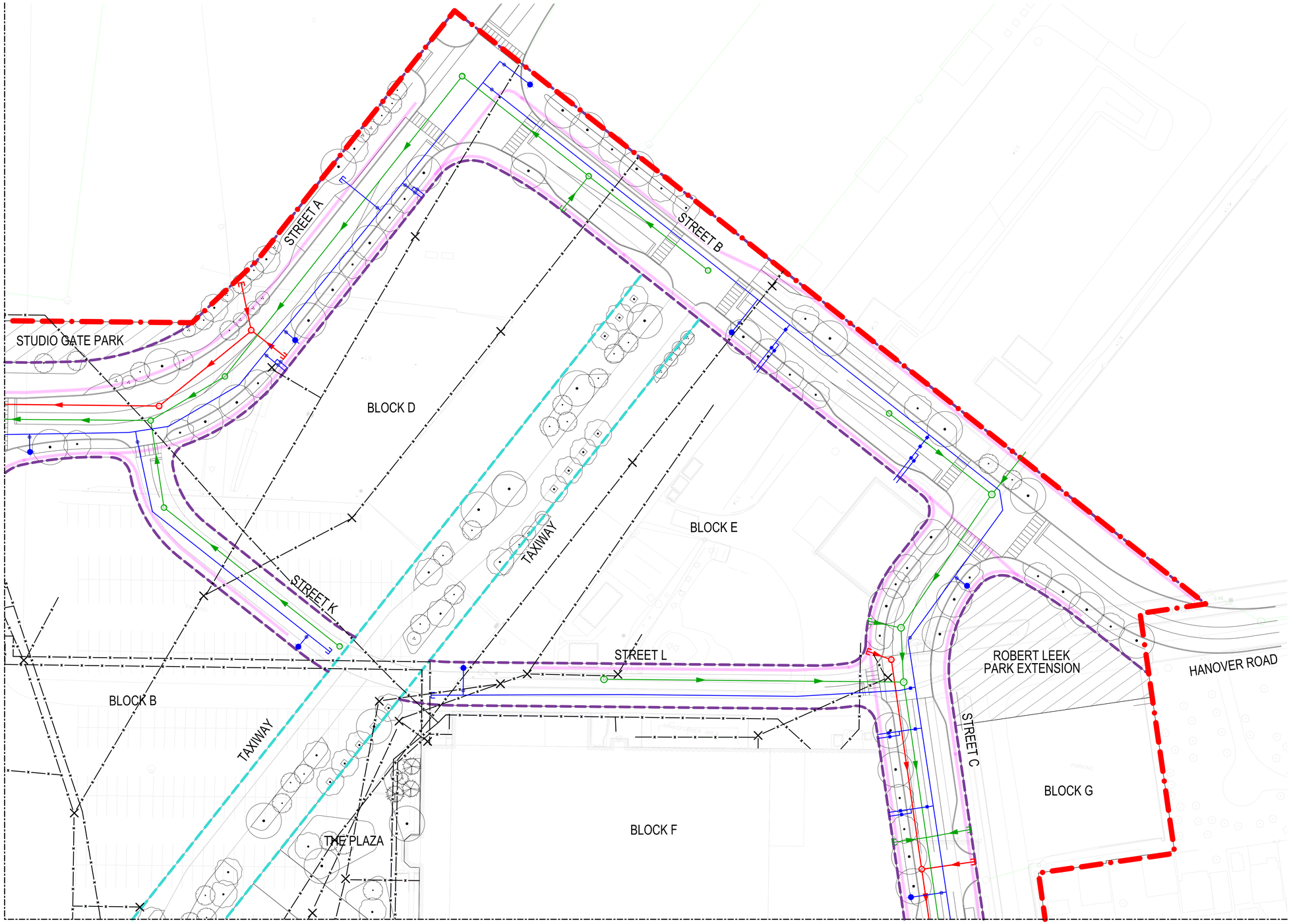
MATCHLINE
C-213
FOR CONTINUATION SEE DWG.




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22x34

FOR CONTINUATION SEE DWG.
MATCHLINE
C-211




NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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100517802
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|---|---|---|
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| 1 | 14-03-22 | DRAFT SUBMISSION |

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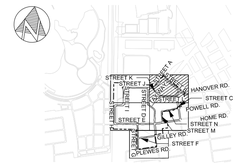
Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



Drawing Title

COMPOSITE LANDSCAPE AND UTILITIES PLAN
SHEET 2 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-212 | 3 |

COMPOSITE LANDSCAPE AND UTILITIES PLAN
NORTHEAST SIDE
1
C-212

MATCHLINE
C-214
FOR CONTINUATION SEE DWG.



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22x34

FOR CONTINUATION SEE DWG.
MATCHLINE
C-211

BLOCK A

CENTRAL SQUARE

STREET H

THE COURTYARD

WATER AND FIRE CONNECTION FOR BLOCK A

HANGAR COURT

STREET E

STREET G

RAIL POPS

BLOCK H1

BLOCK H2

BLOCK I

GARRATT BLVD PARK

MATCHLINE
C-214
FOR CONTINUATION SEE DWG.

MATCHLINE
C-215
FOR CONTINUATION SEE DWG.

## COMPOSITE LANDSCAPE AND UTILITIES PLAN
SOUTHWEST SIDE

1
C-213

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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PROVINCE OF ONTARIO

| Rev | Date | Description |
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| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 05-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

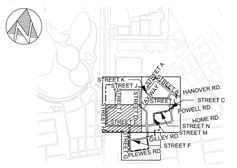

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Job Title
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FORMERLY TAXIWAY WEST
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123 GARRATT BOULEVARD

Key Plan




Drawing Title
COMPOSITE LANDSCAPE AND UTILITIES PLAN
SHEET 3 OF 5

| Scale | Drawn | Designed | Checked | Approved |
|---|---|---|---|---|
| SCALE: 1:500 (0 5 10 15 20m) | TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-213 | 3 |

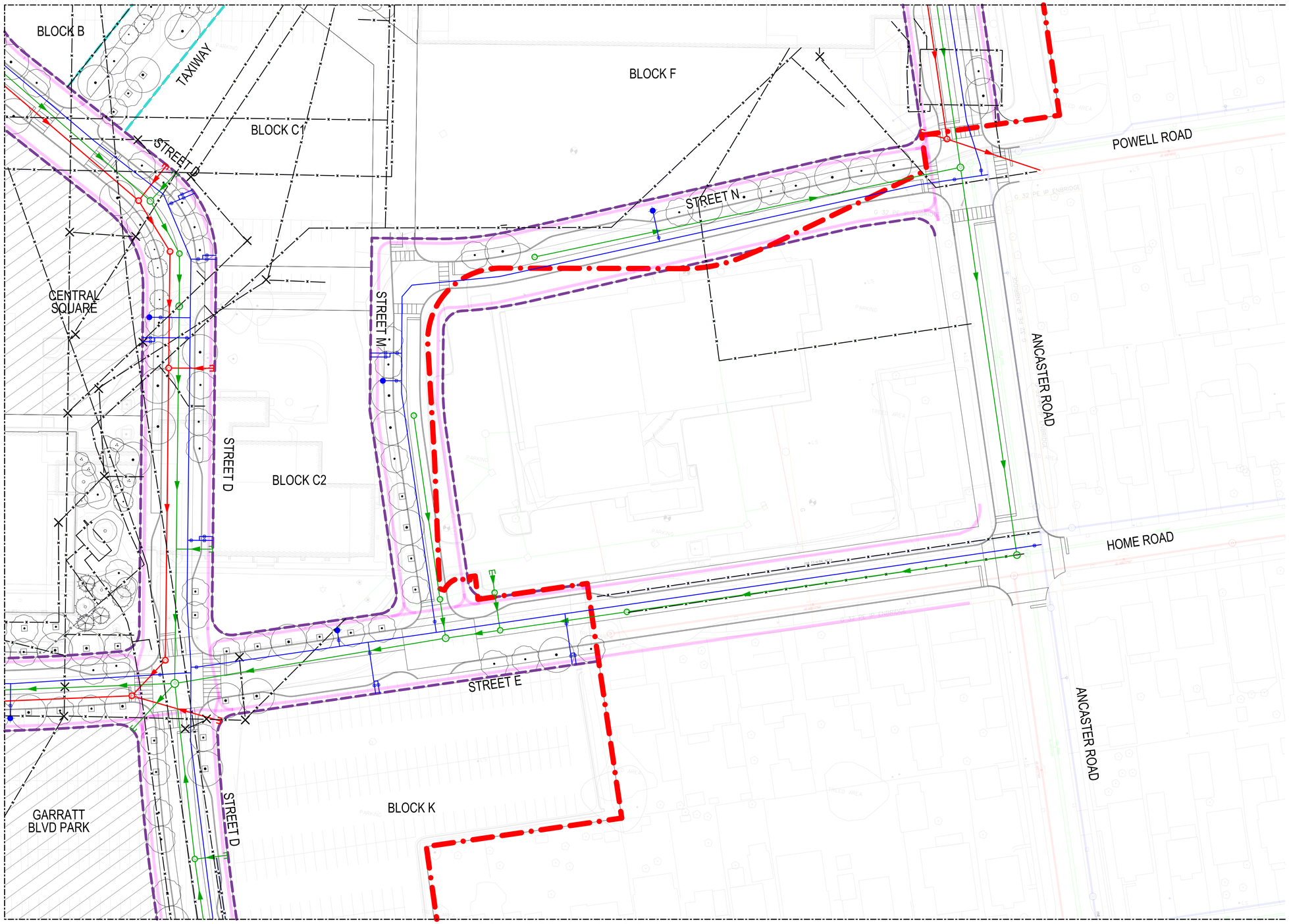



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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-213

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-212




**MATCHLINE**
C-215
FOR CONTINUATION SEE DWG.

# COMPOSITE LANDSCAPE AND UTILITIES PLAN
SOUTHEAST SIDE

1
C-214

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
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PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
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| 1 | 14-03-22 | DRAFT SUBMISSION |

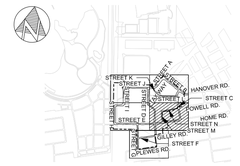

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Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
COMPOSITE LANDSCAPE AND UTILITIES PLAN
SHEET 4 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-214 | 3 |


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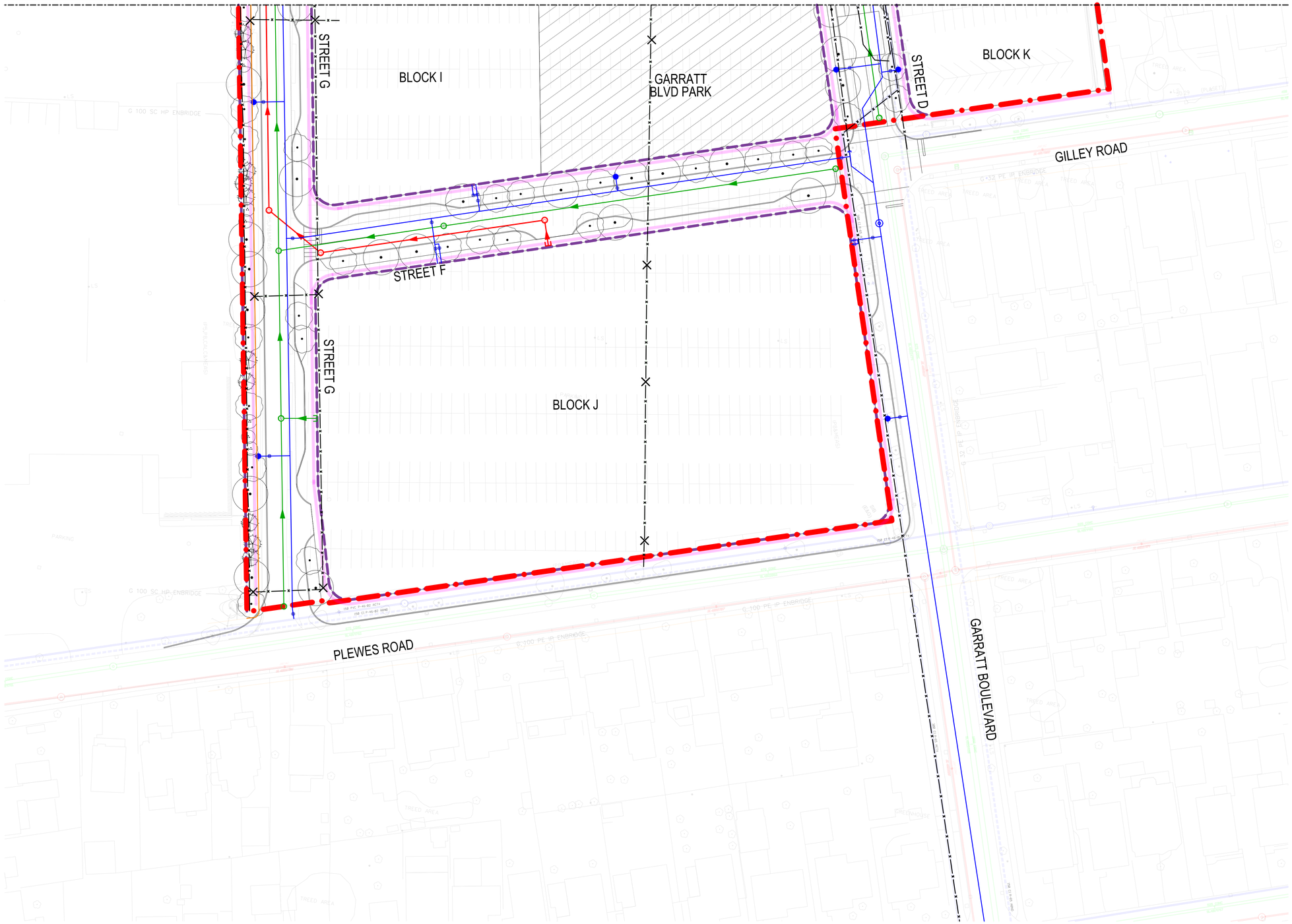


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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-213

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-214




# COMPOSITE LANDSCAPE AND UTILITIES PLAN

SOUTH SIDE

1
C-215

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 05-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

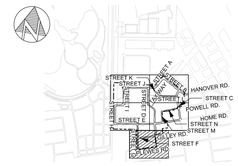

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Client
NORTHCREST DEVELOPMENTS

Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
COMPOSITE LANDSCAPE AND UTILITIES PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

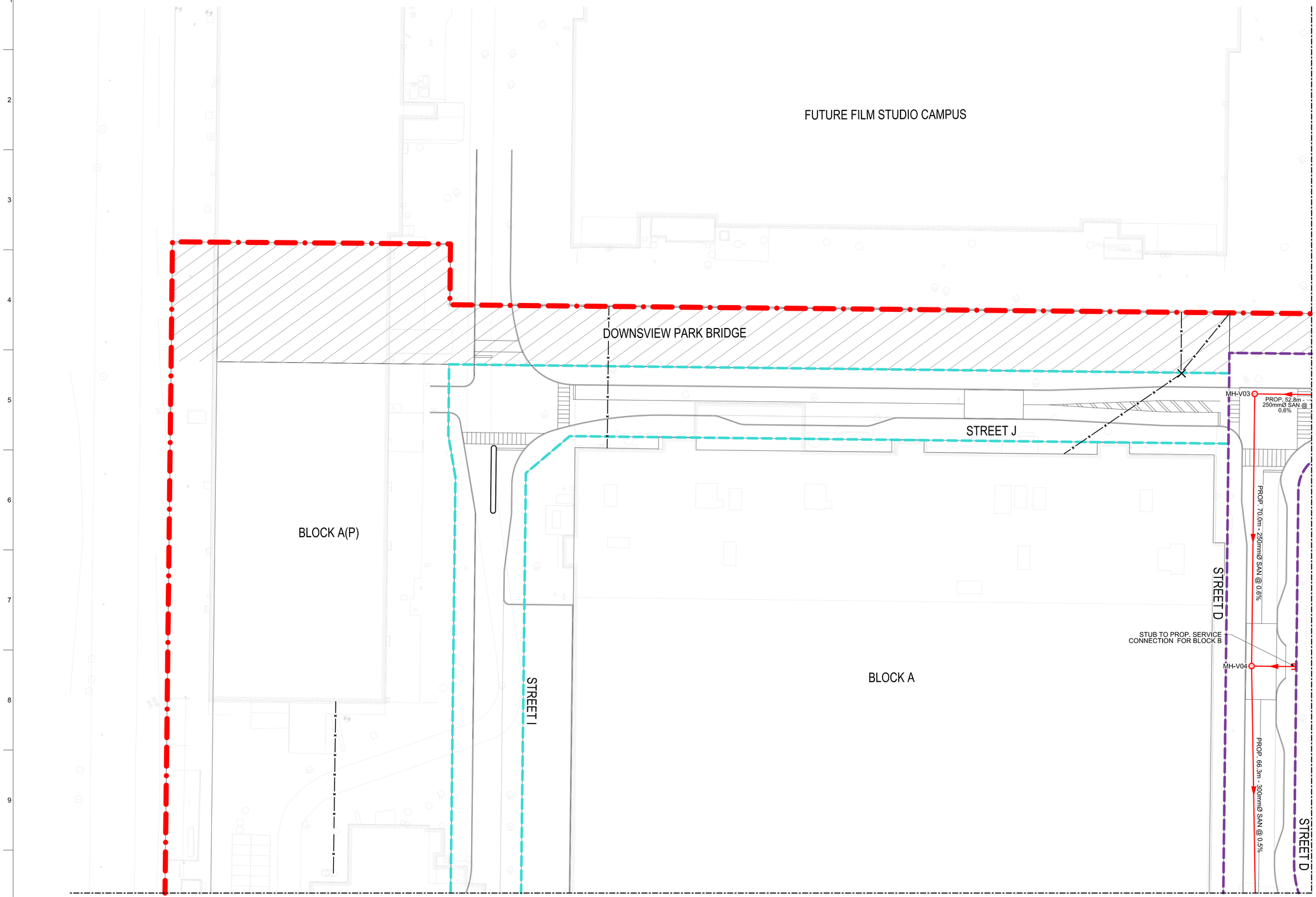
| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-215 | 3 |


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22x34




# SANITARY SERVICING PLAN

NORTHWEST SIDE

1
C-301

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
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| 1 | 14-03-22 | DRAFT SUBMISSION |

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Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

SANITARY SERVICING PLAN
SHEET 1 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-301 | 3 |

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22x34




# SANITARY SERVICING PLAN

NORTHEAST SIDE

1
C-302

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

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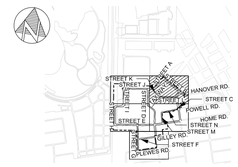
Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



Drawing Title

SANITARY SERVICING PLAN
SHEET 2 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-302 | 3 |

PLOT BY:angus.wan PLOT TIME:2023-07-05 5:37:54 PM FILE:J:\TOR\270000\272777-00\3 Design\3-04 BIM\3-04-30 Civil\06 Sheets\D001_Taxiway West\260341-ARP-CV-DRN-HD03-0302.dgn

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22x34

FOR CONTINUATION SEE DWG.
MATCHLINE
C-201

STUB TO PROP. SERVICE CONNECTION FOR BLOCK A (NORTH)
MH-V05

BLOCK A

CENTRAL SQUARE

STREET H

THE COURTYARD

HANGAR COURT

ALLOWANCE FOR PROPOSED PROVATE SERVICE TO BLOCK A(P) (IF REQUIRED)

STUB TO PROP. SERVICE CONNECTION FOR BLOCK A (SOUTH)

PROP. 19.7m - 375mmØ SAN @ 0.65%

MH-H04

PROP. 64.5m - 375mmØ SAN @ 0.5%

MH-H03

PROP. 107.7m - 375mmØ SAN @ 0.5%

MH-H02

PROP. 79.6m - 300mmØ SAN @ 0.9%

PROP. 51.9m - 300mmØ SAN @ 0.9%

MH-H01

STREET E

MH-H5

STUB TO PROP. SERVICE CONNECTION FOR BLOCK H1 and H2

SANITARY CROSSING UNDER RAIL TO CONNECT TO EX. MH52A AT STANLEY GREENE.

RAIL POPS

BLOCK H1

BLOCK H2

PROP. 40.2m - 250mmØ SAN @ 0.5%

STREET G

BLOCK I

GARRATT BLVD PARK

MH-A04

PROP. 64.8m - 250mmØ SAN @ 0.5%

STUB TO PROP. SERVICE CONNECTION FOR BLOCK I

MATCHLINE
C-304
FOR CONTINUATION SEE DWG.

MATCHLINE
C-305
FOR CONTINUATION SEE DWG.

## SANITARY SERVICING PLAN
SOUTHWEST SIDE

1
C-303

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

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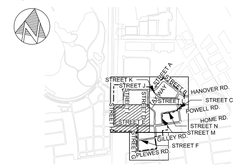

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Key Plan




Drawing Title
SANITARY SERVICING PLAN
SHEET 3 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-303 | 3 |

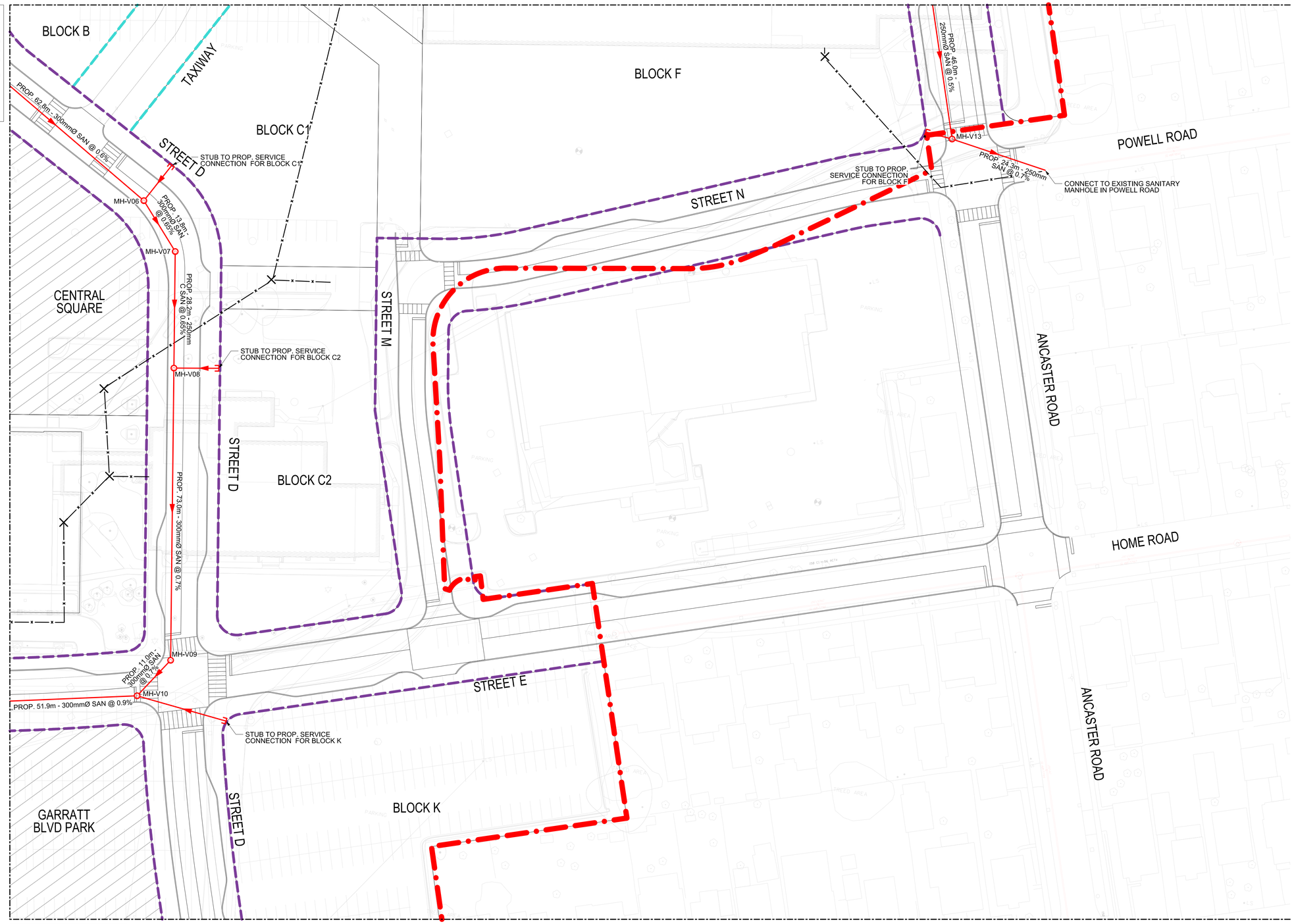

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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-303

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-302




**MATCHLINE**
C-305
FOR CONTINUATION SEE DWG.

## SANITARY SERVICING PLAN
SOUTHEAST SIDE

1
C-304

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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100517802
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| Rev | Date | Description |
|---|---|---|
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| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

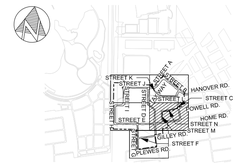

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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
SANITARY SERVICING PLAN
SHEET 4 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-304 | 3 |

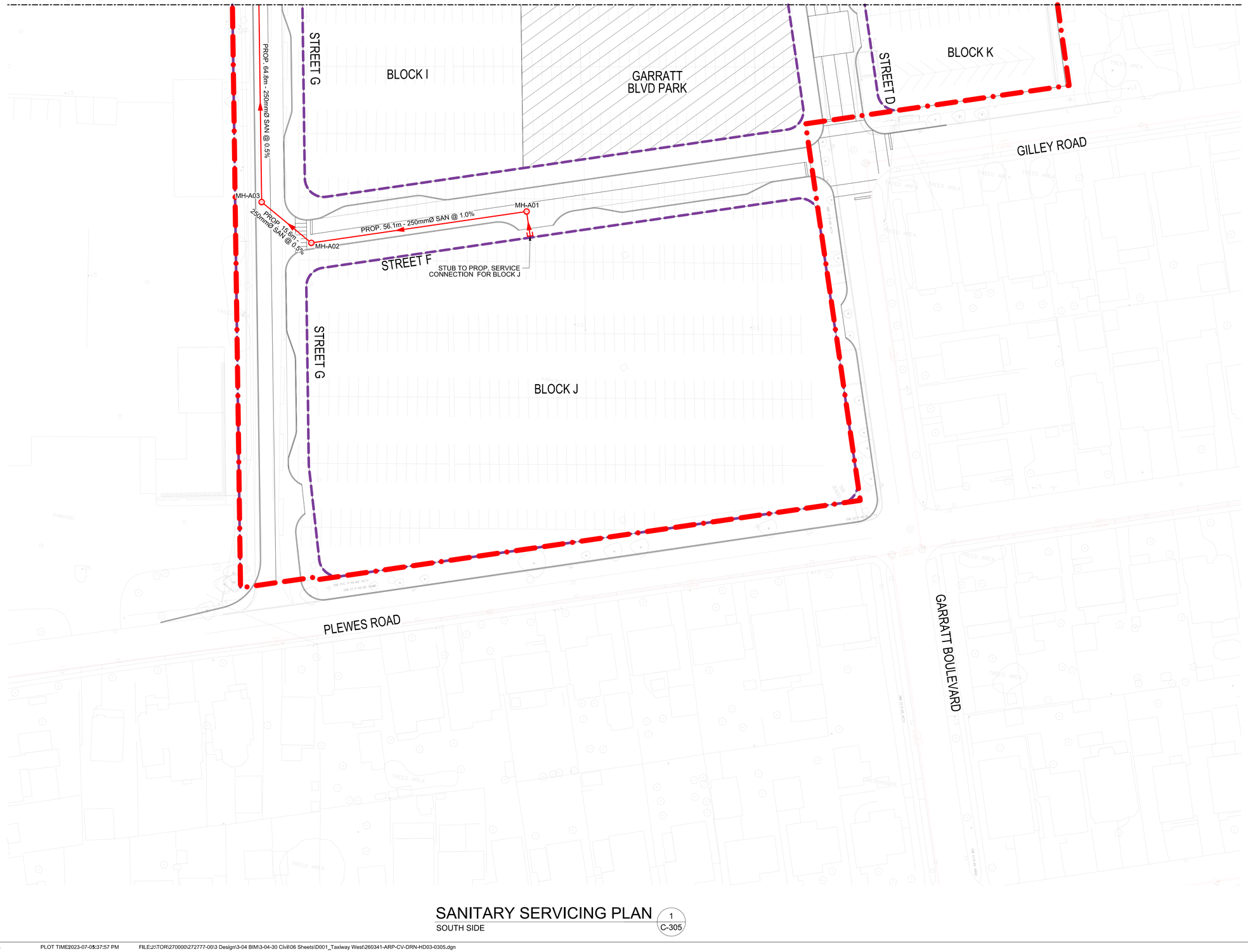



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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-303

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-304




NOTES:

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GENERAL LEGEND ITEMS:

- CITY ROW
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- PRIVATE ROW
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100517802
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| Rev | Date | Description |
|---|---|---|
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| 1 | 14-03-22 | DRAFT SUBMISSION |


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123 GARRATT BOULEVARD

Key Plan




Drawing Title
SANITARY SERVICING PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-305 | 3 |

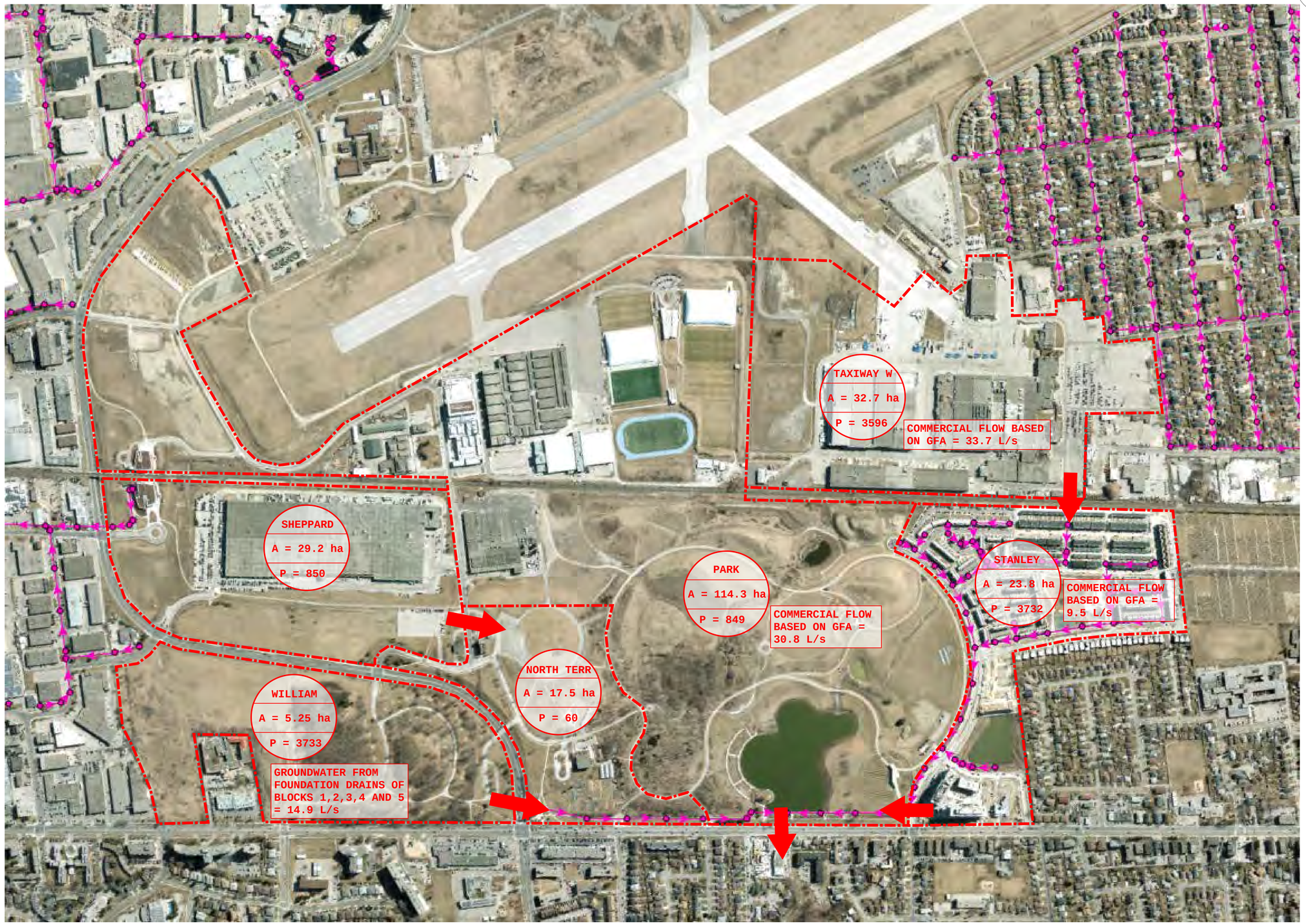
## SANITARY SERVICING PLAN
SOUTH SIDE

1
C-305




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22x34




## SANITARY CATCHMENT MAP
PROPOSED

1
C-311

LEGEND

- SANITARY DRAINAGE BOUNDARY
- XXXXX — IDENTIFICATION
- A = X.X ha — AREA IN HECTARES
- P = XXX — POPULATION
- FLOW DIRECTION

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Key Plan




Drawing Title
SANITARY CATCHMENT MAP
PROPOSED
SHEET 1 OF 1

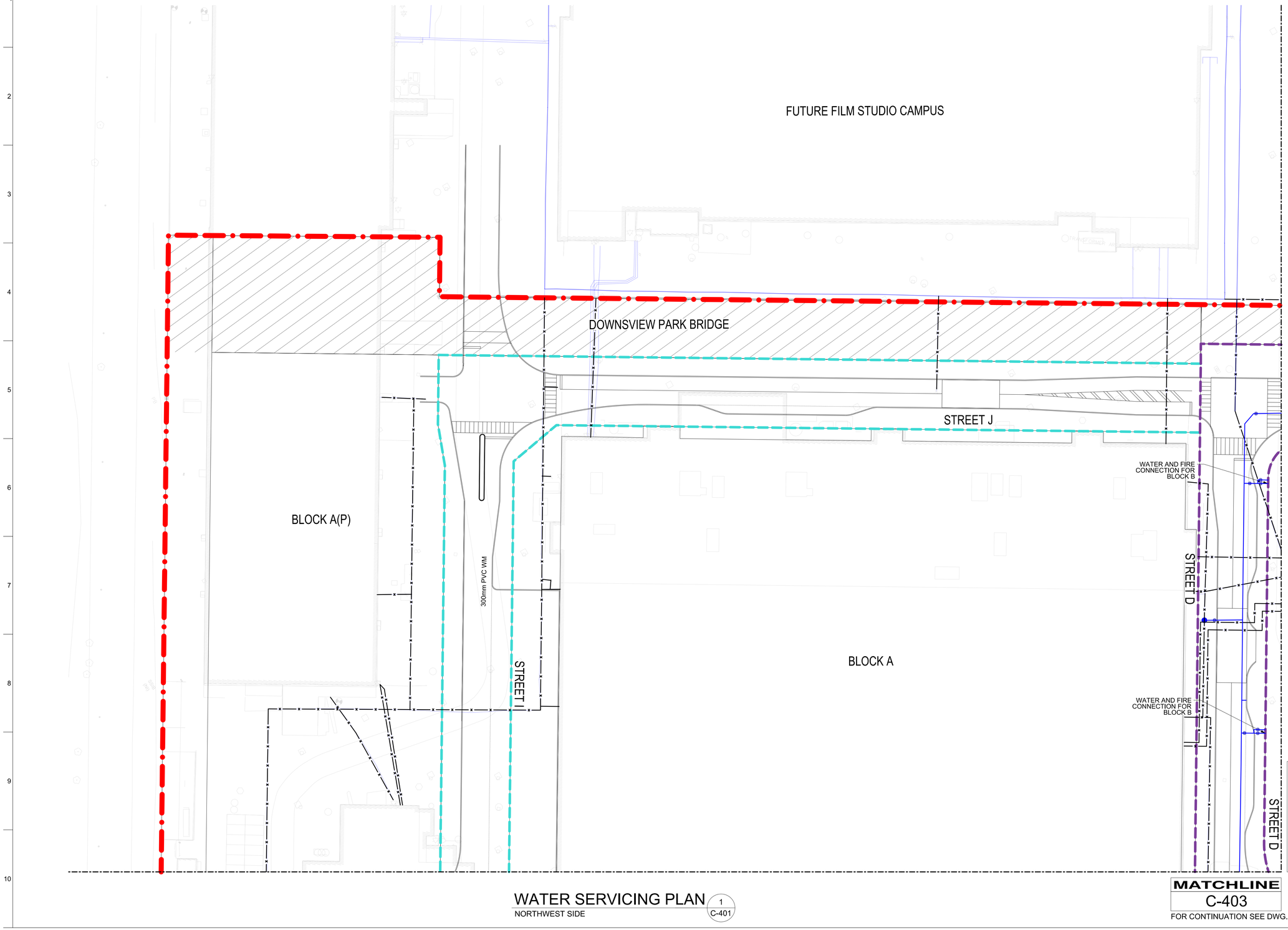
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| AW | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-311 | 3 |

22x34




# WATER SERVICING PLAN

NORTHWEST SIDE

1
C-401

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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PROVINCE OF ONTARIO

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NORTHCREST DEVELOPMENTS

Job Title

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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

WATER SERVICING PLAN
SHEET 1 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

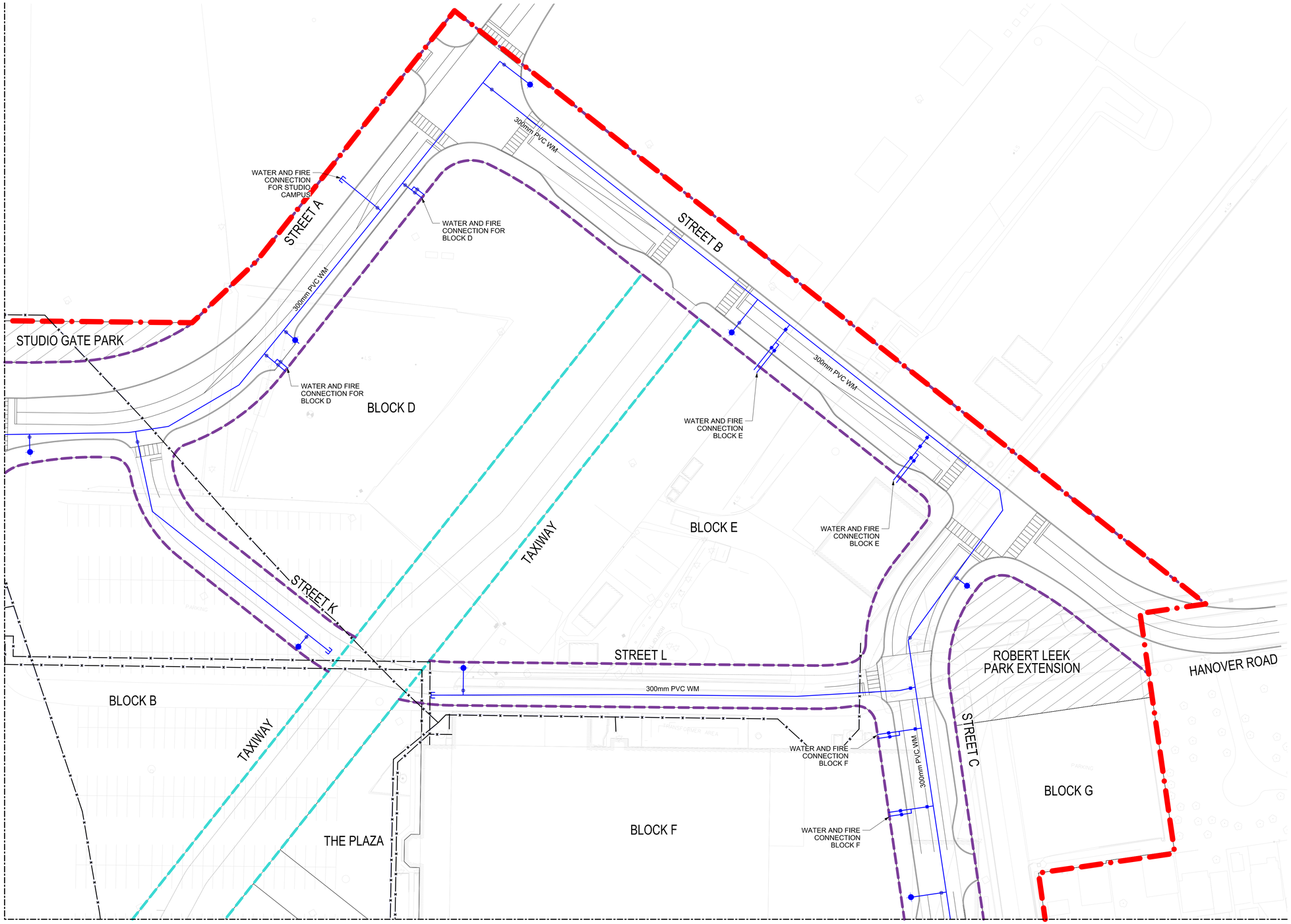
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|---|---|---|
| 260341-00 | C-401 | 3 |


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FOR CONTINUATION SEE DWG. **MATCHLINE C-401**




NOTES:

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GENERAL LEGEND ITEMS:

- CITY ROW
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- PRIVATE ROW
- PARKS

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|---|---|---|
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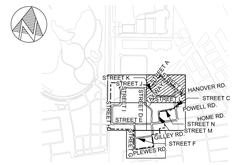

Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

WATER SERVICING PLAN
SHEET 2 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-402 | 3 |

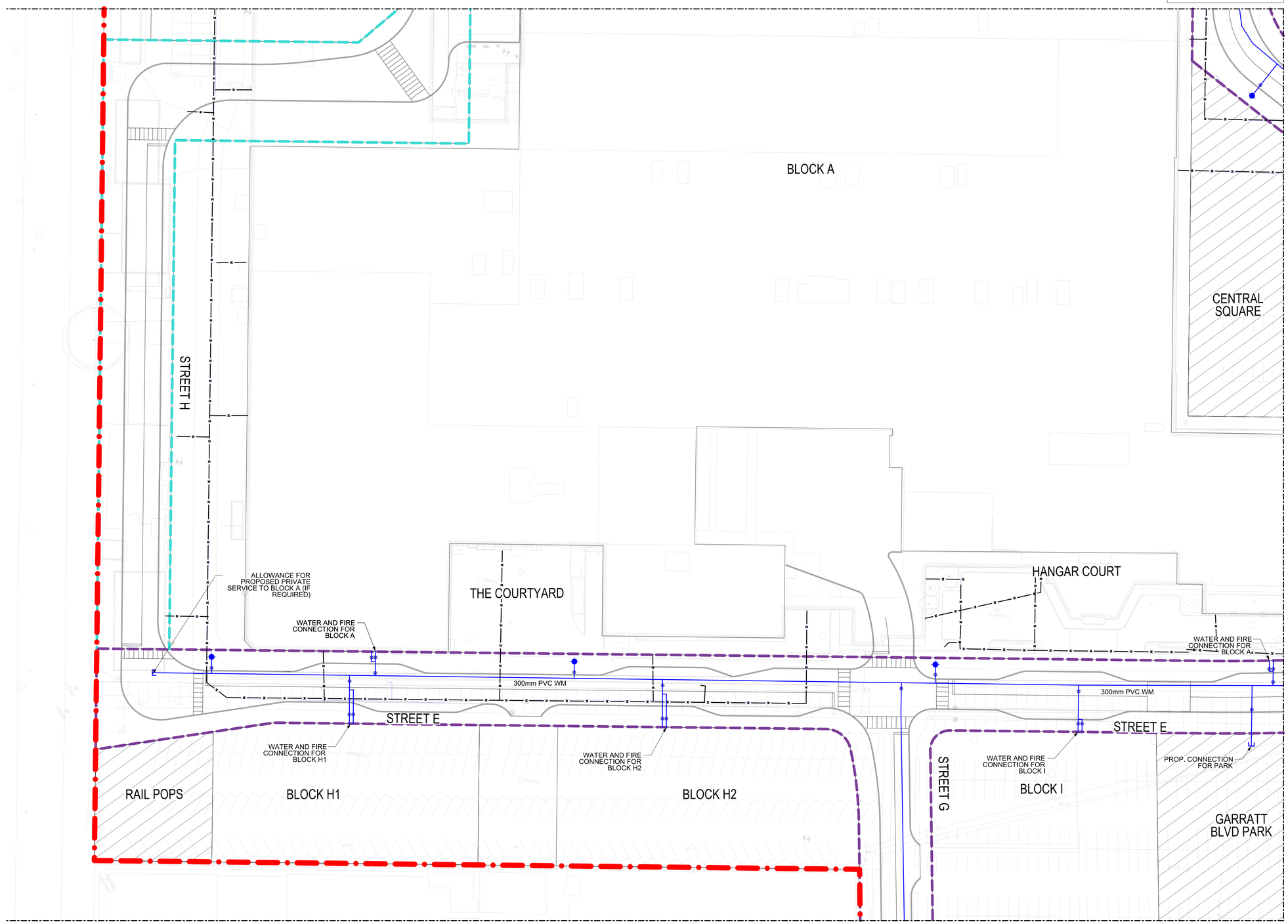
WATER SERVICING PLAN
NORTHEAST SIDE
1 / C-402

**MATCHLINE C-404**
FOR CONTINUATION SEE DWG.




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WATER SERVICING PLAN
SOUTHWEST SIDE
1
C-403

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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| Rev | Date | Description |
|---|---|---|
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| 1 | 14-03-22 | DRAFT SUBMISSION |

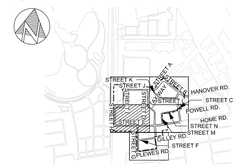

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Client
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Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
WATER SERVICING PLAN
SHEET 3 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-403 | 3 |


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FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-403

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-402

BLOCK B
TAXIWAY
BLOCK C1
STREET D
WATER AND FIRE CONNECTION FOR BLOCK C1
WATER AND FIRE CONNECTION FOR BLOCK C1
CENTRAL SQUARE
WATER AND FIRE CONNECTION FOR CENTRAL SQUARE
400mm PVC WM
400mm PVC WM
STREET D
BLOCK C2
WATER AND FIRE CONNECTION FOR BLOCK C2
BLOCK F
STREET N
300mm PVC WM
CONNECT TO EX. WATERMAIN ON POWELL ROAD
POWELL ROAD
STREET M
300mm PVC WM
WATER AND FIRE CONNECTION FOR BLOCK C2
ANCASTER ROAD
HOME ROAD
CONNECT TO EX. WATERMAIN ON HOME ROAD
300mm PVC WM
300mm PVC WM
STREET E
WATER AND FIRE CONNECTION FOR BLOCK K
WATER AND FIRE CONNECTION FOR BLOCK K
ANCASTER ROAD
GARRATT BLVD PARK
STREET D
BLOCK K

**MATCHLINE**
C-405
FOR CONTINUATION SEE DWG.

# WATER SERVICING PLAN
SOUTHEAST SIDE
1
C-404

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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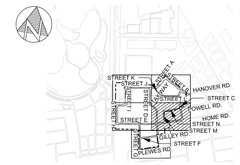
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FORMERLY TAXIWAY WEST
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123 GARRATT BOULEVARD

Key Plan




Drawing Title
WATER SERVICING PLAN
SHEET 4 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

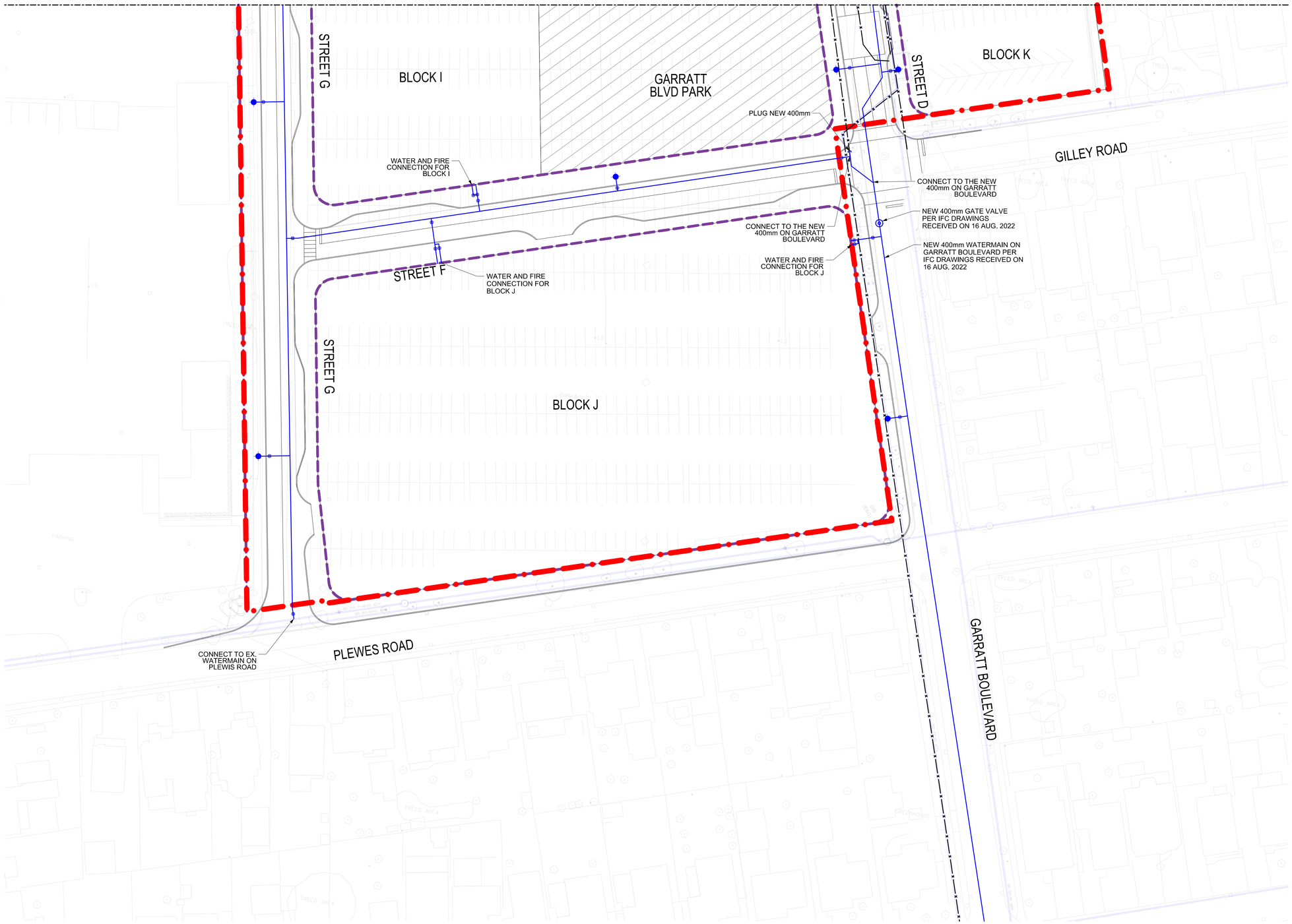
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|---|---|---|
| 260341-00 | C-404 | 3 |


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FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-403

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-404




# WATER SERVICING PLAN
SOUTH SIDE

1
C-405

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

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| Rev | Date | Description |
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Client
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Job Title
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SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



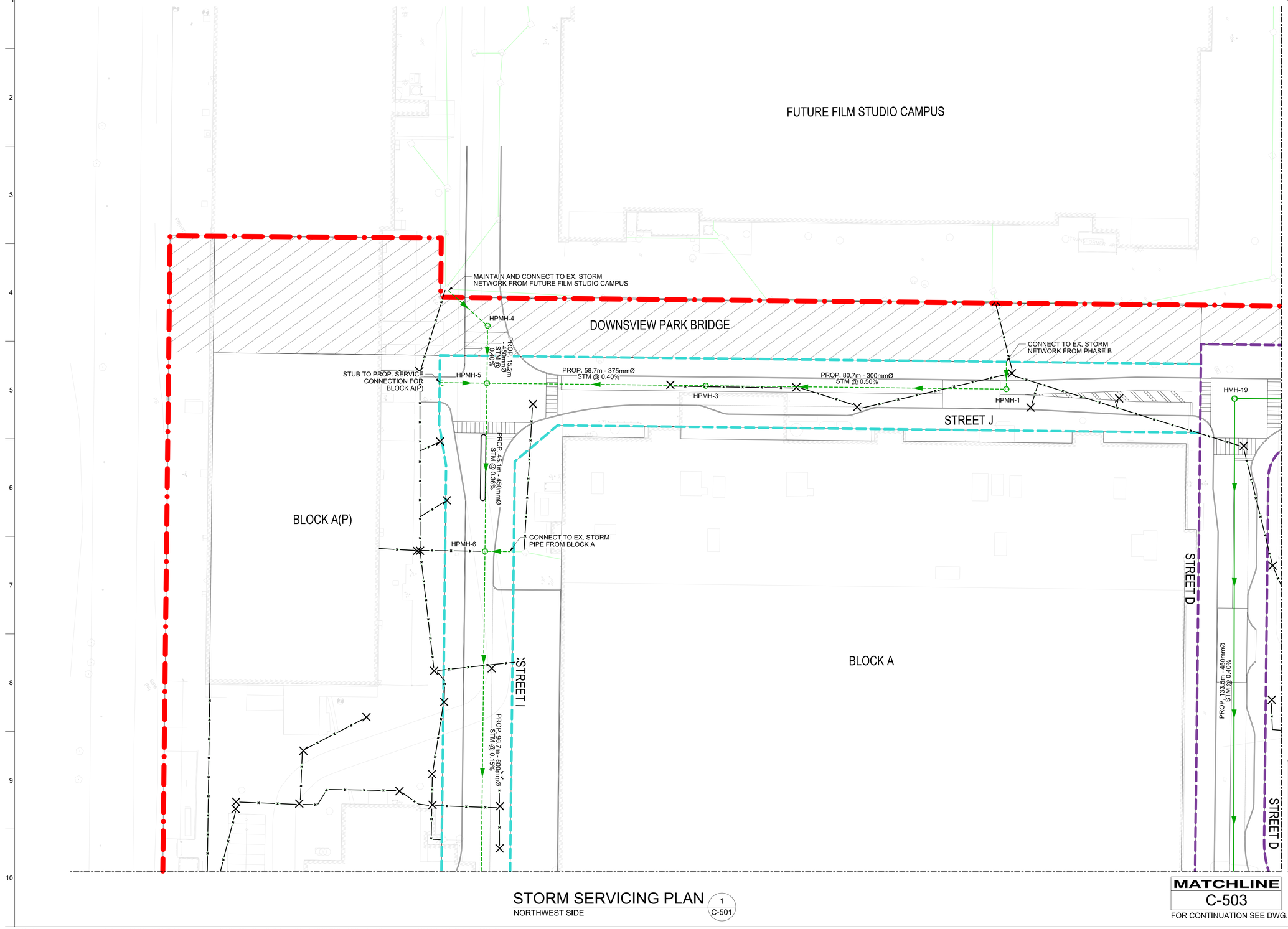

Drawing Title
WATER SERVICING PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-405 | 3 |




# STORM SERVICING PLAN

NORTHWEST SIDE

1
C-501

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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|---|---|---|
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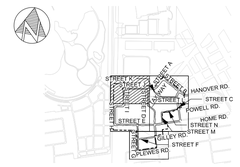
Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

STORM SERVICING PLAN
SHEET 1 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| AW | AM | AS | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

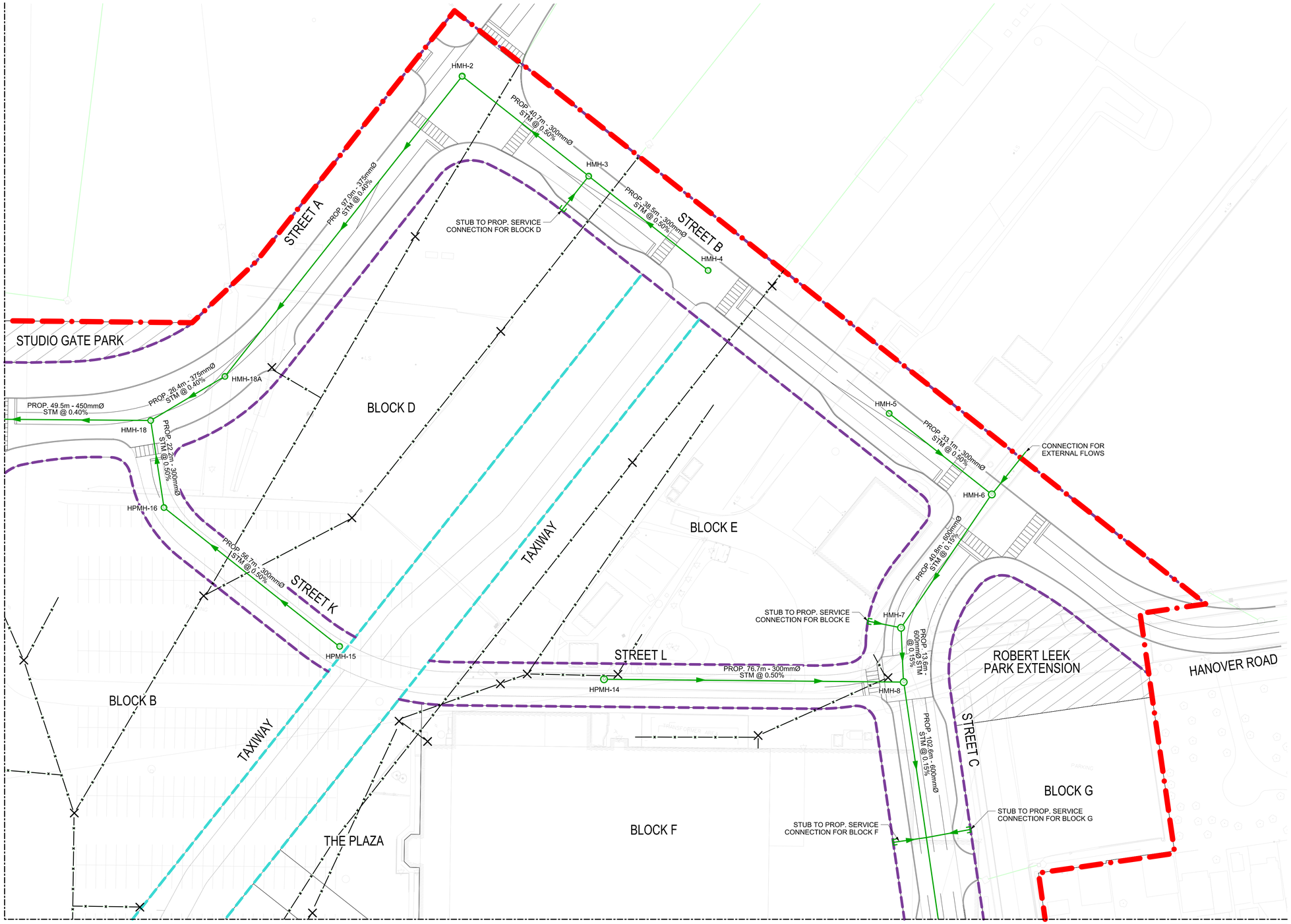
| Job No | Drawing No | Rev |
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22x34

FOR CONTINUATION SEE DWG. **MATCHLINE** C-501




# STORM SERVICING PLAN

NORTHEAST SIDE

1 / C-502

**MATCHLINE** C-504

FOR CONTINUATION SEE DWG.

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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100517802
PROVINCE OF ONTARIO

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|---|---|---|
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Client

NORTHCREST DEVELOPMENTS

Job Title

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SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

STORM SERVICING PLAN
SHEET 2 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| AW | AM | AS | HJ |

Drawing Status

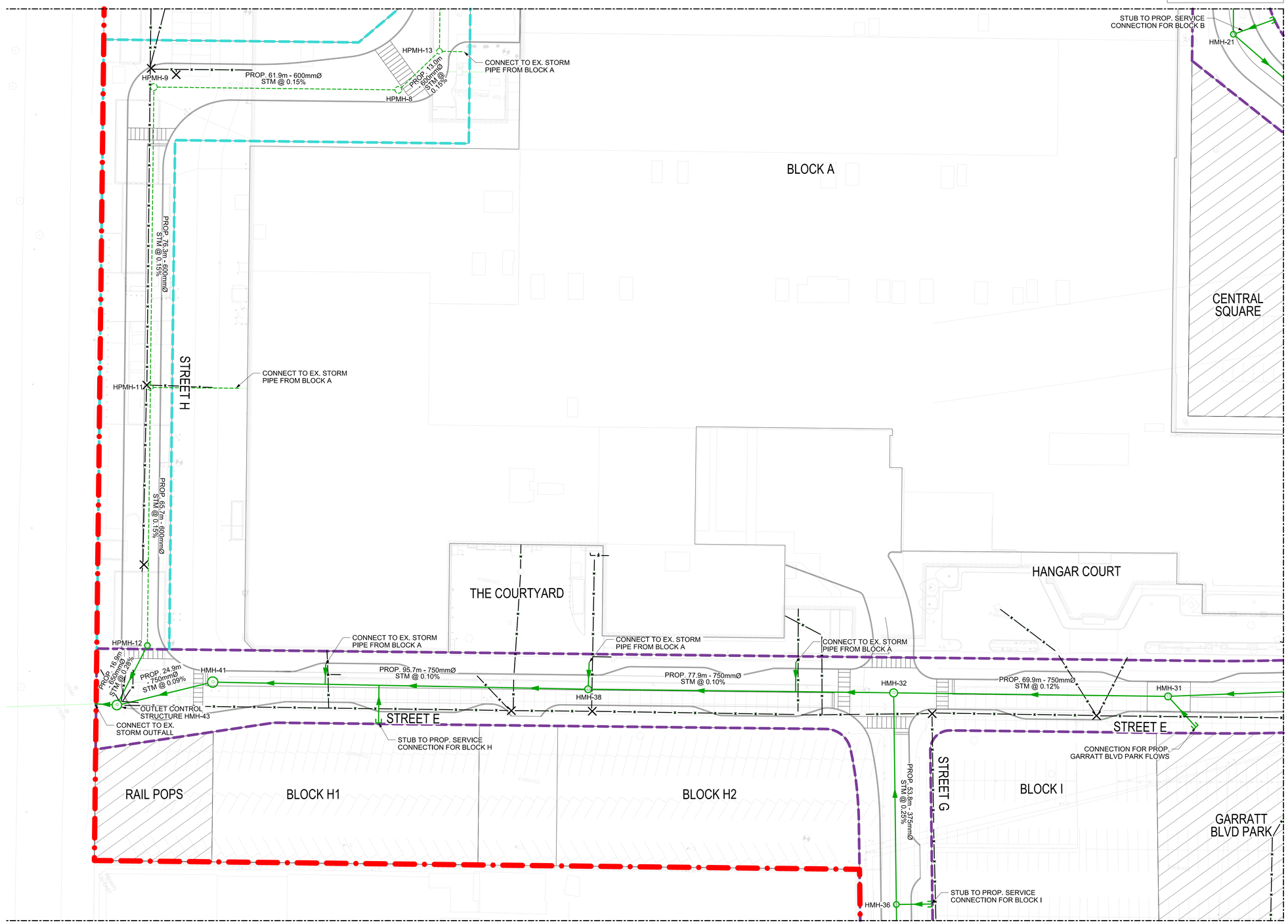
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-502 | 3 |




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# STORM SERVICING PLAN

SOUTHWEST SIDE

1
C-503

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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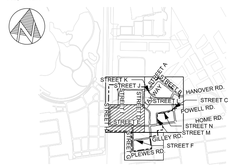

Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

STORM SERVICING PLAN
SHEET 3 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

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| AW | AM | AS | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
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22x34

FOR CONTINUATION SEE DWG. **MATCHLINE C-503**

FOR CONTINUATION SEE DWG. **MATCHLINE C-502**

BLOCK B

TAXIWAY

BLOCK C1

BLOCK F

POWELL ROAD

PROP. 66.0m - 525mmØ STM @ 0.40%

STREET D

STUB TO PROP. SERVICE CONNECTION FOR BLOCK C1

HMH-23

PROP. 15.1m - 750mmØ STM @ 0.40%

HMH-23-A

PROP. 13.2m - 750mmØ STM @ 0.40%

HMH-24

CENTRAL SQUARE

STREET M

STREET N

HMH-10

PROP. 110.9m - 300mmØ STM @ 0.50%

HPMH-17

PROP. 102.6m - 600mmØ STM @ 0.15%

PROP. 99.9m - 600mmØ STM @ 0.15%

ANCASTER ROAD

HPMH-18

PROP. 95.9m - 750mmØ STM @ 0.40%

STREET D

BLOCK C2

PROP. 47.7m - 300mmØ STM @ 0.50%

STUB TO PROP. SERVICE CONNECTION FOR BLOCK C2

CONNECT TO EX. STORM PIPE FROM FLIGHT SAFETY CENTRE

HPMH-19

PROP. 9.7m - 300mmØ STM @ 0.50%

PROP. 13.8m - 600mmØ STM @ 0.36%

HMH-16

HMH-15

PROP. 32.4m - 600mmØ STM @ 0.15%

HMH-14

PROP. 100.2m - 600mmØ STM @ 0.15%

HMH-12

HOME ROAD

PROP. 69.8m - 675mmØ STM @ 0.12%

PROP. 72.7m - 750mmØ STM @ 0.12%

HMH-29

STREET E

PROP. OVERFLOW CONNECTION TO GARRATT BLVD PARK

PROP. 44.8m - 300mmØ STM @ 0.50%

GARRATT BLVD PARK

STREET D

BLOCK K

HMH-28

STUB TO PROP. SERVICE CONNECTION FOR BLOCK K

ANCASTER ROAD

**MATCHLINE C-505**

FOR CONTINUATION SEE DWG.

## STORM SERVICING PLAN

SOUTHEAST SIDE

1 / C-504

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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Toronto ON M4W 3M5 Canada
t: +1 (416) 515 0915
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SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




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STORM SERVICING PLAN
SHEET 4 OF 5

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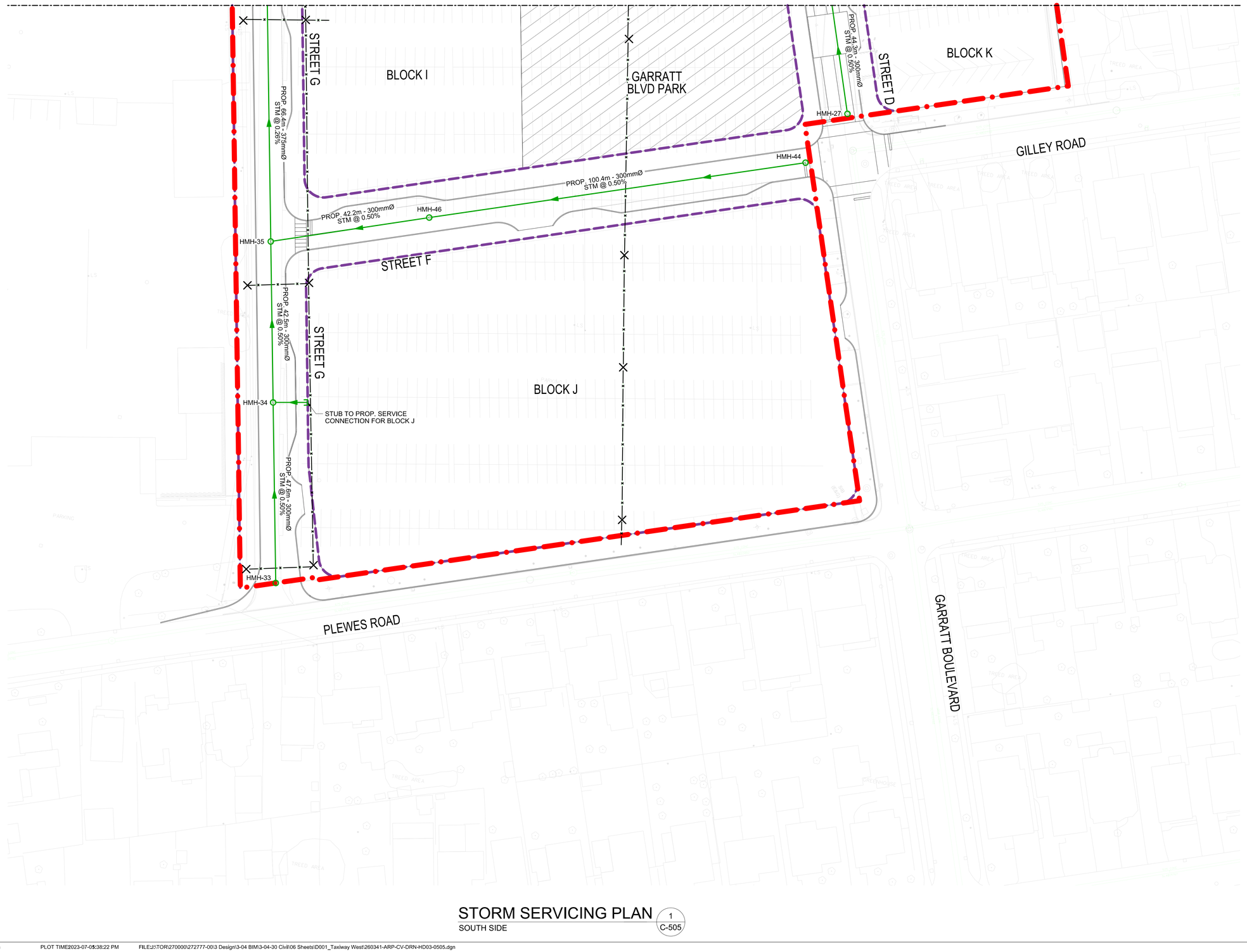
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FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-503

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-504




# STORM SERVICING PLAN
SOUTH SIDE

1
C-505

NOTES:

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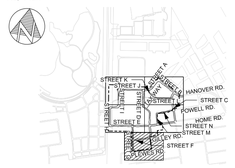

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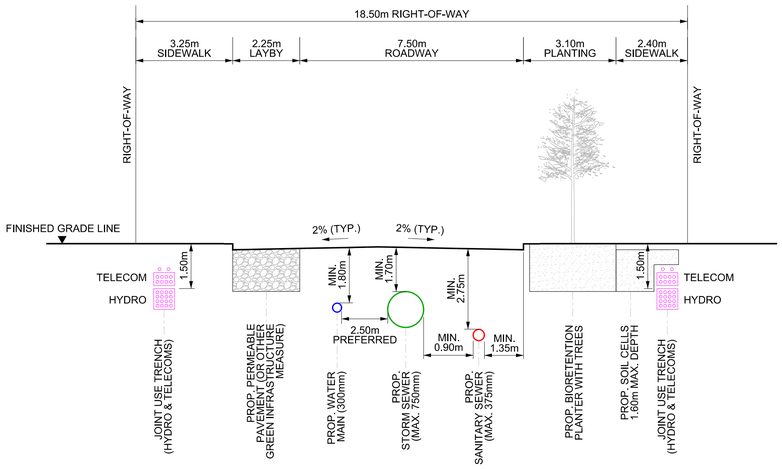

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SHEET 5 OF 5

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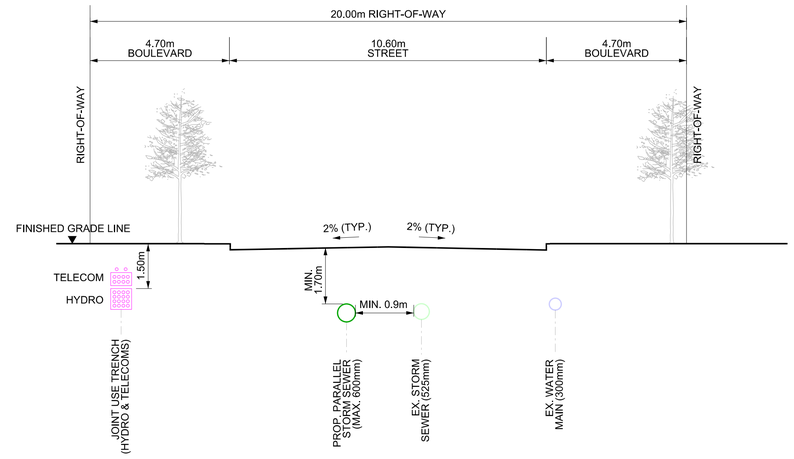
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## TYPICAL SECTION 1

STREET E

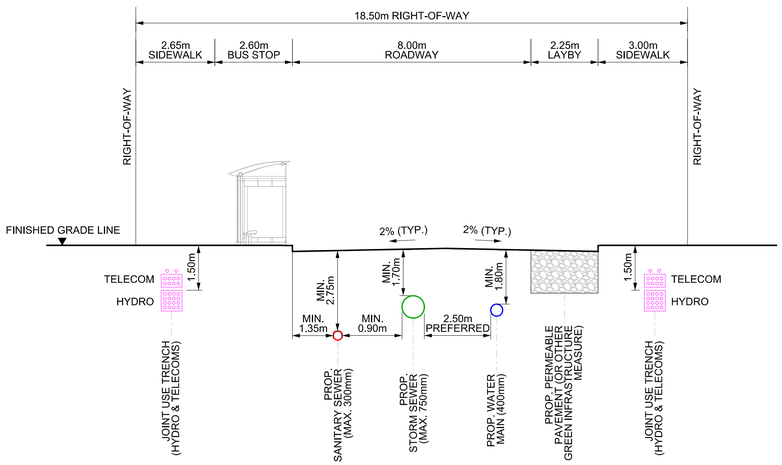
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ANCASTER ROAD

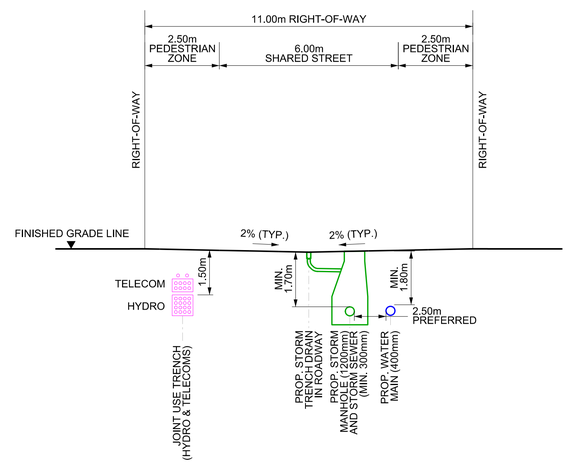
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## TYPICAL SECTION 3

STREET D

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## TYPICAL SECTION 4

STREET K

4

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123 GARRATT BOULEVARD

Key Plan




Drawing Title

TYPICAL UTILITY ARRANGEMENTS
SHEET 1 OF 1

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# 4. Civil Functional Servicing Report

ARUP

**Northcrest Developments**

# The Hangar District (Formerly Taxiway West South Sub-District)

## Functional Servicing Report for the Proposed Redevelopment of 123 Garratt Boulevard

Resubmission #1 | July 2023




This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

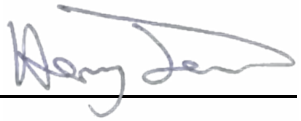
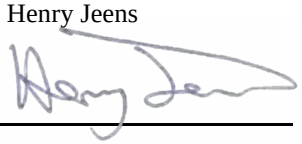
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| **Job number** | 260341-00 |
| **Document ref** | |
| **File reference** | |

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|---|---|---|---|---|---|
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| | | | **Prepared by** | **Checked by** | **Approved by** |
| | | **Name** | Various | Alexandra Suchon | Henry Jeens |
| | | **Signature** | |  |  |
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| | | **Description** | Second draft submission based on Design Freeze #2. | | |
| | | | **Prepared by** | **Checked by** | **Approved by** |
| | | **Name** | Various | Alexandra Suchon | Henry Jeens |
| | | **Signature** | |  |  |
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| | | | **Prepared by** | **Checked by** | **Approved by** |
| | | **Name** | Various | Alexandra Suchon | Henry Jeens |
| | | **Signature** | |  | |

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| **Document title** | Functional Servicing Report |
| **Job number** | 260341-00 |
| **Document ref** | |
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| | | | **Prepared by** | **Checked by** | **Approved by** |
| | | **Name** | Various | Alexandra Suchon | Henry Jeens |
| | | **Signature** | |  |   |
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| | | **Description** | | | |
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# Executive Summary

Arup has been retained by Northcrest Developments ("Northcrest") to prepare this Functional Servicing Report in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application for the resubmission for the Hangar District (previously known as the Taxiway West South Sub-District) at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto.

The Functional Servicing Report discusses the sanitary, water, stormwater, and drainage requirements for the redevelopment of the 22.4-hectare Downsview Airfield Lands in Toronto, Ontario. This development is the first of ten districts within the wider Downsview Framework Plan and focuses on the Hangar District ("Subject Area").

### Sanitary Servicing

The overall sanitary strategy maintains the existing sanitary flow patterns to the existing outfalls to the east at Powell Road and to the west at the railway crossing to the adjacent Stanley Greene neighborhood. Using the methodology outlined in the City of Toronto Design Criteria for Sewers and Watermains, the proposed sanitary sewers are designed to accommodate 105.4 L/s (west catchment) and 39.4 L/s (east catchment). The downstream systems will receive approximately 75.9 L/s (west outfall) and 22.0 L/s (east outfall) of sanitary discharge. Preliminary downstream capacity analysis for both outfalls indicates that there is sufficient capacity in the existing sanitary network to accommodate the flows from the development within the Subject Area.

The Master Environmental Secondary Plan (MESP) and Secondary Plan update are the forum through which detailed InfoWorks modelling of the surrounding municipal systems are being updated. Some sanitary flow monitoring was undertaken in late 2021 and was supplemented by further data collection in May to September 2022. The conclusions of this report are consistent with the MESP work to date and the preferred alternative that has been presented.

All existing sanitary infrastructure within the Subject Area is to be removed or abandoned as it conflicts with the proposed road and buildings plans and is aging and undersized per City standards. New municipal sewers ranging from 250 mm to 375 mm in size will be constructed within the proposed public Rights-of-Way. Development blocks will be responsible for design and construction of any sanitary infrastructure internal to the block boundary subject to approval via the Site Plan Application (SPA) process. In addition, the existing sewer under the railway at the west outfall will require an upgrade to 375 mm. The proposed sanitary infrastructure is consistent with the preferred sanitary alternative selected in the MESP.

### Water Servicing

Using a residential consumption value of 190 L/capita/day (L/person/d) for high rise buildings and 310 litres/capita/day for town houses, peaking factors set out by the City of Toronto including 180,000 L/ floor-ha/day for commercial and retail areas, the residential domestic demand value was calculated to be 12.3 L/s during Average Day Demand and 19.9 L/s as commercial/retail peak demand, 50.6 L/s during Peak Hour Demand, and 35.9 L/s during Maximum Day Demand for the Subject Area. A FUS fire demand for Block D has been estimated to be 111 L/s by assuming the required building information to identify potential fire demand for the Hangar District.

The proposed network was modelled in PCSWMM with the EPANET2 add on. It was set up using hydrant test data from October 2022 for the hydrants on Garratt Boulevard. Modelled scenarios generally resulted in acceptable pressures during Peak Hour Demand, and Minimum Hour Demand. The performance of the network was observed to comply with the City standard network performance guidelines under the max day demand + fire demand. The system performance has also been tested under a higher fire demand of 230 L/s for Phase A and the pressure at all

junctions have been noted to be above the minimum required 20psi pressure value. Thus, it can be said that the threshold for Fire Flow demand is 13,800L/min (230 L/s), at which the pressure slightly above 20 psi was observed.

Based on preliminary model results, a network of 400mm PVC watermain on Street D and 300mm PVC municipal watermains on select public streets will be constructed within the proposed Rights-of-Way. All existing watermain infrastructure within the Subject Area is to be removed or abandoned.

## Stormwater Management

A Stormwater Management Report has been prepared under a separate cover for this Application which should be read in conjunction with the following section.

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# 1. Introduction

Arup has been retained by Northcrest Developments ("Northcrest") to prepare this Functional Servicing Report in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application resubmission for the Hangar District (previously known as the Taxiway West South Sub-District) at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto.

The Subject Area is comprised of 22.4 hectares (55.5 acres) of land consisting of the existing Bombardier hangars, offices and ancillary structures, surface parking lots, and a portion of the Downsview Airport taxiway. The Subject Area is located south of a proposed Film Studio Campus. Figure 1 illustrates the Subject Area in context with the Downsview Framework Plan.

In May 2022, Northcrest filed a combined ZBA and DPS application ("the initial submission"). Since the initial submission, a number of refinements have been made in an effort to align with comments from various City departments and commenting agencies; discussions with staff through various meetings and an in-person workshop; feedback received through community engagement; as well as with policy directions emerging out of the City's draft Update Downsview Secondary Plan and Master Environmental Servicing Plan (MESP). Please refer to the Cover Letter submitted with this application resubmission for the description of key changes to the proposed District design. It is also noted that as a result of some of these refinements, the naming of the blocks throughout the Subject Area has changed.

The refined proposal maintains the vision for the Hangar District introduced in the initial application to create a vibrant, thriving employment hub that is home to technology and creative industries, bringing new jobs and opportunities while creating a unique place to live, work, shop, and enjoy life. The Hangar District design continues to reflect the objective to create a highly walkable, accessible, and inclusive place, featuring a variety of parks and open spaces.




**Figure 1: Subject Area in Context with Downsview Framework Plan**

## 1.1 Project Description

The Subject Area is located in Downsview, City of Toronto (formerly within the district of North York). It is 22.4 hectares (55.5 acres) in size and is located south of the proposed Film Studio Campus, west of the re-imagined Runway, east of the Barrie GO rail line (also known as the GO transit Newmarket Subdivision line), and north of the Ancaster neighborhood. It is in the southwestern portion of the Downsview Framework Plan Area.

Northcrest is seeking to create a vibrant and livable community comprised of three distinct but complementary character areas (refer to Figure 2). The Hangars will be characterized by repurposing the existing buildings, which will create an innovative employment hub for a range of light industrial and office uses. The Village is envisioned as a vibrant, walkable, connected, and comfortable urban environment with places to live, work, and visit year-round. Ancaster West is a predominantly residential neighborhood that will sensitively integrate new housing options and community amenities, while transitioning to the existing Ancaster community.




**Figure 2: Subject Area and Taxiway West District**

## 1.2 Existing Site Conditions

The Subject Area was first developed for aviation uses in the 1950s, after De Havilland Canada (DHC) was given a 99-year lease of the land in 1952. In the decades following, DHC constructed most of the buildings that remain on the site today. In the 1970s, the federal government purchased DHC and operated it as Crown property. In 1985, the Subject Area was sold to Boeing, and the lands were sold again to Bombardier in the 1990s. The Subject Area is currently known as the Bombardier Aerospace facility.

The main buildings that currently exist in the Subject Area include Bays 1-6, the southern portion of Bay 11, and 12, the Administration Building, Cafeteria, Superstore, Chemical Process Building, Fire Pump House, and Data Centre. The lands also include paved areas for circulation and surface parking, as well as a portion of the taxiway that currently connects these lands to the main runway.

The Subject Area is surrounded by a variety of uses. It is bound to the west by the Barrie GO rail line. West of this is the Stanley Greene District and Downsview Park, which have been developed in recent years as part of the 2011

Downsview Area Secondary Plan. To the east of the Subject Area is the broader Downsview Framework Plan area. Today, these lands contain the 2.1-kilometre-long runway, imagined to transform over time into a mixed-use, complete, and connected community where access to jobs, housing, schools, shops, food, parks, and other key community amenities are available within a 15-minute walk, bike, or roll. These lands will be planned through future District Planning processes. To the south of the Subject Area is the Ancaster neighborhood, a low-rise residential neighborhood located between the Downsview Framework Plan lands to the north and east, Wilson Avenue to the south, and the GO rail line to the west. It contains neighborhood parks, two schools, and a community centre.

Immediately to the north of the Subject Area is the Taxiway West North Sub-District, currently being planned for an approximately 93,000 square metre (1 million square foot) film and television studio production campus. A Site Plan Application has been submitted to the City of Toronto for the first phase of development of the Film Studio Campus, known as Phase A (Application Number: 21 230911 NNY 06 SA). Design development of Phase B of the Film Studio Campus is not available for review yet. However, the servicing analysis of the Subject Area includes an allowance for Phase B assuming that the size of development will be similar in scale to that of Phase A. Further north is the Canada Lands Park Commons, developed as part of Downsview Park and containing a variety of institutional, commercial, and recreational uses.

## 1.3 Proposed Development

The development of the Hangar District involves the retrofit of the existing hangar buildings, as well as the construction of new residential, commercial, and community spaces. The proposed development areas, populations, and employment statistics are summarized in Table 1.

**Table 1: Proposed Development Statistics**

| Character Area | Total Area (ha) | Total GFA (m2) | Residents* | Jobs** | Total Population |
|---|---|---|---|---|---|
| **The Village** | 8.47 | 191,608 | 3,405 | 1,873 | 5,278 |
| **The Hangars** | 8.71 | 87,793 | 0 | 2,734 | 2,734 |
| **Ancaster West** | 5.25 | 88,964 | 1,726 | 720 | 2,446 |
| **TOTAL** | **22.44** | **368,365** | **5,131** | **5,327** | **10,458** |

**Residential population is assuming 1.8 PPU (aligns with forecasts in the City of Toronto's DC Background Study (2018))*
***Employment assumption is assuming 1 job per 25$m^2$ for Office; 40$m^2$ for retail; 50$m^2$ for light industrial; 100$m^2$ for institutional*

In total, the Subject Area proposes to accommodate approximately 368,365 square metres (3.97 million square feet) of employment, residential, retail, community, and institutional uses. These uses are supported by an interconnected network of fine-grained streets that connect the Subject Area with its surroundings. Streets will be designed to make walking, cycling, and accessing transit comfortable and convenient, while safely accommodating cars and commercial vehicles. A diverse system of open spaces is proposed consisting of public parks, plazas, and squares, privately owned publicly accessible spaces, interior open spaces, and a signature park bridge that will connect to Downsview Park over the rail corridor. The community will celebrate the rich history of the area and diverse local voices and be a place that is welcoming to all. Refer to Figure 3 for plan layout and key naming of the Subject Area.




**Figure 3: Proposed Development and Key Naming within Subject Area**

## 1.4 Phasing Overview

Taxiway West is the first of 10 districts to be developed as part of the larger Downsview Framework Plan. From an infrastructure perspective, the Taxiway West District as a whole is intended to be serviced primarily through available capacities in existing adjacent municipal infrastructure. Significant new infrastructure and infrastructure upgrades are being proposed through the Master Environmental Servicing Plan (MESP) process; however, the Taxiway West District is not reliant on this work to provide servicing. Within the Hangar District, development will occur in 2 phases, as shown in Figure 4. The current thinking for Phase I involves the retrofit of the existing Hangar buildings, development of a portion of both Ancaster West and The Village, as well as the construction of most public streets required to facilitate access. Generally, Phase I represents approximately 17.7 ha of development on the west side of the Subject Area. Blocks intended to be developed in Phase II may be used for

interim uses such as temporary parking areas until the eventual development of the east side of the Subject Area. The development and phasing of the Film Studio Campus is being progressed through a separate as of right planning process.

The overall servicing strategy will be designed to be in line with the proposed phasing of the development, such that all development is adequately serviced.




**Figure 4: Proposed Development Phasing**

## 1.5 Scope of the Functional Servicing Report

Per City of Toronto Application Material Terms of Reference, the objective of this Functional Servicing Report is to evaluate the effects of the proposed change in land use/development on the City's municipal servicing infrastructure and watercourses. This report will also identify and provide the rationale for any new infrastructure and upgrades to existing infrastructure necessary to provide servicing to the proposed change in land use/development.

The scope of this report includes analysis of existing conditions, estimated proposed demands, identification of the net impact due to the proposed changes, and the need for expansion and upgrades with respect to both sanitary sewage and water consumption. Storm sewage and drainage will be addressed in detail under a separate cover in the "Stormwater Management Report for the Proposed Redevelopment of 123 Garratt Boulevard."

In preparation of the submission documents, Arup staff reviewed the following data:

- Topographic Survey collected by J.D. Barnes in 2021 in DWG format;
- Bombardier As-Builts compiled in 2009 in PDF format;
- Level B Subsurface Utility Engineering (SUE) collected by Callon Dietz in 2021 in DWG format;
- City of Toronto CUMAP Data;
- Downsview Park Design Reports;
- Stanley Greene Development Design Reports; and
- Downsview Area Secondary Plan Documents.

# 2. Sanitary Drainage System

This section of the report outlines the relevant City of Toronto sanitary infrastructure design criteria, quantifies sanitary flow rates for the development, and provides analysis on the impact of the development to the surrounding existing sanitary network.

## 2.1 Sanitary Design Criteria

The existing and proposed sanitary infrastructure was assessed using the criteria set out in the City of Toronto Design Criteria for Sewers and Watermains, January 2021 ("Design Criteria"), as summarized in the following sections.

### 2.1.1 Population Assumptions

The sanitary analysis used the occupancy assumptions outlined in the Design Criteria, per Table 2.

**Table 2: Occupancy Assumptions for Sanitary Demand**

| Type of Housing | Occupancy Assumption |
|---|---|
| Studio Apartment | 1.4 persons/unit |
| 1 Bedroom Apartment | 1.4 persons/unit |
| 2 Bedroom Apartment | 2.1 persons/unit |
| 3 Bedroom Apartment | 3.7 persons/unit |
| Townhouse | 2.7 persons/unit |
| Hotel | 1 person/bed/30 $m^2$ GFA |

### 2.1.2 Per Capita Flow

For sizing new local sewers, an average residential wastewater flow of 450 L/capita/day was assumed. A residential peaking factor was applied per the Harmon equation. The peaking factor applied at each point of analysis is a function of the total upstream population. Commercial/industrial/institutional average wastewater flows were assumed at 180,000 L/floor ha/day, including the peaking factor.

For performing downstream capacity analysis on existing sanitary sewers, an average residential wastewater flow of 240 L/capita/day was assumed.

### 2.1.3 Extraneous Flows

An allowance of 0.26 L/s/ha was applied to account for infiltration and inflow ("I&I") as per the Design Criteria for all contributing lot and road areas.

### 2.1.4 Sewer Design Criteria

New proposed sewers were designed in accordance with the Design Criteria to ensure adoptable standards from Toronto Water. Key criteria to note are as follows:

- Sewer capacities were computed using the Manning formula. Generally, sanitary sewers were designed to flow at a maximum of 80% full flow design capacity of the pipe.
- The minimum allowable size for a sanitary sewer is 250 mm diameter.

- The minimum actual velocity permitted in a sanitary sewer when flowing full is 0.6 m/s to ensure the flow is self-cleansing. The maximum velocity permitted is 3 m/s. Where actual flow depth in the pipe under peak flow is less than 0.3 of the pipe diameter, actual flow velocity is calculated.
- The minimum slope for a 250 mm diameter pipe is 0.5%. The minimum slope of the first leg of sewer is 1%.
- The minimum depth of a sanitary sewer is 2.75 m, measured from the centre line elevation of the road to the obvert of the sewer. In some places this may not be achievable due to the invert of the downstream connection. These locations will be discussed with the City.

## 2.2 Existing Sanitary Network

There is limited existing sanitary infrastructure within the Subject Area, as much of the existing Bombardier facilities are serviced internally within the Hangar buildings. The existing sanitary network and sanitary catchment breakdown is shown in Figure 5. All existing sanitary infrastructure within the Subject Area is privately owned. Generally, sanitary effluent is directed from north to south via a network of 70 mm to 200 mm pipes discharged through two connections to the municipal network, one to the east (green) and one to the west (red).

At the east outfall, sanitary flows are directed to Ancaster Road and Powell Road, flowing through the existing Ancaster neighborhood to the municipal sewer on Wilson Avenue. These flows contribute to the 1500 mm trunk sewer at the Don River in the West Don sanitary sewershed. The service connection at the east outfall is a 150 mm pipe at 1.6% slope, which has a full flow capacity of 19.2 L/s. The downstream municipal pipe it connects to is 250 mm at 0.3% with a full flow capacity of 31.5 L/s.

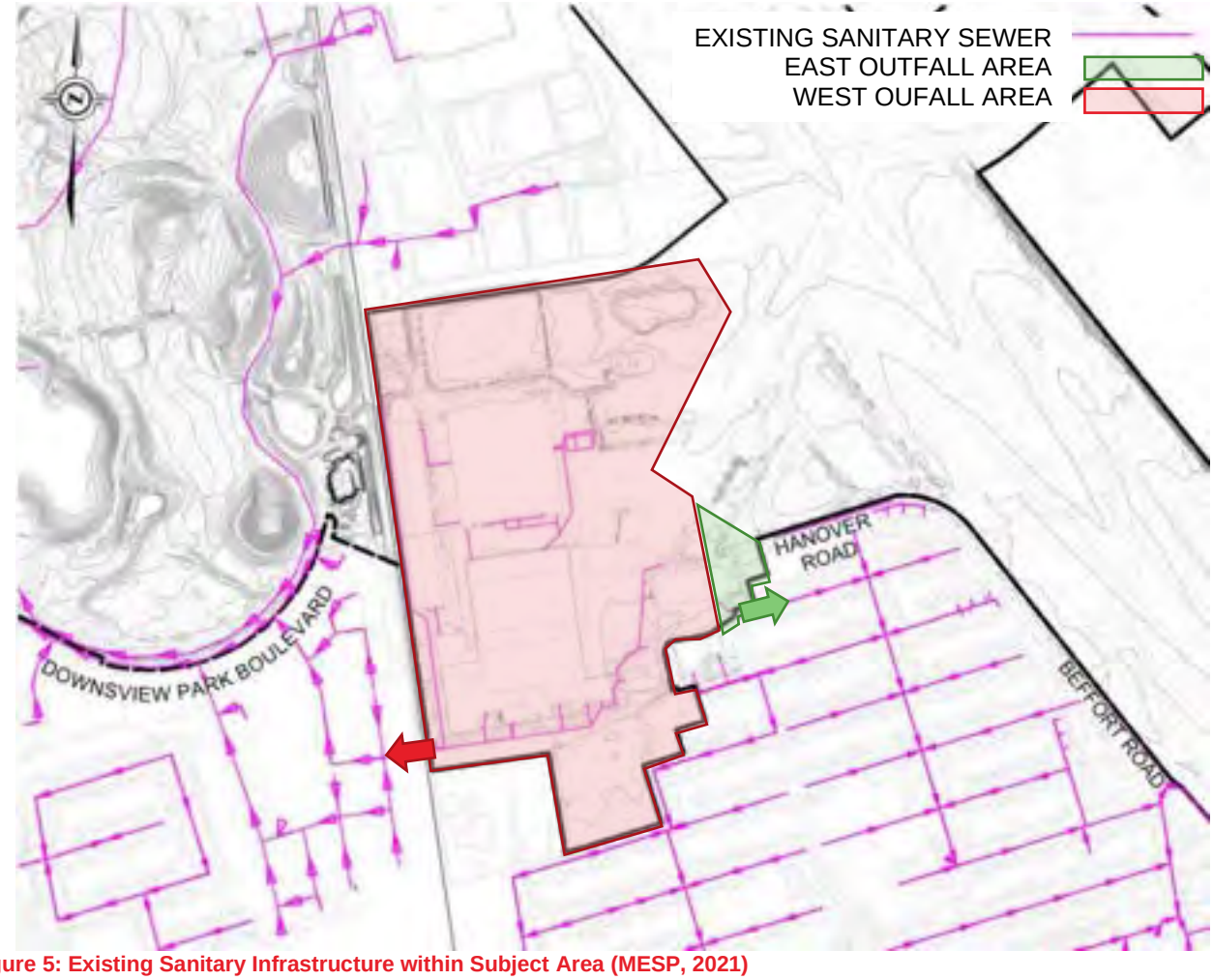



**Figure 5: Existing Sanitary Infrastructure within Subject Area (MESP, 2021)**

At the west outfall, sanitary discharge flows through the adjacent Stanley Greene neighborhood and Downsview Park property to the municipal sub-trunk at Keele Street and Maryport Avenue. These flows contribute to the Humber-Black Creek sanitary sewershed. With the exception of the east half of Bay 12, all existing hangars are serviced at the west outfall by a 200 mm pipe at 1.03% that crosses under the railway corridor. This pipe crossing has a full flow capacity of 33.3 L/s.

In the existing condition, no flows from the proposed Film Studio Campus are considered as it is being progressed through a separate planning application process.

The existing condition of the sanitary infrastructure is unknown but is assumed to be poor due to the age of the Bombardier facilities.

### 2.2.1 Existing Sanitary Flows

Arup calculated the existing sanitary flows at each outfall using the methodology outlined in the Design Criteria and Section 2.1 of this report. They are summarized in Table 3. Detailed calculations are located in Appendix 2.

**Table 3: Existing Sanitary Flows per Outfall**

| Outfall | Contributing Area (ha) | I&I (L/s) | Sanitary Flow (L/s) | Total (L/s) |
|---|---|---|---|---|
| West | 39.8 | 10.35 | 14.51 | **24.86** |
| East | 1.6 | 0.42 | 0.78 | **1.20** |

Per Memorandum # CIVIL 015 prepared by EXP in 2014, flow monitoring data was collected in 2012 which indicated a peak sanitary flow of 22.0 L/s at the west outfall. This flow was measured in the existing manhole just upstream of the rail crossing. For the proposed expansion of the Bombardier facilities, it was determined that the existing Bombardier infrastructure within the Subject Area is at capacity and cannot accept additional flows.

### 2.2.2 Existing Flow Monitoring

As part of the development of the Framework Plan, the MESP for the Downsview Area, and the Update Downsview Secondary Plan, seven flow monitoring stations were installed in Fall 2021 to collect existing Dry Weather Flow (DWF) data for two months at key points of interest within the existing sanitary network. The following season, the seven flow monitors were reinstalled, along with an additional eighth monitor from April to September 2022 to collect existing Wet Weather Flow (WWF) data. The locations of these flow monitors are shown in Figure 6. The data from monitoring stations FM01, FM02, FM03, FM06, and FM07 is relevant to the sanitary analysis for this district. The flow monitoring results were used to calibrate the existing sanitary network models downstream of the Subject Area.

Civica prepared two summary reports of the monitoring periods:

- "ARU21-0001 Final Report Period 1" dated February 2022 summarizing data from the flow monitoring period of October 20, 2021, to January 20, 2022
- "ARU21-0002 Final Report Period 2" dated March 2023 summarizing data from the flow monitoring period of April 1, 2022, to September 6,2022

Per the Sewer Capacity Assessment Guidelines (SCAG) published by the City of Toronto in July 2021, the monitors were only removed once at least two rainfall events equal to or exceeding 20mm if rainfall depth over a duration of 24 hours of less were captured. Copies of these monitoring reports have been shared with the City through the MESP discussions and are attached in Appendix 3 for information.

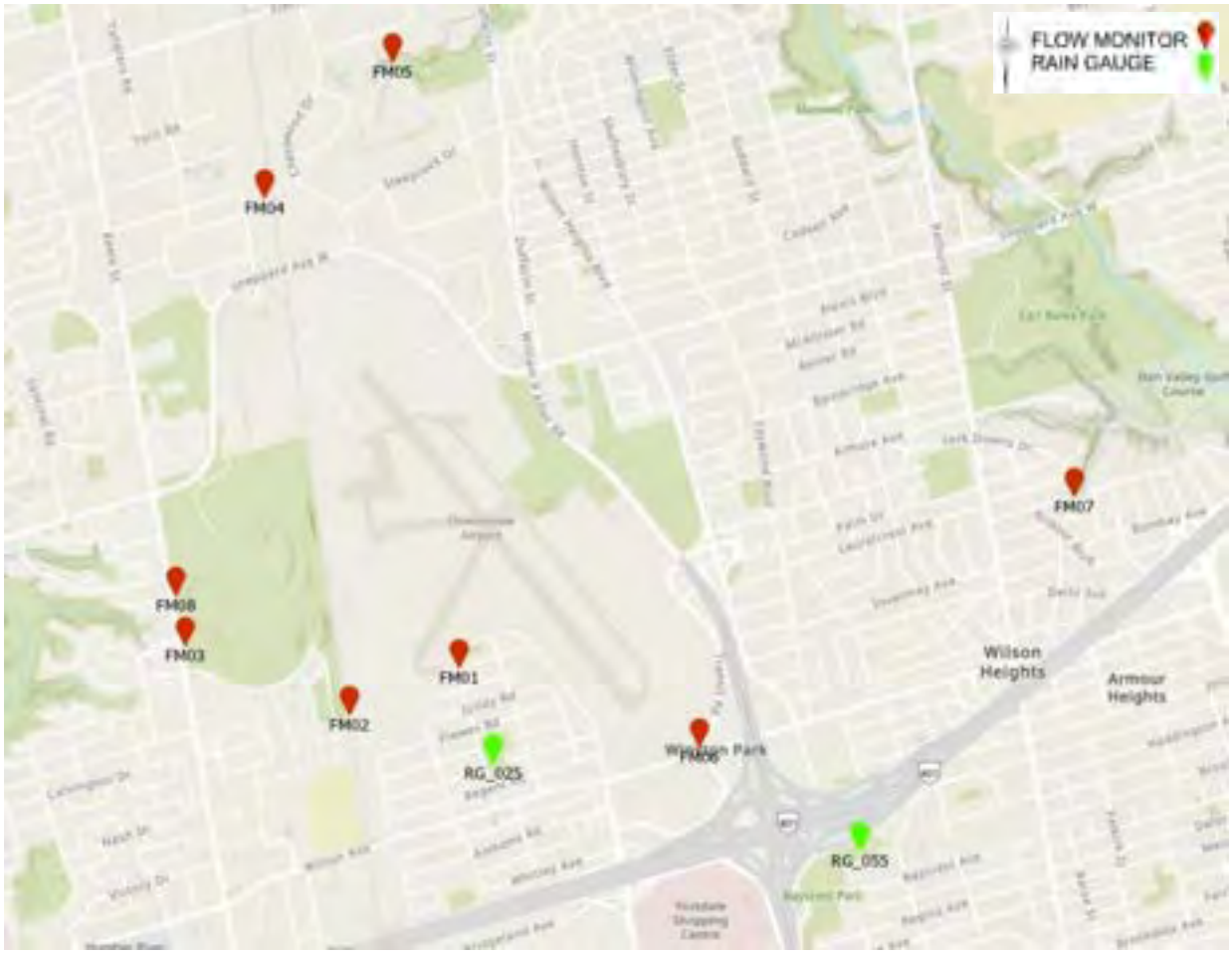



**Figure 6: Sanitary Flow Monitoring Locations**

### 2.2.3 Existing Downstream Capacity

As mentioned in Section 2.2, the west outfall drains to the existing infrastructure within the Stanley Greene neighborhood. The design documents for the sanitary infrastructure within Stanley Greene indicate that the downstream sanitary sewers were designed to accommodate up to 62 L/s of sanitary discharge from underneath the railway. At this flow level, the downstream sanitary infrastructure is operating at 80% capacity assuming 450 L/capita/day for the residential population within Stanley Greene.

Based on the sewer design, flows from the west outfall could be increased to 80 L/s before the existing sewers in Stanley Greene hit 100% of their full flow capacity. Refer to Appendix 2 for detailed calculations.

The potential available capacity for the existing network to the east is discussed in Section 2.4

## 2.3 Proposed Sanitary Network

The proposed sanitary servicing strategy generally maintains the existing sanitary flow patterns. The majority of the Subject Area will be serviced via the west outfall, discharging to the adjacent existing Stanley Greene infrastructure. The eastern portion of the Subject Area will be directed to the east outfall at Powell Road. New sanitary infrastructure proposed for the Film Studio Campus is being designed through a separate planning application process. It is Arup's understanding that the sanitary connection from the Film Studio Campus is planned to be located along Street A at the entrance to the property. Therefore, flows from the Film Studios were considered in the sizing and design of district sanitary infrastructure as well as in the resulting downstream sanitary analysis.

All existing sanitary infrastructure within the Subject Area is to be abandoned or removed as new sanitary sewers are required within the proposed public streets to service the proposed development blocks. The proposed development blocks will be responsible for sanitary infrastructure internal to the block boundary, subject to approval through the Site Plan Application (SPA) process. The proposed sanitary infrastructure for the Subject Area only includes sub-district level infrastructure.

The proposed sanitary network and sanitary catchment breakdown is shown in Figure 7. The proposed sanitary infrastructure is consistent with the approach selected in the preferred alternative in the MESP. Detailed sanitary infrastructure drawings can be found in Appendix 1.




**Figure 7: Proposed Sanitary Infrastructure within Subject Area and Catchment Areas by Outfall**

### 2.3.1 Proposed Sanitary Flows

A detailed sanitary flow analysis was performed, and new sanitary sewers designed for the proposed development within the Subject Area per the criteria outlined in Section 2.1 of this report. The sanitary flows per outfall are summarized in Table 4 both for the design of new sewers and for downstream capacity analysis. Detailed calculations and sanitary sewer design sheet can be found in Appendix 2.

**Table 4: Proposed Sanitary Flows per Outfall**

| Outfall | Contributing Area (ha)* | I&I (L/s) | For Proposed Sewers | | For Downstream Sewers | |
|---|---|---|---|---|---|---|
| | | | Sanitary Flow (L/s) | Total (L/s) | Sanitary Flow (L/s) | Total (L/s) |
| West | 32.69 | 8.50 | 96.87 | **105.37** | 67.38 | **75.88** |
| East | 2.61 | 0.68 | 38.70 | **39.38** | 21.31 | **21.99** |

**Note: The contributing area is the sum of the development block areas tributary to the outlet and the ROW width along the alignment of the proposed pipes in the ROW.*

The District is aspiring to meet Tier 2 Version 4 requirements of the Toronto Green Standard (TGS) as part of the overall sustainability strategy. Committing to Tier 2 would require a 40% reduction in potable water consumption, which would subsequently reduce sanitary discharge. The above calculated sanitary flows and resulting sewer design do not account for this reduction presently. Per discussion with the City of Toronto on February 8, 2022, the City currently does not allow for reductions in flows when designing new infrastructure to align with TGS targets, however the topic will continue to be developed through the Framework planning process. There is opportunity to implement future sanitary flow monitoring after the build out of the district to provide further detail and inform the design of future districts.

## 2.4 Downstream Capacity Analysis

### 2.4.1 East Outfall

The MESP and Secondary Plan work are expected to be the forum through which the existing InfoWorks models of the municipal sanitary infrastructure will be updated. These models will be used to develop a refined understanding of the existing conditions as well as test the impact of various sanitary servicing strategies, including that proposed for this District. The models will be updated based on the flow monitoring undertaken as well as based on the planned capital upgrades to be completed by the City. Coordination is ongoing with the city in relation to the MESP and it is currently expected that additional information will be available later in 2023. As a result, a preliminary Downsview capacity review has been undertaken at this stage. It is expected the future revisions of this report will coordinate with and make use of the analysis in the MESP to provide a more comprehensive assessment.

Arup has performed a preliminary review of potential downstream sewer capacity to assess the impact of the proposed increase in sanitary flows at the Powell outfall to support this submission. The analysis was performed on the Basement Flooding Protection Program ("BFPP") Area 19 Basement Flooding Study InfoWorks Model. The available flow monitoring information was also reviewed. As described in Section 2.2 of this report, the east outfall at Powell Road contributes to the existing sanitary sewers within the Ancaster neighborhood eventually discharging to the 1500 mm trunk sewer at the Don River. Refer to Figure 8.




**Figure 8: Area 19 Existing Sanitary Sewers and East Outfall Flow Path**

An additional flow of 22.0 L/s at the east outfall is expected as a result of the development. A series of preliminary spot checks were undertaken at key points along the route shown in the figure above based firstly on the existing InfoWorks Model and then reviewed for consistency against the flow monitoring data. This review is summarized in Table 5. Based on these observations of the network at this stage, there appears to be capacity in the network for the proposed connection. Through MESP work, it has also been confirmed that there are a series of planned capital upgrades within this network to be completed by 2025 which will further unlock more sewer capacity. These capital upgrades are not required to support the build out of the district.

**Table 5: Preliminary Review Downstream of East Outfall**

| | Location 1 – FM 01 | Location 2 – FM 06 | Location 3 – FM 07 |
|---|---|---|---|
| **Existing Pipe Size and Slope** | 250 mm @ 0.4% | 500 mm @ 0.2% | 675 mm @ 0.7% |
| **Existing Full Flow Capacity** | 37 L/s | 160 L/s | 722 L/s |
| **Estimate DWF (from Flow Monitoring)** | Less than 0.2 L/s | ~15 L/s | ~50 L/s |
| **DWF (from InfoWorks)** | Less than 0.5 L/s | 10.9 L/s | 95.6 L/s |
| **Expected Increase in Flow** | 22.0 L/s | | |
| **Comments** | The DWF flow InfoWorks is greater than that collected in the flow monitoring. Regardless, the additional flow from the development does not surpass the available capacity in the pipe. | The DWF flow collected from flow monitoring is greater than that modeled in InfoWorks. Regardless, the additional flow from the development does not surpass the available capacity in the pipe. | The DWF flow InfoWorks is greater than that collected in the flow monitoring. Regardless, the additional flow from the development does not surpass the available capacity in the pipe. |

### 2.4.2 West Outfall

The west outfall at the railway contributes to BFPP Area 66 Basement Flooding Study, which was completed in late 2022. Detailed analysis of this model is being completed within the MESP through the Secondary Plan update. Arup preformed a downstream sanitary analysis based on the sanitary sewer design sheets produced for the adjacent Stanley Greene (FSR dated February 2013) and William Baker (FSR dated May 2022) neighborhoods.

The sanitary sewers in Stanley Greene direct flows north along Frederick Tisdale Drive, west along Downsview Park Boulevard, and north along the edge of Downsview Park to the ultimate outlet at Maryport Avenue and Keele Street. Pipe sizes range from 300 mm to 525 mm. As discussed in Section 2.2.3, new sewers in Stanley Greene were designed to be at 80% capacity assuming an incoming sanitary flow of 62 L/s from the outlet under the railway.

Per the methodology in the Design Criteria (assuming 240 L/capita/day for residential flows), the contributing flow from the Subject Area is 75.9 L/s. The results of this desktop analysis indicate that there is sufficient capacity in the existing downstream sanitary sewers to handle the additional 13.9 L/s of flow from the original 62 L/s that was considered at the time of their design.

The first 4 legs of sewer within Stanley Greene are at almost 93% capacity as a result of the additional flows, however the remaining downstream infrastructure does not surpass 70% capacity. At the outlet to the Maryport sub-trunk, additional flows from the William Baker neighborhood to the north were considered as well, per the Functional Servicing Report prepared by Counterpoint Engineering in May 2022. Sanitary flows from Phase 1 of William Baker are being directed to this outlet in the interim condition prior to the construction of the Keele Relief Sewer. Counterpoint Engineering's analysis indicates 253.4 L/s total at the ultimate outlet to the Maryport Sub-Trunk. Arup's analysis finds that the total flow at the ultimate outlet will be 245.1 L/s, a decrease of approximately 9 L/s. Detailed calculation sheets supporting this analysis can be found in Appendix 2.

### 2.4.3 Required Network Upgrades

All existing sanitary infrastructure within the Subject Area is to be removed or abandoned as it is understood to conflict with the proposed road and building plans and is undersized per recent City standards. It is also noted that the structural condition of the existing underground infrastructure is unknown.

It appears that at this stage, no network upgrades are required at or downstream of the east outfall. The only network upgrade required at the west outfall is the sewer crossing the railway to Stanley Greene. The existing crossing will be abandoned/removed with a new 375 mm pipe at 1.03% being constructed directly south of the existing crossing connecting to existing MH 52A west of the railway. Further coordination with Metrolinx is required and is being pursued through the MESP process for the Framework Lands.

# 3. Water Supply and Distribution

This section of the report describes the existing and the proposed water servicing systems for the Subject Area. Per the MESP, it is noted that the Subject Area is intended to be serviced from existing networks within the Ancaster neighbourhood.

## 3.1 Water Design Criteria

The proposed water infrastructure was assessed using the criteria set out in the City of Toronto Design Criteria for Sewers and Watermains, January 2021 ("Design Criteria"), as summarized in the following sections.

### 3.1.1 Population Assumptions

The water analysis used the occupancy assumptions outlined in the Design Criteria, per Table 6.

**Table 6: Occupancy Assumptions for Water Demand**

| Type of Housing | Occupancy Assumption |
|---|---|
| Studio Apartment | 1.4 persons/unit |
| 1 Bedroom Apartment | 1.4 persons/unit |
| 2 Bedroom Apartment | 2.1 persons/unit |
| 3 Bedroom Apartment | 3.7 persons/unit |
| Townhouse | 2.7 persons/unit |
| Hotel | 1 person/bed/30 $m^2$ GFA |

### 3.1.2 Demand Values

The following per capita demand values were used to calculate the average domestic and commercial water demand, per Table 7.

**Table 7: Per Capita Demand (DCSW, January 2021)**

| Land Use | Per Capita Demand |
|---|---|
| Residential | 190 L/capita/day |
| | 310 L/capita/day (for Townhouse blocks of 6 or less) |
| Commercial/Industrial/Institutional | 180,000 L/capita/day including peaking factors |

### 3.1.3 Peaking Factors

Peaking factors were applied to the residential Average Daily Demand (ADD) to obtain Peak Hour Demand (PHD), and the Maximum Day Demand (MDD), per Table 8. Since, the per capita demand for non-residential demands includes peaking factors, peak demand scenarios are modelled to observe the proposed network performance.

**Table 8: Peaking Factors (DCSW, January 2021, Table 30)**

| Land Use | MHD | PHD | MDD |
|---|---|---|---|
| Residential (>150,000 population) * | 0.80 | 2.25 | 1.50 |
| Apartments | 0.84 | 2.50 | 1.30 |

* *The residential population is less than 150,000 for the Subject Area. Hence, peaking factor for apartments is used for residential water demand.*

### 3.1.4 Fire Protection

The required fire flow should be calculated using the Fire Underwriters Survey (FUS). At a minimum, the proposed water supply system should provide a flow rate of 5,000 L/min at a residual pressure of 140 kPa (20 psi) for 4 hours.

In absence of detailed building information (i.e., footprint area per building and relative building locations), fire flows are calculated per FUS method while making assumptions for the missing building information.

### 3.1.5 Target Design Criteria

The following criteria must be achieved by new watermain design in the City of Toronto:

- Supply the greater of MDD + Fire Flow (FF) or PHD
- Maximum velocity under ADD < 2m/s
- Maximum velocity under FF < 3m/s
- Maximum Head Loss under PHD is 2-5m/1000m
- ADD preferred pressure range of 350-550 kPa (50-80psi)
- MHD and PHD preferred pressure range of 275-700 kPa (40-101psi)
- Minimum pressure under non-fire demand scenario > 275 kPa (40psi)
- Minimum residual pressure during MDD + FF > 140 kPa (20psi)
- Maximum static pressure < 690 kPa (100psi)
- Test pressure = 1000 kPa (145psi)

## 3.2 Existing Water Supply System

### 3.2.1 Existing Municipal Water Supply Systems

The Subject Area is located within City of Toronto's Pressure District 5 (PD5). Further detail on the existing condition of the surrounding pressure district in the area can be found in the MESP.

The Subject Area is currently serviced by the following watermains:

- A newly constructed 400mm watermain on Garratt Boulevard
- 150mm PVC watermain on Powell Road
- 150mm watermain on Gilley Road

Three hydrant flow tests near the Subject Area were completed in October 2021 by WSP, as part of the background studies to support the MESP. The locations of the hydrant tests are shown in Figure 9. The existing 300mm watermain on Garratt Boulevard has been upgraded to a 400mm watermain between Gilley Road and Regent Road. A new hydrant flow test was performed on this watermain to identify the change in capacity of the water system to support the development within the Subject area in October 2022.

Further details about the hydrant flow test locations and results can be found in Appendix 4. To ensure safe and efficient performance of the water system, the pressure conditions during fire demand should be above 20 psi.

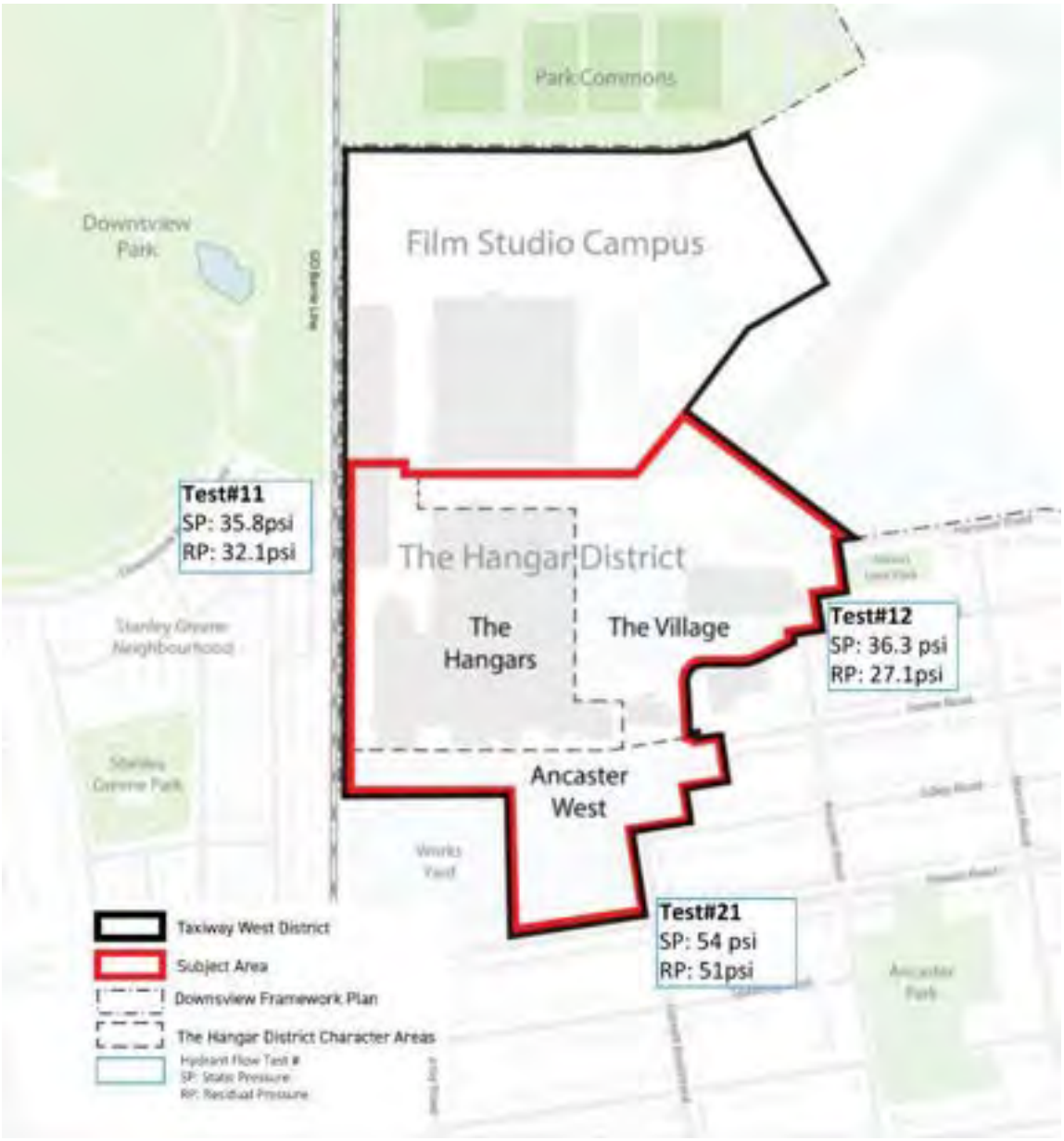



**Figure 9: Hydrant Flow Test Locations**

In summary:

- Test #21: Hydrant flow test was performed on a hydrant on Garratt Boulevard, within the Ancaster neighbourhood, south of the Subject Area. The observed static and residual pressures are above the minimum pressure required in the system under non-fire demand scenarios. The hydrant flow test has been performed on the newly constructed 400mm watermain on Garratt Boulevard as discussed above.

- Test#12 – Hydrant flow test was performed on an existing hydrant on Powell Road and the residual pressure was measured on the hydrant on Ancaster Road, south-east of the Subject Area. The static pressure was observed to be below the lower limit of the preferred pressure range, which is 40 psi, in a water system during non-fire demand scenarios.

  Test#11 – Hydrant flow test was conducted on hydrants located on William Duncan Road and Downsview Park Blvd, within the Stanley Greene Neighbourhood, west of the Subject Area. The static pressure was observed to be below the lower limit of the preferred pressure range, which is 40psi, in a water system during non-fire demand scenarios. It is noted that the Subject Area does not have any direct connections to this location in the existing condition and hence it is not modelled in the hydraulic model.

### 3.2.2 Existing Private Water Supply System

A complex private water supply system services Bombardier's existing structures within the District. It includes separate systems for fire and domestic water supply, several significant tanks, pumping stations and reservoir facilities. The following references were used to understand the existing conditions:

- Existing water network data for the Subject Area and surrounding area was provided by the City of Toronto.
- Proposed Site Servicing Plans for the Bombardier Aerostructures Facility prepared by EXP in 2012 in PDF format
- Fire Main Drawings & Pump/Reservoir Data provided by Bombardier in PDF format.

#### Domestic Water

The existing domestic loop is serviced from Garratt Boulevard by a new 400 mm diameter watermain, where it goes through a water meter chamber and backflow prevention system. In the same above-ground building (shown in Figure 10), there is a booster pump set as the pressure is not adequate for Bombardier operations. Water pressures are boosted to 110 psi. Following the booster pump, the domestic water splits into a 150 mm watermain that goes north to Bays 7-10 and a 300 mm watermain that ends in line with Bay 2, where it splits into a 150 mm and 38 mm to connect to Bay 2 and 12, respectively. Bay 6 may also be connected to an additional 150 mm branch from the main branch 150 mm line that runs north. Domestic water is provided to Bay 11 within the Subject Area, through a 25mm service from Bay 1.

Bay 12 is also serviced by a 150 mm connection from Powell Road. This does not supply any other buildings and is at City pressure. Observed pressures from Bombardier are approximately 56-36 psi from the southern supply and the eastern supply respectively. Each supply has a backflow prevention device.

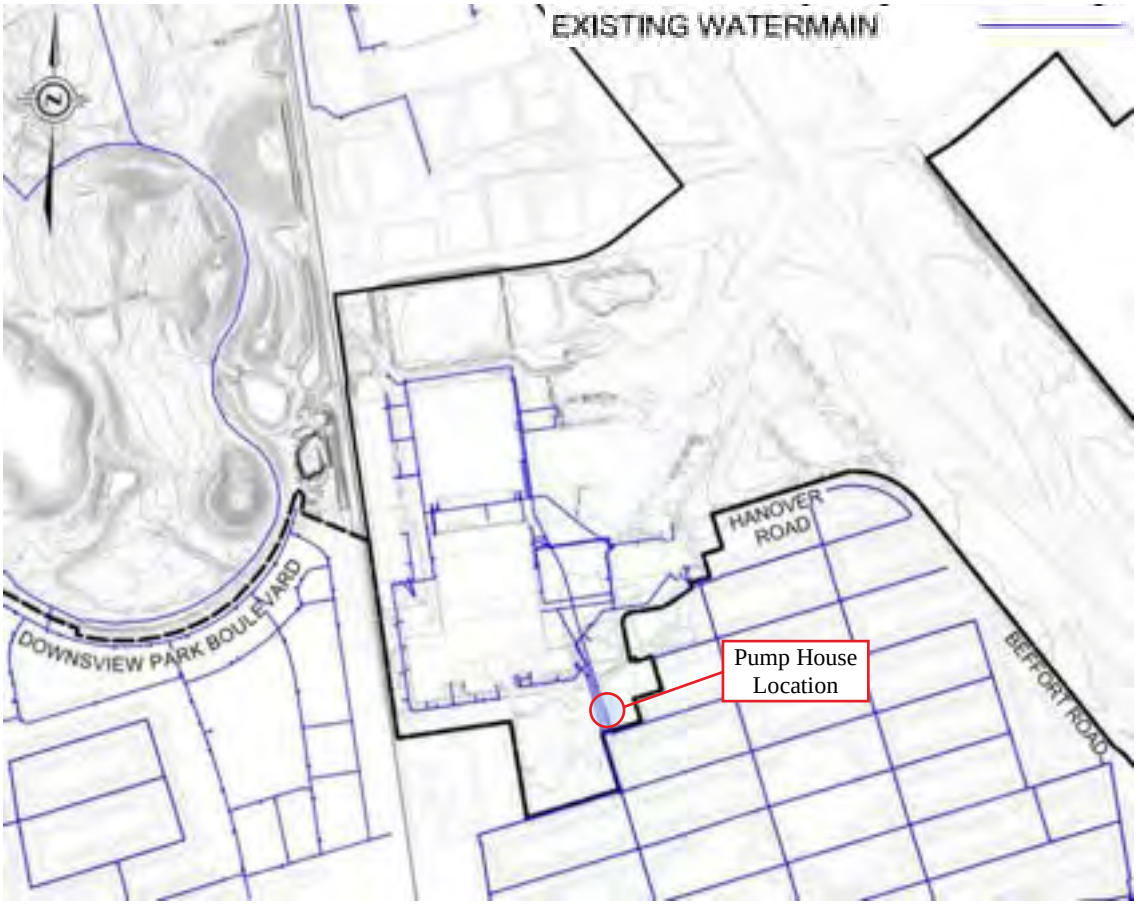



**Figure 10: Existing Water Infrastructure within Subject Area (MESP, 2021)**

## 3.3 Proposed Water Supply System

The proposed water servicing strategy generally aims to provide a more typical municipal layout of watermains, as opposed to the existing private network that is located within the Subject Area. All existing water infrastructure within the Subject Area is to be abandoned or removed as new watermains are required within the proposed public streets to service the proposed development blocks. The proposed development blocks will be responsible for water infrastructure internal to their block boundary, subject to approval through the Site Plan Application (SPA) process. The proposed water infrastructure for the Subject Area excludes any works required for the Film Studio Campus, however, considers the demands exerted by this network on the proposed network in the hydraulic modelling to observe the overall system performance.

The future roadways within the Subject Area will be serviced by new watermains to provide connections to the development blocks. The development blocks will have frontage from public streets for future service connections. The proposed network, including connections to the existing network on Garratt Boulevard, Plewes Road, Powell Road and Home Road is shown in Figure 11. The proposed water servicing plan is included in Appendix 1.




**Figure 11 Proposed Water Infrastructure within Subject Area**

Blocks facing private streets will be serviced by private watermains. Where applicable, a water meter chamber will be provided within private property, within 3 m of the property line, per City requirements.

Currently, the proposed servicing plan shows at least one water service connection to each Block. The number and location of service connections to buildings within each block will be refined during later design stages. Each building shall have a minimum of one domestic/fire connection, per City of Toronto standard detail T-1105.302-1 and T-1104.02-3. For buildings having a mix of residential and non-residential occupants, separate domestic water connections will be proposed to account for these uses. It is assumed that each building will have a sprinkler system, and will have its own water meters, backflow prevention, and fire pumps. In addition, a stub-up connection is provided for a potential water feature in the Garratt Boulevard Park. Gate valves are included on the public watermains at approximately 200 m spacing per City guidelines.

Hydrants are included along all the municipal roads approximately 90m apart as per City of Toronto Design Criteria for Sewers and Watermains, Chapter 4, Table 33: Fire hydrant spacing and location. Final hydrant placements will ensure unobstructed access from hydrant to each building entrance in compliance with Table 33 of DCSW

### 3.3.1 Proposed Water Demand Assessment

Domestic water demands and associated peaking values were calculated using populations, building uses, and City requirements as described in Section 3.1 of this report. The existing Peak Hour (PHD) and Maximum Day Demand (MDD) for the North Sub-District, which is considered an industrial area, was calculated assuming a demand of 180,000 L/floor-ha/day, resulting in a peak water demand of approximately 15 L/s. Refer to calculations in Appendix 5 for detailed water demand estimation.

The development in the Hangar District is expected to have a residential domestic Average Day Demand (ADD) of 12.3 L/s and a commercial/ retail peak demand of 19.9 L/sec. As per the City guidelines, the greater of MDD + Fire Flow (FF) or PHD should be taken as the total demand.

Fire flow requirements were calculated for Block D using FUS method while making suitable assumptions for the building design to estimate a likely fire demand for the Subject area. Block D was selected based on its total gross area because fire flow requirements are calculated as a function of the building floor area. Based on the most demanding of the proposed land uses, an estimated fire flow of 7000 L/min (111 L/s) for Block D was used to run MDD+FF model scenario. A more conservative fire flow demand of 230 L/s which is an estimated fire flow demand for the Film Studios Campus, was used to observe the performance of the proposed water servicing network under MDD+FF scenario.

This scenario was simulated in a hydraulic model to understand the reduction in available pressure during an extreme demand condition and to inform future development applications. The hydraulic modelling results are discussed in Section 3.4 of this report.

The domestic water demands for the Subject Area are summarized in Table 9. Further detailed calculations regarding water demand estimation can be found in Appendix 5.

The District is aspiring to meet Tier 2 Version 4 requirements of the Toronto Green Standard (TGS) as part of the overall sustainability strategy. Committing to Tier 2 would require a 40% reduction in potable water consumption through various block and building level demand reduction strategies. The above calculated water demands and resulting watermain design do not account for this reduction at this time. Per discussion with the City of Toronto on February 8, 2022, and March 1, 2022, the City currently does not allow for reductions in flows when designing new infrastructure to align with TGS targets, however the topic will continue to be developed through the Framework planning process.

**Table 9: Summary of Domestic Water Demands**

| | Res. + Hotel Pop. | ICI GFA (ha) | Avg. Res. Demand (L/s) | Peak Hour Demand (Res. + ICI) (L/s) | Max. Day Demand (Res. + ICI) (L/s) | Min. Res. Hour Demand (L/s) | Fire Flow (L/s) |
|---|---|---|---|---|---|---|---|
| Film Studio Campus | - | - | - | 15.1 | 15.1 | - | 230.0 |
| The Hangar District | 5591 | 9.56 | 12.3 | 50.7 | 35.9 | 10.3 | 111.0 |
| **Total** | **5591** | **9.56** | **12.3** | **65.8** | **51.0** | **10.3** | |

*Note: ICI stands for Industrial/Commercial/ Institutional*

## 3.4 Hydraulic Modelling Analysis

A hydraulic model was prepared in PCSWMM using the EPANET add-on. Model network parameters were assigned using the available TWAG information and the proposed development drawings. Figure 12 illustrates the network model.

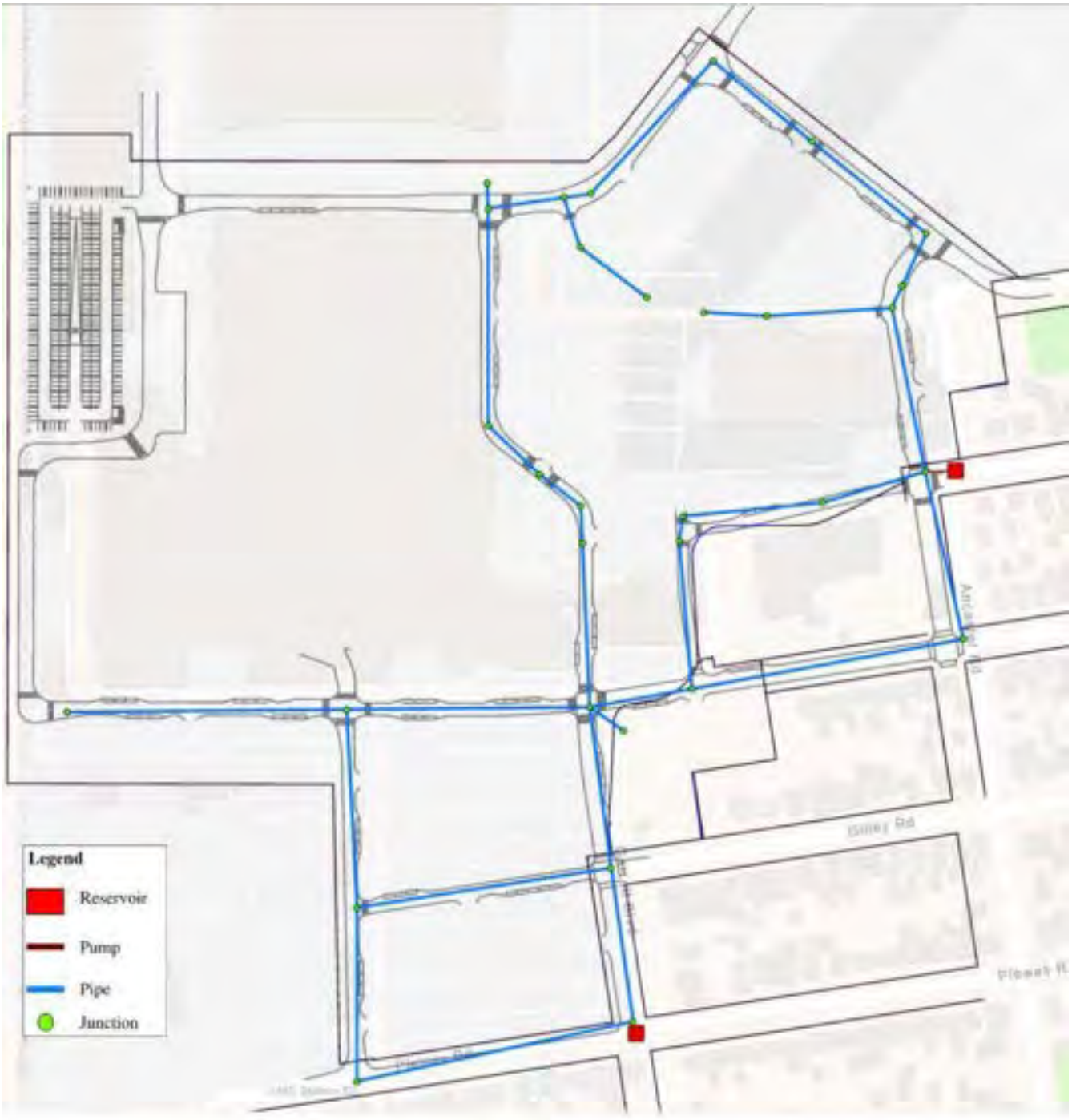



**Figure 12: Proposed Water Network Hydraulic Model**

### 3.4.1 Hydraulic Model Set Up

The water system network consists of nodes, pipe, reservoirs, and pumps. Nodes represent pipe connections and water demand locations. Nodes were modelled by assigning elevations and base water demand values. The existing and proposed watermains were assumed to be 1.8m below existing and proposed grades, respectively. Base water demands for development blocks were assigned at demand nodes based on the demand calculations described in Section 3.3.1.

Proposed watermains were modelled as 300 mm PVC pipes with a friction factor of 120 as suggested in Table 31 of the Design Criteria. While running a steady state MDD+FF scenario with fire flow demand of 230 L/s, the system pressure was observed to have lowered below the minimum requirement of 20 psi (14m). Through network size optimization a 400mm watermain has been proposed along Street D to meet the targeted system performance as noted in section 3.1.5.

Two reservoirs, R-1 and R-2 are connected to the network nodes by pumps. The reservoir and pump arrangement represent the hydraulic conditions between the watermain and hydrants on which flow tests were performed. The pump curves were developed using the two hydrant flow test results (Test #21 and Test#12) to set model boundary limits. The network has been modelled by adjusting the reservoir total head such that the pressure at the immediate downstream node aligns with the hydrant flow test results for baseline conditions. Figure 13 shows the modelling of pump curve based on hydrant flow test result (Test#21), used at reservoir R-1.

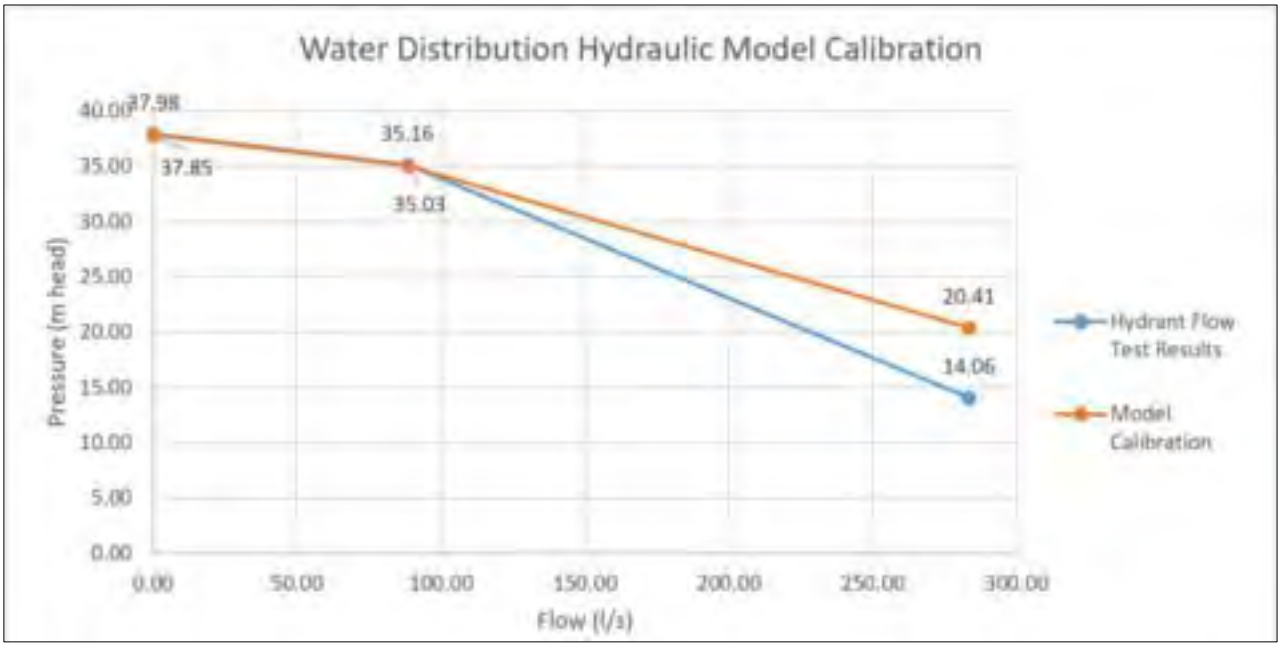



**Figure 13: Hydraulic Model - Pump Curve Set-up at Reservoir R-1**

It was noted by the hydrant flow test operators that the flow tests were performed during max. day conditions where the pump at the pumping station tries to maintain the pressure in the system. The expected flow at 140 kPa is extrapolated based on the points measured during the flow test. Also, during max. day conditions, watermains carry higher flow and with increase in flow, the pressure in the system reduces due to pipe friction. While the model has slightly higher pressure than the hydrant test as seen in Figure 13, the existing pressure in the system during average day demand is expected to be higher than the test results due to the above-mentioned flow test conditions. Hence, the model is believed to be calibrated conservatively.

### 3.4.2 Model Scenarios

The following steady state scenarios were analyzed in the model to determine the appropriate pipe sizing and network capacity, as described in Table 10.

Scenario WM_0 was created without any demand to calibrate the model. It has been used as a baseline model for all subsequent scenarios. Four hydrants share the fire flow demand of 19,000 L/min (317 L/sec) in scenario WM_3.

**Table 10: Hydraulic Modelling Scenarios**

| Scenario ID | Proposed Network Demand |
|---|---|
| WM_0[1] | Baseline Condition, No Demand |
| WM_1 | PHD |
| WM_2[1] | MDD + FF |

[1] *A total fire demand of 13,800 L/min was applied to the model to observe pressure conditions under extreme demand scenario.*

### 3.4.3 Preliminary Results

Pressure results from the modelling software are available in metres of head and summarized in Table 11. Therefore, when reading the model results, the values that are acceptable are noted below in units as noted from the model as well as converted to the units as provided in the City's guidelines, below:

- Maximum velocity under FF = 1.8 m/s
- Maximum Head Loss under PHD is 0.53 m/1000m
- PHD pressure range of 344.7 kPa (35.16m = 50psi) to 358.9 kPa (36.6m = 52 psi)
- Minimum residual pressure during MDD + FF = 155.6 kPa (15.87m = 22.5 psi > 20 psi)
- Maximum static pressure = 373.04 kPa (38.04m = 54 psi) < 70 m (100psi)

**Table 11 Summary of pressure conditions during different demand scenarios**

| Scenario | Minimum Observed Pressure (m) | Maximum Observed Pressure (m) | Within Range? (Y/N) | Adequate Fire Flow? (Y/N) |
|---|---|---|---|---|
| WM_0 | 35.5 | 38.04 | Y | N/A |
| WM_1 | 33.8 | 36.6 | Y | N/A |
| WM_2 | 15.8 | 21.4 | Y | Y |

From the hydraulic modelling results, it is observed that R-1 has higher head than R-2. The non-fire demands are met by pump P1 and pump P2 acts as a secondary pump, suggesting that the water demands for the Hangar District are serviced by the southern connection at Garratt Boulevard during normal operating conditions. During fire scenario, both the pumps are actively supporting the water demand of the Subject Area suggesting that the water is being supplied to the proposed network within the Subject Area from the two modelled connections to the existing City system.

The MDD + FF scenario was further tested to identify the threshold FF demand for the Subject Area. It was observed that the pressure in the water system remains just above 20 psi (14 m) when FF demand of 13,800 L/min (230 L/sec) is applied to the hydraulic model. The hydraulic model is considered to show conservative results as the water is being supplied through two reservoirs whereas in reality the proposed network will have more than two connections to the City system which is anticipated to provide more pressure when a 230 L/s of fire demand is exerted. Additionally, the hydrant tests are performed around the noon time when higher demands are expected to be exerted on the network. Since, the hydraulic modelling results reflect the available pressure as noted by the hydrant flow test results, it is believed that the watermain system will have adequate flow and pressure to service the proposed development under all demand scenarios.

Based on the modelling results it is noted that the proposed water distribution system performance complies with the City standard requirements as mentioned in section 3.1. If the estimated FUS FF demand is larger than the

above estimated threshold value, and the pressure will drop below 14 m (20 psi) even after considering the adjacent upgrades, the following measures could be considered:

- Increase the proposed public watermain size to help alleviate pressure in the water system
- Identify critical locations in the system and add booster pumps to improve pressure conditions
- Further refine the adjacent hydrant test results to better understand pressure variation in the system. During the hydrant flow test results, the test operators noted that even with a higher flow being withdrawn from the flow hydrant, they were not able to observe desired reduction in the pressure at the test hydrant due to the presence of a pressure sustaining valve (PSV) in the region.

Full results and modelling outputs from the model scenarios are included in Appendix E.

## 3.5 Required Network Upgrades

All existing water system infrastructure will be removed as it is understood to be conflicting with the proposed road and building plans. Also, it is noted that the structural condition of the underground infrastructure is unknown.

New infrastructure per the proposed water network plans is required to support the development. This includes proposed watermains of 400mm and 300mm diameter along select public streets with adequate network appurtenances as discussed in section 3.3. It appears that at this stage, no network upgrades are required within existing adjacent municipal infrastructure to support proposed development within the Subject Area.

# 4. Stormwater Management

A Stormwater Management Report addressing grading, drainage, and stormwater management objectives has been prepared under a separate cover which should be read in conjunction with this report.

# 5. Conclusion

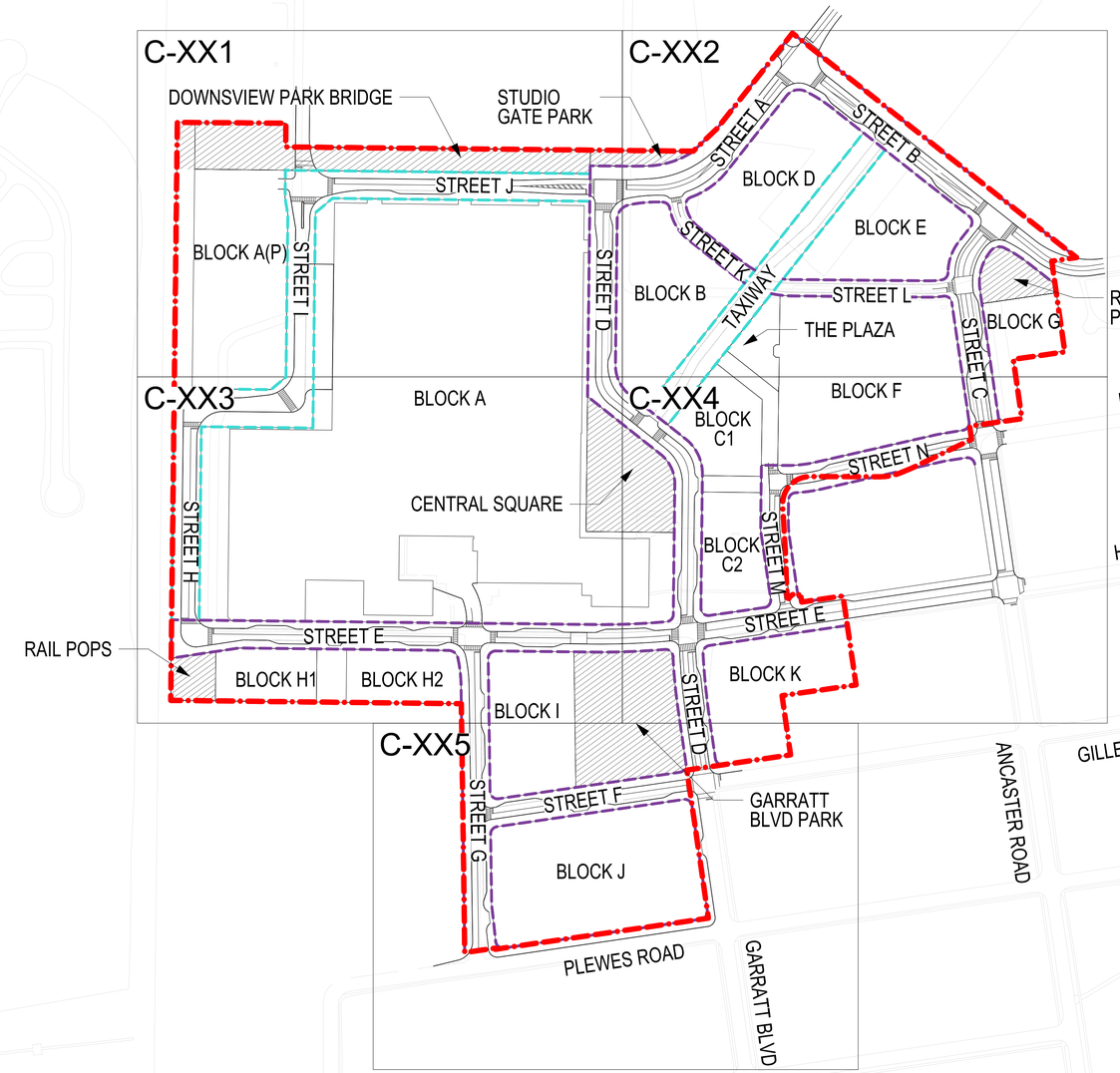
This report has summarized the preliminary servicing strategies for the Subject Area with respect to sanitary drainage and water supply. The Subject Area is located in the Taxiway West District of the Downsview Framework Plan and is the first of ten districts to be developed. The servicing strategy for the Subject Area is independent of Framework Plan level infrastructure.

In conclusion:

- All existing sanitary and water infrastructure within the Subject Area is to be abandoned or removed and replaced with new municipal sewers and watermains designed to meet relevant City criteria within select public Rights-of Way.
- All development blocks will be responsible for design and construction of infrastructure within the block boundary subject to approval through the Site Plan Application process.
- **Sanitary:** There is sufficient downstream sanitary capacity within the existing municipal network to accommodate flows from the development within the Subject Area. Additional flow monitoring and detailed modelling of the sanitary networks is being presented through the Master Environmental Servicing Plan (MESP) and Secondary Plan update. An upgrade to the existing sanitary sewer crossing under the railway corridor is required.
- **Water:** The proposed water supply servicing system complies with the City design criteria under Peak Hour Demand and Max. Day Demand scenarios. A conservative estimate was taken for Fire Flow demand; however, demands will require further refinement using the FUS method once relevant building information is available. A threshold fire flow demand of 230 L/s has been identified based on the current hydraulic model performance.
- **Stormwater:** A Stormwater Management Report has been prepared under a separate cover which should be read in conjunction with this report.

Further details to be provided at future phases of design, and as the MESP and Downsview Secondary Plan update progresses.

# Appendix 1: Civil Drawings




NOTES:

1. ALL DRAWING SERIES FOLLOW THIS KEY PLAN WITH THE EXCEPTION OF THE FOLLOWING:

C-311 - SANITARY CATCHMENT MAP

C-60X SERIES - UTILITY SECTIONS

2. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

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121 Bloor Street East, Suite 900
Toronto ON M4W 3M5 Canada
t: +1 (416) 515 0915
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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



Drawing Title
KEY PLAN

Scale SCALE: 1:2000 (0 50 80m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PC | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-002 | 3 |

PLOT BY:angus.wan PLOT TIME2023-07-05:37:15 PM FILEJ:\TOR\270000\272777-00\3 Design\3-04 BIM\3-04-30 Civil\06 Sheets\D001_Taxiway West\260341-ARP_CV-DRN-HD03-0002.dgn

22x34

# LEGEND:

## GENERAL:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

## GRADING PLAN :

- XXX.XX — EXISTING GRADE
- XXX.XX — PROPOSED GRADE
- XXX.XX — EXISTING CONTOUR LINES
- XXX.XX — PROPOSED CONTOUR LINES
- MAJOR OVERLAND FLOW DIRECTION
- 2% — SLOPE DIRECTION

## UTILITIES PLAN:

- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN
- PRIVATE STORM INFRASTRUCTURE
- PROPOSED JOINT USE TRENCH (HYDRO & TELECOMS)
- PROPOSED WATERMAIN
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED GAS MAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- EXISTING UTILITIES TO BE ABANDONED
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN

# GENERAL NOTES:

## EROSION AND SEDIMENT CONTROL

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED OR REPLACED WITHIN 48 HOURS OF INSPECTION OR BOTH.
2. ALL DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
3. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREA. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS AND A TORONTO REGION CONSERVATION AUTHORITY ENFORCEMENT OFFICE SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
4. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE AND REFUELING WILL BE CONDUCTED A MINIMUM OF 30 M FROM THE WATER.
5. ALL GRADES WITHIN THE REGULATORY FLOOD PLAN WILL BE MAINTAINED OR MATCHED.

## ADDITIONAL GENERAL NOTES - GRADING AND DRAINAGE

1. ALL ELEVATIONS ARE OF EDGE OF PAVEMENT, UNLESS OTHERWISE NOTED.
2. ALL COORDINATES ARE IN METER AND REFERENCED TO ZONE 10 OF THE ONTARIO COORDINATE SYSTEM NAD-27.
3. CONNECTION TO EXISTING NETWORKS IS SUBJECT TO AGREEMENT WITH STATUTORY AUTHORITIES AND APPROVING BODIES.
4. LOCATION AND EXTENT OF EXISTING SERVICES IS INDICATIVE ONLY AND IS INTENDED TO IDENTIFY APPROXIMATE LOCATION OF MAIN SERVICE CORRIDORS. FOR FULL DETAILS REFER TO UTILITY PROVIDERS RECORD DRAWINGS OR TOPOGRAPHICAL SURVEY.
5. CONFLICTS WITH EXISTING UTILITIES AND OTHER PROPOSED WORKS SHOULD BE NOTIFIED TO THE ENGINEER OF RECORD.
6. CONTRACTOR SHALL CONFIRM EXACT LIMITS OF GRADING AND PROVIDE SMOOTH TIE-IN TO EXISTING SURFACES IN THE FIELD.
7. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SURFACES TOWARDS CATCHBASINS OR DRAINAGE FEATURES AT TIE-INS TO EXISTING SURFACES AND ALL LOCATIONS WITHIN PROJECT LIMITS. CONTRACTOR SHALL NOTIFY CONTRACT ADMINISTRATOR PRIOR TO COMMENCING WORKS IF SITE CONDITIONS DO NOT ACHIEVE POSITIVE DRAINAGE.
8. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SUB-GRADE TOWARDS SUBDRAINS AND A MINIMUM 0.5% SLOPE FOR SUBDRAIN AND ITS OUTLET PIPE.
9. CROSSFALLS AND ELEVATIONS PROVIDED IN TYPICAL SECTIONS DRAWINGS ARE FOR INFORMATION ONLY. REFER TO GRADING AND DRAINAGE DRAWINGS FOR DETAILS AND PROPOSED ELEVATIONS.

## ADDITIONAL GENERAL NOTES - REMOVALS

1. LIMITS OF WORK WILL INCLUDE REMOVALS OF AREAS AND OTHER INFRASTRUCTURE (RAILINGS, FURNITURE, ETC.) ON PRIVATE PROPERTY. EXACT LIMITS AND REQUIREMENTS WILL BE DETERMINED ON-SITE. CONTRACTOR TO COORDINATE WITH AFFECTED PROPERTY OWNERS ON REINSTATEMENT OF REMOVED PRIVATE ELEMENTS DISTURBED DURING PROJECT CONSTRUCTION.
2. UNLESS OTHERWISE NOTED, SALVAGE MATERIALS REMOVED FROM PRIVATE PROPERTY FOR REUSE / DISPOSAL BY OWNER.
3. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SITE FURNITURE (TRASH RECEPTACLES, BENCHES, SIGN POSTS, INFORMATION PILLARS, ETC.) WITHIN THE LIMITS OF WORK TO BE REMOVED BY THE CITY OF TORONTO (OR ITS AGENT).
4. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SIGNAGE WITHIN THE LIMITS OF WORK TO BE REMOVED FOR REUSE / RETURN TO THE CITY.
5. ALL REFUSE, DEBRIS AND MISCELLANEOUS ITEMS TO BE REMOVED. THAT ARE NOT TO BE STOCKPILED FOR LATER USE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF-SITE BY THE CONTRACTOR.
6. CONTRACTOR RESPONSIBLE FOR IDENTIFICATION, MAINTENANCE, PROTECTION, ETC. OF ANY PRIVATE IRRIGATION, ELECTRICAL AND LIGHTING SYSTEMS WITHIN THE PUBLIC AND PRIVATE RIGHT-OF-WAY THAT MAY BE ENCOUNTERED WHICH ARE NOT SHOWN ON THE DRAWINGS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND SHRUBS DESIGNATED TO REMAIN FOR THE LENGTH OF THE CONSTRUCTION PERIOD. REFER TO ARBORIST REPORTS FOR TREE REMOVAL AND PROTECTION. THE PLACEMENT OF PROTECTION DEVICES ADDITIONAL TO THOSE SPECIFIED SHALL, HOWEVER, BE AT THE CONTRACTORS DISCRETION.

## EXISTING UTILITIES GENERAL NOTES:

1. EXISTING UTILITIES SHOWN ARE BASED ON BACKGROUND INFORMATION SUPPLED BY CLIENT, UTILITY COMPANIES AND CITY OF TORONTO. INFORMATION INCLUDES BUT NOT LIMITED TO RECORD DESIGN DRAWINGS, AS-BUILT DRAWINGS, AND SUBSURFACE UTILITY ENGINEERING (SUE) INVESTIGATION INFORMATION BY CLIENT.
2. LOCATIONS AND SIZES OF ALL UTILITY SERVICE CONNECTIONS ARE BASED ON AVAILABLE RECORDS AND MUST BE FIELD VERIFIED PRIOR TO ANY CONSTRUCTION ACTIVITIES.

## SANITARY AND STORM SEWERS:

1. MAIN LINE PVC PIPE SHALL BE DR 35 UNLESS NOTED OTHERWISE.
2. SANITARY SERVICE CONNECTIONS SHALL BE SINGLE, 200 mm DIAMETER MINIMUM, PVC DR 28 INSTALLED AT 2 PERCENT.
3. BEDDING MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A NATIVE OR GRANULAR A RCM ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
4. BEDDING FOR RIGID PIPE SHALL BE CLASS B BEDDING MATERIAL ACCORDING TO OPSD 802.031 AND USING GRANULAR A NATIVE OR GRANULAR A RCM BEDDING MATERIAL ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98 % OF MAXIMUM DRY DENSITY.
5. MAINTENANCE HOLES SHALL BE ACCORDING TO T-701.010 (1200 mm), T-701.011 (1500 mm), T-701.012-1 (1800 mm) OR T-701.013 (2400 mm). FRAME AND COVER SHALL BE ACCORDING TO OPSD 401.010 TYPE A CLOSED (SANITARY AND STORM).
6. MAINTENANCE HOLE CHAMBER OPENINGS MUST BE LOCATED ON THE UPSTREAM SIDE OF THE MAINTENANCE HOLE UNLESS OTHERWISE SPECIFIED.
7. BENCHING DETAILS SHALL BE ACCORDING TO T-701.021 OR AS SHOWN ON THE DRAWINGS.
8. SANITARY MAINTENANCE HOLES SHALL HAVE WATERTIGHT FRAMES AND COVERS IN PONDING AREAS ACCORDING TO OPSD 401.030.
9. SINGLE CATCHBASINS SHALL BE ACCORDING TO T-705.010 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED. FRAME AND COVER SHALL BE ACCORDING TO OPSD 400.070.
10. SINGLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.010-1. DOUBLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.020-1.
11. DOUBLE CATCHBASINS SHALL BE ACCORDING TO T-705.020 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED.
12. CATCHBASIN LEADS TO BE 250 mm PVC DR 35 FOR SINGLE CATCHBASINS AND 300 mm PVC DR 35 FOR DOUBLE CATCHBASINS.
13. CONNECTION DETAIL FOR SEWER PIPE AT CATCHBASINS AND MAINTENANCE HOLES SHALL BE ACCORDING TO T-708.020.

## WATERMAINS

1. REMOVAL AND ABANDONMENT OF EXISTING TORONTO WATER INFRASTRUCTURE PER CITY OF TORONTO SPECIFICATION TS 510.
2. BACKFILLING IN PAVEMENT PER CITY OF TORONTO SPECIFICATION TS 4.60.07.02.03.
3. PVC WATERMAINS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPES RANGING IN SIZE FROM 100 mm TO 300 mm IN DIAMETER PRESSURE CLASS 235 AWWA C909-09. PVC PIPES RANGING IN SIZE FROM 350 mm THROUGH 600 mm IN DIAMETER, SHALL BE PRESSURE RATING 235, DR 18, ACCORDING TO AWWA C905-10.
4. EMBEDMENT MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
5. MINIMUM COVER ON WATERMAINS SHALL BE 1.8 m.
6. ALL HYDRANTS SHALL BE CONSTRUCTED ACCORDING TO T-1105.01.
7. HYDRANT LEADS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR PRESSURE CLASS 235 AWWA C909-09.
8. ALL SERVICE CONNECTIONS SHALL BE CONSTRUCTED ACCORDING TO T-1104.01, T-1104.02-1, T-1104.02-3, T-1105.02-1 AND T-1105.02-2.
9. SINGLE WATER SERVICE CONNECTIONS SHALL BE A MINIMUM OF 19mm DIA. TYPE "K" SOFT COPPER ACCORDING TO T-1104.01. WHEN SERVICE LENGTH EXCEEDS 30 m, THE DIAMETER SHALL BE 25 mm DIA.
10. ALL CURB AND VALVE BOXES TO BE LOCATED AT STREET LINE.
11. MECHANICAL THRUST RESTRAINTS SHALL BE INSTALLED AT ALL FITTINGS, BENDS, TEES, CROSSES, REDUCERS AND VALVES FOR ALL WATERMAIN SIZES. MECHANICAL RESTRAINTS AT JOINTS SHALL BE INSTALLED AT EVERY PIPE JOINT 6.1 m OF EITHER SIDE OF THE VALVE FOR WATERMAINS 100 mm DIAMETER OR LARGER UNLESS OTHERWISE NOTED.
12. ALL TEES, PLUGS, HORIZONTAL, VERTICAL BENDS, REDUCERS AND HYDRANTS USED WITH WATERMAIN DIAMETER UP TO 300mm TO HAVE CONCRETE THRUST BLOCKS ACCORDING TO T-1103.01 AND T-1103.020 UNLESS OTHERWISE NOTED.
13. WATERMAINS MUST FOLLOW THE ONTARIO MINISTRY OF THE ENVIRONMENT PROCEDURE F-6-1 THAT GOVERN THE SEPARATION OF SEWERS AND WATERMAINS. A MINIMUM VERTICAL CLEARANCE OF 0.30 m WHEN CROSSING OVER AND 0.5 m WHEN CROSSING UNDER SEWERS AND ALL OTHER UTILITIES IS REQUIRED. MUST ALSO MAINTAIN 2.5 m HORIZONTAL SEPARATION WITH SEWERS.
14. CITY IN-SERVICE WATER VALVES, CURB STOPS, FIRE HYDRANTS CAN ONLY BE OPERATED BY TORONTO WATER STAFF.
15. ALL NEW WATERMAINS SHALL BE INSULATED WHERE THE COVER IS LESS THAN 1.65 m ACCORDING TO T-708.01-4.
16. ALL SERVICE CONNECTIONS SHALL BE REPLACED UP TO PROPERTY LINES.

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

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ARUP

121 Bloor Street East, Suite 900
Toronto ON M4W 3M5 Canada
t: +1 (416) 515 0915
www.arup.com


Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
GENERAL NOTES AND LEGEND

Scale
NOT TO SCALE

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PC | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-003 | 3 |

22x34

FUTURE FILM STUDIO CAMPUS

DOWNSVIEW PARK BRIDGE

STREET J

BLOCK A(P)

STREET I

BLOCK A

STREET D

STREET D

MATCHLINE C-202

FOR CONTINUATION SEE DWG.

MATCHLINE C-203

FOR CONTINUATION SEE DWG.

PUBLIC UTILITIES PLAN

NORTHWEST SIDE

1 C-201

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. R. T. JEENS
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PROVINCE OF ONTARIO

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Client

NORTHCREST DEVELOPMENTS

Job Title

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123 GARRATT BOULEVARD

Key Plan




Drawing Title

PUBLIC UTILITIES PLAN
SHEET 1 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-201 | 4 |


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Ove Arup & Partners Consulting Engineers PC

22x34

FOR CONTINUATION SEE DWG. **MATCHLINE** C-201

STUDIO GATE PARK

STREET A

STREET B

BLOCK D

BLOCK E

TAXIWAY

STREET K

STREET L

BLOCK B

TAXIWAY

ROBERT LEEK
PARK EXTENSION

HANOVER ROAD

STREET C

BLOCK G

THE PLAZA

BLOCK F

**MATCHLINE** C-204
FOR CONTINUATION SEE DWG.

# PUBLIC UTILITIES PLAN
NORTHEAST SIDE

1
C-202

NOTES:

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| 2 | 14-03-22 | DRAFT SUBMISSION |
| 1 | 17-01-22 | DRAFT SUBMISSION |

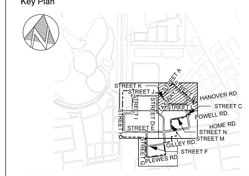

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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 2 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-202 | 4 |

22x34

FOR CONTINUATION SEE DWG.
MATCHLINE
C-201

BLOCK A

CENTRAL SQUARE

STREET H

THE COURTYARD

HANGAR COURT

WATER AND FIRE CONNECTION FOR BLOCK A

STREET E

STREET E

STREET G

RAIL POPS

BLOCK H1

BLOCK H2

BLOCK I

GARRATT BLVD PARK

MATCHLINE
C-204
FOR CONTINUATION SEE DWG.

MATCHLINE
C-205
FOR CONTINUATION SEE DWG.

PUBLIC UTILITIES PLAN
SOUTHWEST SIDE
1
C-203

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 4 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 3 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 2 | 14-03-22 | DRAFT SUBMISSION |
| 1 | 17-01-22 | DRAFT SUBMISSION |

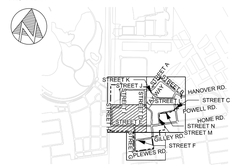

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Client
NORTHCREST DEVELOPMENTS

Job Title
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123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 3 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-203 | 4 |

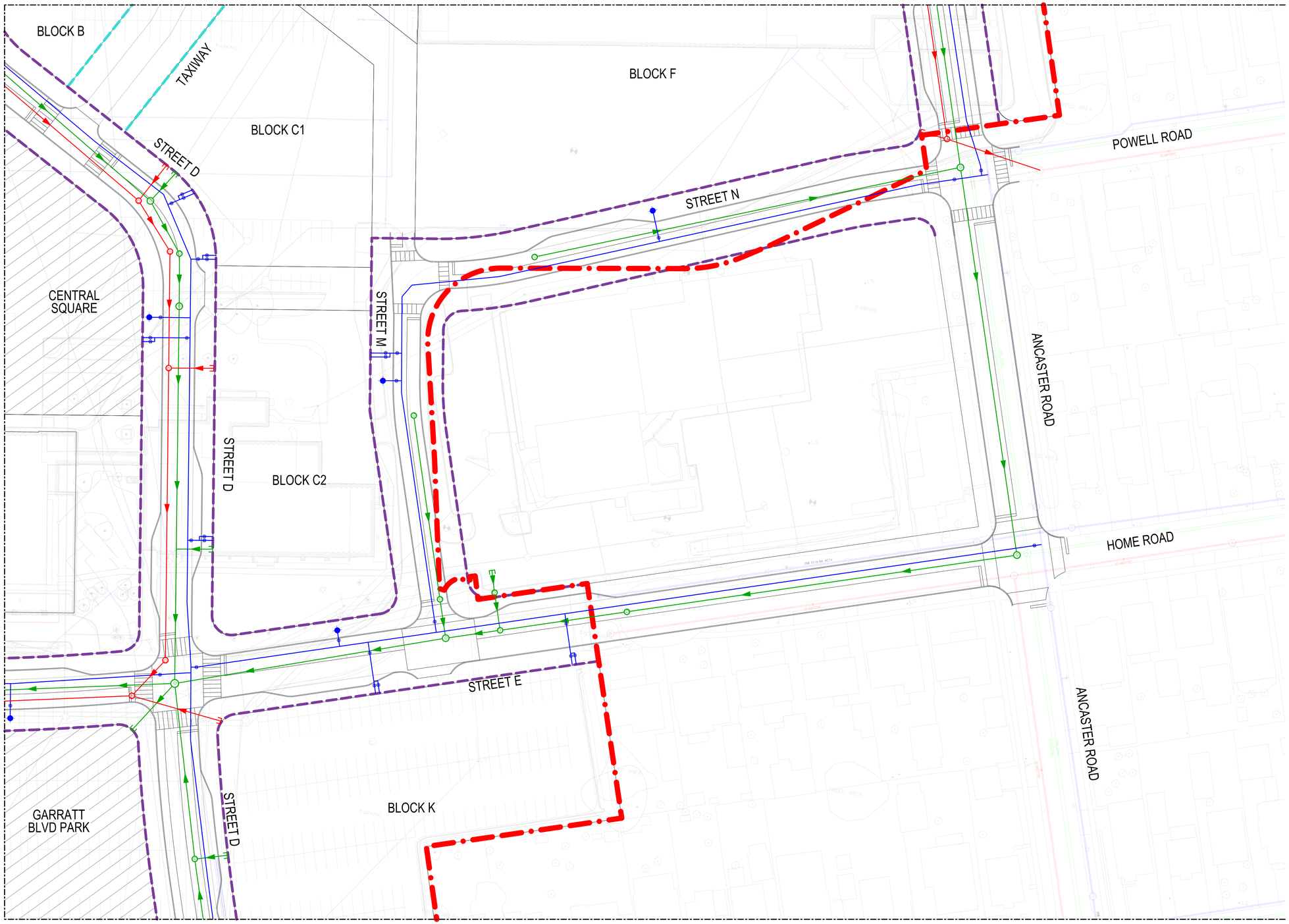

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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-203

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-202




**MATCHLINE**
C-205
FOR CONTINUATION SEE DWG.

## PUBLIC UTILITIES PLAN
SOUTHEAST SIDE
1
C-204

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. T. JEENS
100517802
PROVINCE OF ONTARIO

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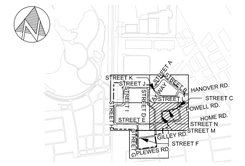

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Client
NORTHCREST DEVELOPMENTS

Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 4 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-204 | 4 |


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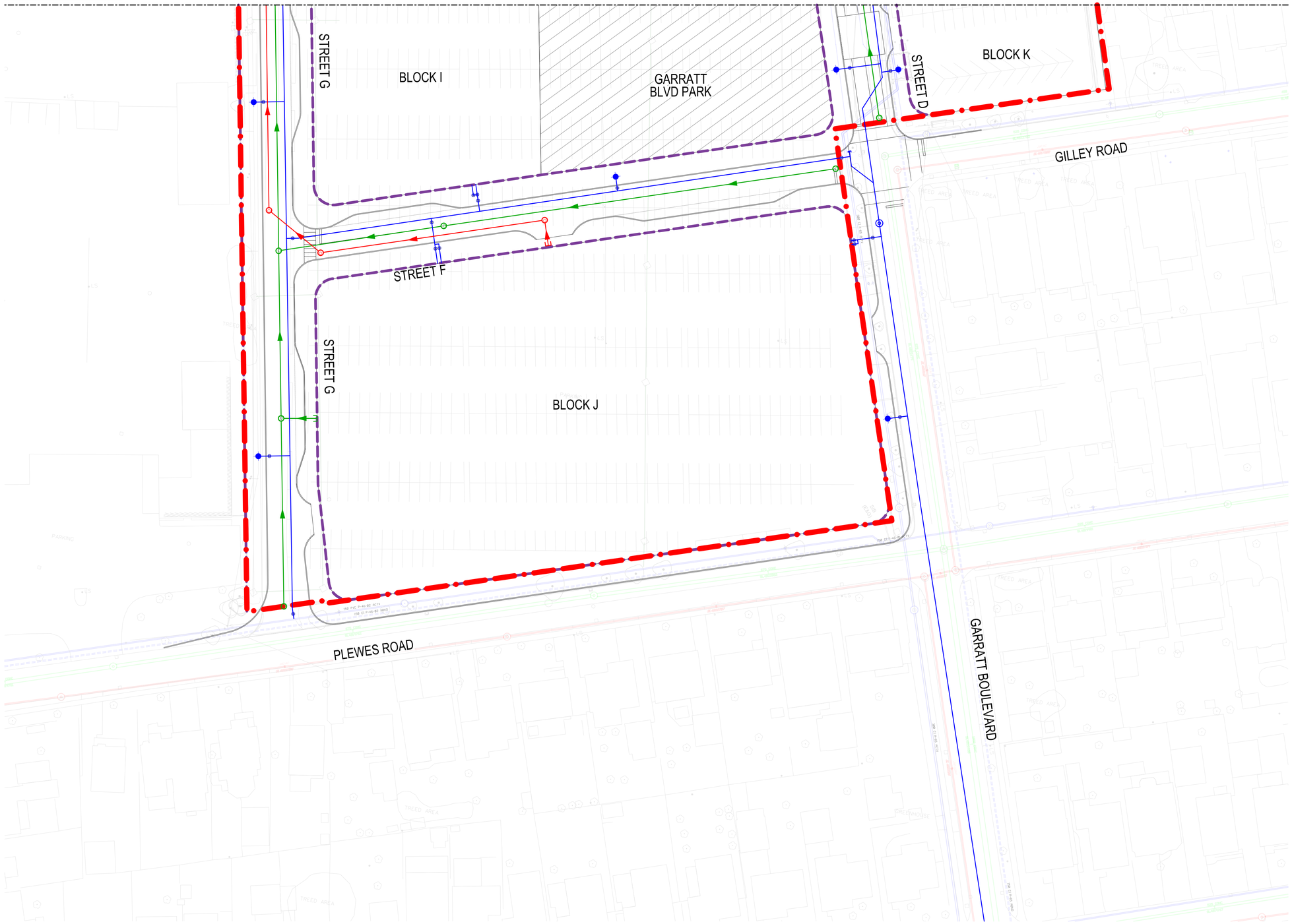


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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-203

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-204




## PUBLIC UTILITIES PLAN
SOUTH SIDE

1
C-205

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. A. T. JEENS
100517802
PROVINCE OF ONTARIO

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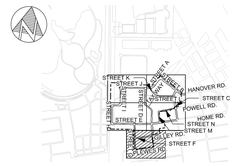

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Client
NORTHCREST DEVELOPMENTS

Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
PUBLIC UTILITIES PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

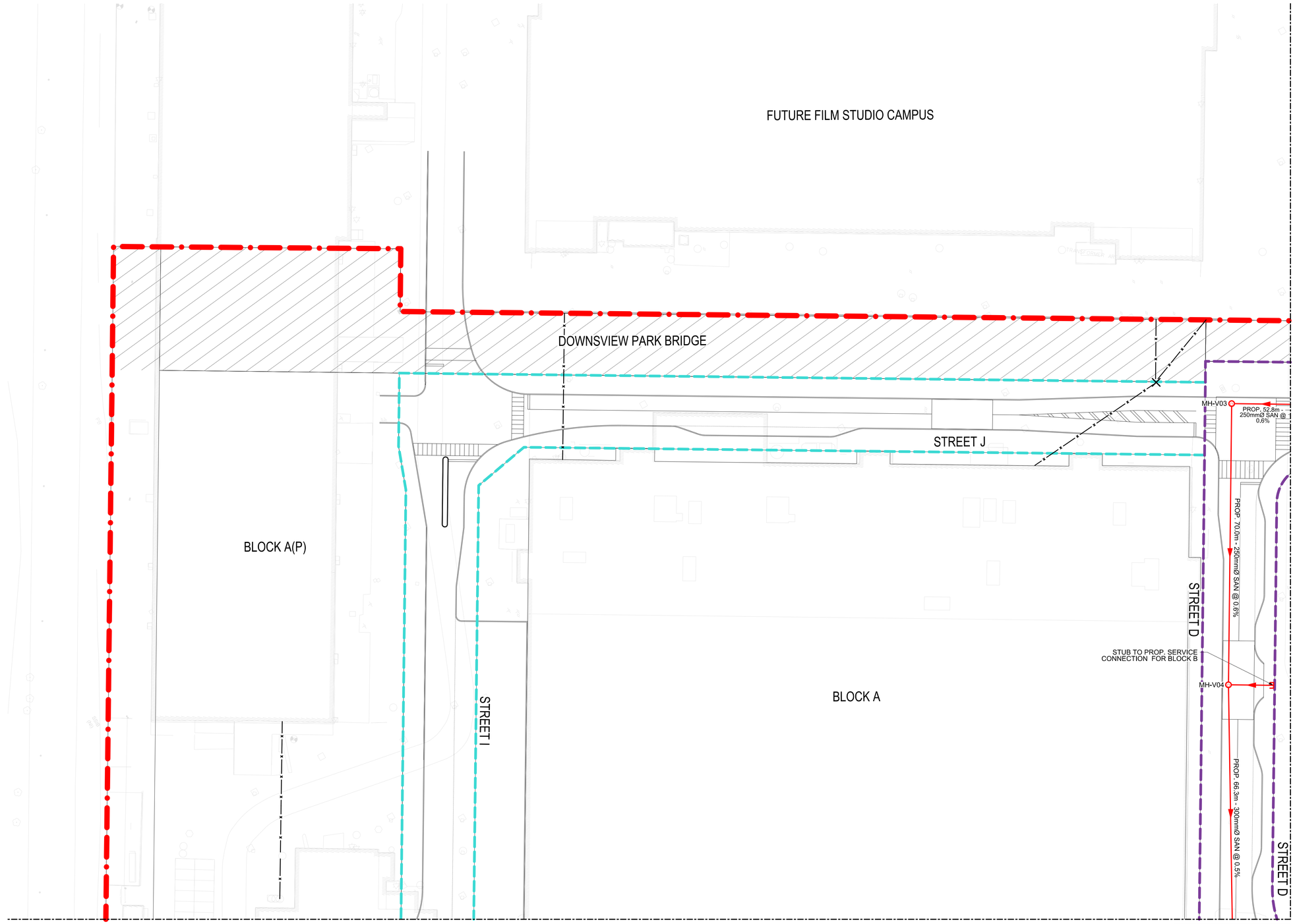
Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-205 | 4 |




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22x34




# SANITARY SERVICING PLAN

NORTHWEST SIDE

1
C-301

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
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PROVINCE OF ONTARIO

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NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

SANITARY SERVICING PLAN
SHEET 1 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-301 | 3 |

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22x34


FOR CONTINUATION SEE DWG.
MATCHLINE
C-301
STREET A
STREET B
STREET K
STREET L
STREET C
TAXIWAY
TAXIWAY
STUDIO GATE PARK
BLOCK D
BLOCK E
BLOCK B
BLOCK F
BLOCK G
THE PLAZA
ROBERT LEEK
PARK EXTENSION
HANOVER ROAD
PROP. CONNECTION TO
STUDIO CAMPUS
MH-V01
MH-V02
PROP. 29.9m - 250mmØ
SAN @ 1.00%
PROP. 52.8m - 250mmØ
SAN @ 0.6%
STUB TO PROP. SERVICE
CONNECTION FOR BLOCK D
STUB TO PROP. SERVICE
CONNECTION FOR BLOCK E
MH-V11
PROP. 52.5m - 250mmØ SAN @ 1.0%
MH-V12
PROP. 46.0m
250mmØ
SAN @ 0.5%
STUB TO PROP. SERVICE
CONNECTION FOR BLOCK G
PARKING
PARKING
PARKING

22x34

FOR CONTINUATION SEE DWG.
MATCHLINE
C-201

STUB TO PROP. SERVICE CONNECTION FOR BLOCK A (NORTH)
MH-V05

BLOCK A

CENTRAL SQUARE

STREET H

THE COURTYARD

HANGAR COURT

ALLOWANCE FOR PROPOSED PROVATE SERVICE TO BLOCK A(P) (IF REQUIRED)

STUB TO PROP. SERVICE CONNECTION FOR BLOCK A (SOUTH)

PROP. 19.7m - 375mmØ SAN @ 0.65%

MH-H04

PROP. 64.5m - 375mmØ SAN @ 0.5%

MH-H03

PROP. 107.7m - 375mmØ SAN @ 0.5%

MH-H02

PROP. 79.6m - 300mmØ SAN @ 0.9%

PROP. 51.9m - 300mmØ SAN @ 0.9%

MH-H01

STREET E

MH-H5

STUB TO PROP. SERVICE CONNECTION FOR BLOCK H1 and H2

SANITARY CROSSING UNDER RAIL TO CONNECT TO EX. MH52A AT STANLEY GREENE.

RAIL POPS

BLOCK H1

BLOCK H2

PROP. 40.2m - 250mmØ SAN @ 0.5%

STREET G

BLOCK I

GARRATT BLVD PARK

MH-A04

PROP. 64.8m - 250mmØ SAN @ 0.5%

STUB TO PROP. SERVICE CONNECTION FOR BLOCK I

MATCHLINE
C-304
FOR CONTINUATION SEE DWG.

MATCHLINE
C-305
FOR CONTINUATION SEE DWG.

## SANITARY SERVICING PLAN
SOUTHWEST SIDE

1
C-303

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
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- PRIVATE ROW
- PARKS

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100517802
PROVINCE OF ONTARIO

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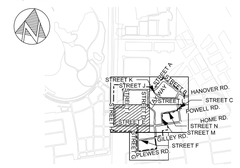

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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
SANITARY SERVICING PLAN
SHEET 3 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-303 | 3 |

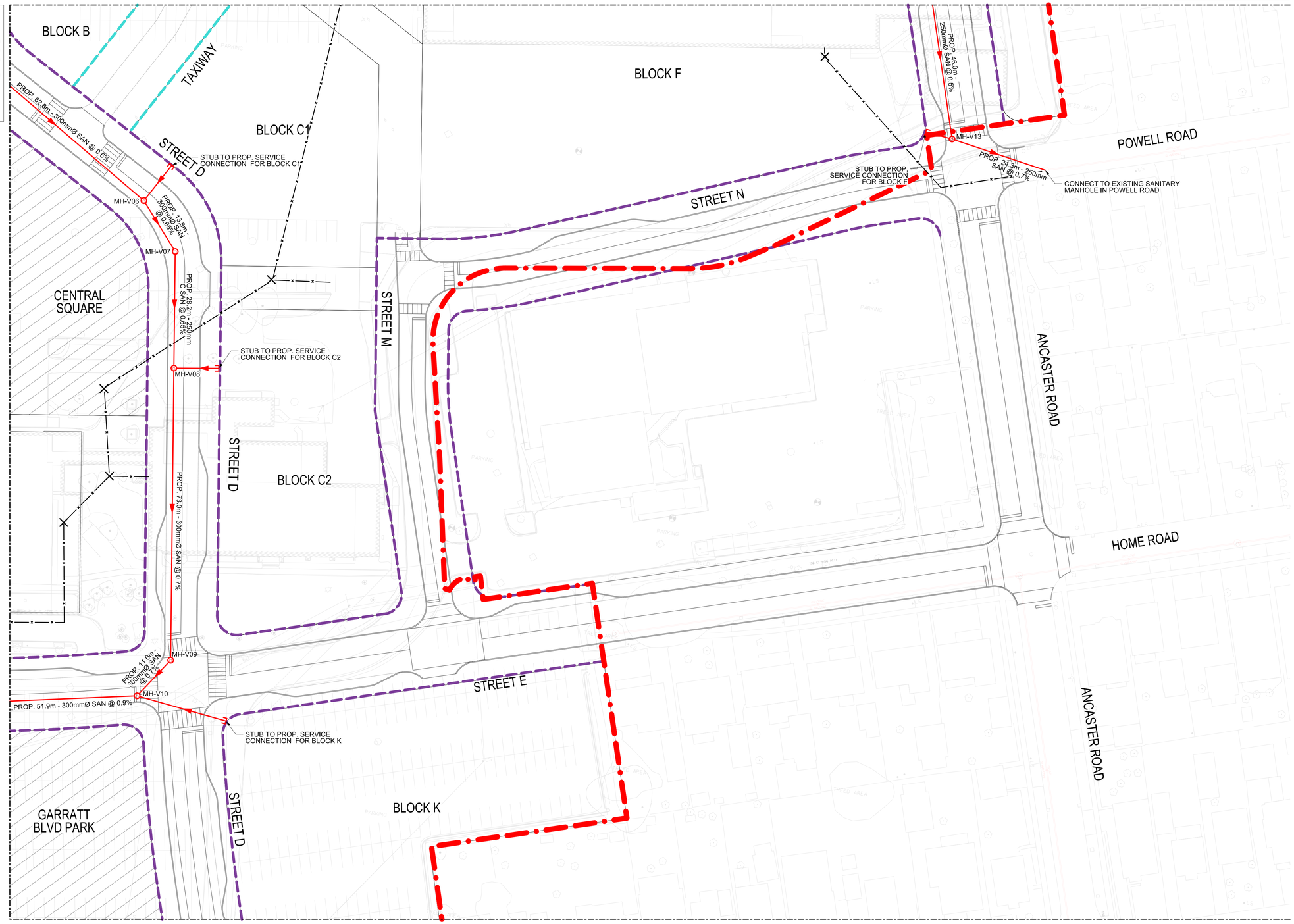

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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-303

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-302




**MATCHLINE**
C-305
FOR CONTINUATION SEE DWG.

## SANITARY SERVICING PLAN
SOUTHEAST SIDE

1
C-304

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

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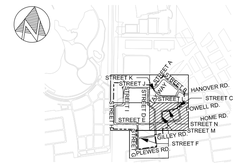

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Client
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Job Title
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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
SANITARY SERVICING PLAN
SHEET 4 OF 5

Scale SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-304 | 3 |

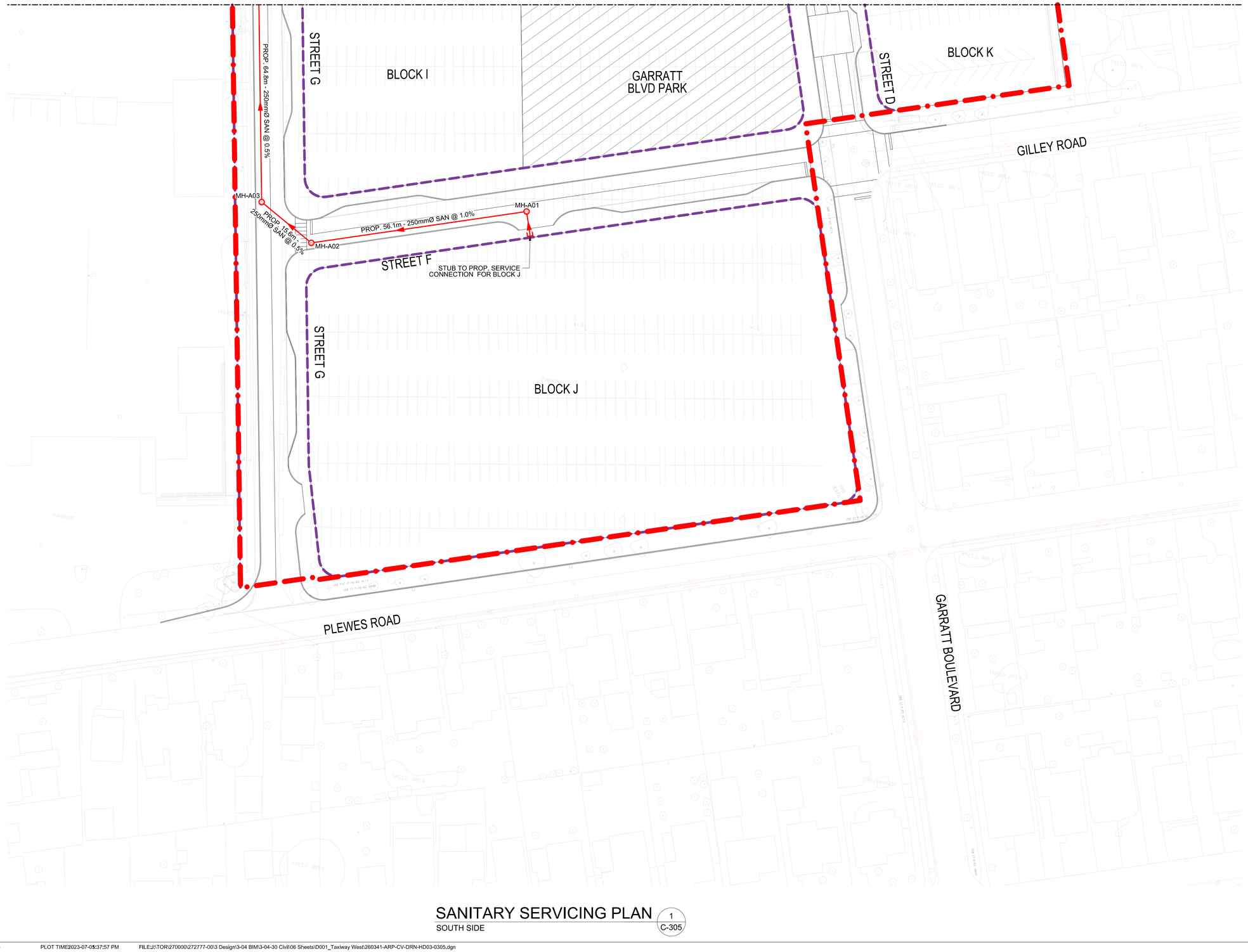



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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-303

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-304




NOTES:

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PROVINCE OF ONTARIO

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Key Plan




Drawing Title
SANITARY SERVICING PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | AS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

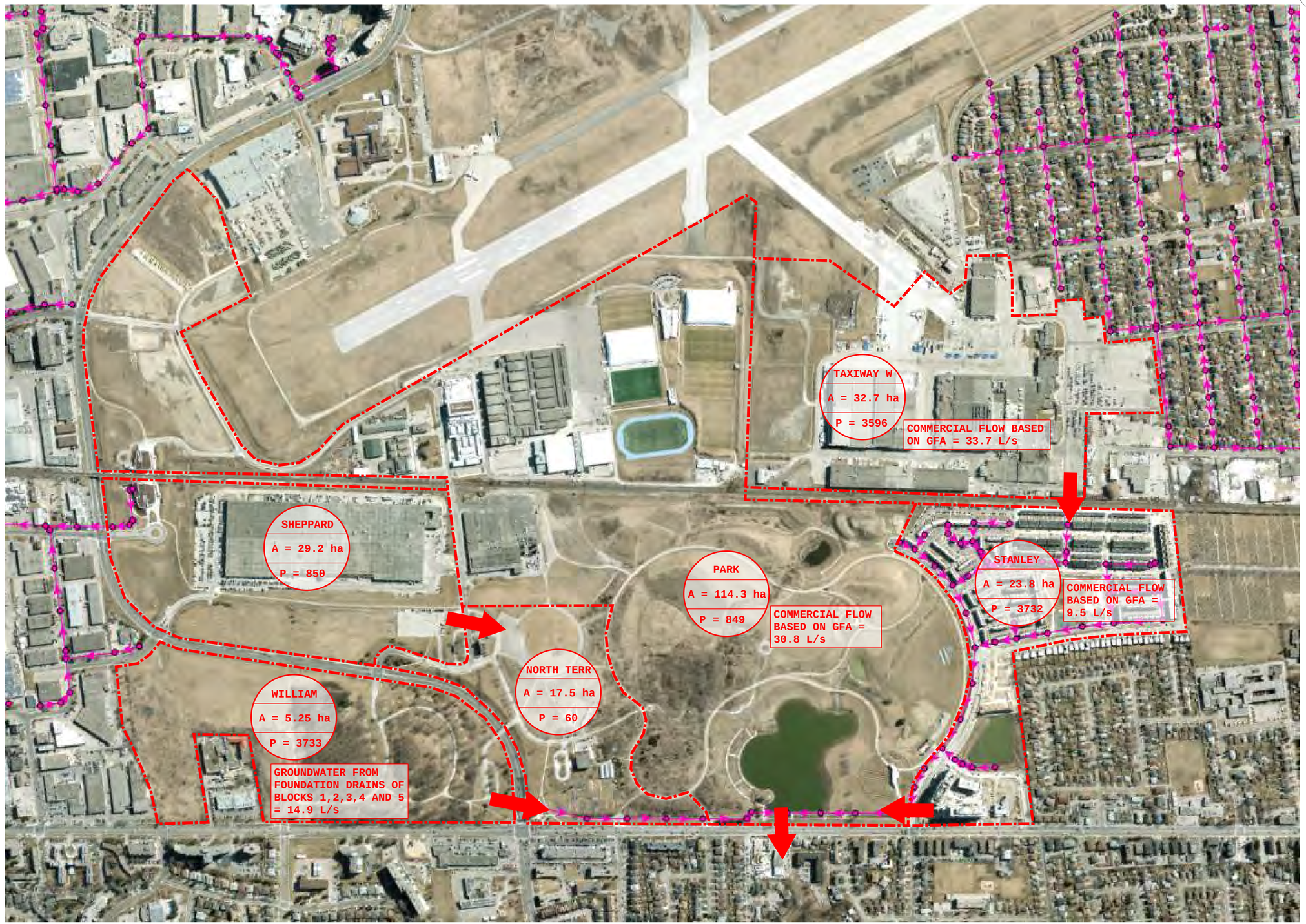
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|---|---|---|
| 260341-00 | C-305 | 3 |

SANITARY SERVICING PLAN
SOUTH SIDE
1
C-305




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22x34




# SANITARY CATCHMENT MAP

PROPOSED

1
C-311

LEGEND

- SANITARY DRAINAGE BOUNDARY
- XXXXX / A = X.X ha / P = XXX — IDENTIFICATION / AREA IN HECTARES / POPULATION
- FLOW DIRECTION

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H. A. T. JEENS
100517802
PROVINCE OF ONTARIO

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Key Plan




Drawing Title

SANITARY CATCHMENT MAP
PROPOSED
SHEET 1 OF 1

Scale: NOT TO SCALE

| Drawn | Designed | Checked | Approved |
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| AW | AS | PP | HJ |

Drawing Status: DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

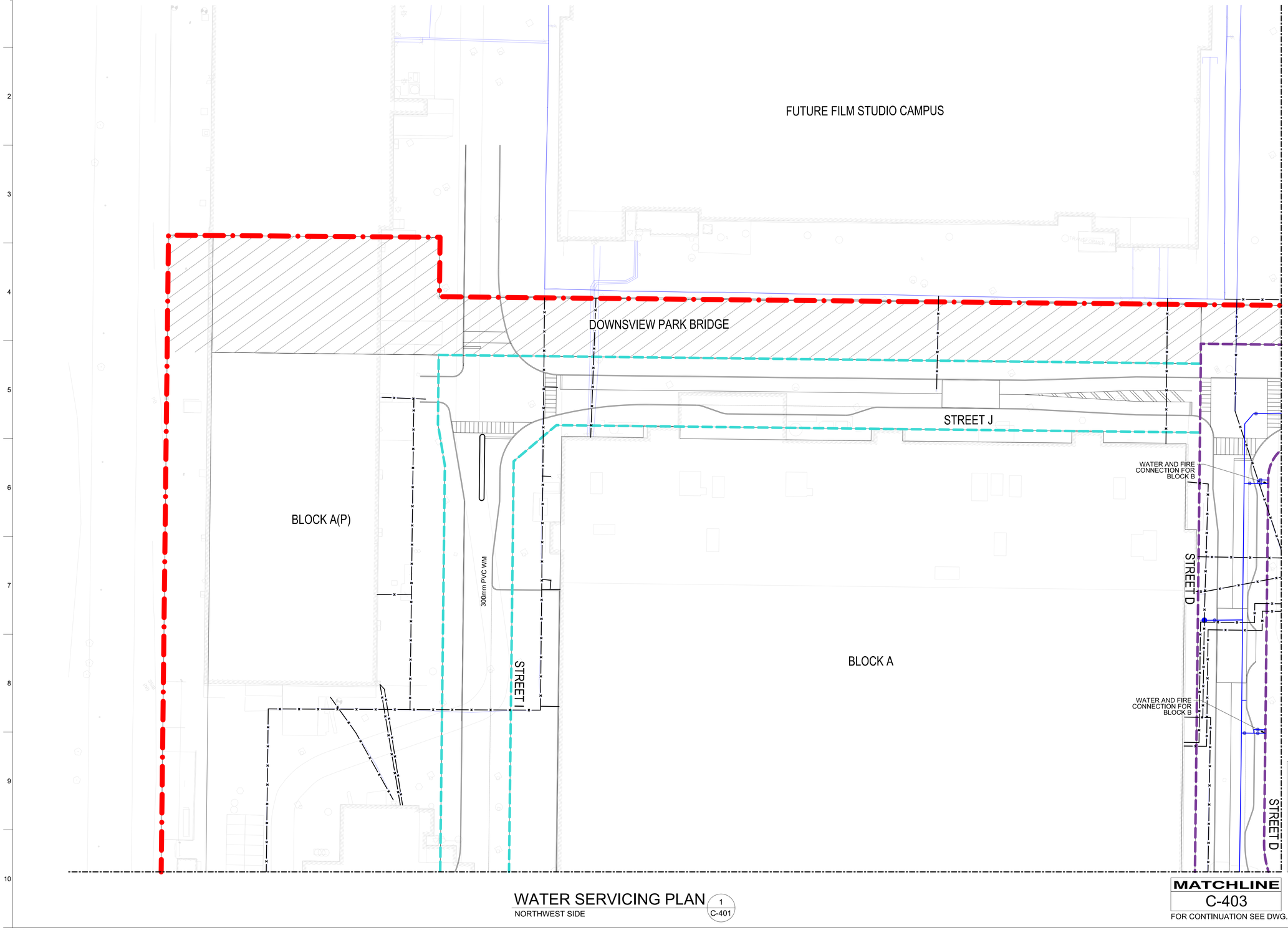
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| 260341-00 | C-311 | 3 |


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22x34




# WATER SERVICING PLAN

NORTHWEST SIDE

1
C-401

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

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NORTHCREST DEVELOPMENTS

Job Title

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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

WATER SERVICING PLAN
SHEET 1 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

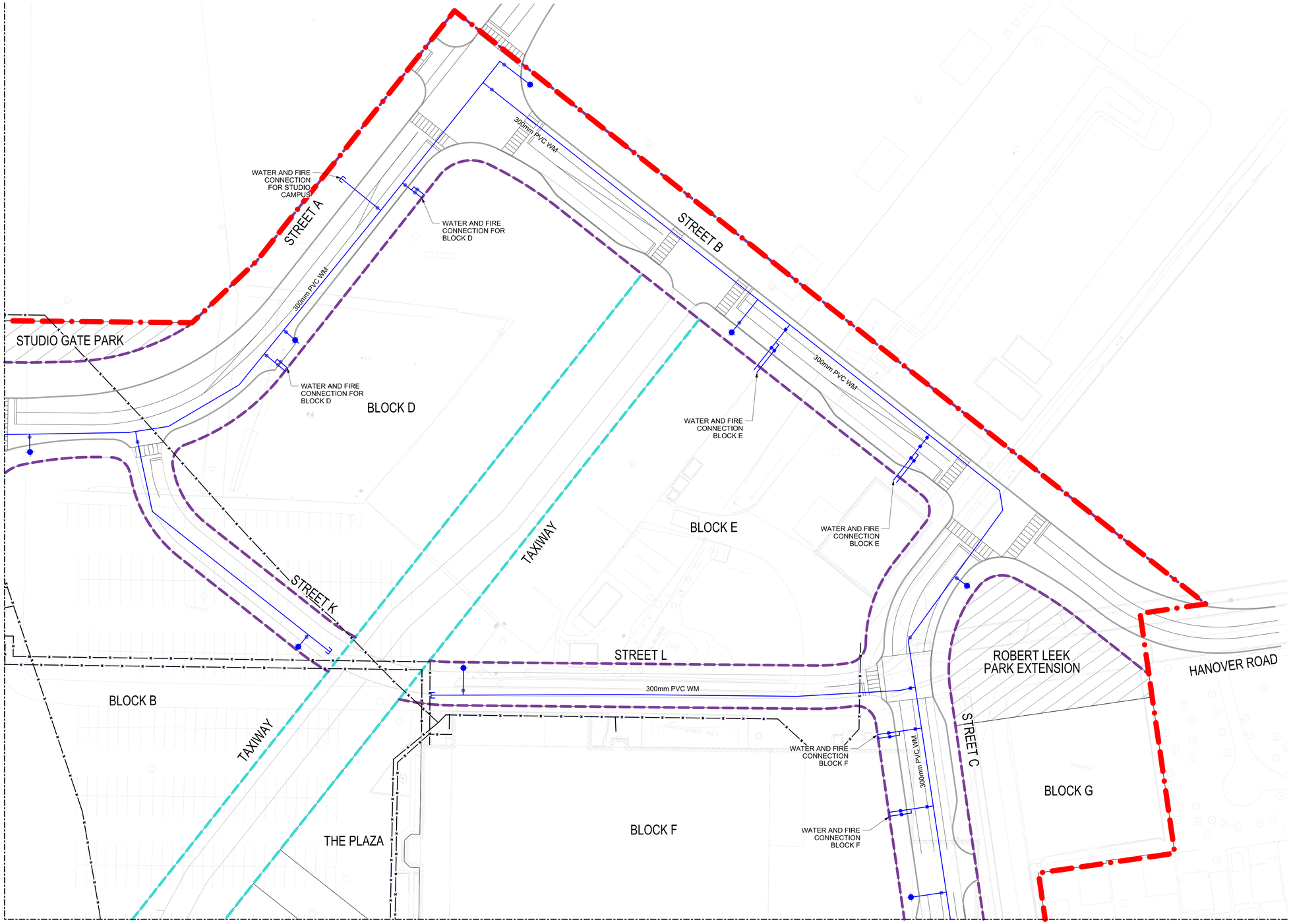
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| 260341-00 | C-401 | 3 |

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22x34

FOR CONTINUATION SEE DWG. **MATCHLINE C-401**




## WATER SERVICING PLAN
NORTHEAST SIDE

1
C-402

**MATCHLINE C-404**
FOR CONTINUATION SEE DWG.

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |


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Client
NORTHCREST DEVELOPMENTS

Job Title
THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
WATER SERVICING PLAN
SHEET 2 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-402 | 3 |




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22x34

FOR CONTINUATION SEE DWG.
MATCHLINE
C-401

BLOCK A

CENTRAL SQUARE

STREET H

ALLOWANCE FOR PROPOSED PRIVATE SERVICE TO BLOCK A (IF REQUIRED)

THE COURTYARD

HANGAR COURT

WATER AND FIRE CONNECTION FOR BLOCK A

300mm PVC WM

300mm PVC WM

STREET E

STREET E

WATER AND FIRE CONNECTION FOR BLOCK H1

WATER AND FIRE CONNECTION FOR BLOCK H2

WATER AND FIRE CONNECTION FOR BLOCK I

PROP. CONNECTION FOR PARK

STREET G

RAIL POPS

BLOCK H1

BLOCK H2

BLOCK I

GARRATT BLVD PARK

MATCHLINE
C-404
FOR CONTINUATION SEE DWG.

MATCHLINE
C-405
FOR CONTINUATION SEE DWG.

## WATER SERVICING PLAN
SOUTHWEST SIDE

1
C-403

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. R. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

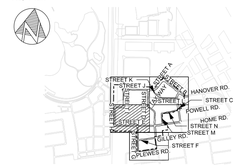

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Client
NORTHCREST DEVELOPMENTS

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THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
WATER SERVICING PLAN
SHEET 3 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-403 | 3 |


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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-403

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-402

BLOCK B
TAXIWAY
BLOCK C1
STREET D
WATER AND FIRE CONNECTION FOR BLOCK C1
WATER AND FIRE CONNECTION FOR BLOCK C1
CENTRAL SQUARE
WATER AND FIRE CONNECTION FOR CENTRAL SQUARE
400mm PVC WM
400mm PVC WM
STREET D
BLOCK C2
WATER AND FIRE CONNECTION FOR BLOCK C2
400mm PVC WM
BLOCK F
STREET N
300mm PVC WM
CONNECT TO EX. WATERMAIN ON POWELL ROAD
POWELL ROAD
STREET M
300mm PVC WM
WATER AND FIRE CONNECTION FOR BLOCK C2
ANCASTER ROAD
HOME ROAD
CONNECT TO EX. WATERMAIN ON HOME ROAD
300mm PVC WM
300mm PVC WM
STREET E
WATER AND FIRE CONNECTION FOR BLOCK K
WATER AND FIRE CONNECTION FOR BLOCK K
ANCASTER ROAD
GARRATT BLVD PARK
STREET D
BLOCK K

**MATCHLINE**
C-405
FOR CONTINUATION SEE DWG.

# WATER SERVICING PLAN
SOUTHEAST SIDE
1
C-404

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

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- PARKS

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H. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
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| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

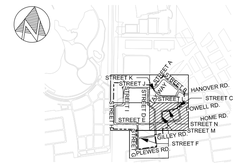

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FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
WATER SERVICING PLAN
SHEET 4 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-404 | 3 |

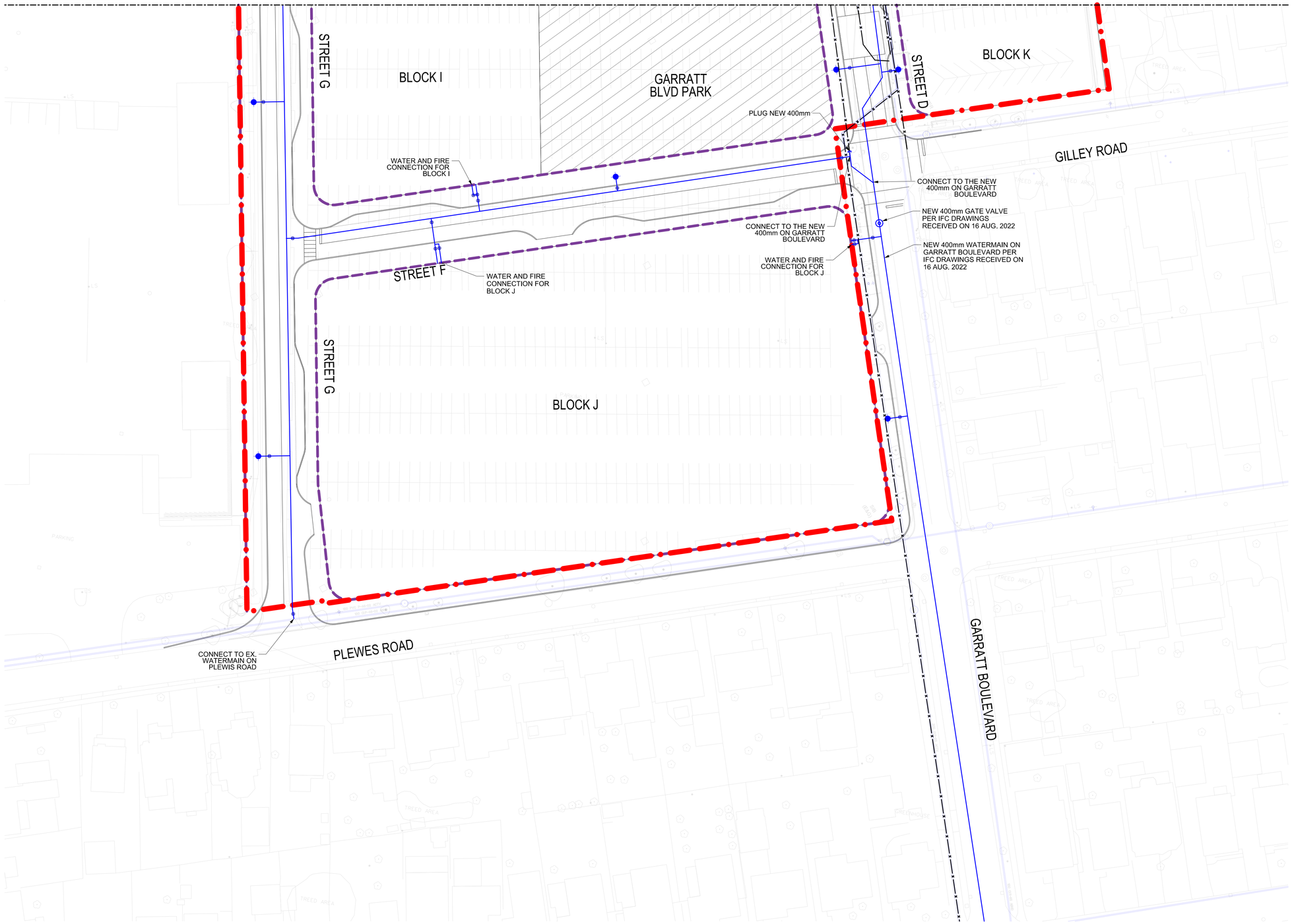



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22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-403

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-404




# WATER SERVICING PLAN
SOUTH SIDE

1
C-405

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

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Key Plan




Drawing Title
WATER SERVICING PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PS | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-405 | 3 |

# Appendix 2: Sanitary Calculations

| ARUP | Job No. | Sheet No. | Rev. |
|---|---|---|---|
| | 260341-00 | SAN-001 | 1 |
| | Member/Location | Toronto | |
| Job Title: The Hangar District ZBA/DPS Resubmission | Drg. Ref. | | |
| Calculation: Existing Sanitary Flow Analysis | Made by: AS | Date: 2023/06/22 | Chd.: HJ |

***Commercial Flow*** *180000 L/floor ha/day*
***Extraneous Flow*** *0.26 L/s/ha*

**AVERAGE COMMERCIAL SANITARY FLOWS**

| | Floor Area (ha) | Avg. Sanitary Flow (L/s) | Outfall |
|---|---|---|---|
| Bays 1-6, Admin, Café | 6.02 | 12.54 | West |
| Bay 11 (South)** | 0.57 | 1.19 | West |
| Bay 12 (West) | 0.38 | 0.78 | West |
| Bay 12 (East) | 0.38 | 0.78 | East |

**EXTRANEOUS FLOWS**

| | Lot Area (ha) | Extraneous Flow (L/s) | Outfall |
|---|---|---|---|
| West Catchment | 39.8 | 10.35 | West |
| East Catchment | 1.6 | 0.42 | East |
| **TOTAL AREA** | **41.4** | | |

**EXISTING FLOW SUMMARY BY OUTFALL**

| | Total Sanitary Flow (L/s) |
|---|---|
| West Outfall | 24.86 |
| East Outfall | 1.20 |

| ARUP | Job No. | Sheet No. | Rev. |
|---|---|---|---|
| | 260341-00 | SAN-002 | 1 |
| | Member/Location | Toronto | |
| Job Title: The Hangar District ZBA/DPS Resubmission | Drg. Ref. | | |
| Calculation: Proposed Development Statistics Summary | Made by: AS | Date: 2023/06/22 | Chd.: HJ |

***Residential Population (Design Criteria for Sewers and Watermains, January 2021, Chapter 2 Table 4)***

| | |
|---|---|
| *Studio* | *1.4 persons* |
| *1 Bedroom* | *1.4 persons* |
| *2 Bedroom* | *2.1 persons* |
| *3 Bedroom* | *3.1 persons* |
| *Townhouse* | *2.7 persons* |

***Hotel Population (Design Criteria for Sewers and Watermains, January 2021, Chapter 2 Table 3)***

*Hotel (# Unknown)* *1 person/bed/30m2 GFA*

| Character Area | Block | Lot Area (ha) | Comm. Floor Area (ha)[1] | Residential | | | | | | Hotel Pop. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Studio | 1 BDR | 2 BDR | 3 BDR | TWNH | Res. Pop. | |
| The Hangars | A | 6.58 | 6.58 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| | A(P) | 0.92 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Ancaster West | B | 0.72 | 0.24 | 19 | 190 | 133 | 38 | 0 | 690 | - |
| | C | 0.70 | 0.70 | 9 | 86 | 60 | 17 | 0 | 312 | - |
| | D | 0.67 | 0.67 | 20 | 201 | 141 | 40 | 0 | 730 | - |
| | E | 0.64 | 0.00 | 26 | 264 | 185 | 53 | 0 | 959 | - |
| | F | 1.48 | 0.65 | 13 | 131 | 91 | 26 | 0 | 473 | 294 |
| | G | 0.26 | 0.04 | 7 | 74 | 52 | 15 | 0 | 269 | - |
| | H1 | 0.33 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| | H2 | 0.27 | 0.27 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| | I | 0.55 | 0.03 | 18 | 180 | 126 | 36 | 0 | 653 | - |
| | J | 1.15 | 0.00 | 14 | 139 | 97 | 28 | 105 | 788 | - |
| | K | 0.60 | 0.04 | 9 | 87 | 61 | 17 | 40 | 423 | - |

*Notes:*

[1] *Where commercial/industrial/institutional GFA > total lot area, total lot area is assumed as comm. floor area, as confirmed with City of Toronto during Infrastructure Workshop on February 8, 2022.*

| ARUP | Job No. | Sheet No. | Rev. |
|---|---|---|---|
| | 260341-00 | SAN-003 | 1 |
| | Member/Location | Toronto | |
| Job Title: The Hangar District ZBA/DPS Resubmission | Drg. Ref. | | |
| Calculation: Proposed Sanitary Sewer Design Sheet | Made by: AS | Date: 2023/06/22 | Chd.: HJ |

***Avg. Res. Wastewater Flow*** *450 L/capita/day*
***Res. Peaking Factor*** *1+ (14/(4+(P/1000)$^{1/2}$ ))*
***Res. Population*** *Refer to Statistics Summary*
***Comm. Avg. Peak Flow*** *180000* L/floor ha/day
***Infiltration Allowance*** *0.26* L/s/ha

**EAST OUTFALL**

| LOCATION | MANHOLE FROM | MANHOLE TO | LENGTH m | TYPE | UNITS - | RES POP - | LOT AREA *ha* | COMM AREA *ha* | ACC RES POP - | M - | ACC RES FLOW *L/s* | A GROSS *ha* | I/I *L/s* | COM FLOW *L/s* | ACC COM FLOW *L/s* | **Q TOTAL *L/s*** | SLOPE *%* | D *mm* | n | Q FULL *L/s* | FLOW VEL$^2$ *m/s* | **CAPACITY *%*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Block E | | MH-V11 | - | Res | 528 | 959 | 0.64 | 0.00 | 959 | 3.8 | 19.04 | 0.64 | 0.17 | 0.00 | 0.00 | 19.20 | 2.00% | 200 | 0.013 | 46.4 | 1.48 | 41% |
| Street C | MH-V11 | MH-V12 | 52.5 | - | 0 | 0 | 0.11 | 0.00 | 959 | 3.8 | 19.04 | 0.74 | 0.19 | 0.00 | 0.00 | 19.23 | 1.00% | 250 | 0.013 | 59.5 | 0.93 | 32% |
| Block G | | MH-V12 | - | Mixed | 148 | 269 | 0.26 | 0.04 | 269 | 4.1 | 5.74 | 0.26 | 0.07 | 0.08 | 0.08 | 5.89 | 2.00% | 200 | 0.013 | 46.4 | 1.17 | 13% |
| Street C | MH-V12 | MH-V13 | 46 | - | 0 | 0 | 0.09 | 0.00 | 1228 | 3.7 | 23.93 | 1.10 | 0.29 | 0.00 | 0.08 | 24.29 | 0.50% | 250 | 0.013 | 42.0 | 0.86 | 58% |
| Block F | | MH-V13 | - | Mixed | 261 | 767 | 1.48 | 0.65 | 767 | 3.9 | 15.47 | 1.48 | 0.39 | 1.35 | 1.35 | 17.20 | 2.00% | 200 | 0.013 | 46.4 | 1.48 | 37% |
| Powell Road | MH-V13 | Ex. MH | 24.3 | - | 0 | 0 | 0.05 | 0.00 | 1995 | 3.6 | 37.27 | 2.63 | 0.68 | 0.00 | 1.44 | **39.39** | 0.70% | 250 | 0.013 | 49.8 | 1.01 | 79% |

**WEST OUTFALL**

| LOCATION | MANHOLE FROM | MANHOLE TO | LENGTH m | TYPE | UNITS - | RES POP - | LOT AREA *ha* | COMM AREA *ha* | ACC RES POP - | M - | ACC RES FLOW *L/s* | A GROSS *ha* | I/I *L/s* | COM FLOW *L/s* | ACC COM FLOW *L/s* | **Q TOTAL *L/s*** | SLOPE *%* | D *mm* | n | Q FULL *L/s* | FLOW VEL$^2$ *m/s* | **CAPACITY *%*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Studio Flows | | MH-V01 | - | Comm | 0 | 0 | 18.40 | 7.25 | 0 | 4.5 | 0.00 | 18.40 | 4.78 | 15.10 | 15.10 | 19.89 | 2.00% | 200 | 0.013 | 42.0 | 0.86 | 47% |
| Block D | | MH-V01 | - | Mixed | 402 | 730 | 0.67 | 0.67 | 730 | 3.9 | 14.77 | 0.67 | 0.17 | 1.40 | 1.40 | 16.34 | 2.00% | 200 | 0.013 | 46.4 | 1.48 | 35% |
| Street A | MH-V01 | MH-V02 | 39.8 | - | 0 | 0 | 0.08 | 0.00 | 730 | 3.9 | 14.77 | 19.15 | 4.98 | 0.00 | 16.51 | 36.25 | 1.00% | 250 | 0.013 | 59.5 | 1.21 | 61% |
| Street A | MH-V02 | MH-V03 | 39.6 | - | 0 | 0 | 0.08 | 0.00 | 730 | 3.9 | 14.77 | 19.23 | 5.00 | 0.00 | 16.51 | 36.27 | 0.60% | 250 | 0.013 | 46.1 | 0.94 | 79% |
| Street D | MH-V03 | MH-V04 | 70.0 | - | 0 | 0 | 0.14 | 0.00 | 730 | 3.9 | 14.77 | 19.37 | 5.04 | 0.00 | 16.51 | 36.31 | 0.60% | 250 | 0.013 | 46.1 | 0.94 | 79% |
| Block B | | MH-V04 | - | Mixed | 380 | 690 | 0.72 | 0.24 | 690 | 3.9 | 14.01 | 0.72 | 0.19 | 0.50 | 0.50 | 14.70 | 2.00% | 200 | 0.013 | 46.4 | 1.48 | 32% |
| Street D | MH-V04 | MH-V05 | 66.3 | - | 0 | 0 | 0.13 | 0.00 | 1420 | 3.7 | 27.34 | 20.22 | 5.26 | 0.00 | 17.01 | 49.60 | 0.50% | 300 | 0.013 | 68.4 | 0.97 | 73% |
| Block A (North) | | MH-V05 | - | Comm | 0 | 0 | 3.29 | 3.29 | 0 | 4.5 | 0.00 | 3.29 | 0.86 | 6.86 | 6.86 | 7.71 | 2.00% | 200 | 0.013 | 46.4 | 1.48 | 17% |
| Street D | MH-V05 | MH-V06 | 62.8 | - | 0 | 0 | 0.13 | 0.00 | 1420 | 3.7 | 27.34 | 23.64 | 6.15 | 0.00 | 23.86 | 57.35 | 0.60% | 300 | 0.013 | 74.9 | 1.06 | 77% |
| Block C1 | | MH-V06 | - | Mixed | 86 | 156 | 0.35 | 0.35 | 156 | 4.2 | 3.40 | 0.35 | 0.09 | 0.73 | 0.73 | 4.22 | 2.00% | 200 | 0.013 | 46.4 | 0.82 | 9% |
| Street D | MH-V06 | MH-V07 | 13.8 | - | 0 | 0 | 0.03 | 0.00 | 1576 | 3.7 | 30.07 | 24.02 | 6.24 | 0.00 | 24.59 | 60.91 | 0.65% | 300 | 0.013 | 78.0 | 1.10 | 78% |
| Street D | MH-V07 | MH-V08 | 28.2 | - | 0 | 0 | 0.05 | 0.00 | 1576 | 3.7 | 30.07 | 24.07 | 6.26 | 0.00 | 24.59 | 60.93 | 0.65% | 300 | 0.013 | 78.0 | 1.10 | 78% |
| Block C2 | | MH-V08 | - | Mixed | 86 | 156 | 0.35 | 0.35 | 156 | 4.2 | 3.40 | 0.35 | 0.09 | 0.73 | 0.73 | 4.22 | 2.00% | 200 | 0.013 | 46.4 | 0.82 | 9% |
| Street D | MH-V08 | MH-V09 | 73.0 | - | 0 | 0 | 0.14 | 0.00 | 1732 | 3.6 | 32.78 | 24.55 | 6.38 | 0.00 | 25.33 | 64.49 | 0.70% | 300 | 0.013 | 80.9 | 1.14 | 80% |
| Street E | MH-V09 | MH-V10 | 11.0 | - | 0 | 0 | 0.02 | 0.00 | 1732 | 3.6 | 32.78 | 24.57 | 6.39 | 0.00 | 25.33 | 64.49 | 0.70% | 300 | 0.013 | 80.9 | 1.14 | 80% |

**WEST OUTFALL (CONT'D)**

| LOCATION | MANHOLE | | LENGTH | TYPE | UNITS | RES POP | LOT AREA | COMM AREA | ACC RES POP | M | ACC RES FLOW | A GROSS | I/I | COM FLOW | ACC COM FLOW | **Q TOTAL** | SLOPE | D | n | Q FULL | FLOW VEL[2] | **CAPACITY** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | m | | - | - | *ha* | *ha* | - | - | *L/s* | *ha* | *L/s* | *L/s* | *L/s* | ***L/s*** | *%* | *mm* | | *L/s* | *m/s* | ***%*** |
| Block K | | MH-V10 | - | Mixed | 214 | 423 | 0.60 | 0.04 | 423 | 4.0 | 8.84 | 0.60 | 0.16 | 0.08 | 0.08 | 9.08 | 2.00% | 200 | 0.013 | 46.4 | 0.98 | 20% |
| | MH-V10 | MH-H01 | 51.9 | - | 0 | 0 | 0.10 | 0.00 | 2155 | 3.6 | 39.96 | 25.27 | 6.57 | 0.00 | 25.41 | 71.94 | 0.90% | 300 | 0.013 | 91.7 | 1.30 | 78% |
| Street E | MH-H01 | MH-H02 | 79.6 | - | 0 | 0 | 0.15 | 0.00 | 2155 | 3.6 | 39.96 | 25.42 | 6.61 | 0.00 | 25.41 | 71.98 | 0.90% | 300 | 0.013 | 91.7 | 1.30 | 78% |
| Block J | | MH-A01 | - | Res | 383 | 788 | 1.15 | 0.00 | 788 | 3.9 | 15.86 | 1.15 | 0.30 | 0.00 | 0.00 | 16.16 | 2.00% | 200 | 0.013 | 46.4 | 1.48 | 35% |
| Street F | MH-A01 | MH-A02 | 56.1 | - | 0 | 0 | 0.10 | 0.04 | 788 | 3.9 | 15.86 | 1.25 | 0.32 | 0.08 | 0.08 | 16.27 | 1.00% | 250 | 0.013 | 59.5 | 1.21 | 27% |
| Street F | MH-A02 | MH-A03 | 15.6 | - | 0 | 0 | 0.03 | 0.00 | 788 | 3.9 | 15.86 | 1.28 | 0.33 | 0.00 | 0.08 | 16.28 | 0.50% | 250 | 0.013 | 42.0 | 0.86 | 39% |
| Street G | MH-A03 | MH-A04 | 64.8 | - | 0 | 0 | 0.12 | 0.00 | 788 | 3.9 | 15.86 | 1.40 | 0.36 | 0.00 | 0.08 | 16.31 | 0.50% | 250 | 0.013 | 42.0 | 0.86 | 39% |
| Block I | | MH-A04 | - | Mixed | 360 | 653 | 0.55 | 0.03 | 653 | 3.9 | 13.30 | 0.55 | 0.14 | 0.06 | 0.06 | 13.51 | 2.00% | 200 | 0.013 | 46.4 | 1.48 | 29% |
| Street G | MH-A04 | MH-H02 | 40.2 | Road | 0 | 0 | 0.07 | 0.00 | 1441 | 3.7 | 27.71 | 2.02 | 0.53 | 0.00 | 0.15 | 28.38 | 0.50% | 250 | 0.013 | 42.0 | 0.86 | 67% |
| Street E | MH-H02 | MH-H03 | 107.7 | - | 0 | 0 | 0.20 | 0.00 | 3596 | 3.4 | 63.20 | 27.64 | 7.19 | 0.00 | 25.55 | 95.94 | 0.50% | 375 | 0.013 | 124.0 | 1.12 | 77% |
| Block A (South) | | MH-H03 | - | Comm | 0 | 0 | 3.29 | 3.29 | 0 | 4.5 | 0.00 | 3.29 | 0.86 | 6.86 | 6.86 | 7.71 | 2.00% | 200 | 0.013 | 46.4 | 1.10 | 17% |
| Block H | | MH-H03 | - | Mixed | 0 | 0 | 0.61 | 0.61 | 0 | 4.5 | 0.00 | 0.61 | 0.16 | 1.26 | 1.26 | 1.42 | 2.00% | 200 | 0.013 | 46.4 | 0.69 | 3% |
| Street E | MH-H03 | MH-H04 | 64.5 | - | 0 | 0 | 0.12 | 0.00 | 3596 | 3.4 | 63.20 | 31.66 | 8.23 | 0.00 | 33.67 | 105.10 | 0.60% | 375 | 0.013 | 135.8 | 1.23 | 77% |
| Street E | MH-H04 | MH-H05 | 19.7 | - | 0 | 0 | 0.04 | 0.00 | 3596 | 3.4 | 63.20 | 31.70 | 8.24 | 0.00 | 33.67 | 105.11 | 0.65% | 375 | 0.013 | 141.4 | 1.28 | 74% |
| Block A(P) | | MH-H05 | - | - | 0 | 0 | 0.92 | 0.00 | 0 | 4.5 | 0.00 | 0.92 | 0.24 | 0.00 | 0.00 | 0.24 | 2.10% | 200 | 0.013 | 47.5 | 1.51 | 1% |
| Under Rail[1] | MH-H05 | MH52A | 32.0 | Rail | 0 | 0 | 0.06 | 0.00 | 3596 | 3.4 | 63.20 | 32.68 | 8.50 | 0.00 | 33.67 | **105.37** | 1.03% | 375 | 0.013 | 177.9 | 1.61 | 59% |

*Notes*

[1] *Easement required under Metrolinx property for railway crossing*

[2] *Where flow depth is less than 30% of the pipe, actual flow velocity is calculated. Cells are highlighted in green where this occurs.*

ARUP

| Job No. | Sheet No. | Rev. |
|---|---|---|
| 260341-00 | SAN-004 | 1 |

Member/Location **Toronto**

Job Title **The Hangar District ZBA/DPS Resubmission**

Drg. Ref.

Calculation **Proposed Sanitary Manhole Schedule**

Made by **AS** Date **2023/06/22** Chd. **HJ**

| LOCATION | MH ID | DIA. *mm* | RIM ELEV. *m* | INV. N *m* | INV. E *m* | INV. S *m* | INV. W *m* | DEPTH* *m* | MAX PIPE SIZE *mm* | COVER *m* | CHECK** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Street A | MH-V01 | 1200 | 195.30 | 191.42 | - | 191.42 | **191.37** | 3.93 | 250 | 3.68 | *OK* |
| Street A | MH-V02 | 1200 | 195.50 | - | 190.97 | - | **190.94** | 4.56 | 250 | 4.31 | *OK* |
| Street A/D | MH-V03 | 1200 | 195.10 | - | 190.70 | **190.67** | **-** | 4.43 | 250 | 4.18 | *OK* |
| Street D | MH-V04 | 1200 | 194.80 | 190.25 | 190.30 | **190.20** | **-** | 4.60 | 250 | 4.35 | *OK* |
| Street D | MH-V05 | 1200 | 194.60 | 189.87 | - | **189.84** | 189.94 | 4.76 | 300 | 4.46 | *OK* |
| Street D | MH-V06 | 1200 | 194.40 | 189.47 | 189.54 | **189.44** | - | 4.96 | 300 | 4.66 | *OK* |
| Street D | MH-V07 | 1200 | 194.40 | 189.35 | - | **189.32** | - | 5.08 | 300 | 4.78 | *OK* |
| Street D | MH-V08 | 1200 | 194.30 | 189.13 | 189.20 | **189.10** | - | 5.20 | 300 | 4.90 | *OK* |
| Street D/E | MH-V09 | 1200 | 194.00 | 188.59 | - | **188.56** | - | 5.44 | 300 | 5.14 | *OK* |
| Street E | MH-V10 | 1200 | 193.90 | 188.48 | 189.05 | **-** | **188.95** | 5.42 | 300 | 5.12 | *OK* |
| Street C | MH-V11 | 1200 | 193.8 | - | - | **192.19** | 192.24 | 1.61 | 250 | 1.36 | *Insufficient* |
| Street C | MH-V12 | 1200 | 193.6 | 191.66 | 191.68 | **191.63** | - | 1.97 | 250 | 1.72 | *Insufficient* |
| Street C/Powell Rd | MH-V13 | 1200 | 193.4 | 191.40 | **191.37** | - | 191.42 | 2.03 | 250 | 1.78 | *Insufficient* |
| Street E | MH-H01 | 1200 | 193.80 | - | 188.48 | - | **188.45** | 5.35 | 300 | 5.05 | *OK* |
| Street E | MH-H02 | 1200 | 193.35 | - | 187.74 | 187.79 | **187.66** | 5.69 | 375 | 5.31 | *OK* |
| Street E | MH-H03 | 1200 | 193.30 | 187.27 | 187.12 | 187.27 | **187.09** | 6.21 | 375 | 5.83 | *OK* |
| Street E | MH-H04 | 1200 | 193.20 | - | 186.71 | - | **186.68** | 6.52 | 375 | 6.15 | *OK* |
| Street E | MH-H05 | 1200 | 193.45 | 186.55 | 186.55 | - | **186.52** | 6.93 | 375 | 6.56 | *OK* |
| Street F | MH-A01 | 1200 | 194.38 | - | - | 189.09 | **189.04** | 5.34 | 250 | 5.09 | *OK* |
| Street F | MH-A02 | 1200 | 194.05 | - | 188.48 | - | **188.45** | 5.60 | 250 | 5.35 | *OK* |
| Street G | MH-A03 | 1200 | 194.05 | **188.34** | 188.37 | - | - | 5.71 | 250 | 5.46 | *OK* |
| Street G | MH-A04 | 1200 | 193.80 | **187.99** | 188.04 | 188.02 | - | 5.81 | 250 | 5.56 | *OK* |

*__Bolded elevation__ represents outlet invert with which depth is calculated.

** Cover check is based on 2.75m requirement per DCSW. Locations where there is insufficient cover are due to downstream connection constraints.

| ARUP | Job No. | Sheet No. | Rev. |
|---|---|---|---|
| | 260341-00 | SAN-005 | 1 |
| | Member/Location | Toronto | |
| Job Title: The Hangar District ZBA/DPS Resubmission | Drg. Ref. | | |
| Calculation: West Outlet - Downstream Analysis | Made by: AS | Date: 2023/06/22 | Chd.: HJ |

***Avg. Res. Wastewater Flow*** *240 L/capita/day (for analysis of existing sewers)*
***Res. Peaking Factor*** *1+ (14/(4+(P/1000)$^{1/2}$ ))*
***Res. Population*** *Refer to Statistics Summary*
***Comm. Avg. Peak Flow*** *180000* L/floor ha/day
***Infiltration Allowance*** *0.26* L/s/ha

**DOWNSTREAM OF WEST OUTLET**

| LOCATION | MANHOLE | | LENGTH | TYPE | UNITS | RES POP | LOT AREA | COMM AREA | ACC RES POP | M | ACC RES FLOW | A GROSS | I/I | COM FLOW | ACC COM FLOW | **Q TOTAL** | SLOPE | D | Q FULL | FLOW VELOCITY | **CAPACITY** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | m | | - | - | *ha* | *ha* | - | - | *L/s* | *ha* | *L/s* | *L/s* | *L/s* | ***L/s*** | *%* | *mm* | *L/s* | *m/s* | ***%*** |
| Block 42 Plug | | MH3A | 8.1 | Res | 138 | 373 | 1.36 | 0.00 | 373 | 4.0 | 4.18 | 1.36 | 0.35 | 0.00 | 0.00 | 4.54 | 0.020 | 200 | | | |
| William Duncan Rd | MH3A | MH5A | 43 | - | 0 | 0 | 0 | 0.00 | 373 | 4.0 | 4.18 | 1.36 | 0.35 | 0.00 | 0.00 | 4.54 | 0.020 | 250 | 84.1 | 1.71 | 5.39% |
| Downsview Park Blvd | MH4A | MH5A | 40.6 | Res | 6 | 16 | 0.21 | 0.00 | 16 | 4.4 | 0.20 | 0.21 | 0.05 | 0.00 | 0.00 | 0.25 | 0.04 | 250 | 118.9 | 2.42 | 0.21% |
| Downsview Park Blvd | MH5A | MH6A | 63.5 | Res | 10 | 27 | 0.33 | 0.00 | 416 | 4.0 | 4.64 | 1.9 | 0.49 | 0.00 | 0.00 | 5.13 | 0.009 | 250 | 56.4 | 1.15 | 9.10% |
| Downsview Park Blvd | MH6A | MH7A | 53.6 | Res | 9 | 24 | 0.31 | 0.00 | 440 | 4.0 | 4.89 | 2.21 | 0.57 | 0.00 | 0.00 | 5.47 | 0.009 | 250 | 56.4 | 1.15 | 9.69% |
| Subject Area | | MH52A | 1.7 | Mixed | | 3596 | 32.68 | - | 3596 | 3.4 | 33.71 | 32.68 | 8.50 | 33.67 | 33.67 | 75.88 | 0.008 | 300 | 83.7 | 1.18 | 90.60% |
| Stanley Greene | MH52A | NEW MH1 | 50.3 | Mixed | 0 | 0 | 0.00 | 0.00 | 3596 | 3.4 | 33.71 | 32.68 | 8.50 | 0.00 | 33.67 | 75.88 | 0.007 | 300 | 83.2 | 1.18 | 91.21% |
| Block G (North) | | NEW MH1 | | Com | 47 | 127 | 1.25 | 0.00 | 127 | 4.2 | 1.49 | 1.25 | 0.33 | 0.00 | 0.00 | 1.81 | | | | | |
| Local Road A | NEW MH1 | MH 51 A | 76.9 | - | 0 | 0 | 0.00 | 0.00 | 3723 | 3.4 | 34.76 | 33.93 | 8.82 | 0.00 | 33.67 | 77.25 | 0.0074 | 300 | 83.2 | 1.18 | 92.87% |
| Local Road A | MH 51 A | MH8A | 8.9 | - | 0 | 0 | 0.00 | 0.00 | 3723 | 3.4 | 34.76 | 33.93 | 8.82 | 0.00 | 33.67 | 77.25 | 0.0075 | 300 | 83.7 | 1.18 | 92.25% |
| Block G | | MH8A | | Res | 8 | 22 | 0.19 | 0.00 | 22 | 4.4 | 0.27 | 0.19 | 0.05 | 0.00 | 0.00 | 0.32 | | | | | |
| Frederick Tisdale Dr | MH8A | MH 9A | 52.1 | - | 0 | 0 | 0.00 | 0.00 | 3745 | 3.4 | 34.94 | 34.12 | 8.87 | 0.00 | 33.67 | 77.49 | 0.0075 | 300 | 83.7 | 1.18 | 92.52% |
| Block G | | MH9A | | | 13 | 35 | 0.23 | 0.00 | 35 | 4.3 | 0.42 | 0.23 | 0.06 | 0.00 | 0.00 | 0.48 | | | | | |
| Frederick Tisdale Dr | MH9A | MH10A | 68.9 | Res | 6 | 16 | 0.20 | 0.00 | 3796 | 3.4 | 35.36 | 34.55 | 8.98 | 0.00 | 33.67 | 78.02 | 0.005 | 375 | 124.0 | 1.12 | 62.93% |
| Frederick Tisdale Dr | MH10A | MH11A | 24 | Res | 10 | 27 | 0.23 | 0.00 | 3823 | 3.4 | 35.58 | 34.78 | 9.04 | 0.00 | 33.67 | 78.30 | 0.005 | 375 | 124.0 | 1.12 | 63.16% |
| Block 41 Plug | | MH11A | 8 | Res | 38 | 103 | 0.15 | 0.00 | 103 | 4.2 | 1.21 | 0.15 | 0.04 | 0.00 | 0.00 | 1.25 | 0.020 | 200 | 46.4 | 1.48 | 2.70% |
| Frederick Tisdale Dr | MH11A | MH12A | 38.6 | Res | 3 | 8 | 0.06 | 0.00 | 3934 | 3.3 | 36.50 | 34.99 | 9.10 | 0.00 | 33.67 | 79.27 | 0.005 | 375 | 124.0 | 1.12 | 63.94% |
| Sara Jackson Cres | MH31A | MH32A | 24.9 | Res | 10 | 27 | 0.32 | 0.00 | 27 | 4.4 | 0.33 | 0.32 | 0.08 | 0.00 | 0.00 | 0.41 | 0.020 | 250 | 84.1 | 1.71 | 0.49% |
| Sara Jackson Cres | MH32A | MH33A | 31.6 | Res | 8 | 22 | 0.10 | 0.00 | 49 | 4.3 | 0.59 | 0.42 | 0.11 | 0.00 | 0.00 | 0.70 | 0.020 | 250 | 84.1 | 1.71 | 0.83% |
| Sara Jackson Cres | MH33A | MH30A | 30.3 | - | 4 | 11 | 0.07 | 0.00 | 60 | 4.3 | 0.72 | 0.49 | 0.13 | 0.00 | 0.00 | 0.84 | 0.0215 | 250 | 87.2 | 1.78 | 0.97% |
| Block G | | MH28A | 75 | Res | 0 | 0 | 0.00 | 0.00 | 0 | 4.5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.010 | 250 | 59.5 | 1.21 | 0.00% |
| William Duncan Rd | MH28A | MH29A | 88.7 | Res | 12 | 32 | 0.18 | 0.00 | 32 | 4.4 | 0.39 | 0.18 | 0.05 | 0.00 | 0.00 | 0.43 | 0.017 | 250 | 77.5 | 1.58 | 0.56% |
| Thomas Mulholland Dr | MH29A | MH30A | 48.2 | Res | 13 | 35 | 0.28 | 0.00 | 67 | 4.3 | 0.80 | 0.46 | 0.12 | 0.00 | 0.00 | 0.92 | 0.016 | 250 | 75.2 | 1.53 | 1.22% |

**DOWNSTREAM OF WEST OUTLET CONT'D**

| LOCATION | MANHOLE | | LENGTH | TYPE | UNITS | RES POP | LOT AREA | COMM AREA | ACC RES POP | M | ACC RES FLOW | A GROSS | I/I | COM FLOW | ACC COM FLOW | **Q TOTAL** | SLOPE | D | Q FULL | FLOW VELOCITY | **CAPACITY** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | m | | - | - | *ha* | *ha* | - | - | *L/s* | *ha* | *L/s* | *L/s* | *L/s* | ***L/s*** | *%* | *mm* | *L/s* | *m/s* | ***%*** |
| Thomas Mulholland Dr | MH30A | MH70A | 23.3 | Res | 4 | 11 | 0.07 | 0.00 | 138 | 4.2 | 1.61 | 1.02 | 0.27 | 0.00 | 0.00 | 1.88 | 0.030 | 250 | 103.0 | 2.10 | 1.82% |
| Block 43 Plug | | MH70A | 9.1 | Res | 5 | 14 | 0.09 | 0.00 | 14 | 4.4 | 0.17 | 0.09 | 0.02 | 0.00 | 0.00 | 0.19 | 0.0225 | 200 | 49.2 | 1.57 | 0.40% |
| Thomas Mulholland Dr | MH70A | MH71A | 32.7 | Res | 5 | 14 | 0.10 | 0.00 | 166 | 4.2 | 1.93 | 1.21 | 0.31 | 0.00 | 0.00 | 2.24 | 0.015 | 250 | 72.8 | 1.48 | 3.08% |
| Frederick Tisdale Dr | MH71A | MH12A | 8.7 | - | 0 | 0 | 0.00 | 0.00 | 166 | 4.2 | 1.93 | 1.21 | 0.31 | 0.00 | 0.00 | 2.24 | 0.010 | 250 | 59.5 | 1.21 | 3.77% |
| Frederick Tisdale Dr | MH12A | MH13A | 41.1 | Res | 16 | 43 | 0.36 | 0 | 4143 | 3.3 | 38.20 | 36.56 | 9.50 | 0.00 | 33.67 | 81.38 | 0.005 | 375 | 124.0 | 1.12 | 65.64% |
| Frederick Tisdale Dr | MH13A | MH7A | 45.8 | - | 0 | 0 | 0.00 | 0.00 | 4143 | 3.3 | 38.20 | 36.56 | 9.50 | 0.00 | 33.67 | 81.38 | 0.005 | 375 | 124.0 | 1.12 | 65.64% |
| Downsview Park Blvd | MH7A | MH14A | 72.1 | Res | 11 | 30 | 0.38 | 0.00 | 4613 | 3.3 | 41.99 | 39.15 | 10.18 | 0.00 | 33.67 | 85.85 | 0.005 | 375 | 124.0 | 1.12 | 69.24% |
| Downsview Park Blvd | MH14A | MH15A | 80.2 | Res | 11 | 30 | 0.41 | 0.00 | 4643 | 3.3 | 42.23 | 39.56 | 10.28 | 0.00 | 33.67 | 86.19 | 0.005 | 375 | 124.0 | 1.12 | 69.52% |
| Block G | | MH19A | 6.8 | Res | 59 | 159 | 0.85 | 0.00 | 159 | 4.2 | 1.85 | 0.85 | 0.22 | 0.00 | 0.00 | 2.07 | 0.020 | 250 | 84.1 | 1.71 | 2.46% |
| Frederick Tisdale Dr | MH19A | MH20A | 8.7 | Res | 0 | 0 | 0.00 | 0.00 | 159 | 4.2 | 1.85 | 0.85 | 0.22 | 0.00 | 0.00 | 2.07 | 0.020 | 250 | 84.1 | 1.71 | 2.46% |
| Frederick Tisdale Dr | MH20A | MH21A | 105.3 | Res | 14 | 38 | 0.52 | 0.00 | 197 | 4.2 | 2.27 | 1.37 | 0.36 | 0.00 | 0.00 | 2.63 | 0.010 | 250 | 59.5 | 1.21 | 4.42% |
| Block G | | MH21A | 8.1 | Res | 98 | 265 | 2.44 | 0.00 | 265 | 4.1 | 3.02 | 2.44 | 0.63 | 0.00 | 0.00 | 3.65 | 0.020 | 250 | 84.1 | 1.71 | 4.34% |
| Locust Lodge Gardens | MH21A | MH22A | 65.2 | Res | 7 | 19 | 0.19 | 0.00 | 481 | 4.0 | 5.32 | 4.00 | 1.04 | 0.00 | 0.00 | 6.36 | 0.016 | 250 | 75.2 | 1.53 | 8.46% |
| Caroline Carpenter Gr | MH23A | MH24A | 92.8 | Res | 28 | 76 | 0.51 | 0.00 | 76 | 4.3 | 0.90 | 0.51 | 0.13 | 0.00 | 0.00 | 1.03 | 0.020 | 250 | 84.1 | 1.71 | 1.23% |
| Caroline Carpenter Gr | MH24A | MH22A | 7 | - | 0 | 0 | 0.00 | 0.00 | 76 | 4.3 | 0.90 | 0.51 | 0.13 | 0.00 | 0.00 | 1.03 | 0.020 | 250 | 84.1 | 1.71 | 1.23% |
| Locust Lodge Gardens | MH22A | MH18A | 71.1 | Res | 7 | 19 | 0.25 | 0.00 | 576 | 3.9 | 6.31 | 4.76 | 1.24 | 0.00 | 0.00 | 7.54 | 0.014 | 250 | 69.1 | 1.41 | 10.92% |
| Block 39 Plug | | MH99A | 10.5 | Res | 60 | 162 | 0.69 | 0.00 | 162 | 4.2 | 1.88 | 0.69 | 0.18 | 0.00 | 0.00 | 2.06 | 0.008 | 200 | 28.4 | 0.90 | 7.25% |
| John Perkins Bull Dr | MH99A | MH17A | 68.7 | - | 0 | 0 | 0.00 | 0.00 | 162 | 4.2 | 1.88 | 0.69 | 0.18 | 0.00 | 0.00 | 2.06 | 0.010 | 250 | 59.5 | 1.21 | 3.46% |
| Stanley Greene Blvd | MH49A | MH17A | 43.8 | Res | 3 | 11 | 0.20 | 0.00 | 11 | 4.4 | 0.13 | 0.20 | 0.05 | 0.00 | 0.00 | 0.19 | 0.028 | 250 | 98.6 | 2.01 | 0.19% |
| Stanley Greene Blvd | MH17A | MH18A | 113.4 | Res | 12+9 | 64 | 0.94 | 0.00 | 237 | 4.1 | 2.71 | 1.83 | 0.48 | 0.00 | 0.00 | 3.19 | 0.006 | 250 | 47.6 | 0.97 | 6.70% |
| Stanley Greene Blvd | MH18A | MH25A | 68.1 | Res | 6 | 21 | 0.49 | 0.00 | 834 | 3.8 | 8.92 | 7.08 | 1.84 | 0.00 | 0.00 | 10.76 | 0.005 | 250 | 42.5 | 0.87 | 25.33% |
| Stanley Greene Blvd | MH25A | MH26A | 77.4 | Res | 6 | 21 | 0.51 | 0.00 | 855 | 3.8 | 9.13 | 7.59 | 1.97 | 0.00 | 0.00 | 11.10 | 0.005 | 250 | 42.0 | 0.86 | 26.40% |
| Block 36 Plug (Park)[1] | | MH26A | 15.8 | Park | 0 | 10 | 1.77 | 0.00 | 10 | 4.4 | 0.12 | 1.77 | 0.46 | 8.82 | 8.82 | 9.40 | 0.020 | 200 | 46.4 | 1.48 | 20.27% |
| Stanley Greene Blvd | MH26A | MH27A | 79.5 | Res | 10+5 | 45 | 0.74 | 0.00 | 910 | 3.8 | 9.67 | 10.10 | 2.63 | 0.00 | 8.82 | 21.12 | 0.005 | 250 | 42.0 | 0.86 | 50.22% |
| Block 34 Plug | | MH37A | 8.2 | Res | 31 | 84 | 0.51 | 0.00 | 84 | 4.3 | 0.99 | 0.51 | 0.13 | 0.00 | 0.00 | 1.13 | 0.020 | 200 | 46.4 | 1.48 | 2.43% |
| Block 35 Plug | | MH37A | 10.5 | Res | 54 | 146 | 0.92 | 0.00 | 146 | 4.2 | 1.70 | 0.92 | 0.24 | 0.00 | 0.00 | 1.94 | 0.020 | 200 | 46.4 | 1.48 | 4.18% |
| Thomas Mulholland Dr | MH37A | MH27A | 38.2 | - | 0 | 0 | 0.00 | 0.00 | 230 | 4.1 | 2.64 | 1.43 | 0.37 | 0.00 | 0.00 | 3.01 | 0.035 | 250 | 111.3 | 2.27 | 2.70% |
| Stanley Greene Blvd | MH27A | MH38A | 51.1 | Res | 8 | 22 | 0.20 | 0.00 | 1162 | 3.8 | 12.13 | 11.73 | 3.05 | 0.00 | 8.82 | 24.00 | 0.006 | 250 | 47.6 | 0.97 | 50.44% |
| Block 33 Plug[3] | | MH38A | 11.3 | Mixed | 264 | 713 | 1.62 | 0.05 | 713 | 3.9 | 7.70 | 1.62 | 0.42 | 0.10 | 0.10 | 8.23 | 0.020 | 250 | 84.1 | 1.71 | 9.79% |
| Stanley Greene Blvd | MH38A | MH15A | 43.5 | Res | 0 | 0 | 0.00 | 0.00 | 1875 | 3.6 | 18.79 | 13.35 | 3.47 | 0.00 | 8.92 | 31.18 | 0.011 | 250 | 61.2 | 1.25 | 50.93% |

**DOWNSTREAM OF WEST OUTLET CONT'D**

| LOCATION | MANHOLE | | LENGTH | TYPE | UNITS | RES POP | LOT AREA | COMM AREA | ACC RES POP | M | ACC RES FLOW | A GROSS | I/I | COM FLOW | ACC COM FLOW | **Q TOTAL** | SLOPE | D | Q FULL | FLOW VELOCITY | **CAPACITY** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FROM | TO | m | | - | - | *ha* | *ha* | - | - | *L/s* | *ha* | *L/s* | *L/s* | *L/s* | ***L/s*** | *%* | *mm* | *L/s* | *m/s* | ***%*** |
| Downsview Park Blvd | MH15A | MH39A | 83.9 | - | 0 | 0 | 0.00 | 0.00 | 6518 | 3.1 | 56.79 | 52.91 | 13.76 | 0.00 | 42.60 | 113.14 | 0.005 | 450 | 201.6 | 1.27 | 56.12% |
| Downsview Park Blvd | MH39A | MH40A | 80.1 | - | 0 | 0 | 0.00 | 0.00 | 6518 | 3.1 | 56.79 | 52.91 | 13.76 | 0.00 | 42.60 | 113.14 | 0.005 | 450 | 201.6 | 1.27 | 56.12% |
| Downsview Park Blvd | MH40A | MH41A | 83.7 | - | 0 | 0 | 0.23 | 0.00 | 6518 | 3.1 | 56.79 | 53.14 | 13.82 | 0.00 | 42.60 | 113.20 | 0.005 | 450 | 201.6 | 1.27 | 56.15% |
| Firehall Plug[4] | | MH42A | 8.9 | Inst | 0 | 0 | 1.12 | 0.12 | 0 | 4.5 | 0.00 | 1.12 | 0.29 | 0.25 | 0.25 | 0.54 | 0.020 | 200 | 46.4 | 1.48 | 1.17% |
| George Butchart Dr | MH42A | MH43A | 59.0 | - | 0 | 0 | 0.00 | 0.00 | 0 | 4.5 | 0.00 | 1.12 | 0.29 | 0.00 | 0.25 | 0.54 | 0.010 | 250 | 59.5 | 1.21 | 0.91% |
| George Butchart Dr | MH43A | MH44A | 24.3 | - | 0 | 0 | 0.00 | 0.00 | 0 | 4.5 | 0.00 | 1.12 | 0.29 | 0.00 | 0.25 | 0.54 | 0.009 | 250 | 54.8 | 1.12 | 0.99% |
| George Butchart Dr | MH44A | MH45A | 26.0 | - | 0 | 0 | 0.00 | 0.00 | 0 | 4.5 | 0.00 | 1.12 | 0.29 | 0.00 | 0.25 | 0.54 | 0.009 | 250 | 54.8 | 1.12 | 0.99% |
| George Butchart Dr | MH45A | MH41A | 36.2 | - | 0 | 0 | 0.00 | 0.00 | 0 | 4.5 | 0.00 | 1.12 | 0.29 | 0.00 | 0.25 | 0.54 | 0.009 | 250 | 54.8 | 1.12 | 0.99% |
| Downsview Park Blvd | MH41A | MH46A | 48.4 | - | 0 | 0 | 0.00 | 0.00 | 6518 | 3.1 | 56.79 | 54.26 | 14.11 | 0.00 | 42.85 | 113.74 | 0.005 | 450 | 201.6 | 1.27 | 56.42% |
| Downsview Park Blvd | MH46A | MH47A | 55.2 | - | 0 | 0 | 0.00 | 0.00 | 6518 | 3.1 | 56.79 | 54.26 | 14.11 | 0.00 | 42.85 | 113.74 | 0.006 | 450 | 220.8 | 1.39 | 51.50% |
| Downsview Park Blvd | MH47A | MH48A | 51.8 | - | 0 | 0 | 0.00 | 0.00 | 6518 | 3.1 | 56.79 | 54.26 | 14.11 | 0.00 | 42.85 | 113.74 | 0.008 | 450 | 253.4 | 1.59 | 44.88% |
| Block 30 Plug[3] | | MH48A | 24.0 | Mixed | 300 | 810 | 2.04 | 0.15 | 810 | 3.9 | 8.68 | 2.04 | 0.53 | 0.31 | 0.31 | 9.52 | 0.010 | 250 | 59.5 | 1.21 | 16.01% |
| Downsview Park Blvd | MH48A | EX. MH10A | 24.8 | N/A | 0 | 0 | 0.00 | 0.00 | 7328 | 3.1 | 62.84 | 56.30 | 14.64 | 0.00 | 43.16 | 120.64 | 0.007 | 450 | 243.6 | 1.53 | 49.53% |
| PDP East & South Circuit Path (Future- Population from Downsview Area Secondary Plan Review Study Sepember 2009) | | EX. MH10A | 71.5 | Comm | | 849 | 114.30 | 0.00 | 849 | 3.8 | 9.07 | 114.30 | 29.72 | 30.82 | 30.82 | 69.61 | 0.010 | 450 | 285.1 | 1.79 | 24.41% |
| PDP Sewer | EX. MH10A | EX. MH11A | 6.0 | - | | 0 | 0.00 | 0.00 | 8177 | 3.0 | 69.07 | 170.60 | 44.35 | 0.00 | 73.98 | 187.41 | 0.032 | 450 | 506.0 | 3.18 | 37.04% |
| PDP Sewer | EX. MH11A | EX. MH12A | 92.0 | - | | 0 | 0.00 | 0.00 | 8177 | 3.0 | 69.07 | 170.60 | 44.35 | 0.00 | 73.98 | 187.41 | 0.034 | 450 | 524.2 | 3.30 | 35.75% |
| PDP Sewer | EX. MH12A | EX. MH13A | 76.0 | - | | 0 | 0.00 | 0.00 | 8177 | 3.0 | 69.07 | 170.60 | 44.35 | 0.00 | 73.98 | 187.41 | 0.031 | 450 | 498.7 | 3.14 | 37.58% |
| PDP Sewer | EX. MH13A | EX. MH96A | 86.0 | - | | 0 | 0.00 | 0.00 | 8177 | 3.0 | 69.07 | 170.60 | 44.35 | 0.00 | 73.98 | 187.41 | 0.029 | 450 | 485.5 | 3.05 | 38.60% |
| William Baker (Refer to Counterpoint FSR dated May 2022)[5] | | EX. MH96A | | Res | | 3733 | 5.25 | 0.00 | 3733 | 3.4 | 34.84 | 5.25 | 12.94 | 0.00 | 0.00 | 47.78 | | | | | |
| Sheppard District (Refer to Counterpoint FSR dated May 2022)[5] | | EX. MH96A | | | | 850 | 29.20 | 0.00 | 850 | 3.8 | 9.08 | 29.20 | 7.59 | 0.00 | 0.00 | 16.67 | | | | | |
| PDP North Terrace (Refer to MMM FSR dated Feb 2013) | | EX. MH96A | | Mixed | | 60 | 17.50 | 0.00 | 60 | 4.3 | 0.72 | 17.50 | 4.55 | 0.00 | 0.00 | 5.27 | | | | | |
| PDP Sewer | EX. MH96A | EX. MH1A | 4.4 | - | | 0 | 0.00 | 0.00 | 12820 | 2.8 | 101.38 | 222.55 | 69.43 | 0.00 | 73.98 | 244.79 | 0.018 | 525 | 577.0 | 2.67 | 42.43% |
| City Sewer[2] | EX. MH1A | EX. MH199A | 5.7 | - | | 0 | 0.00 | 0.00 | 12820 | 2.8 | 101.38 | 222.55 | 69.43 | 0.00 | 73.98 | 244.79 | 0.081 | 525 | 1221.7 | 5.64 | 20.04% |
| City Sewer[2] | EX. MH199A | EX. MH200A | 19.3 | - | | 0 | 0.00 | 0.00 | 12820 | 2.8 | 101.38 | 222.55 | 69.43 | 0.00 | 73.98 | 244.79 | 0.052 | 525 | 978.8 | 4.52 | 25.01% |
| City Sewer from South (Keele St from Denbigh to Ex. MH 200A) | Keele St. | EX. MH200A | | Mixed | | 28 | 0.43 | 0.00 | 28 | 4.4 | 0.34 | 0.43 | 0.11 | 0.00 | 0.00 | 0.45 | | | | | |
| City Sewer[2] | EX. MH200A | EX. MH201A | 55.0 | | | 0 | 0.00 | 0.00 | 12848 | 2.8 | 101.57 | 222.98 | 69.54 | 0.00 | 73.98 | 245.09 | 0.042 | 525 | 876.1 | 4.05 | 27.98% |

*Notes:*

[1] *Block 36 (Park) - assumed to have a population of 10 people to account for possible washrooms. Water that falls on splash pad to go to sanitary sewer (to be restricted to 2 year flow = 8.82 L/s)*

[2] *Existing pipes crossing Keele Street - maximum subcritical flow capacity used rather than the actual flow capacity of the pipe*

[3] *Populations of Block A (30) and Block P (33) are determined from the maximum units allowable under zoning*

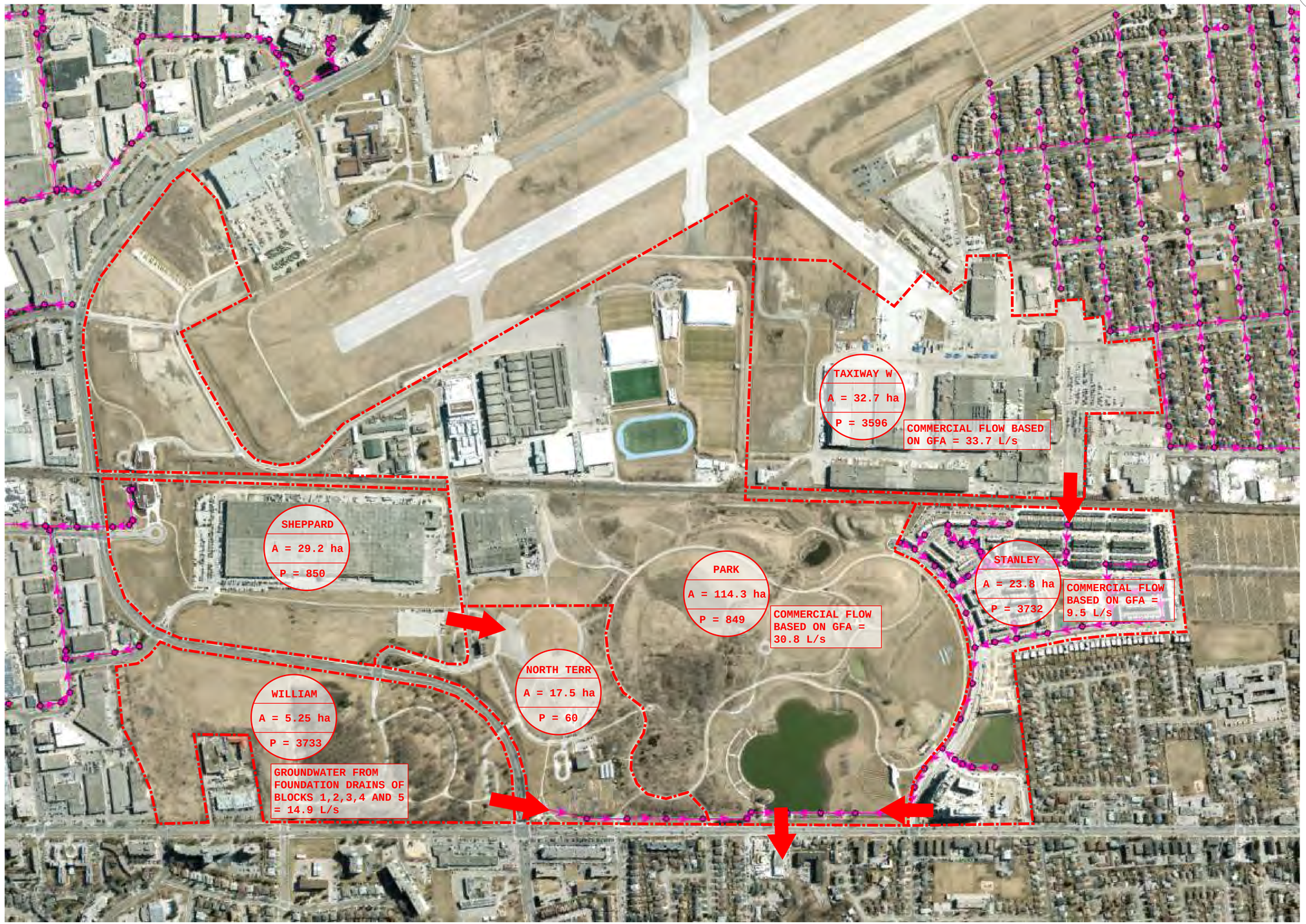
*Maximum units for Block A = 300 Units*

*Maximum Units for Block P = 264 Units*

[4] *Fire Hall Block to have institutional floor area of 1200m2 as indicated by the City in Stanley Greene FSR.*

[5] *Values per William Baker FSR. Includes estimated groundwater from foundation drains = 11.57 L/s*

22x34




# SANITARY CATCHMENT MAP

PROPOSED

1
C-311

LEGEND

- SANITARY DRAINAGE BOUNDARY
- XXXXX / A = X.X ha / P = XXX — IDENTIFICATION / AREA IN HECTARES / POPULATION
- FLOW DIRECTION

LICENSED PROFESSIONAL ENGINEER
H. A. T. JEENS
100517802
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 3 | 06-07-23 | REISSUED FOR ZBA/DPS |
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |


ARUP

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Toronto ON M4W 3M5 Canada
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www.arup.com


Client

NORTHCREST DEVELOPMENTS

Job Title

THE HANGAR DISTRICT
FORMERLY TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

SANITARY CATCHMENT MAP
PROPOSED
SHEET 1 OF 1

Scale: NOT TO SCALE

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| AW | AS | PP | HJ |

Drawing Status: DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-311 | 3 |


PLOT BY:angus.wan PLOT TIME:2023-07-05:37:57 PM FILE:J:\TOR\270000\272777-00\3 Design\3-04 BIM\3-04-30 Civil\06 Sheets\D001_Taxiway West\260341-ARP-CV-DRN-HD03-0311.dgn



Ove Arup & Partners Consulting Engineers PC

# Appendix 3: Sanitary Flow Monitoring Report

# ARU21-0002 Final Report Period 1

## ARU21-0002 - Downsview Flow Monitoring

*Monitoring Period: Oct 20, 2021 – Jan 20, 2022*

*Generated on: Feb 02, 2022*

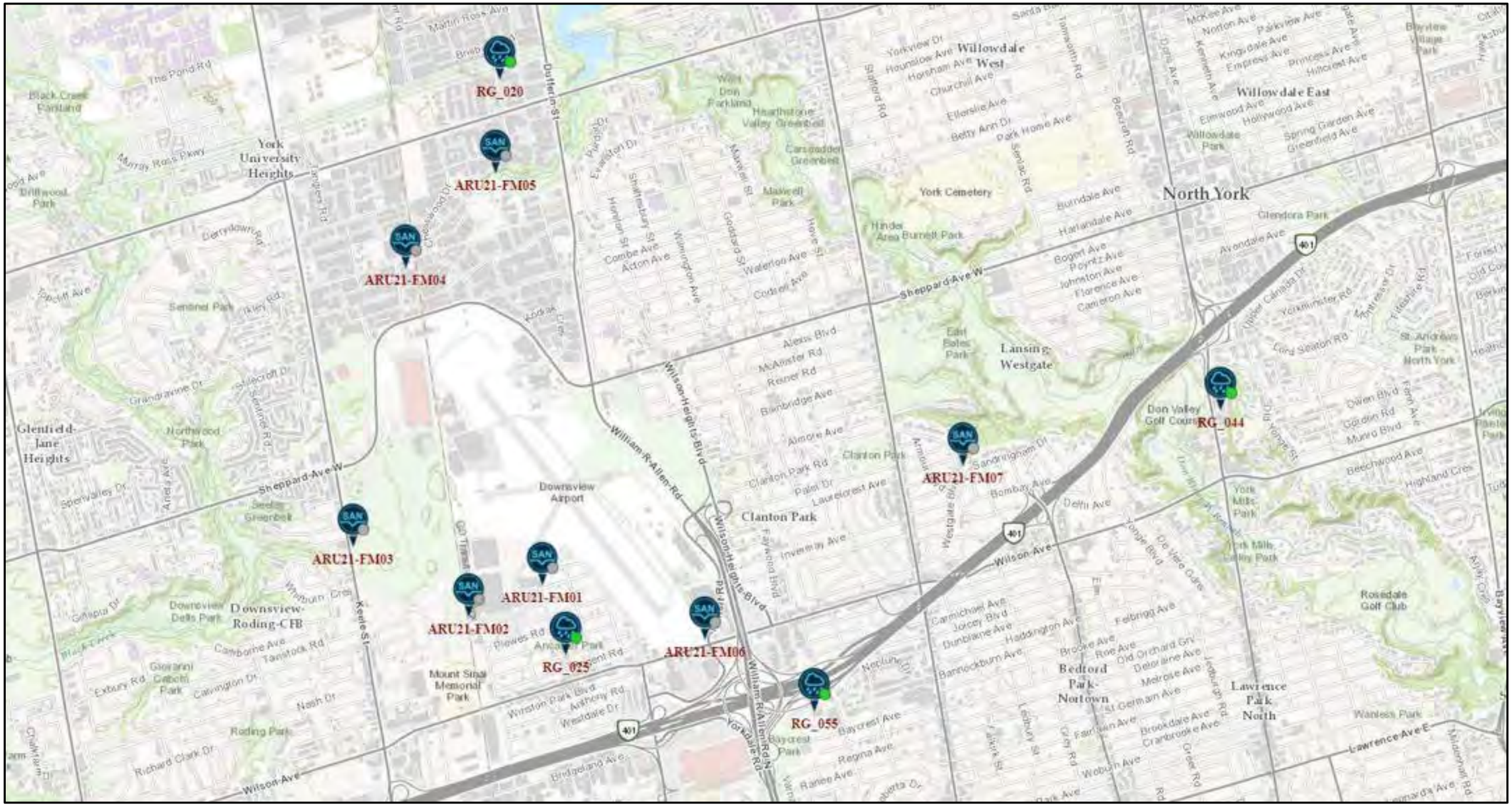
CIVICA
Water Management Solutions
www.civi.ca

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# Flow Monitoring Location



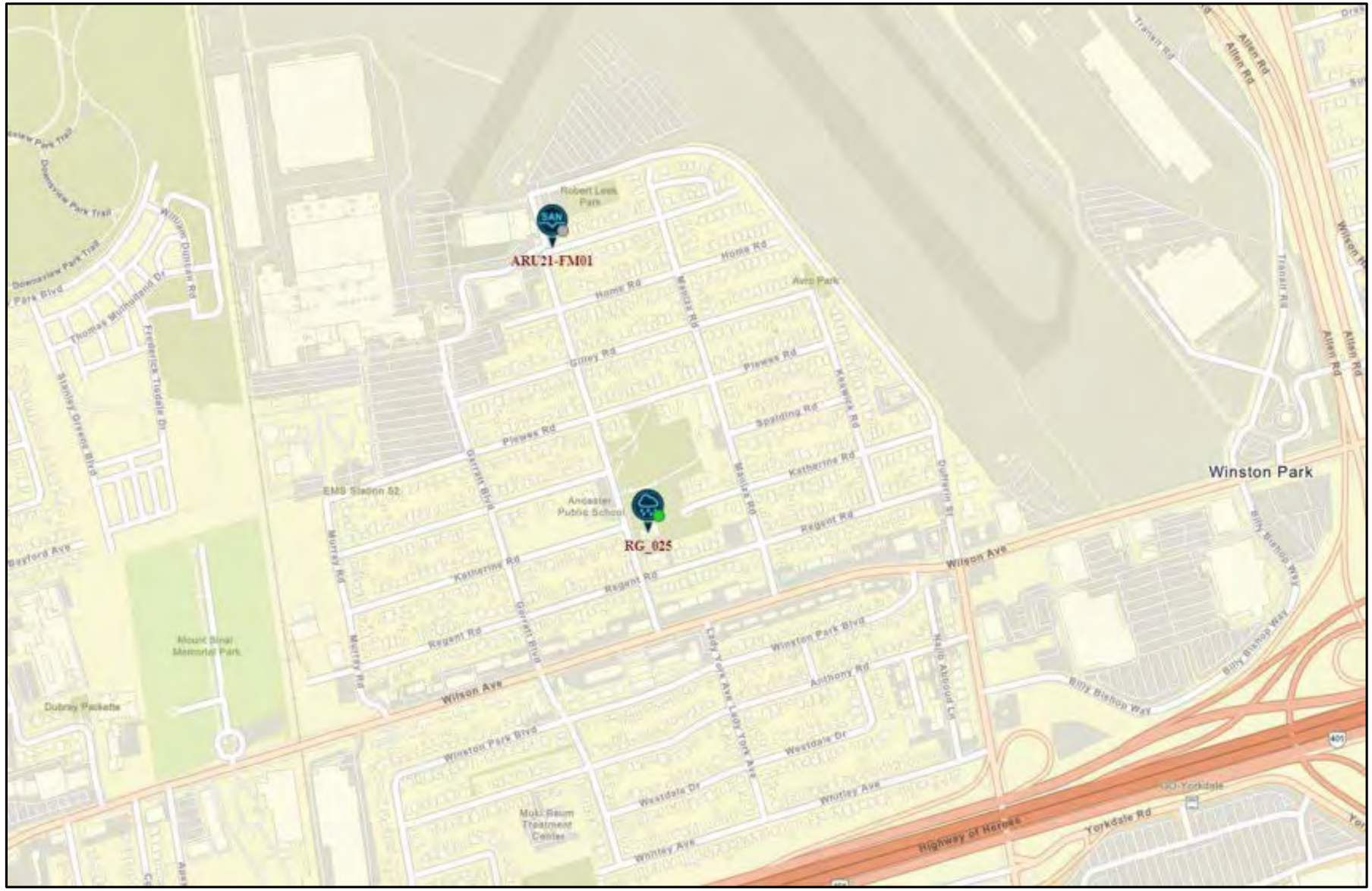
# Monitoring Station List

| Station Name | Inlet/Outlet | Station Type | Station State | Latitude | Longitude | Start Date | End Date | Station Pipe Diameter (mm) | Catchment Area (ha) | Catchment Population (Persons) | Station Tc (min) | Average Dry Weather Flow (L/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARU21-FM01 | Inlet | Sanitary Flow | Receiving | 43.73705 | -79.467836 | Oct 20, 2021 | Dec 14, 2021 | 150 | 1.6 | 102 | 5 | 0.034 |
| ARU21-FM02[1] | Inlet | Sanitary Flow | Receiving | 43.734975 | -79.474424 | Sep 30, 2021 | Dec 14, 2021 | 215 | 39.4 | 3060 | 5 | 2.045 |
| ARU21-FM03 | Inlet | Sanitary Flow | Receiving | 43.739509 | -79.484776 | Oct 26, 2021 | Dec 30, 2021 | 450 | 79.7 | 7641 | 5 | 19.504 |
| ARU21-FM04 | Inlet | Sanitary Flow | Receiving | 43.757625 | -79.48012 | Oct 20, 2021 | Dec 29, 2021 | 300 | N/A[2] | N/A[2] | 5 | 0.572 |
| ARU21-FM05 | Inlet | Sanitary Flow | Receiving | 43.763753 | -79.472047 | Nov 23, 2021 | Jan 20, 2022 | 700 | N/A[2] | N/A[2] | 5 | 41.195 |
| ARU21-FM06 | Outlet | Sanitary Flow | Receiving | 43.733488 | -79.453199 | Sep 30, 2021 | Dec 29, 2021 | 500 | 70 | 3752 | 5 | 10.818 |
| ARU21-FM07 | Inlet | Sanitary Flow | Receiving | 43.744786 | -79.430031 | Nov 04, 2021 | Dec 29, 2021 | 750 | 256 | 15503 | 5 | 28.037 |

[1]ARU21-FM02 – Initially installed in outlet (Pipe Diameter: 250mm). Moved to the inlet (Pipe Diameter: 215mm) on October 27th, 2021. This was done due to poor quality of data at the outlet

[2]Data not provided

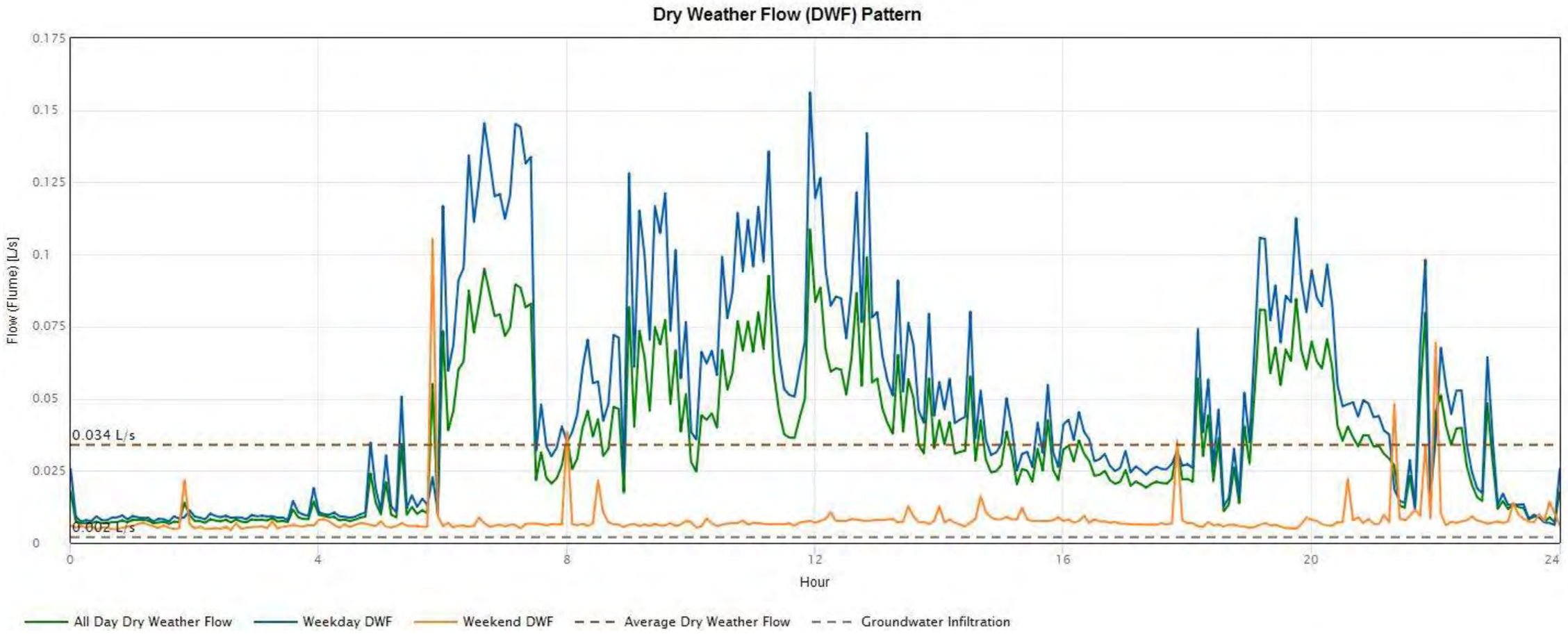
# Station: ARU21-FM01



# Sanitary Report

**Station: ARU21-FM01**

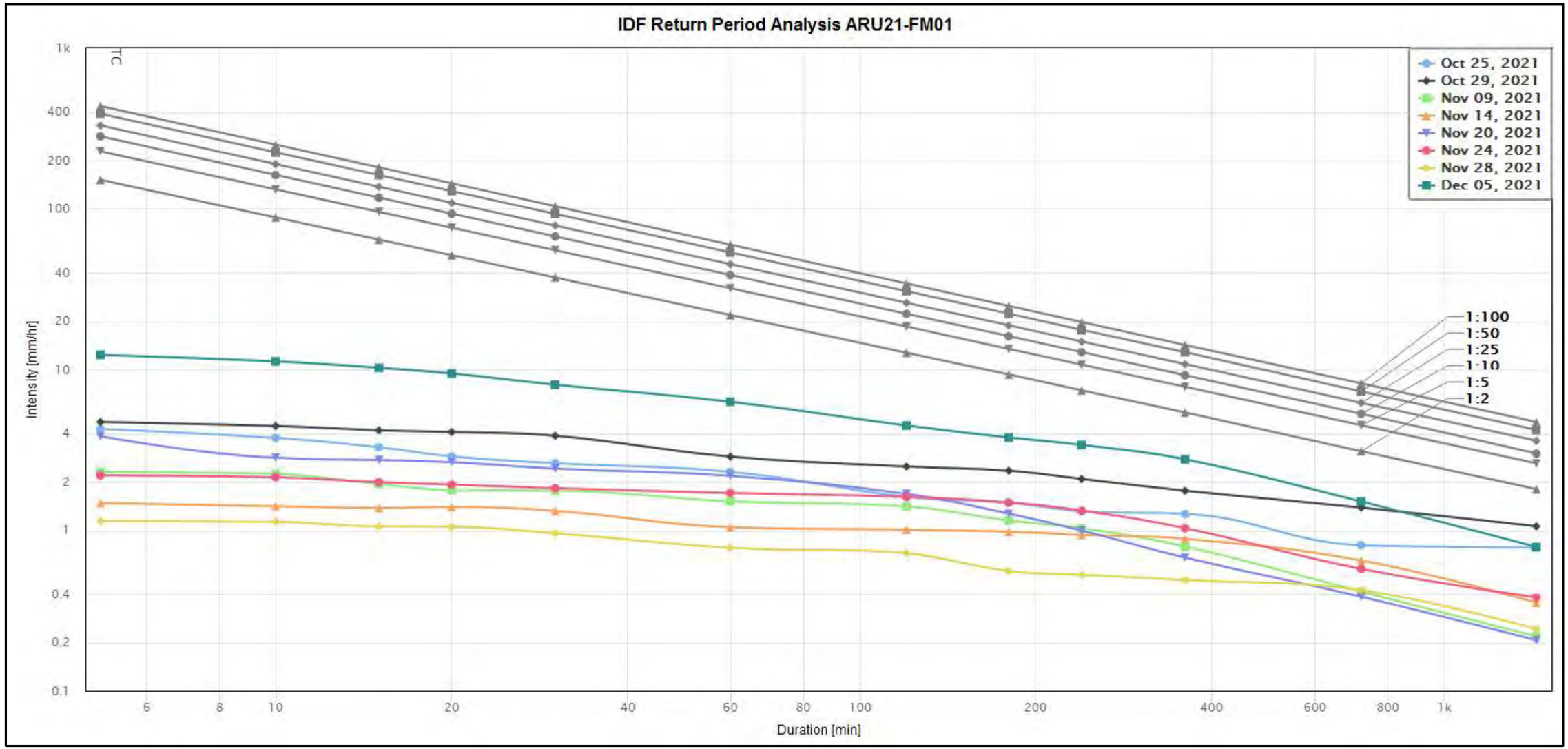
| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) | Catchment Population (Persons) |
|---|---|---|---|---|
| 0.034 | 29.033 | 0.003 | 0.536 | 102 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** | **Catchment Area (ha)** |
| 15.626 | 0.002 | 134.417 | 7.262 | 1.6 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# IDF Return Period Analysis

**Station: ARU21-FM01**



# IDF Return Period Analysis

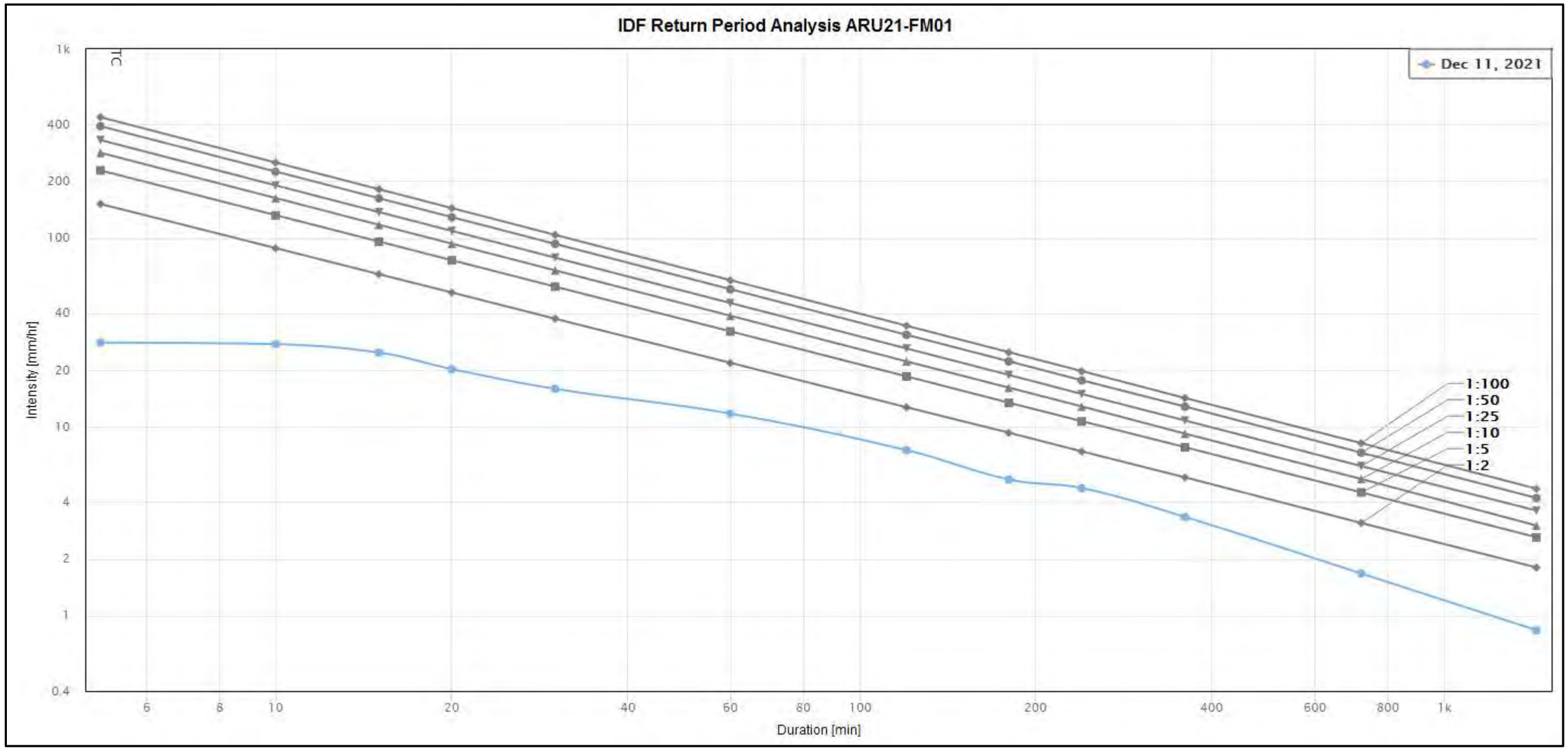


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | - | - | - | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | - | - | - | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | - | - | - | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | - | - | - | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | - | - | - | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | - | - | - | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Oct 25, 2021 | 38.25 | < 2 Yr | 25.38 | 4.27 | 3.75 | 3.28 | 2.88 | 2.61 | 2.31 | 1.61 | 1.48 | 1.31 | 1.26 | 0.81 | 0.78 |
| Oct 29, 2021 | 38.75 | < 2 Yr | 26.16 | 4.72 | 4.45 | 4.18 | 4.09 | 3.87 | 2.87 | 2.49 | 2.34 | 2.08 | 1.76 | 1.38 | 1.06 |
| Nov 09, 2021 | 26.17 | < 2 Yr | 5.32 | 2.30 | 2.24 | 1.94 | 1.78 | 1.76 | 1.51 | 1.41 | 1.15 | 1.03 | 0.79 | 0.41 | 0.22 |
| Nov 14, 2021 | 20.25 | < 2 Yr | 8.49 | 1.48 | 1.41 | 1.38 | 1.40 | 1.32 | 1.04 | 1.01 | 0.98 | 0.93 | 0.88 | 0.65 | 0.35 |
| Nov 20, 2021 | 26.08 | < 2 Yr | 5.04 | 3.84 | 2.83 | 2.73 | 2.65 | 2.42 | 2.18 | 1.68 | 1.26 | 0.99 | 0.67 | 0.39 | 0.21 |
| Nov 24, 2021 | 25.25 | < 2 Yr | 9.22 | 2.20 | 2.14 | 1.99 | 1.92 | 1.83 | 1.70 | 1.61 | 1.49 | 1.32 | 1.03 | 0.57 | 0.38 |
| Nov 28, 2021 | 19.92 | < 2 Yr | 5.82 | 1.14 | 1.13 | 1.06 | 1.05 | 0.96 | 0.78 | 0.72 | 0.56 | 0.53 | 0.49 | 0.42 | 0.24 |
| Dec 05, 2021 | 20.00 | < 2 Yr | 18.83 | 12.32 | 11.24 | 10.25 | 9.44 | 8.04 | 6.29 | 4.48 | 3.77 | 3.39 | 2.76 | 1.51 | 0.78 |
| Dec 11, 2021 | 9.08 | < 2 Yr | 20.10 | 27.95 | 27.45 | 24.75 | 20.20 | 15.91 | 11.75 | 7.53 | 5.26 | 4.74 | 3.33 | 1.68 | 0.84 |

# I/I Analysis Table

**Station: ARU21-FM01**

| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | ARU21-FM01 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| Measured Storms | Oct 25, 2021 | 25.38 | 38.25 | 4.30 | Flow KPIs | Oct 26, 2021 11:50 | 51.00 | 1.15 | 1.18 | 0.03 |
| | Oct 29, 2021 | 26.16 | 38.75 | 4.70 | | Oct 31, 2021 03:50 | 51.00 | 1.17 | 1.18 | 0.01 |
| | Nov 09, 2021 | 5.32 | 26.17 | 2.30 | | Nov 10, 2021 08:45 | 45.00 | 0.79 | 0.85 | 0.06 |
| | Nov 14, 2021 | 8.49 | 20.25 | 1.50 | | Nov 15, 2021 12:50 | 45.00 | 0.79 | 0.85 | 0.07 |
| | Nov 20, 2021 | 5.04 | 26.08 | 3.80 | | Nov 22, 2021 06:30 | 42.00 | 0.64 | 0.71 | 0.08 |
| | Nov 24, 2021 | 9.22 | 25.25 | 2.20 | | Nov 25, 2021 14:55 | 40.00 | 0.50 | 0.63 | 0.02 |
| | Nov 28, 2021 | 5.82 | 19.92 | 1.10 | | Nov 29, 2021 09:15 | 34.00 | 0.36 | 0.41 | 0.05 |
| | Dec 05, 2021 | 18.83 | 20.00 | 12.30 | | Dec 06, 2021 00:00 | 10.00 | 0.01 | 0.01 | 0.00 |
| | Dec 11, 2021 | 20.10 | 9.08 | 27.95 | | N/A[2] | | | | |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

[2] I/I event analysis unable to be completed due to missing flow monitoring data during event

# Aggregate Data

**Station: ARU21-FM01**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 13, 2021 | 48 | 0.01 | 0.01 | 0.05 | 13,535 | Sat Nov 20, 2021 10:00 | Thu Nov 11, 2021 09:00 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (L) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 13, 2021 | 48 | 0.00 | 0.04 | 1.30 | 1.501E+5 | 13,535 | Sat Nov 20, 2021 10:00 | Thu Nov 11, 2021 09:00 |

## Precipitation

| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 13, 2021 | 55 | 0.00 | 0.01 | 2.33 | 136.87 | 15,840 | Wed Oct 20, 2021 00:00 | Sat Dec 11, 2021 04:50 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Activity Log

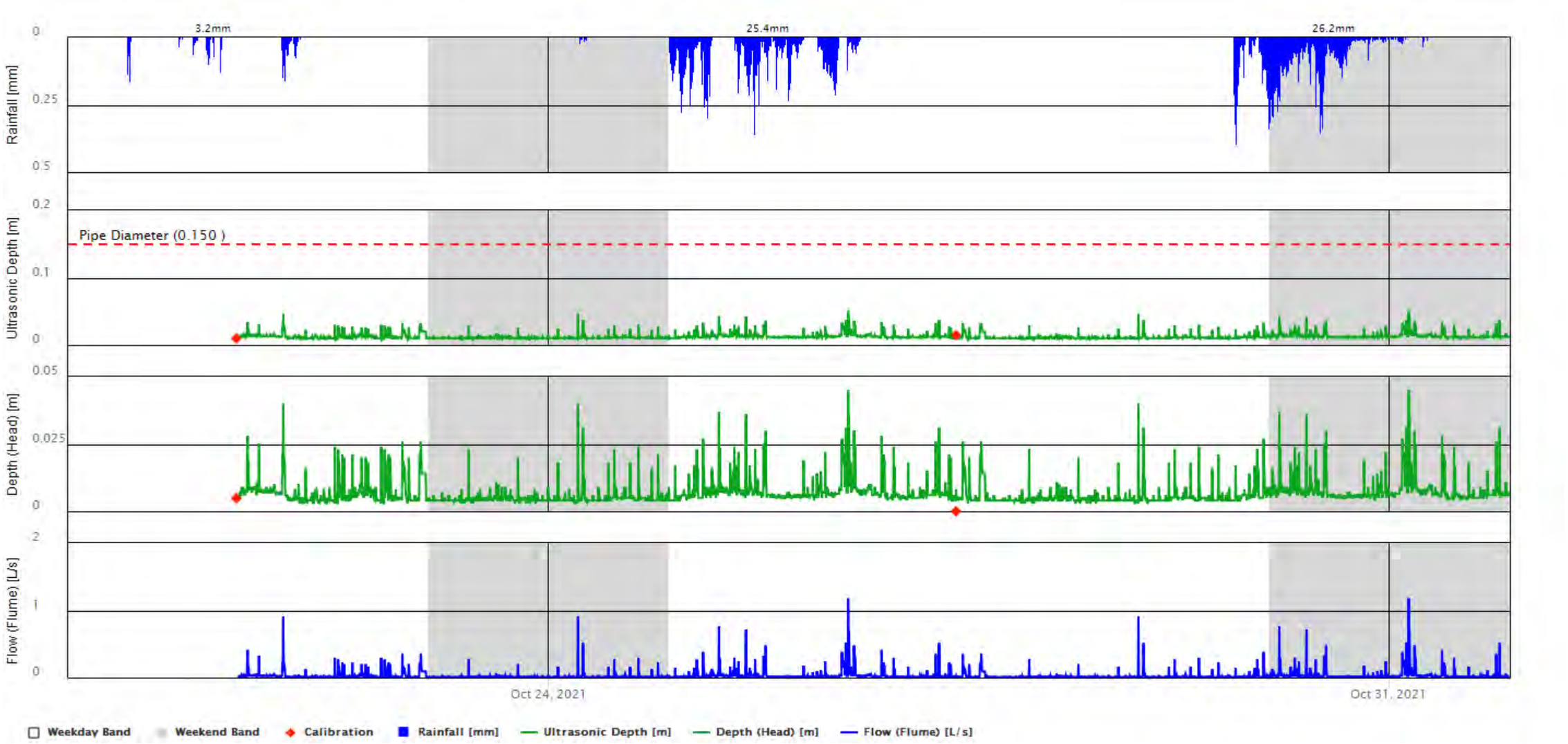
**Station: ARU21-FM01**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 21-Oct-2021 09:37:00 AM | Installation Log | Install | MUST SIGN IN AT BOMBARDIER MAIN ENTRANCE  BEFORE SITE ACCESS | Yes |
| 27-Oct-2021 09:30:00 AM | Maintenance Log | DATA DOWNLOAD AND CALIBRATION | Data downloaded<br>Debris cleared<br>Telemetry sent<br>Ensured manual and sensor readings are satisfactory before leaving site | Yes |
| 01-Dec-2021 10:15:00 AM | Maintenance Log | Calibration | Site calibrated<br>Debris cleared<br>Telemetry sent<br>Made sure LiDoTT has no interference - no obstacles - empty distance updated - ensured live reading good | Yes |
| 13-Dec-2021 09:45:00 AM | Removal Log | Removal | Removed all equipment<br>CN: 20201191868 | Yes |

# Data Chart

**Station: ARU21-FM01**

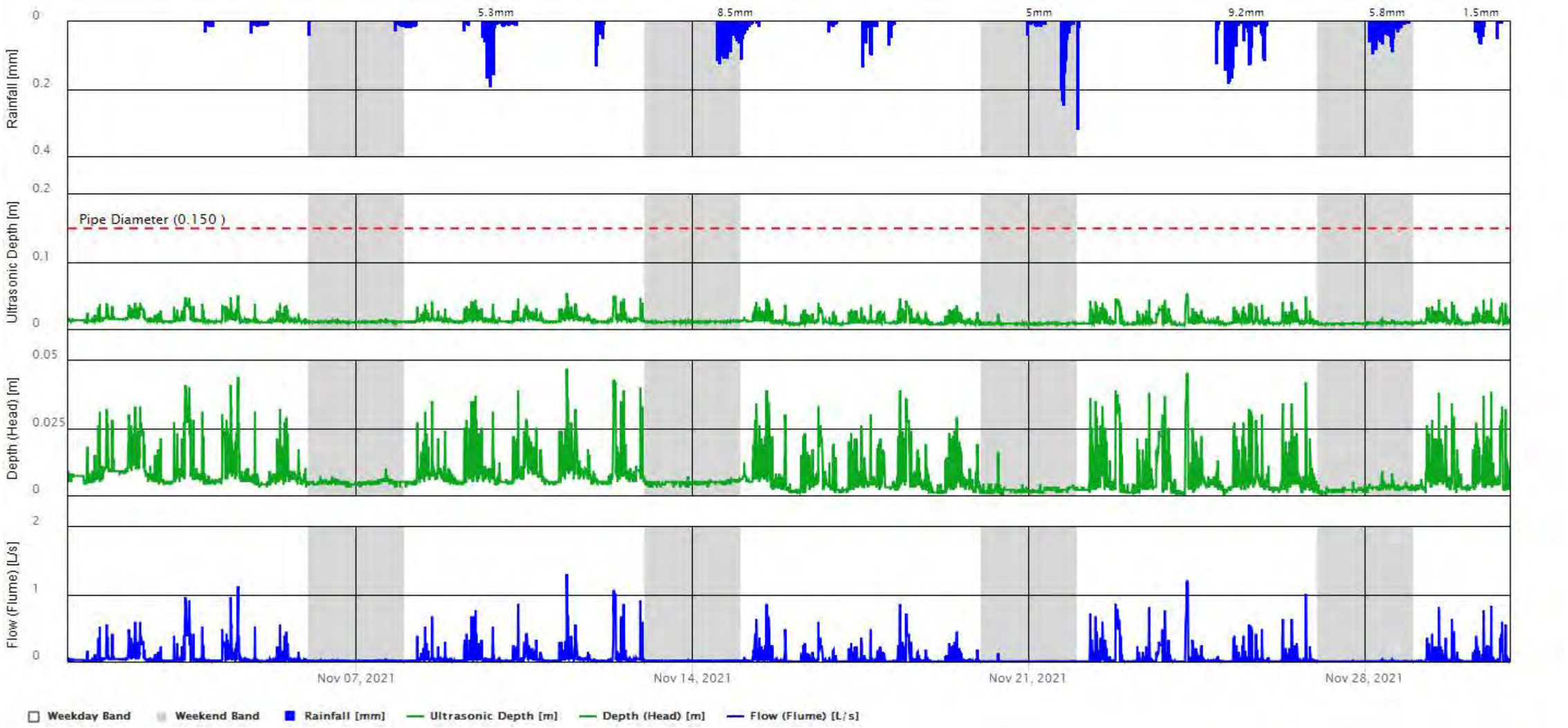
Oct 20, 2021 – Oct 31, 2021



# Data Chart

**Station: ARU21-FM01**

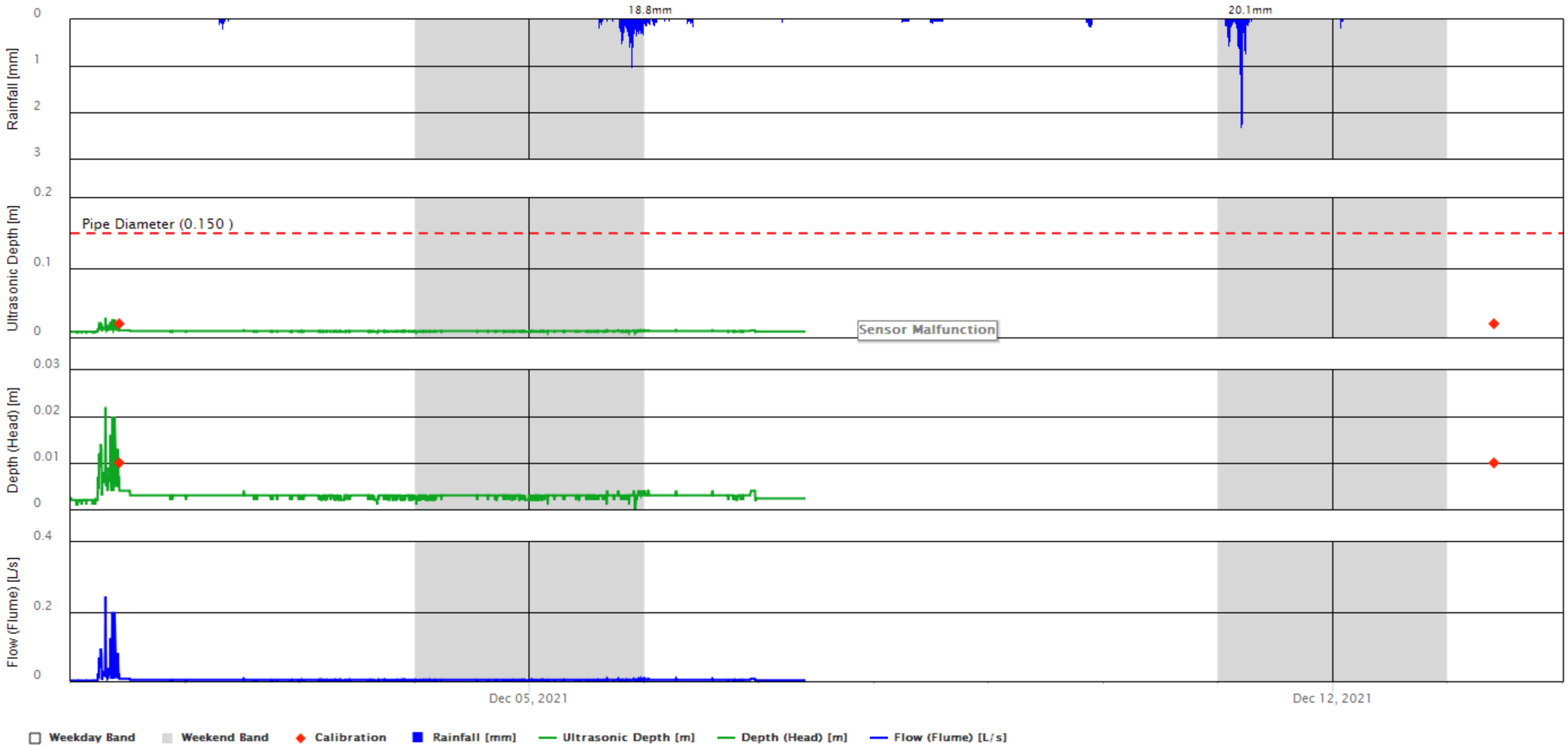
Nov 01, 2021 – Nov 30, 2021



# Data Chart

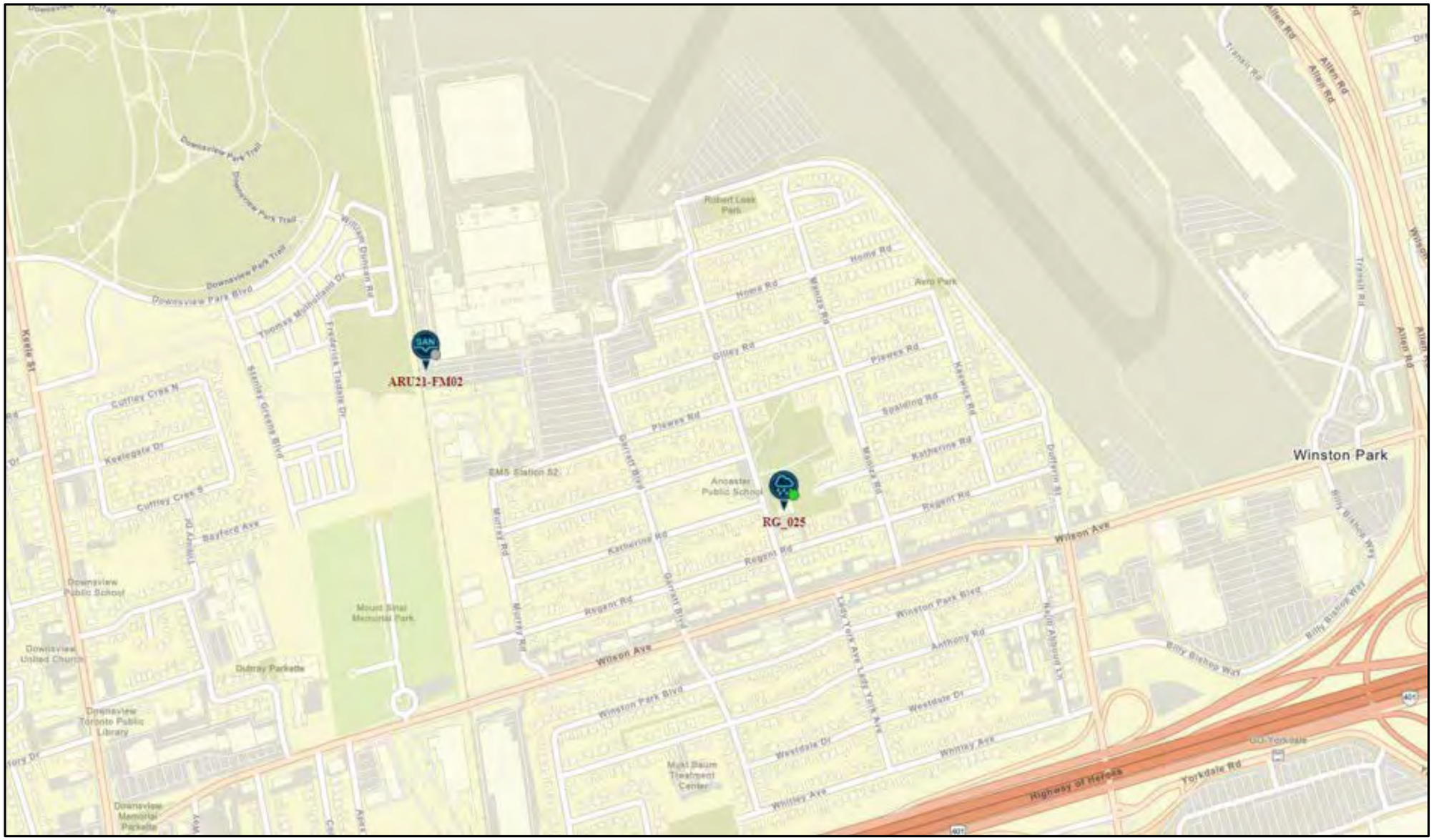
**Station: ARU21-FM01**

Dec 01, 2021 – Dec 13, 2021




[1]Sensor Malfunction starting on Dec 7th 2021

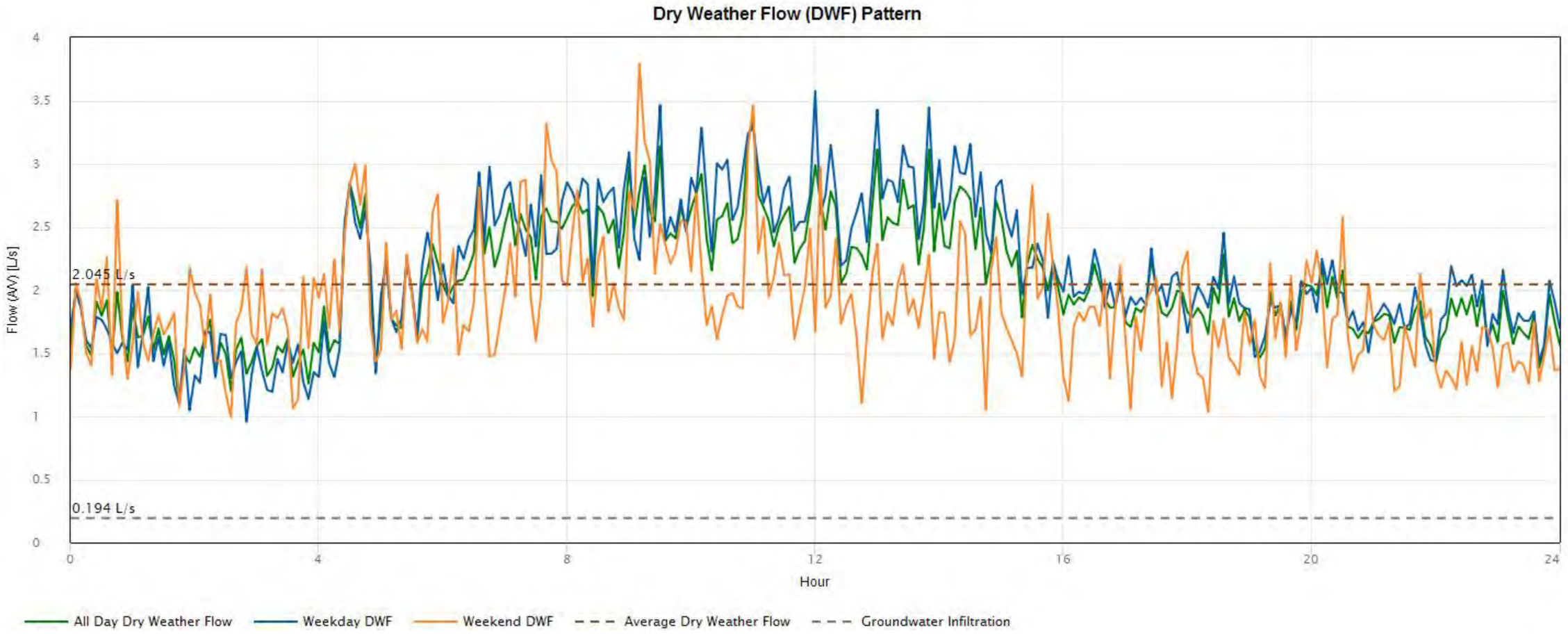
# Station: ARU21-FM02



# Sanitary Report

**Station: ARU21-FM02**

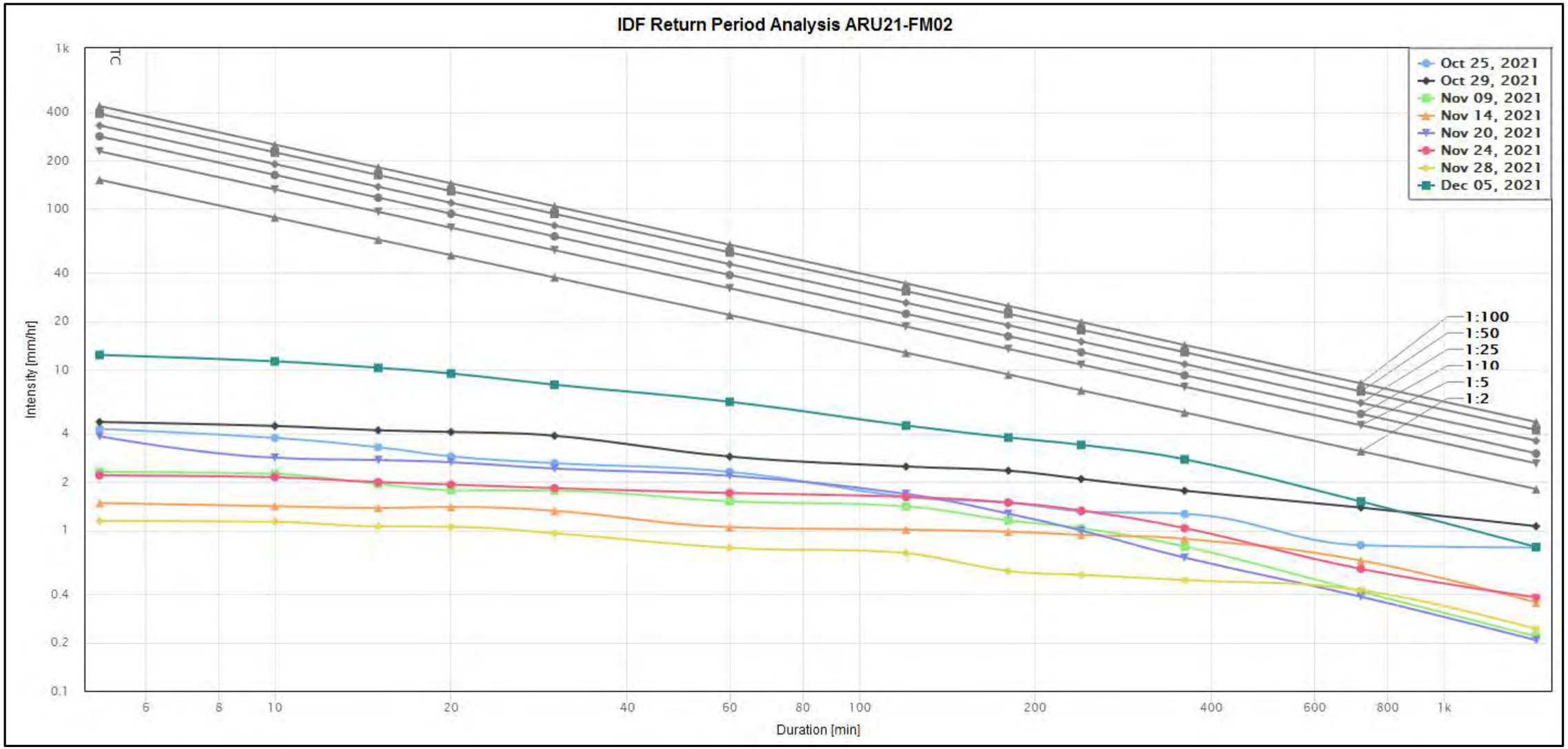
| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) | Catchment Population (Persons) |
|---|---|---|---|---|
| 2.045 | 57.743 | 0.228 | 6.938 | 3,060 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** | **Catchment Area (ha)** |
| 3.393 | 0.194 | 425.799 | 9.495 | 39.4 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# IDF Return Period Analysis

**Station: ARU21-FM02**



# IDF Return Period Analysis

**Station: ARU21-FM02**

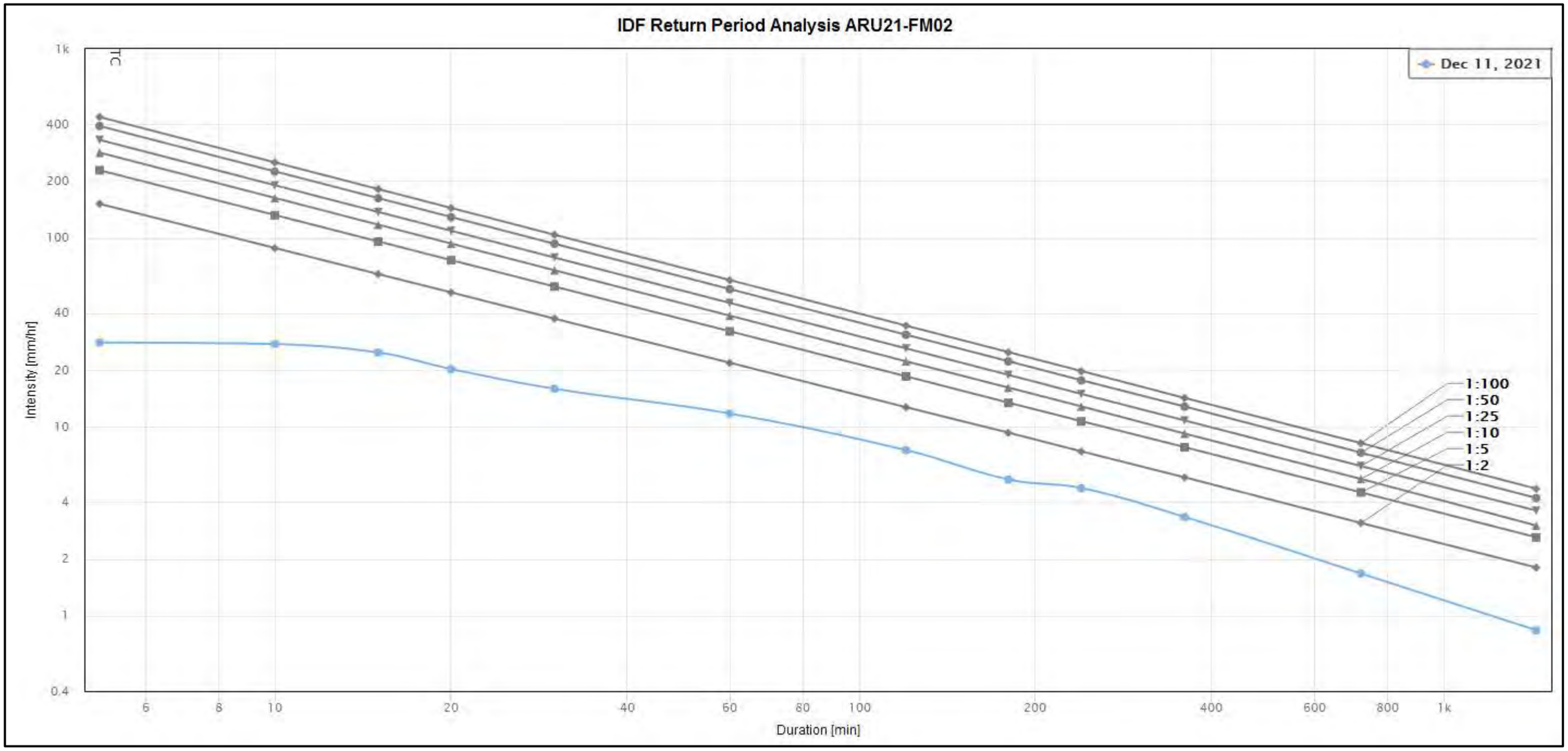


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | - | - | - | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | - | - | - | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | - | - | - | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | - | - | - | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | - | - | - | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | - | - | - | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Oct 25, 2021 | 38.25 | < 2 Yr | 25.38 | 4.27 | 3.75 | 3.28 | 2.88 | 2.61 | 2.31 | 1.61 | 1.48 | 1.31 | 1.26 | 0.81 | 0.78 |
| Oct 29, 2021 | 38.75 | < 2 Yr | 26.16 | 4.72 | 4.45 | 4.18 | 4.09 | 3.87 | 2.87 | 2.49 | 2.34 | 2.08 | 1.76 | 1.38 | 1.06 |
| Nov 09, 2021 | 26.17 | < 2 Yr | 5.32 | 2.30 | 2.24 | 1.94 | 1.78 | 1.76 | 1.51 | 1.41 | 1.15 | 1.03 | 0.79 | 0.41 | 0.22 |
| Nov 14, 2021 | 20.25 | < 2 Yr | 8.49 | 1.48 | 1.41 | 1.38 | 1.40 | 1.32 | 1.04 | 1.01 | 0.98 | 0.93 | 0.88 | 0.65 | 0.35 |
| Nov 20, 2021 | 26.08 | < 2 Yr | 5.04 | 3.84 | 2.83 | 2.73 | 2.65 | 2.42 | 2.18 | 1.68 | 1.26 | 0.99 | 0.67 | 0.39 | 0.21 |
| Nov 24, 2021 | 25.25 | < 2 Yr | 9.22 | 2.20 | 2.14 | 1.99 | 1.92 | 1.83 | 1.70 | 1.61 | 1.49 | 1.32 | 1.03 | 0.57 | 0.38 |
| Nov 28, 2021 | 19.92 | < 2 Yr | 5.82 | 1.14 | 1.13 | 1.06 | 1.05 | 0.96 | 0.78 | 0.72 | 0.56 | 0.53 | 0.49 | 0.42 | 0.24 |
| Dec 05, 2021 | 20.00 | < 2 Yr | 18.83 | 12.32 | 11.24 | 10.25 | 9.44 | 8.04 | 6.29 | 4.48 | 3.77 | 3.39 | 2.76 | 1.51 | 0.78 |
| Dec 11, 2021 | 9.08 | < 2 Yr | 20.10 | 27.95 | 27.45 | 24.75 | 20.20 | 15.91 | 11.75 | 7.53 | 5.26 | 4.74 | 3.33 | 1.68 | 0.84 |

# I/I Analysis Table

**Station: ARU21-FM02**

| Measured | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | Flow KPIs | ARU21-FM02 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Oct 25, 2021 | 25.38 | 38.25 | 4.30 | | Oct 26, 2021 09:05 | 119.50 | 7.42 | 9.91 | 2.49 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oct 29, 2021 | 26.16 | 38.75 | 4.70 | | Oct 29, 2021 17:40 | 109.50 | 5.86 | 7.99 | 1.71 |
| | Nov 09, 2021 | 5.32 | 26.17 | 2.30 | | Nov 10, 2021 02:55 | 105.00 | 6.42 | 7.84 | 1.32 |
| | Nov 14, 2021 | 8.49 | 20.25 | 1.50 | | Nov 14, 2021 11:45 | 92.00 | 4.51 | 6.24 | 1.36 |
| | Nov 20, 2021 | 5.04 | 26.08 | 3.80 | | Nov 22, 2021 07:55 | 91.00 | 3.71 | 5.94 | 2.23 |
| | Nov 24, 2021 | 9.22 | 25.25 | 2.20 | | Nov 26, 2021 07:35 | 98.00 | 5.12 | 7.64 | 2.52 |
| | Nov 28, 2021 | 5.82 | 19.92 | 1.10 | | Nov 28, 2021 16:55 | 93.00 | 4.62 | 6.69 | 1.60 |
| | Dec 05, 2021 | 18.83 | 20.00 | 12.30 | | Dec 05, 2021 21:15 | 116.00 | 8.11 | 9.16 | 1.05 |
| | Dec 11, 2021 | 20.10 | 9.08 | 27.90 | | Dec 11, 2021 05:15 | 126.00 | 7.88 | 9.60 | 1.72 |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

# Aggregate Data

**Station: ARU21-FM02**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 13, 2021 | 55 | 0.04 | 0.07 | 0.14 | 15,662 | Thu Oct 28, 2021 21:30 | Tue Dec 07, 2021 14:25 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (1,000,000 L) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 13, 2021 | 55 | 0.00 | 2.21 | 9.91 | 10.41 | 15,662 | Tue Nov 30, 2021 01:50 | Tue Oct 26, 2021 09:05 |

## Precipitation

| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 13, 2021 | 55 | 0.00 | 0.01 | 2.33 | 136.87 | 15,840 | Wed Oct 20, 2021 00:00 | Sat Dec 11, 2021 04:50 |

## Velocity

| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 13, 2021 | 55 | 0.00 | 0.20 | 0.49 | 15,662 | Sat Oct 30, 2021 16:00 | Sat Dec 04, 2021 00:45 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Activity Log

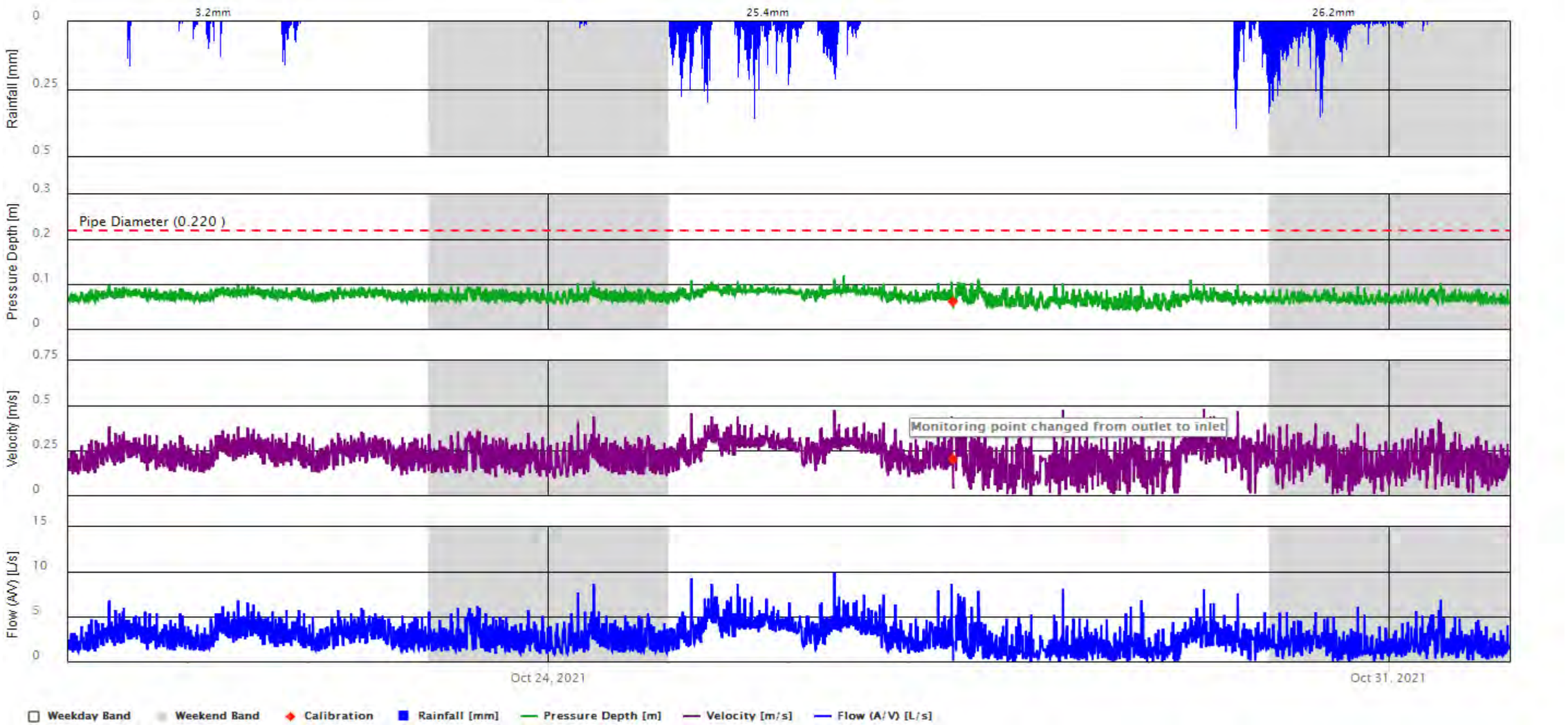
**Station: ARU21-FM02**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 27-Oct-2021 08:45:00 AM | Maintenance Log | DATA DOWNLOAD AND CALIBRATION | Data downloaded<br>Telemetry sent<br>Debris cleared<br>Ensured manual and sensor readings are satisfactory before leaving site<br>AV Ring and CSO sensor have been moved to INLET<br>Inlet has significant encrustation- Ring has to be resized to fit pipe (215 mm) | Yes |
| 01-Dec-2021 09:30:00 AM | Maintenance Log | Calibration | Site calibrated<br>Debris cleared<br>Telemetry sent<br>Pressure depth noisy - replaced dessicant to take care of that | Yes |
| 13-Dec-2021 09:22:00 AM | Removal Log | Removal | -Removed all equipment<br>- CN: 20201191861 | Yes |

# Data Chart

**Station: ARU21-FM02**

Oct 20, 2021 – Oct 31, 2021

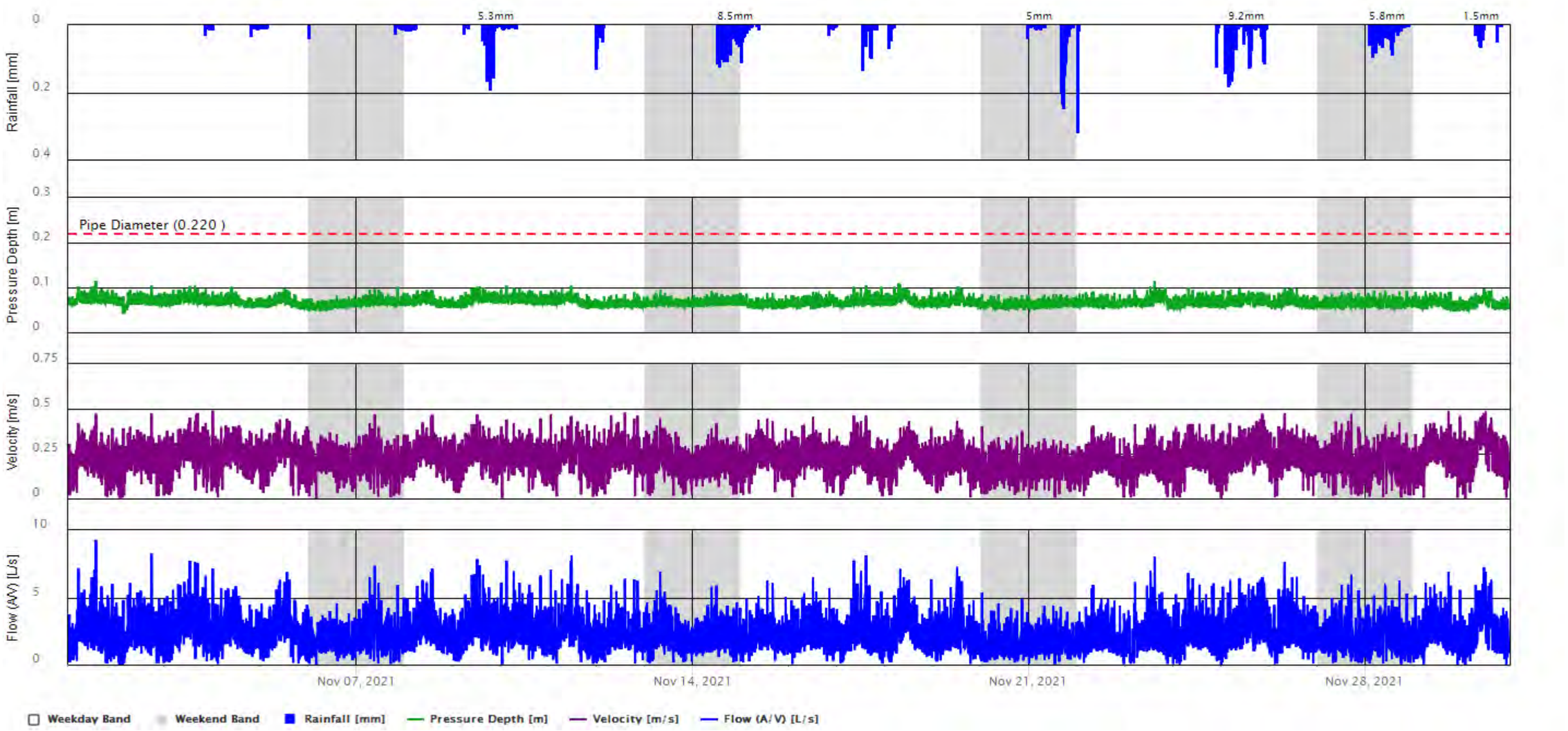



[1]Monitoring point changed from outlet to inlet on Oct 27th 2021

# Data Chart

**Station: ARU21-FM02**

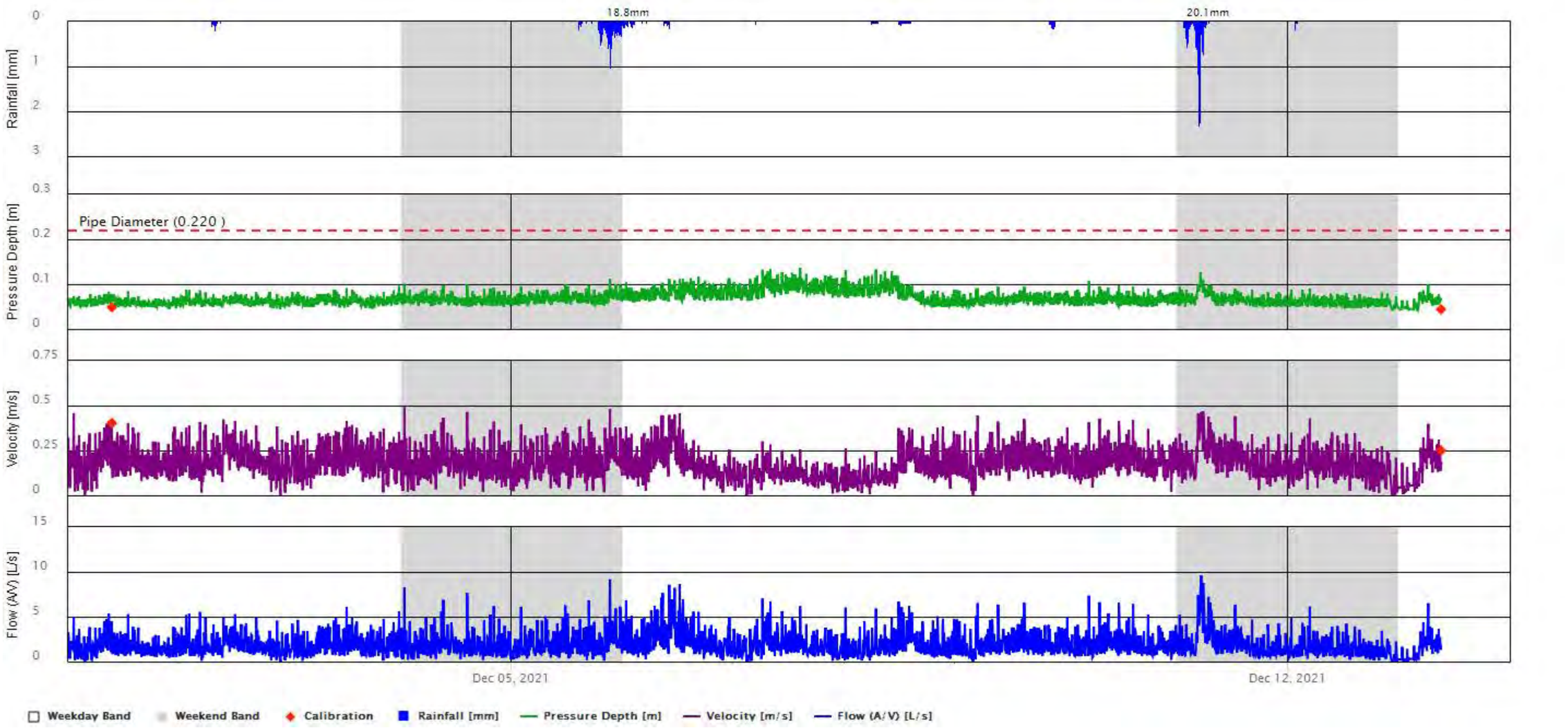
Nov 01, 2021 – Nov 30, 2021



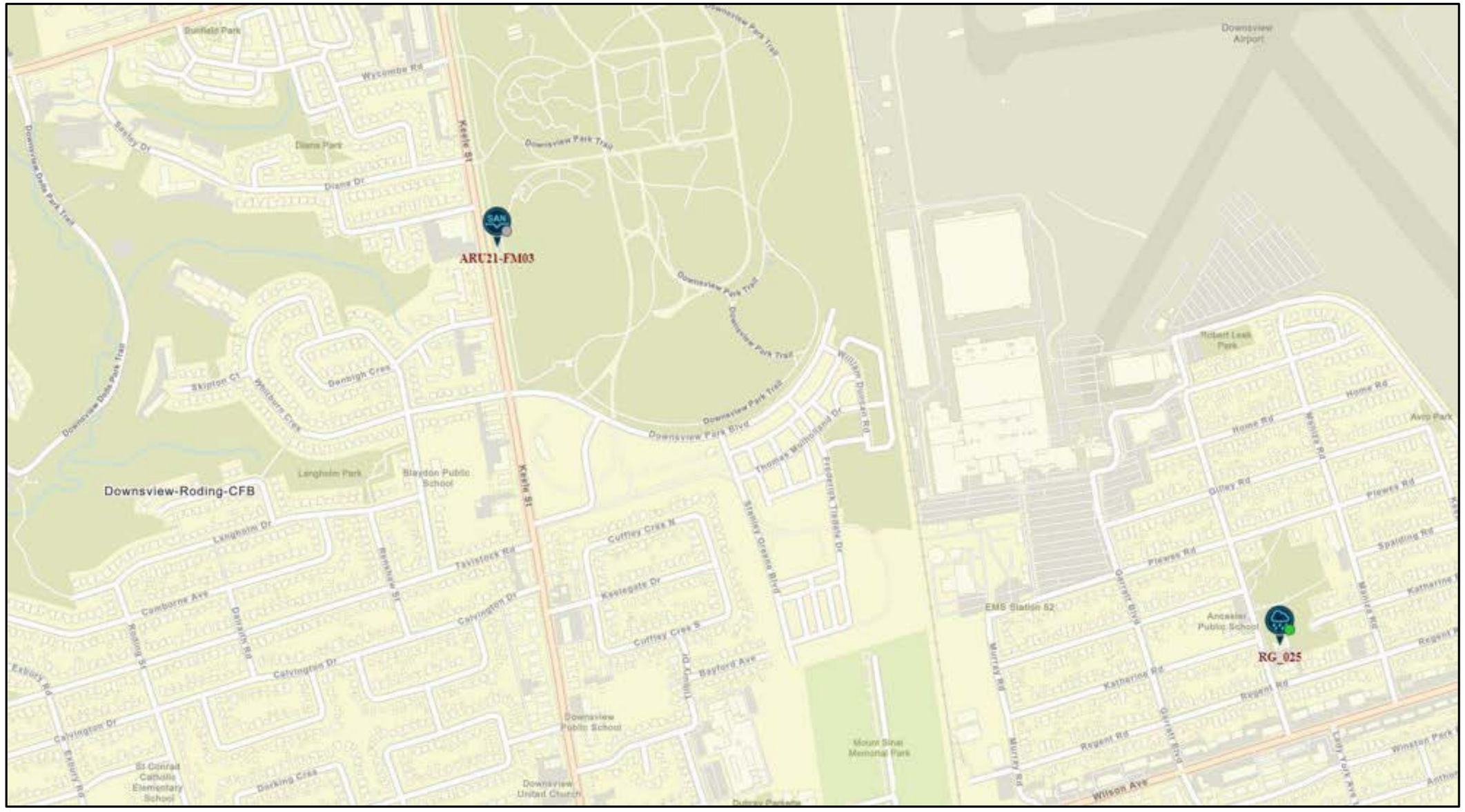
# Data Chart

**Station: ARU21-FM02**

Dec 01, 2021 – Dec 13, 2021



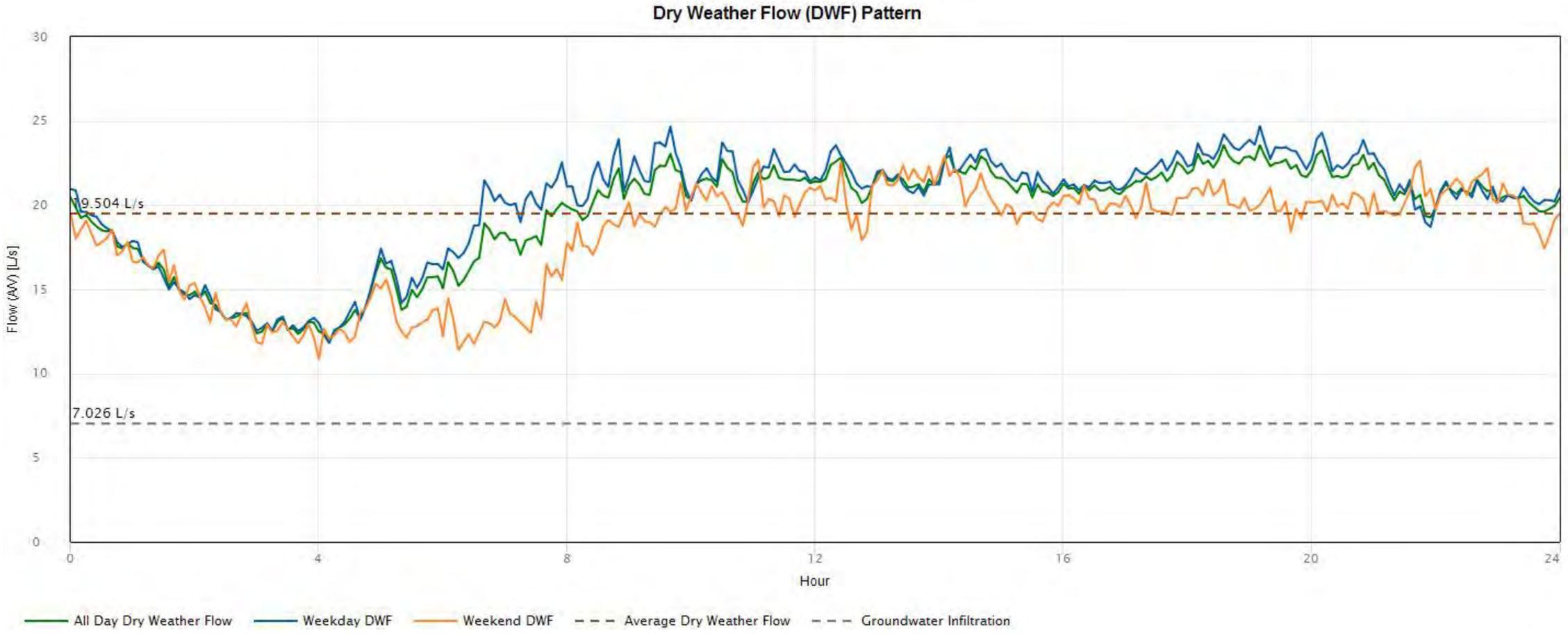
# Station: ARU21-FM03



# Sanitary Report

**Station: ARU21-FM03**

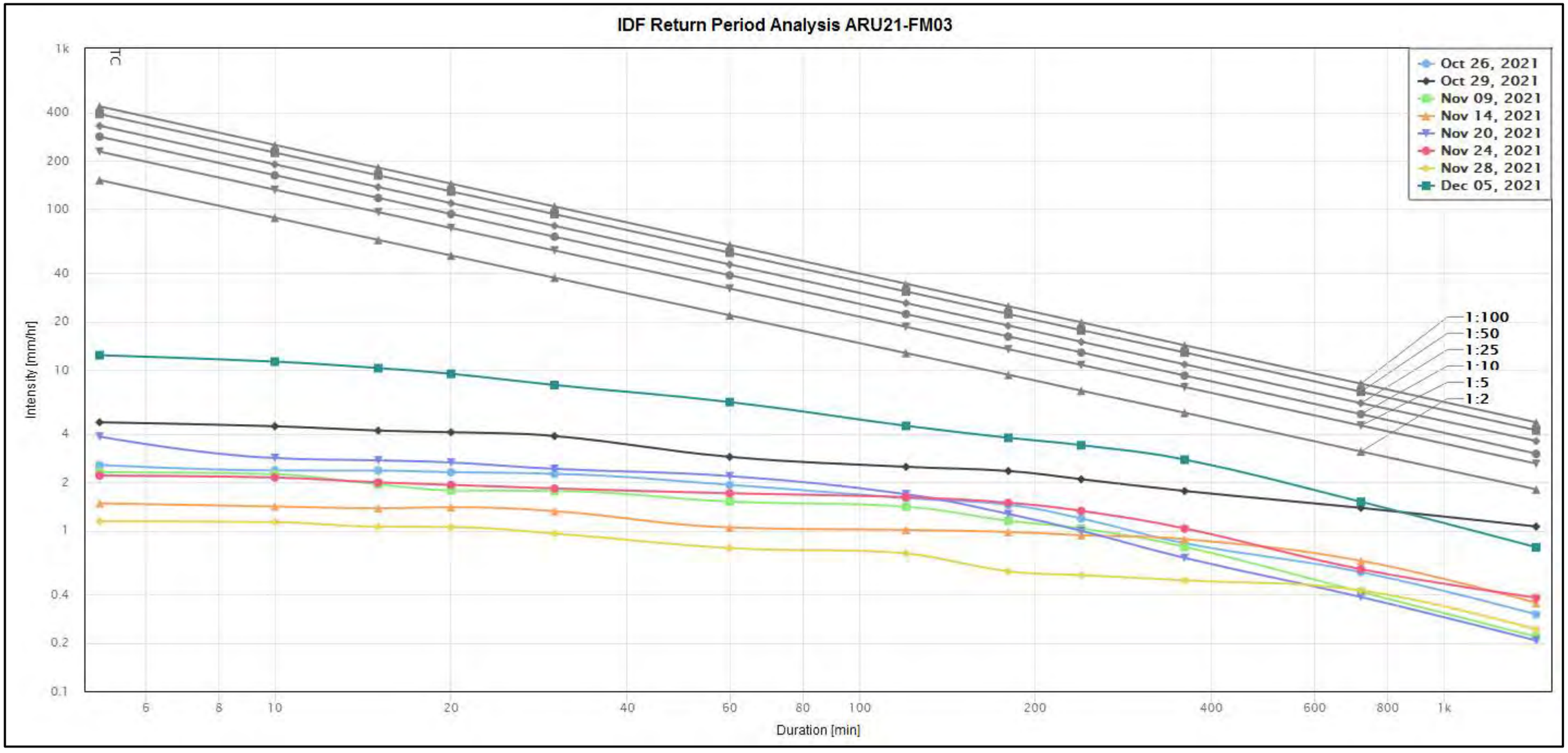
| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) | Catchment Population (Persons) |
|---|---|---|---|---|
| 19.504 | 220.538 | 8.266 | 33.866 | 7,641 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** | **Catchment Area (ha)** |
| 1.736 | 7.026 | 7,617.087 | 36.026 | 79.7 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# IDF Return Period Analysis

**Station: ARU21-FM03**



# IDF Return Period Analysis

**Station: ARU21-FM03**

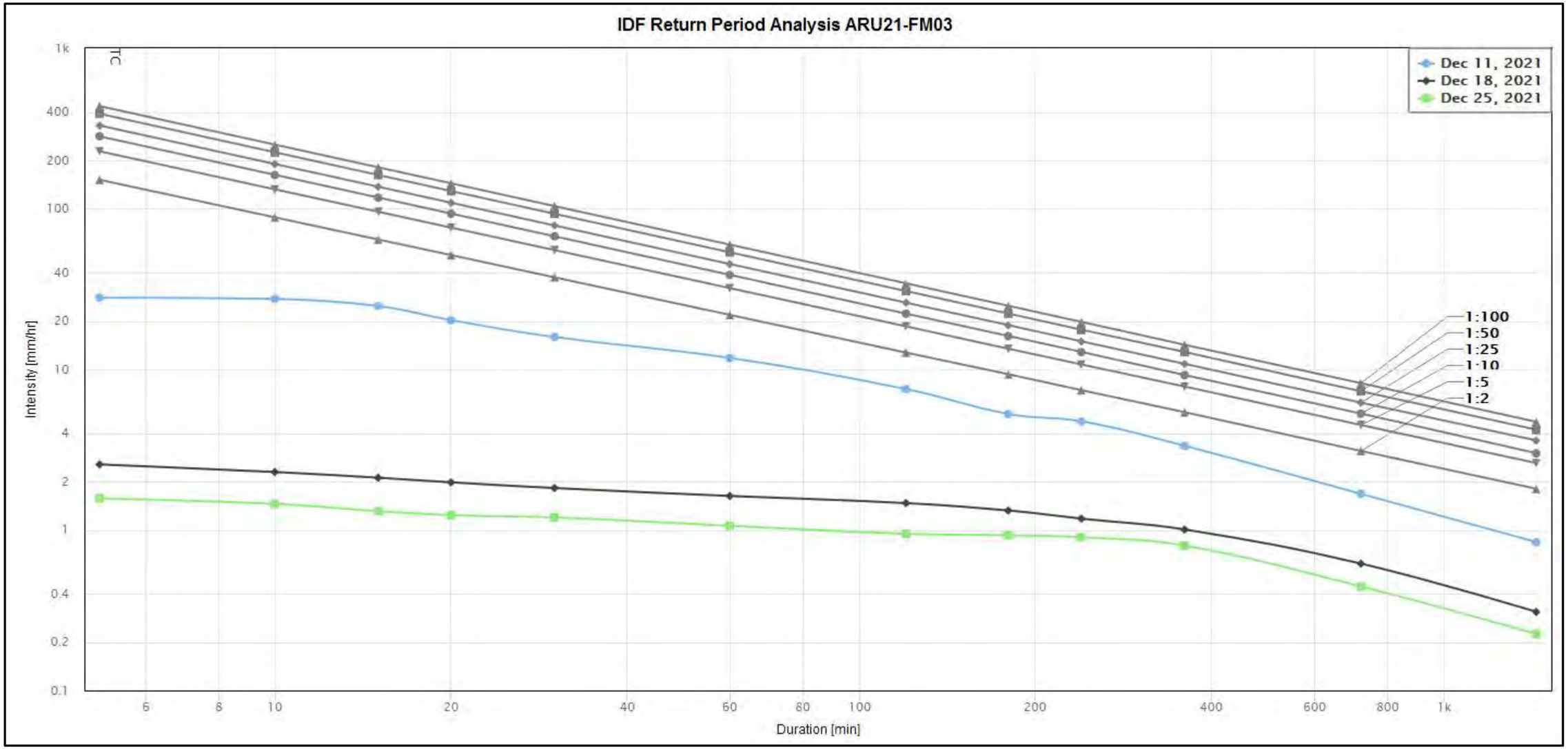


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | - | - | - | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | - | - | - | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | - | - | - | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | - | - | - | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | - | - | - | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | - | - | - | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Oct 26, 2021 | 14.33 | < 2 Yr | 7.21 | 2.56 | 2.36 | 2.36 | 2.30 | 2.25 | 1.92 | 1.59 | 1.44 | 1.18 | 0.83 | 0.55 | 0.30 |
| Oct 29, 2021 | 38.75 | < 2 Yr | 26.16 | 4.72 | 4.45 | 4.18 | 4.09 | 3.87 | 2.87 | 2.49 | 2.34 | 2.08 | 1.76 | 1.38 | 1.06 |
| Nov 09, 2021 | 26.17 | < 2 Yr | 5.32 | 2.30 | 2.24 | 1.94 | 1.78 | 1.76 | 1.51 | 1.41 | 1.15 | 1.03 | 0.79 | 0.41 | 0.22 |
| Nov 14, 2021 | 20.25 | < 2 Yr | 8.49 | 1.48 | 1.41 | 1.38 | 1.40 | 1.32 | 1.04 | 1.01 | 0.98 | 0.93 | 0.88 | 0.65 | 0.35 |
| Nov 20, 2021 | 26.08 | < 2 Yr | 5.04 | 3.84 | 2.83 | 2.73 | 2.65 | 2.42 | 2.18 | 1.68 | 1.26 | 0.99 | 0.67 | 0.39 | 0.21 |
| Nov 24, 2021 | 25.25 | < 2 Yr | 9.22 | 2.20 | 2.14 | 1.99 | 1.92 | 1.83 | 1.70 | 1.61 | 1.49 | 1.32 | 1.03 | 0.57 | 0.38 |
| Nov 28, 2021 | 19.92 | < 2 Yr | 5.82 | 1.14 | 1.13 | 1.06 | 1.05 | 0.96 | 0.78 | 0.72 | 0.56 | 0.53 | 0.49 | 0.42 | 0.24 |
| Dec 05, 2021 | 20.00 | < 2 Yr | 18.83 | 12.32 | 11.24 | 10.25 | 9.44 | 8.04 | 6.29 | 4.48 | 3.77 | 3.39 | 2.76 | 1.51 | 0.78 |
| Dec 11, 2021 | 9.08 | < 2 Yr | 20.10 | 27.95 | 27.45 | 24.75 | 20.20 | 15.91 | 11.75 | 7.53 | 5.26 | 4.74 | 3.33 | 1.68 | 0.84 |
| Dec 18, 2021 | 9.08 | < 2 Yr | 7.40 | 2.56 | 2.29 | 2.11 | 1.98 | 1.82 | 1.63 | 1.47 | 1.32 | 1.17 | 1.00 | 0.62 | 0.31 |
| Dec 25, 2021 | 15.42 | < 2 Yr | 5.39 | 1.57 | 1.45 | 1.31 | 1.24 | 1.20 | 1.06 | 0.94 | 0.93 | 0.90 | 0.80 | 0.44 | 0.22 |

# I/I Analysis Table

**Station: ARU21-FM03**

| Measure | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | Flow KPIs | ARU21-FM03 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow (L/s) | Estimated Dry Weather Flow at TD (L/s) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Oct 26, 2021 | 7.21 | 14.33 | 2.56 | | N/A[2] | | | | |
| | Oct 29, 2021 | 26.16 | 38.75 | 4.70 | | Oct 30, 2021 23:30 | 749.00 [3] | 28.81 | 48.02 | 19.21 |
| | Nov 09, 2021 | 5.32 | 26.17 | 2.30 | | Nov 09, 2021 18:55 | 106.00 | 14.60 | 37.07 | 22.47 |
| | Nov 14, 2021 | 8.49 | 20.25 | 1.50 | | Nov 14, 2021 17:15 | 258.00 | 22.53 | 42.13 | 19.60 |
| | Nov 20, 2021 | 5.04 | 26.08 | 3.80 | | Nov 21, 2021 18:00 | 632.00 [3] | 21.10 | 40.45 | 19.35 |
| | Nov 24, 2021 | 9.22 | 25.25 | 2.20 | | Nov 24, 2021 22:10 | 1,409.00 [3] | 21.79 | 42.07 | 20.28 |
| | Nov 28, 2021 | 5.82 | 19.92 | 1.10 | | Nov 28, 2021 10:15 | 394.00 | 19.83 | 40.72 | 20.90 |
| | Dec 05, 2021 | 18.83 | 20.00 | 12.30 | | Dec 05, 2021 23:25 | 733.00 [3] | 39.89 | 58.78 | 18.89 |
| | Dec 11, 2021 | 20.10 | 9.08 | 27.90 | | Dec 11, 2021 06:25 | 1,604.50 [3] | 55.10 | 66.60 | 11.50 |
| | Dec 18, 2021 | 7.40 | 9.08 | 2.60 | | Dec 19, 2021 03:25 | 294.00 | 9.66 | 32.33 | 13.53 |
| | Dec 25, 2021 | 5.39 | 15.42 | 1.60 | | Dec 25, 2021 10:15 | 233.00 | 16.88 | 36.10 | 18.38 |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

[2] I/I event analysis unable to be completed due to missing flow monitoring data during event

[3] Captured peak depth is greater than 90% of pipe diameter, pipe containing flow monitor may have experienced surcharge

# Aggregate Data

**Station: ARU21-FM03**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 26, 2021 | Dec 30, 2021 | 64 | 0.01 | 0.11 | 1.60 | 18,104 | Wed Dec 29, 2021 09:00 | Sat Dec 11, 2021 05:15 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (1,000,000 L) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 26, 2021 | Dec 30, 2021 | 64 | 0.00 | 18.18 | 66.60 | 98.76 | 18,104 | Fri Oct 29, 2021 08:45 | Sat Dec 11, 2021 06:25 |

## Precipitation

| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 26, 2021 | Dec 30, 2021 | 66 | 0.00 | 0.01 | 2.33 | 136.44 | 18,900 | Tue Oct 26, 2021 02:45 | Sat Dec 11, 2021 04:50 |

## Velocity

| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 26, 2021 | Dec 30, 2021 | 64 | 0.00 | 1.04 | 1.88 | 18,104 | Fri Oct 29, 2021 08:45 | Tue Dec 14, 2021 07:40 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Activity Log

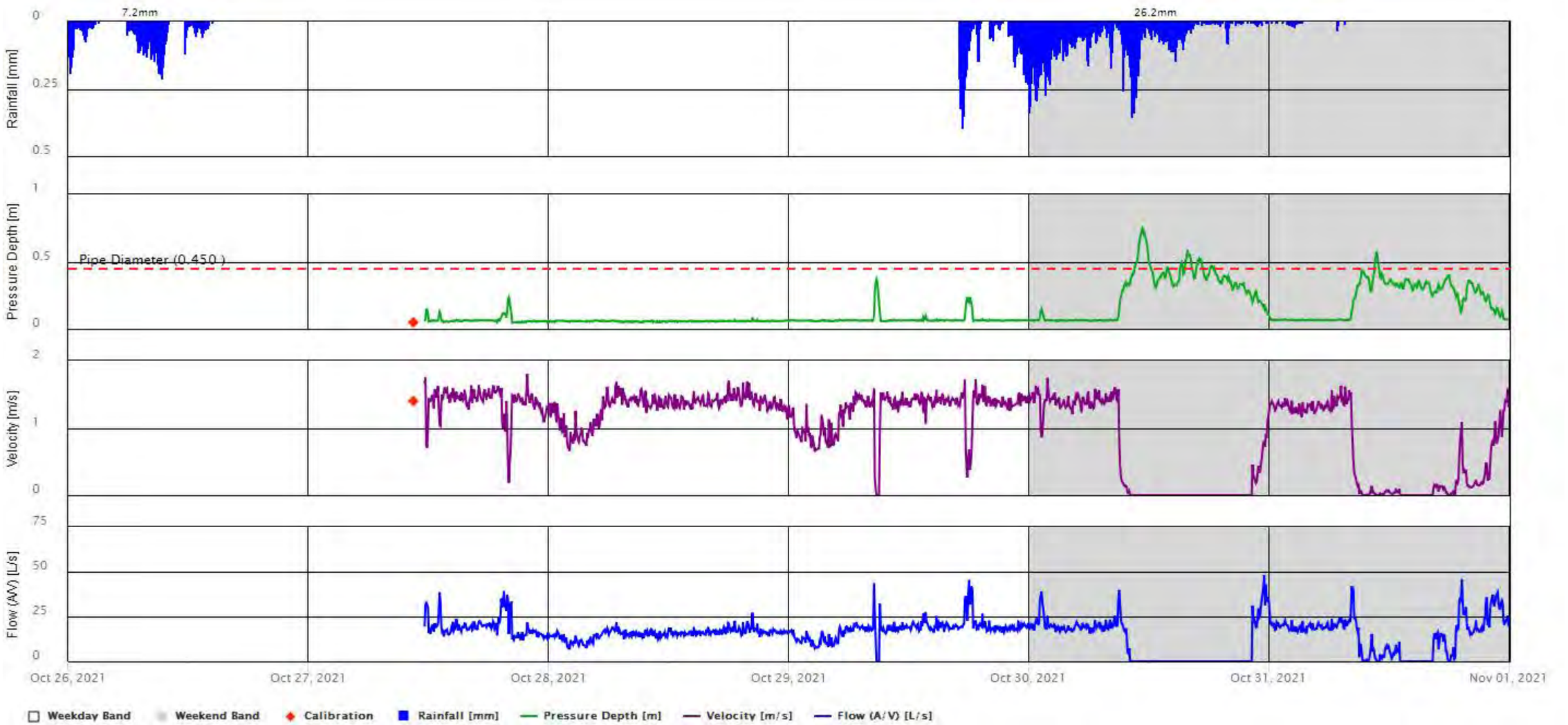
**Station: ARU21-FM03**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 27-Oct-2021 10:30:00 AM | Installation Log | Installation | Outlet is surcharged - AV Ring provided was 520 mm instead of 450 mm. Ring had to be resized to fit pipe. Encrustation evident around Inlet. Had to removed prior to install. | Yes |
| 16-Nov-2021 10:30:00 AM | Maintenance Log | DATA DOWNLOAD AND CALIBRATION | Data downloaded<br>Debris cleared<br>Telemetry sent<br>Ensured manual and sensor readings are satisfactory before leaving site<br>Replaced Wooden Bracket for 3D Printed Bracket<br>Adjusted Empty distance for accurate Downward U/S Depth reading | Yes |
| 24-Nov-2021 12:27:00 PM | Maintenance Log | CALIBRATION | DATA DOWNLOADED<br>NO ENTRY MADE, WE FELT IT WAS UNSAFE TO DO SO DUE TO SURCHARGING. WE ARE UNABLE TO SEE THE CHANNEL OR ANY BENCHING. | Yes |
| 01-Dec-2021 08:10:00 AM | Maintenance Log | Calibration | Site calibrated<br>Debris cleared<br>Telemetry sent<br>CSO was flat lining - fixed the issue by unplugging and replugging the sensor cable - also made sure face of sensor is clean and bracket is level | Yes |
| 29-Dec-2021 08:51:00 AM | Removal Log | FM REMOVAL | | Yes |

# Data Chart

**Station: ARU21-FM03**

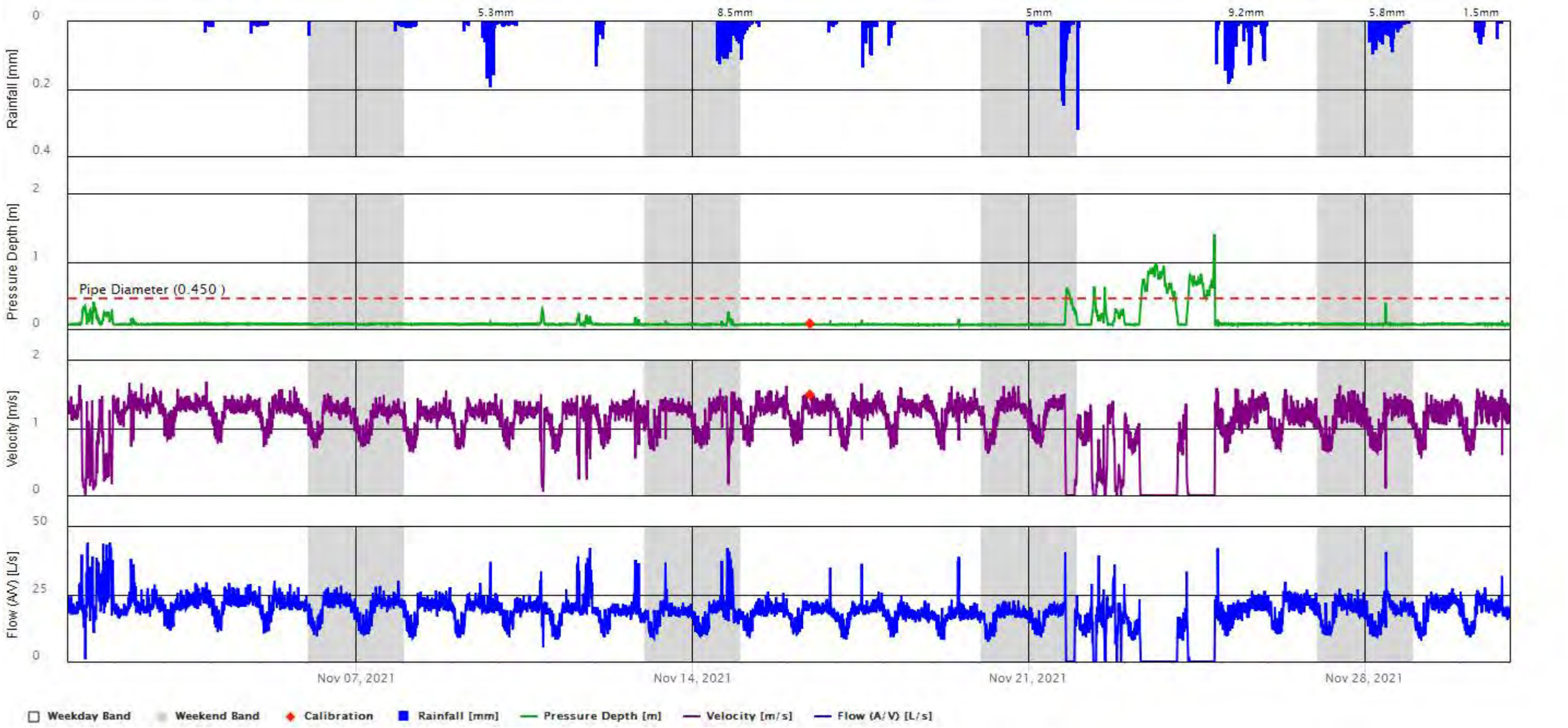
Oct 26, 2021 – Oct 31, 2021



# Data Chart

**Station: ARU21-FM03**

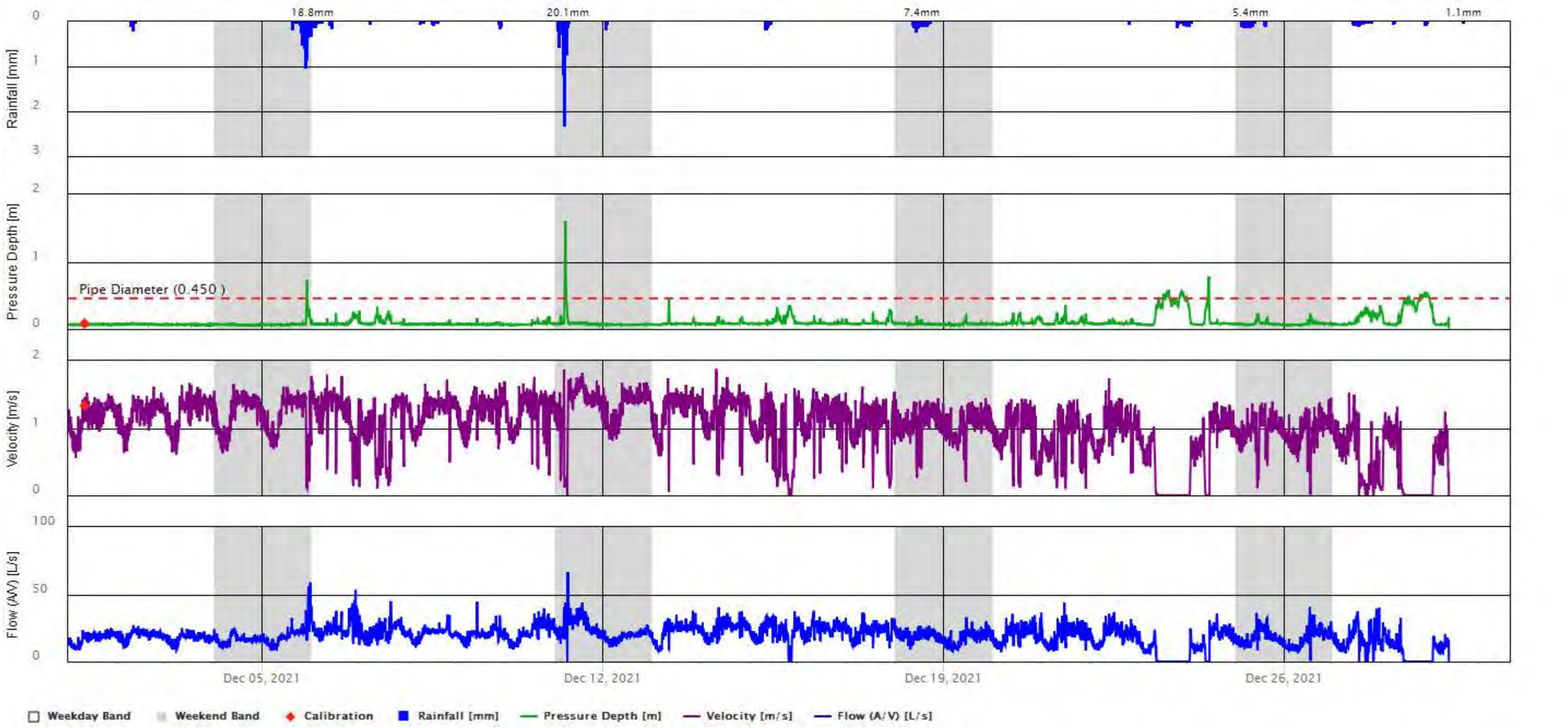
Nov 01, 2021 – Nov 30, 2021



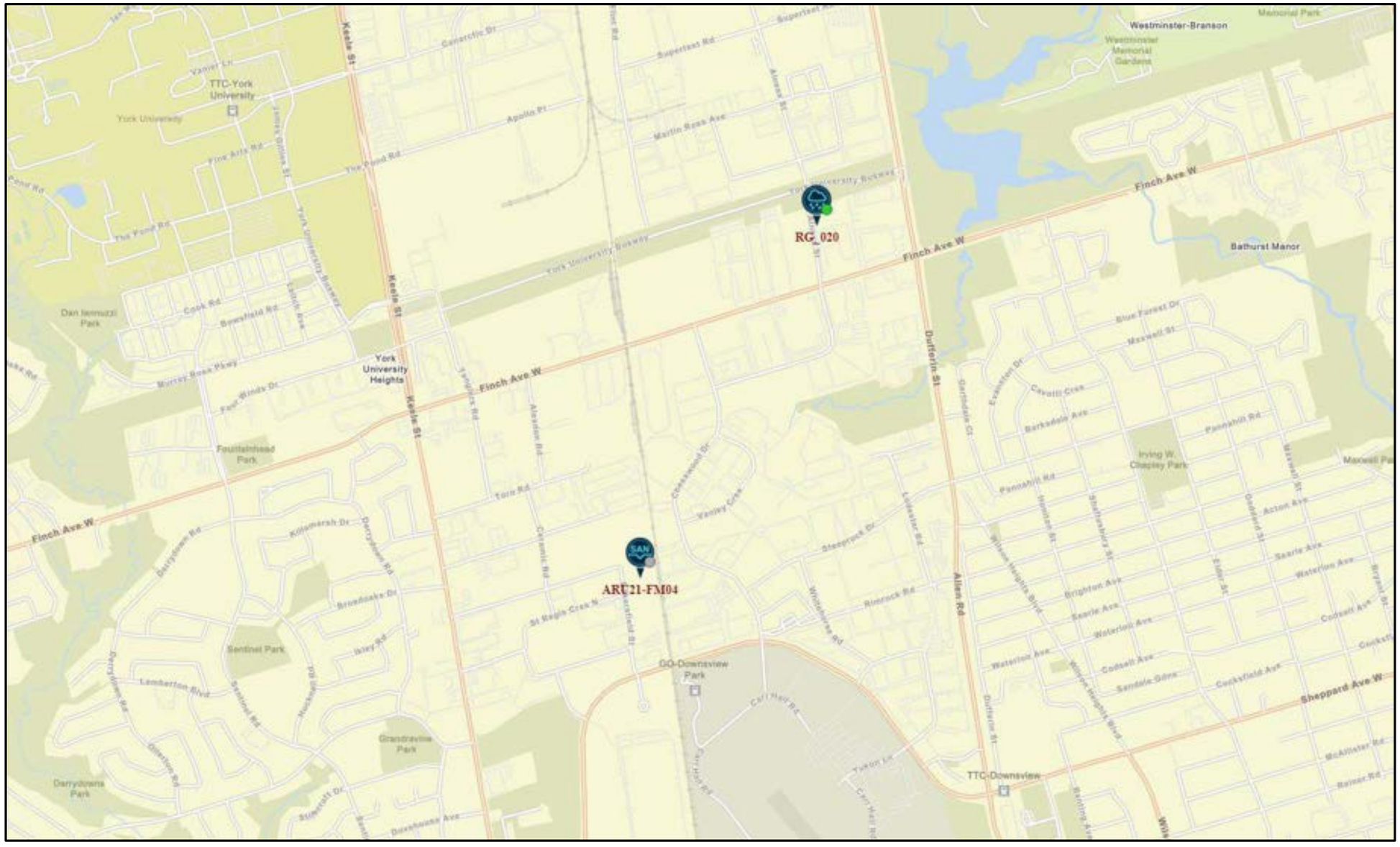
# Data Chart

**Station: ARU21-FM03**

Dec 01, 2021 – Dec 30, 2021



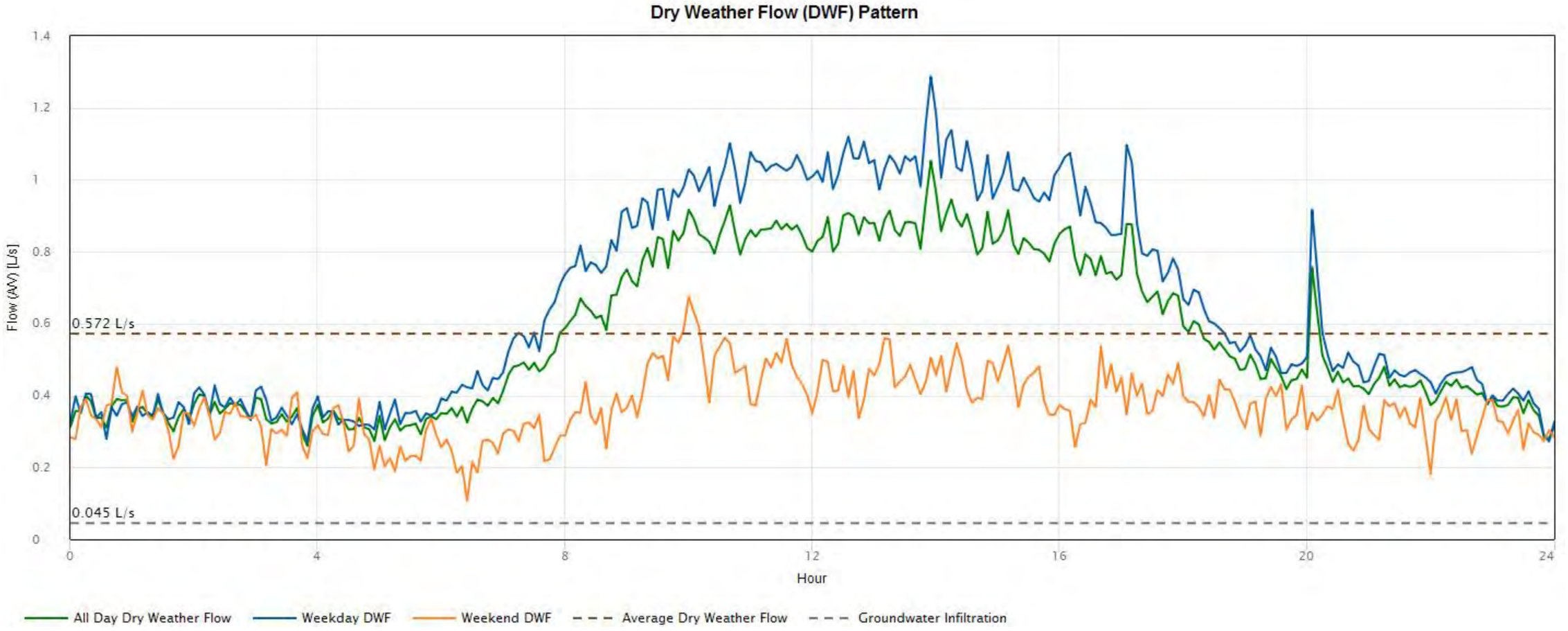
# Station: ARU21-FM04



# Sanitary Report

**Station: ARU21-FM04**

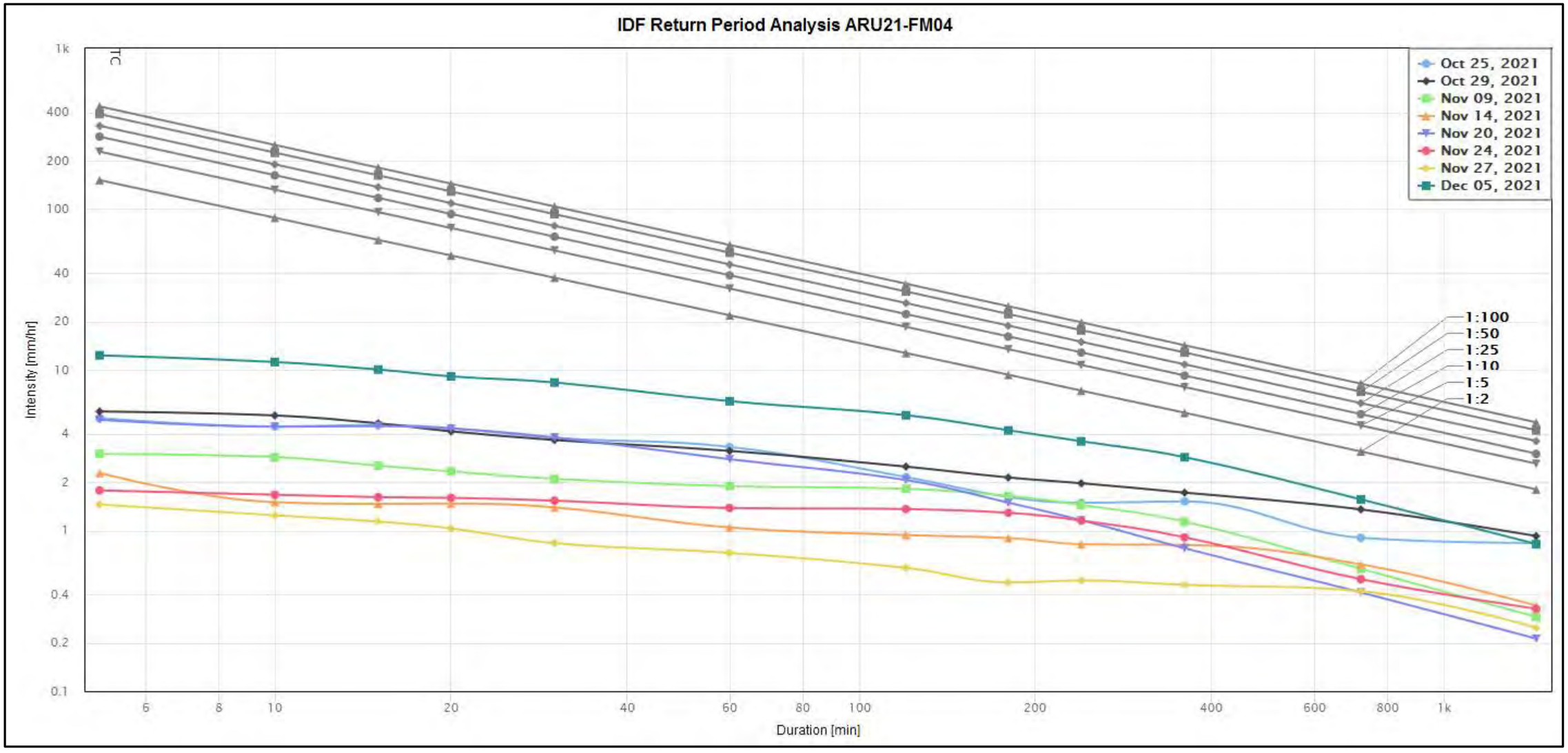
| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) | Catchment Population (Persons) |
|---|---|---|---|---|
| 0.572 | 49,454.391 | 0.053 | 2.179 | Data not provided; per capita value used = 1 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** | **Catchment Area (ha)** |
| 3.808 | 0.045 | 3,873.273 | 7.832 | Data not provided; Catchment Area value used = 1 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# IDF Return Period Analysis

**Station: ARU21-FM04**



# IDF Return Period Analysis

**Station: ARU21-FM04**

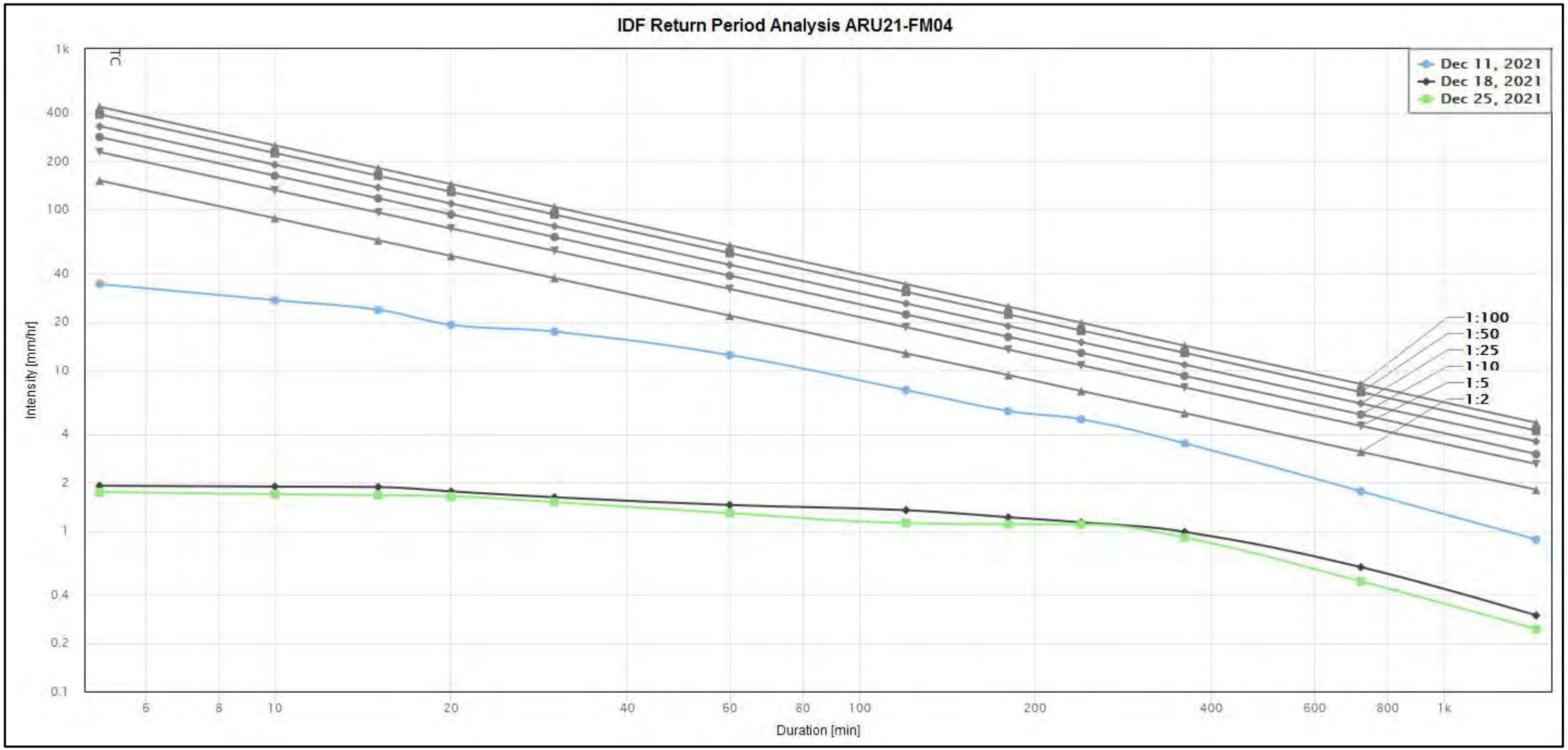


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | - | - | - | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | - | - | - | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | - | - | - | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | - | - | - | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | - | - | - | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | - | - | - | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Oct 25, 2021 | 38.25 | < 2 Yr | 26.55 | 5.00 | 4.44 | 4.54 | 4.34 | 3.77 | 3.31 | 2.15 | 1.61 | 1.49 | 1.52 | 0.90 | 0.84 |
| Oct 29, 2021 | 33.92 | < 2 Yr | 22.54 | 5.51 | 5.20 | 4.64 | 4.14 | 3.66 | 3.13 | 2.50 | 2.14 | 1.97 | 1.72 | 1.35 | 0.92 |
| Nov 09, 2021 | 12.17 | < 2 Yr | 6.93 | 3.00 | 2.86 | 2.53 | 2.33 | 2.10 | 1.89 | 1.82 | 1.64 | 1.44 | 1.13 | 0.58 | 0.29 |
| Nov 14, 2021 | 20.08 | < 2 Yr | 8.15 | 2.28 | 1.50 | 1.46 | 1.47 | 1.39 | 1.04 | 0.94 | 0.90 | 0.82 | 0.81 | 0.62 | 0.34 |
| Nov 20, 2021 | 26.58 | < 2 Yr | 5.31 | 4.88 | 4.42 | 4.46 | 4.31 | 3.79 | 2.77 | 2.06 | 1.49 | 1.16 | 0.77 | 0.41 | 0.21 |
| Nov 24, 2021 | 37.17 | < 2 Yr | 8.07 | 1.78 | 1.67 | 1.61 | 1.60 | 1.53 | 1.38 | 1.36 | 1.29 | 1.15 | 0.91 | 0.50 | 0.33 |
| Nov 27, 2021 | 21.33 | < 2 Yr | 5.95 | 1.45 | 1.24 | 1.14 | 1.03 | 0.83 | 0.73 | 0.59 | 0.48 | 0.49 | 0.46 | 0.42 | 0.25 |
| Dec 05, 2021 | 39.00 | < 2 Yr | 19.97 | 12.30 | 11.18 | 10.04 | 9.10 | 8.34 | 6.37 | 5.22 | 4.20 | 3.59 | 2.86 | 1.56 | 0.82 |
| Dec 11, 2021 | 9.33 | < 2 Yr | 21.15 | 34.38 | 27.26 | 23.76 | 19.13 | 17.38 | 12.41 | 7.51 | 5.55 | 4.94 | 3.50 | 1.76 | 0.88 |
| Dec 18, 2021 | 8.92 | < 2 Yr | 7.13 | 1.91 | 1.88 | 1.87 | 1.76 | 1.62 | 1.45 | 1.34 | 1.21 | 1.13 | 0.98 | 0.59 | 0.30 |
| Dec 25, 2021 | 14.58 | < 2 Yr | 5.86 | 1.74 | 1.69 | 1.66 | 1.64 | 1.51 | 1.29 | 1.12 | 1.10 | 1.10 | 0.91 | 0.48 | 0.24 |

# I/I Analysis Table

**Station: ARU21-FM04**

| Measure | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | Flow KPIs | ARU21-FM04 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow (L/s) | Estimated Dry Weather Flow at TD (L/s) |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Oct 25, 2021 | 26.55 | 38.25 | 5.00 | | Oct 26, 2021 08:25 | 47.00 | 1.69 | 2.54 | 0.84 |
| | Oct 29, 2021 | 22.54 | 33.92 | 5.50 | | Oct 30, 2021 01:25 | 55.00 | 3.48 | 3.92 | 0.45 |
| | Nov 09, 2021 | 6.93 | 12.17 | 3.00 | | Nov 10, 2021 15:10 | 47.00 | 1.45 | 2.54 | 1.09 |
| | Nov 14, 2021 | 8.15 | 20.08 | 2.30 | | Nov 15, 2021 17:25 | 45.00 | 1.21 | 2.25 | 0.74 |
| | Nov 20, 2021 | 5.31 | 26.58 | 4.90 | | Nov 21, 2021 17:55 | 49.00 | 2.33 | 2.78 | 0.45 |
| | Nov 24, 2021 | 8.07 | 37.17 | 1.80 | | Nov 25, 2021 05:55 | 44.00 | 1.06 | 1.92 | 0.32 |
| | Nov 27, 2021 | 5.95 | 21.33 | 1.50 | | Nov 28, 2021 09:45 | 42.00 | 1.49 | 1.95 | 0.46 |
| | Dec 05, 2021 | 19.97 | 39.00 | 12.30 | | Dec 05, 2021 22:45 | 66.00 | 4.74 | 4.97 | 0.22 |
| | Dec 11, 2021 | 21.15 | 9.33 | 34.40 | | Dec 11, 2021 05:10 | 109.00 | 14.52 | 14.60 | 0.08 |
| | Dec 18, 2021 | 7.13 | 8.92 | 1.90 | | Dec 18, 2021 16:50 | 32.00 | 0.75 | 1.11 | 0.36 |
| | Dec 25, 2021 | 5.86 | 14.58 | 1.70 | | Dec 25, 2021 07:55 | 42.00 | 1.82 | 1.89 | 0.07 |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

# Aggregate Data

**Station: ARU21-FM04**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 70 | 0.01 | 0.03 | 0.11 | 19,783 | Tue Nov 23, 2021 03:20 | Sat Dec 11, 2021 05:10 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (1,000,000 L) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 70 | 0.00 | 0.59 | 14.60 | 3.52 | 19,783 | Fri Nov 19, 2021 04:45 | Sat Dec 11, 2021 05:10 |

## Precipitation

| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 71 | 0.00 | 0.01 | 2.87 | 155.73 | 20,054 | Wed Oct 20, 2021 23:30 | Sat Dec 11, 2021 04:55 |

## Velocity

| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 70 | 0.00 | 0.16 | 0.63 | 19,783 | Fri Nov 19, 2021 04:45 | Sat Dec 11, 2021 05:10 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Activity Log

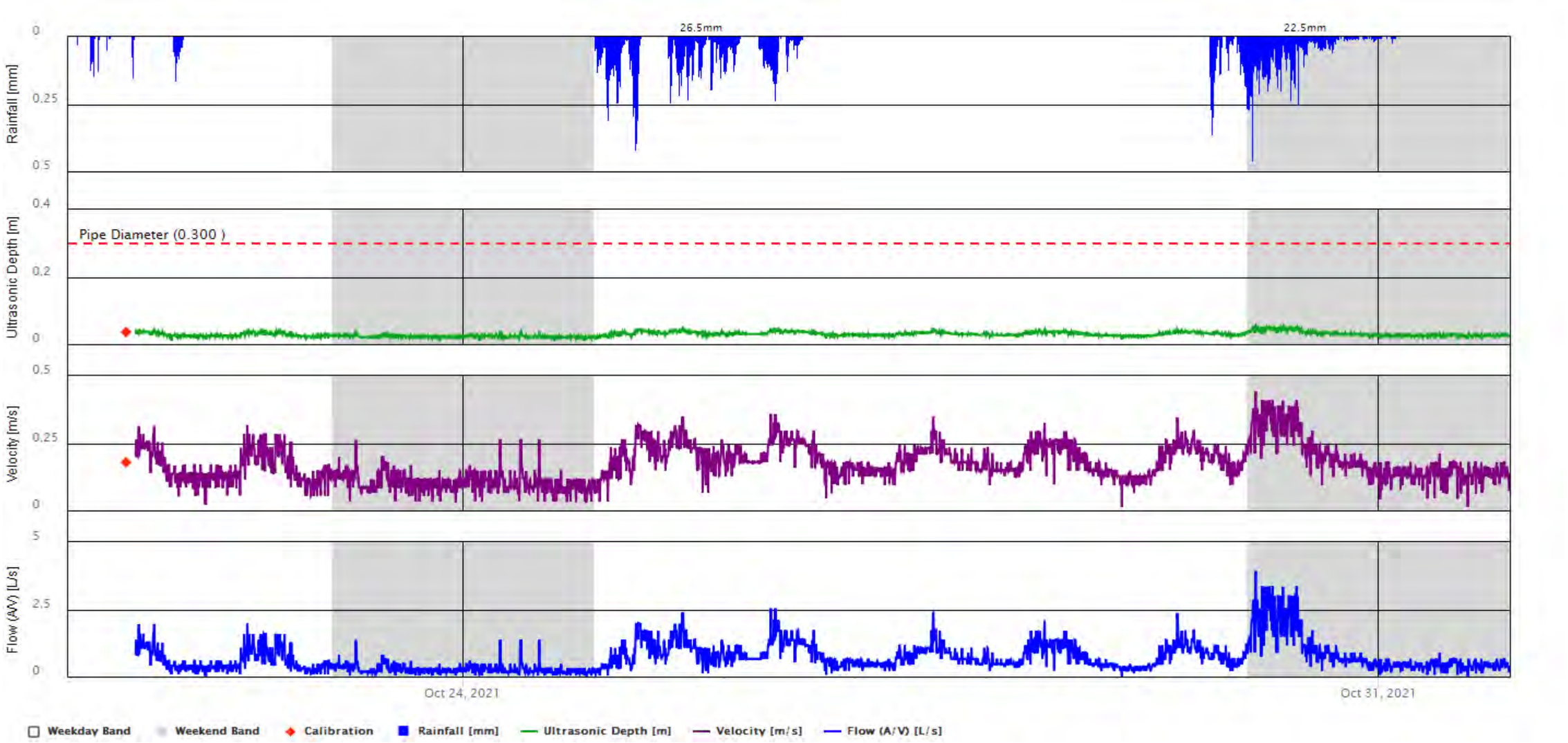
**Station: ARU21-FM04**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 21-Oct-2021 10:10:00 AM | Installation Log | Installation | PMAC ID: 08174<br>Installed AV ring and CSO sensor - inlet:325mm | Yes |
| 16-Nov-2021 11:20:00 PM | Maintenance Log | DATA DOWNLOAD AND CALIBRATION | Data downloaded<br>Debris cleared<br>Telemetry sent<br>Ensured manual and sensor readings are satisfactory before leaving site<br>Expander ring attached to A/V ring to secure it within pipe - Metal strip too big to fit<br>Had to move A/V sensor to back up rings for better fitment<br>Antenna drilled | Yes |
| 01-Dec-2021 12:15:00 PM | Maintenance Log | Calibration | Site calibrated<br>Debris cleared<br>Telemetry sent | Yes |
| 13-Dec-2021 11:18:00 AM | Maintenance Log | Calibration | -Site Calibrated<br>-Debris Cleared<br>-Telemetry Sent | Yes |
| 29-Dec-2021 08:00:00 AM | Removal Log | FM REMOVAL | All FM Equipment removed | Yes |

# Data Chart

**Station: ARU21-FM04**

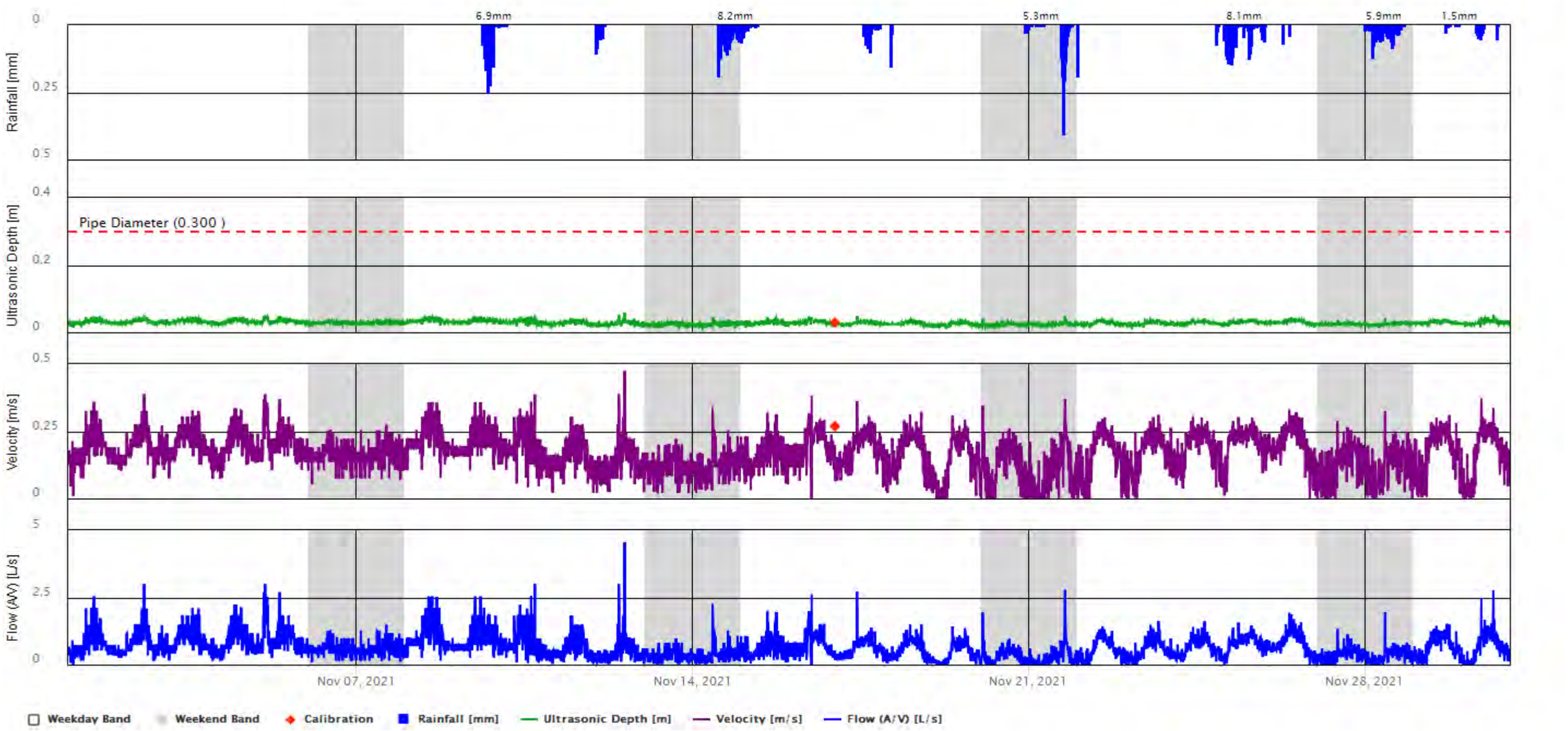
Oct 20, 2021 – Oct 31, 2021



# Data Chart

**Station: ARU21-FM04**

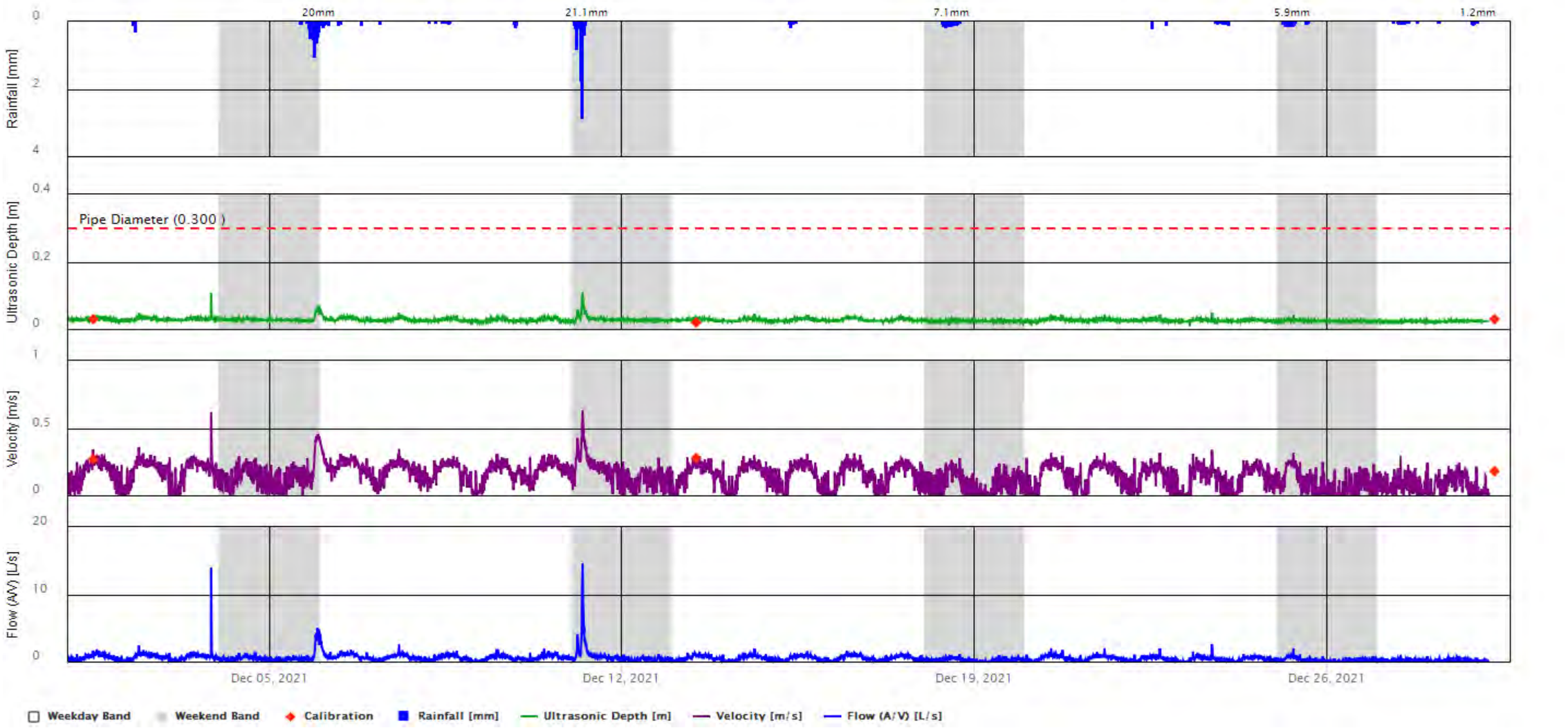
Nov 01, 2021 – Nov 30, 2021



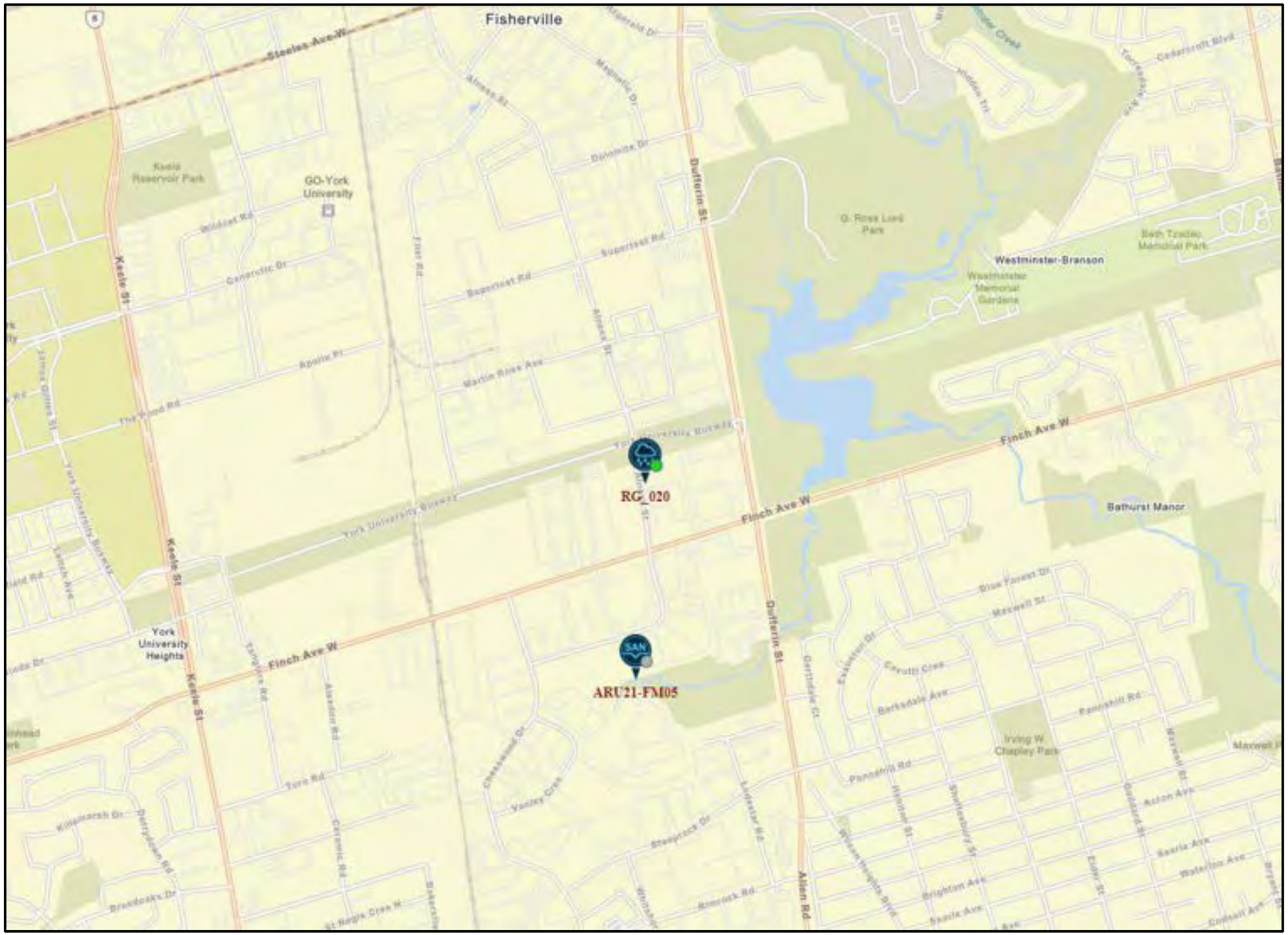
# Data Chart

**Station: ARU21-FM04**

Dec 01, 2021 – Dec 29, 2021



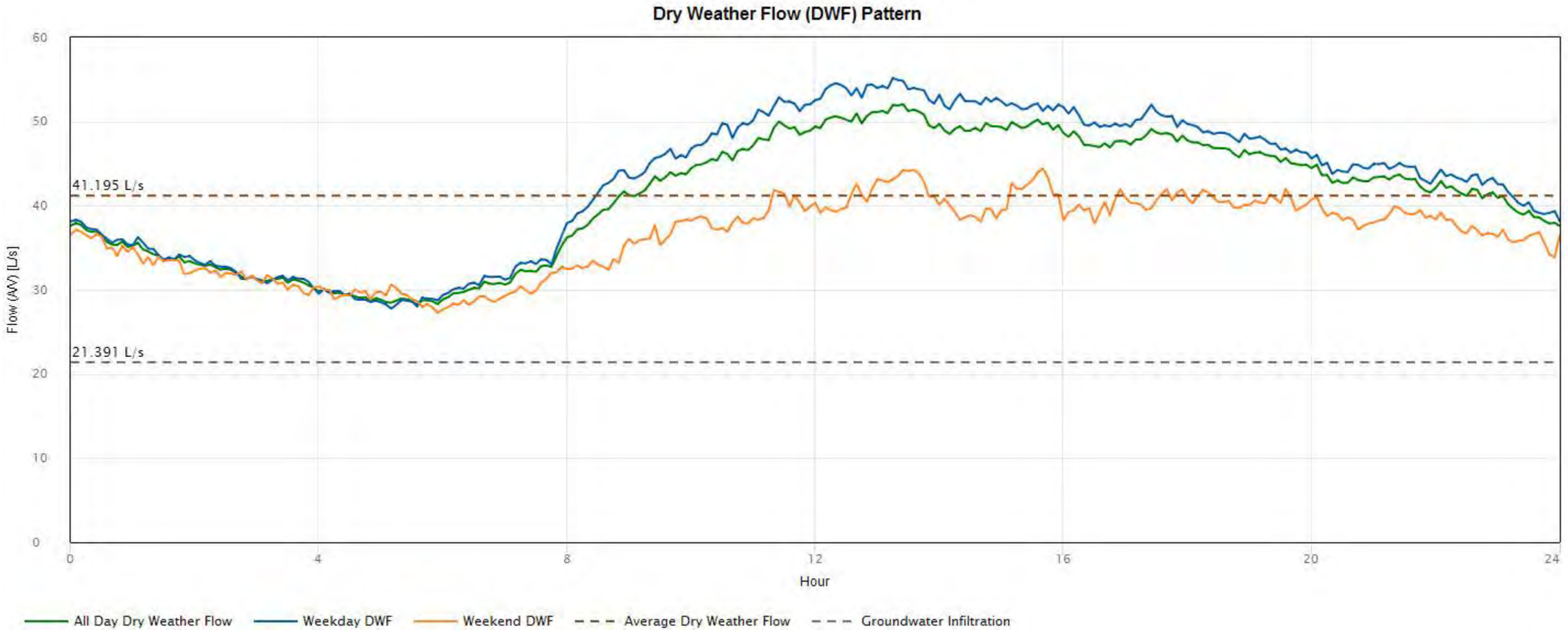
# Station: ARU21-FM05



# Sanitary Report

**Station: ARU21-FM05**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) | Catchment Population (Persons) |
|---|---|---|---|---|
| 41.195 | 3,559,237.537 | 25.166 | 60.662 | Data not provided; per capita value used = 1 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** | **Catchment Area (ha)** |
| 1.473 | 21.391 | 1,848,208.556 | 51.927 | Data not provided; Catchment Area value used = 1 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# IDF Return Period Analysis

**Station: ARU21-FM05**

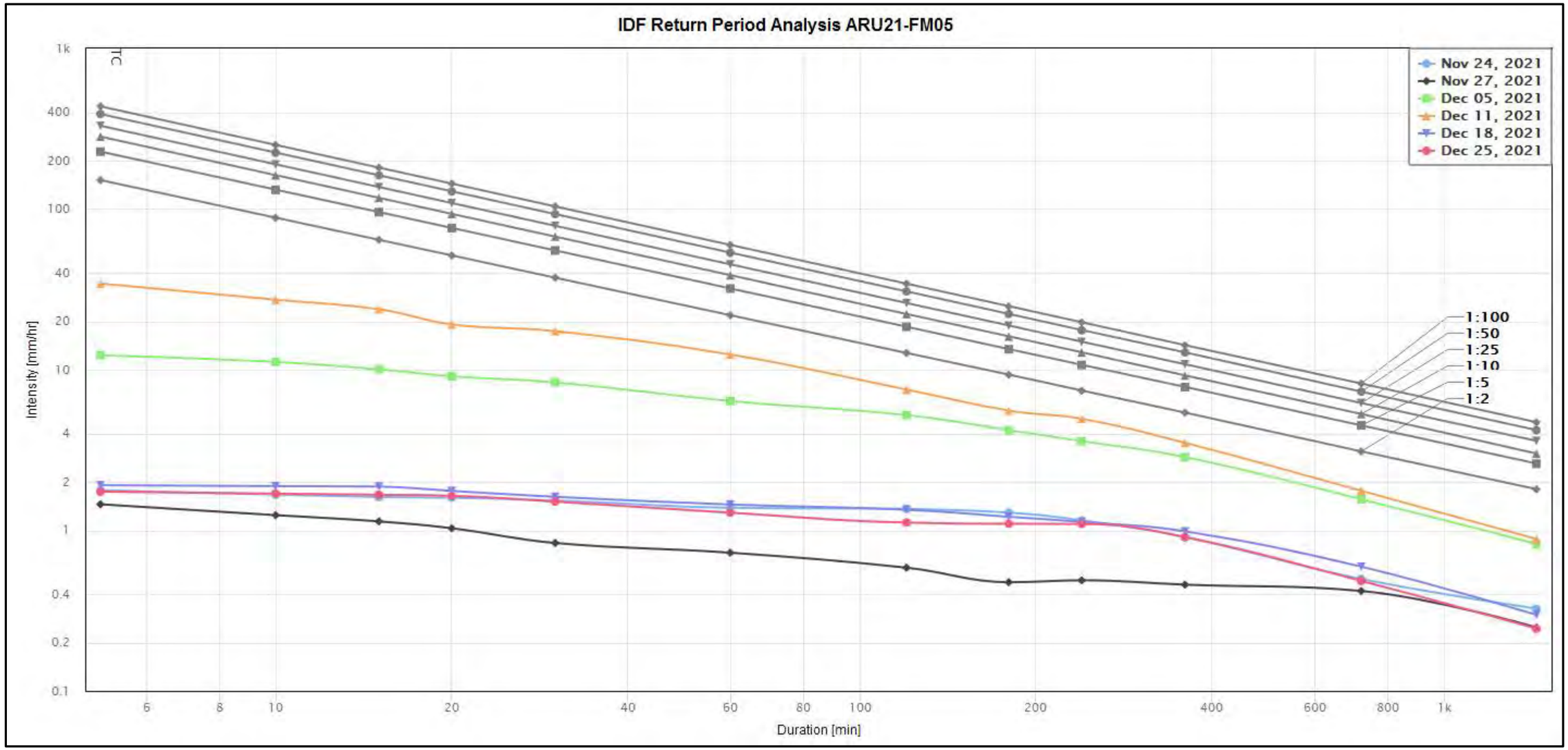


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | - | - | - | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | - | - | - | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | - | - | - | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | - | - | - | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | - | - | - | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | - | - | - | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Nov 24, 2021 | 37.17 | < 2 Yr | 8.07 | 1.78 | 1.67 | 1.61 | 1.60 | 1.53 | 1.38 | 1.36 | 1.29 | 1.15 | 0.91 | 0.50 | 0.33 |
| Nov 27, 2021 | 21.33 | < 2 Yr | 5.95 | 1.45 | 1.24 | 1.14 | 1.03 | 0.83 | 0.73 | 0.59 | 0.48 | 0.49 | 0.46 | 0.42 | 0.25 |
| Dec 05, 2021 | 39.00 | < 2 Yr | 19.97 | 12.30 | 11.18 | 10.04 | 9.10 | 8.34 | 6.37 | 5.22 | 4.20 | 3.59 | 2.86 | 1.56 | 0.82 |
| Dec 11, 2021 | 9.33 | < 2 Yr | 21.15 | 34.38 | 27.26 | 23.76 | 19.13 | 17.38 | 12.41 | 7.51 | 5.55 | 4.94 | 3.50 | 1.76 | 0.88 |
| Dec 18, 2021 | 8.92 | < 2 Yr | 7.13 | 1.91 | 1.88 | 1.87 | 1.76 | 1.62 | 1.45 | 1.34 | 1.21 | 1.13 | 0.98 | 0.59 | 0.30 |
| Dec 25, 2021 | 14.58 | < 2 Yr | 5.86 | 1.74 | 1.69 | 1.66 | 1.64 | 1.51 | 1.29 | 1.12 | 1.10 | 1.10 | 0.91 | 0.48 | 0.24 |

# I/I Analysis Table

**Station: ARU21-FM05**

| Measured Storms | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | Flow KPIs | ARU21-FM05 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Nov 24, 2021 | 8.07 | 37.17 | 1.80 | | Nov 25, 2021 15:55 | 194.00 | 39.47 | 90.42 | 50.96 |
| | Nov 27, 2021 | 5.95 | 21.33 | 1.50 | | Nov 28, 2021 14:55 | 164.00 | 16.93 | 58.97 | 38.62 |
| | Dec 05, 2021 | 19.97 | 39.00 | 12.30 | | Dec 05, 2021 22:40 | 218.00 | 55.95 | 97.61 | 37.60 |
| | Dec 11, 2021 | 21.15 | 9.33 | 34.40 | | Dec 11, 2021 05:05 | 296.00 | 96.68 | 127.86 | 31.18 |
| | Dec 18, 2021 | 7.13 | 8.92 | 1.90 | | Dec 18, 2021 14:20 | 177.00 | 34.36 | 72.34 | 37.98 |
| | Dec 25, 2021 | 5.86 | 14.58 | 1.70 | | Dec 25, 2021 06:40 | 149.00 | 23.31 | 52.51 | 28.75 |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

# Aggregate Data

**Station: ARU21-FM05**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Nov 23, 2021 | Jan 19, 2022 | 57 | 0.09 | 0.13 | 0.30 | 16,286 | Tue Dec 14, 2021 04:45 | Sat Dec 11, 2021 05:05 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (1,000,000 L) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Nov 23, 2021 | Jan 19, 2022 | 57 | 10.64 | 41.29 | 127.86 | 201.74 | 16,286 | Mon Jan 03, 2022 03:50 | Sat Dec 11, 2021 05:05 |

## Precipitation

| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Nov 23, 2021 | Jan 19, 2022 | 53 | 0.00 | 0.01 | 2.87 | 85.48 | 15,082 | Tue Nov 23, 2021 00:00 | Sat Dec 11, 2021 04:55 |

## Velocity

| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Nov 23, 2021 | Jan 19, 2022 | 57 | 0.31 | 0.82 | 1.12 | 16,286 | Thu Dec 23, 2021 17:30 | Thu Nov 25, 2021 16:10 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Activity Log

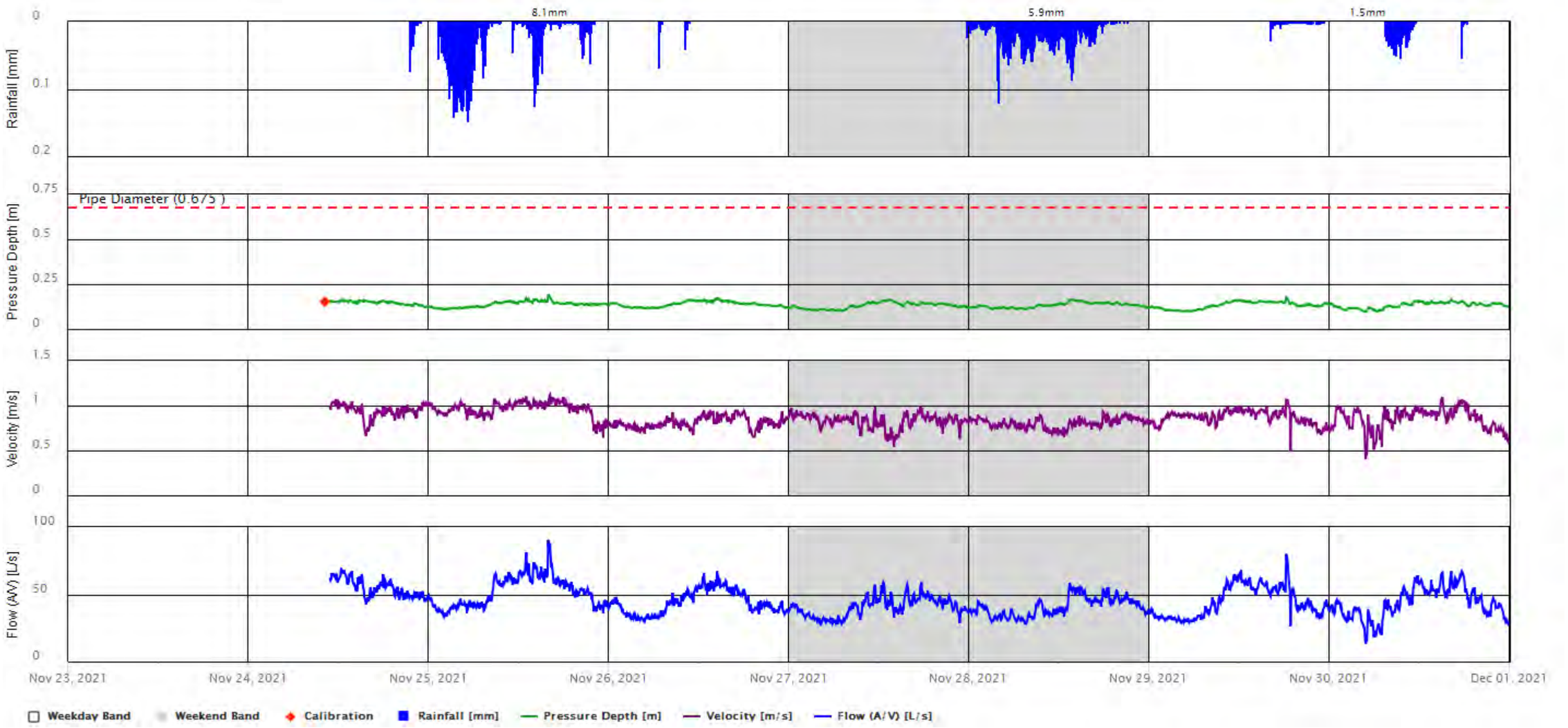
**Station: ARU21-FM05**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 24-Nov-2021 10:12:00 AM | Installation Log | INSTALL FM 05 | SITE IS THROUGH THE GATES OFF THE SIDE OF THE ROAD. | Yes |

# Data Chart

**Station: ARU21-FM05**

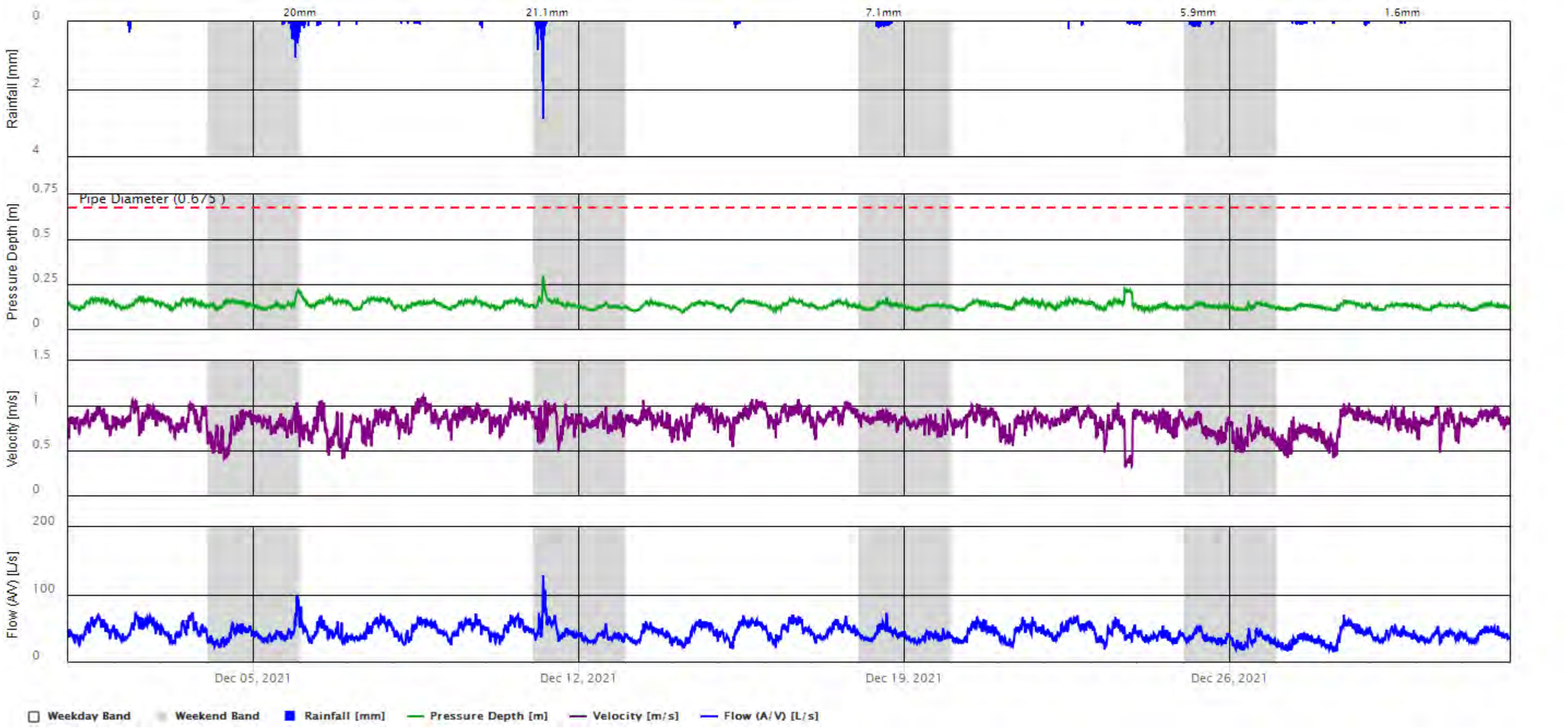
Nov 23, 2021 – Nov 30, 2021



# Data Chart

**Station: ARU21-FM05**

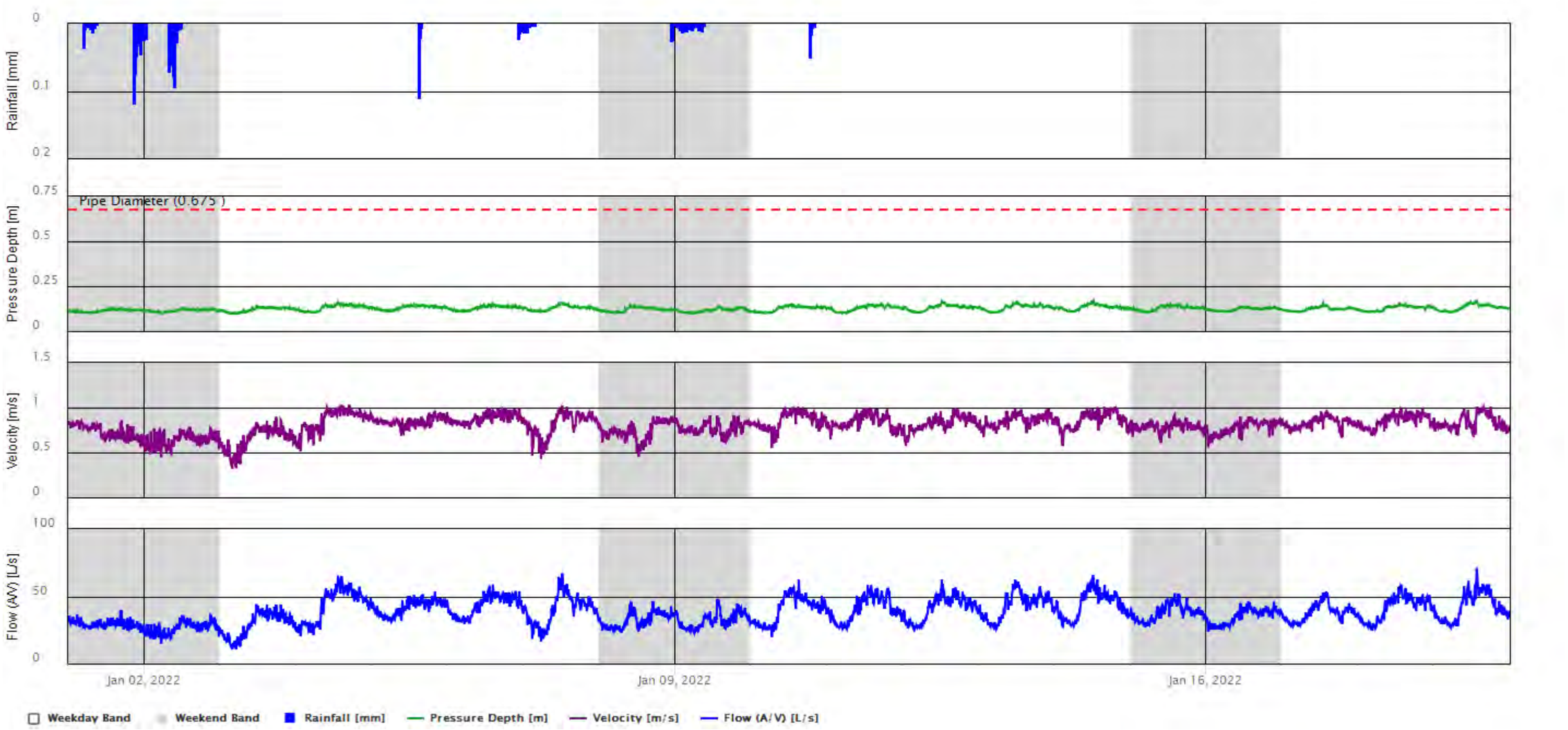
Dec 01, 2021 – Dec 31, 2021



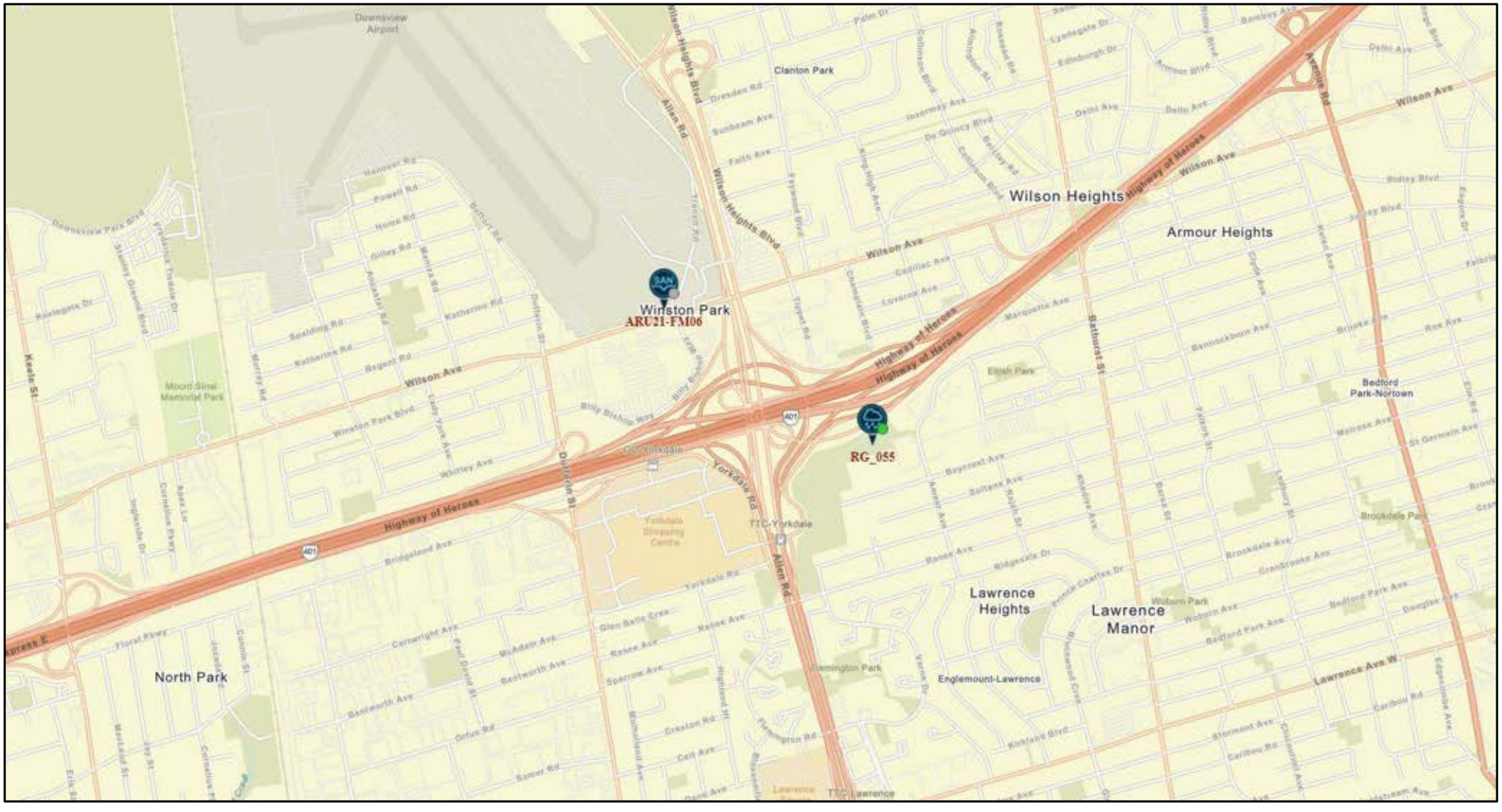
# Data Chart

**Station: ARU21-FM05**

Jan 01, 2022 – Jan 19, 2022



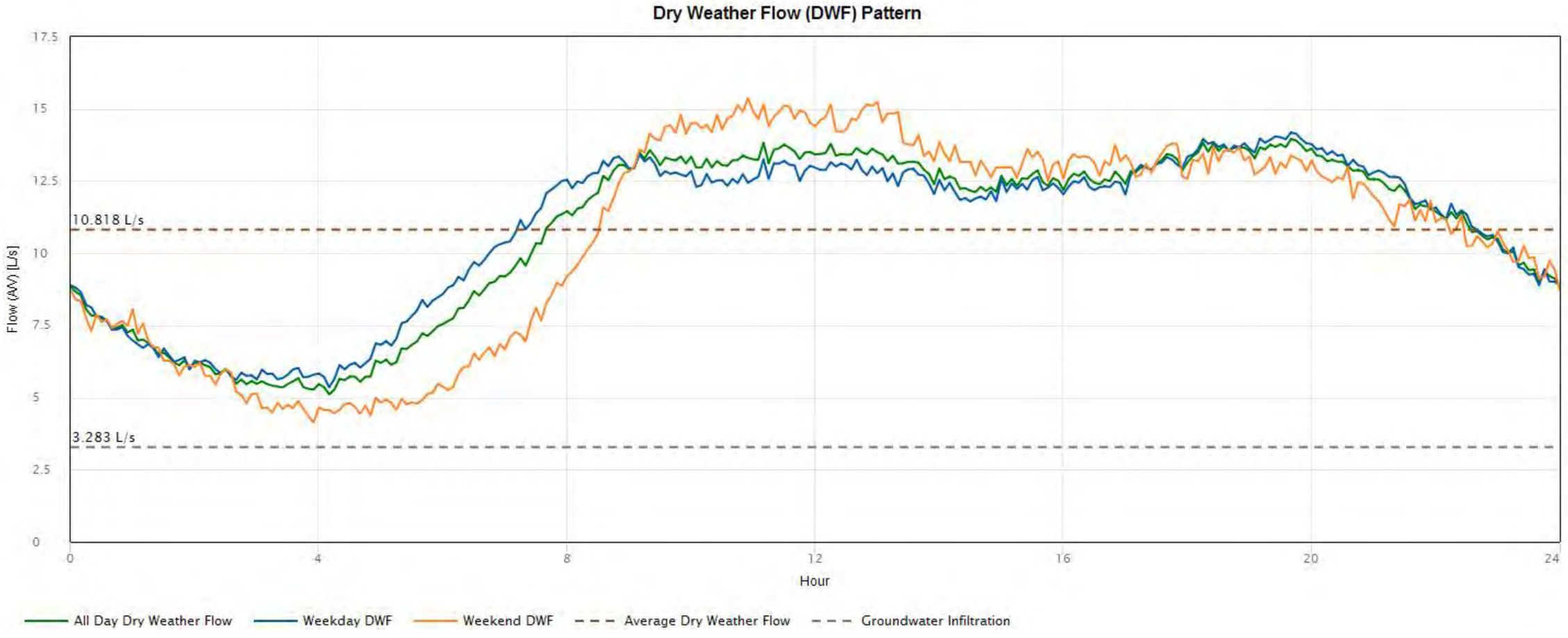
# Station: ARU21-FM06



# Sanitary Report

**Station: ARU21-FM06**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) | Catchment Population (Persons) |
|---|---|---|---|---|
| 10.818 | 249.121 | 3.862 | 17.715 | 3,752 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** | **Catchment Area (ha)** |
| 1.638 | 3.283 | 4,051.652 | 30.343 | 70 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# IDF Return Period Analysis

**Station: ARU21-FM06**

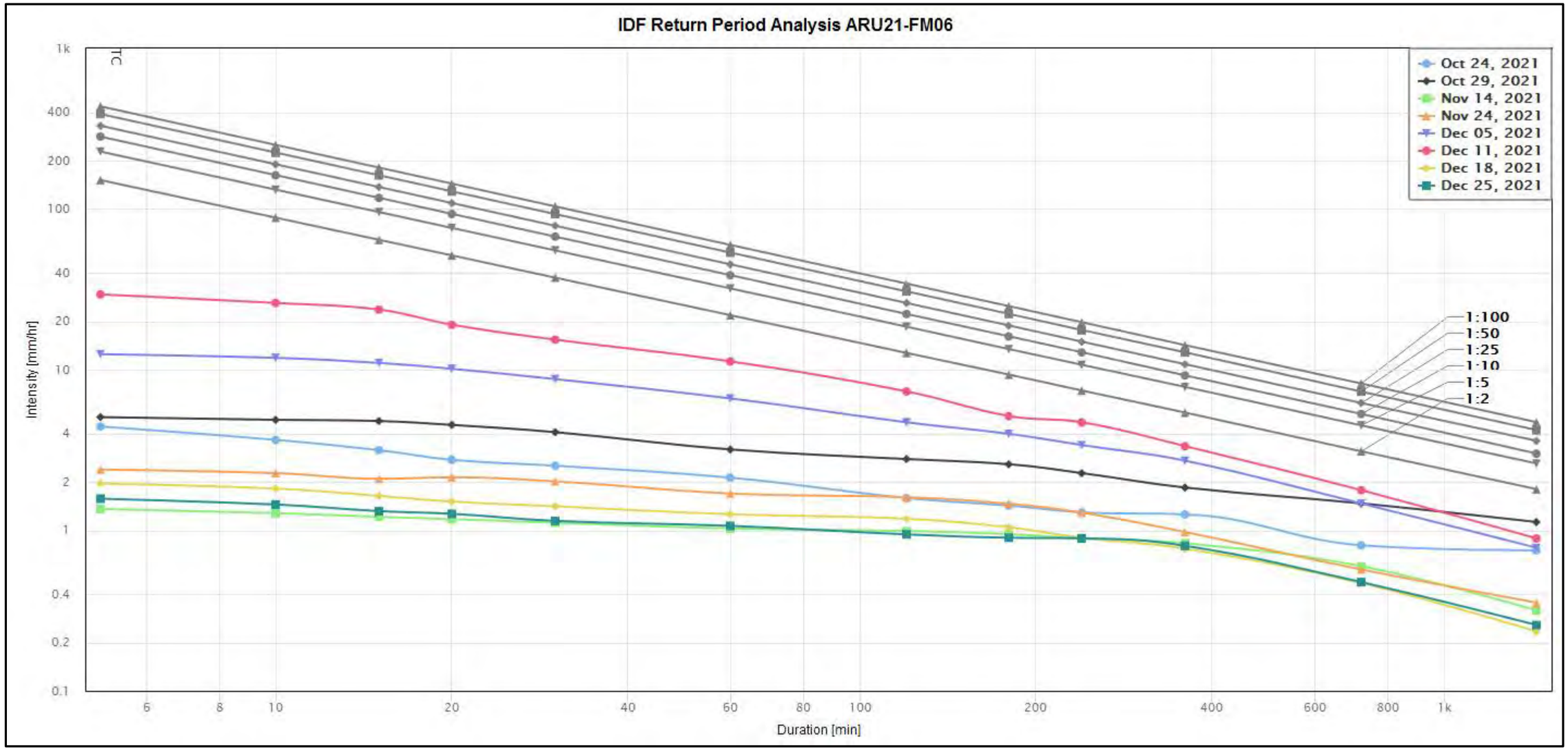


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | - | - | - | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | - | - | - | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | - | - | - | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | - | - | - | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | - | - | - | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | - | - | - | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Oct 24, 2021 | 41.08 | < 2 Yr | 24.39 | 4.43 | 3.65 | 3.15 | 2.75 | 2.52 | 2.12 | 1.59 | 1.42 | 1.29 | 1.25 | 0.81 | 0.75 |
| Oct 29, 2021 | 35.08 | < 2 Yr | 27.44 | 5.06 | 4.87 | 4.79 | 4.53 | 4.08 | 3.19 | 2.78 | 2.58 | 2.27 | 1.84 | 1.47 | 1.12 |
| Nov 14, 2021 | 26.00 | < 2 Yr | 7.77 | 1.36 | 1.28 | 1.21 | 1.17 | 1.11 | 1.03 | 0.99 | 0.95 | 0.89 | 0.83 | 0.60 | 0.32 |
| Nov 24, 2021 | 24.75 | < 2 Yr | 8.54 | 2.39 | 2.27 | 2.09 | 2.14 | 2.02 | 1.69 | 1.61 | 1.46 | 1.29 | 0.97 | 0.57 | 0.35 |
| Dec 05, 2021 | 19.75 | < 2 Yr | 18.63 | 12.48 | 11.84 | 11.01 | 10.12 | 8.74 | 6.61 | 4.70 | 3.98 | 3.38 | 2.71 | 1.47 | 0.78 |
| Dec 11, 2021 | 11.83 | < 2 Yr | 21.32 | 29.41 | 26.02 | 23.65 | 19.03 | 15.38 | 11.25 | 7.32 | 5.13 | 4.70 | 3.34 | 1.78 | 0.89 |
| Dec 18, 2021 | 8.42 | < 2 Yr | 5.62 | 1.96 | 1.82 | 1.64 | 1.51 | 1.41 | 1.26 | 1.18 | 1.04 | 0.90 | 0.77 | 0.47 | 0.23 |
| Dec 25, 2021 | 20.92 | < 2 Yr | 6.16 | 1.57 | 1.45 | 1.32 | 1.27 | 1.14 | 1.07 | 0.94 | 0.90 | 0.89 | 0.80 | 0.48 | 0.26 |

# I/I Analysis Table

**Station: ARU21-FM06**

| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | ARU21-FM06 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| Measured Storms | Oct 24, 2021 | 24.39 | 41.08 | 4.40 | Flow KPIs | Oct 26, 2021 10:15 | 172.00 | 23.84 | 35.85 | 12.01 |
| | Oct 29, 2021 | 27.44 | 35.08 | 5.10 | | Oct 30, 2021 11:15 | 209.00 | 34.01 | 48.99 | 14.97 |
| | Nov 14, 2021 | 7.77 | 26.00 | 1.40 | | Nov 15, 2021 02:10 | 124.72 | 7.48 | 18.90 | 5.20 |
| | Nov 24, 2021 | 8.54 | 24.75 | 2.40 | | Nov 25, 2021 05:15 | 127.67 | 10.48 | 21.45 | 6.10 |
| | Dec 05, 2021 | 18.63 | 19.75 | 12.50 | | Dec 05, 2021 23:25 | 175.00 | 33.04 | 44.25 | 11.22 |
| | Dec 11, 2021 | 21.32 | 11.83 | 29.40 | | Dec 11, 2021 05:20 | 245.00 | 65.51 | 71.18 | 5.67 |
| | Dec 18, 2021 | 5.62 | 8.42 | 2.00 | | Dec 18, 2021 14:00 | 110.97 | 4.04 | 16.56 | 12.52 |
| | Dec 25, 2021 | 6.16 | 20.92 | 1.60 | | Dec 25, 2021 08:45 | 126.58 | 13.74 | 24.64 | 10.90 |

[1] An event is a storm with a minimum volume of 15mm and a minimum inter-event dry period of 12 hours

# Aggregate Data

**Station: ARU21-FM06**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 71 | 0.05 | 0.10 | 0.25 | 20,258 | Sat Dec 18, 2021 03:55 | Sat Dec 11, 2021 05:20 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (1,000,000 L) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 71 | 1.60 | 11.82 | 71.18 | 71.86 | 20,258 | Thu Oct 21, 2021 03:40 | Sat Dec 11, 2021 05:20 |

## Precipitation

| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 71 | 0.00 | 0.01 | 2.45 | 148.66 | 20,432 | Wed Oct 20, 2021 00:00 | Sat Dec 11, 2021 04:50 |

## Velocity

| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Oct 20, 2021 | Dec 29, 2021 | 71 | 0.09 | 0.40 | 0.79 | 20,258 | Fri Nov 19, 2021 03:45 | Wed Dec 22, 2021 11:20 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Activity Log

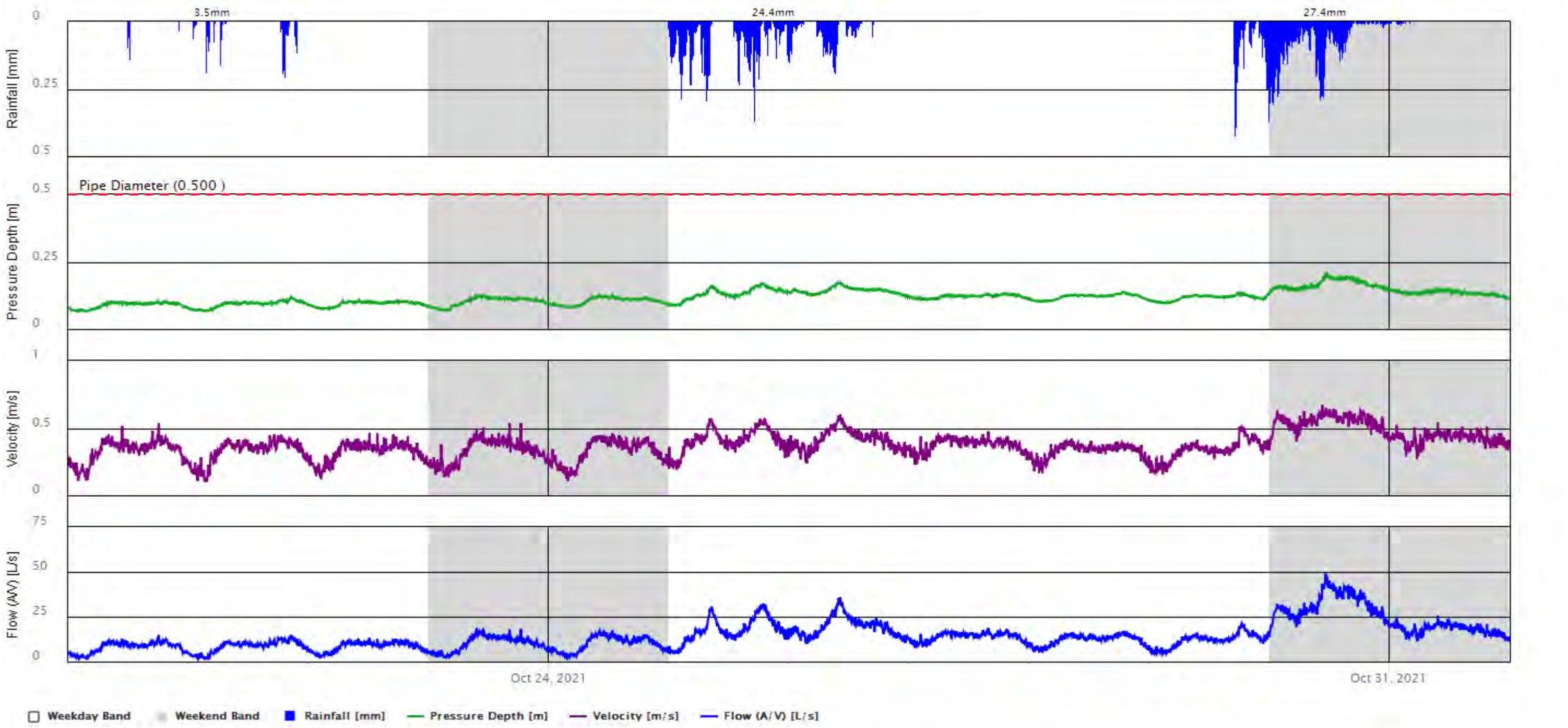
**Station: ARU21-FM06**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 05-Nov-2021 07:00:00 AM | Maintenance Log | Calibration | Data downloaded<br>Debris cleared<br>Telemetry sent - dialout settings updated - restarted logger - verified that the issue is fixed<br>Ensured manual and sensor readings are satisfactory before leaving site<br>MH too foggy/misty -bad photos<br>wiped face of us sensor - reading high but data looks good - mustve just been a spike | Yes |
| 16-Nov-2021 12:30:00 PM | Maintenance Log | CALIBRATION AND DATA DOWNLOAD | Data downloaded<br>Debris cleared<br>Telemetry sent<br>Ensured manual and sensor readings are satisfactory before leaving site | Yes |
| 01-Dec-2021 11:05:00 AM | Maintenance Log | Calibration | Site calibrated<br>Debris cleared<br>Telemetry sent | Yes |
| 13-Dec-2021 11:54:00 AM | Maintenance Log | Calibration | -Site calibrated<br>-Telemetry sent<br>-Debris Cleared | Yes |
| 29-Dec-2021 08:20:00 AM | Removal Log | FM REMOVAL | All FM Equipment removed | Yes |

# Data Chart

**Station: ARU21-FM06**

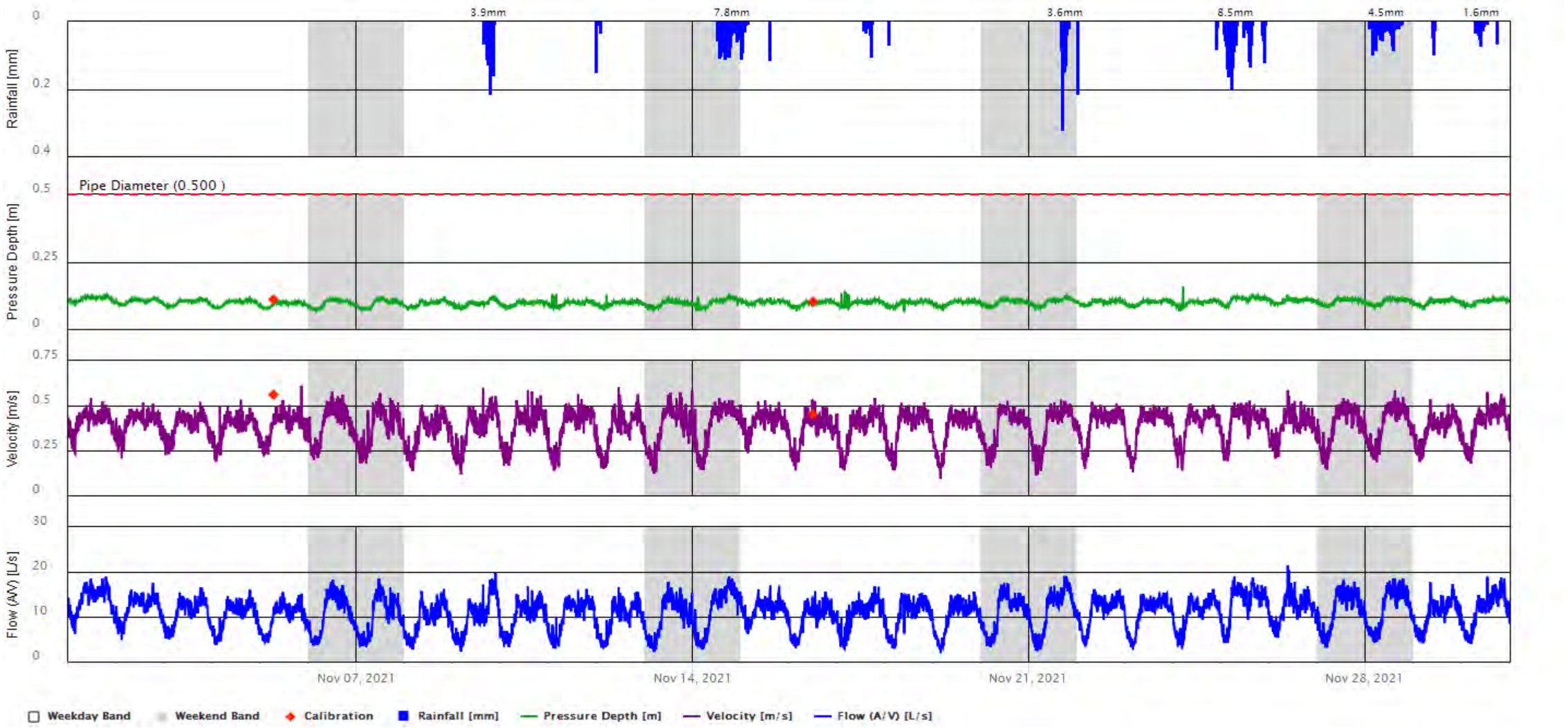
Oct 20, 2021 – Oct 31, 2021



# Data Chart

**Station: ARU21-FM06**

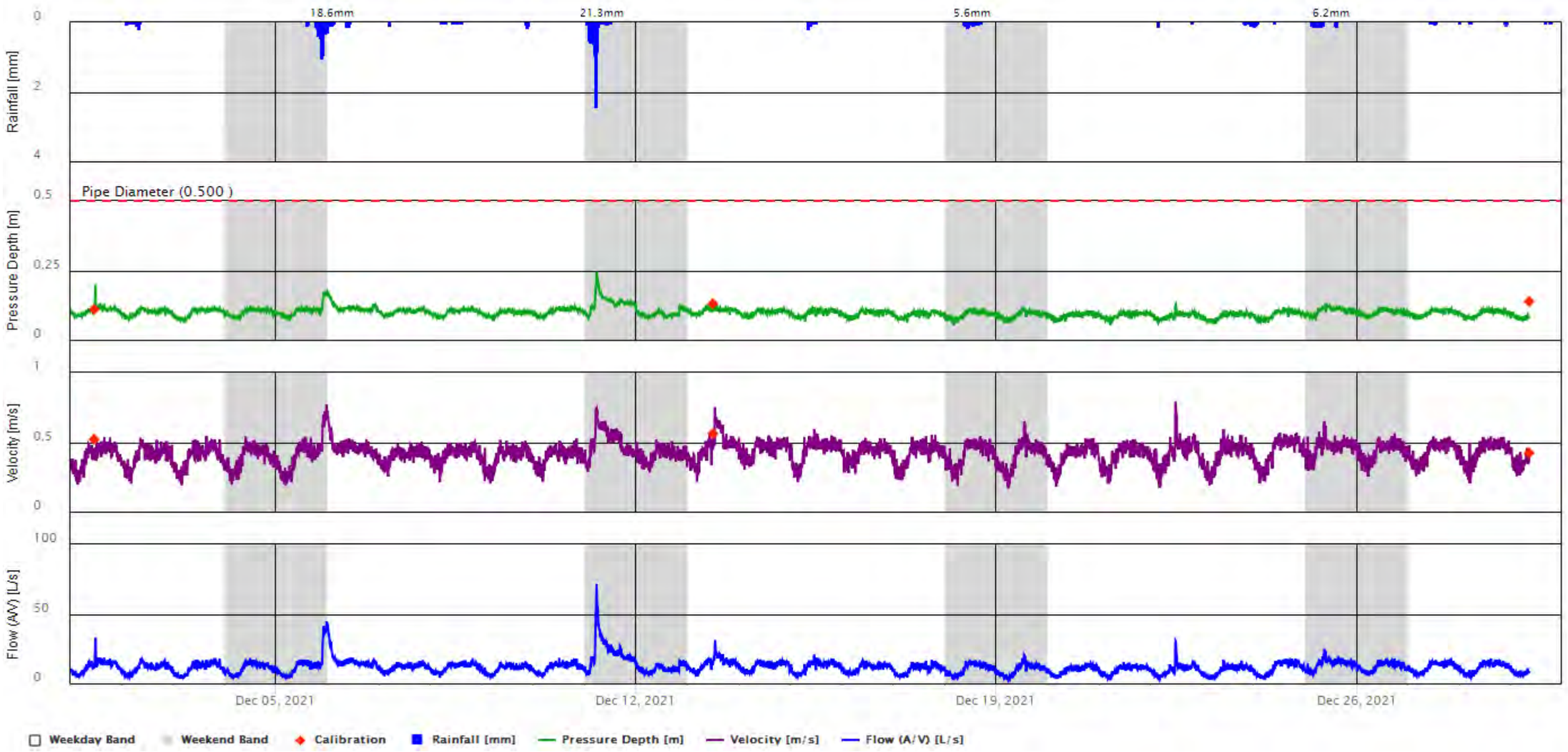
Nov 01, 2021 – Nov 30, 2021



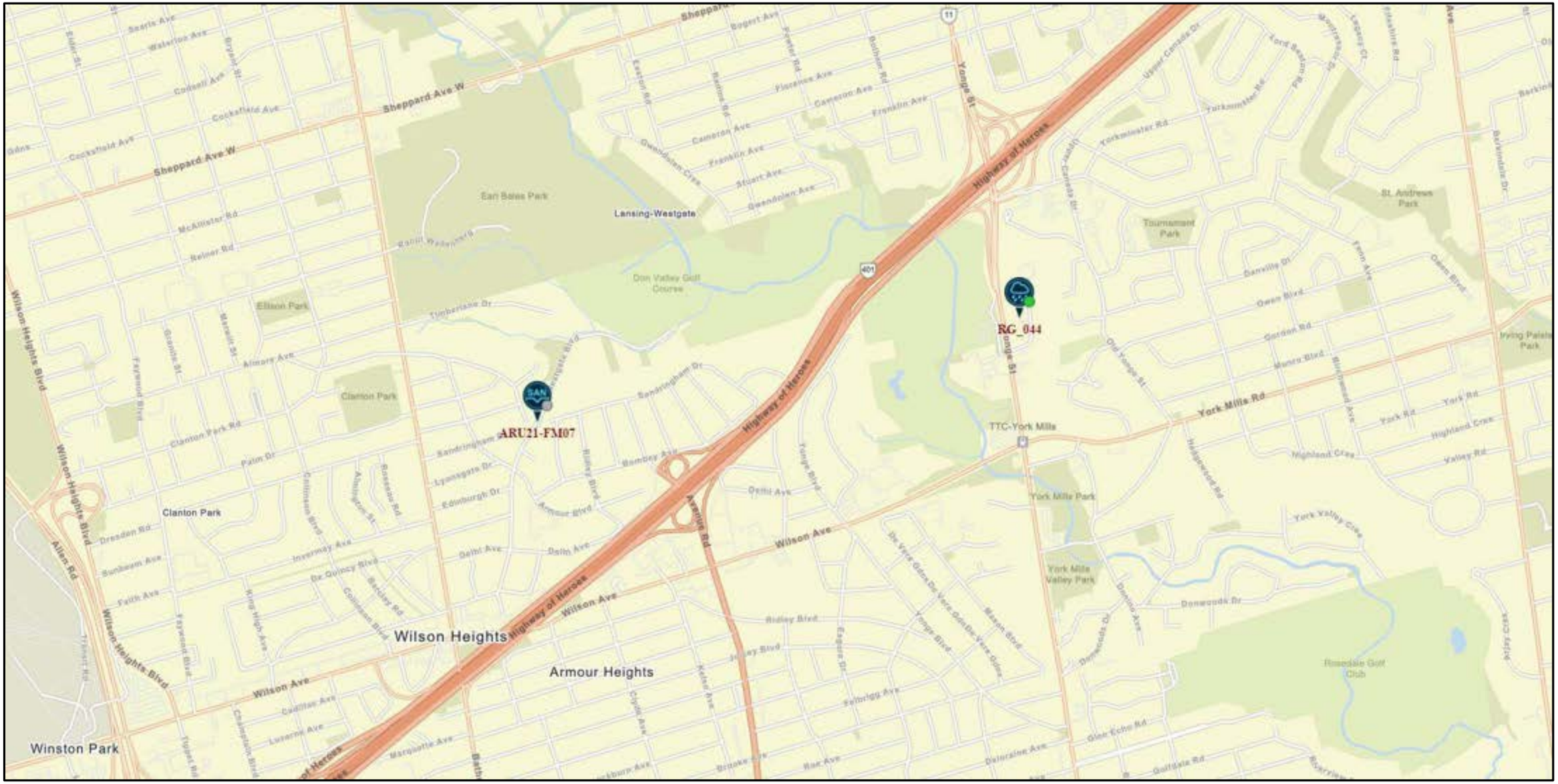
# Data Chart

**Station: ARU21-FM06**

Dec 01, 2021 – Dec 29, 2021



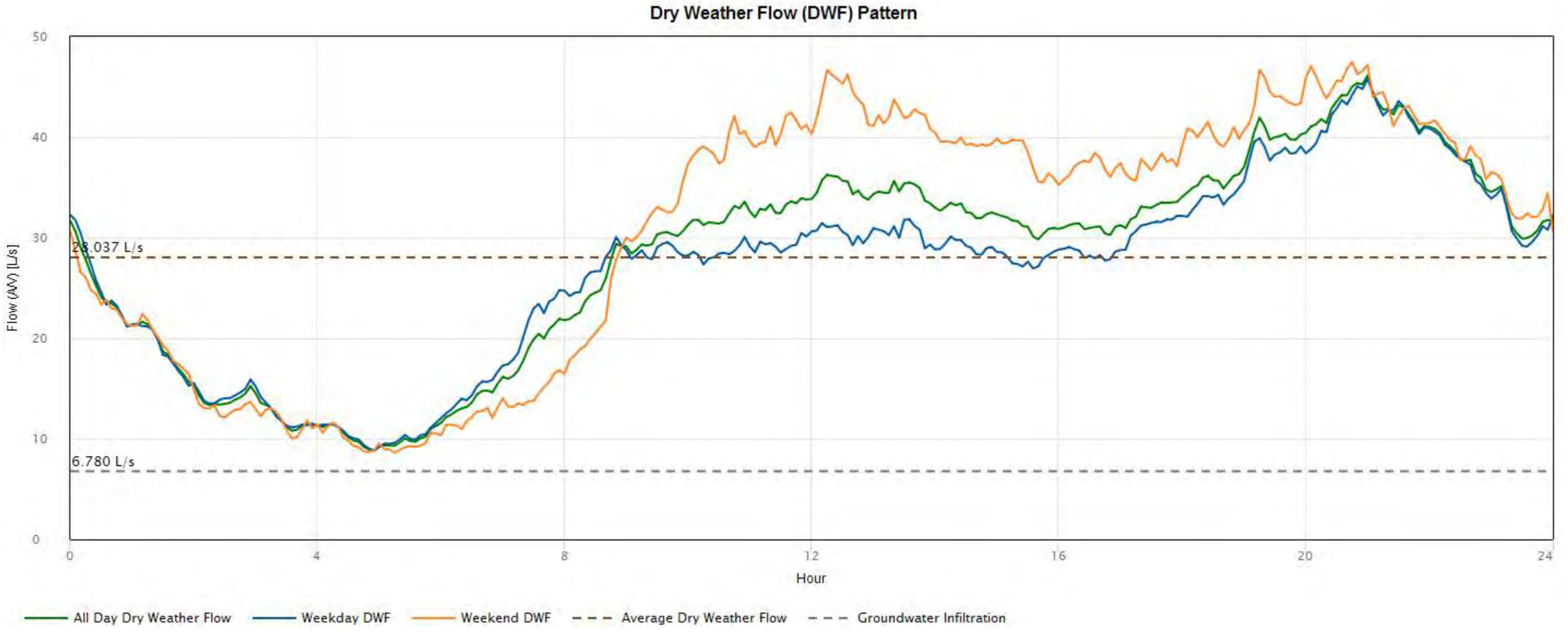
# Station: ARU21-FM07



# Sanitary Report

**Station: ARU21-FM07**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) | Catchment Population (Persons) |
|---|---|---|---|---|
| 28.037 | 156.256 | 7.976 | 52.328 | 15,503 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** | **Catchment Area (ha)** |
| 1.866 | 6.780 | 2,288.146 | 24.181 | 256 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# IDF Return Period Analysis

**Station: ARU21-FM07**

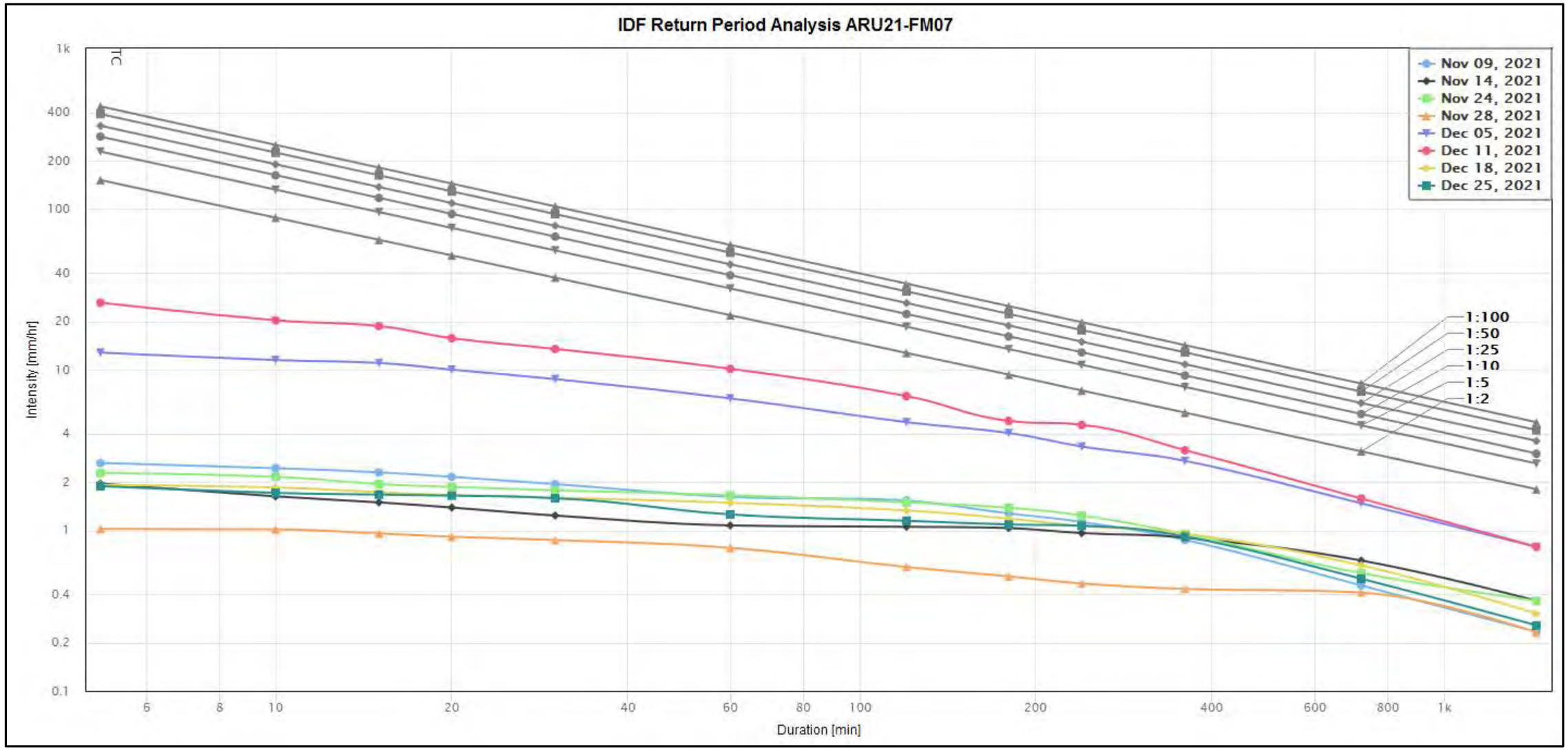


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | - | - | - | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | - | - | - | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | - | - | - | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | - | - | - | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | - | - | - | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | - | - | - | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Nov 09, 2021 | 16.50 | < 2 Yr | 5.58 | 2.63 | 2.44 | 2.30 | 2.15 | 1.94 | 1.62 | 1.54 | 1.27 | 1.13 | 0.87 | 0.45 | 0.23 |
| Nov 14, 2021 | 26.00 | < 2 Yr | 8.78 | 1.96 | 1.63 | 1.49 | 1.39 | 1.24 | 1.07 | 1.05 | 1.03 | 0.96 | 0.90 | 0.65 | 0.36 |
| Nov 24, 2021 | 37.42 | < 2 Yr | 9.08 | 2.28 | 2.15 | 1.94 | 1.86 | 1.77 | 1.66 | 1.49 | 1.38 | 1.23 | 0.95 | 0.54 | 0.36 |
| Nov 28, 2021 | 18.42 | < 2 Yr | 5.54 | 1.02 | 1.01 | 0.96 | 0.91 | 0.87 | 0.78 | 0.59 | 0.52 | 0.47 | 0.43 | 0.41 | 0.23 |
| Dec 05, 2021 | 38.42 | < 2 Yr | 19.09 | 12.78 | 11.47 | 11.01 | 9.99 | 8.74 | 6.62 | 4.71 | 4.03 | 3.32 | 2.70 | 1.47 | 0.79 |
| Dec 11, 2021 | 6.08 | < 2 Yr | 18.91 | 26.11 | 20.29 | 18.69 | 15.69 | 13.46 | 10.12 | 6.85 | 4.80 | 4.52 | 3.15 | 1.58 | 0.79 |
| Dec 18, 2021 | 9.25 | < 2 Yr | 7.26 | 1.92 | 1.85 | 1.73 | 1.66 | 1.60 | 1.48 | 1.33 | 1.18 | 1.06 | 0.95 | 0.61 | 0.30 |
| Dec 25, 2021 | 16.00 | < 2 Yr | 6.13 | 1.88 | 1.71 | 1.67 | 1.64 | 1.58 | 1.26 | 1.15 | 1.09 | 1.07 | 0.91 | 0.50 | 0.26 |

# I/I Analysis Table

**Station: ARU21-FM07**

| Measured Storms | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | Flow KPIs | ARU21-FM07 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Nov 09, 2021 | 5.58 | 16.50 | 2.60 | | Nov 09, 2021 22:10 | 204.00 | 27.54 | 69.05 | 37.63 |
| | Nov 14, 2021 | 8.78 | 26.00 | 2.00 | | Nov 14, 2021 18:35 | 209.00 | 37.42 | 71.40 | 33.98 |
| | Nov 24, 2021 | 9.07 | 37.42 | 2.30 | | Nov 25, 2021 07:55 | 199.00 | 34.35 | 67.42 | 22.49 |
| | Nov 28, 2021 | 5.54 | 18.42 | 1.00 | | Nov 28, 2021 15:05 | 195.00 | 25.54 | 64.07 | 34.88 |
| | Dec 05, 2021 | 19.09 | 38.42 | 12.80 | | Dec 06, 2021 00:00 | 334.00 | 146.87 | 179.08 | 32.21 |
| | Dec 11, 2021 | 18.90 | 6.08 | 26.10 | | Dec 11, 2021 05:35 | 559.00 | 406.57 | 414.66 | 8.09 |
| | Dec 18, 2021 | 7.26 | 9.25 | 1.90 | | Dec 19, 2021 03:40 | 186.00 | 5.16 | 49.57 | 12.66 |
| | Dec 25, 2021 | 6.13 | 16.00 | 1.90 | | Dec 25, 2021 08:30 | 215.50 | 35.30 | 69.37 | 13.82 |

[1] An event is a storm with a minimum volume of 15mm and a minimum inter-event dry period of 12 hours

# Aggregate Data

**Station: ARU21-FM07**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Nov 04, 2021 | Dec 29, 2021 | 55 | 0.05 | 0.14 | 0.56 | 15,507 | Sun Dec 05, 2021 05:30 | Sat Dec 11, 2021 05:35 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (1,000,000 L) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Nov 04, 2021 | Dec 29, 2021 | 55 | 1.30 | 31.47 | 414.66 | 146.38 | 15,507 | Sun Dec 05, 2021 05:45 | Sat Dec 11, 2021 05:35 |

## Precipitation

| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|---|
| Nov 04, 2021 | Dec 29, 2021 | 56 | 0.00 | 0.01 | 2.18 | 102.33 | 16,020 | Thu Nov 04, 2021 00:00 | Sat Dec 11, 2021 05:00 |

## Velocity

| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Count | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Nov 04, 2021 | Dec 29, 2021 | 55 | 0.09 | 0.51 | 1.18 | 15,507 | Sun Dec 05, 2021 05:45 | Sat Dec 11, 2021 05:30 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Activity Log

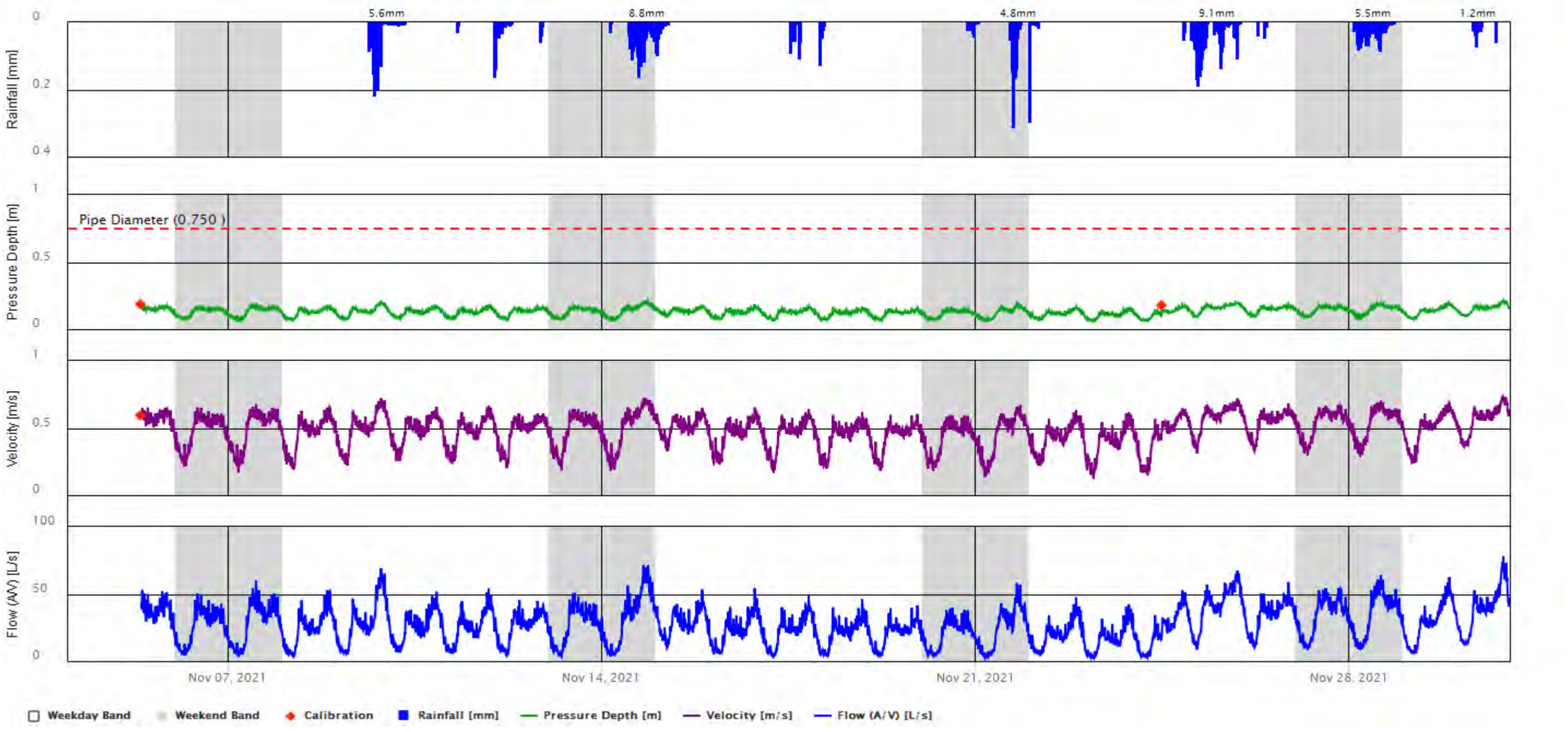
**Station: ARU21-FM07**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 05-Nov-2021 08:45:00 AM | Installation Log | Install Detec AV + ring and CSO with wooden bracket | Pipe size 750 mm not 675 mm<br>PMAC: 8149 | Yes |
| 24-Nov-2021 11:49:00 AM | Maintenance Log | CALIBRATION | DATA DOWNLOADED<br>SITE CALIBRATED, NO VELOCITY PROBE<br>DEBRIS CLEARED<br>TELEMETRY SENT | Yes |
| 13-Dec-2021 11:18:00 AM | Maintenance Log | Calibration | Site calibrated<br>Debris cleared - significant - velocity reading good after clearing<br>Telemetry sent, Battery swapped | Yes |
| 29-Dec-2021 07:30:00 AM | Removal Log | FM REMOVAL | All FM Equipment removed from site | Yes |

# Data Chart

**Station: ARU21-FM07**

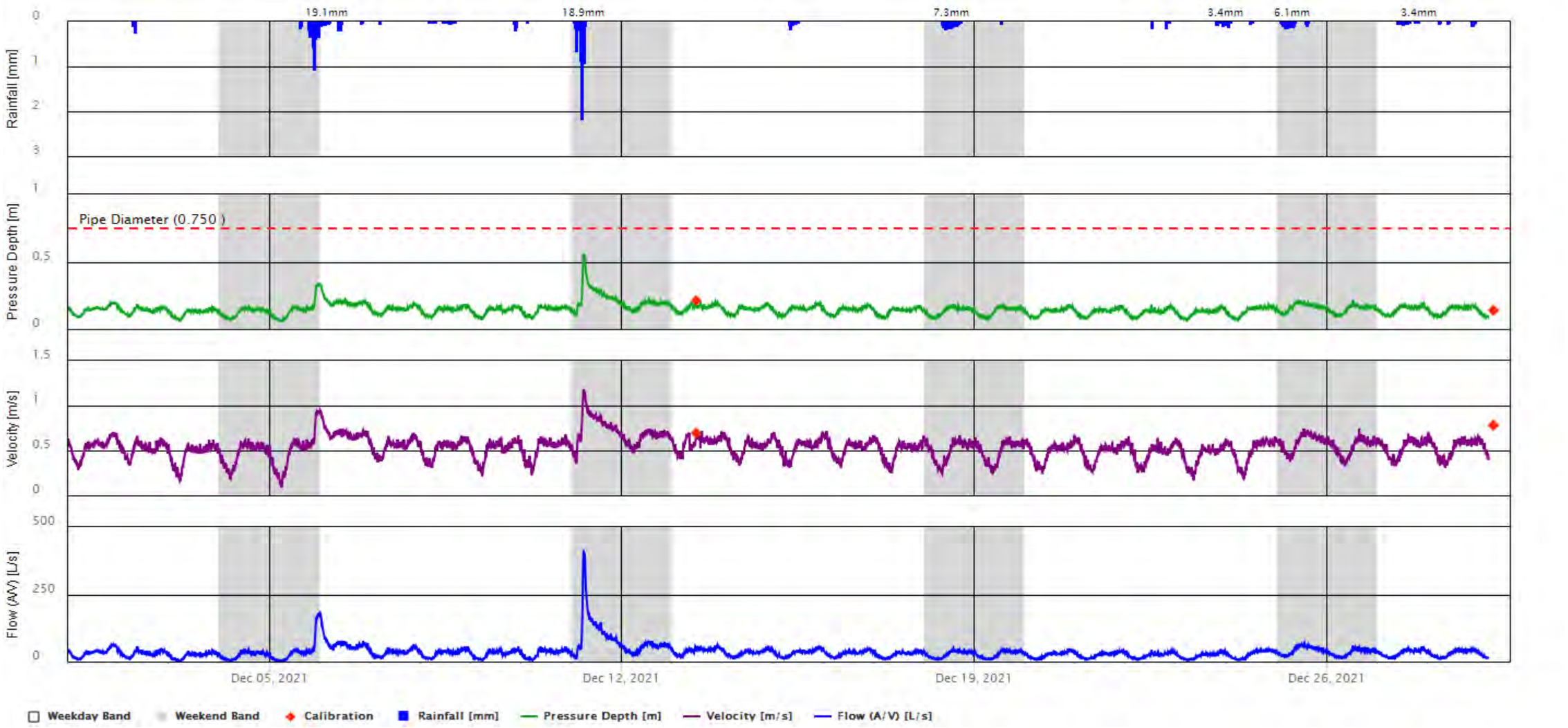
Nov 04, 2021 – Nov 30, 2021



# Data Chart

**Station: ARU21-FM07**

Dec 01, 2021 – Dec 29, 2021



# ARU21-0002 Final Report Period 2

## ARU21-0002 - Downsview Flow Monitoring

*Monitoring Period: Apr 01, 2022 – Sep 06, 2022*

*Generated on: Mar 31, 2023*

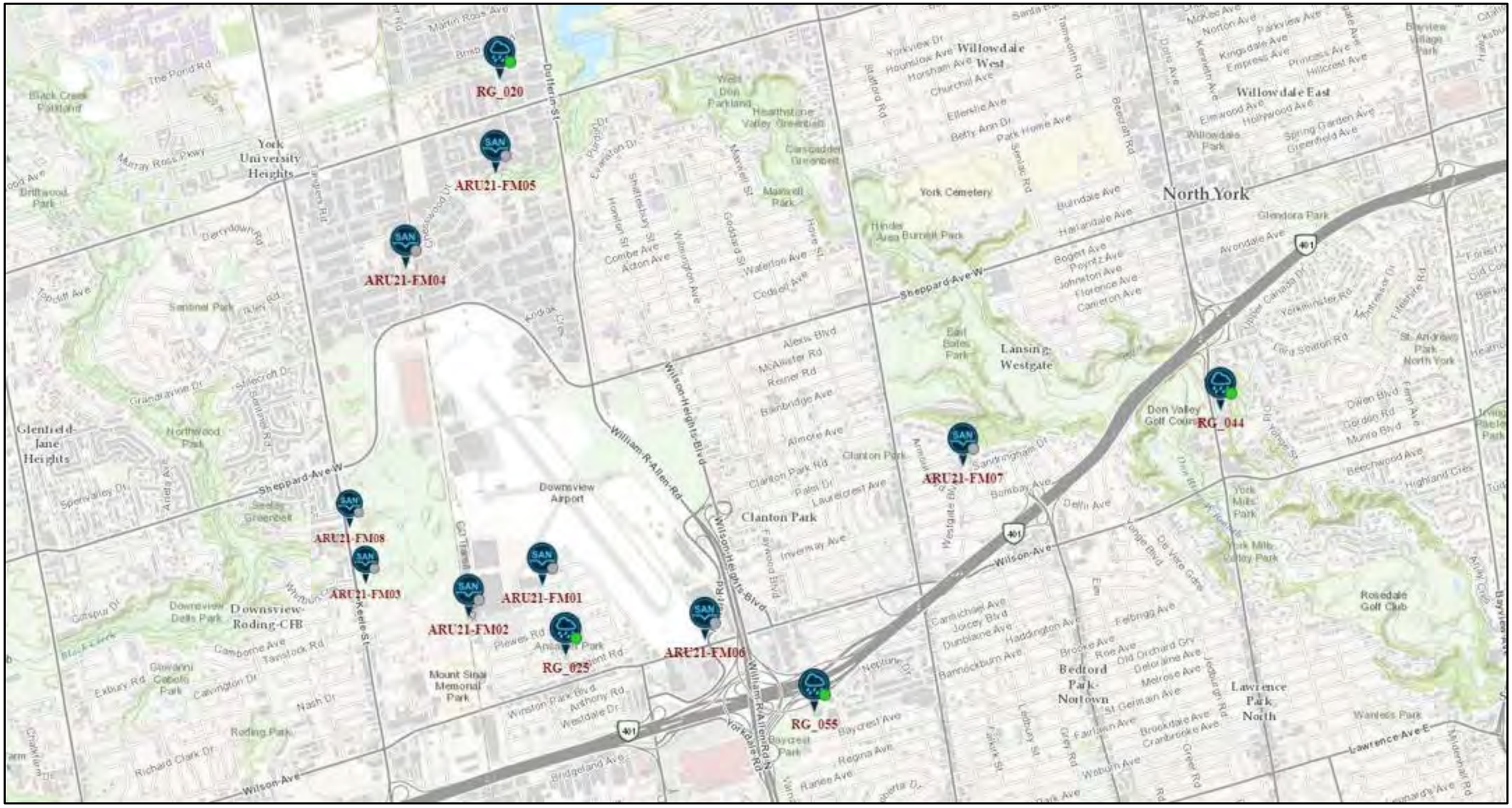
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www.civi.ca

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# Flow Monitoring Location



# Monitoring Station List

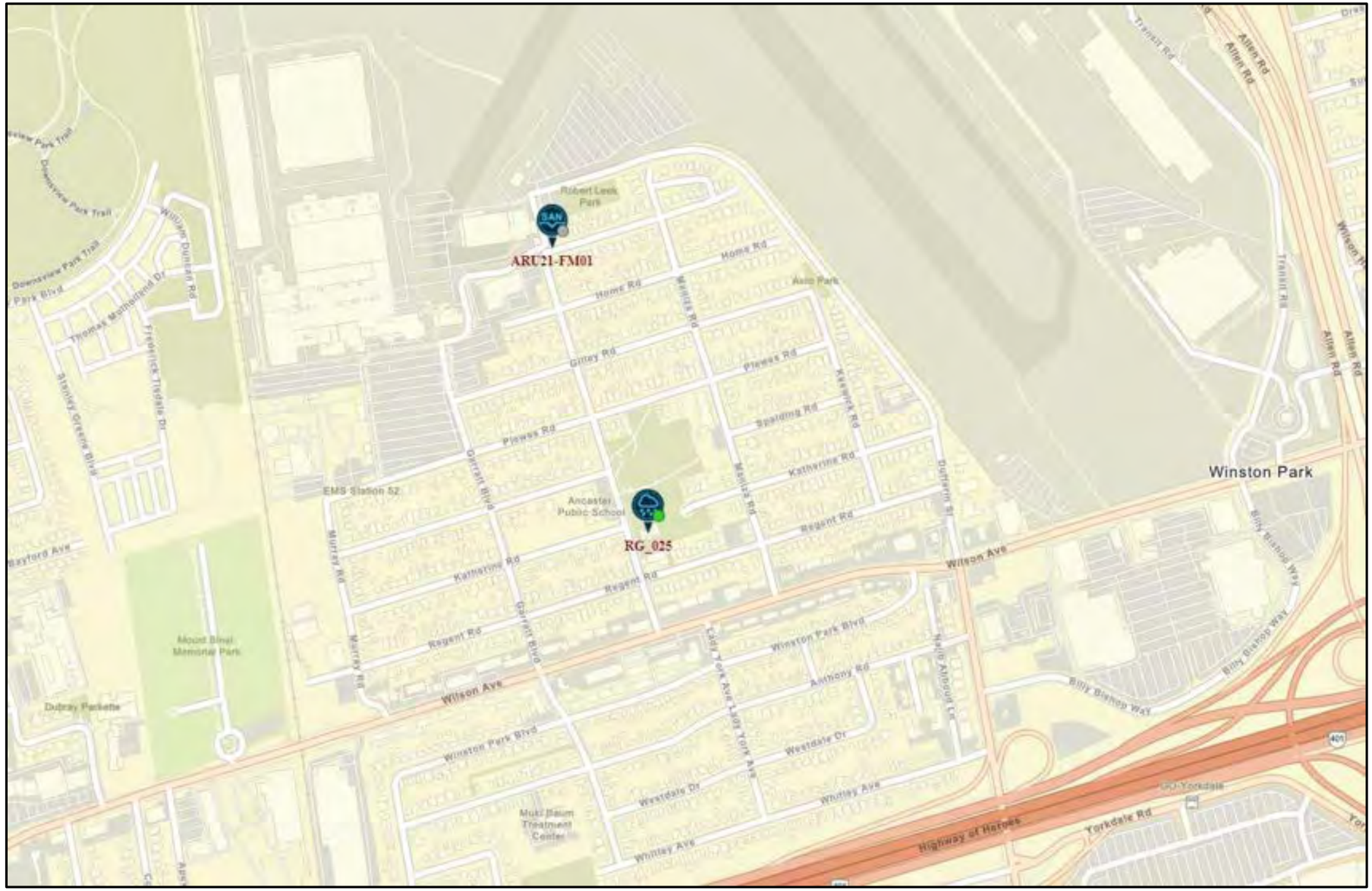
| Station Name | U/S Station Name | Inlet/Outlet | Station Type | Station State | Latitude | Longitude | Start Date | End Date | Station Pipe Diameter (mm) | Catchment Area (ha) | Catchment Population (Persons)[3] | Station Tc (min) | Average Dry Weather Flow (L/s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ARU21-FM01 | - | Inlet | Sanitary Flow | Receiving | 43.73705 | -79.467836 | Apr 01, 2022 | Sep 06, 2022 | 150 | 1.3 | 77 | 5 | 0.025 |
| ARU21-FM02 | - | Inlet | Sanitary Flow | Receiving | 43.734975 | -79.474424 | Apr 01, 2022 | Sep 06, 2022 | 300 | 29.2 | 2049 | 5 | 1.776 |
| ARU21-FM03[1][2] | ARU21-FM02 | Inlet | Sanitary Flow | Receiving | 43.739509 | -79.484776 | May 11, 2022 | Sep 06, 2022 | 450 | 278.1 | 6630 | 5 | 33.403 |
| ARU21-FM04 | - | Inlet | Sanitary Flow | Receiving | 43.757625 | -79.48012 | Apr 01, 2022 | Sep 06, 2022 | 375 | 50 | 952 | 5 | 1.245 |
| ARU21-FM05[2] | ARU21-FM04 | Inlet | Sanitary Flow | Receiving | 43.763753 | -79.472047 | Apr 01, 2022 | Sep 29, 2022 | 700 | 385.1 | 14669 | 5 | 44.113 |
| ARU21-FM06[2] | ARU21-FM01 | Outlet | Sanitary Flow | Receiving | 43.733488 | -79.453199 | Apr 01, 2022 | Sep 06, 2022 | 500 | 69.8 | 3474 | 5 | 8.106 |
| ARU21-FM07[2] | ARU21-FM01<br>ARU21-FM06 | Inlet | Sanitary Flow | Receiving | 43.744786 | -79.430031 | Apr 01, 2022 | Sep 06, 2022 | 675 | 334.6 | 18805 | 5 | 49.291 |
| ARU21-FM08 | - | Inlet | Sanitary Flow | Receiving | 43.740282 | -79.485221 | May 19, 2022 | Sep 06, 2022 | 550 | 70.8 | 70 | 5 | 2.355 |

[1] Catchment population and area of FM02 was added to FM03

[2] U/S catchment area and populations have been included in the corresponding D/S rows

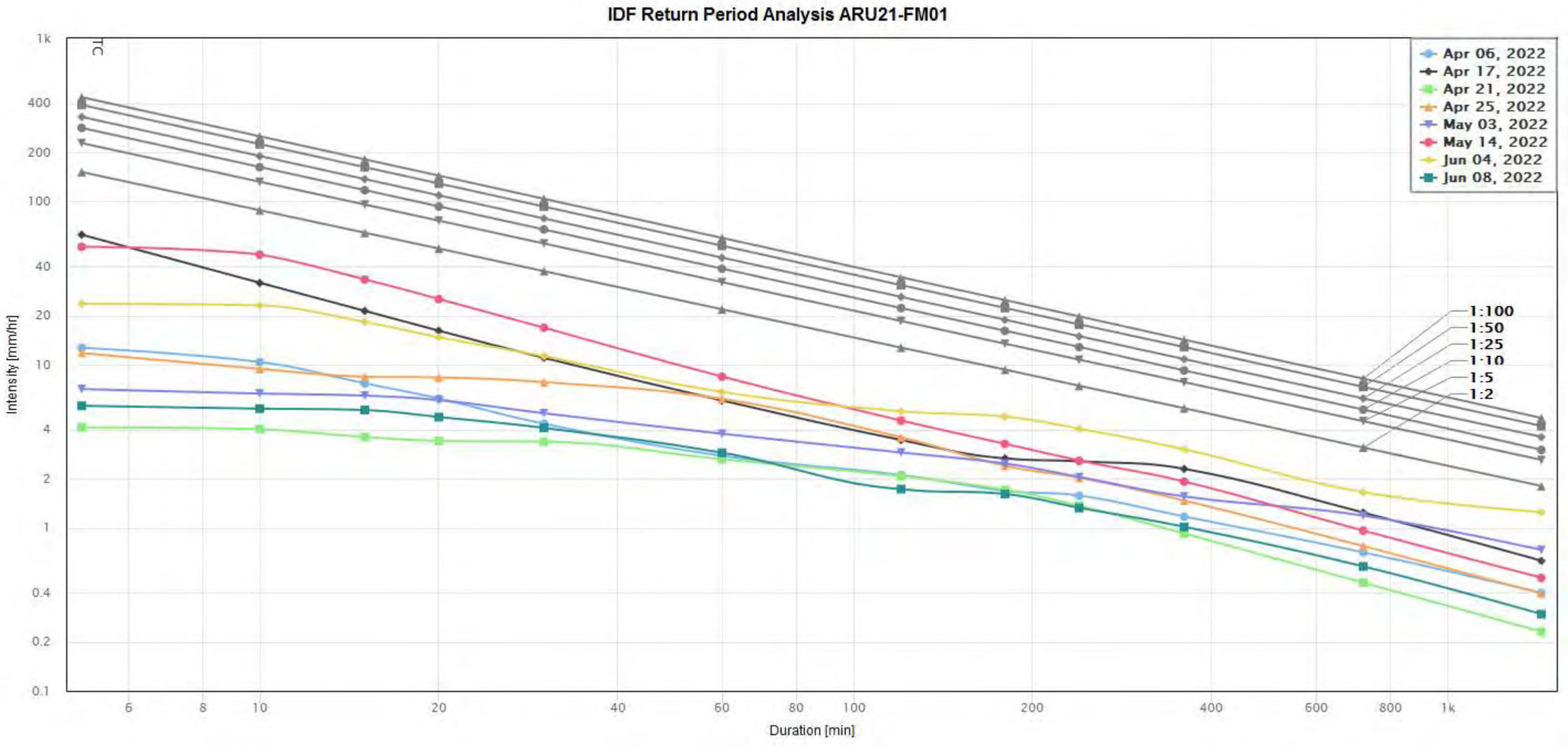
[3] Total population includes = ICI population + Residential population

# Station: ARU21-FM01



# IDF Analysis

**Station: ARU21-FM01**



# IDF Analysis

**Station: ARU21-FM01**

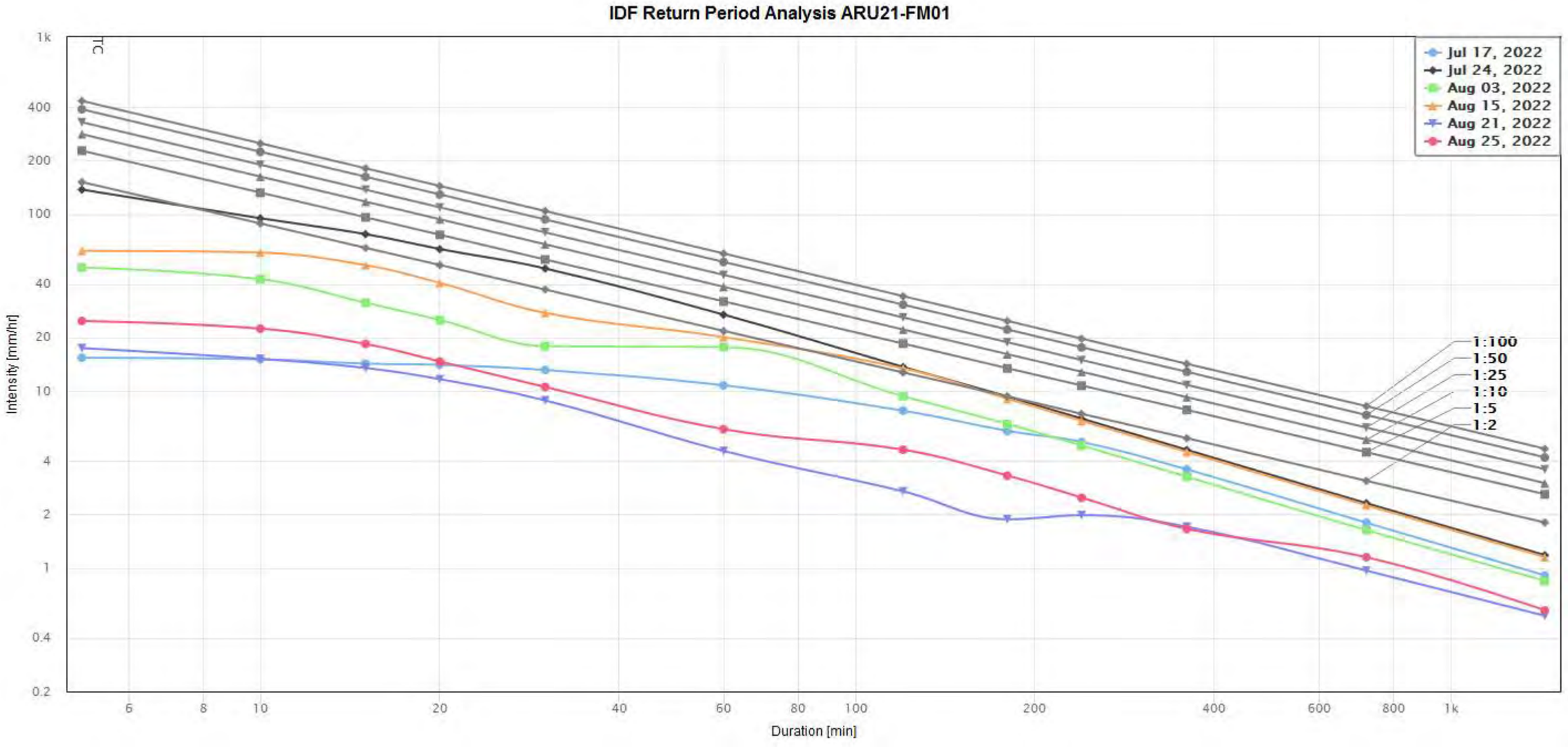


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

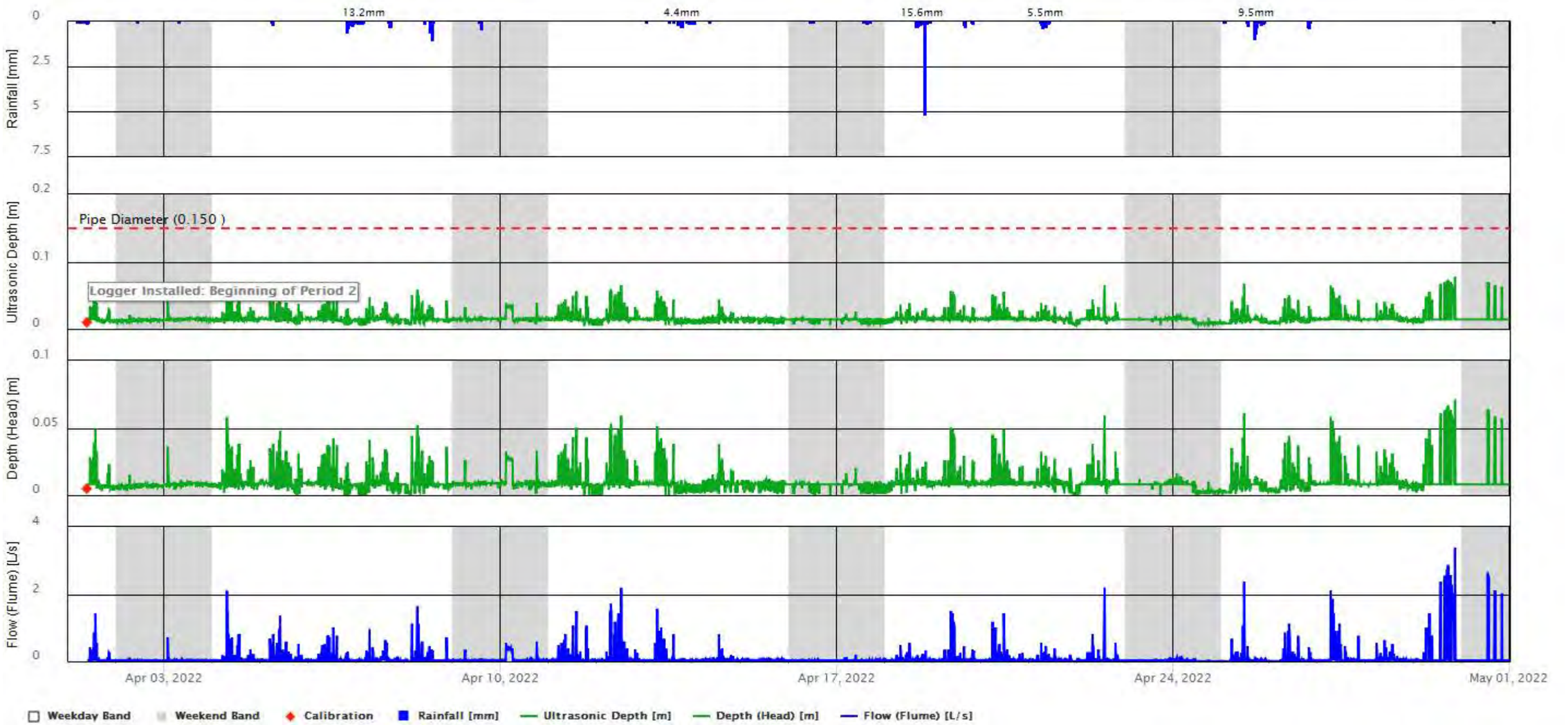
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Apr 06, 2022 | 43.17 | < 2 Yr | 13.19 | 12.70 | 10.36 | 7.67 | 6.19 | 4.34 | 2.76 | 2.11 | 1.68 | 1.57 | 1.17 | 0.71 | 0.40 |
| Apr 17, 2022 | 37.83 | < 2 Yr | 15.59 | 62.54 | 31.66 | 21.32 | 16.11 | 11.01 | 6.02 | 3.45 | 2.66 | 2.55 | 2.29 | 1.24 | 0.63 |
| Apr 21, 2022 | 5.67 | < 2 Yr | 5.53 | 4.13 | 4.03 | 3.60 | 3.41 | 3.37 | 2.63 | 2.07 | 1.70 | 1.36 | 0.92 | 0.46 | 0.23 |
| Apr 25, 2022 | 20.83 | < 2 Yr | 9.46 | 11.78 | 9.41 | 8.44 | 8.33 | 7.81 | 6.16 | 3.58 | 2.39 | 2.02 | 1.47 | 0.77 | 0.39 |
| May 03, 2022 | 17.50 | < 2 Yr | 17.55 | 7.08 | 6.64 | 6.46 | 6.06 | 5.04 | 3.77 | 2.89 | 2.47 | 2.04 | 1.55 | 1.19 | 0.73 |
| May 14, 2022 | 49.00 | < 2 Yr | 12.24 | 52.73 | 47.27 | 33.29 | 25.21 | 16.84 | 8.43 | 4.54 | 3.26 | 2.57 | 1.92 | 0.96 | 0.49 |
| Jun 04, 2022 | 65.50 | < 2 Yr | 32.78 | 23.60 | 23.08 | 18.25 | 14.69 | 11.27 | 6.79 | 5.17 | 4.80 | 4.04 | 3.02 | 1.65 | 1.25 |
| Jun 08, 2022 | 19.33 | < 2 Yr | 7.09 | 5.59 | 5.37 | 5.27 | 4.77 | 4.09 | 2.88 | 1.73 | 1.61 | 1.32 | 1.01 | 0.58 | 0.30 |
| Jul 17, 2022 | 27.42 | < 2 Yr | 21.71 | 15.40 | 15.09 | 14.26 | 14.04 | 13.12 | 10.75 | 7.72 | 5.93 | 5.13 | 3.59 | 1.80 | 0.90 |
| Jul 24, 2022 | 15.58 | < 2 Yr | 28.23 | 137.33 | 94.43 | 76.86 | 63.25 | 49.19 | 26.92 | 13.63 | 9.27 | 6.95 | 4.63 | 2.32 | 1.18 |
| Aug 03, 2022 | 21.08 | < 2 Yr | 20.19 | 49.86 | 42.76 | 31.47 | 25.14 | 17.90 | 17.67 | 9.32 | 6.49 | 4.89 | 3.26 | 1.63 | 0.84 |
| Aug 15, 2022 | 44.17 | < 2 Yr | 27.70 | 61.96 | 60.60 | 51.34 | 40.73 | 27.60 | 20.12 | 13.40 | 9.00 | 6.75 | 4.50 | 2.25 | 1.15 |
| Aug 21, 2022 | 28.42 | < 2 Yr | 13.04 | 17.45 | 15.17 | 13.46 | 11.63 | 8.83 | 4.57 | 2.70 | 1.88 | 1.98 | 1.70 | 0.96 | 0.53 |
| Aug 25, 2022 | 10.50 | < 2 Yr | 13.77 | 24.86 | 22.48 | 18.41 | 14.63 | 10.52 | 6.06 | 4.65 | 3.31 | 2.49 | 1.66 | 1.15 | 0.57 |

# Data Chart

**Station: ARU21-FM01**

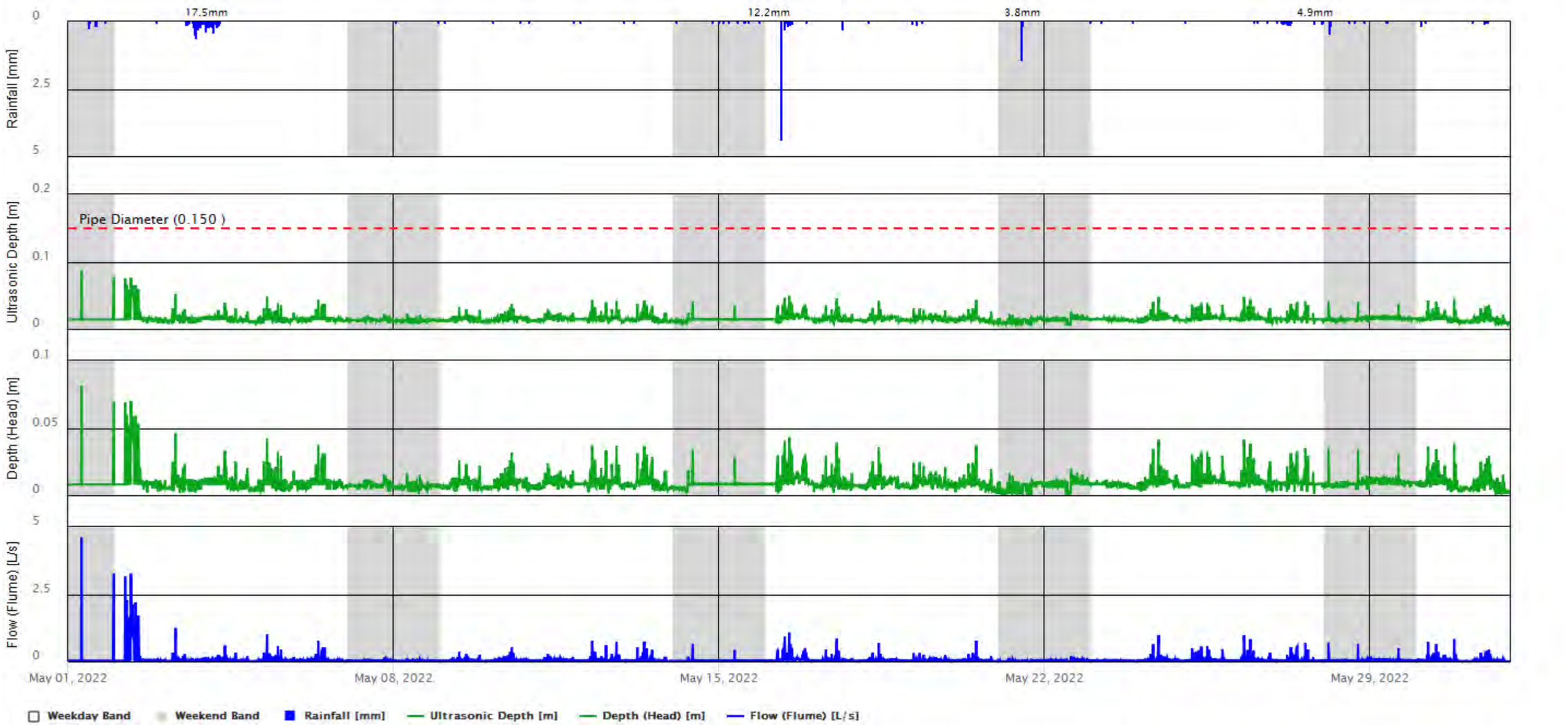
Apr 01, 2022 – Apr 30, 2022



# Data Chart

**Station: ARU21-FM01**

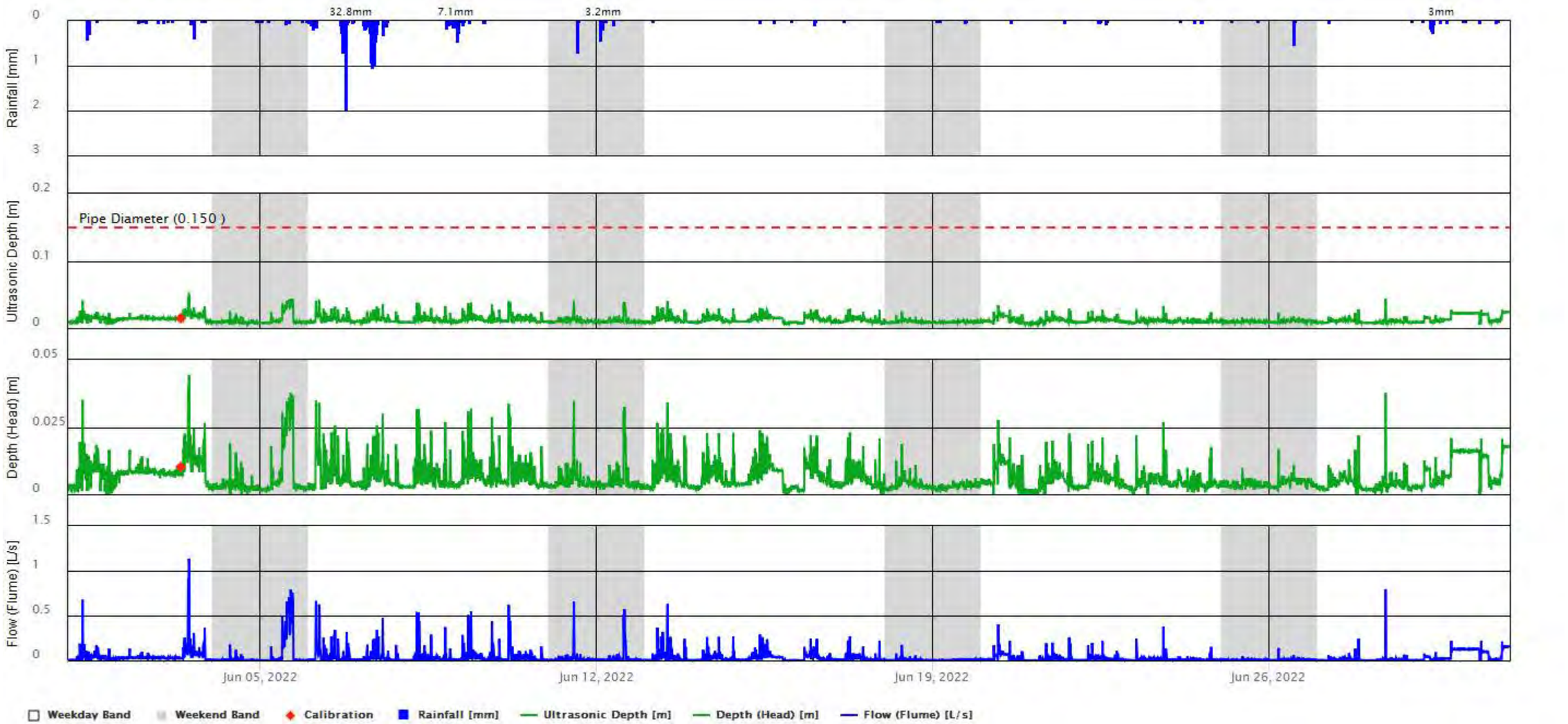
May 01, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM01**

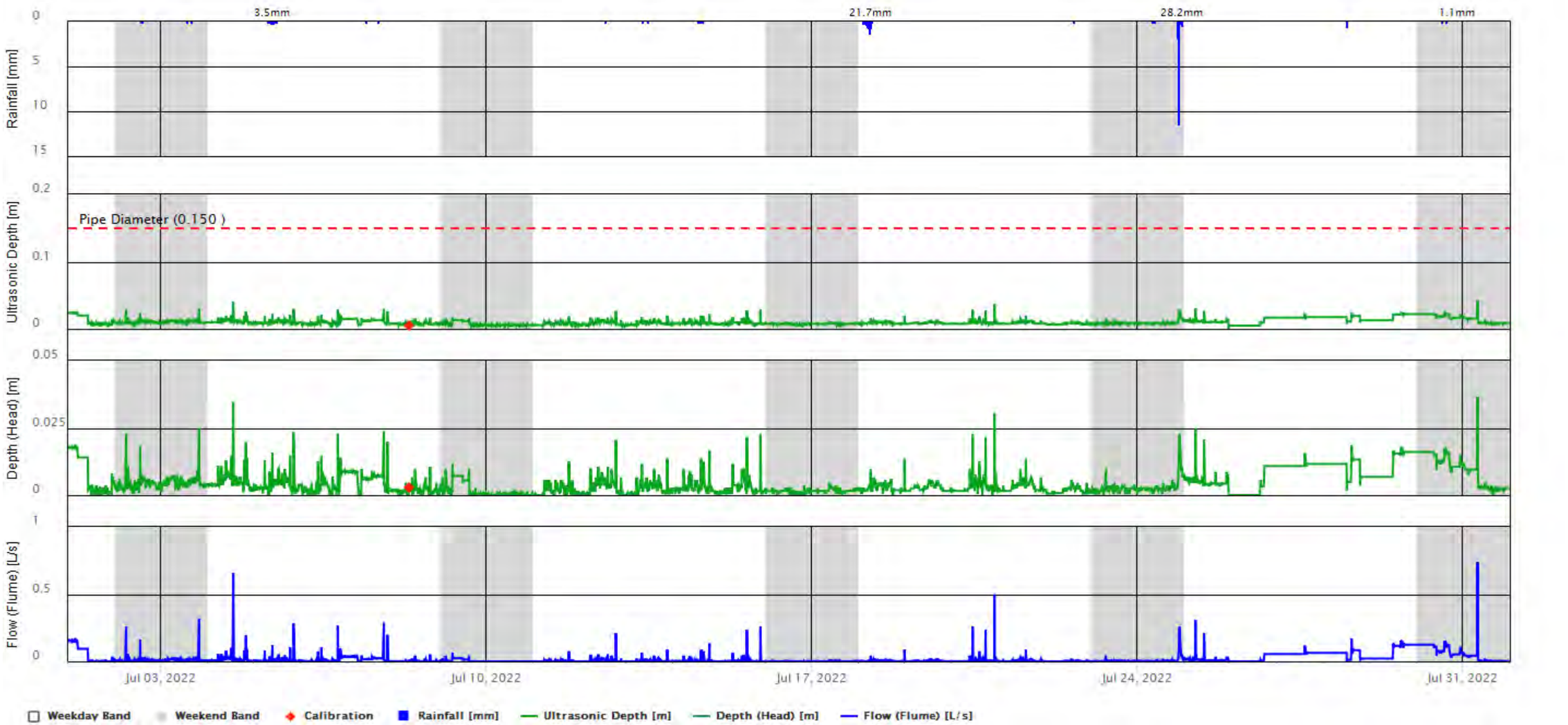
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM01**

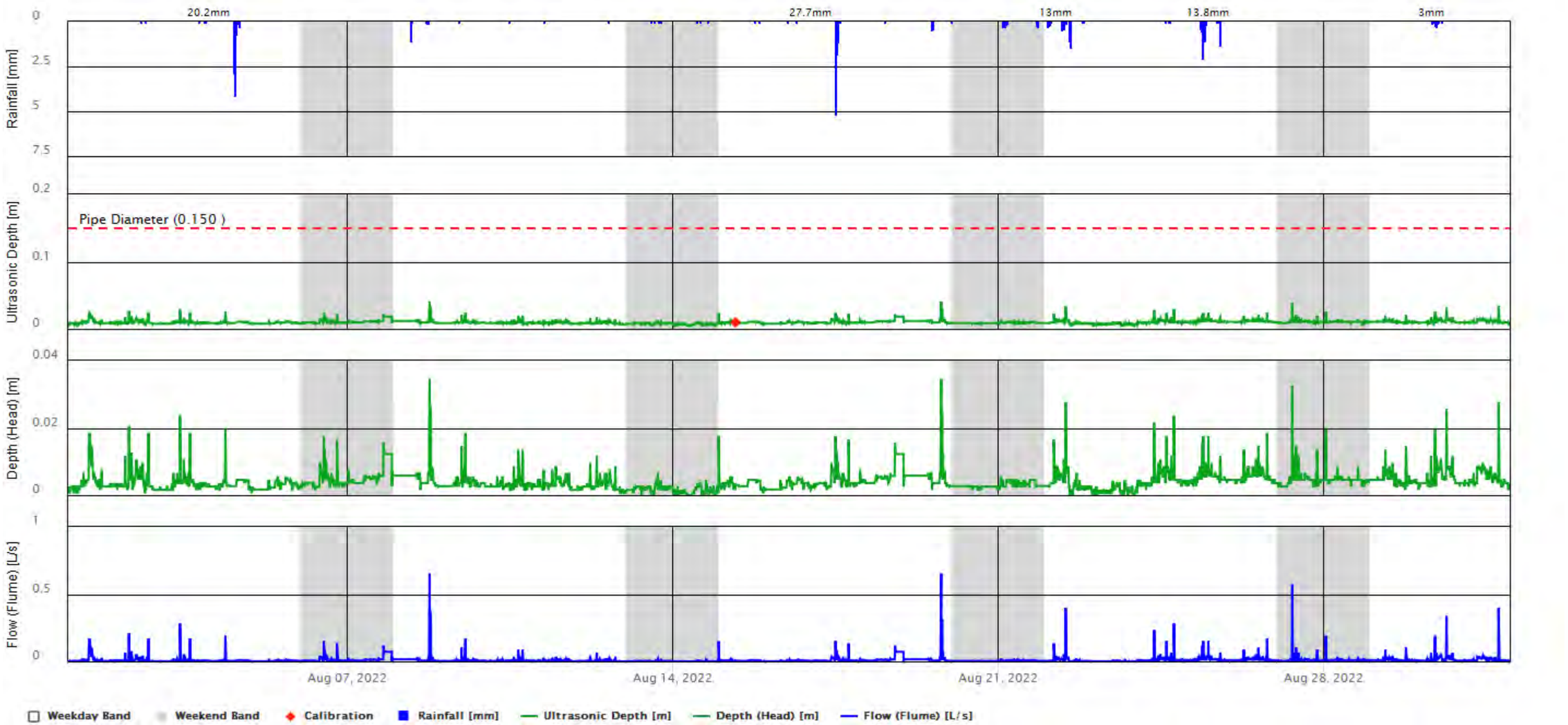
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM01**

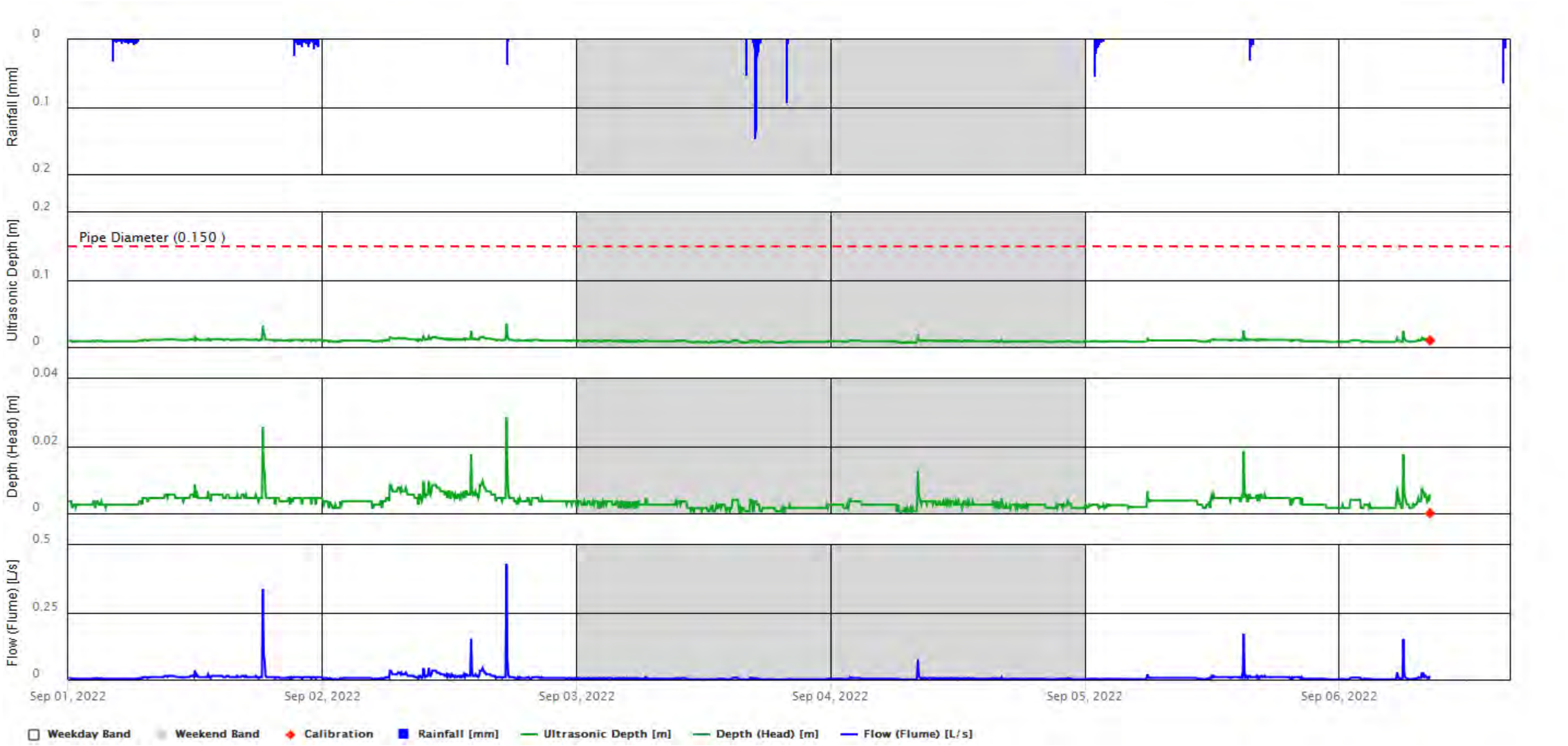
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM01**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM01**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.00 | 0.01 | 0.08 | Tue Apr 05, 2022 18:10 | Sun May 01, 2022 06:50 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume ($m^3$) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.00 | 0.03 | 4.61 | 466.2 | Tue Apr 05, 2022 18:10 | Sun May 01, 2022 06:50 |

## Precipitation

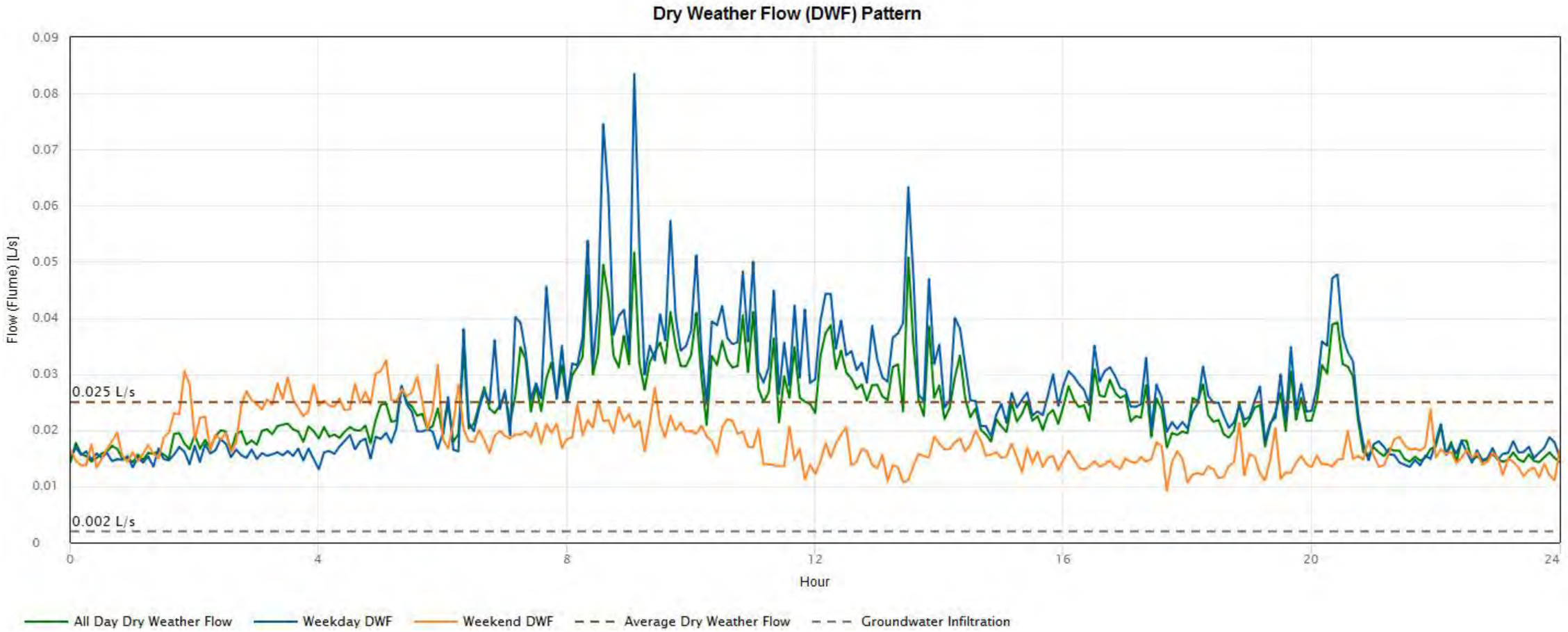
| Date From | Date To | Days | Min (mm) | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.00 | 0.01 | 11.44 | 302.27 | Sun Jul 24, 2022 21:05 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Sanitary Report

**Station: ARU21-FM01**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 0.025 | 27.989 | 0.002 | 0.445 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 17.830 | 0.002 | 104.036 | 6.276 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM01**

| Measured Storms | | | | | Flow KPIs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ARU21-FM01 | | | | | |
| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[2] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Apr 06, 2022 | 13.18 | 43.17 | 12.70 | Apr 08, 2022 06:25 | 52.00 | 1.59 | 1.64 | 0.05 |
| | Apr 17, 2022 | 15.59 | 37.83 | 62.50 | Apr 19, 2022 08:55 | 50.00 | 1.42 | 1.50 | 0.08 |
| | Apr 21, 2022 | 5.52 | 5.67 | 4.10 | Apr 21, 2022 06:00 | 32.00 | 0.52 | 0.55 | 0.03 |
| | Apr 25, 2022 | 9.46 | 20.83 | 11.80 | Apr 25, 2022 11:20 | 61.00 | 2.30 | 2.36 | 0.07 |
| | May 03, 2022 | 17.55 | 17.50 | 7.10 | May 04, 2022 08:50 | 46.00 | 0.52 | 0.59 | 0.07 |
| | May 14, 2022 | 12.24 | 49.00 | 52.70 | May 16, 2022 12:10 | 43.13 | 0.98 | 1.07 | 0.09 |
| | Jun 04, 2022 | 32.78 | 65.50 | 23.60 | Jun 05, 2022 15:05 | 37.63 | 0.76 | 0.79 | 0.03 |
| | Jun 08, 2022 | 7.09 | 19.33 | 5.60 | Jun 10, 2022 04:00 | 33.73 | 0.61 | 0.62 | 0.01 |
| | Jul 17, 2022 | 21.71 | 27.42 | 15.40 | Jul 18, 2022 06:10 | 9.56 | 0.04 | 0.04 | 0.00 |
| | Jul 24, 2022 | 28.23 | 15.58 | 137.30 | Jul 25, 2022 05:50 | 24.56 | 0.31 | 0.31 | 0.00 |
| | Aug 03, 2022 | 20.19 | 21.08 | 49.90 | Aug 04, 2022 09:05 | 23.56 | 0.18 | 0.19 | 0.01 |
| | Aug 15, 2022 | 27.70 | 44.17 | 62.00 | Aug 17, 2022 12:00 | 17.56 | 0.14 | 0.15 | 0.01 |
| | Aug 21, 2022 | 13.04 | 28.42 | 17.40 | Aug 22, 2022 10:50 | 27.56 | 0.39 | 0.40 | 0.01 |
| | Aug 25, 2022 | 13.77 | 10.50 | 24.90 | Aug 25, 2022 12:25 | 17.56 | 0.14 | 0.15 | 0.01 |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

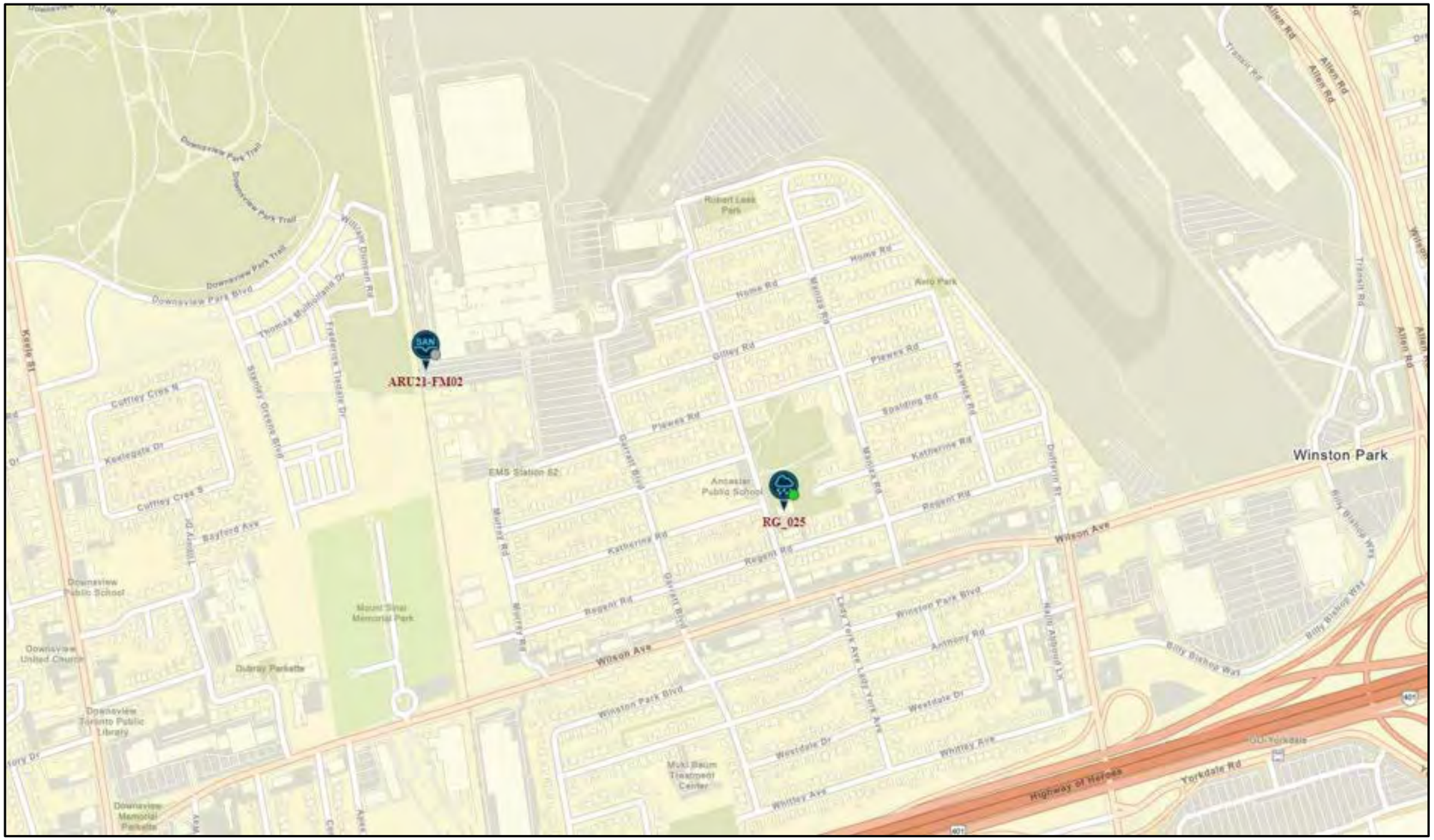
[2] Time of Measured Peak Flow may not happen at TD

# Activity Log

**Station: ARU21-FM01**

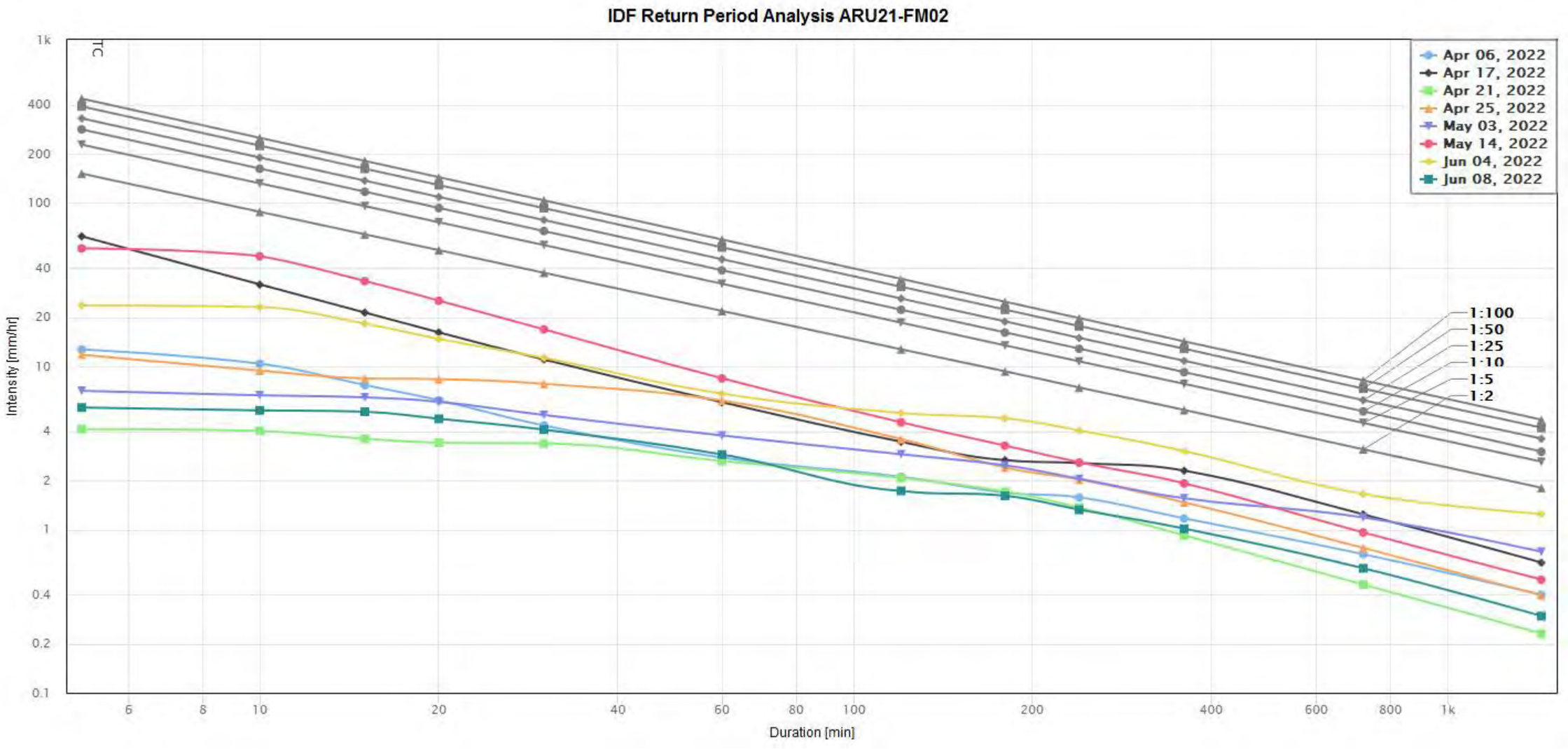
| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 01-Apr-2022 09:45:00 AM | Installation Log | Installation | LOGGER INSTALLED , INTIAL MEASUREMENTS DONE, SITE CALIBRATED, LOGGER STARTED, TELEMETRY SENT , PHOTOS TAKEN, FLOW TOO LOW FOR VELOCITY PROBE | Yes |
| 03-Jun-2022 08:30:00 AM | Maintenance Log | Calibration | SITE CALIBRATEED<br>DEBRIS CLEARED<br>DOWNWARD SENSOR FACING THE FLUME<br>TELEMETRY SENT<br>DATA DOWNLOADED | Yes |
| 08-Jul-2022 08:04:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 15-Aug-2022 08:29:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 06-Sep-2022 08:35:00 AM | Removal Log | Removal | REMOVED ALL EQUIPMENT(LOGGER, SENSORS, FLUME, HARDWARE) FROM MANHOLE. **NO FUNCTIONING VELOCITY PROBE FOR MANUAL MEASUREMENT | Yes |

# Station: ARU21-FM02



# IDF Analysis

**Station: ARU21-FM02**



# IDF Analysis

**Station: ARU21-FM02**

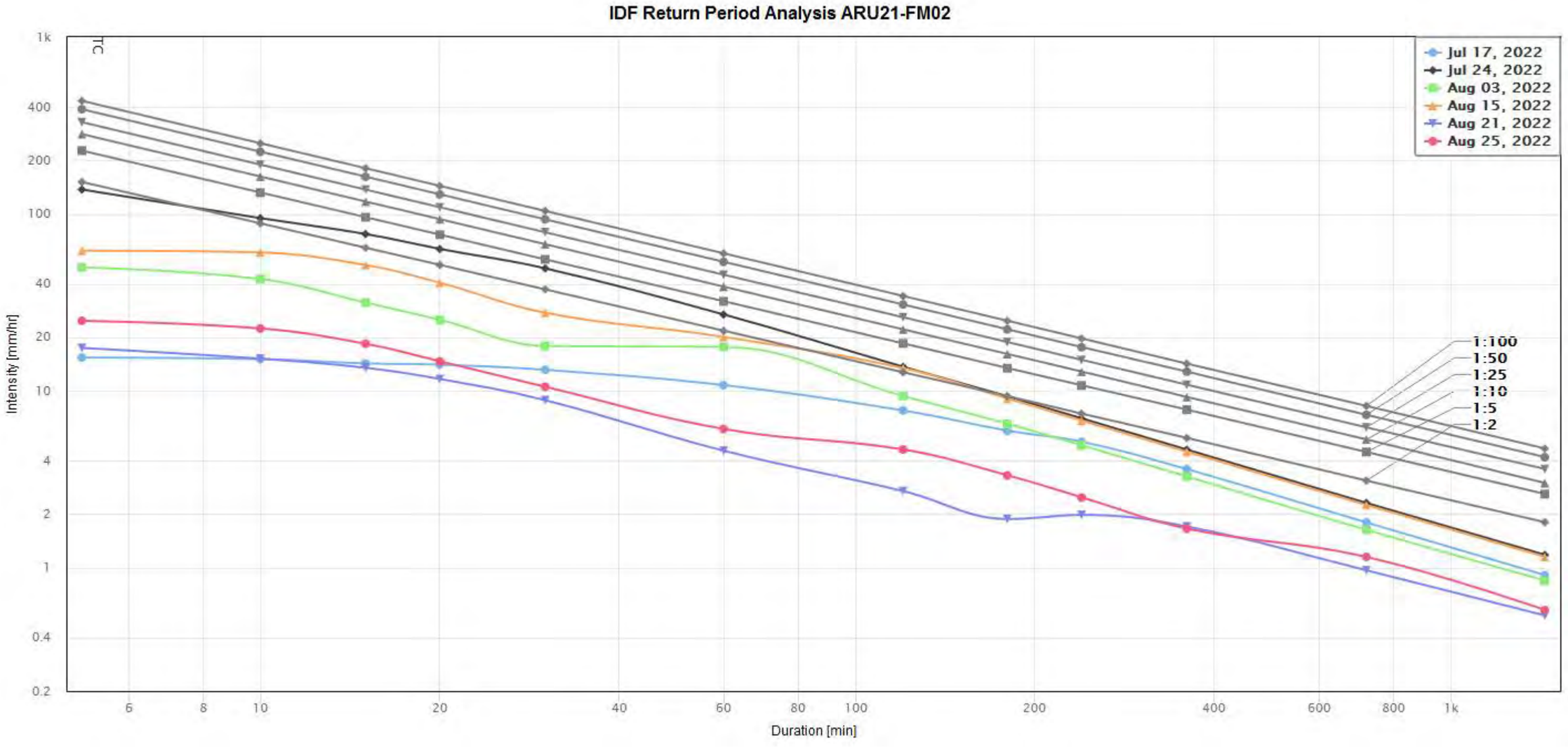


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

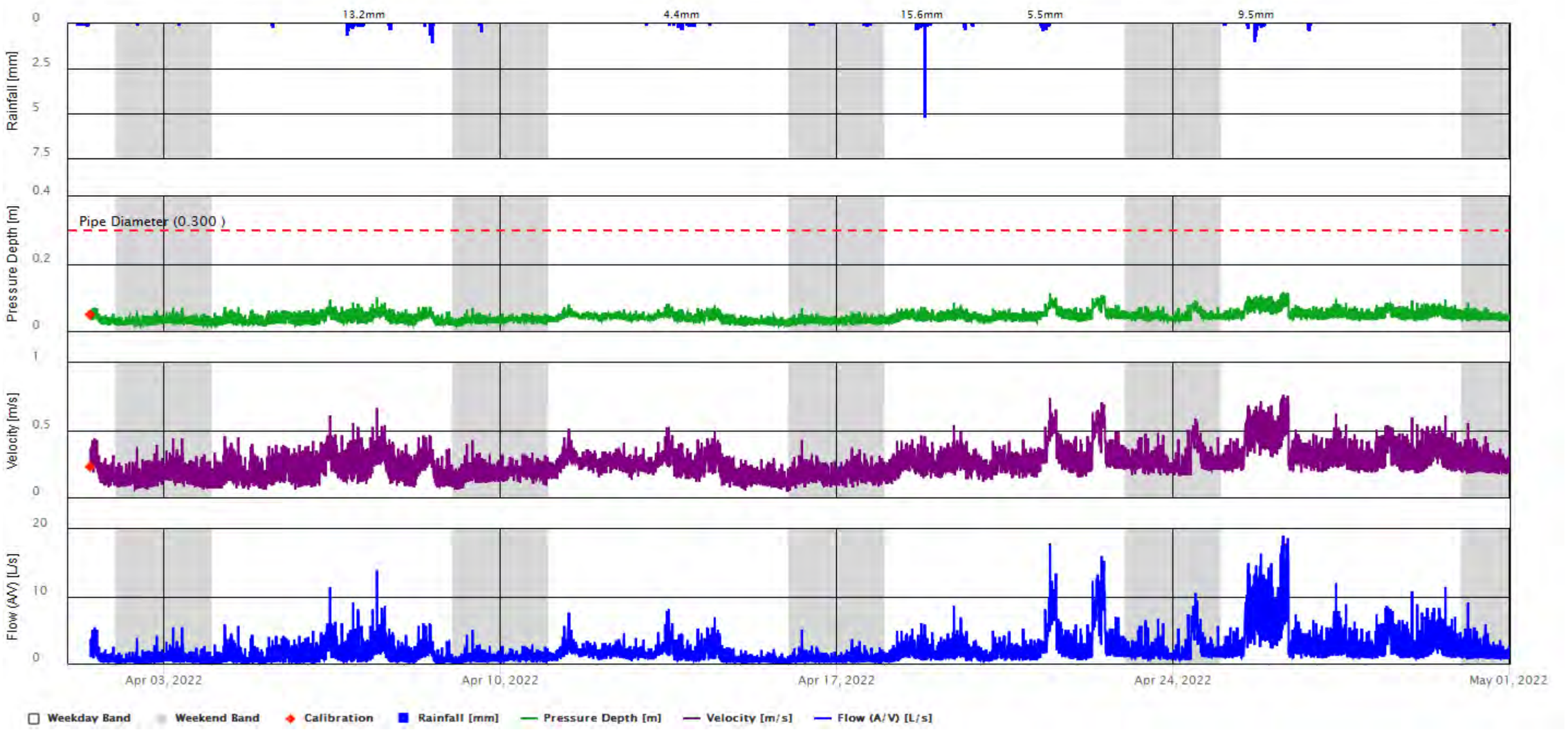
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Apr 06, 2022 | 43.17 | < 2 Yr | 13.19 | 12.70 | 10.36 | 7.67 | 6.19 | 4.34 | 2.76 | 2.11 | 1.68 | 1.57 | 1.17 | 0.71 | 0.40 |
| Apr 17, 2022 | 37.83 | < 2 Yr | 15.59 | 62.54 | 31.66 | 21.32 | 16.11 | 11.01 | 6.02 | 3.45 | 2.66 | 2.55 | 2.29 | 1.24 | 0.63 |
| Apr 21, 2022 | 5.67 | < 2 Yr | 5.53 | 4.13 | 4.03 | 3.60 | 3.41 | 3.37 | 2.63 | 2.07 | 1.70 | 1.36 | 0.92 | 0.46 | 0.23 |
| Apr 25, 2022 | 20.83 | < 2 Yr | 9.46 | 11.78 | 9.41 | 8.44 | 8.33 | 7.81 | 6.16 | 3.58 | 2.39 | 2.02 | 1.47 | 0.77 | 0.39 |
| May 03, 2022 | 17.50 | < 2 Yr | 17.55 | 7.08 | 6.64 | 6.46 | 6.06 | 5.04 | 3.77 | 2.89 | 2.47 | 2.04 | 1.55 | 1.19 | 0.73 |
| May 14, 2022 | 49.00 | < 2 Yr | 12.24 | 52.73 | 47.27 | 33.29 | 25.21 | 16.84 | 8.43 | 4.54 | 3.26 | 2.57 | 1.92 | 0.96 | 0.49 |
| Jun 04, 2022 | 65.50 | < 2 Yr | 32.78 | 23.60 | 23.08 | 18.25 | 14.69 | 11.27 | 6.79 | 5.17 | 4.80 | 4.04 | 3.02 | 1.65 | 1.25 |
| Jun 08, 2022 | 19.33 | < 2 Yr | 7.09 | 5.59 | 5.37 | 5.27 | 4.77 | 4.09 | 2.88 | 1.73 | 1.61 | 1.32 | 1.01 | 0.58 | 0.30 |
| Jul 17, 2022 | 27.42 | < 2 Yr | 21.71 | 15.40 | 15.09 | 14.26 | 14.04 | 13.12 | 10.75 | 7.72 | 5.93 | 5.13 | 3.59 | 1.80 | 0.90 |
| Jul 24, 2022 | 15.58 | < 2 Yr | 28.23 | 137.33 | 94.43 | 76.86 | 63.25 | 49.19 | 26.92 | 13.63 | 9.27 | 6.95 | 4.63 | 2.32 | 1.18 |
| Aug 03, 2022 | 21.08 | < 2 Yr | 20.19 | 49.86 | 42.76 | 31.47 | 25.14 | 17.90 | 17.67 | 9.32 | 6.49 | 4.89 | 3.26 | 1.63 | 0.84 |
| Aug 15, 2022 | 44.17 | < 2 Yr | 27.70 | 61.96 | 60.60 | 51.34 | 40.73 | 27.60 | 20.12 | 13.40 | 9.00 | 6.75 | 4.50 | 2.25 | 1.15 |
| Aug 21, 2022 | 28.42 | < 2 Yr | 13.04 | 17.45 | 15.17 | 13.46 | 11.63 | 8.83 | 4.57 | 2.70 | 1.88 | 1.98 | 1.70 | 0.96 | 0.53 |
| Aug 25, 2022 | 10.50 | < 2 Yr | 13.77 | 24.86 | 22.48 | 18.41 | 14.63 | 10.52 | 6.06 | 4.65 | 3.31 | 2.49 | 1.66 | 1.15 | 0.57 |

# Data Chart

**Station: ARU21-FM02**

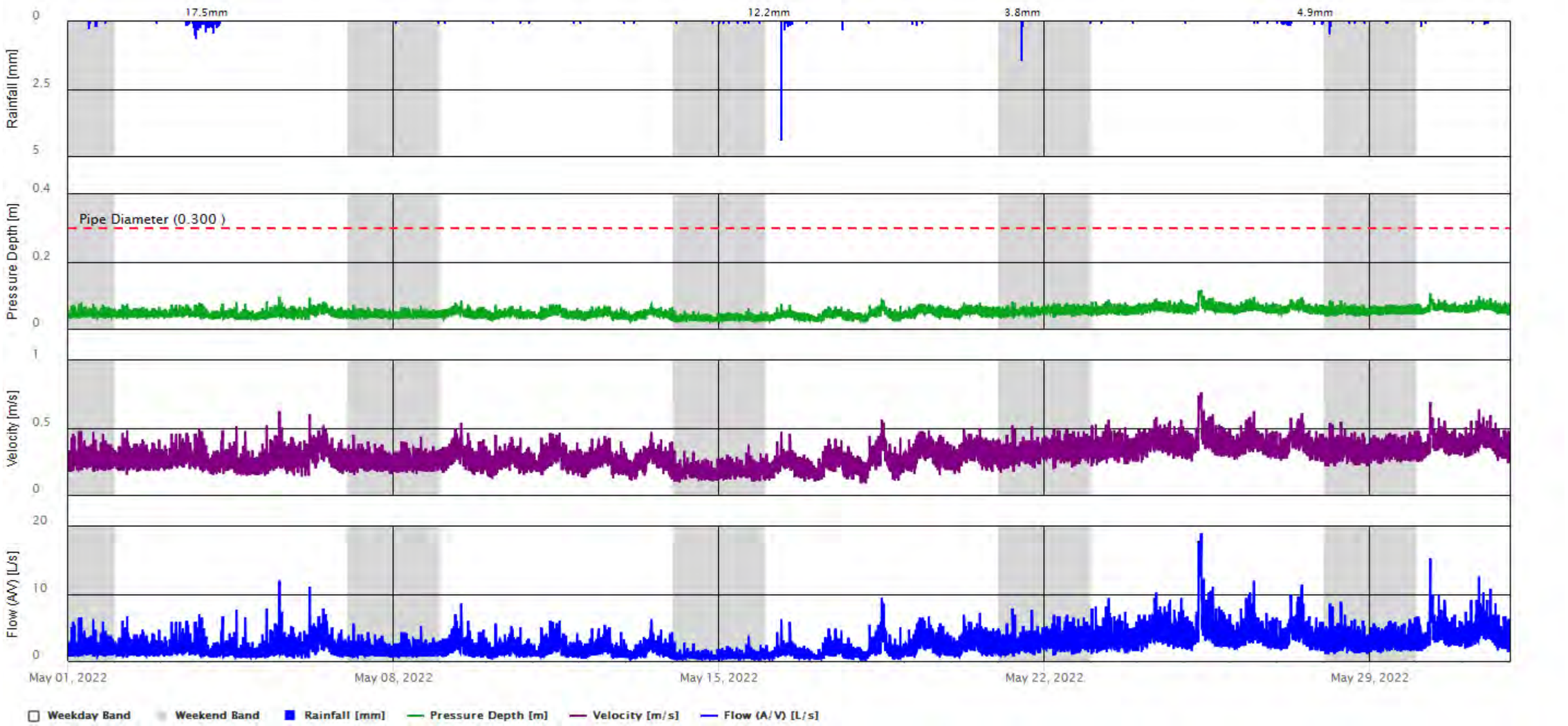
Apr 01, 2022 – Apr 30, 2022



# Data Chart

**Station: ARU21-FM02**

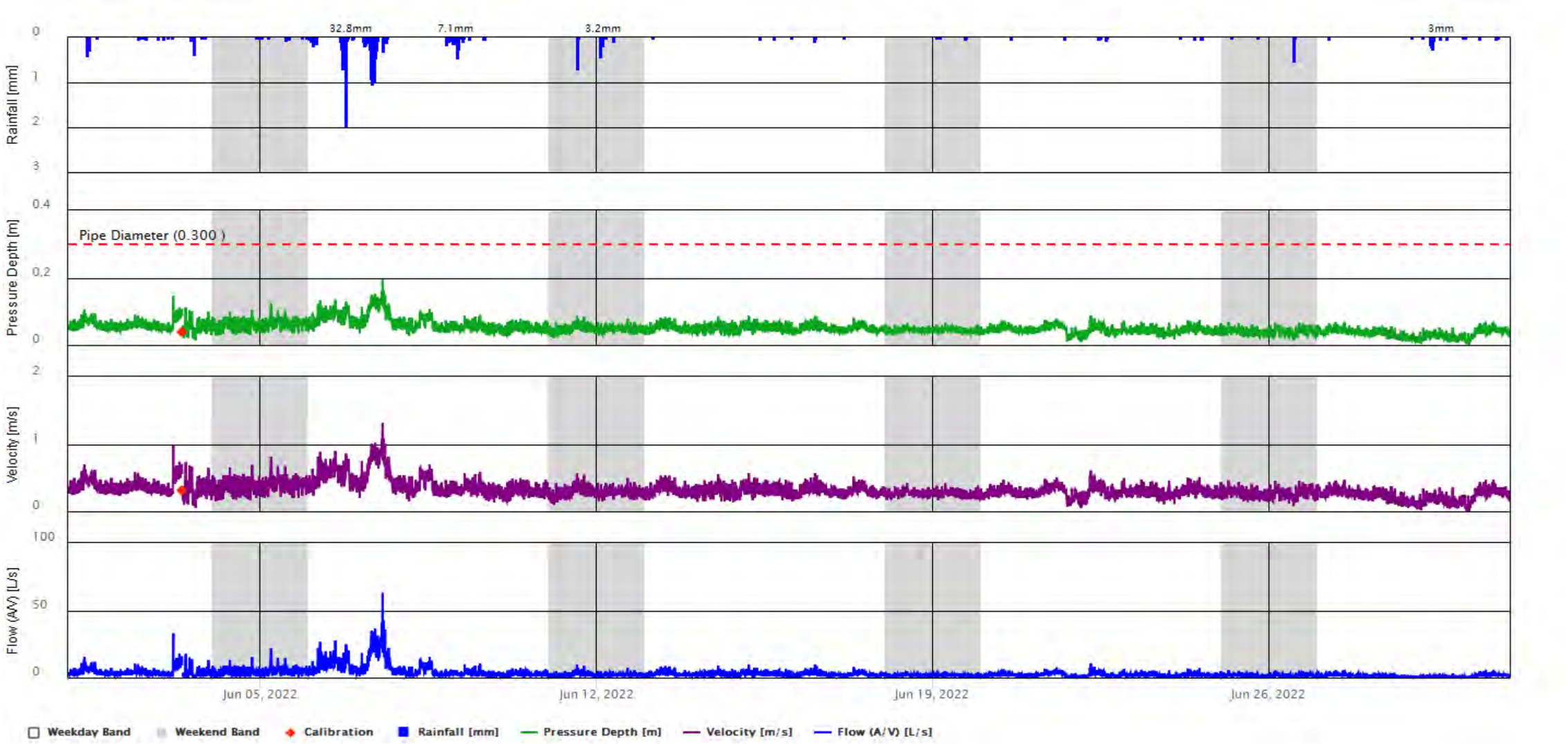
May 01, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM02**

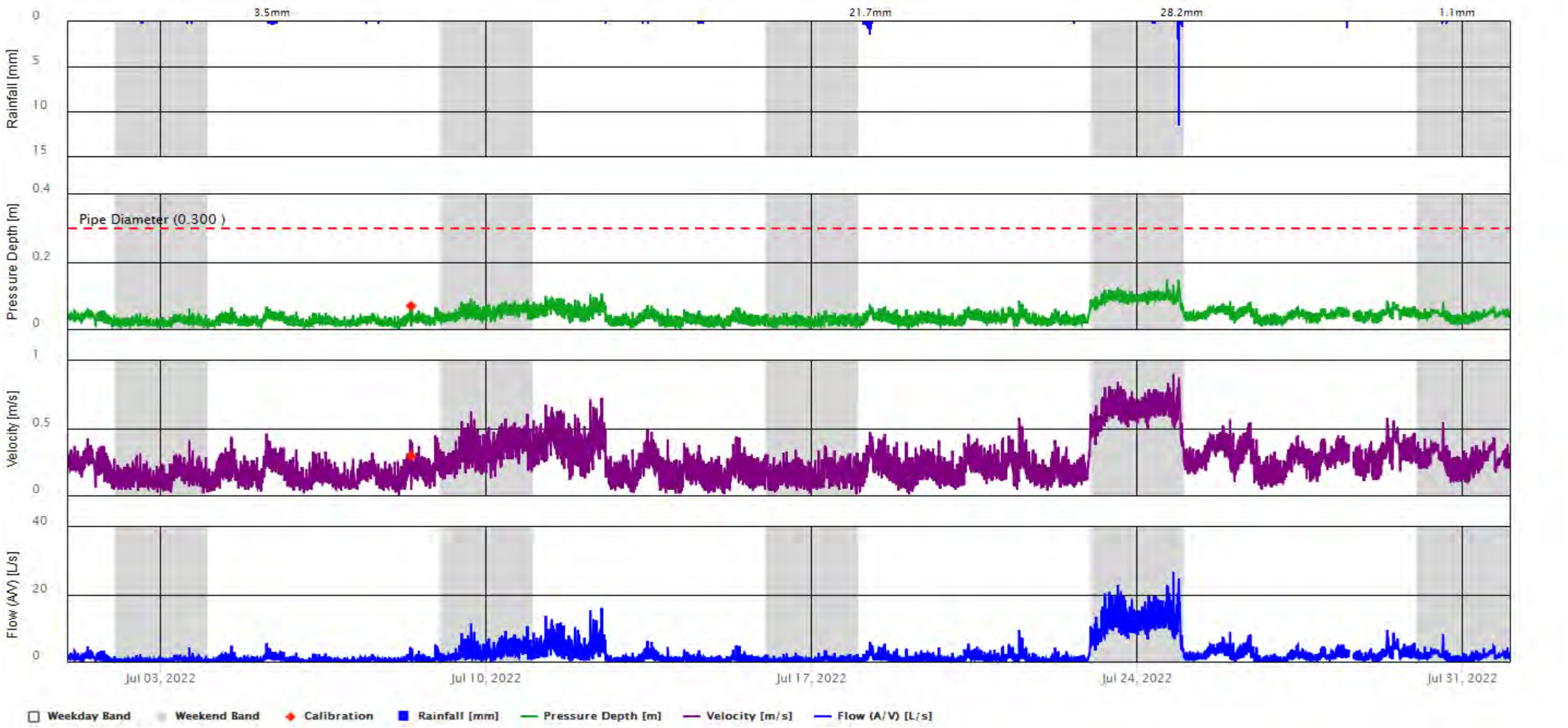
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM02**

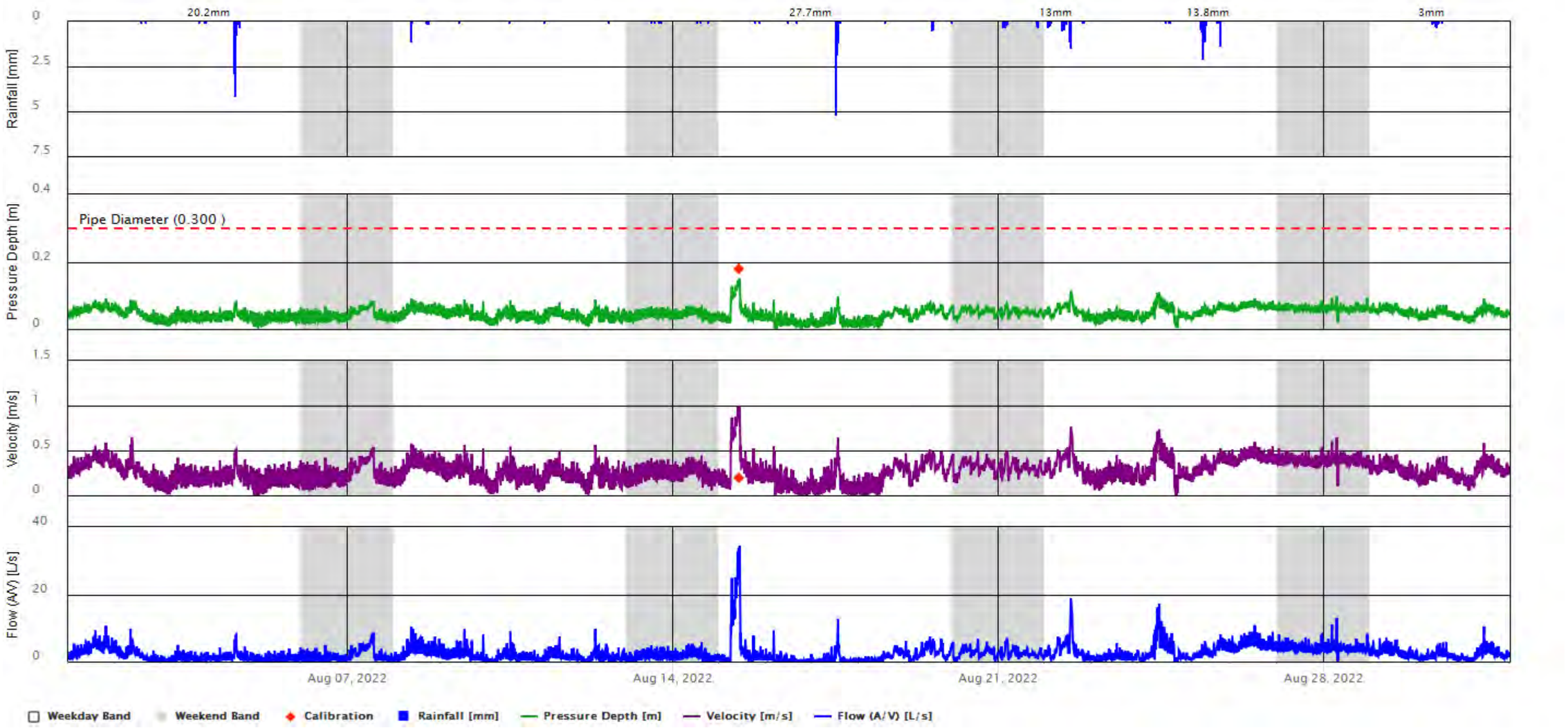
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM02**

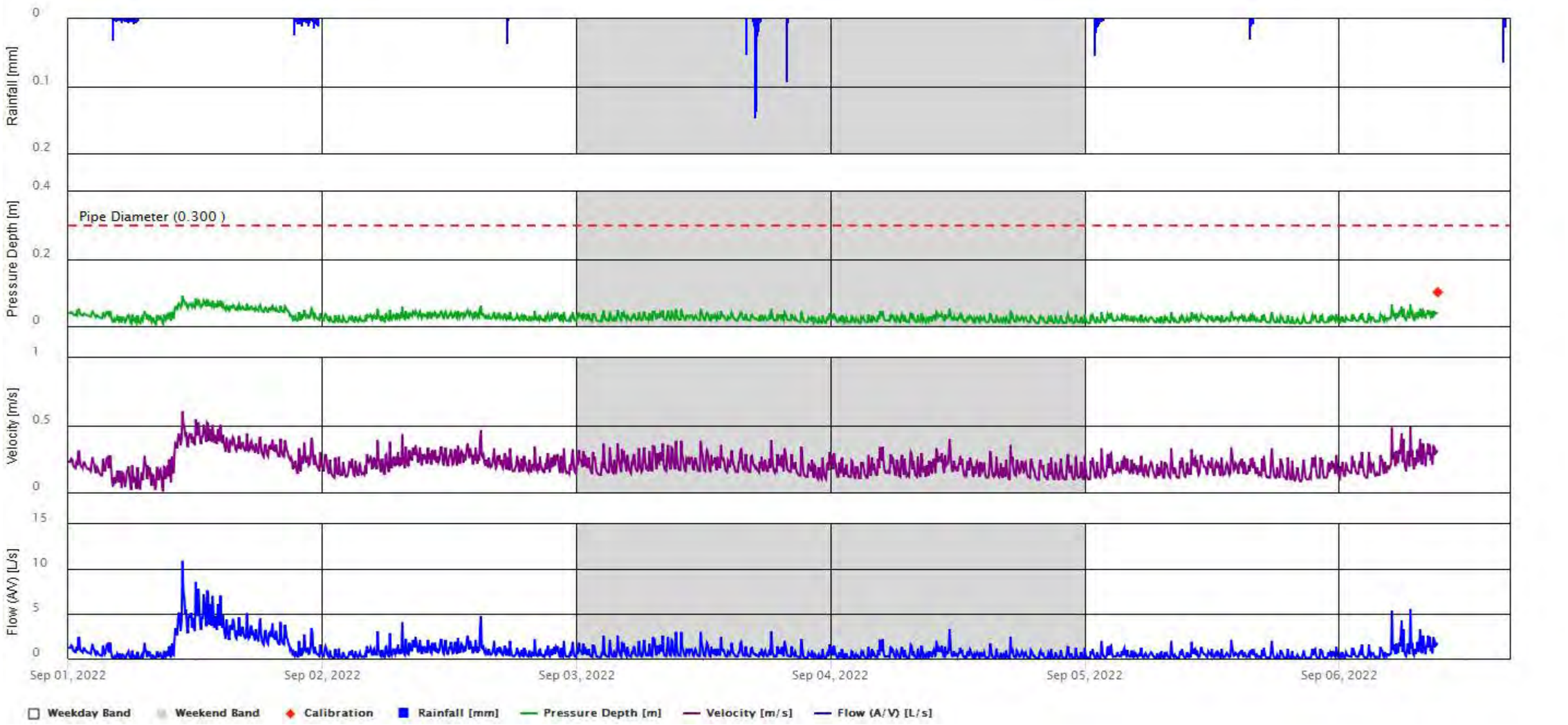
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM02**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM02**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.00 | 0.04 | 0.19 | Thu Jun 30, 2022 03:45 | Tue Jun 07, 2022 13:00 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume ($m^3$) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.00 | 2.23 | 62.87 | 30390 | Thu Jun 30, 2022 03:45 | Tue Jun 07, 2022 13:00 |

## Precipitation

| Date From | Date To | Days | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 11.44 | 302.16 | Sun Jul 24, 2022 21:05 |

## Velocity

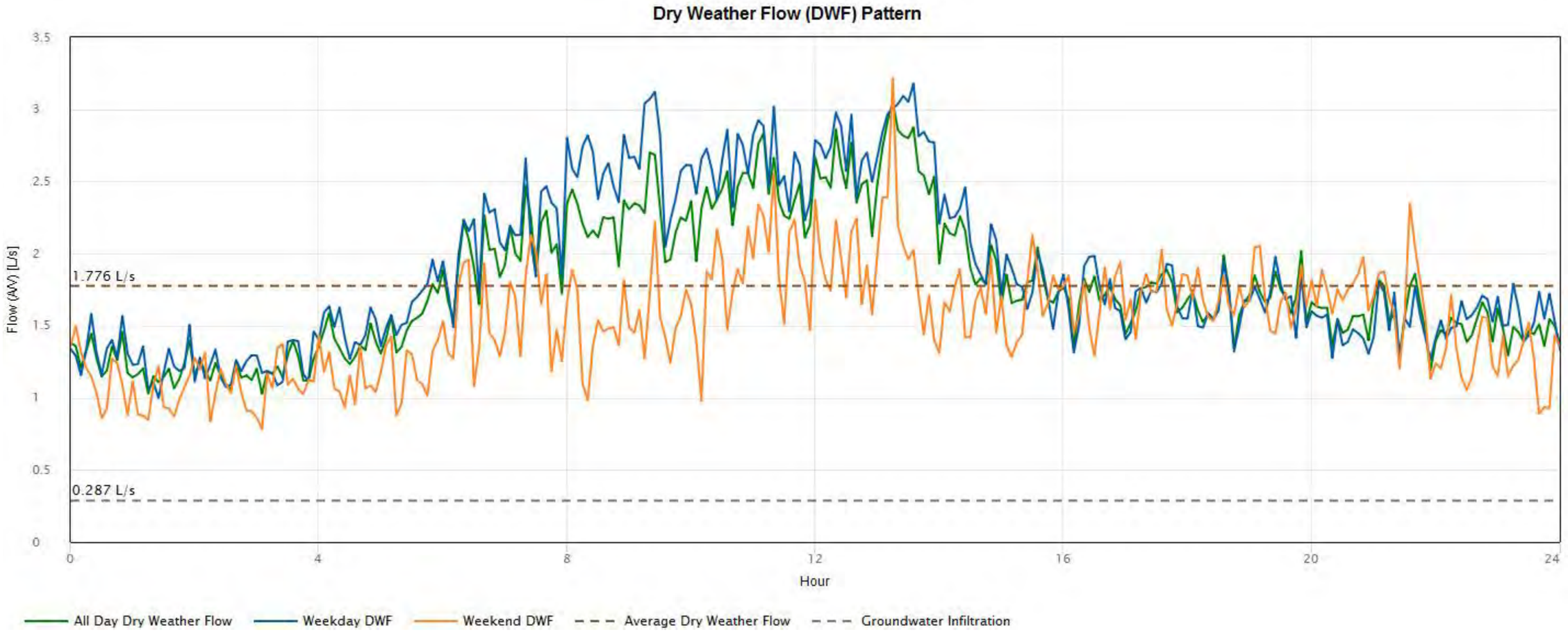
| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.00 | 0.27 | 1.31 | Thu Jun 30, 2022 03:45 | Tue Jun 07, 2022 13:00 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Sanitary Report

**Station: ARU21-FM02**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 1.776 | 74.885 | 0.338 | 7.068 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 3.980 | 0.287 | 849.507 | 16.166 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM02**

| Measured Storms | | | | | Flow KPIs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | ARU21-FM02 | | | | |
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[2] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Apr 06, 2022 | 13.18 | 43.17 | 12.70 | | Apr 07, 2022 10:10 | 101.00 | 11.21 | 13.87 | 2.66 |
| | Apr 17, 2022 | 15.59 | 37.83 | 62.50 | | Apr 19, 2022 10:25 | 83.00 | 5.87 | 8.55 | 2.69 |
| | Apr 21, 2022 | 5.52 | 5.67 | 4.10 | | Apr 21, 2022 10:25 | 112.00 | 15.03 | 17.82 | 2.79 |
| | Apr 25, 2022 | 9.46 | 20.83 | 11.80 | | Apr 26, 2022 06:55 | 115.00 | 16.33 | 18.99 | 2.67 |
| | May 03, 2022 | 17.55 | 17.50 | 7.10 | | May 04, 2022 14:50 | 79.00 | 5.69 | 7.56 | 1.87 |
| | May 14, 2022 | 12.24 | 49.00 | 52.70 | | May 16, 2022 08:05 | 73.00 | 3.11 | 6.21 | 3.10 |
| | Jun 04, 2022 | 32.78 | 65.50 | 23.60 | | Jun 07, 2022 13:00 | 192.90 | 58.40 | 62.87 | 4.47 |
| | Jun 08, 2022 | 7.09 | 19.33 | 5.60 | | Jun 09, 2022 06:00 | 105.60 | 6.59 | 10.20 | 3.19 |
| | Jul 17, 2022 | 21.71 | 27.42 | 15.40 | | Jul 18, 2022 05:45 | 69.00 | 4.81 | 5.79 | 0.98 |
| | Jul 24, 2022 | 28.23 | 15.58 | 137.30 | | Jul 24, 2022 18:25 | 146.00 | 25.48 | 26.67 | 1.18 |
| | Aug 03, 2022 | 20.19 | 21.08 | 49.90 | | Aug 04, 2022 14:40 | 81.00 | 6.23 | 7.96 | 1.72 |
| | Aug 15, 2022 | 27.70 | 44.17 | 62.00 | | Aug 15, 2022 06:30 | 150.00 | 23.35 | 12.70 | 1.48 |
| | Aug 21, 2022 | 13.04 | 28.42 | 17.40 | | Aug 22, 2022 13:30 | 114.00 | 15.56 | 18.76 | 3.20 |
| | Aug 25, 2022 | 13.77 | 10.50 | 24.90 | | Aug 26, 2022 05:20 | 82.00 | 6.44 | 8.34 | 1.40 |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

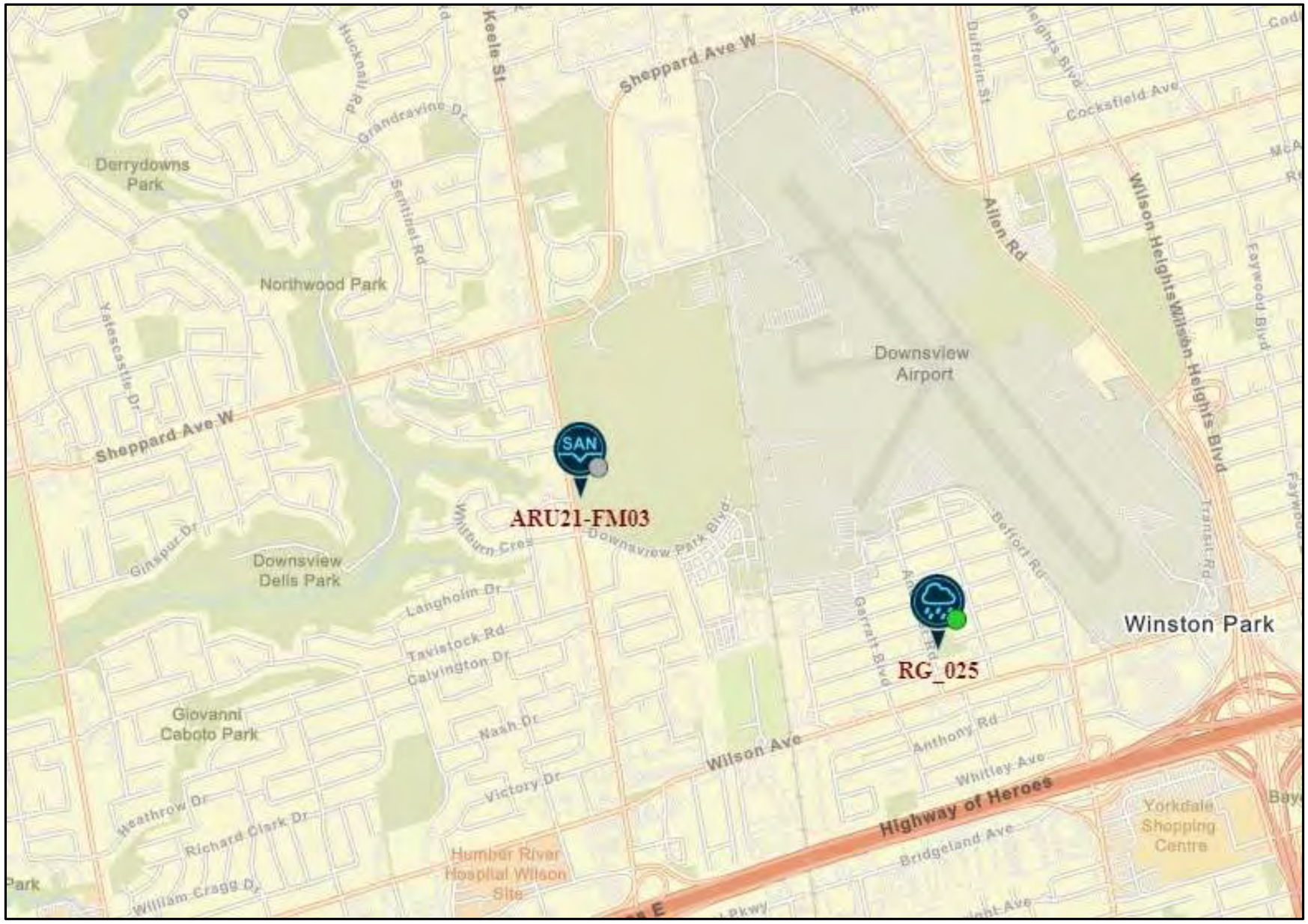
[2] Time of Measured Peak Flow may not happen at TD.

# Activity Log

**Station: ARU21-FM02**

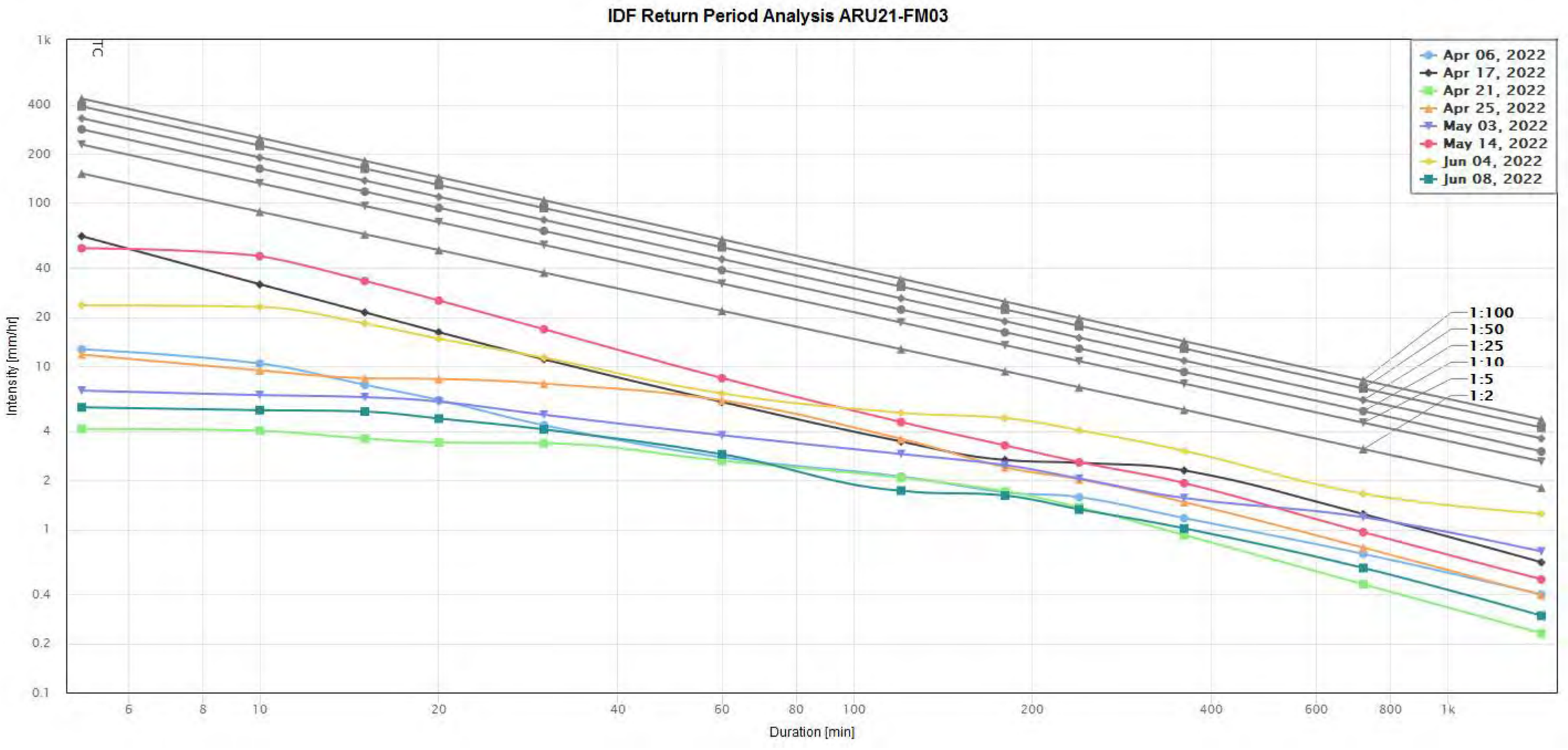
| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 01-Apr-2022 11:15:00 AM | Installation Log | Installation | NOTE : HIGH GASES BLOWER NEEEDED LOGGER INSTALLED , INTIAL MEASUREMENTS DONE, SITE CALIBRATED, LOGGER STARTED, TELEMETRY SENT , PHOTOS TAKEN, FLOW TOO LOW FOR VELOCITY PROBE | Yes |
| 03-Jun-2022 08:30:00 AM | Maintenance Log | CALIBRATION | SITE CALIBRATEED<br>DEBRIS CLEARED<br>DOWNWARD SENSOR FACING THE FLUME<br>TELEMETRY SENT<br>DATA DOWNLOADED | Yes |
| 03-Jun-2022 09:10:00 AM | Maintenance Log | CALIBRATION | DATA DOWNLOADED<br>SITE CALIBRATED<br>DEBRIS CLEARED<br>SENT TELEMETRY | Yes |
| 08-Jul-2022 09:23:00 AM | Maintenance Log | CALIBRATION | DATA DOWNLOADED. TELEMETRY SENT. MEASUREMENTS TAKEN. CSO INSTALLED. SENSOR ROTATED AS REQUESTED. DEBRIS CLEAR. CALIBRATED. | Yes |
| 15-Aug-2022 10:33:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 06-Sep-2022 09:19:00 AM | Removal Log | Removal | REMOVED ALL EQUIPMENT(LOGGER, SENSORS, RING, HARDWARE) FROM MANHOLE. **NO FUNCTIONING VELOCITY PROBE FOR MANUAL MEASUREMENT | Yes |

# Station: ARU21-FM03



# IDF Analysis

**Station: ARU21-FM03**



# IDF Analysis

**Station: ARU21-FM03**

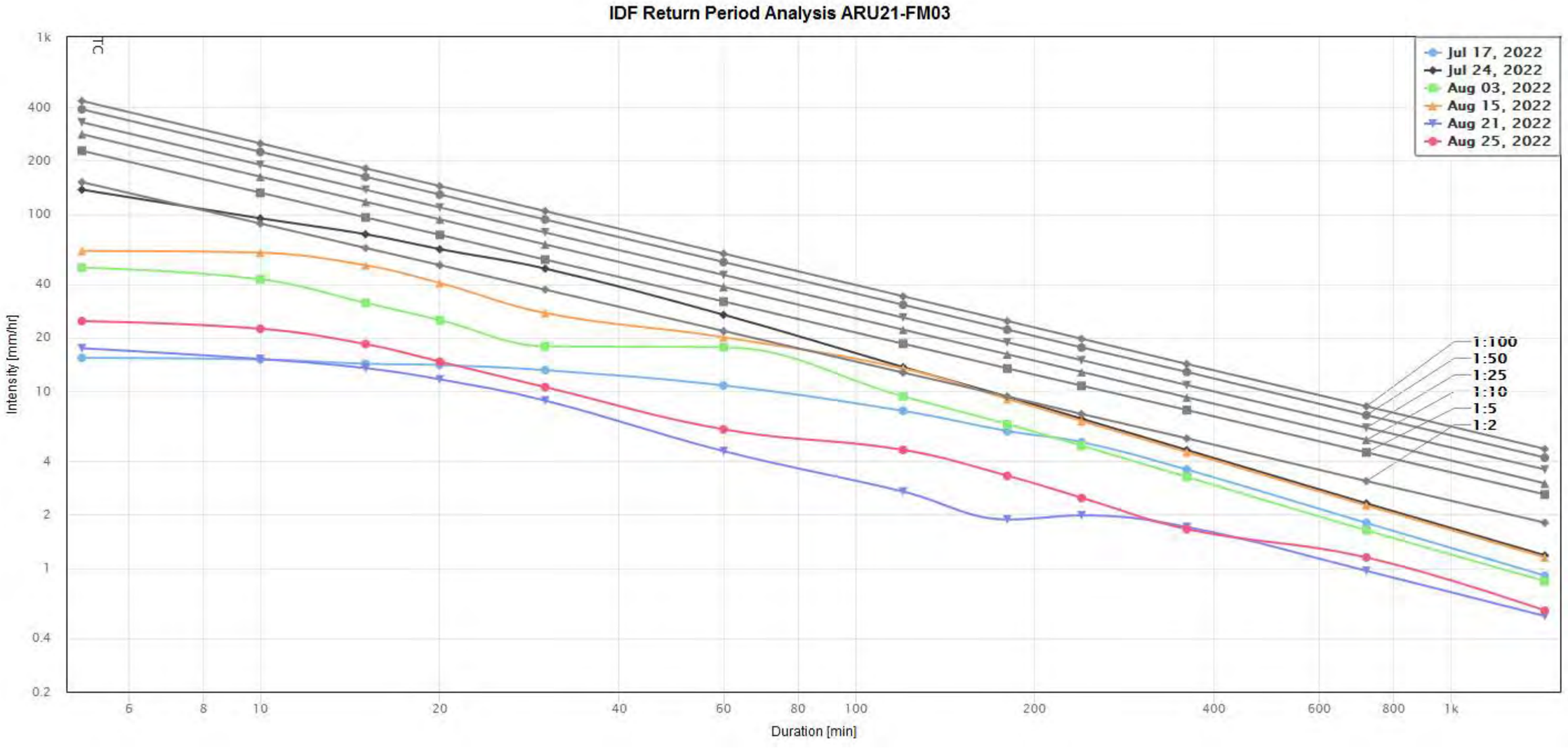


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

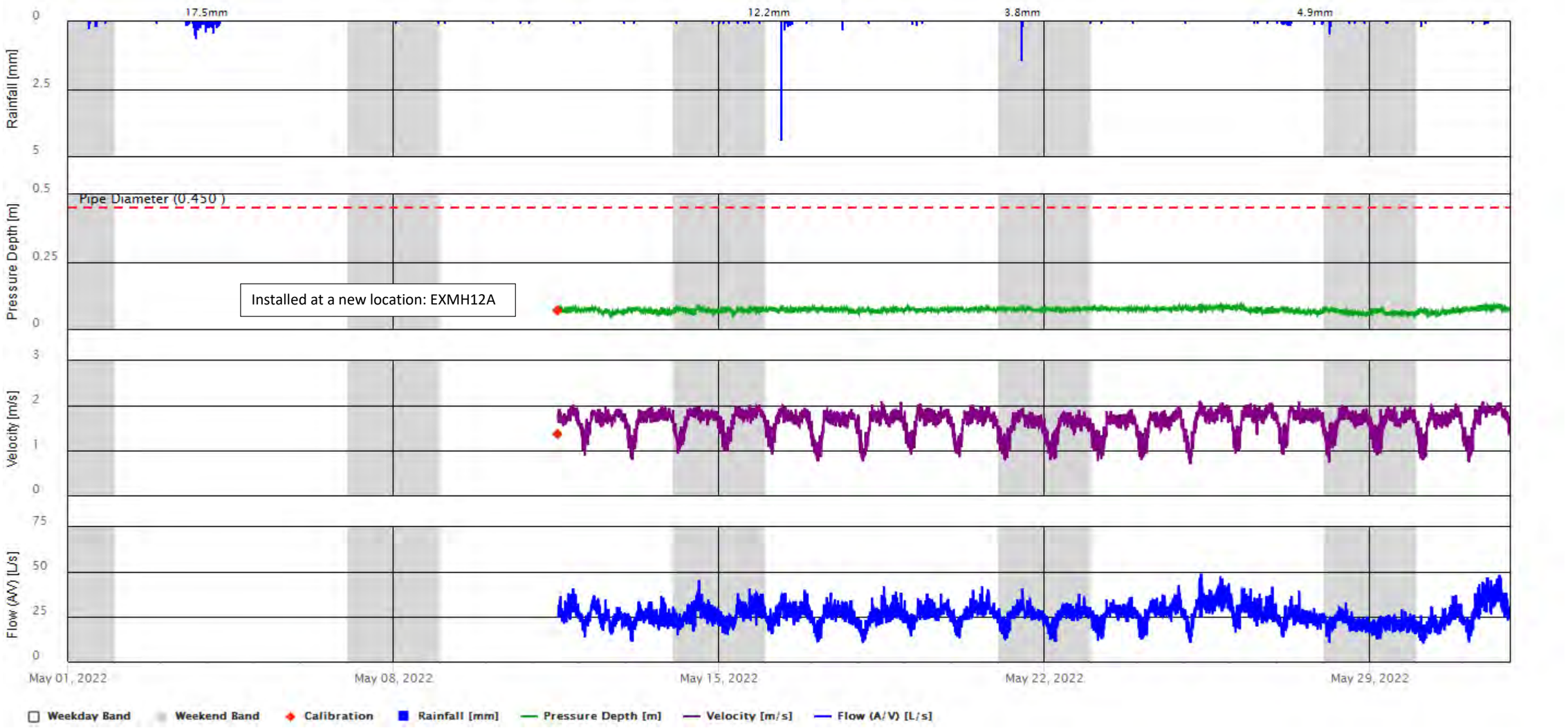
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Apr 06, 2022 | 43.17 | < 2 Yr | 13.19 | 12.70 | 10.36 | 7.67 | 6.19 | 4.34 | 2.76 | 2.11 | 1.68 | 1.57 | 1.17 | 0.71 | 0.40 |
| Apr 17, 2022 | 37.83 | < 2 Yr | 15.59 | 62.54 | 31.66 | 21.32 | 16.11 | 11.01 | 6.02 | 3.45 | 2.66 | 2.55 | 2.29 | 1.24 | 0.63 |
| Apr 21, 2022 | 5.67 | < 2 Yr | 5.53 | 4.13 | 4.03 | 3.60 | 3.41 | 3.37 | 2.63 | 2.07 | 1.70 | 1.36 | 0.92 | 0.46 | 0.23 |
| Apr 25, 2022 | 20.83 | < 2 Yr | 9.46 | 11.78 | 9.41 | 8.44 | 8.33 | 7.81 | 6.16 | 3.58 | 2.39 | 2.02 | 1.47 | 0.77 | 0.39 |
| May 03, 2022 | 17.50 | < 2 Yr | 17.55 | 7.08 | 6.64 | 6.46 | 6.06 | 5.04 | 3.77 | 2.89 | 2.47 | 2.04 | 1.55 | 1.19 | 0.73 |
| May 14, 2022 | 49.00 | < 2 Yr | 12.24 | 52.73 | 47.27 | 33.29 | 25.21 | 16.84 | 8.43 | 4.54 | 3.26 | 2.57 | 1.92 | 0.96 | 0.49 |
| Jun 04, 2022 | 65.50 | < 2 Yr | 32.78 | 23.60 | 23.08 | 18.25 | 14.69 | 11.27 | 6.79 | 5.17 | 4.80 | 4.04 | 3.02 | 1.65 | 1.25 |
| Jun 08, 2022 | 19.33 | < 2 Yr | 7.09 | 5.59 | 5.37 | 5.27 | 4.77 | 4.09 | 2.88 | 1.73 | 1.61 | 1.32 | 1.01 | 0.58 | 0.30 |
| Jul 17, 2022 | 27.42 | < 2 Yr | 21.71 | 15.40 | 15.09 | 14.26 | 14.04 | 13.12 | 10.75 | 7.72 | 5.93 | 5.13 | 3.59 | 1.80 | 0.90 |
| Jul 24, 2022 | 15.58 | < 2 Yr | 28.23 | 137.33 | 94.43 | 76.86 | 63.25 | 49.19 | 26.92 | 13.63 | 9.27 | 6.95 | 4.63 | 2.32 | 1.18 |
| Aug 03, 2022 | 21.08 | < 2 Yr | 20.19 | 49.86 | 42.76 | 31.47 | 25.14 | 17.90 | 17.67 | 9.32 | 6.49 | 4.89 | 3.26 | 1.63 | 0.84 |
| Aug 15, 2022 | 44.17 | < 2 Yr | 27.70 | 61.96 | 60.60 | 51.34 | 40.73 | 27.60 | 20.12 | 13.40 | 9.00 | 6.75 | 4.50 | 2.25 | 1.15 |
| Aug 21, 2022 | 28.42 | < 2 Yr | 13.04 | 17.45 | 15.17 | 13.46 | 11.63 | 8.83 | 4.57 | 2.70 | 1.88 | 1.98 | 1.70 | 0.96 | 0.53 |
| Aug 25, 2022 | 10.50 | < 2 Yr | 13.77 | 24.86 | 22.48 | 18.41 | 14.63 | 10.52 | 6.06 | 4.65 | 3.31 | 2.49 | 1.66 | 1.15 | 0.57 |

# Data Chart

**Station: ARU21-FM03**

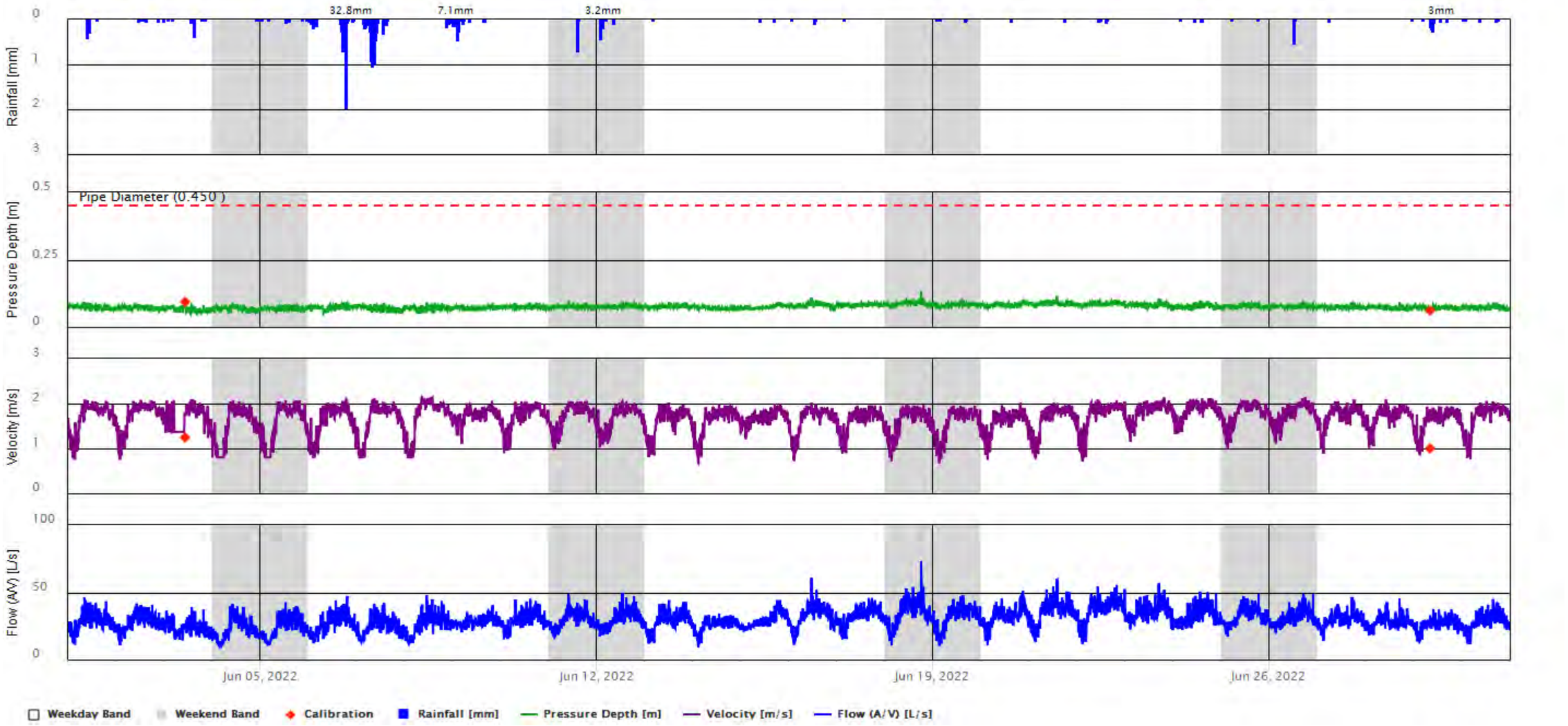
May 01, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM03**

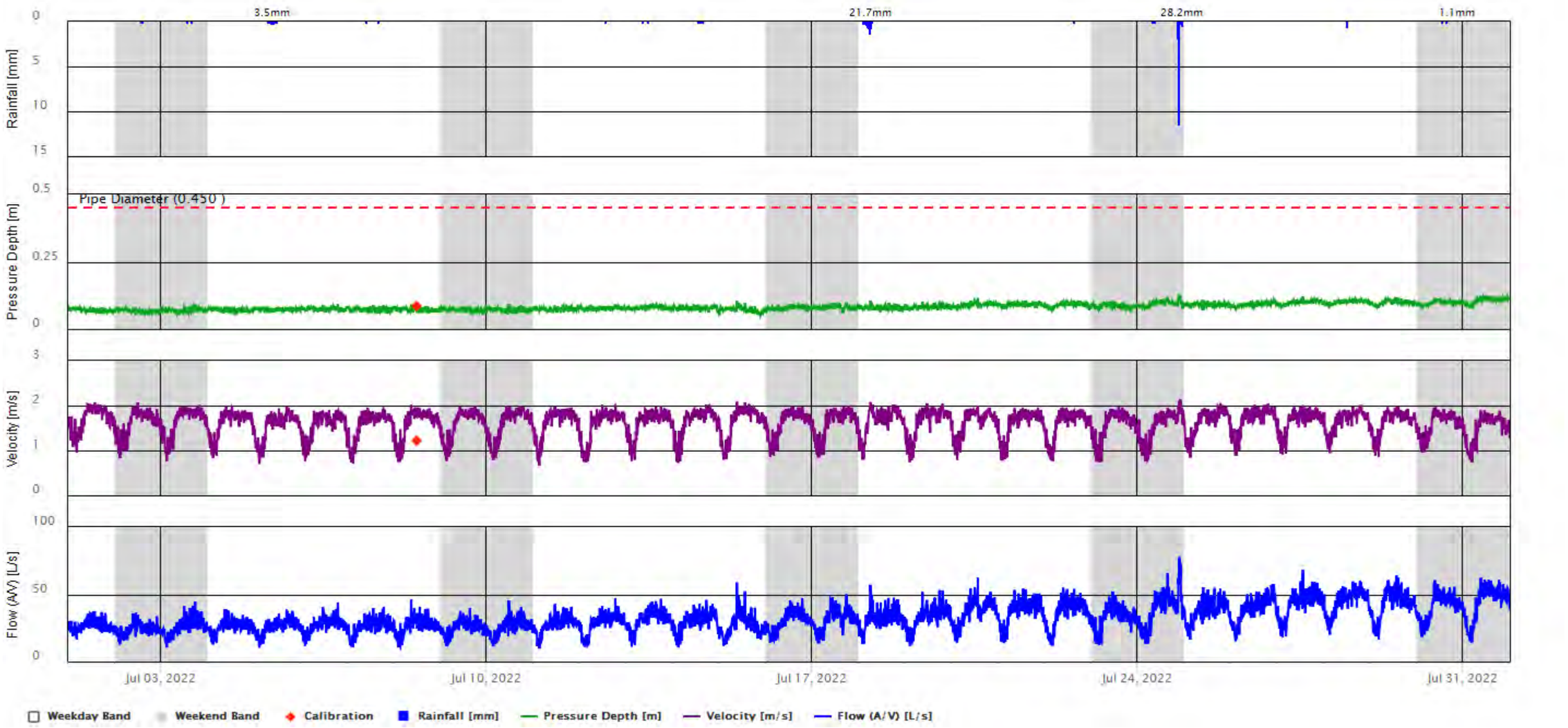
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM03**

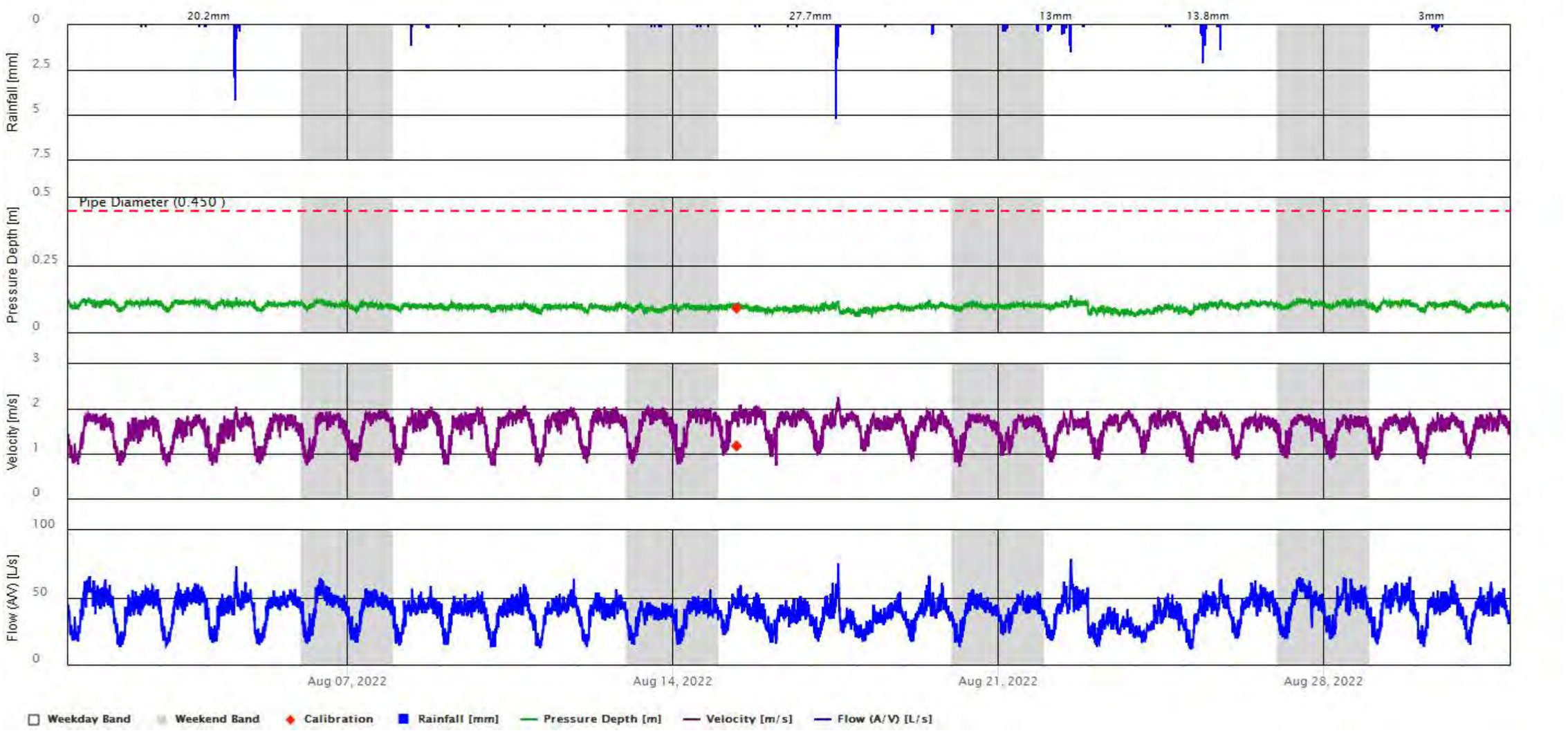
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM03**

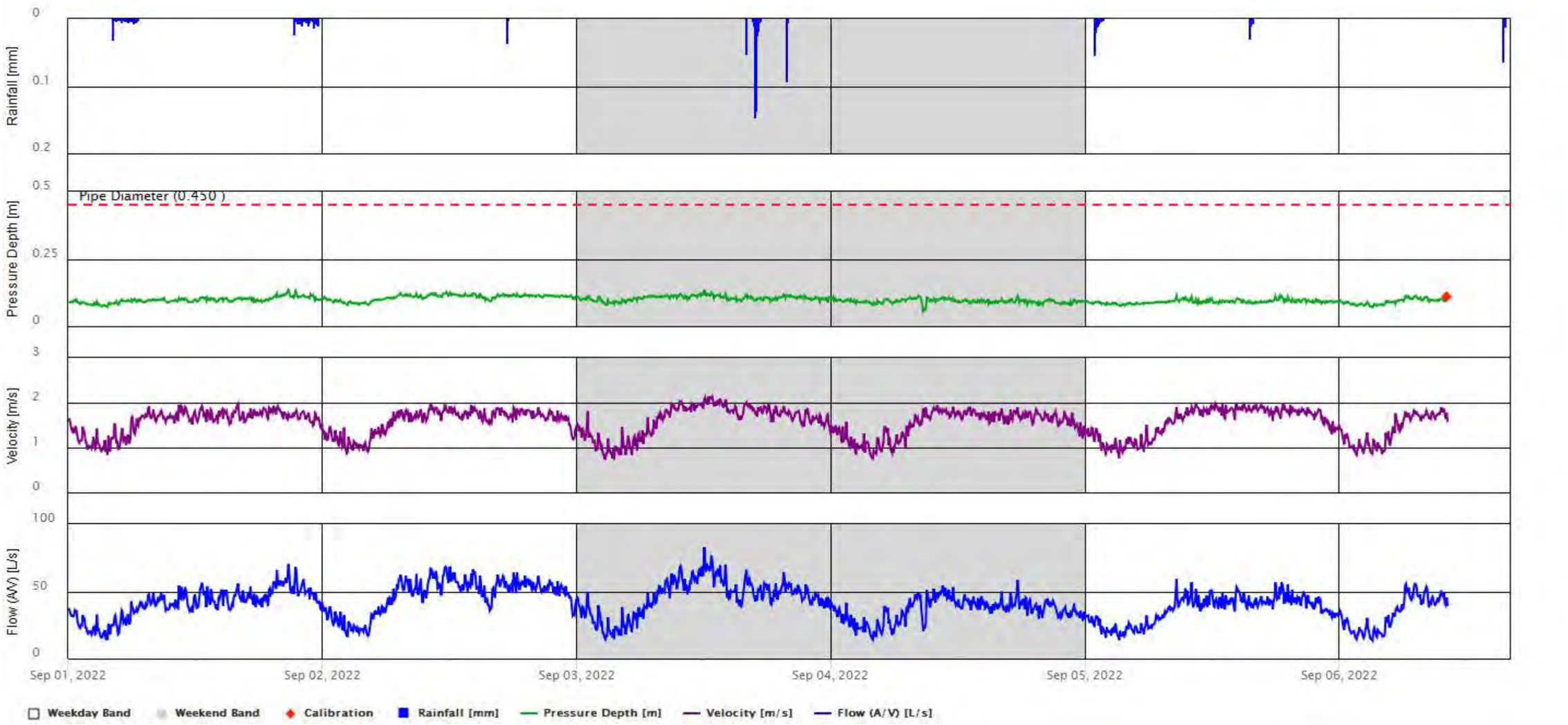
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM03**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM03**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 119 | 0.05 | 0.08 | 0.14 | Thu May 12, 2022 15:50 | Mon Aug 22, 2022 13:35 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume ($m^3$) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 119 | 9.33 | 32.65 | 82.89 | 332570 | Tue Jun 14, 2022 02:50 | Sat Sep 03, 2022 12:00 |

## Precipitation

| Date From | Date To | Days | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 11.44 | 302.16 | Sun Jul 24, 2022 21:05 |

## Velocity

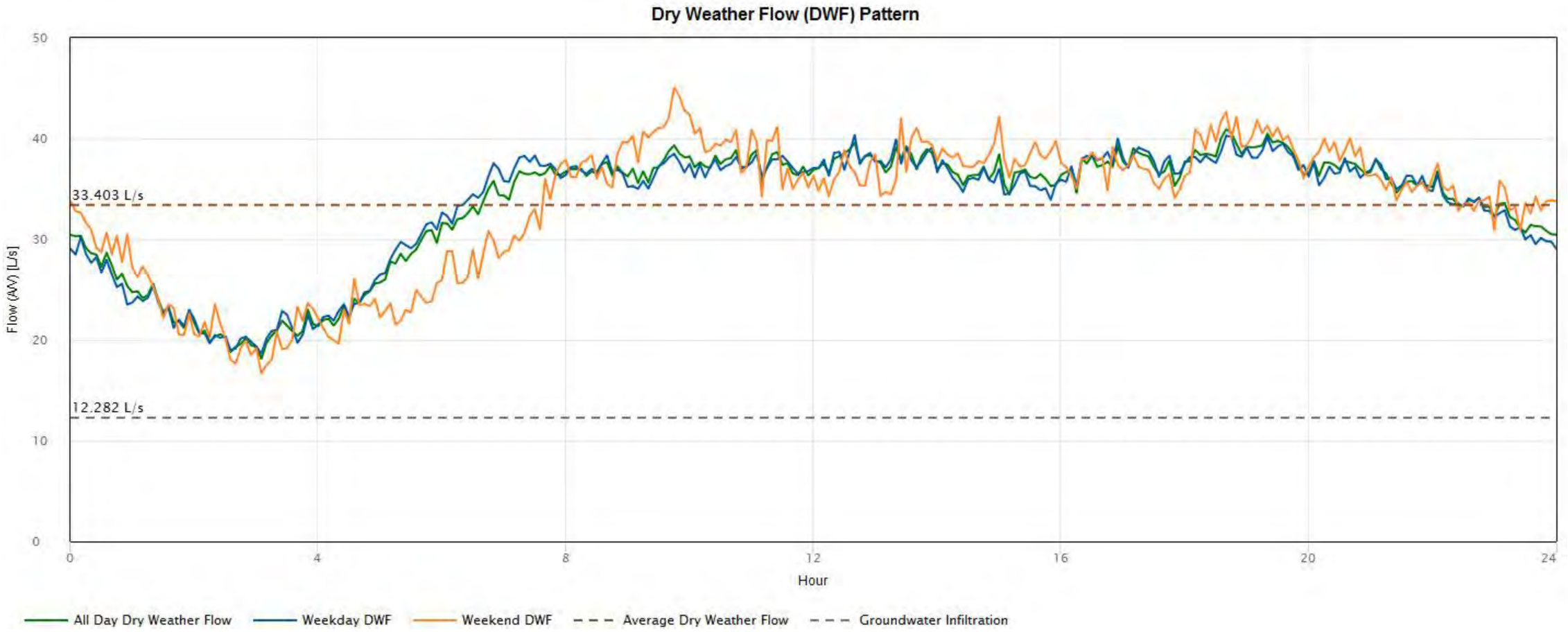
| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 119 | 0.66 | 1.61 | 2.26 | Mon Jul 11, 2022 03:10 | Wed Aug 17, 2022 13:25 |

[1] Time of Min and Time of Max will be displayed by first occurrence.

# Sanitary Report

**Station: ARU21-FM03**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 33.403 | 435.292 | 14.450 | 51.646 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 1.546 | 12.282 | 3,815.860 | 36.770 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM03**

| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | ARU21-FM03 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[2] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| Measured Storms | May 14, 2022 | 12.24 | 49.00 | 52.70 | Flow KPIs | May 15, 2022 21:20 | 91.00 | 13.90 | 40.64 | 23.81 |
| | Jun 04, 2022 | 32.78 | 65.50 | 23.60 | | Jun 06, 2022 19:20 | 91.00 | 14.12 | 47.29 | 33.18 |
| | Jun 08, 2022 | 7.09 | 19.33 | 5.60 | | Jun 09, 2022 02:45 | 91.00 | 13.40 | 40.46 | 15.11 |
| | Jul 17, 2022 | 21.71 | 27.42 | 15.40 | | Jul 18, 2022 05:55 | 105.00 | 24.84 | 57.01 | 32.16 |
| | Jul 24, 2022 | 28.23 | 15.58 | 137.30 | | Jul 24, 2022 21:30 | 127.00 | 34.07 | 77.61 | 43.54 |
| | Aug 03, 2022 | 20.19 | 21.08 | 49.90 | | Aug 04, 2022 14:45 | 128.00 | 25.87 | 72.77 | 46.90 |
| | Aug 15, 2022 | 27.70 | 44.17 | 62.00 | | Aug 17, 2022 13:25 | 118.00 | 33.99 | 75.12 | 41.13 |
| | Aug 21, 2022 | 13.04 | 28.42 | 17.40 | | Aug 22, 2022 13:35 | 137.00 | 37.68 | 78.37 | 40.69 |
| | Aug 25, 2022 | 13.77 | 10.50 | 24.90 | | Aug 25, 2022 19:10 | 118.00 | 20.16 | 62.93 | 42.78 |

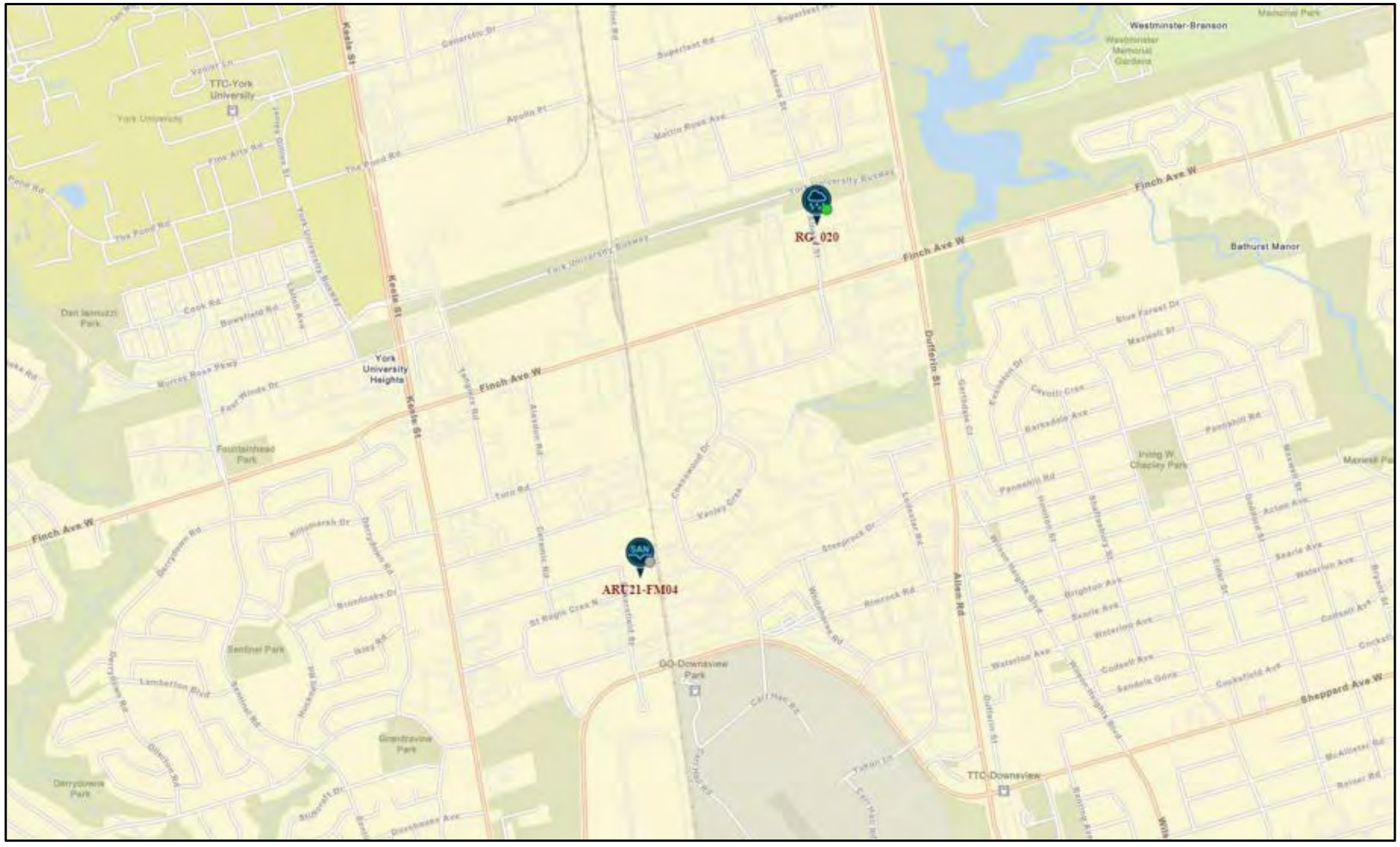
[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours
[2] Time of Measured Peak Flow may not happen at TD.

# Activity Log

**Station: ARU21-FM03**

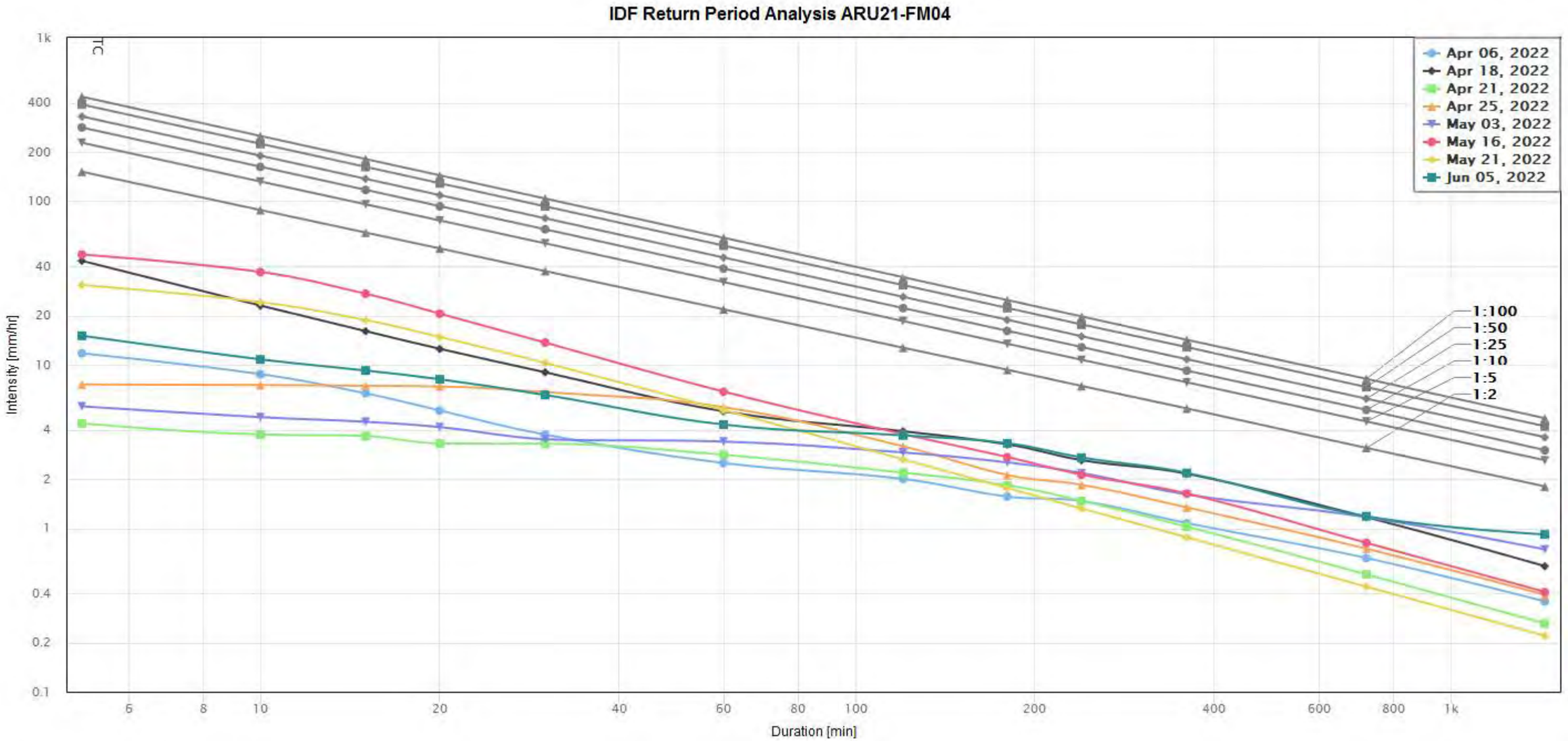
| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 11-May-2022 12:35:00 PM | Installation Log | INSTALLATION | | Yes |
| 03-Jun-2022 10:24:00 AM | Maintenance Log | CALIBRATION | DATA DOWNLOADED<br>SIE CALIBRATED<br>DEBRIS CLEARED<br>SENT TELEMETRY | Yes |
| 29-Jun-2022 08:16:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 08-Jul-2022 12:18:00 PM | Maintenance Log | CALIBRATION | DATA DOWNLOADED. TELEMETRY SENT. DEBRIS CLEARED. SITE CALIBRATED. PICTURES TAKEN. | Yes |
| 15-Aug-2022 09:27:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 15-Aug-2022 09:27:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 06-Sep-2022 10:07:00 AM | Removal Log | Removal | REMOVED ALL EQUIPMENT(LOGGER, SENSORS, RING, HARDWARE) FROM MANHOLE. **NO FUNCTIONING VELOCITY PROBE FOR MANUAL MEASUREMENT | Yes |

# Station: ARU21-FM04



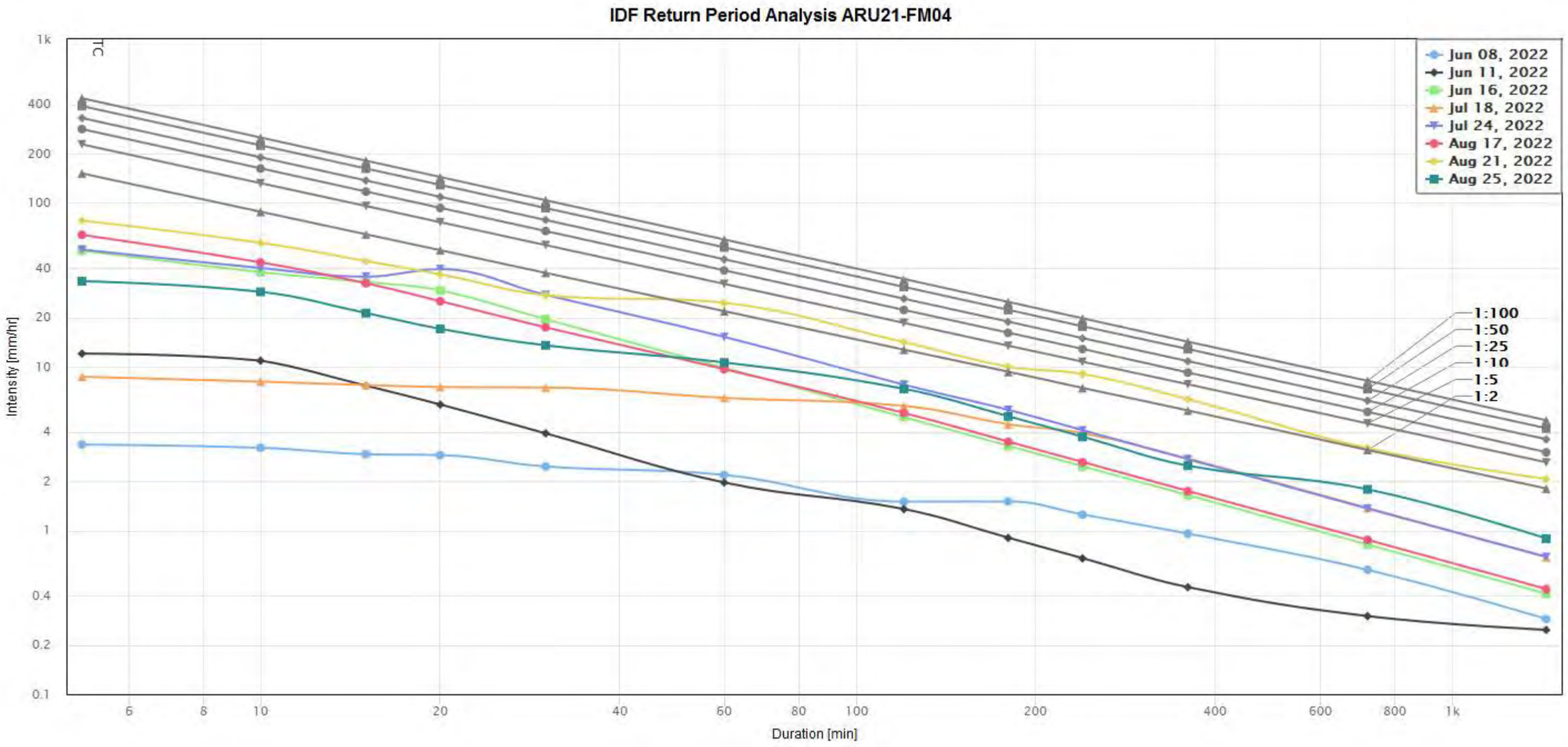
# IDF Analysis

**Station: ARU21-FM04**



# IDF Analysis

**Station: ARU21-FM04**



# IDF Analysis

**Station: ARU21-FM04**

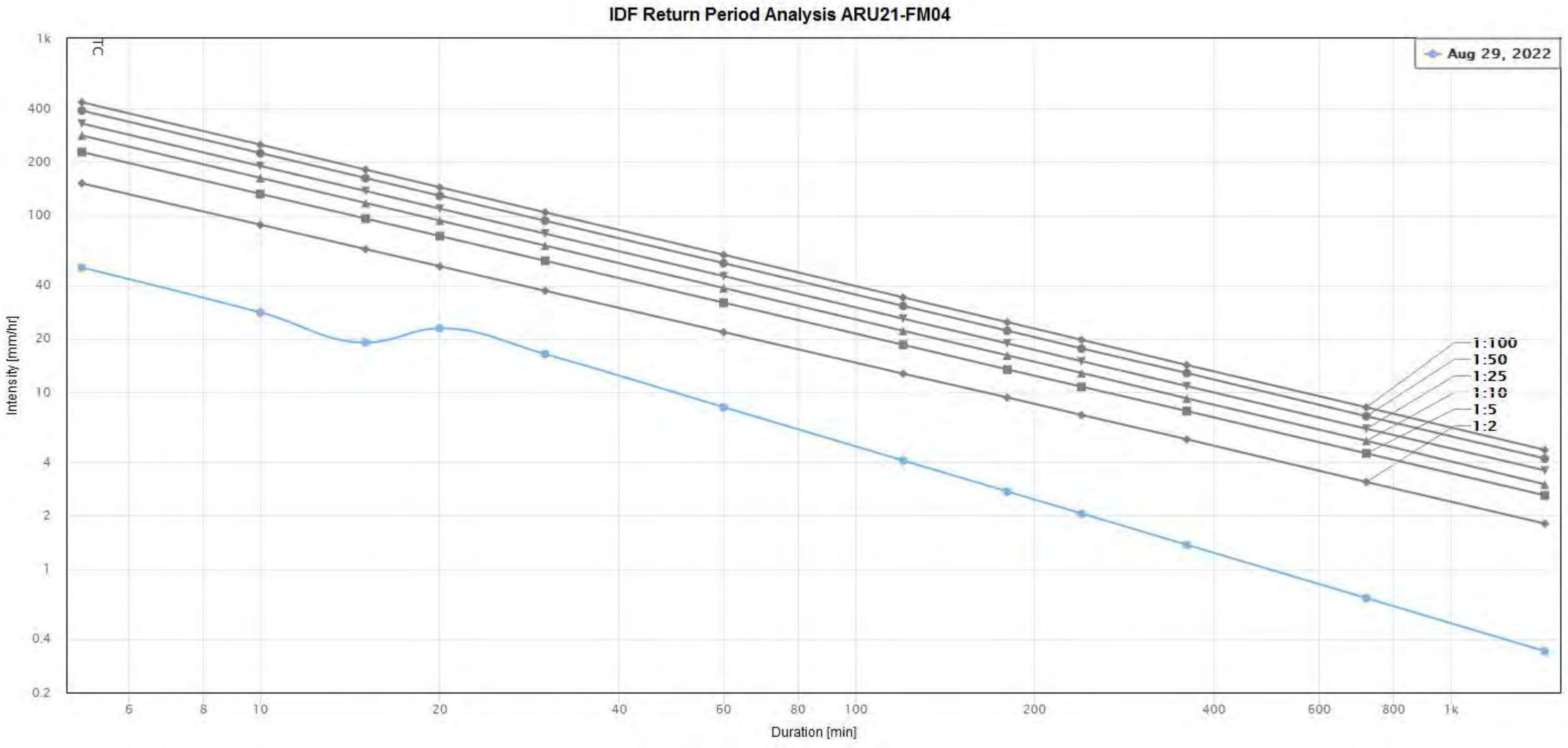


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

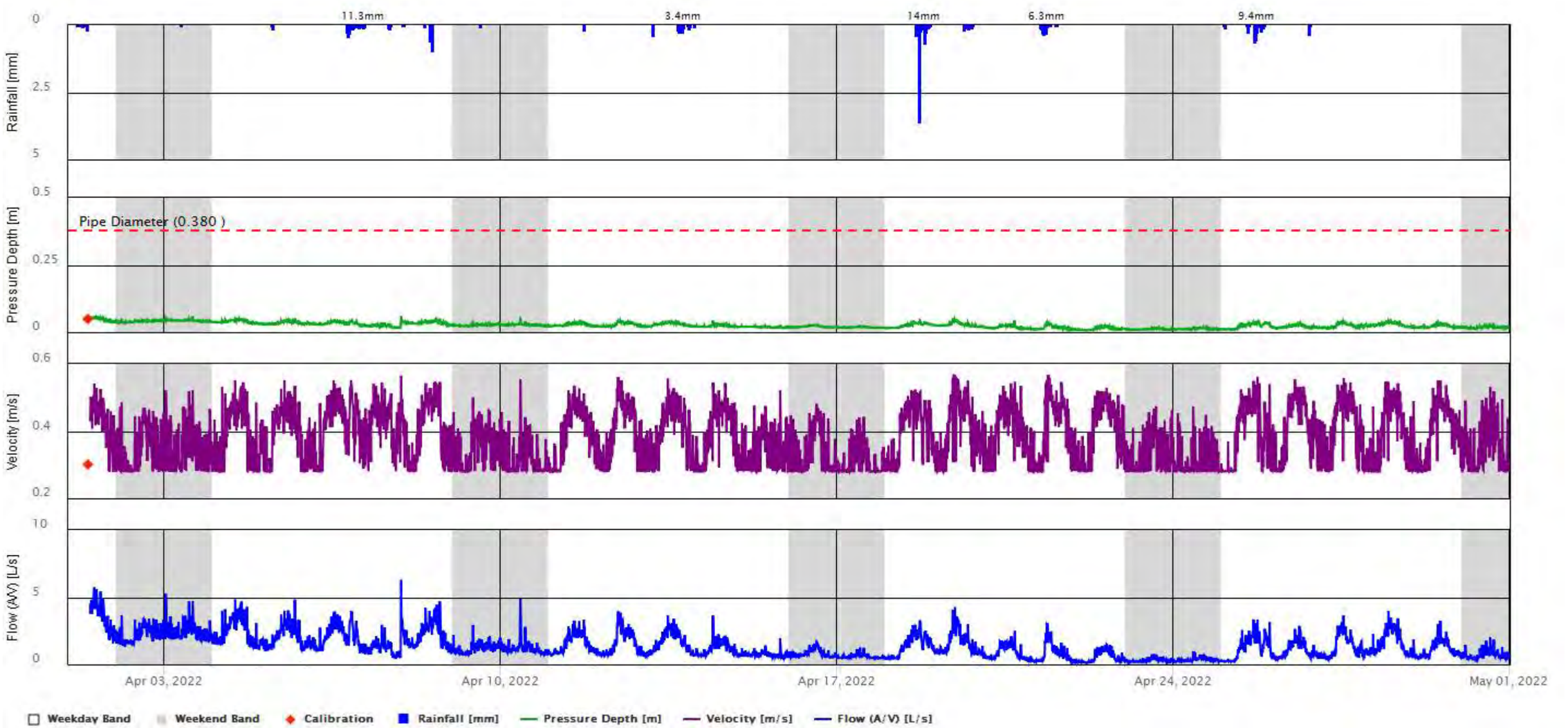
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Apr 06, 2022 | 43.00 | < 2 Yr | 11.34 | 11.76 | 8.75 | 6.68 | 5.24 | 3.74 | 2.51 | 2.00 | 1.56 | 1.46 | 1.07 | 0.66 | 0.36 |
| Apr 18, 2022 | 11.42 | < 2 Yr | 14.04 | 43.20 | 22.97 | 16.04 | 12.50 | 9.00 | 5.19 | 3.92 | 3.26 | 2.60 | 2.15 | 1.17 | 0.59 |
| Apr 21, 2022 | 8.08 | < 2 Yr | 6.27 | 4.38 | 3.75 | 3.67 | 3.30 | 3.29 | 2.81 | 2.19 | 1.83 | 1.47 | 1.02 | 0.52 | 0.26 |
| Apr 25, 2022 | 20.83 | < 2 Yr | 9.39 | 7.58 | 7.52 | 7.44 | 7.36 | 6.81 | 5.50 | 3.17 | 2.11 | 1.84 | 1.34 | 0.75 | 0.39 |
| May 03, 2022 | 17.58 | < 2 Yr | 17.81 | 5.57 | 4.78 | 4.48 | 4.15 | 3.50 | 3.39 | 2.91 | 2.53 | 2.17 | 1.61 | 1.17 | 0.74 |
| May 16, 2022 | 5.67 | < 2 Yr | 9.77 | 47.26 | 36.92 | 27.17 | 20.50 | 13.67 | 6.83 | 3.76 | 2.72 | 2.12 | 1.63 | 0.81 | 0.41 |
| May 21, 2022 | 0.83 | < 2 Yr | 5.27 | 30.77 | 24.15 | 18.76 | 14.78 | 10.27 | 5.27 | 2.64 | 1.76 | 1.32 | 0.88 | 0.44 | 0.22 |
| Jun 05, 2022 | 36.42 | < 2 Yr | 23.62 | 15.05 | 10.78 | 9.22 | 8.15 | 6.54 | 4.30 | 3.70 | 3.31 | 2.71 | 2.18 | 1.18 | 0.92 |
| Jun 08, 2022 | 12.00 | < 2 Yr | 6.90 | 3.35 | 3.20 | 2.92 | 2.88 | 2.46 | 2.18 | 1.50 | 1.51 | 1.25 | 0.96 | 0.57 | 0.29 |
| Jun 11, 2022 | 19.33 | < 2 Yr | 5.92 | 12.02 | 10.88 | 7.65 | 5.87 | 3.92 | 1.96 | 1.35 | 0.90 | 0.68 | 0.45 | 0.30 | 0.25 |
| Jun 16, 2022 | 0.58 | < 2 Yr | 9.83 | 51.11 | 37.77 | 32.88 | 29.17 | 19.50 | 9.83 | 4.92 | 3.28 | 2.46 | 1.64 | 0.82 | 0.41 |
| Jul 18, 2022 | 5.75 | < 2 Yr | 16.45 | 8.69 | 8.11 | 7.73 | 7.51 | 7.46 | 6.45 | 5.76 | 4.45 | 3.92 | 2.74 | 1.37 | 0.69 |
| Jul 24, 2022 | 14.58 | < 2 Yr | 16.52 | 51.91 | 40.03 | 35.48 | 39.42 | 27.44 | 15.16 | 7.76 | 5.44 | 4.08 | 2.72 | 1.36 | 0.69 |
| Aug 17, 2022 | 10.75 | < 2 Yr | 10.51 | 63.85 | 43.30 | 32.29 | 25.11 | 17.39 | 9.65 | 5.21 | 3.48 | 2.61 | 1.74 | 0.88 | 0.44 |
| Aug 21, 2022 | 28.50 | < 2 Yr | 49.43 | 78.08 | 57.04 | 44.15 | 36.59 | 27.38 | 24.52 | 14.12 | 9.99 | 9.01 | 6.33 | 3.18 | 2.06 |
| Aug 25, 2022 | 10.25 | < 2 Yr | 21.38 | 33.31 | 28.63 | 21.26 | 17.02 | 13.51 | 10.60 | 7.32 | 4.97 | 3.73 | 2.48 | 1.78 | 0.89 |
| Aug 29, 2022 | 0.42 | < 2 Yr | 8.20 | 50.60 | 28.16 | 19.06 | 22.95 | 16.40 | 8.20 | 4.10 | 2.73 | 2.05 | 1.37 | 0.68 | 0.34 |

# Data Chart

**Station: ARU21-FM04**

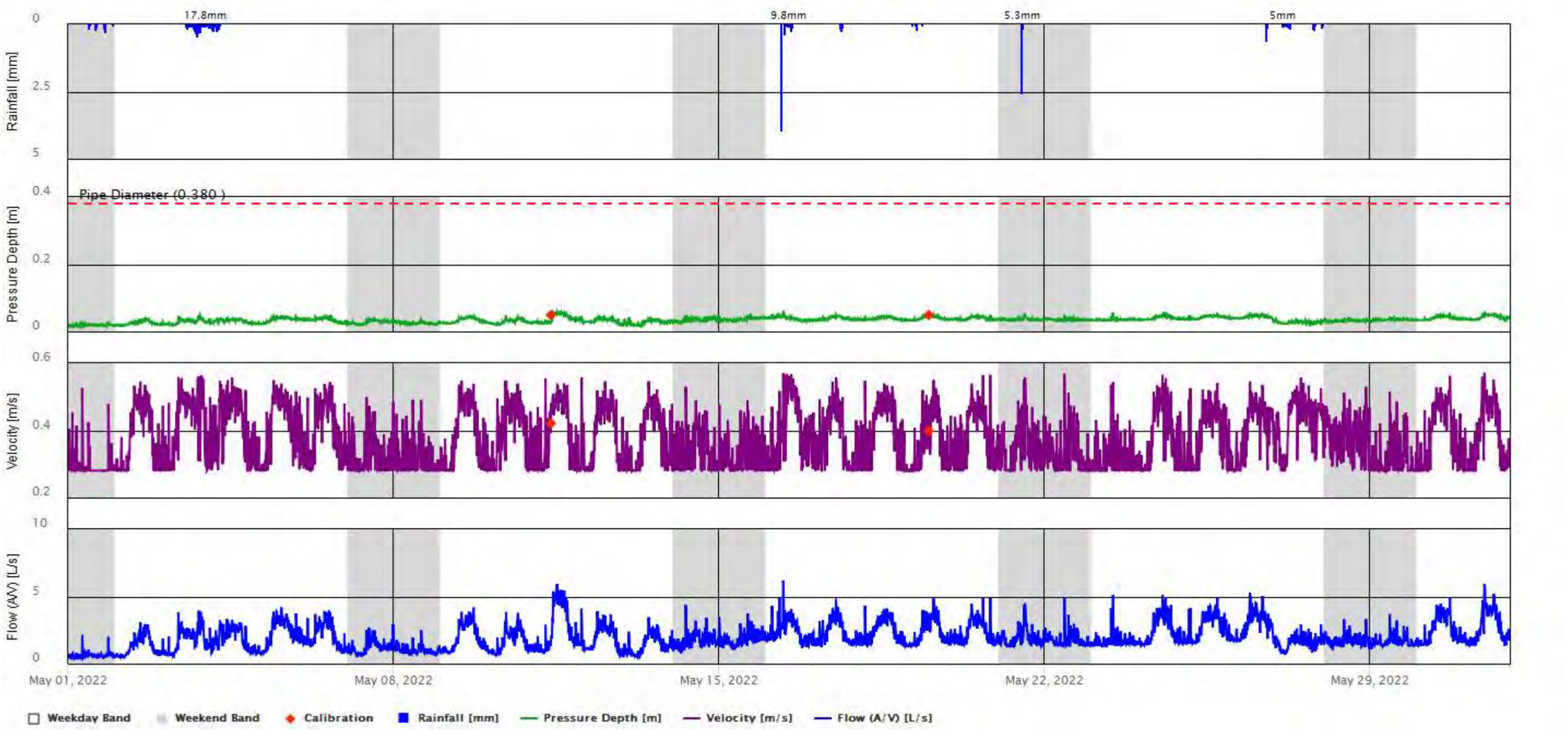
Apr 01, 2022 – Apr 30, 2022



# Data Chart

**Station: ARU21-FM04**

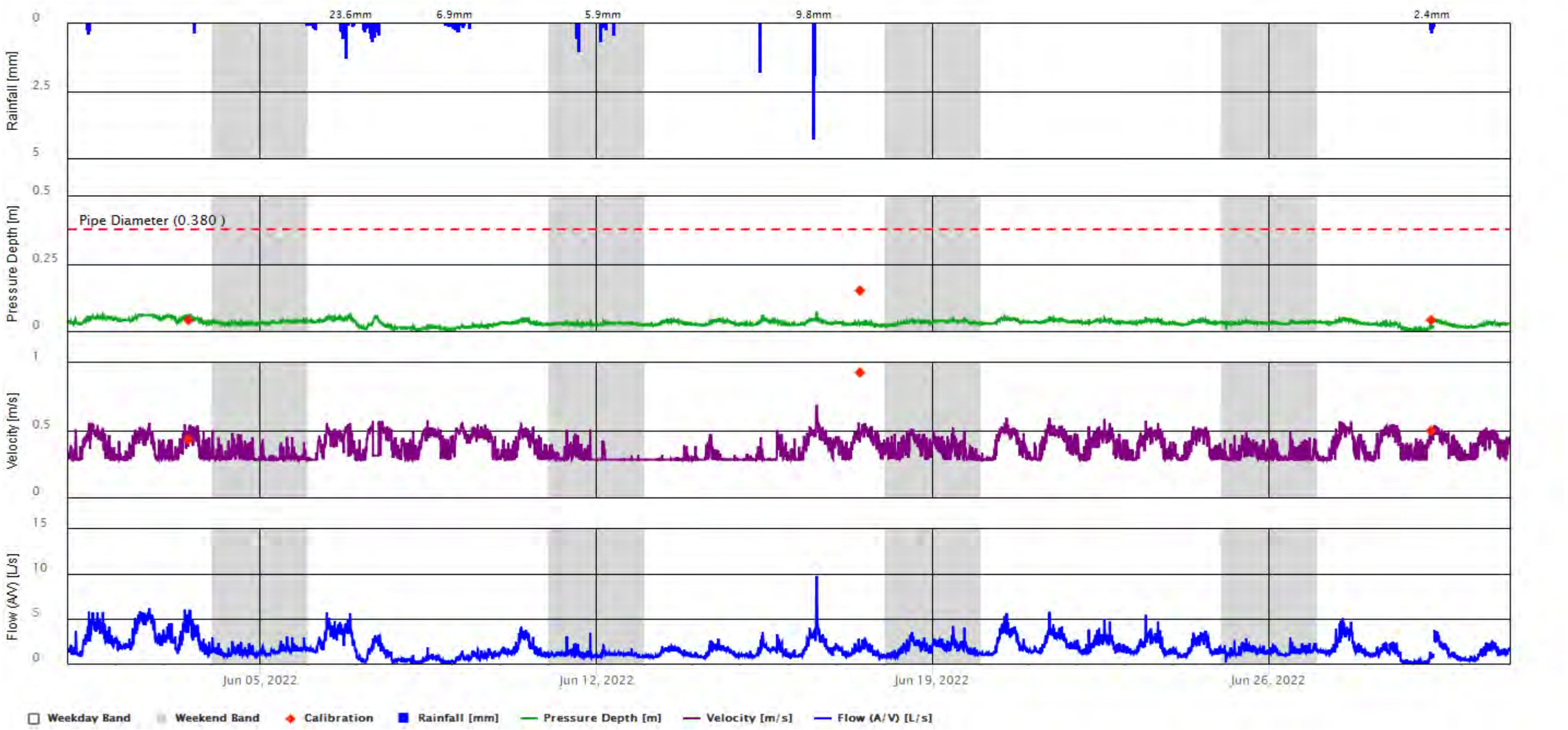
May 01, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM04**

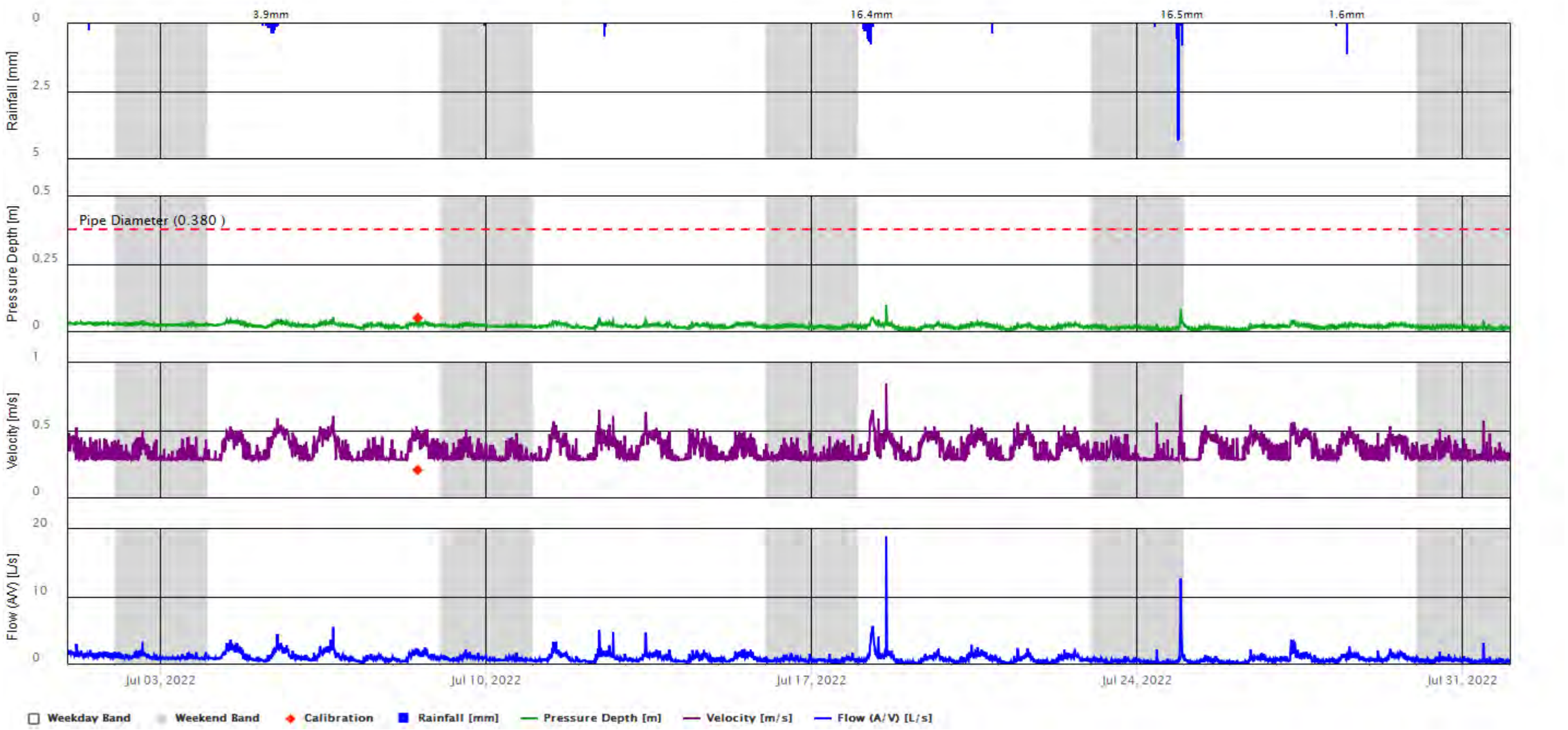
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM04**

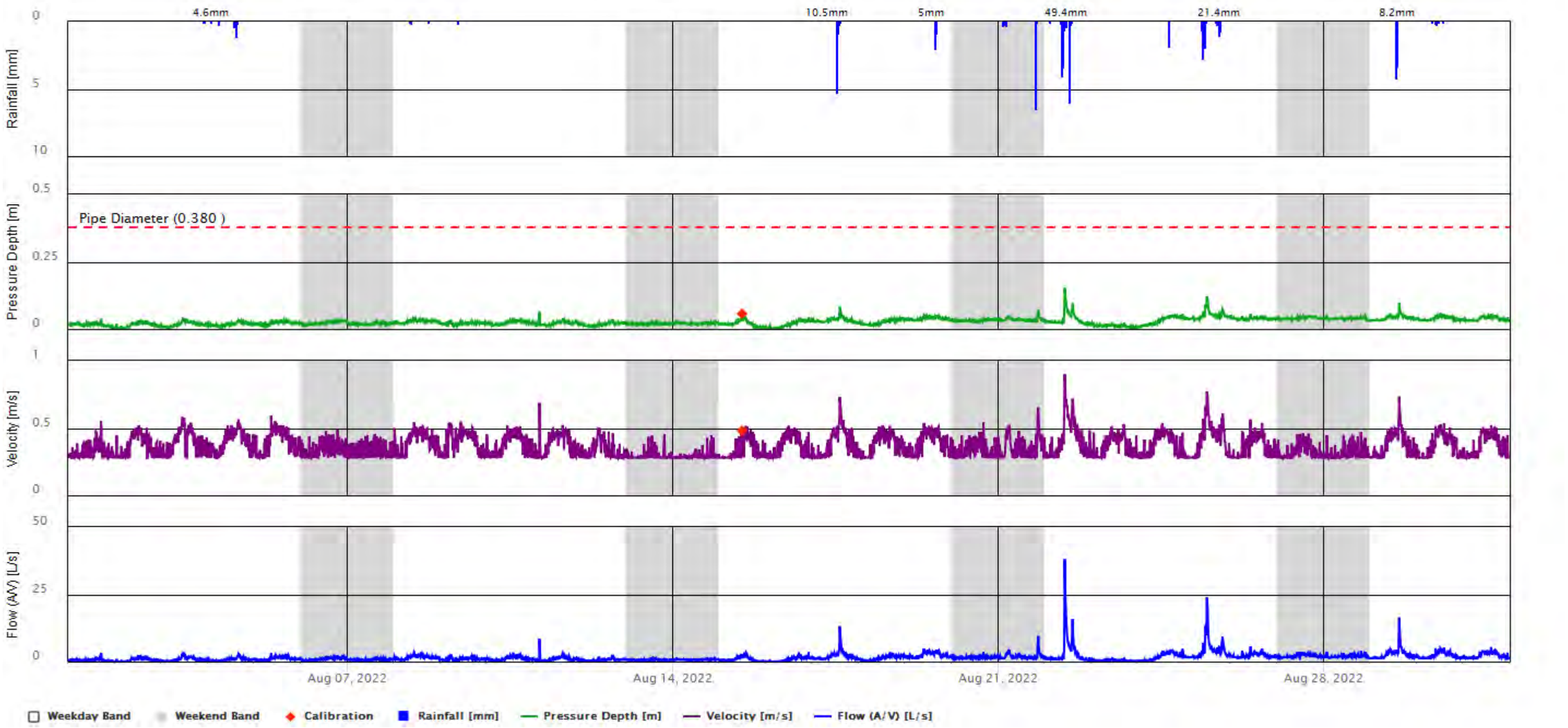
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM04**

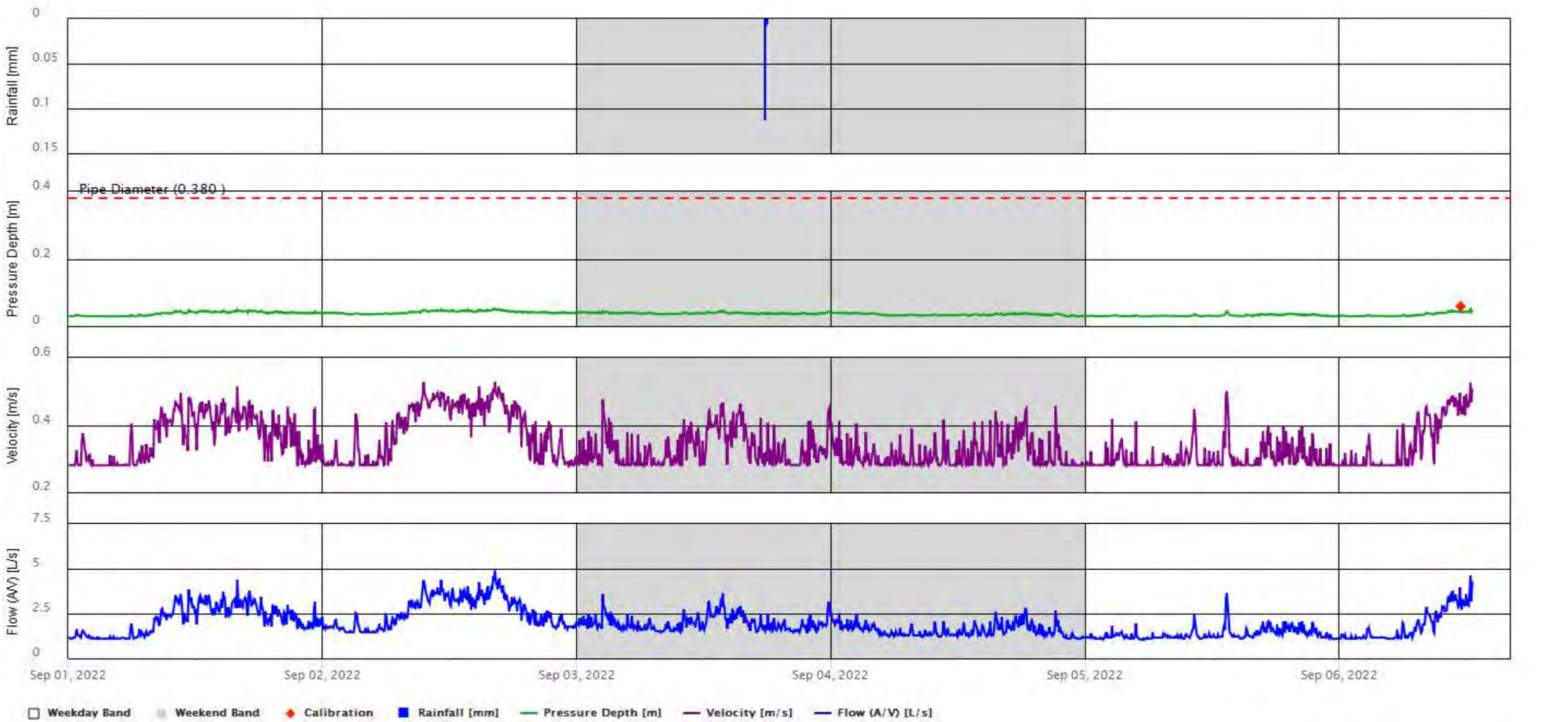
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM04**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM04**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | -0.67 | 0.00 | 0.24 | Thu Jun 23, 2022 14:55 | Wed May 04, 2022 06:45 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (1,000,000 L) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 1.47 | 38.07 | 20050 | Tue Jun 28, 2022 23:40 | Mon Aug 22, 2022 10:20 |

## Precipitation

| Date From | Date To | Days | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 6.51 | 295.09 | Sun Aug 21, 2022 19:20 |

## Velocity

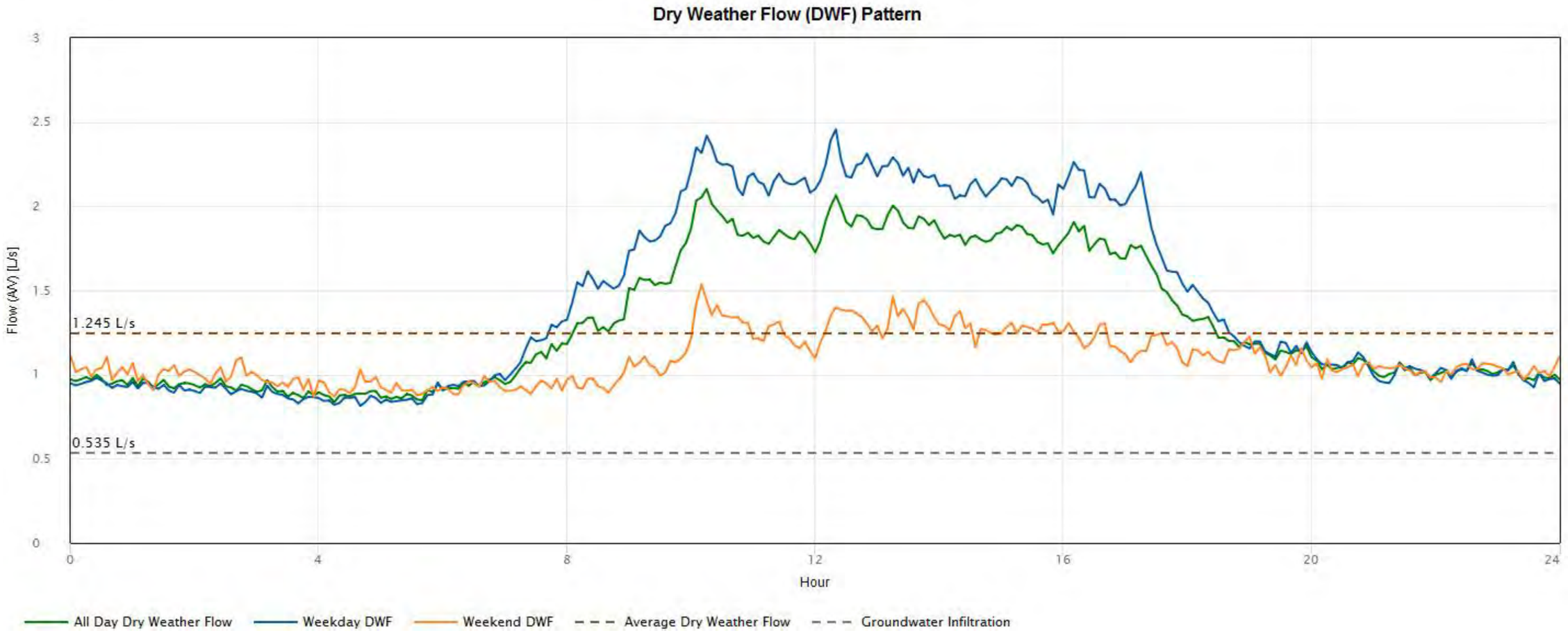
| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.28 | 0.36 | 0.90 | Fri Apr 01, 2022 22:25 | Mon Aug 22, 2022 10:20 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Sanitary Report

**Station: ARU21-FM04**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 1.245 | 112.955 | 0.629 | 3.395 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 2.728 | 0.535 | 923.831 | 42.956 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM04**

| Measured Storms | | | | | Flow KPIs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | ARU21-FM04 | | | | | |
| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[2] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Apr 06, 2022 | 11.33 | 43.00 | 11.80 | Apr 07, 2022 22:15 | 216.00 | 5.17 | 6.29 | 1.12 |
| | Apr 18, 2022 | 14.04 | 11.42 | 43.20 | Apr 19, 2022 10:55 | 213.00 | 2.18 | 4.25 | 2.08 |
| | Apr 21, 2022 | 6.27 | 8.08 | 4.40 | Apr 21, 2022 08:45 | 226.00 | 1.59 | 3.04 | 1.34 |
| | Apr 25, 2022 | 9.39 | 20.83 | 7.60 | Apr 26, 2022 00:05 | 213.00 | 2.21 | 3.34 | 0.95 |
| | May 03, 2022 | 17.80 | 17.58 | 5.60 | May 03, 2022 19:20 | 242.00 | 2.67 | 3.94 | 1.27 |
| | May 16, 2022 | 9.77 | 5.67 | 47.30 | May 16, 2022 09:00 | 206.00 | 3.71 | 6.18 | 2.48 |
| | May 21, 2022 | 5.27 | 0.83 | 30.80 | May 21, 2022 14:00 | 206.00 | 2.68 | 4.49 | 1.78 |
| | Jun 05, 2022 | 23.62 | 36.42 | 15.00 | Jun 06, 2022 20:45 | 208.00 | 4.01 | 5.72 | 1.57 |
| | Jun 08, 2022 | 6.90 | 12.00 | 3.30 | Jun 09, 2022 04:50 | 211.00 | 0.28 | 1.66 | 1.16 |
| | Jun 11, 2022 | 5.92 | 19.33 | 12.00 | Jun 11, 2022 20:45 | 205.00 | 2.01 | 3.42 | 1.41 |
| | Jun 16, 2022 | 9.83 | 0.58 | 51.10 | Jun 16, 2022 13:50 | 211.00 | 6.99 | 9.77 | 2.77 |
| | Jul 18, 2022 | 16.45 | 5.75 | 8.70 | Jul 18, 2022 14:10 | N/A | 17.72 | 18.90 | 1.18 |
| | Jul 24, 2022 | 16.52 | 14.58 | 51.90 | Jul 24, 2022 22:10 | N/A | 12.07 | 12.67 | 0.60 |
| | Aug 17, 2022 | 10.51 | 10.75 | 63.90 | Aug 17, 2022 14:10 | N/A | 11.18 | 13.07 | 1.89 |
| | Aug 21, 2022 | 49.43 | 28.50 | 78.10 | Aug 22, 2022 10:20 | 10.00 | 36.10 | 38.07 | 1.97 |
| | Aug 25, 2022 | 21.38 | 10.25 | 33.30 | Aug 25, 2022 11:40 | N/A | 21.86 | 23.79 | 1.92 |
| | Aug 29, 2022 | 8.20 | 0.42 | 50.60 | Aug 29, 2022 14:55 | 190.00 | 14.33 | 16.37 | 2.04 |

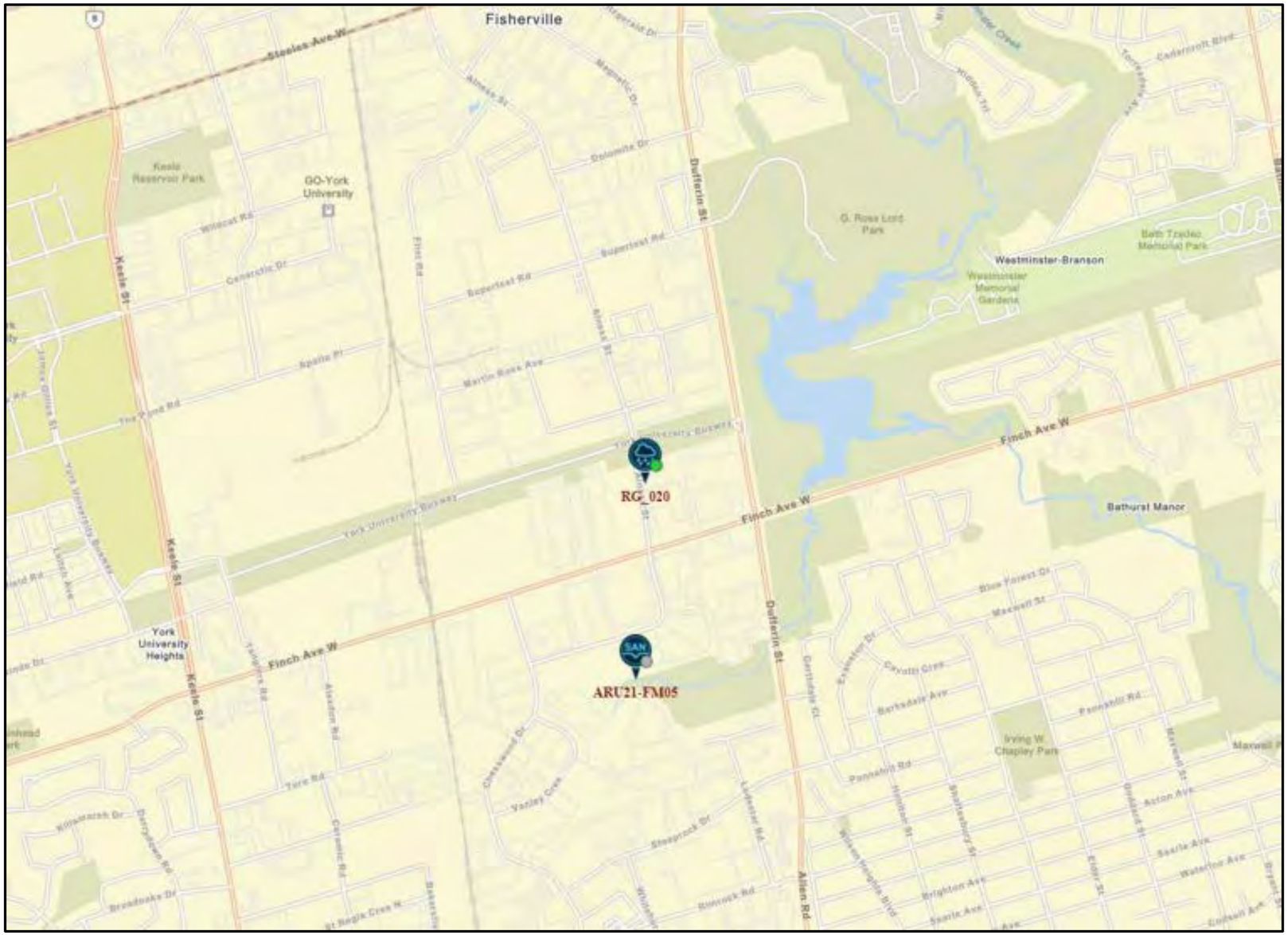
[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours
[2] Time of Measured Peak Flow may not happen at TD

# Activity Log

**Station: ARU21-FM04**

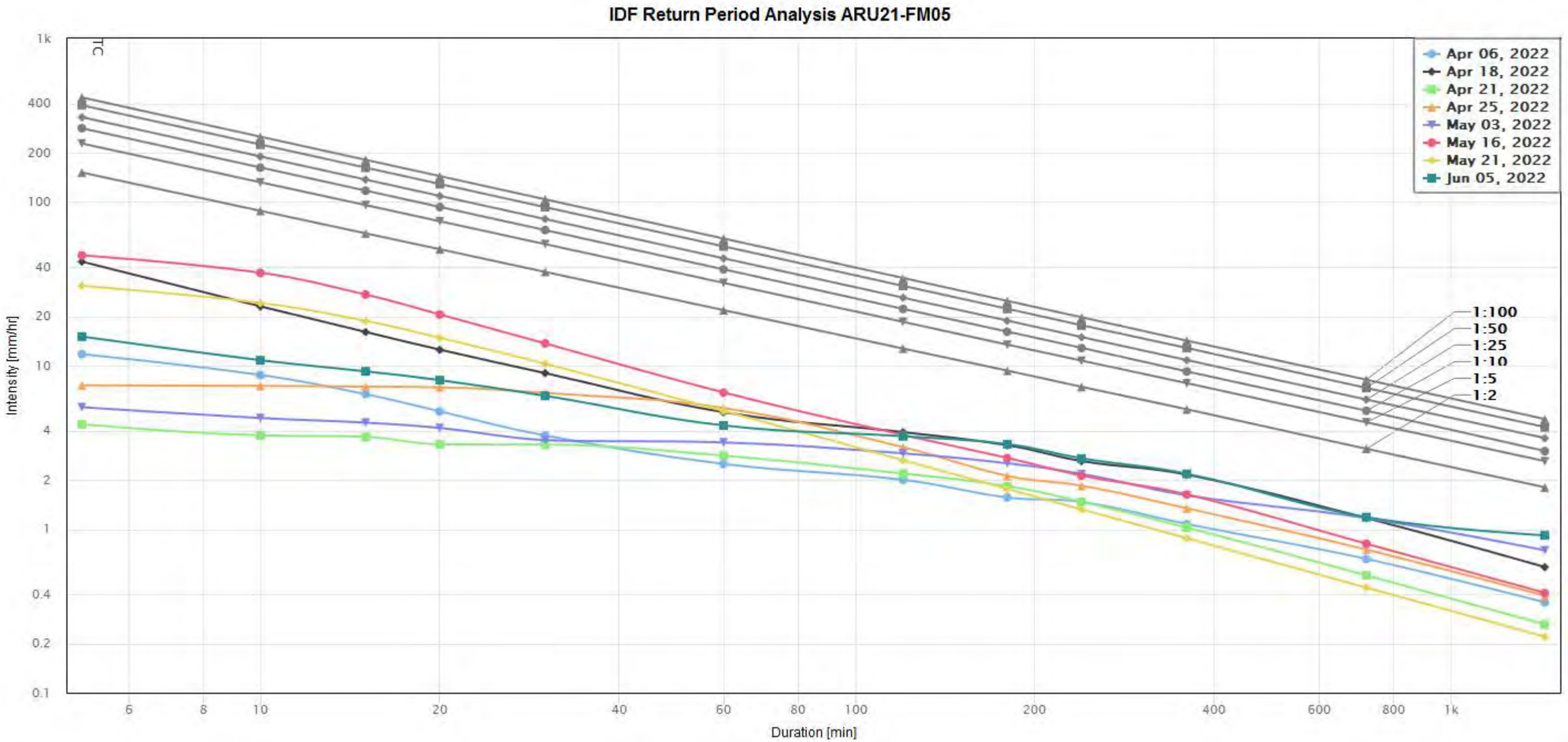
| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 01-Apr-2022 10:15:00 AM | Installation Log | Installation | AV + CSO installed<br>PMAC ID:8114 | Yes |
| 11-May-2022 09:15:00 AM | Maintenance Log | calibration | | Yes |
| 19-May-2022 12:32:00 PM | Maintenance Log | CALIBRATION | DATA DOWNLOADED , TELEMETRY SENT, BATTERY REPLACED | Yes |
| 03-Jun-2022 12:13:00 PM | Maintenance Log | CALIBRATION | DATA DOWNLOADED<br>SITE CALIBRATED<br>DEBRIS CLEARED<br>SENT TELEMETRY | Yes |
| 17-Jun-2022 11:51:00 AM | Maintenance Log | CALIBRATION | DATA DOWNLOADED<br>SITE CALIBRATED<br>PHOTOS TAKEN<br>CLEARED DEBRIS<br>TELEMETRY SENT<br>ANTENNA BENEATH LID | Yes |
| 29-Jun-2022 08:56:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 08-Jul-2022 12:52:00 PM | Maintenance Log | CALIBRATION | | Yes |
| 15-Aug-2022 11:48:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 06-Sep-2022 11:28:00 AM | Removal Log | Removal | REMOVED ALL EQUIPMENT(LOGGER, SENSORS, RING, HARDWARE) FROM MANHOLE. **NO FUNCTIONING VELOCITY PROBE FOR MANUAL MEASUREMENT | Yes |

# Station: ARU21-FM05



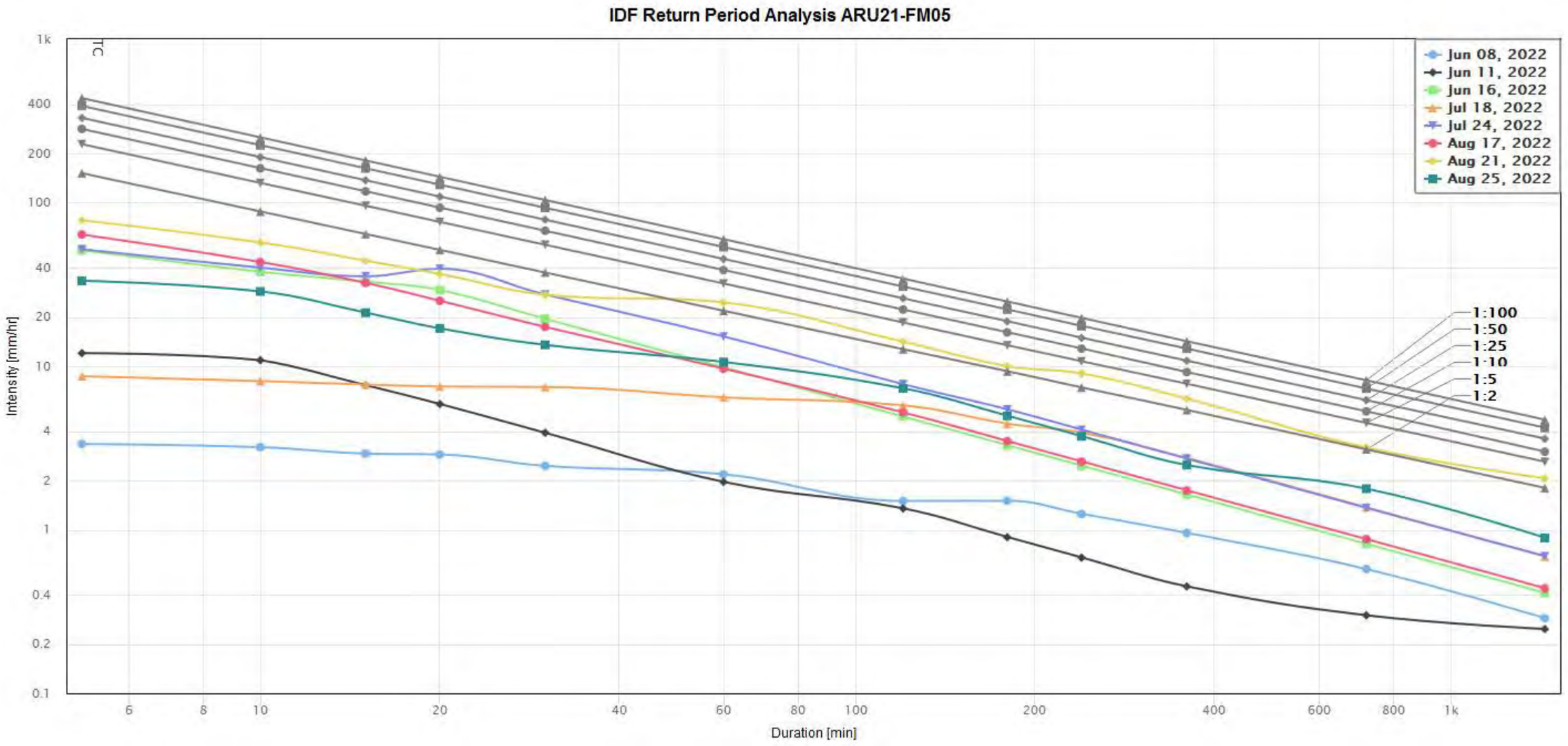
# IDF Analysis

**Station: ARU21-FM05**



# IDF Analysis

**Station: ARU21-FM05**



# IDF Analysis

**Station: ARU21-FM05**

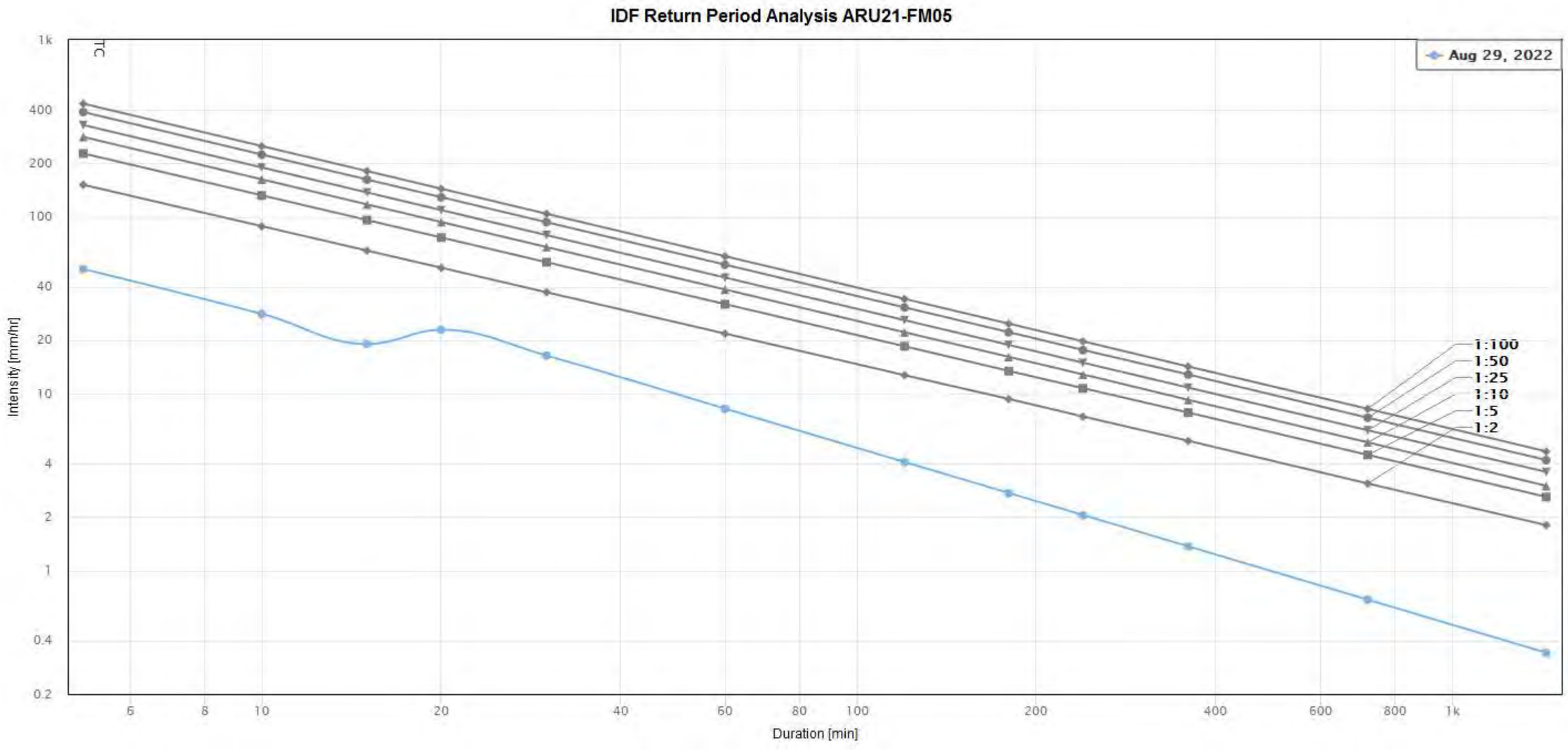


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

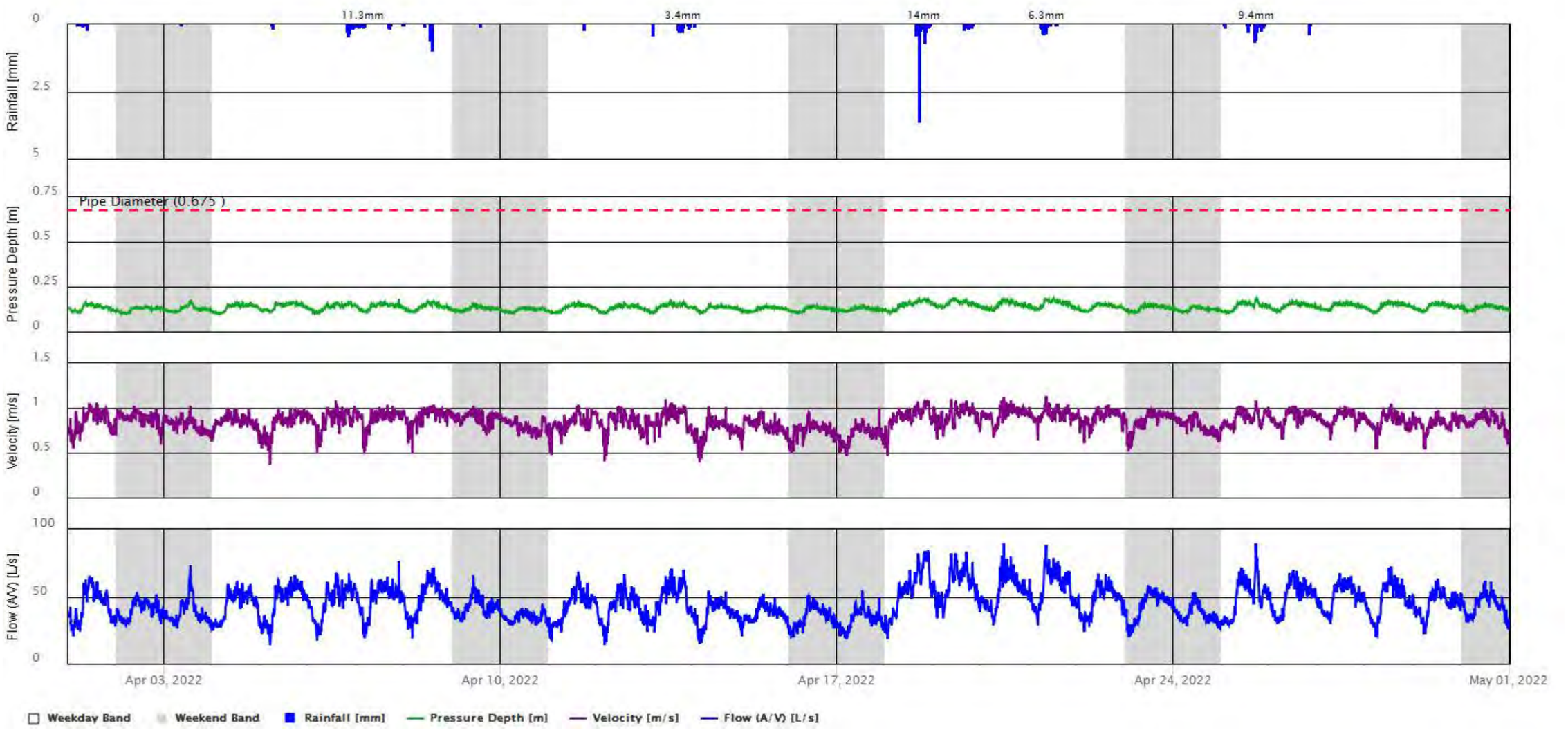
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Apr 06, 2022 | 43.00 | < 2 Yr | 11.34 | 11.76 | 8.75 | 6.68 | 5.24 | 3.74 | 2.51 | 2.00 | 1.56 | 1.46 | 1.07 | 0.66 | 0.36 |
| Apr 18, 2022 | 11.42 | < 2 Yr | 14.04 | 43.20 | 22.97 | 16.04 | 12.50 | 9.00 | 5.19 | 3.92 | 3.26 | 2.60 | 2.15 | 1.17 | 0.59 |
| Apr 21, 2022 | 8.08 | < 2 Yr | 6.27 | 4.38 | 3.75 | 3.67 | 3.30 | 3.29 | 2.81 | 2.19 | 1.83 | 1.47 | 1.02 | 0.52 | 0.26 |
| Apr 25, 2022 | 20.83 | < 2 Yr | 9.39 | 7.58 | 7.52 | 7.44 | 7.36 | 6.81 | 5.50 | 3.17 | 2.11 | 1.84 | 1.34 | 0.75 | 0.39 |
| May 03, 2022 | 17.58 | < 2 Yr | 17.81 | 5.57 | 4.78 | 4.48 | 4.15 | 3.50 | 3.39 | 2.91 | 2.53 | 2.17 | 1.61 | 1.17 | 0.74 |
| May 16, 2022 | 5.67 | < 2 Yr | 9.77 | 47.26 | 36.92 | 27.17 | 20.50 | 13.67 | 6.83 | 3.76 | 2.72 | 2.12 | 1.63 | 0.81 | 0.41 |
| May 21, 2022 | 0.83 | < 2 Yr | 5.27 | 30.77 | 24.15 | 18.76 | 14.78 | 10.27 | 5.27 | 2.64 | 1.76 | 1.32 | 0.88 | 0.44 | 0.22 |
| Jun 05, 2022 | 36.42 | < 2 Yr | 23.62 | 15.05 | 10.78 | 9.22 | 8.15 | 6.54 | 4.30 | 3.70 | 3.31 | 2.71 | 2.18 | 1.18 | 0.92 |
| Jun 08, 2022 | 12.00 | < 2 Yr | 6.90 | 3.35 | 3.20 | 2.92 | 2.88 | 2.46 | 2.18 | 1.50 | 1.51 | 1.25 | 0.96 | 0.57 | 0.29 |
| Jun 11, 2022 | 19.33 | < 2 Yr | 5.92 | 12.02 | 10.88 | 7.65 | 5.87 | 3.92 | 1.96 | 1.35 | 0.90 | 0.68 | 0.45 | 0.30 | 0.25 |
| Jun 16, 2022 | 0.58 | < 2 Yr | 9.83 | 51.11 | 37.77 | 32.88 | 29.17 | 19.50 | 9.83 | 4.92 | 3.28 | 2.46 | 1.64 | 0.82 | 0.41 |
| Jul 18, 2022 | 5.75 | < 2 Yr | 16.45 | 8.69 | 8.11 | 7.73 | 7.51 | 7.46 | 6.45 | 5.76 | 4.45 | 3.92 | 2.74 | 1.37 | 0.69 |
| Jul 24, 2022 | 14.58 | < 2 Yr | 16.52 | 51.91 | 40.03 | 35.48 | 39.42 | 27.44 | 15.16 | 7.76 | 5.44 | 4.08 | 2.72 | 1.36 | 0.69 |
| Aug 17, 2022 | 10.75 | < 2 Yr | 10.51 | 63.85 | 43.30 | 32.29 | 25.11 | 17.39 | 9.65 | 5.21 | 3.48 | 2.61 | 1.74 | 0.88 | 0.44 |
| Aug 21, 2022 | 28.50 | < 2 Yr | 49.43 | 78.08 | 57.04 | 44.15 | 36.59 | 27.38 | 24.52 | 14.12 | 9.99 | 9.01 | 6.33 | 3.18 | 2.06 |
| Aug 25, 2022 | 10.25 | < 2 Yr | 21.38 | 33.31 | 28.63 | 21.26 | 17.02 | 13.51 | 10.60 | 7.32 | 4.97 | 3.73 | 2.48 | 1.78 | 0.89 |
| Aug 29, 2022 | 0.42 | < 2 Yr | 8.20 | 50.60 | 28.16 | 19.06 | 22.95 | 16.40 | 8.20 | 4.10 | 2.73 | 2.05 | 1.37 | 0.68 | 0.34 |

# Data Chart

**Station: ARU21-FM05**

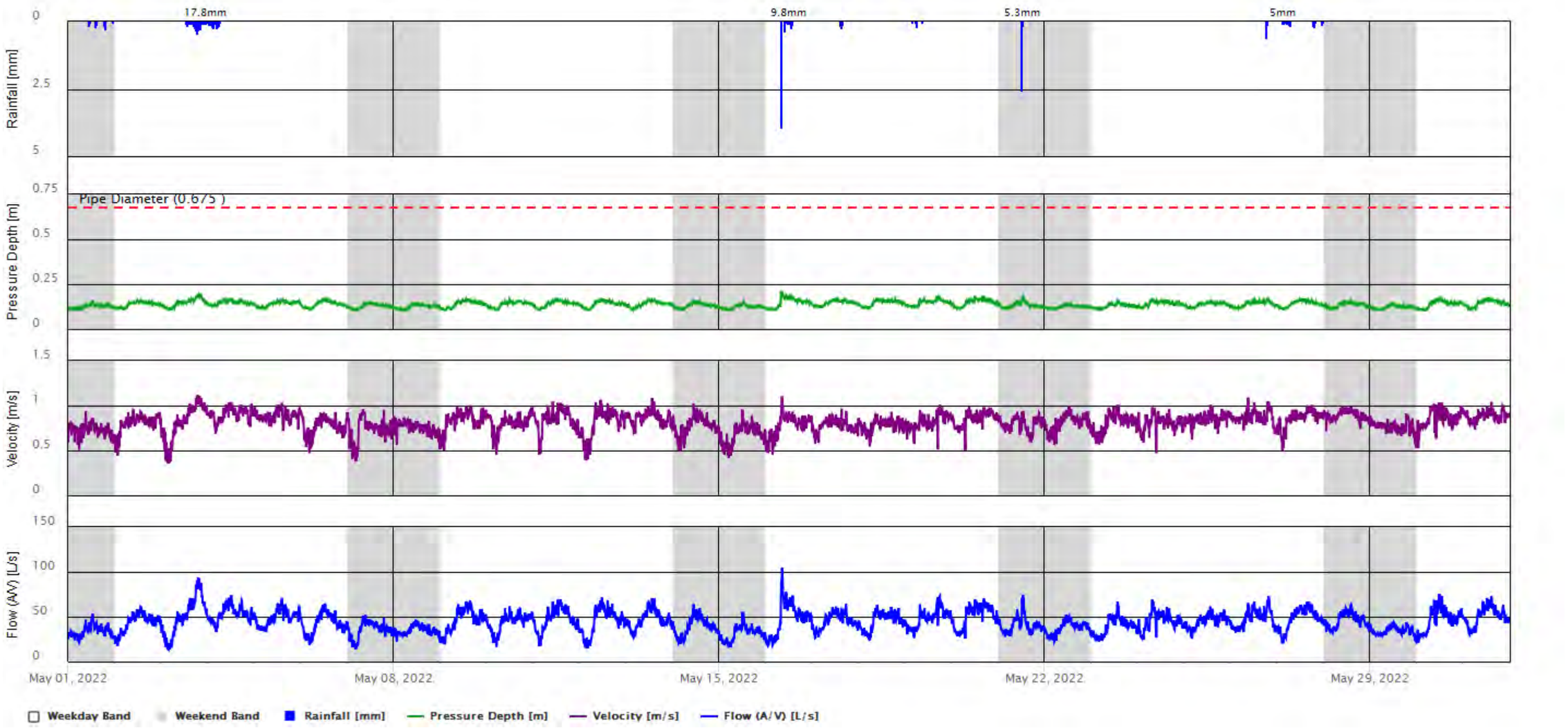
Apr 01, 2022 – Apr 30, 2022



# Data Chart

**Station: ARU21-FM05**

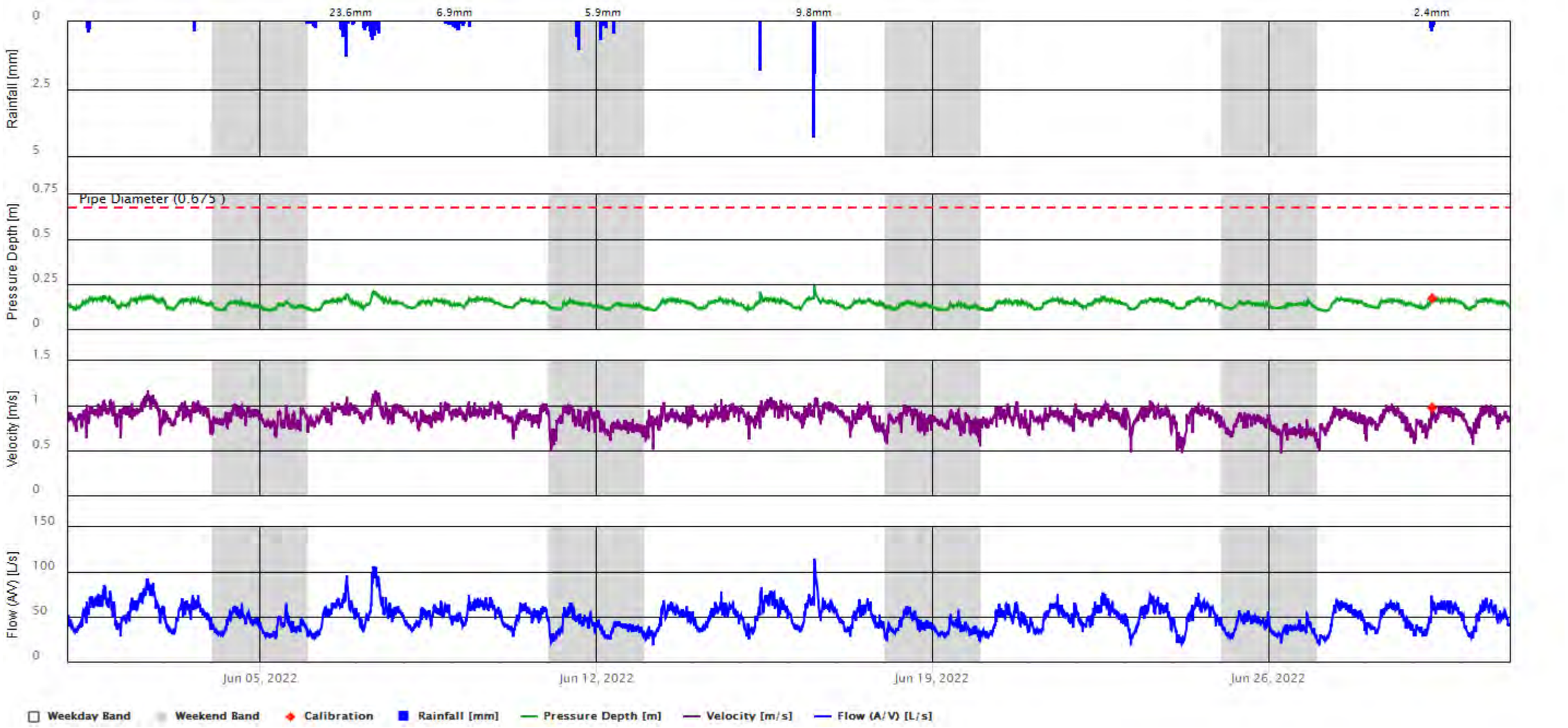
May 01, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM05**

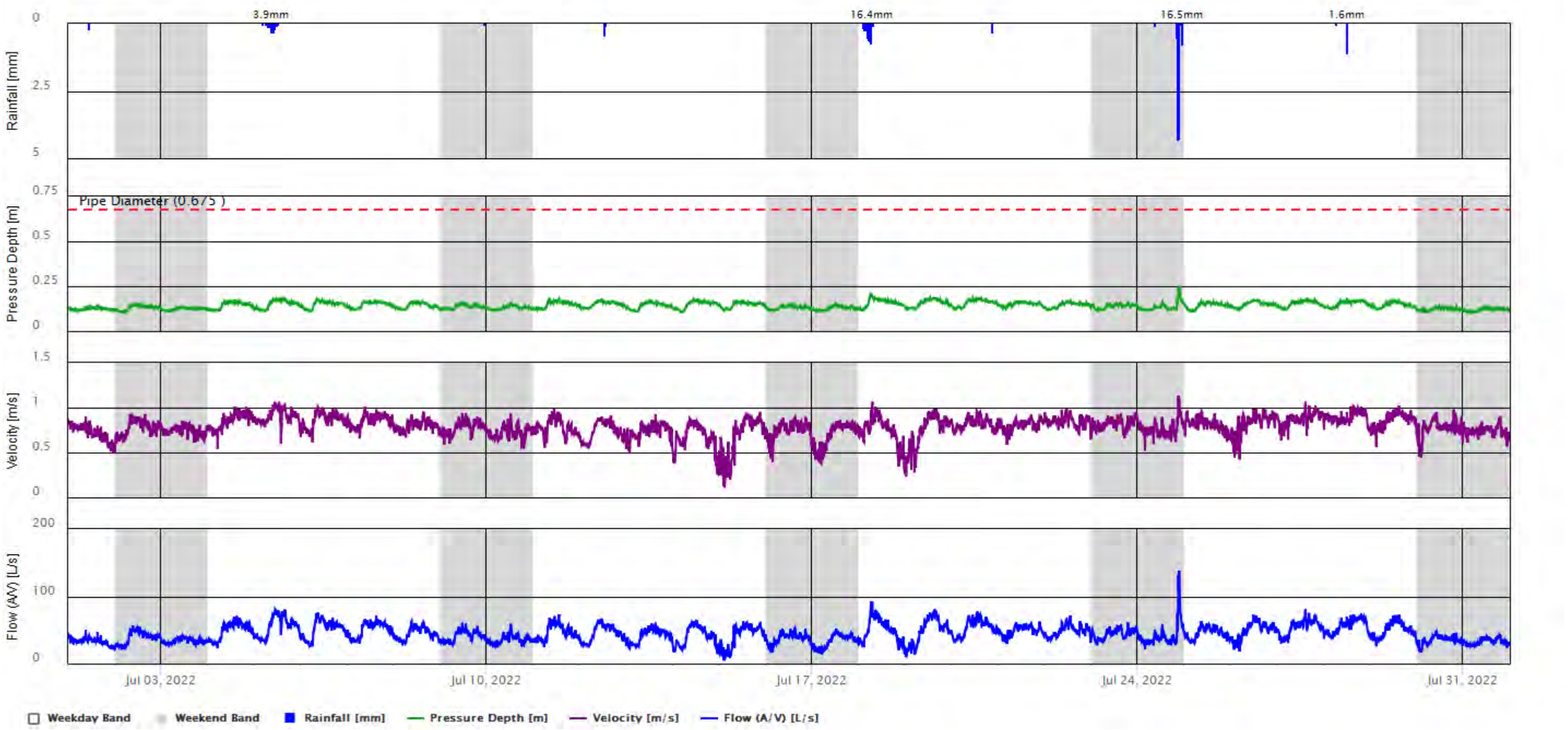
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM05**

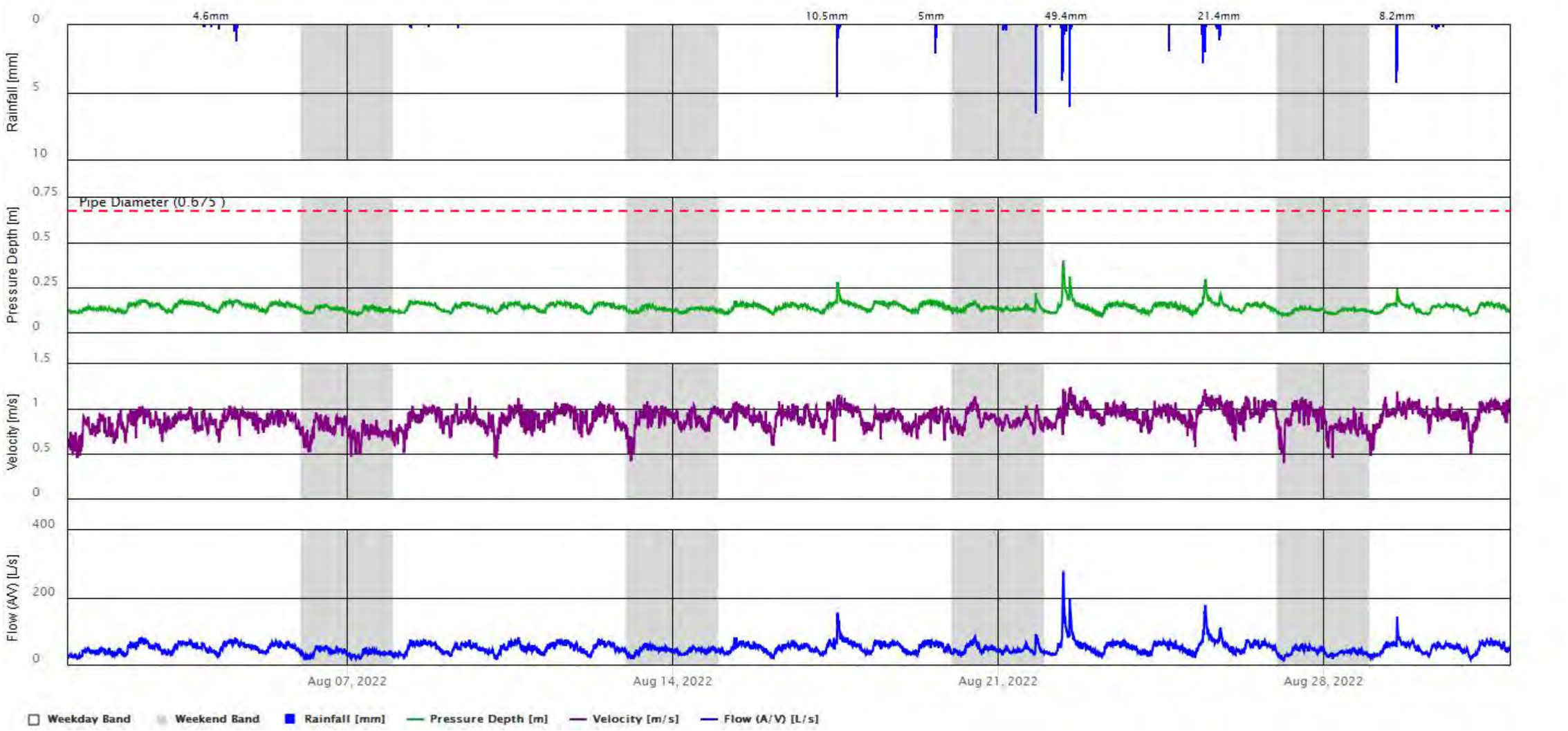
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM05**

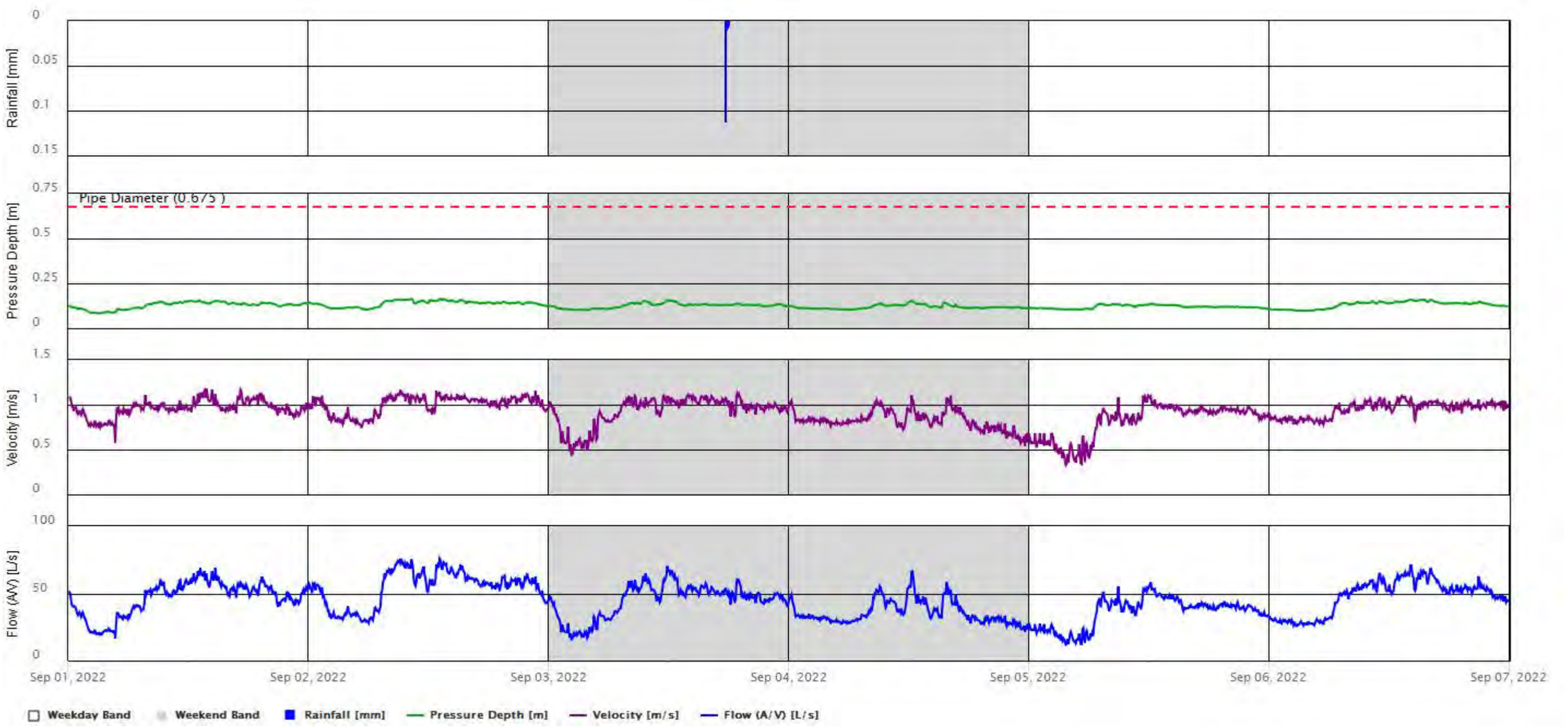
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM05**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM05**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.08 | 0.14 | 0.40 | Thu Sep 01, 2022 02:50 | Mon Aug 22, 2022 09:40 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume ($m^3$) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 4.59 | 46.09 | 277.16 | 633210 | Fri Jul 15, 2022 02:45 | Mon Aug 22, 2022 09:40 |

## Precipitation

| Date From | Date To | Days | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 6.51 | 295.09 | Sun Aug 21, 2022 19:20 |

## Velocity

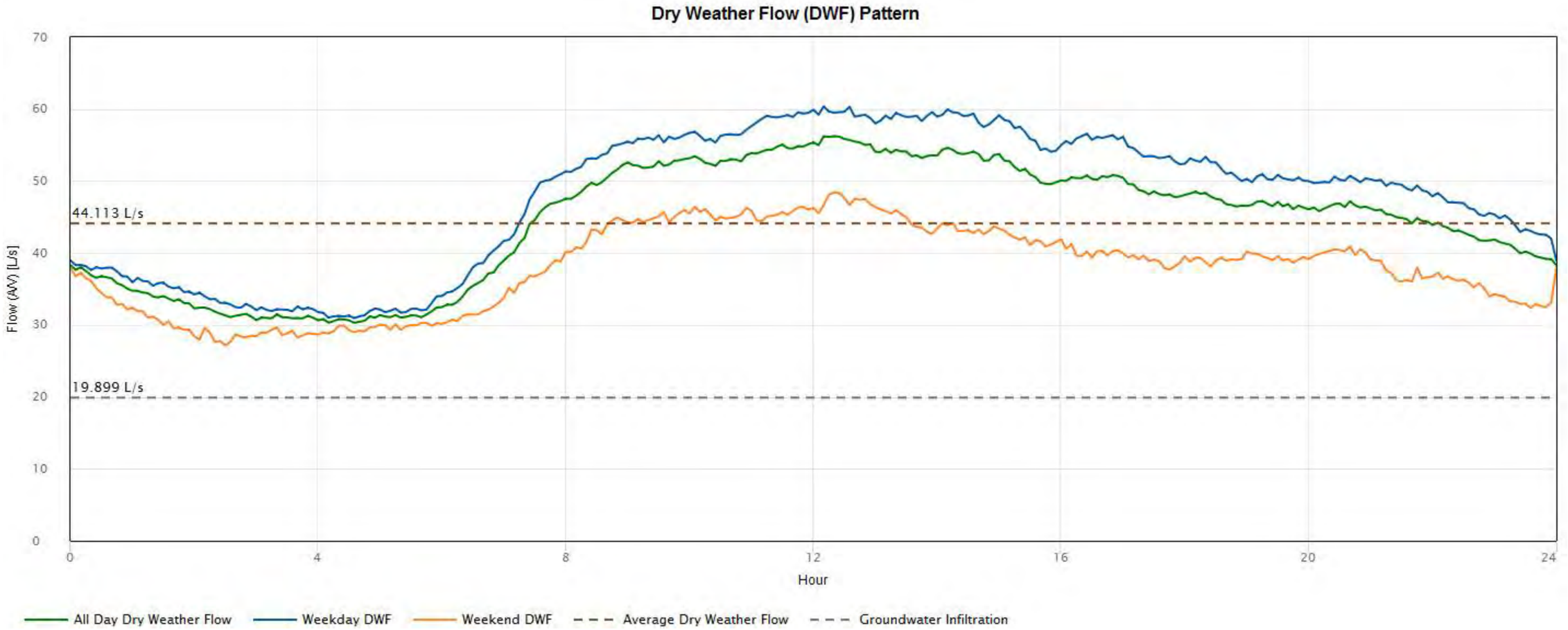
| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.11 | 0.84 | 1.24 | Fri Jul 15, 2022 02:45 | Mon Aug 22, 2022 13:20 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Sanitary Report

**Station: ARU21-FM05**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 44.113 | 259.824 | 23.411 | 66.098 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 1.498 | 19.899 | 4,464.572 | 45.110 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM05**

| Measured Storms | | | | | Flow KPIs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | ARU21-FM05 | | | | |
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[2] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Apr 06, 2022 | 11.33 | 43.00 | 11.80 | | Apr 07, 2022 21:10 | 180.50 | 26.99 | 76.04 | 49.05 |
| | Apr 18, 2022 | 14.04 | 11.42 | 43.20 | | Apr 18, 2022 21:30 | 184.00 | 37.18 | 84.12 | 46.94 |
| | Apr 21, 2022 | 6.27 | 8.08 | 4.40 | | Apr 21, 2022 08:30 | 185.00 | 40.48 | 88.42 | 47.94 |
| | Apr 25, 2022 | 9.39 | 20.83 | 7.60 | | Apr 25, 2022 17:20 | 189.00 | 37.74 | 89.37 | 51.07 |
| | May 03, 2022 | 17.80 | 17.58 | 5.60 | | May 03, 2022 19:05 | 190.00 | 48.52 | 93.31 | 44.79 |
| | May 16, 2022 | 9.77 | 5.67 | 47.30 | | May 16, 2022 08:25 | 214.00 | 54.10 | 104.33 | 50.22 |
| | May 21, 2022 | 5.27 | 0.83 | 30.80 | | May 21, 2022 12:50 | 180.50 | 26.36 | 73.86 | 47.50 |
| | Jun 05, 2022 | 23.62 | 36.42 | 15.00 | | Jun 07, 2022 08:25 | 212.00 | 52.32 | 106.32 | 54.00 |
| | Jun 08, 2022 | 6.90 | 12.00 | 3.30 | | Jun 09, 2022 08:10 | 176.00 | 20.77 | 74.37 | 53.60 |
| | Jun 11, 2022 | 5.92 | 19.33 | 12.00 | | Jun 12, 2022 00:55 | 160.00 | 17.97 | 55.82 | 28.81 |
| | Jun 16, 2022 | 9.83 | 0.58 | 51.10 | | Jun 16, 2022 12:40 | 242.00 | 53.38 | 114.75 | 61.36 |
| | Jul 18, 2022 | 16.45 | 5.75 | 8.70 | | Jul 18, 2022 06:15 | 214.00 | 56.19 | 92.53 | 34.82 |
| | Jul 24, 2022 | 16.52 | 14.58 | 51.90 | | Jul 24, 2022 21:25 | 252.00 | 96.62 | 137.98 | 41.36 |
| | Aug 17, 2022 | 10.51 | 10.75 | 63.90 | | Aug 17, 2022 13:05 | 280.50 | 92.02 | 154.14 | 62.12 |
| | Aug 21, 2022 | 49.43 | 28.50 | 78.10 | | Aug 22, 2022 09:40 | 399.50 | 217.20 | 277.16 | 59.96 |
| | Aug 25, 2022 | 21.38 | 10.25 | 33.30 | | Aug 25, 2022 10:55 | 295.00 | 117.30 | 176.65 | 59.35 |
| | Aug 29, 2022 | 8.20 | 0.42 | 50.60 | | Aug 29, 2022 13:55 | 244.00 | 78.19 | 141.76 | 63.57 |

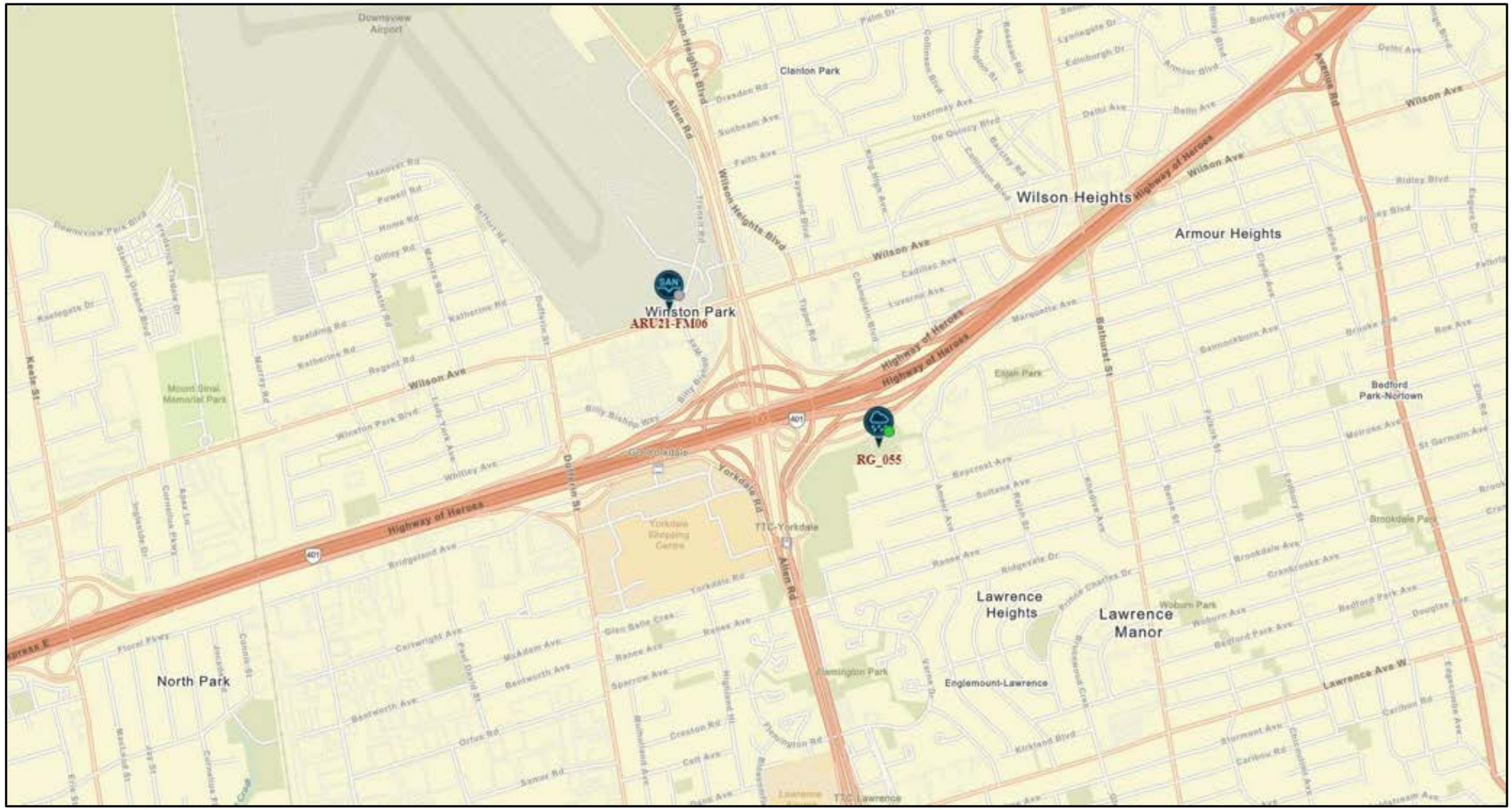
[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours
[2] Time of Measured Peak Flow may not happen at TD

# Activity Log

**Station: ARU21-FM05**

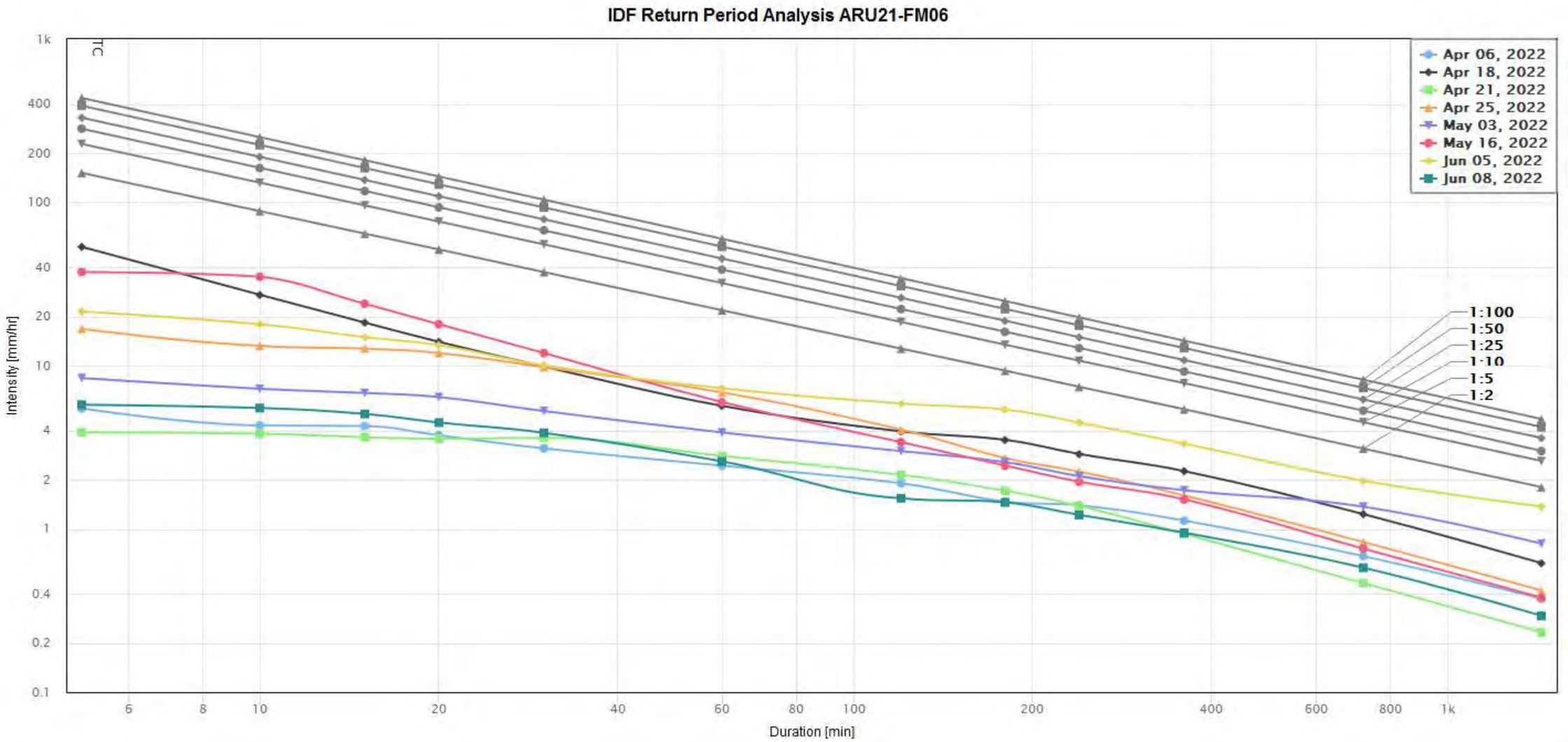
| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 29-Jun-2022 09:46:00 AM | Maintenance Log | Calibration | DATA DOWNLOADED,<br>SITE CALIBRATED,<br>DEBRIS CLEARED,<br>TELEMETRY SENT | Yes |

# Station: ARU21-FM06



# IDF Analysis

**Station: ARU21-FM06**



# IDF Analysis

**Station: ARU21-FM06**

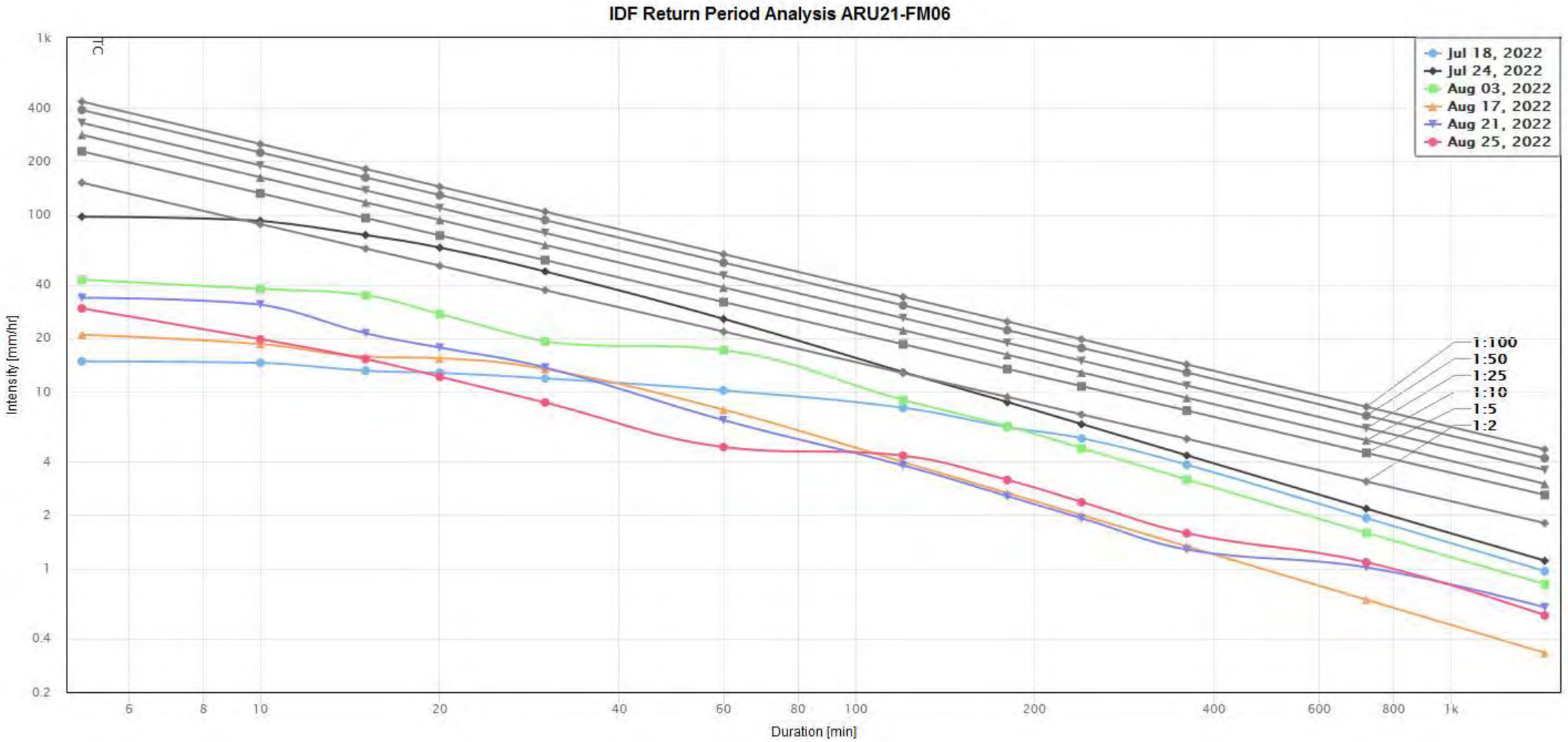


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

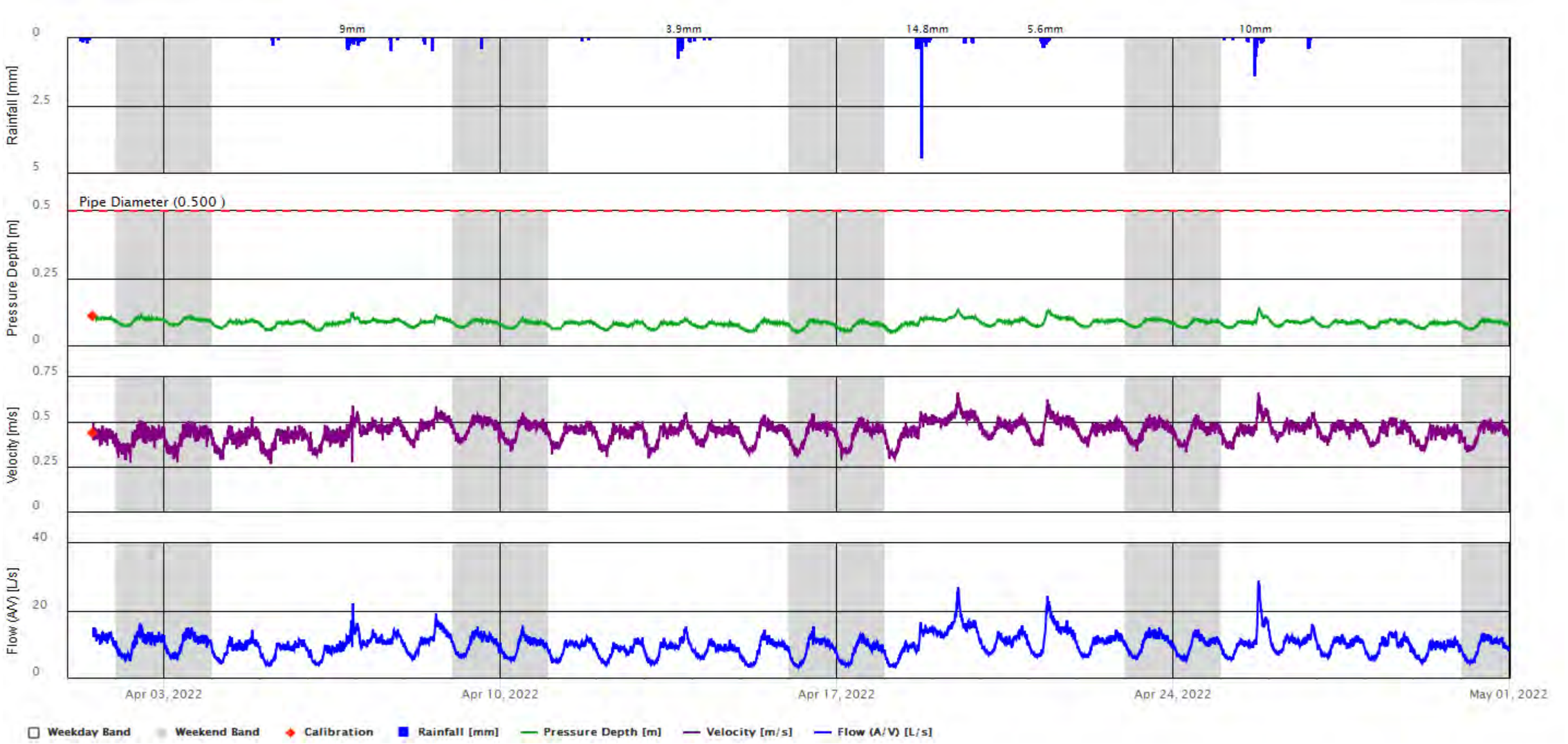
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Apr 06, 2022 | 25.50 | < 2 Yr | 9.01 | 5.47 | 4.30 | 4.27 | 3.74 | 3.11 | 2.44 | 1.90 | 1.47 | 1.39 | 1.12 | 0.68 | 0.37 |
| Apr 18, 2022 | 10.58 | < 2 Yr | 14.78 | 53.39 | 27.09 | 18.32 | 13.96 | 9.87 | 5.66 | 3.96 | 3.50 | 2.87 | 2.26 | 1.23 | 0.62 |
| Apr 21, 2022 | 4.67 | < 2 Yr | 5.58 | 3.90 | 3.83 | 3.64 | 3.56 | 3.61 | 2.80 | 2.14 | 1.71 | 1.38 | 0.93 | 0.47 | 0.23 |
| Apr 25, 2022 | 21.17 | < 2 Yr | 10.05 | 16.80 | 13.22 | 12.70 | 11.94 | 9.78 | 6.84 | 4.06 | 2.71 | 2.24 | 1.60 | 0.83 | 0.42 |
| May 03, 2022 | 17.75 | < 2 Yr | 19.45 | 8.39 | 7.21 | 6.80 | 6.42 | 5.27 | 3.89 | 2.99 | 2.56 | 2.10 | 1.72 | 1.37 | 0.81 |
| May 16, 2022 | 5.92 | < 2 Yr | 9.08 | 37.43 | 35.05 | 23.89 | 17.92 | 11.94 | 5.97 | 3.40 | 2.43 | 1.94 | 1.51 | 0.76 | 0.38 |
| Jun 05, 2022 | 40.08 | < 2 Yr | 35.03 | 21.48 | 17.91 | 14.92 | 13.33 | 10.04 | 7.26 | 5.85 | 5.37 | 4.47 | 3.32 | 1.97 | 1.37 |
| Jun 08, 2022 | 12.25 | < 2 Yr | 7.04 | 5.76 | 5.50 | 5.06 | 4.48 | 3.88 | 2.59 | 1.54 | 1.45 | 1.22 | 0.95 | 0.58 | 0.29 |
| Jul 18, 2022 | 6.17 | < 2 Yr | 23.11 | 14.81 | 14.53 | 13.11 | 12.75 | 11.87 | 10.14 | 8.09 | 6.28 | 5.43 | 3.85 | 1.93 | 0.96 |
| Jul 24, 2022 | 15.58 | < 2 Yr | 26.49 | 97.36 | 92.28 | 76.65 | 65.04 | 47.72 | 25.70 | 12.86 | 8.70 | 6.53 | 4.35 | 2.18 | 1.10 |
| Aug 03, 2022 | 18.67 | < 2 Yr | 19.53 | 42.92 | 37.99 | 34.96 | 27.38 | 19.18 | 17.11 | 8.96 | 6.36 | 4.77 | 3.18 | 1.59 | 0.81 |
| Aug 17, 2022 | 1.50 | < 2 Yr | 7.98 | 20.95 | 18.55 | 15.76 | 15.41 | 13.38 | 7.88 | 3.99 | 2.66 | 1.99 | 1.33 | 0.66 | 0.33 |
| Aug 21, 2022 | 27.33 | < 2 Yr | 14.47 | 33.88 | 31.03 | 21.32 | 17.71 | 13.67 | 6.87 | 3.82 | 2.55 | 1.92 | 1.28 | 1.01 | 0.60 |
| Aug 25, 2022 | 10.58 | < 2 Yr | 13.02 | 29.50 | 19.75 | 15.25 | 12.10 | 8.66 | 4.85 | 4.34 | 3.16 | 2.37 | 1.58 | 1.08 | 0.54 |

# Data Chart

**Station: ARU21-FM06**

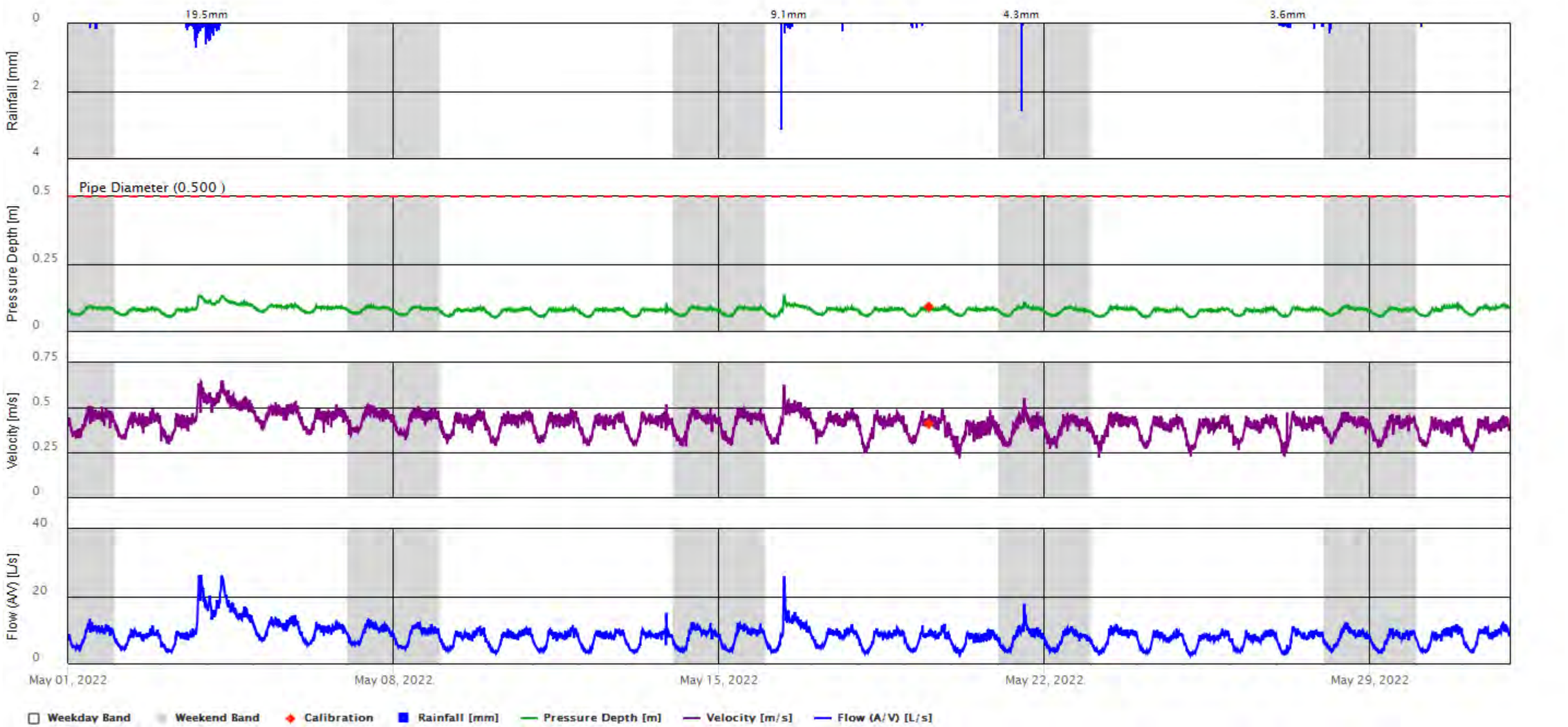
Apr 01, 2022 – Apr 30, 2022



# Data Chart

**Station: ARU21-FM06**

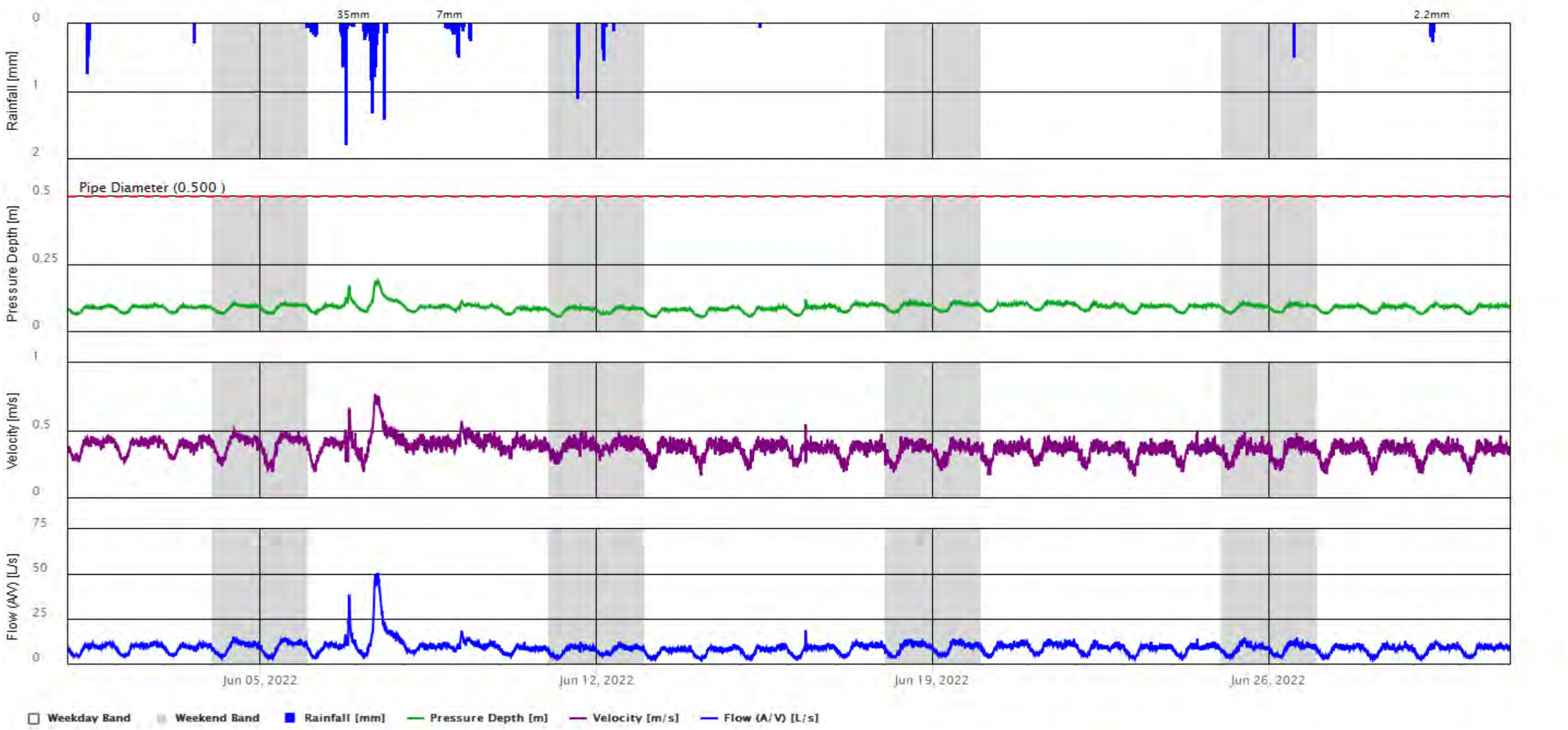
May 01, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM06**

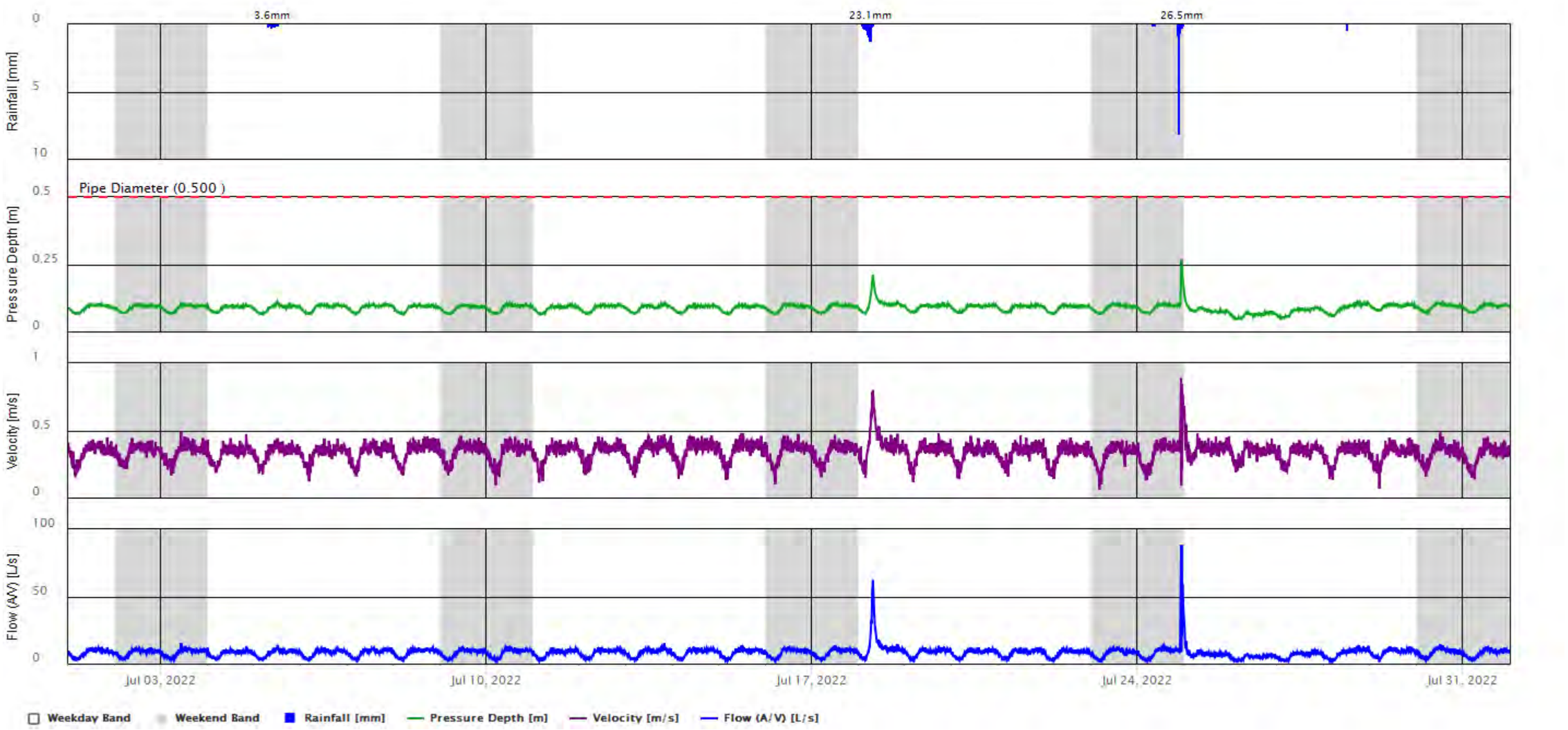
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM06**

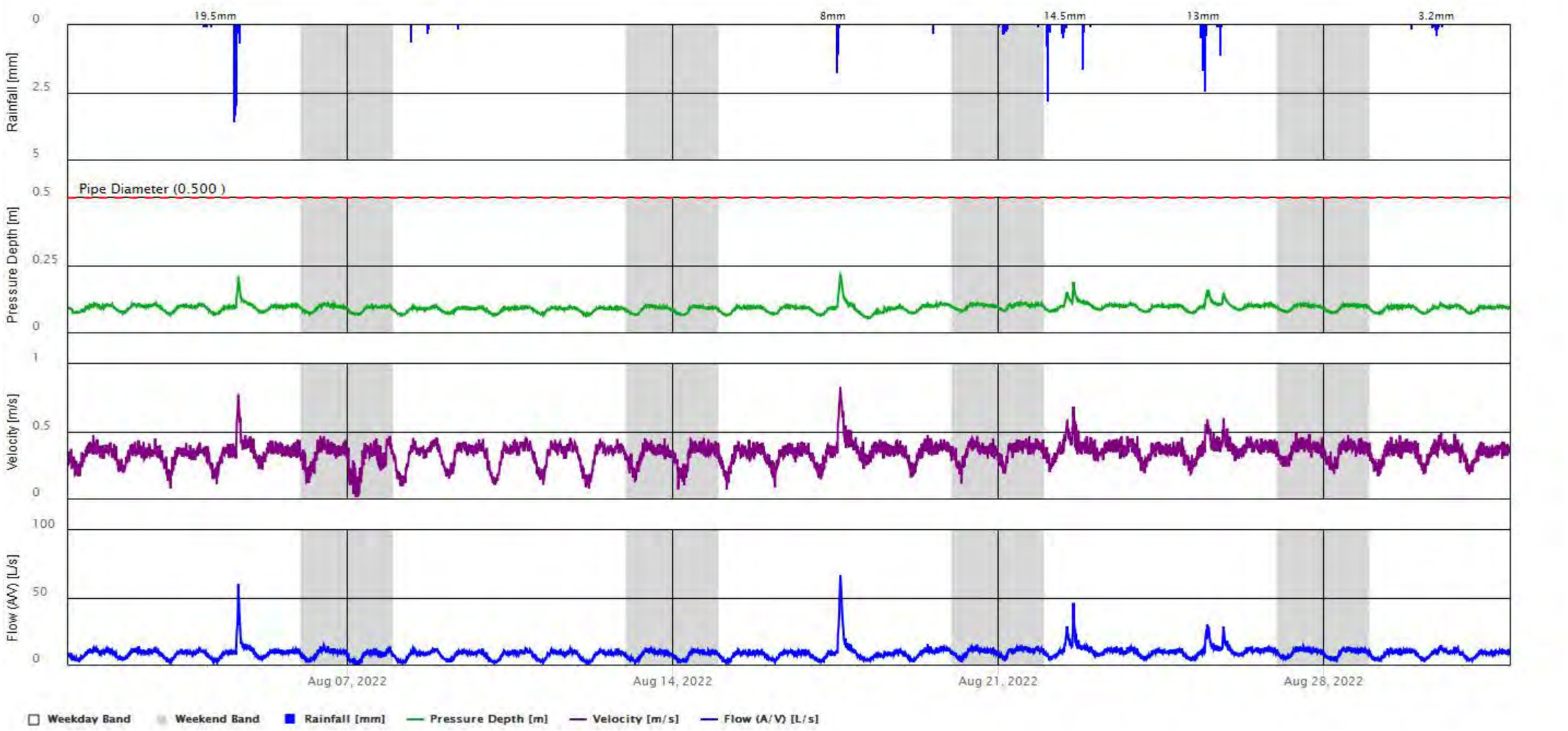
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM06**

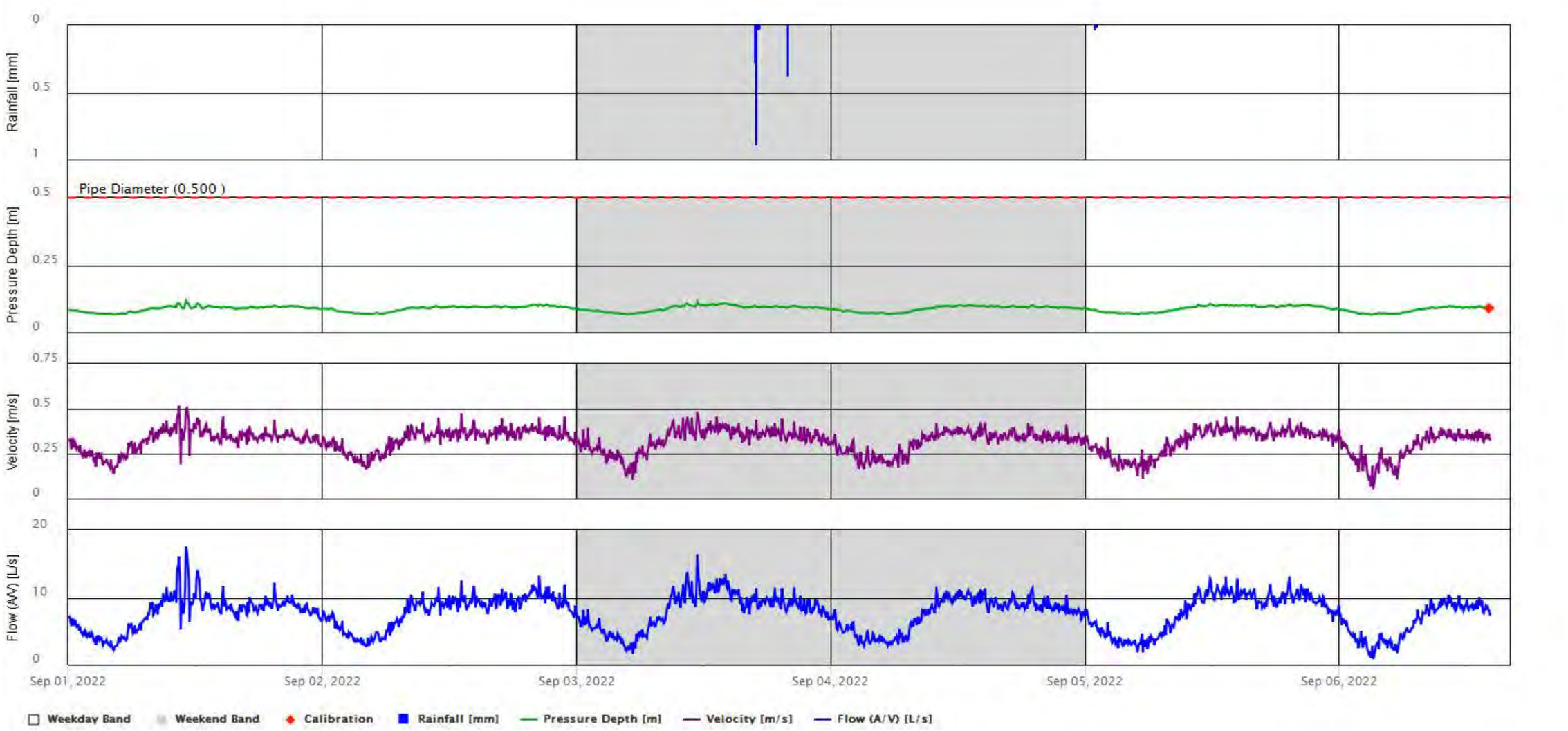
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM06**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM06**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.05 | 0.09 | 0.27 | Tue Jul 26, 2022 03:05 | Sun Jul 24, 2022 22:35 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume ($m^3$) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.19 | 8.64 | 88.63 | 117950 | Sun Aug 07, 2022 04:35 | Sun Jul 24, 2022 22:35 |

## Precipitation

| Date From | Date To | Days | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 8.11 | 261.85 | Sun Jul 24, 2022 21:10 |

## Velocity

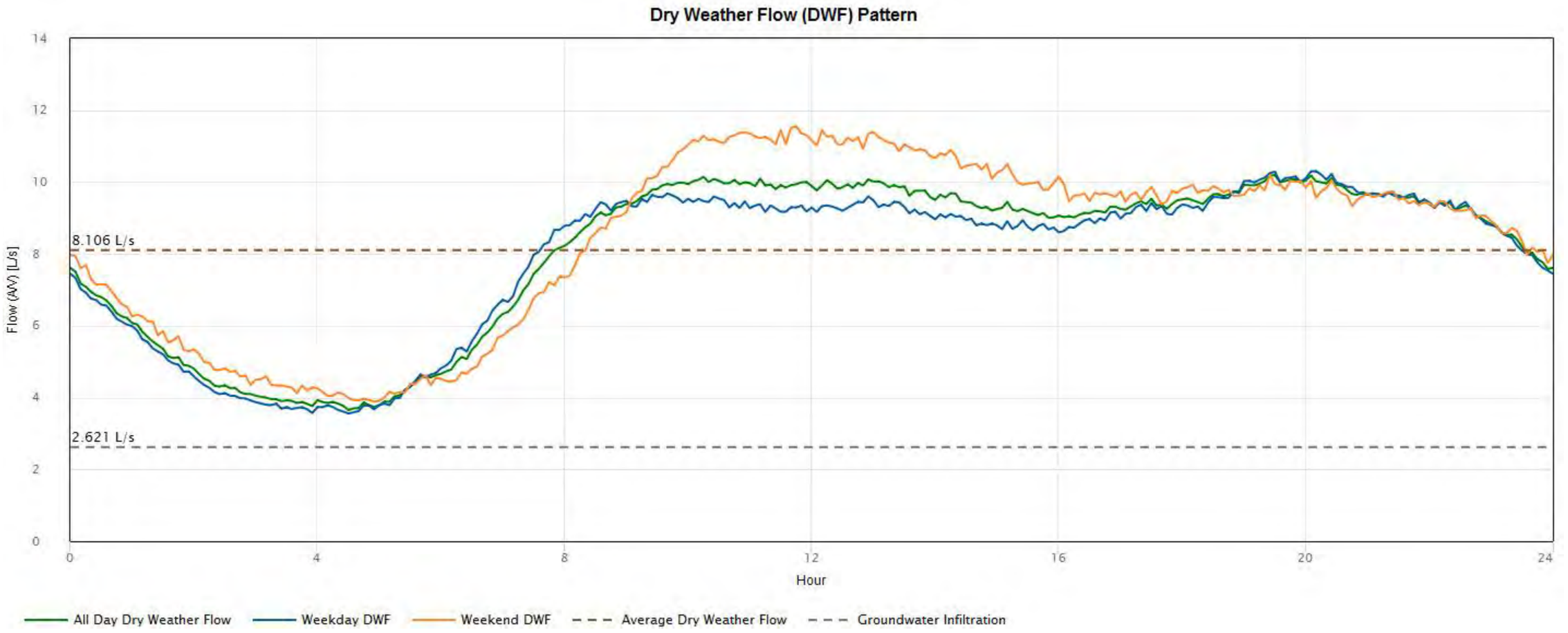
| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 0.38 | 0.89 | Sun Aug 07, 2022 04:35 | Sun Jul 24, 2022 22:25 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Sanitary Report

**Station: ARU21-FM06**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 8.106 | 201.595 | 3.083 | 12.702 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 1.567 | 2.621 | 3,244.021 | 32.332 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM06**

| Measured Storms | | | | | Flow KPIs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ARU21-FM06 | | | | |
| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[2] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Apr 06, 2022 | 9.01 | 25.50 | 5.50 | | Apr 06, 2022 22:10 | 123.00 | 11.96 | 22.10 | 10.14 |
| | Apr 18, 2022 | 14.77 | 10.58 | 53.40 | | Apr 19, 2022 12:30 | 133.00 | 17.07 | 26.99 | 9.92 |
| | Apr 21, 2022 | 5.58 | 4.67 | 3.90 | | Apr 21, 2022 09:05 | 127.00 | 14.87 | 24.24 | 9.36 |
| | Apr 25, 2022 | 10.05 | 21.17 | 16.80 | | Apr 25, 2022 18:40 | 139.00 | 18.29 | 28.60 | 10.31 |
| | May 03, 2022 | 19.45 | 17.75 | 8.40 | | May 04, 2022 07:15 | 132.00 | 19.40 | 26.19 | 6.75 |
| | May 16, 2022 | 9.08 | 5.92 | 37.40 | | May 16, 2022 09:35 | 134.50 | 17.00 | 25.93 | 8.93 |
| | Jun 05, 2022 | 35.03 | 40.08 | 21.50 | | Jun 07, 2022 10:35 | 188.00 | 41.60 | 50.64 | 9.05 |
| | Jun 08, 2022 | 7.04 | 12.25 | 5.80 | | Jun 09, 2022 04:30 | 111.00 | 14.55 | 18.31 | 3.77 |
| | Jul 18, 2022 | 23.11 | 6.17 | 14.80 | | Jul 18, 2022 07:20 | 209.00 | 54.65 | 62.10 | 7.45 |
| | Jul 24, 2022 | 26.49 | 15.58 | 97.40 | | Jul 24, 2022 22:35 | 269.00 | 79.68 | 88.63 | 8.95 |
| | Aug 03, 2022 | 19.53 | 18.67 | 42.90 | | Aug 04, 2022 15:45 | 208.00 | 51.25 | 59.82 | 8.57 |
| | Aug 17, 2022 | 7.98 | 1.50 | 21.00 | | Aug 17, 2022 14:30 | 216.00 | 57.70 | 66.64 | 8.94 |
| | Aug 21, 2022 | 14.47 | 27.33 | 33.90 | | Aug 22, 2022 14:50 | 187.00 | 37.01 | 45.74 | 8.73 |
| | Aug 25, 2022 | 13.02 | 10.58 | 29.50 | | Aug 25, 2022 12:05 | 158.00 | 20.40 | 29.65 | 9.25 |

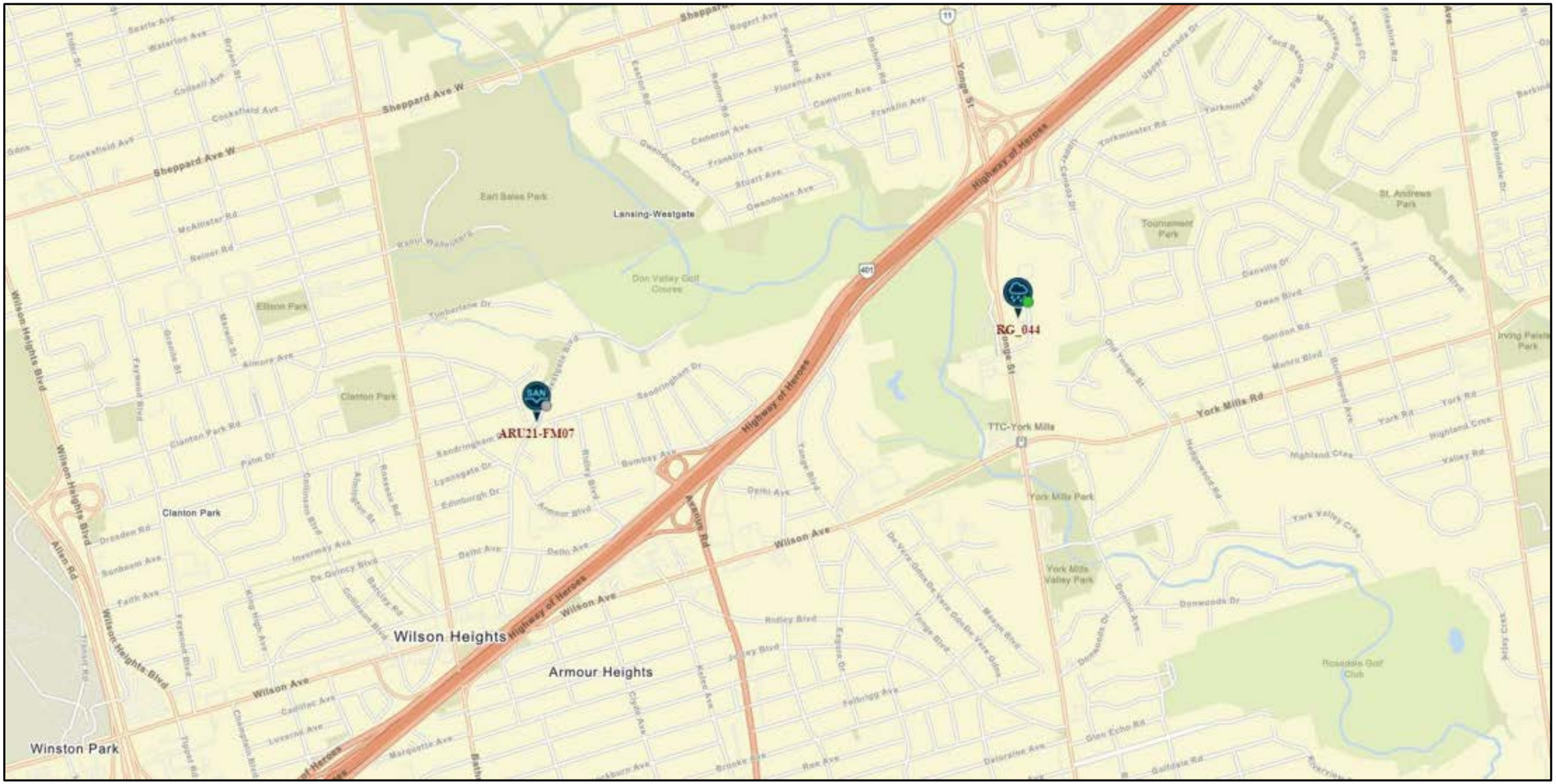
[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours
[2] Time of Measured Peak Flow may not happen at TD

# Activity Log

**Station: ARU21-FM06**

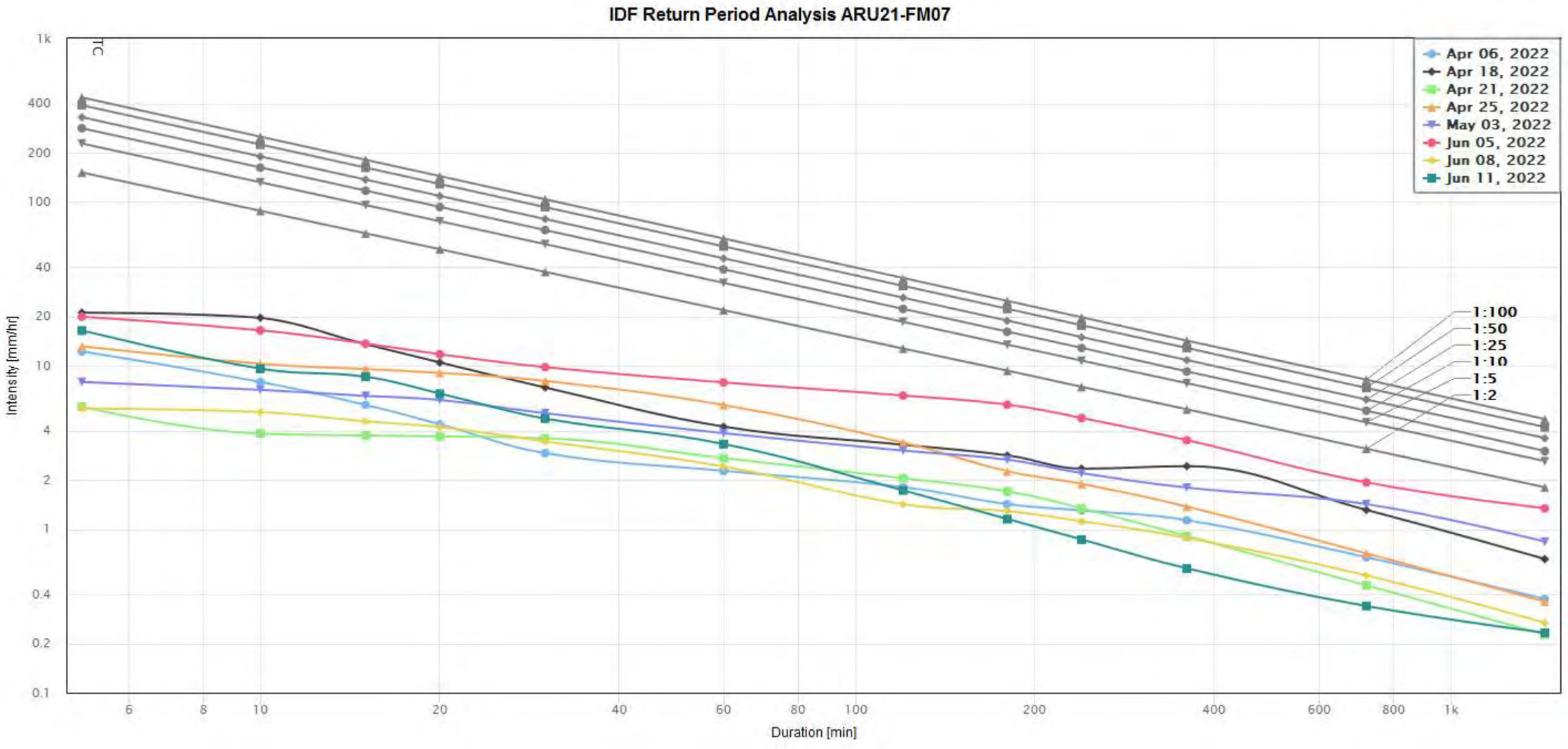
| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 01-Apr-2022 12:30:00 PM | Installation Log | Installation | We caused a leak when we drilled into the wall to install a cso sensor so we drilled a tapcon in to block it. | Yes |
| 19-May-2022 12:17:00 PM | Maintenance Log | CALIBRATION | DATA DOWNLOADED , TELEMETRY SENT | Yes |
| 06-Sep-2022 02:10:00 PM | Removal Log | FM REMOVAL | | Yes |

# Station: ARU21-FM07



# IDF Analysis

**Station: ARU21-FM07**



# IDF Analysis

**Station: ARU21-FM07**

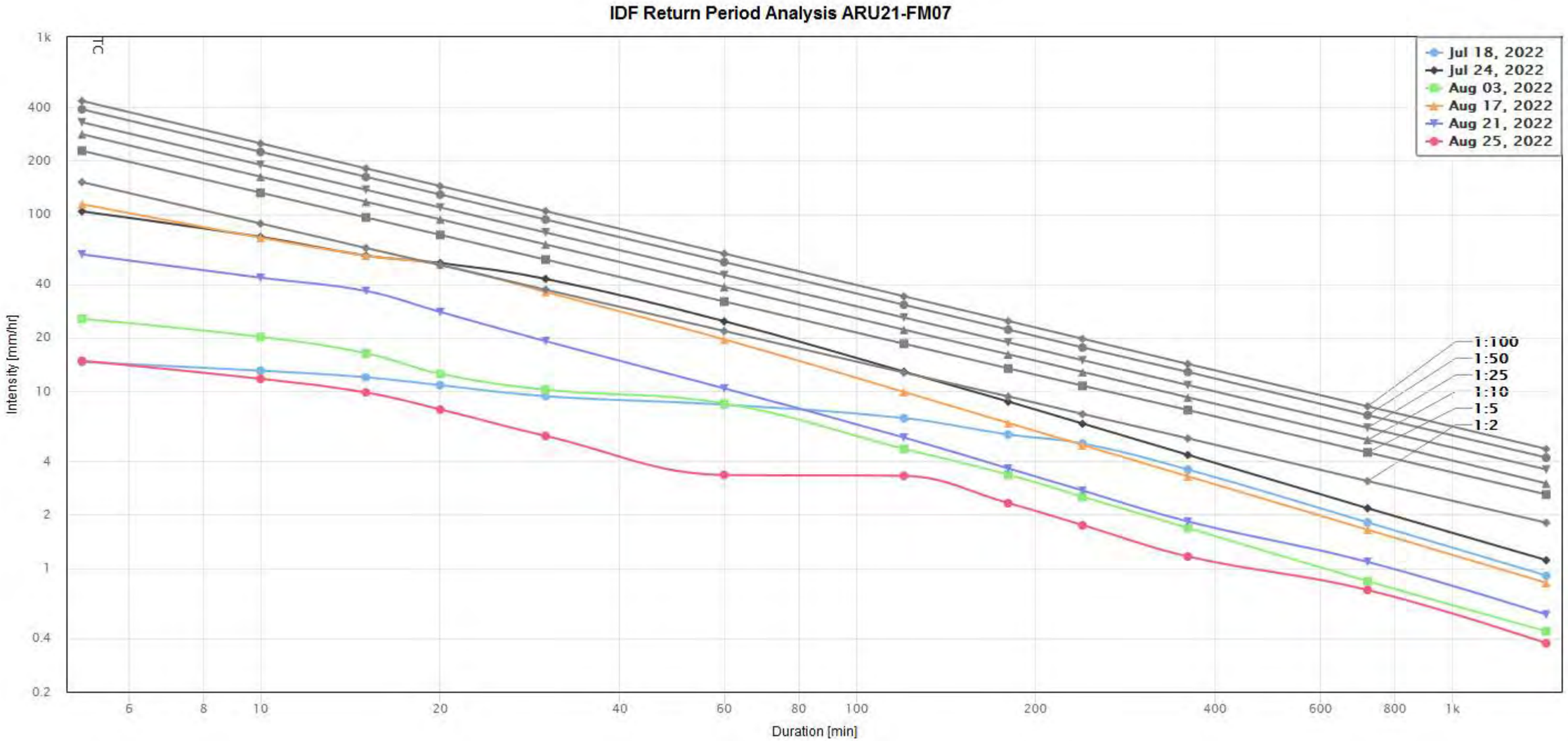


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

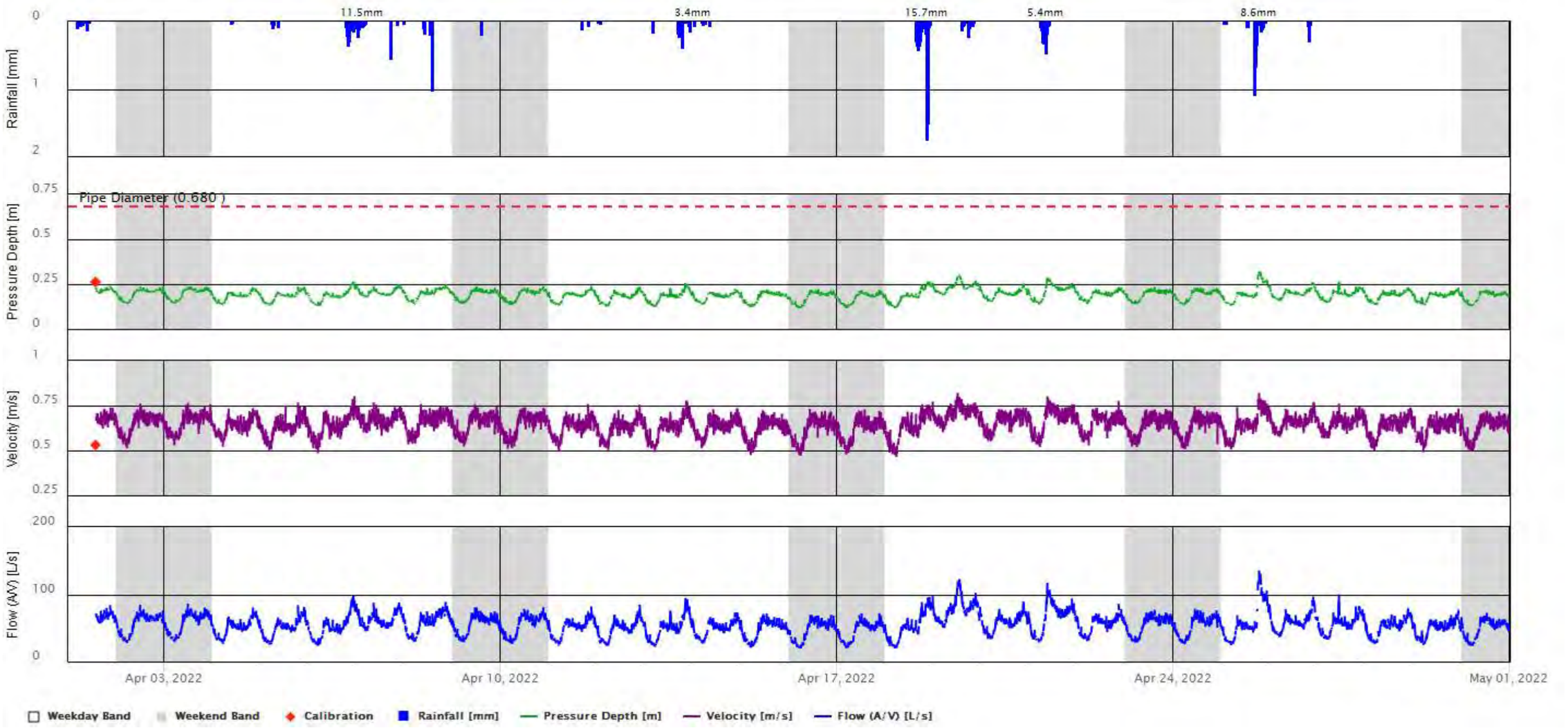
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Apr 06, 2022 | 43.08 | < 2 Yr | 11.50 | 12.22 | 7.93 | 5.74 | 4.37 | 2.91 | 2.27 | 1.81 | 1.42 | 1.30 | 1.13 | 0.67 | 0.37 |
| Apr 18, 2022 | 8.33 | < 2 Yr | 15.73 | 21.08 | 19.60 | 13.50 | 10.43 | 7.35 | 4.23 | 3.28 | 2.82 | 2.34 | 2.43 | 1.31 | 0.66 |
| Apr 21, 2022 | 4.92 | < 2 Yr | 5.44 | 5.60 | 3.84 | 3.74 | 3.69 | 3.59 | 2.71 | 2.05 | 1.70 | 1.34 | 0.91 | 0.45 | 0.23 |
| Apr 25, 2022 | 21.25 | < 2 Yr | 8.63 | 13.13 | 10.25 | 9.52 | 9.03 | 8.06 | 5.73 | 3.38 | 2.26 | 1.89 | 1.37 | 0.71 | 0.36 |
| May 03, 2022 | 18.00 | < 2 Yr | 20.10 | 7.94 | 7.10 | 6.52 | 6.16 | 5.12 | 3.86 | 3.02 | 2.66 | 2.20 | 1.79 | 1.42 | 0.84 |
| Jun 05, 2022 | 40.08 | < 2 Yr | 33.73 | 19.91 | 16.43 | 13.64 | 11.73 | 9.78 | 7.89 | 6.56 | 5.76 | 4.78 | 3.50 | 1.93 | 1.34 |
| Jun 08, 2022 | 12.25 | < 2 Yr | 6.41 | 5.47 | 5.20 | 4.56 | 4.20 | 3.44 | 2.41 | 1.42 | 1.29 | 1.11 | 0.88 | 0.52 | 0.27 |
| Jun 11, 2022 | 19.17 | < 2 Yr | 5.58 | 16.39 | 9.56 | 8.54 | 6.74 | 4.75 | 3.31 | 1.73 | 1.15 | 0.86 | 0.58 | 0.34 | 0.23 |
| Jul 18, 2022 | 6.75 | < 2 Yr | 21.71 | 14.59 | 13.03 | 11.96 | 10.79 | 9.35 | 8.37 | 7.03 | 5.67 | 5.04 | 3.60 | 1.81 | 0.90 |
| Jul 24, 2022 | 16.75 | < 2 Yr | 26.54 | 103.52 | 74.22 | 58.21 | 52.85 | 43.02 | 24.76 | 12.86 | 8.70 | 6.53 | 4.35 | 2.18 | 1.11 |
| Aug 03, 2022 | 18.58 | < 2 Yr | 10.53 | 25.61 | 20.21 | 16.34 | 12.50 | 10.18 | 8.50 | 4.71 | 3.36 | 2.52 | 1.68 | 0.84 | 0.44 |
| Aug 17, 2022 | 1.33 | < 2 Yr | 19.75 | 113.76 | 73.41 | 58.18 | 51.78 | 36.28 | 19.53 | 9.87 | 6.58 | 4.94 | 3.29 | 1.65 | 0.82 |
| Aug 21, 2022 | 27.33 | < 2 Yr | 13.19 | 59.18 | 43.64 | 36.74 | 27.94 | 19.14 | 10.33 | 5.46 | 3.64 | 2.73 | 1.83 | 1.08 | 0.55 |
| Aug 25, 2022 | 10.67 | < 2 Yr | 9.02 | 14.83 | 11.71 | 9.81 | 7.86 | 5.58 | 3.36 | 3.32 | 2.32 | 1.74 | 1.16 | 0.75 | 0.38 |

# Data Chart

**Station: ARU21-FM07**

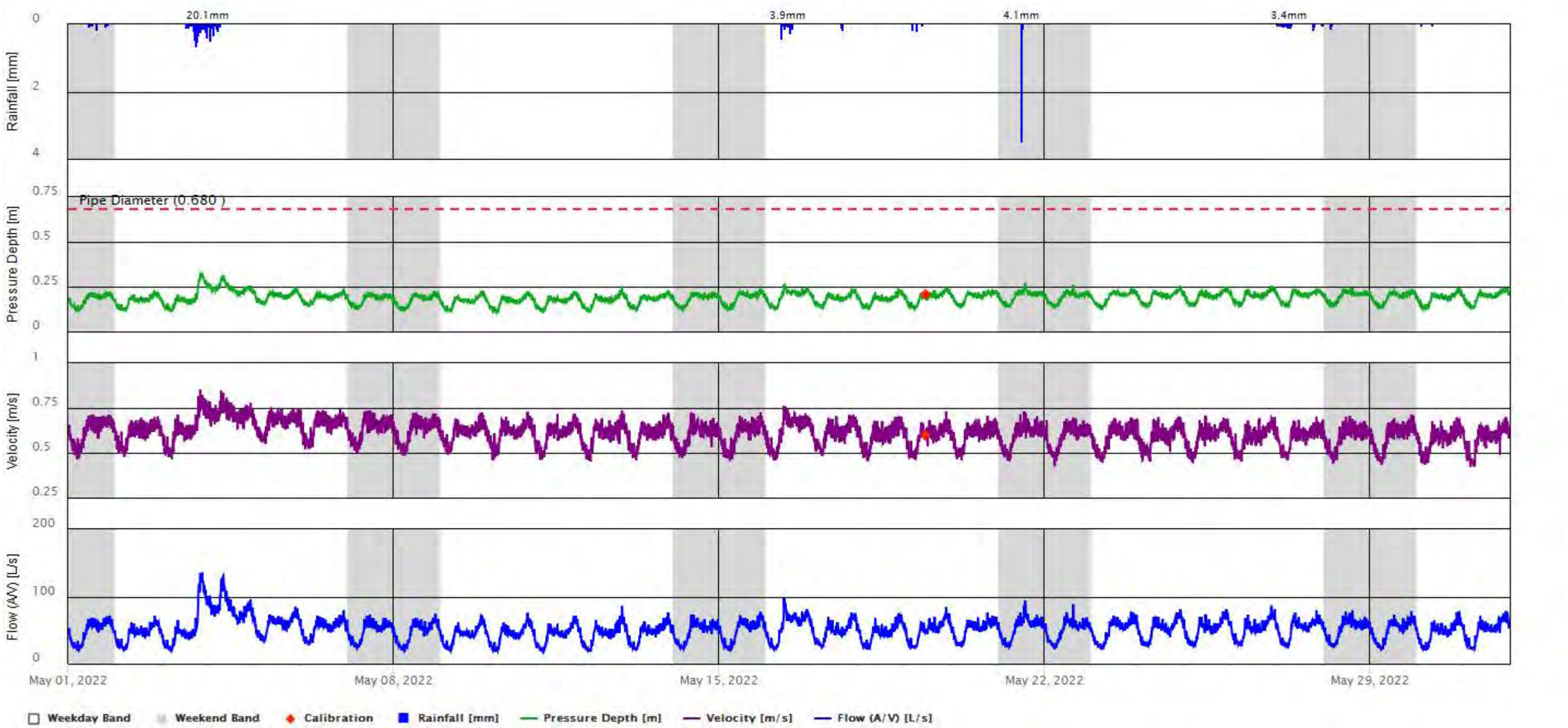
Apr 01, 2022 – Apr 30, 2022



# Data Chart

**Station: ARU21-FM07**

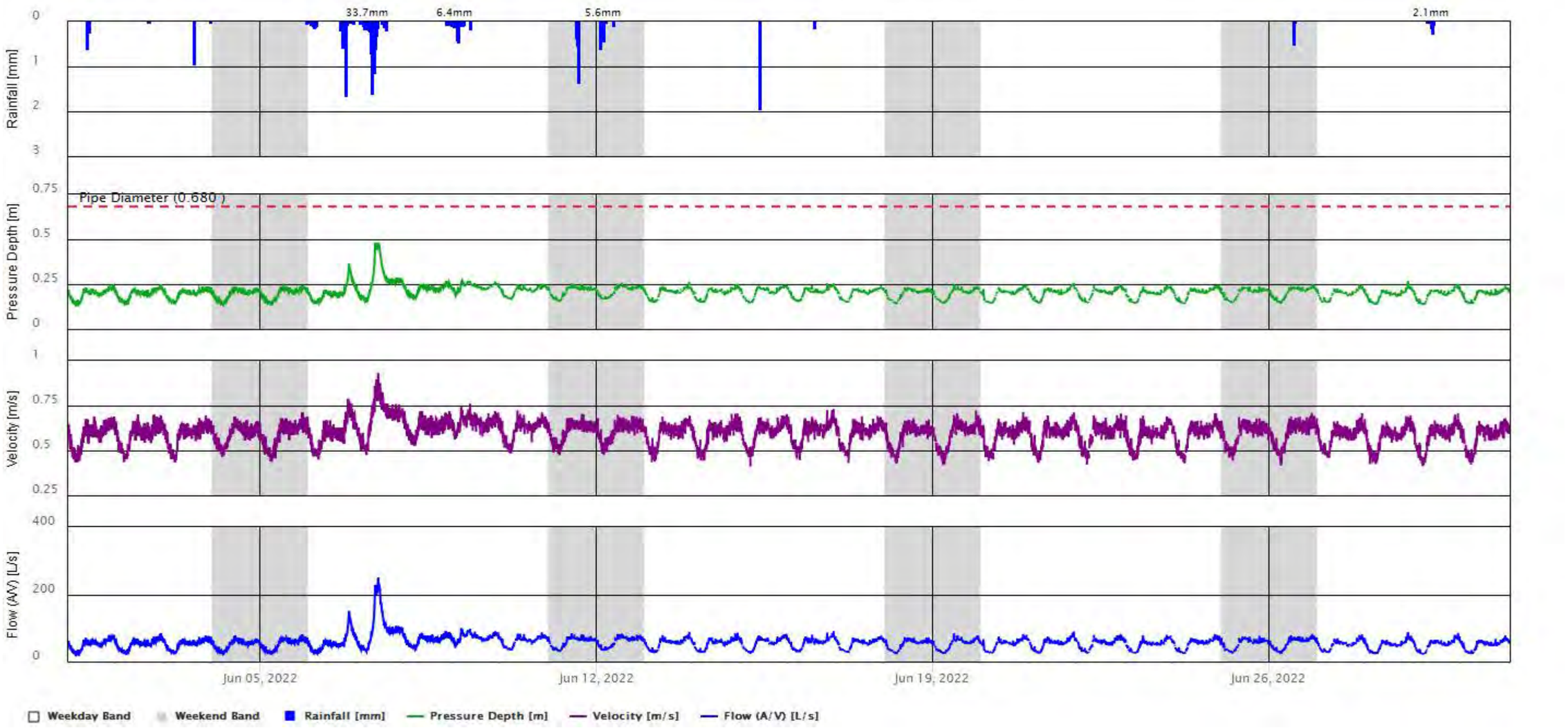
May 01, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM07**

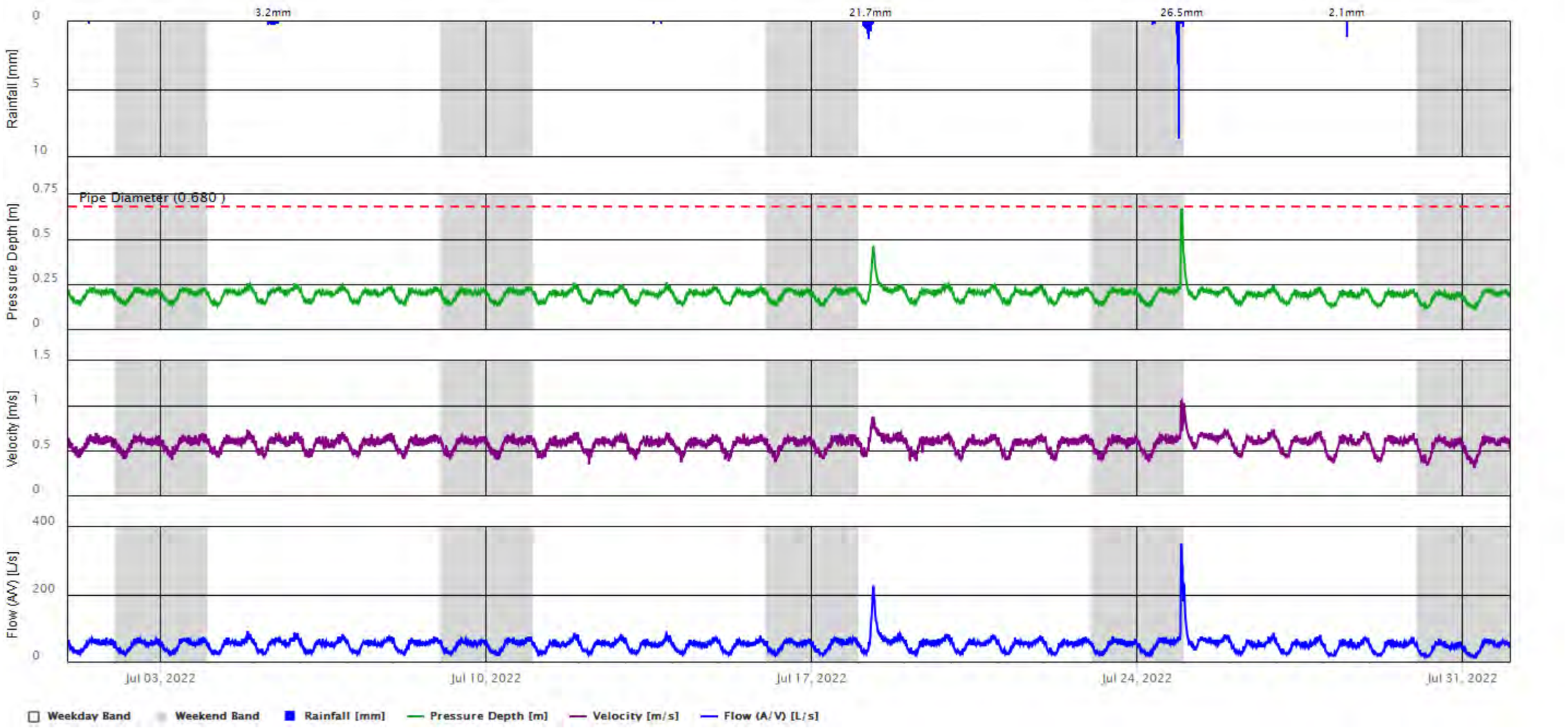
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM07**

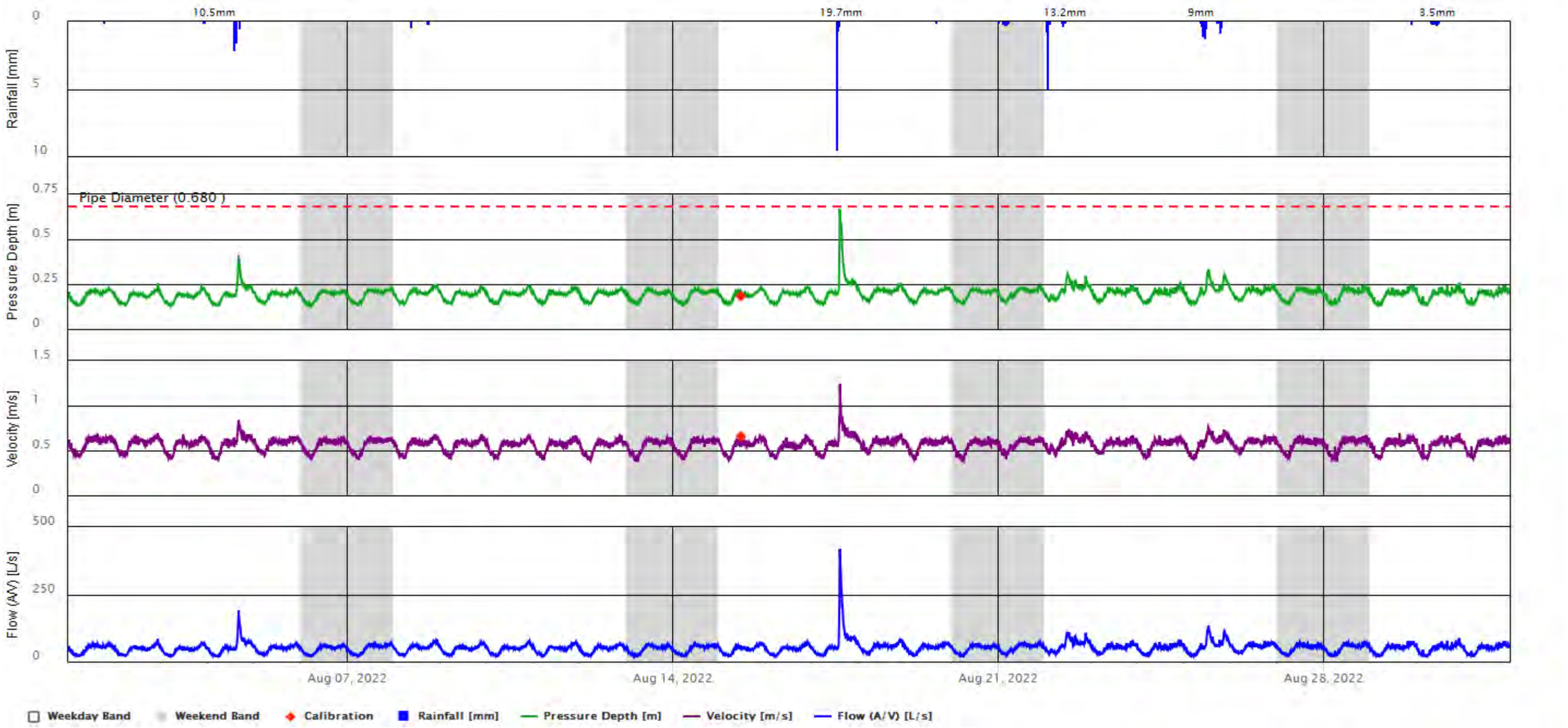
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM07**

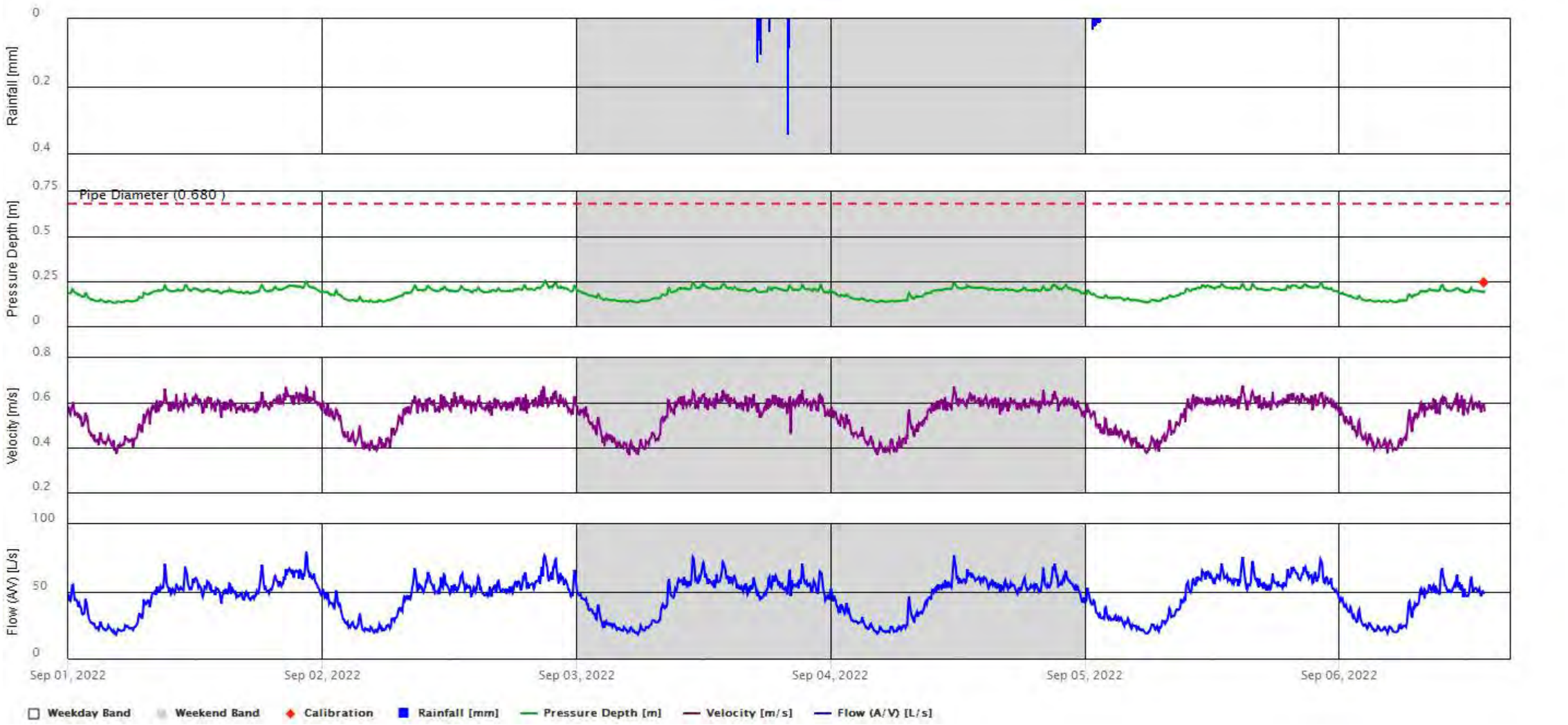
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM07**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM07**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.11 | 0.19 | 0.67 | Tue May 10, 2022 05:00 | Wed Aug 17, 2022 14:10 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume ($m^3$) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 12.01 | 52.02 | 418.38 | 710170 | Sun Jul 31, 2022 05:55 | Wed Aug 17, 2022 14:15 |

## Precipitation

| Date From | Date To | Days | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.01 | 9.48 | 256.96 | Wed Aug 17, 2022 12:55 |

## Velocity

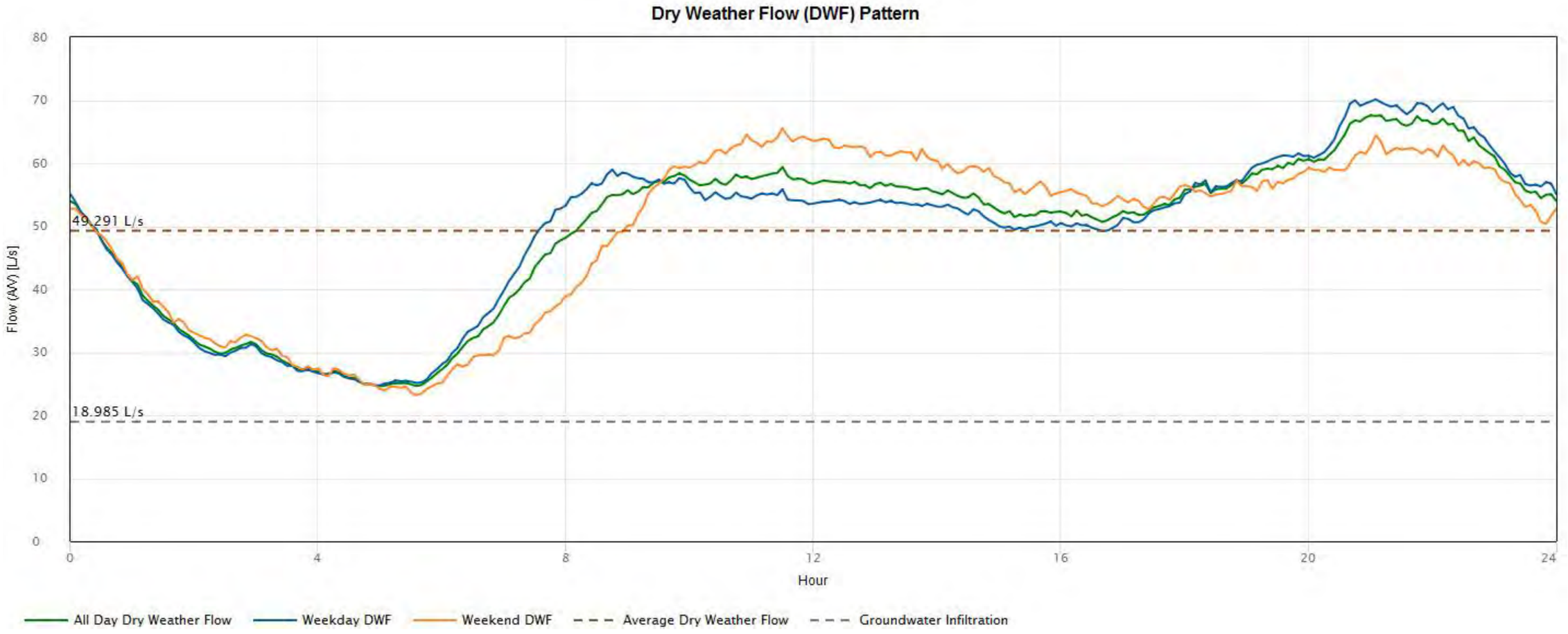
| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| Apr 01, 2022 | Sep 06, 2022 | 159 | 0.30 | 0.60 | 1.24 | Sun Jul 31, 2022 05:55 | Wed Aug 17, 2022 14:15 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Sanitary Report

**Station: ARU21-FM07**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 49.291 | 226.467 | 22.336 | 77.349 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 1.569 | 18.985 | 4,902.339 | 38.517 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM07**

| Measured Storms | | | | | Flow KPIs | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ARU21-FM07 | | | | |
| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[2] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| | Apr 06, 2022 | 11.50 | 43.08 | 12.20 | | Apr 07, 2022 01:05 | 265.00 | 39.02 | 98.61 | 39.06 |
| | Apr 18, 2022 | 15.73 | 8.33 | 21.10 | | Apr 19, 2022 11:45 | 265.00 | 50.71 | 103.23 | 52.52 |
| | Apr 21, 2022 | 5.44 | 4.92 | 5.60 | | Apr 21, 2022 09:05 | 289.00 | 61.36 | 117.16 | 55.79 |
| | Apr 25, 2022 | 8.63 | 21.25 | 13.10 | | Apr 25, 2022 18:45 | 321.00 | 78.59 | 135.51 | 56.92 |
| | May 03, 2022 | 20.10 | 18.00 | 7.90 | | May 04, 2022 06:55 | 325.00 | 86.89 | 135.63 | 38.74 |
| | Jun 05, 2022 | 33.72 | 40.08 | 19.90 | | Jun 07, 2022 10:50 | 482.00 | 191.28 | 248.90 | 57.62 |
| | Jun 08, 2022 | 6.41 | 12.25 | 5.50 | | Jun 09, 2022 04:50 | 270.00 | 67.19 | 97.64 | 27.24 |
| | Jun 11, 2022 | 5.58 | 19.17 | 16.40 | | Jun 11, 2022 16:20 | 258.00 | 24.79 | 83.81 | 55.66 |
| | Jul 18, 2022 | 21.71 | 6.75 | 14.60 | | Jul 18, 2022 07:35 | 457.00 | 178.61 | 225.25 | 46.64 |
| | Jul 24, 2022 | 26.54 | 16.75 | 103.50 | | Jul 24, 2022 22:25 | 670.00 | 289.44 | 348.64 | 59.20 |
| | Aug 03, 2022 | 10.53 | 18.58 | 25.60 | | Aug 04, 2022 15:55 | 410.00 | 140.75 | 189.97 | 49.22 |
| | Aug 17, 2022 | 19.75 | 1.33 | 113.80 | | Aug 17, 2022 14:15 | 670.00 | 366.70 | 418.38 | 51.68 |
| | Aug 21, 2022 | 13.19 | 27.33 | 59.20 | | Aug 22, 2022 11:35 | 303.00 | 57.99 | 110.55 | 52.56 |
| | Aug 25, 2022 | 9.02 | 10.67 | 14.80 | | Aug 25, 2022 12:35 | 332.00 | 81.68 | 133.25 | 51.57 |

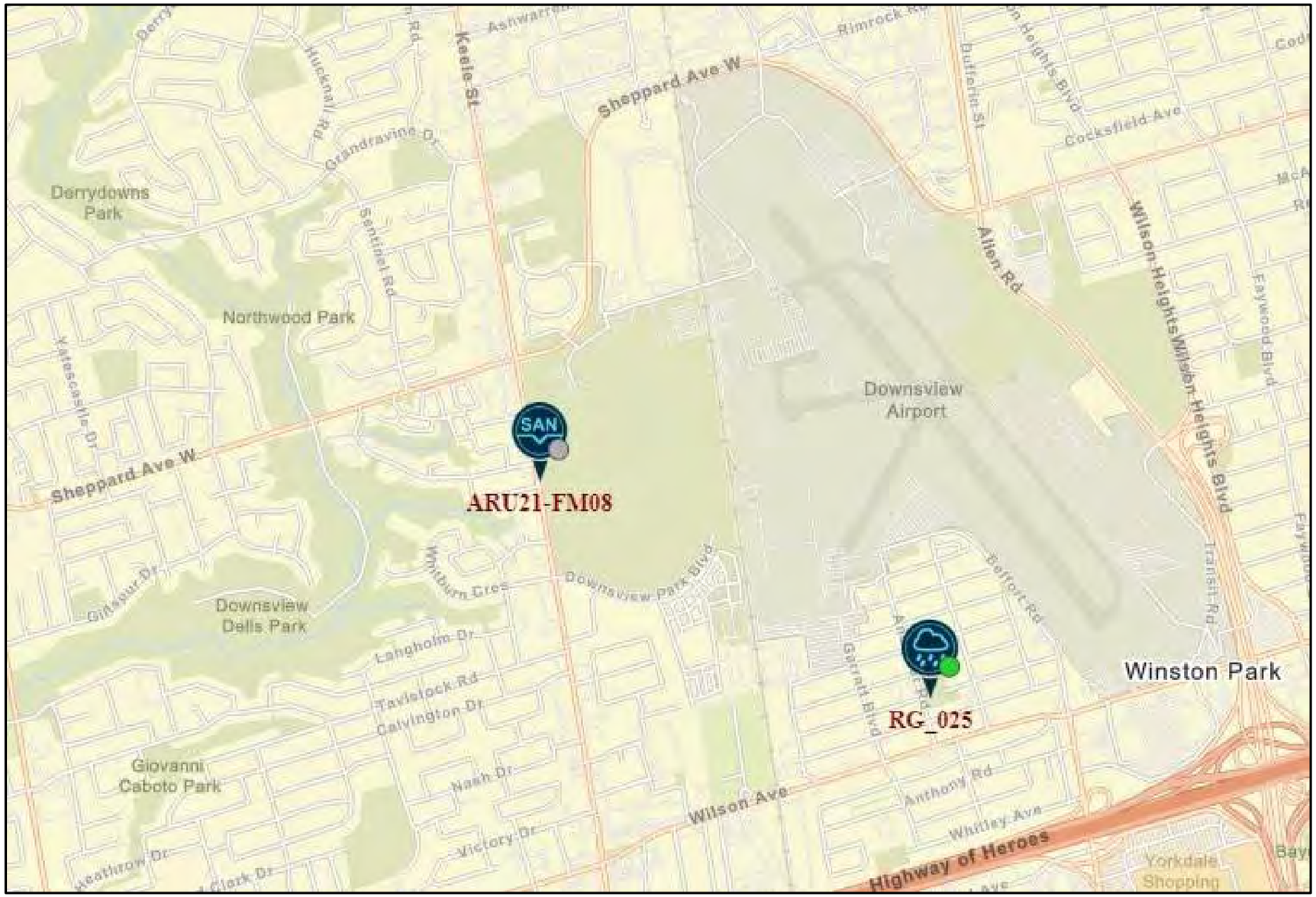
[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours
[2] Time of Measured Peak Flow may not happen at TD

# Activity Log

**Station: ARU21-FM07**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 01-Apr-2022 01:55:00 PM | Installation Log | Installation | AV + CSO INSTALLED<br>PMAC ID: 8074 | Yes |
| 19-May-2022 10:38:00 AM | Maintenance Log | CALIBRATION | DATA DOWNLOADED, TELEMETRY SENT | Yes |
| 15-Aug-2022 11:13:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 06-Sep-2022 01:40:00 PM | Removal Log | FM Removal | REMOVED ALL EQUIPMENT(LOGGER, SENSORS, RING, HARDWARE) FROM MANHOLE. | Yes |

# Station: ARU21-FM08



# IDF Analysis

**Station: ARU21-FM08**

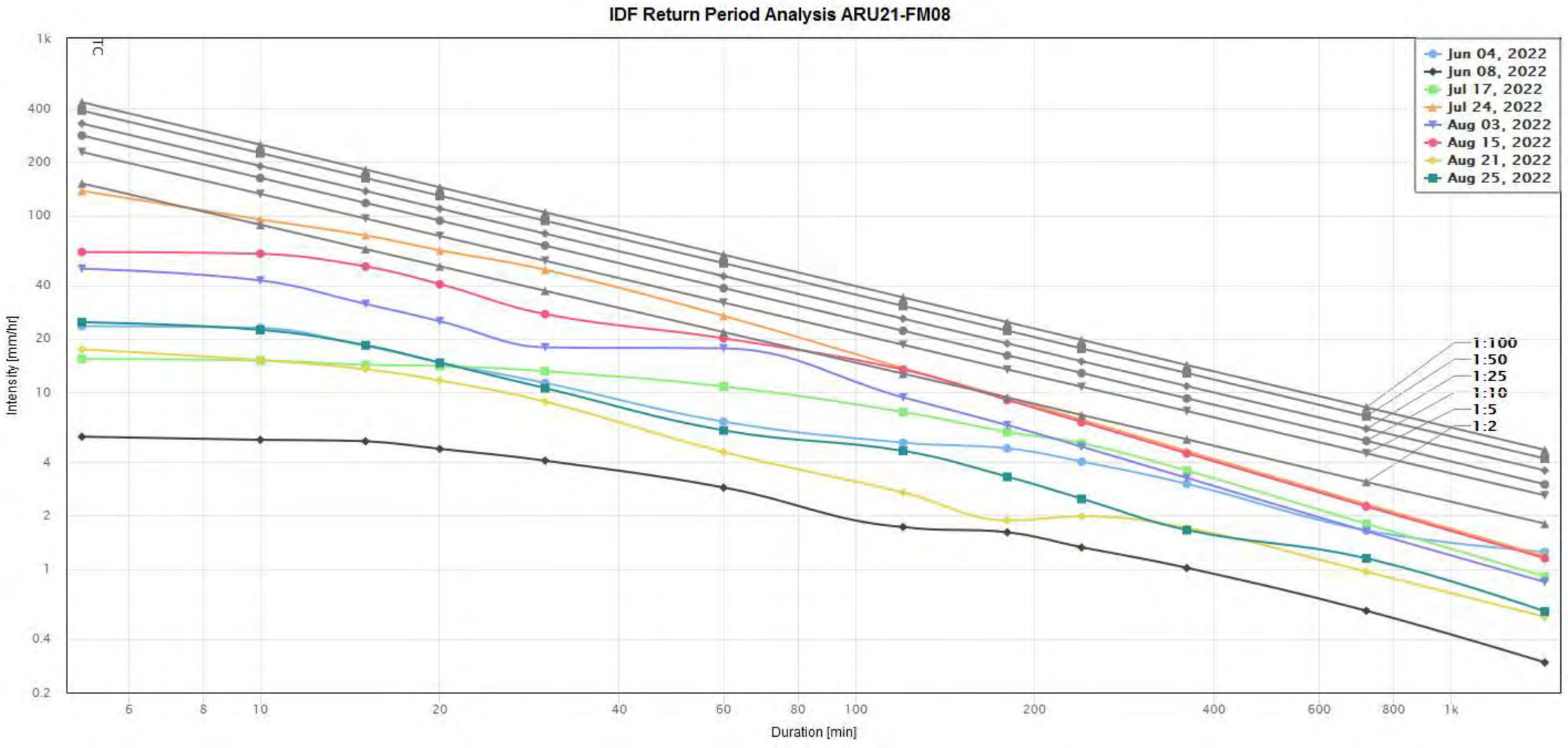


**Table 1:** Toronto Wastewater Treatment Plant (2019) IDF Design Storm

| Event | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| 2 Year Storm | 151.40 | 88.20 | 64.30 | 51.40 | 37.40 | 21.80 | 12.70 | 9.30 | 7.40 | 5.40 | 3.10 | 1.80 |
| 5 Year Storm | 227.90 | 131.80 | 95.70 | 76.20 | 55.30 | 32.00 | 18.50 | 13.40 | 10.70 | 7.80 | 4.50 | 2.60 |
| 10 Year Storm | 282.50 | 162.30 | 117.30 | 93.20 | 67.40 | 38.70 | 22.20 | 16.10 | 12.80 | 9.20 | 5.30 | 3.00 |
| 25 Year Storm | 330.00 | 189.50 | 137.00 | 108.90 | 78.70 | 45.20 | 26.00 | 18.80 | 14.90 | 10.80 | 6.20 | 3.60 |
| 50 Year Storm | 390.60 | 224.30 | 162.20 | 128.80 | 93.10 | 53.50 | 30.70 | 22.20 | 17.60 | 12.80 | 7.30 | 4.20 |
| 100 Year Storm | 435.80 | 250.30 | 181.00 | 143.80 | 103.90 | 59.70 | 34.30 | 24.80 | 19.70 | 14.20 | 8.20 | 4.70 |

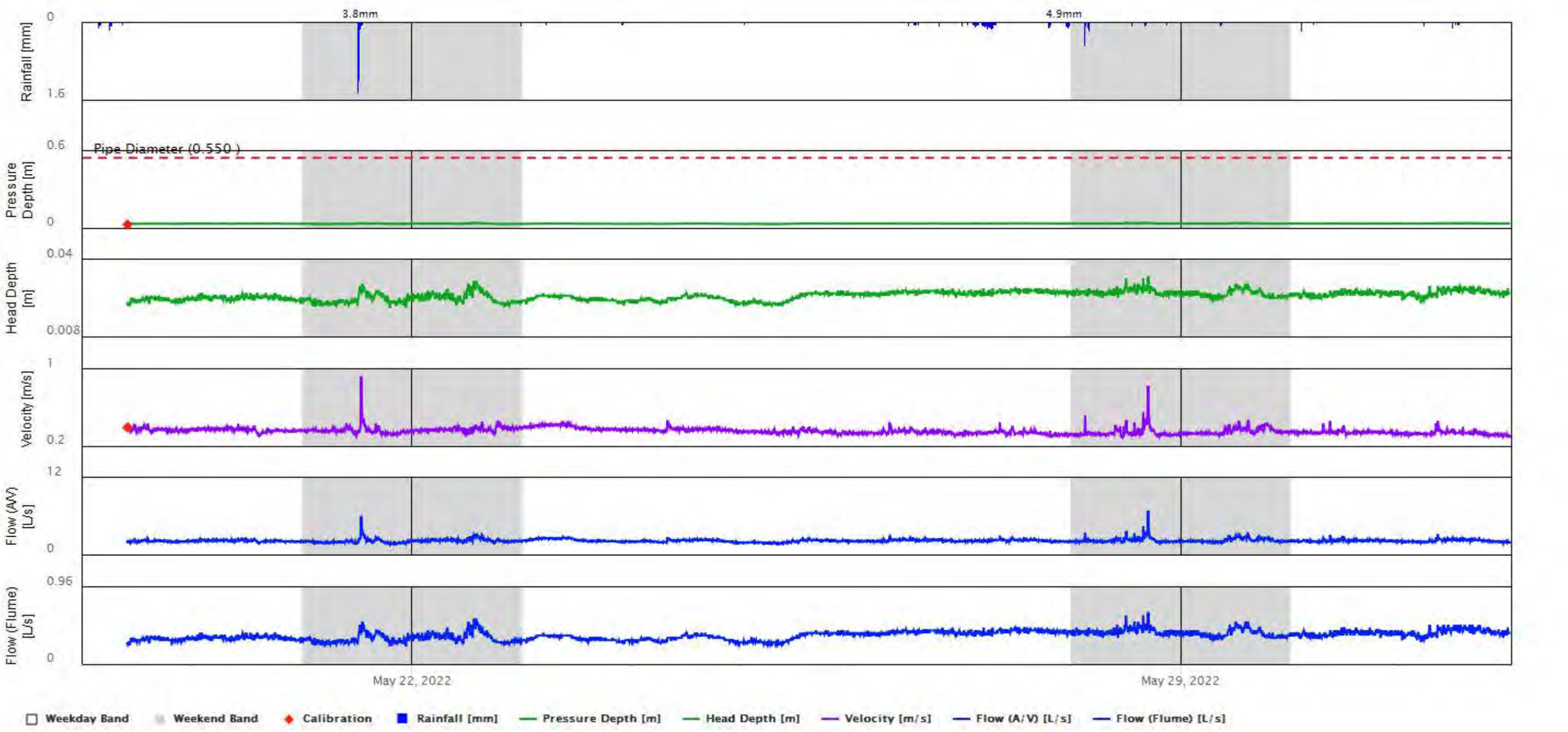
**Table 2:** IDF Return Period Results

| Event | Duration (hrs) | Return Period Over Tc | Total Precipitation (mm) | Peak Intensity at Timestep (mm/hr) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 5 min | 10 min | 15 min | 20 min | 30 min | 60 min | 120 min | 180 min | 240 min | 360 min | 720 min | 1440 min |
| Jun 04, 2022 | 65.50 | < 2 Yr | 32.78 | 23.60 | 23.08 | 18.25 | 14.69 | 11.27 | 6.79 | 5.17 | 4.80 | 4.04 | 3.02 | 1.65 | 1.25 |
| Jun 08, 2022 | 19.33 | < 2 Yr | 7.09 | 5.59 | 5.37 | 5.27 | 4.77 | 4.09 | 2.88 | 1.73 | 1.61 | 1.32 | 1.01 | 0.58 | 0.30 |
| Jul 17, 2022 | 27.42 | < 2 Yr | 21.71 | 15.40 | 15.09 | 14.26 | 14.04 | 13.12 | 10.75 | 7.72 | 5.93 | 5.13 | 3.59 | 1.80 | 0.90 |
| Jul 24, 2022 | 15.58 | < 2 Yr | 28.23 | 137.33 | 94.43 | 76.86 | 63.25 | 49.19 | 26.92 | 13.63 | 9.27 | 6.95 | 4.63 | 2.32 | 1.18 |
| Aug 03, 2022 | 21.08 | < 2 Yr | 20.19 | 49.86 | 42.76 | 31.47 | 25.14 | 17.90 | 17.67 | 9.32 | 6.49 | 4.89 | 3.26 | 1.63 | 0.84 |
| Aug 15, 2022 | 44.17 | < 2 Yr | 27.70 | 61.96 | 60.60 | 51.34 | 40.73 | 27.60 | 20.12 | 13.40 | 9.00 | 6.75 | 4.50 | 2.25 | 1.15 |
| Aug 21, 2022 | 28.42 | < 2 Yr | 13.04 | 17.45 | 15.17 | 13.46 | 11.63 | 8.83 | 4.57 | 2.70 | 1.88 | 1.98 | 1.70 | 0.96 | 0.53 |
| Aug 25, 2022 | 10.50 | < 2 Yr | 13.77 | 24.86 | 22.48 | 18.41 | 14.63 | 10.52 | 6.06 | 4.65 | 3.31 | 2.49 | 1.66 | 1.15 | 0.57 |

# Data Chart

**Station: ARU21-FM08**

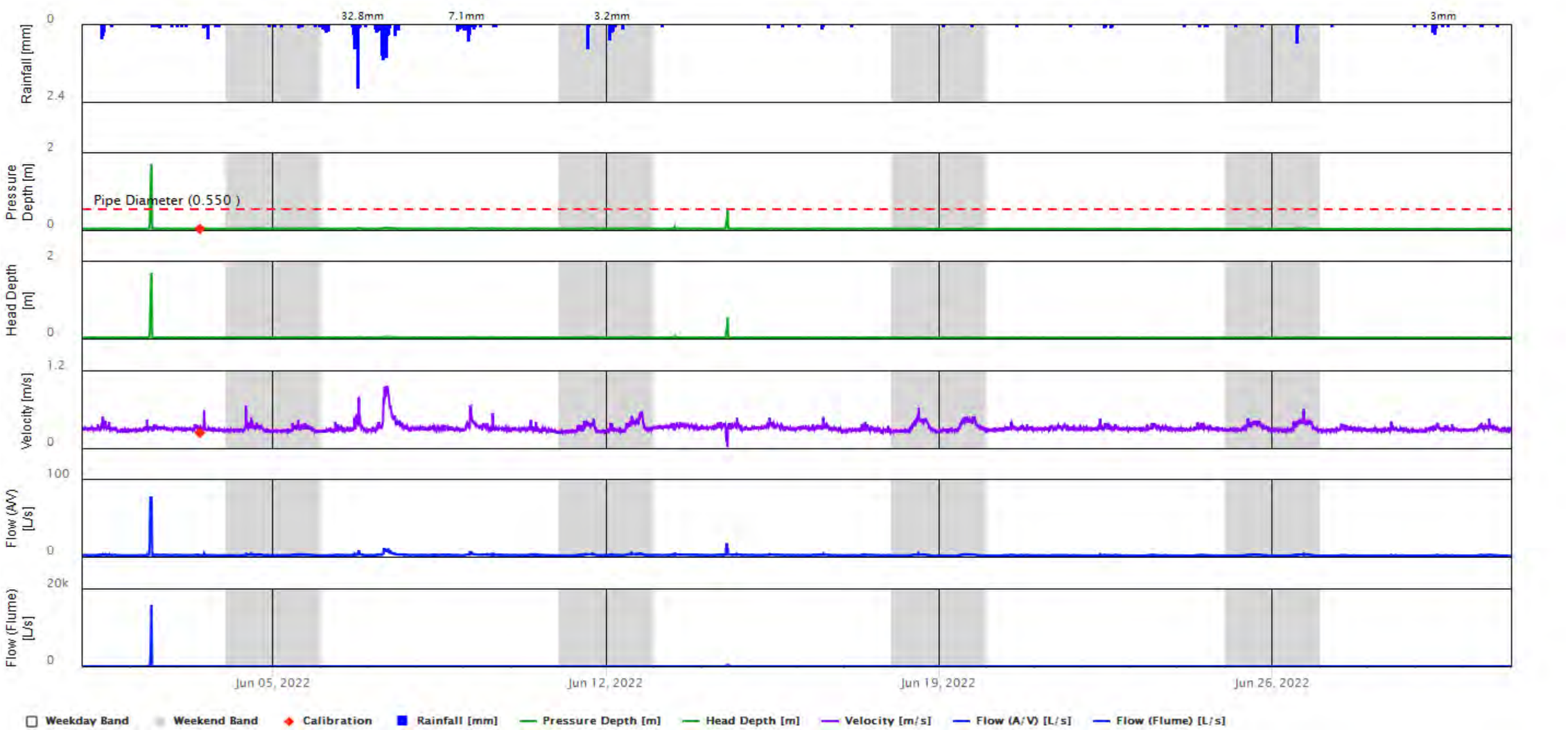
May 19, 2022 – May 31, 2022



# Data Chart

**Station: ARU21-FM08**

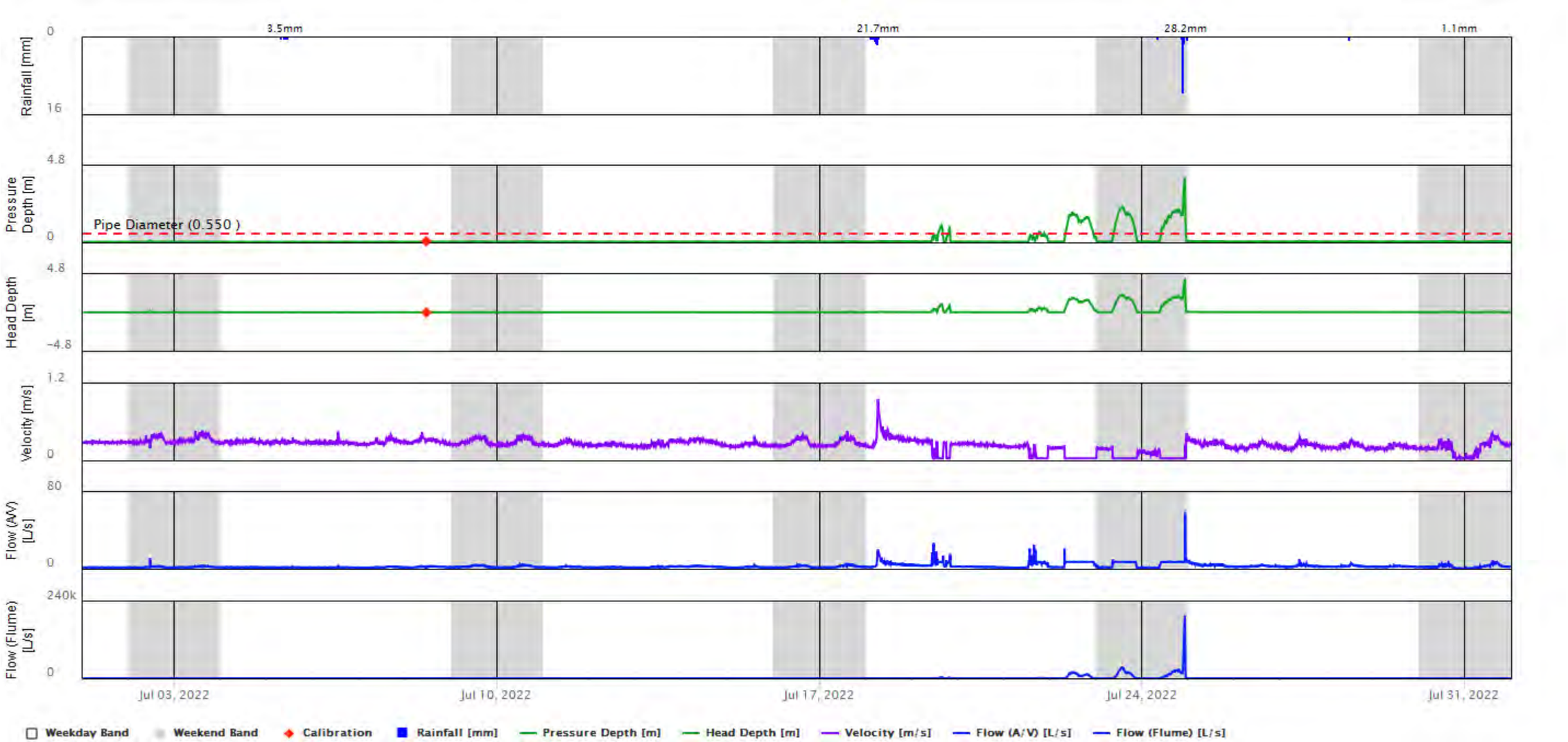
Jun 01, 2022 – Jun 30, 2022



# Data Chart

**Station: ARU21-FM08**

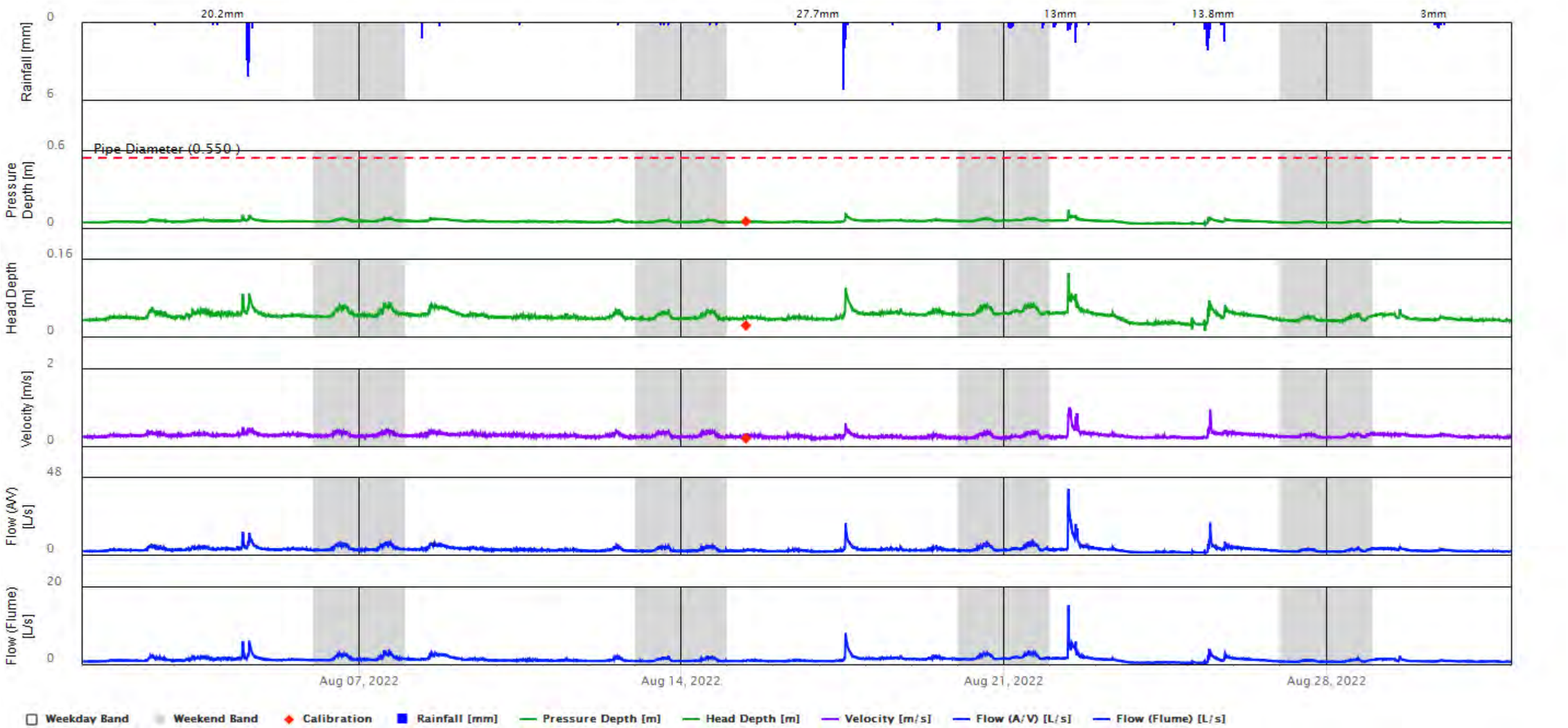
Jul 01, 2022 – Jul 31, 2022



# Data Chart

**Station: ARU21-FM08**

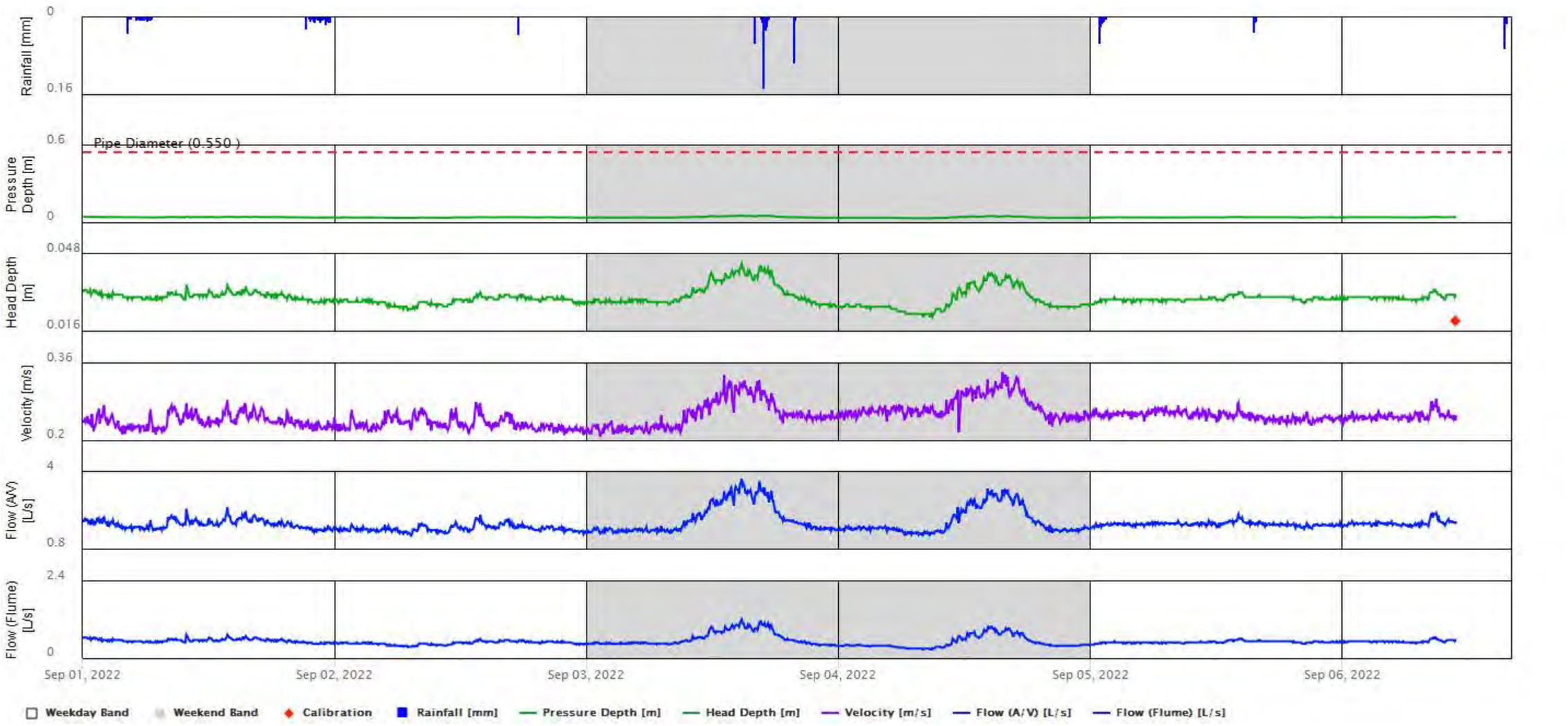
Aug 01, 2022 – Aug 31, 2022



# Data Chart

**Station: ARU21-FM08**

Sep 01, 2022 – Sep 06, 2022



# Aggregate Data

**Station: ARU21-FM08**

## Level

| Date From | Date To | Days | Min (m) | Avg (m) | Max (m) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| May 19, 2022 | Sep 06, 2022 | 111 | 0.00 | 0.07 | 4.03 | Fri Jul 08, 2022 10:45 | Sun Jul 24, 2022 22:05 |

## Flow

| Date From | Date To | Days | Min (L/s) | Avg (L/s) | Max (L/s) | Total Volume (m3) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|---|
| May 19, 2022 | Sep 06, 2022 | 111 | 0.05 | 2.56 | 77.06 | 24310 | Fri Jul 08, 2022 10:45 | Thu Jun 02, 2022 10:05 |

## Precipitation

| Date From | Date To | Days | Avg (mm) | Max (mm) | Sum (mm) | Time of Max[1] |
|---|---|---|---|---|---|---|
| May 19, 2022 | Sep 06, 2022 | 111 | 0.01 | 11.44 | 213.73 | Sun Jul 24, 2022 21:05 |

## Velocity

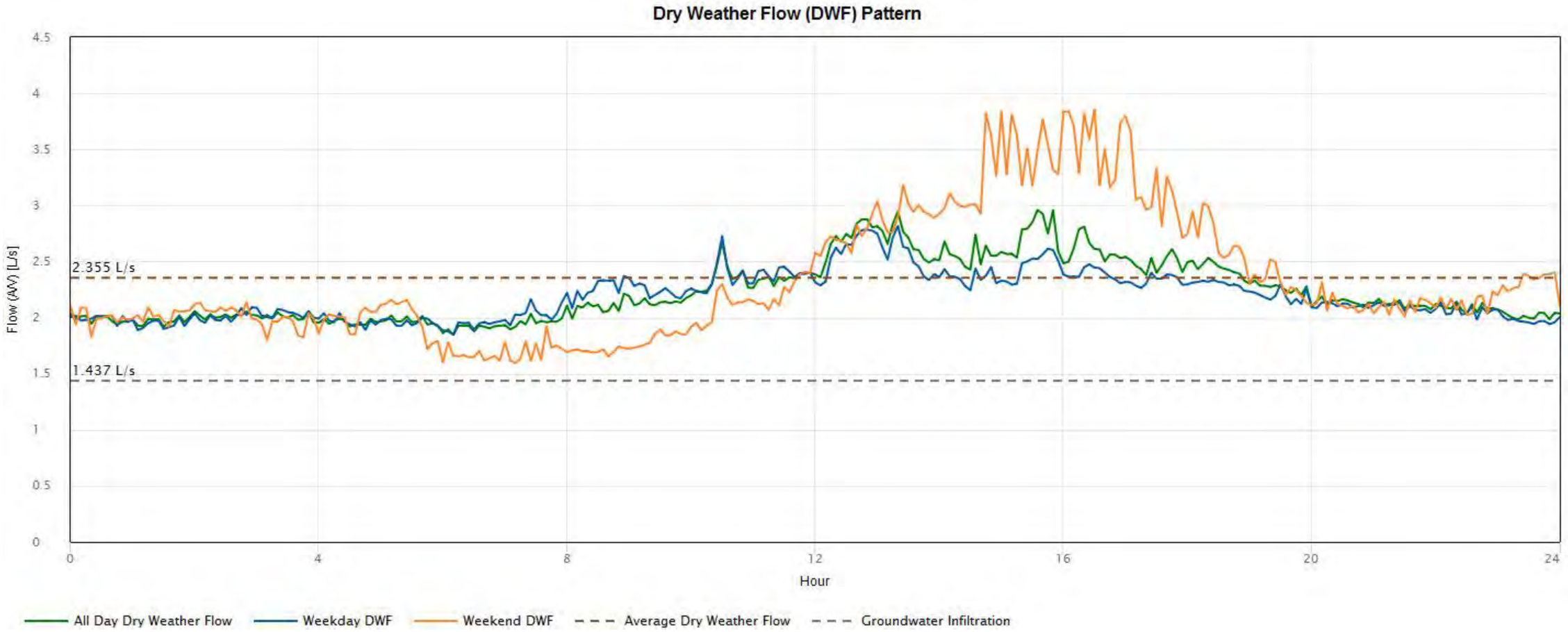
| Date From | Date To | Days | Min (m/s) | Avg (m/s) | Max (m/s) | Time of Min[1] | Time of Max[1] |
|---|---|---|---|---|---|---|---|
| May 19, 2022 | Sep 06, 2022 | 111 | 0.03 | 0.28 | 0.99 | Tue Jul 19, 2022 14:35 | Mon Aug 22, 2022 10:20 |

[1] Time of Min and Time of Max will be displayed by first occurrence

# Sanitary Report

**Station: ARU21-FM08**

| Average Dry Weather Flow (L/s) | Average Dry Weather Flow (L/c/d) | Average Daily Minimum Dry Weather Flow (L/s) | Average Daily Peak Dry Weather Flow (L/s) |
|---|---|---|---|
| 2.355 | 2,906.676 | 1.690 | 5.169 |
| **Peaking Factor** | **Groundwater Infiltration (L/s)[1]** | **Groundwater Infiltration (L/ha/d)** | **% of GWI in Average DWF** |
| 2.195 | 1.437 | 1,753.489 | 61.016 |




[1] Groundwater infiltration (GWI) is assumed as 85% of the daily minimum flow averaged over the monitoring period

# I/I Analysis Table

**Station: ARU21-FM08**

| | Event[1] | Total Precipitation (mm) | Duration (hours) | Peak Intensity Over Tc at Station (mm/hr) | | ARU21-FM08 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Time of Peak I/I Flow (TD) (date) | Peak Depth (mm) | Peak I/I Flow (L/s) | Measured Peak Flow During Rain Event[3] (L/s) | Estimated Dry Weather Flow at TD (L/s) |
| Measured Storms | Jun 04, 2022 | 32.78 | 65.50 | 23.60 | Flow KPIs | Jun 07, 2022 08:10 | 52.00 | 8.68 | 10.60 | 1.92 |
| | Jun 08, 2022 | 7.09 | 19.33 | 5.60 | | Jun 09, 2022 03:40 | 46.00 | 4.28 | 6.28 | 2.00 |
| | Jul 17, 2022 | 21.71 | 27.42 | 15.40 | | Jul 18, 2022 06:15 | 80.00 | 17.68 | 20.07 | 2.39 |
| | Jul 24, 2022 | 28.23 | 15.58 | 137.30 | | Jul 24, 2022 22:15 | 4,025.50 [2] | 56.39 | 58.68 | 2.29 |
| | Aug 03, 2022 | 20.19 | 21.08 | 49.90 | | Aug 04, 2022 11:25 | 99.00 | 11.16 | 14.13 | 2.97 |
| | Aug 15, 2022 | 27.70 | 44.17 | 62.00 | | Aug 17, 2022 13:25 | 110.00 | 16.59 | 19.74 | 3.14 |
| | Aug 21, 2022 | 13.04 | 28.42 | 17.40 | | Aug 22, 2022 09:30 | 141.00 | 38.33 | 40.95 | 2.62 |
| | Aug 25, 2022 | 13.77 | 10.50 | 24.90 | | Aug 25, 2022 11:20 | 84.00 | 16.88 | 20.01 | 3.13 |

[1] An event is a storm with a minimum volume of 5mm and a minimum inter-event dry period of 12 hours

[2] Captured peak depth is greater than 90% of pipe diameter, pipe containing flow monitor may have experienced surcharge

[3] Time of Measured Peak Flow may not happen at TD

# Activity Log

**Station: ARU21-FM08**

| Date Time | Type | Purpose of Visit | Comment | Calibration Measurement |
|---|---|---|---|---|
| 19-May-2022 10:00:00 AM | Installation Log | INSTALL | INSTALLED AV RING WITH DOWNWARD SENSOR (WOODEN BRACKET), SET MANUAL MEASUREMENTS<br>PMAC ID: 8088 | Yes |
| 03-Jun-2022 11:07:00 AM | Maintenance Log | CALIBRATION | DATA DOWNLOADED<br>SITE CALIBRATED<br>DEBRIS CLEARED<br>SENT TELEMETRY<br>ANTENNA REPLACED | Yes |
| 08-Jul-2022 11:30:00 AM | Installation Log | INSTALL | DATA DOWNLOADED. TELEMTRY SENT. MEASURMENTS TAKEN. FLUME INSTALLED AND LEVELED. SITE CALIBRATED, PHOTOS TAKEN. | Yes |
| 15-Aug-2022 10:00:00 AM | Maintenance Log | CALIBRATION | | Yes |
| 06-Sep-2022 10:49:00 AM | Removal Log | Removal | | Yes |

# Appendix 4: Hydrant Test Results

# 5.0 HYDRANT FLOW TEST REPORTS

## 5.1 Hydrant Flow Test #21 - 134 Gilley Road

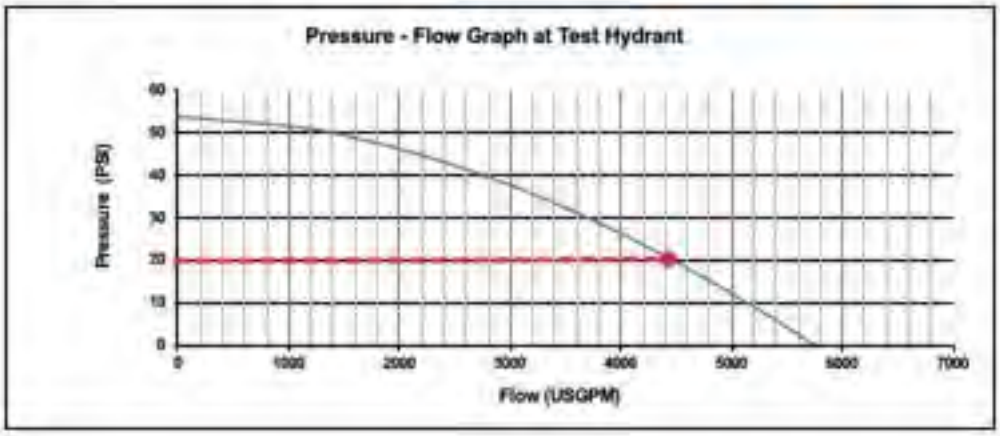
# HYDRANT TEST REPORT

| | | | |
|---|---|---|---|
| **Zone ID** | CITY OF TORONTO | **TEST #** | 21 |
| DATE: | 05-Oct-22 | TIME: | 12:20 PM |
| OPERATOR: | ROB GAMACHE | | |
| R.-TEST HYDRANT | 134 GILLEY ROAD | HYDRANT No. | 4005351 |
| HYDRANT MODEL: | McAVITY | COLOUR: | BLUE |
| STATIC PRESSURE: | 54 | AAWA | 5.56% |
| RESIDUAL PRESSURE: | 51 | | |
| Q - FLOW HYDRANT | Opp 75 GARRATT BLVD | HYDRANT No. | N/A |
| HYDRANT MODEL: | McAvity | COLOUR: | BLUE |

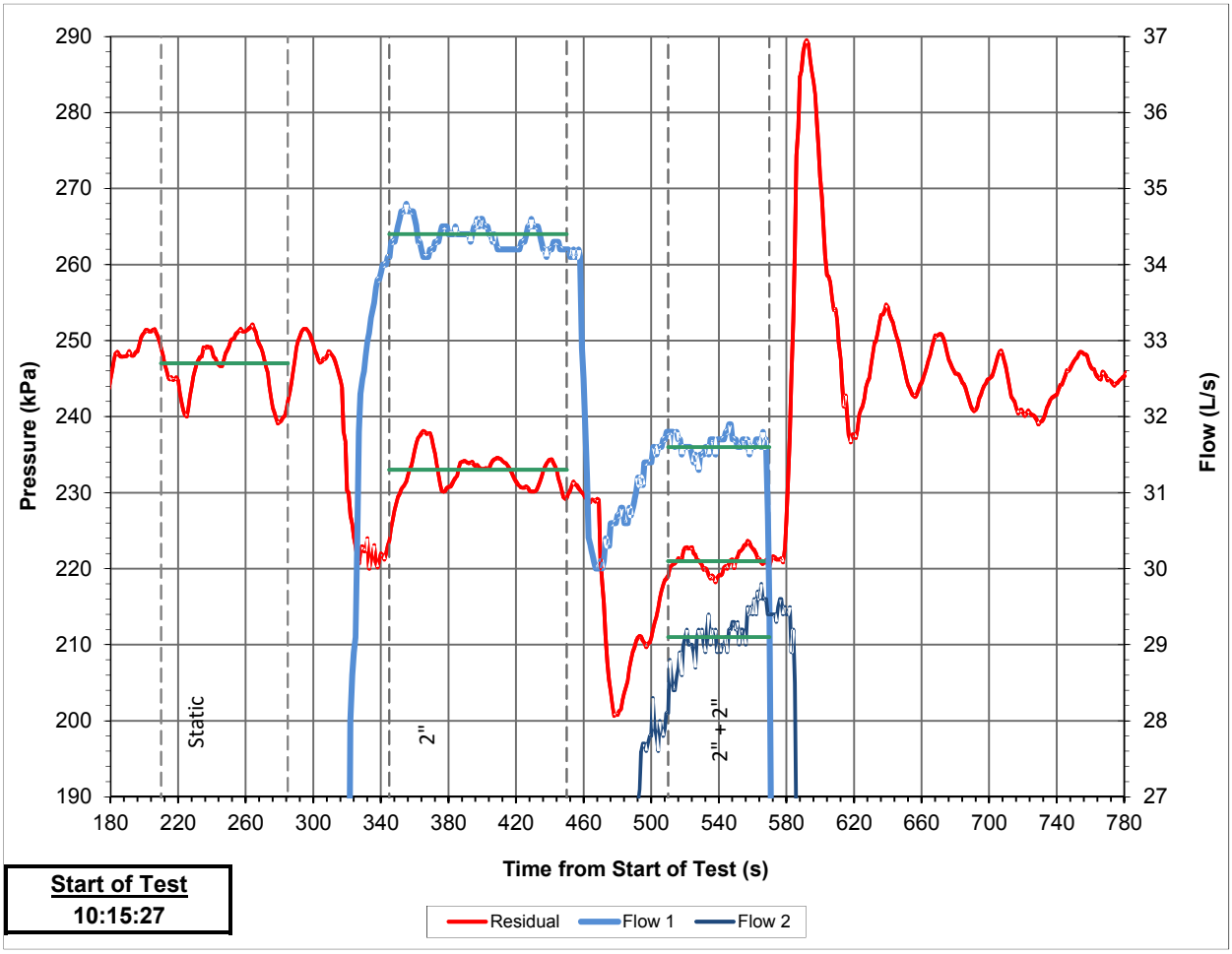
| Logger Type | Outlet Dia. (in.) | Coefficient (~0.9) | Pitot Gauge Reading (psi) | Flow (USGPM) |
|---|---|---|---|---|
| Hose Monster Little Boy | 2 | 1.31 | 15 | 605 |
| Hose Monster Little Boy | 2 | 1.31 | 15 | 605 |
| | | | | |
| | | | | |
| | | | | |
| | | Total Flow (USGPM) | | 1211 |

| | | | | |
|---|---|---|---|---|
| PROJECTED Flow @ 20 psi | 4492 | USGPM | 3712 | KPM |
| | 283 | L/s | | |

| NFPA Rating: | CLASS AA - BLUE |
|---|---|



# Test 11 - 289 Downsview Park HY33059




| Subject Watermain Details | | | | Subject Hydrant & Valve Details | |
|---|---|---|---|---|---|
| **Diameter:** | 300 mm | **Material:** | PVC | **Residual Hydrant:** | HY33059 |
| **Area:** | 0.071 m2 | | | **Flow Hydrant:** | HY33061 |

**TABLE A: TESTED PRESSURES AND FLOWS**

| Point | Time | | Residual | | Flow Hydrant (HY33061) | | | | Total Flow | | Velocity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | on Residual Hydra | | Port 1 (S1) | | Port 2 (S2) | | | | |
| | Start | Finish | (kPa) | (psi) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (m/s) |
| **Static** | 210 | 285 | 247 | 35.8 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2"** | 345 | 450 | 233 | 33.8 | 34.4 | 545 | 0.0 | 0 | 34.4 | 545 | 0.5 |
| **2"** | | | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **1" + 2"** | | | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2" + 2"** | 510 | 570 | 221 | 32.1 | 31.6 | 501 | 29.1 | 461 | 60.7 | 962 | 0.9 |

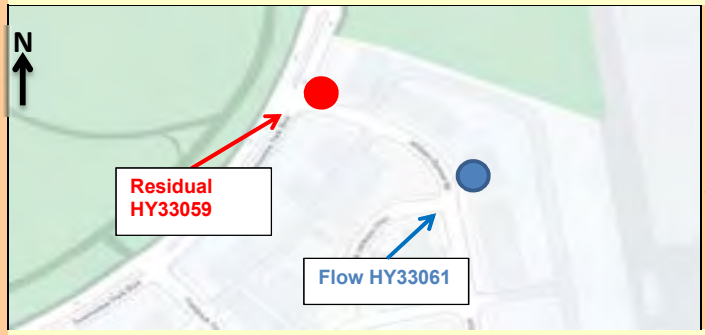
# 289 Downsview Park HY33059

## HYDRANT FLOW TEST RESULTS

Date: 12-Oct-21 Time: 10:15 (hh/mm)

Municipality: Toronto
Operator: Anthony
Test No: **11**

Tested By: Adil/Rayden



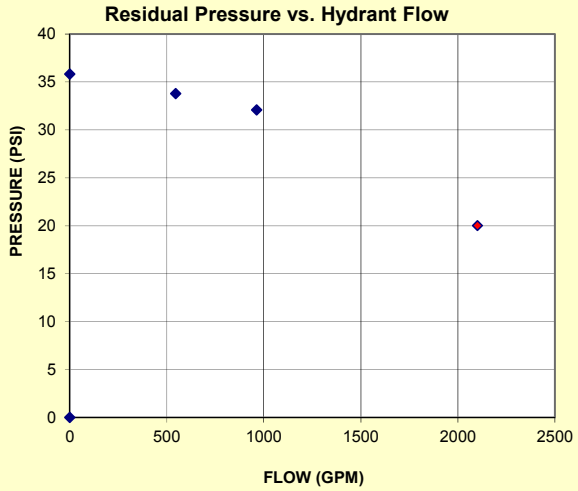

Conditions before Test (STATIC)

| | | |
|---|---|---|
| Residual Hydrant: | 35.8 psi | 247 kPa |
| Hydrant that will Flow: | 35.8 psi | 247 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) | 7% Pressure Drop Achieved? |
|---|---|---|---|---|---|---|---|---|---|
| Port Size (in) | Nozzle Pressure (psi) | (USGPM) | (L/s) | Monitoring Hydrant | Flow Hydrant (Corrected) * | | | | |
| STATIC | n/a | 0 | 0 | 35.8 | 35.8 | | | | |
| Single Port Tests | | | | | | | | | |
| 2 | 12.2 | 545.0 | 34.4 | 33.8 | 33.8 | 20 | 1654 | 104 | NO |
| 2 | | | | | | 20 | | | |
| Two Port Test | | | | | | | | | |
| 1 | | | | | | 20 | | | |
| 2 | | | | | | | | | |
| Two Port Test | | | | | | | | | |
| 2 | 8.7 | 461.0 | 29.1 | 32.1 | 32.1 | 20 | 2101 | 133 | YES |
| 2 | 10.3 | 501.0 | 31.6 | | | | | | |

* 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) |
| 35.8 | 247 | 2100 | 132 |

* 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: | 11600 L |
|---|---|

Rounded up to closest 100L

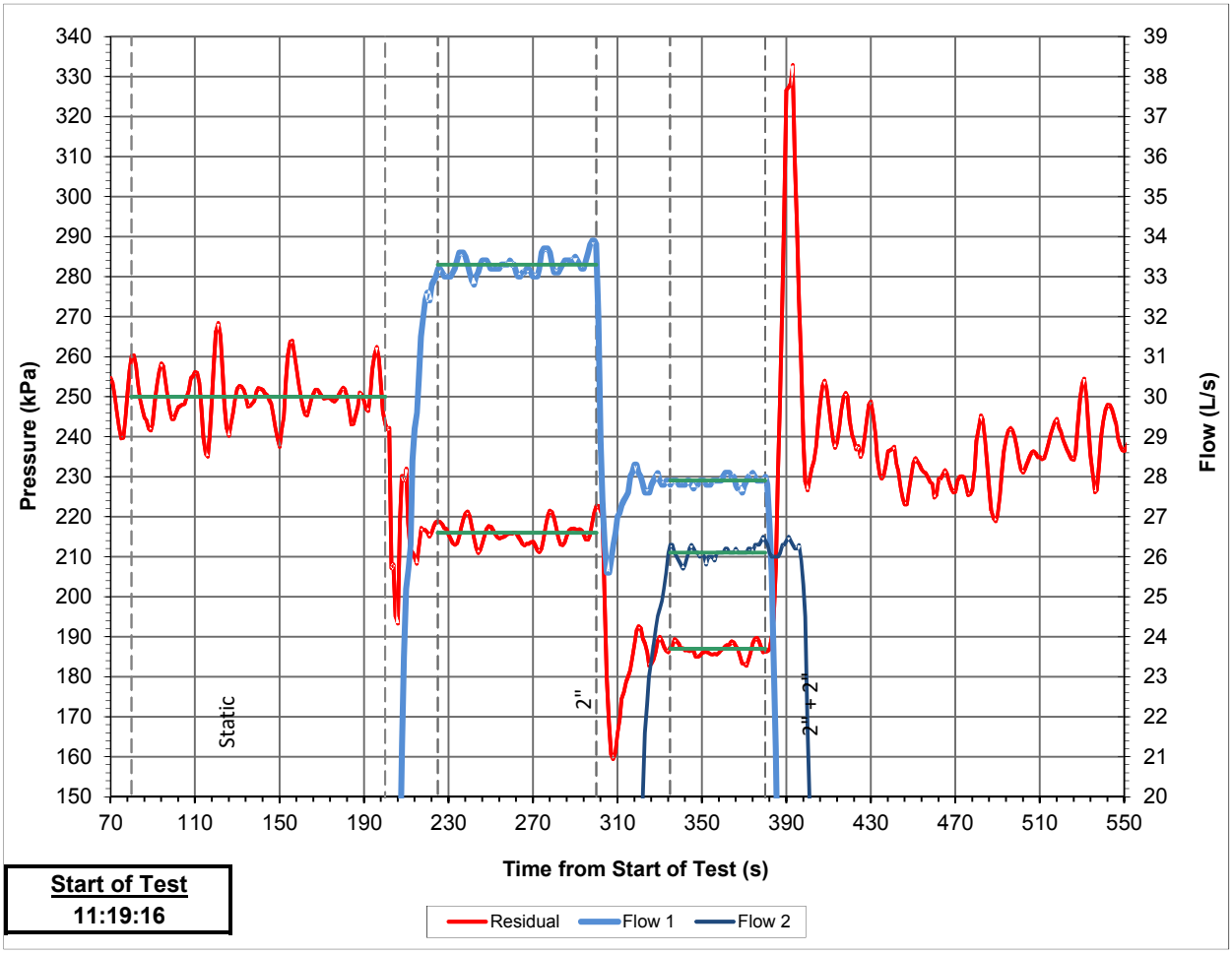
DISCLAIMER FOR FIRE FLOW TESTS

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# Test 12 - 96 Powell Rd HY4006475




| Subject Watermain Details | | | | Subject Hydrant & Valve Details | |
|---|---|---|---|---|---|
| **Diameter:** | 300 mm | **Material:** | PVC | **Residual Hydrant:** | HY4006475 |
| **Area:** | 0.071 m2 | | | **Flow Hydrant:** | HY4006432 |

**TABLE A: TESTED PRESSURES AND FLOWS**

| Point | Time | | Residual | | Flow Hydrant (HY4006432) | | | | Total Flow | | Velocity |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | on Residual Hydra | | Port 1 (S1) | | Port 2 (S2) | | | | |
| | Start | Finish | (kPa) | (psi) | (L/s) | (GPM) | (L/s) | (GPM) | (L/s) | (GPM) | (m/s) |
| **Static** | 80 | 200 | 250 | 36.3 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2"** | 225 | 300 | 216 | 31.3 | 33.3 | 528 | 0.0 | 0 | 33.3 | 528 | 0.5 |
| **2"** | | | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **1" + 2"** | | | 0 | 0.0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2" + 2"** | 335 | 380 | 187 | 27.1 | 27.9 | 442 | 26.1 | 414 | 54.0 | 856 | 0.8 |

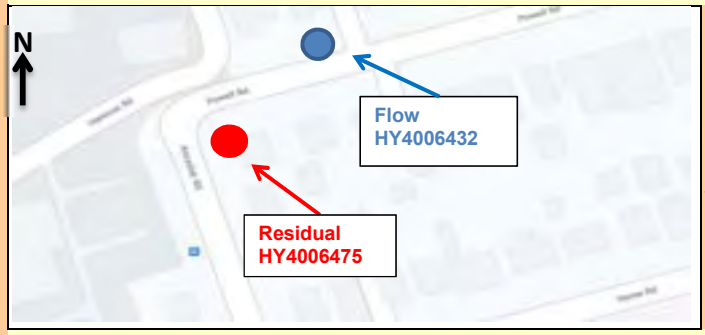
# 96 Powell Rd HY4006475

## HYDRANT FLOW TEST RESULTS

Date: 12-Oct-21 Time: 11:19 (hh/mm)

Municipality: Toronto
Operator: Anthony
Test No: **12**

Tested By: Adil/Rayden




Conditions before Test (STATIC)

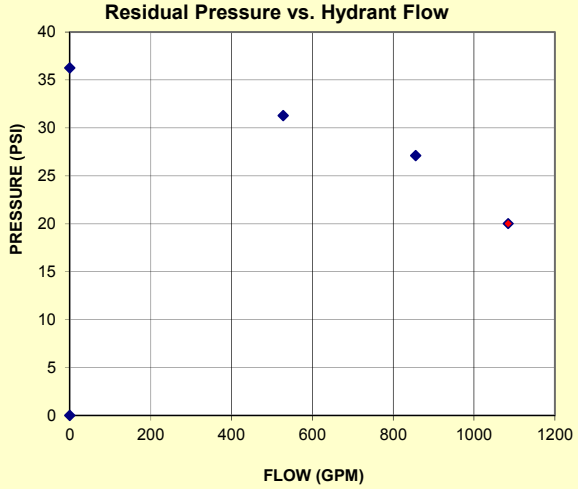
| | | |
|---|---|---|
| Residual Hydrant: | 36.3 psi | 250 kPa |
| Hydrant that will Flow: | 36.3 psi | 250 kPa |
| Δ pressure: | 0.0 psi | 0 kPa |
| Elevation Difference: (Flow El. - Residual El.) | 0.0 ft | 0.0 m |

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) | 7% Pressure Drop Achieved? |
|---|---|---|---|---|---|---|---|---|---|
| Port Size (in) | Nozzle Pressure (psi) | (USGPM) | (L/s) | Monitoring Hydrant | Flow Hydrant (Corrected) * | | | | |
| STATIC | n/a | 0 | 0 | 36.3 | 36.3 | | | | |
| Single Port Tests | | | | | | | | | |
| 2 | 11.5 | 528.0 | 33.3 | 31.3 | 31.3 | 20 | 1003 | 63 | YES |
| 2 | | | | | | 20 | | | |
| Two Port Test | | | | | | | | | |
| 1 | | | | | | 20 | | | |
| 2 | | | | | | | | | |
| Two Port Test | | | | | | | | | |
| 2 | 7 | 414.0 | 26.1 | 27.1 | 27.1 | 20 | 1167 | 74 | YES |
| 2 | 8 | 442.0 | 27.9 | | | | | | |

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

**Residual Pressure vs. Hydrant Flow**




| Results | | | |
|---|---|---|---|
| Static Pressure | | Flow at 20 psi (140kPa)* | |
| (psi) | (kPa) | (gpm) | (L/s) |
| 36.3 | 250 | 1100 | 69 |

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

| Hydrant Classification as per NFPA 291 | | | |
|---|---|---|---|
| Class | A | Color | GREEN |

| Water Discharged During Test: | 7600 L |
|---|---|

Rounded up to closest 100L

DISCLAIMER FOR FIRE FLOW TESTS

While WSP makes every effort to ensure that the information contained herein is accurate and up to date, WSP is not responsible for unintended or incorrect use of the data and information described and/or contained herein. The user must make his/her own determination as to its accuracy and suitability. The information is representative for a dynamic water system that may change over time.

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# Appendix 5: Water Servicing Calculations

| ARUP | Job No. | Sheet No. | Rev. |
|---|---|---|---|
| | 260341-08 | WAT-001 | |
| | Member/Location | City of Toronto | |
| Job Title: The Hangar District ZBA/DPS Re-submission | Drg. Ref. | | |
| Calculation: Proposed Development Statistics Summary | Made by: PS | Date: 2023/06/13 | Chd.: HJ |

This calculation sheets summarizes proposed development statistics and evaluates residential population per City of Toronto's Design Criteria for Sewers and Watermains, required to calculate proposed water demand for the Subject Area.

***Residential Population (Design Criteria for Sewers and Watermains, January 2021, Chapter 2 Table 4)***

| | |
|---|---|
| *Studio* | *1.4 persons* |
| *1 Bedroom* | *1.4 persons* |
| *2 Bedroom* | *2.1 persons* |
| *3 Bedroom* | *3.1 persons* |
| *Townhouse* | *2.7 persons* |

***Commercial or Retail Population (Design Criteria for Sewers and Watermains, September 2022, Chapter 2 Table 3)***

1.1 persons/100 $m^2$ (GFA)

***Hotel Population (Design Criteria for Sewers and Watermains, September 2022, Chapter 2 Table 3)***

*titutional - Hostel (# Unknown)* *1 person/bed/30m2 GFA*

| | Block | Comm. Gross Area | Comm. Gross Floor Area[1] | Studio | 1 BDR | 2 BDR | 3 BDR | TWNH | Res Population | Hotel Eq. Population |
|---|---|---|---|---|---|---|---|---|---|---|
| | | (ha) | (ha) | No. | No. | No. | No. | No. | No. | No. |
| The Village | B | 0.72 | 0.24 | 19 | 190 | 133 | 38 | 0 | 690 | 0 |
| | C | 0.70 | 0.70 | 9 | 86 | 60 | 17 | 0 | 312 | 0 |
| | D | 0.67 | 0.67 | 20 | 201 | 141 | 40 | 0 | 730 | 0 |
| | E | 0.64 | 0.00 | 26 | 264 | 185 | 53 | 0 | 959 | 0 |
| | F | 1.48 | 0.65 | 13 | 131 | 91 | 26 | 0 | 473 | 294 |
| | G | 0.26 | 0.04 | 7 | 74 | 52 | 15 | 0 | 269 | 0 |
| The Hangar | A | 6.58 | 6.58 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | A(P) | 0.92 | 0.00 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Ancaster West | H1 | 0.33 | 0.33 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | H2 | 0.27 | 0.27 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | I | 0.55 | 0.03 | 18 | 180 | 126 | 36 | 0 | 653 | 0 |
| | J | 1.15 | 0.00 | 14 | 139 | 97 | 28 | 105 | 788 | 0 |
| | K | 0.60 | 0.04 | 9 | 87 | 61 | 17 | 40 | 423 | 0 |
| **Total** | | | **9.56** | | | | | | **5297** | **294** |

*Notes:*

*[1] Where commercial/industrial/institutional GFA > total lot area, total lot area is assumed as comm. floor area, as confirmed with City of Toronto during Infrastructure Workshop on February 8, 2022.*

*[2] Assuming 60/40 residential split between north and south sub-block per email from Perkins Eastman on February 23, 2022.*

| ARUP | Job | Sheet | Rev |
|---|---|---|---|
| | 260341-08 | WAT-002 | |
| | Member/Locatio | City of Toronto | |
| Job Title: The Hangar District ZBA/DPS Re-submission | Drg. | C-401 to C-405 | |
| Calculation: Proposed Development - Water Demand Estimation | Made: PS | Date: 2023/06/13 | Chd: HJ |

**Calculation Inputs**

| Criteria | | Value | Unit | City of Toronto Design Criteria |
|---|---|---|---|---|
| **Residential Water Demand** | | 190 | L/ca/day | Design Criteria for Sewers and Watermains, Jan. 2021, Table 28 |
| **Hotel Water Demand** | | | | |
| **Townhouses - semi-detached, row housing (3-6 units), plexes (2-6 units)** | | 310 | L/ca/day | |
| **Commercial/Retail** | | 180000 | L/floor area/day | Design Criteria for Sewers and Watermains, Jan. 2021, Table 5 |
| **Employment** | | | | |
| **Institutional/ Industrial** | | | | |
| **Peaking Factors** | | | | |
| | **MIN Hr** | **Peak Hr** | **MAX Day** | Design Criteria for Sewers and Watermains, Jan. 2021, Table 30 |
| **Residential** | 0.84 | 2.50 | 1.30 | |

*Note:*

*value is refereneced from the sanitary demand section. It is assumed that the sanitary demand closely corresponds to the water demand for these areas.*

*2. Peaking factor for apartments is used because the residential population is less than 150,000 people.*

**Adjacent Development**

| Film Studio Campus | Peak Water demand (L/s) | Fire Flow (L/s)* |
|---|---|---|
| **Phase A+B:** | 15 | 230 |
| **Total** | **15** | **230** |

*Taxiway North Sub-district relies on stored water in the underground bunkers and pumps to meet fire flow requirements. The fire flow is referenced from the SPA report for this development.

ARUP

| Job | Sheet | Rev |
|---|---|---|
| 260341-08 | WAT-002 | |
| Member/Locatio | City of Toronto | |
| Drg. | C-401 to C-405 | |
| Made | Date | Chd |
| PS | 2023/06/13 | HJ |

Job Title: The Hangar District ZBA/DPS Re-submission

Calculation: Proposed Development - Water Demand Estimation

| | Block | Comm./Retail/Inst. Gross Floor Area | Peak Comm/Retail Area Water Demand | Residential + Hotel Population | Avg. Residential Water Demand | Peak Hour Demand | Max. Day Demand |
|---|---|---|---|---|---|---|---|
| | | No. | (L/s) | | (L/s) | (L/s) | (L/s) |
| The Village | B | 0.24 | 0.50 | 690.00 | 1.52 | 4.29 | 2.5 |
| | C | 0.70 | 1.46 | 312.00 | 0.69 | 3.18 | 2.4 |
| | D | 0.67 | 1.40 | 730.00 | 1.61 | 5.41 | 3.5 |
| | E | 0.00 | 0.00 | 959.00 | 2.11 | 5.27 | 2.7 |
| | F | 0.65 | 1.35 | 767.00 | 1.69 | 5.57 | 3.5 |
| | G | 0.04 | 0.08 | 269.00 | 0.59 | 1.56 | 0.9 |
| | H1 | 0.33 | 0.69 | 0.00 | 0.00 | 0.69 | 0.7 |
| | H2 | 0.27 | 0.57 | 0.00 | 0.00 | 0.57 | 0.6 |
| | I | 0.03 | 0.06 | 653.00 | 1.44 | 3.65 | 1.9 |
| The Hangar | A | 6.58 | 13.72 | 0.00 | 0.00 | 13.72 | 13.7 |
| | A(P) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.0 |
| Ancaster West | J | 0.00 | 0.00 | 788.00 | 1.73 | 4.33 | 2.3 |
| | K | 0.04 | 0.08 | 423.00 | 0.93 | 2.41 | 1.3 |
| **Total** | | **9.56** | **19.92** | **5591.00** | **12.3** | **50.66** | **35.9** |

Notes:

1 Columns in blue highlight represent calculated results.

2 Peak Hour and Max. Day Demands are the summation of the calculated peak residential demand and peak non-residential demand which is estimated using 180,000L/ floor-ha/day demand rate. This value is refereneced from the sanitary demand section. It is assumed that the sanitary demand closely corresponds to the water demand for these areas.

| ARUP | Job No. | Sheet No. | Rev. |
|---|---|---|---|
| | 260341-08 | WAT-003 | |
| | Member/Location | City of Toronto | |
| Job Title: The Hangar District ZBA/DPS Re-submission | Drg. Ref. | | |
| Calculation: Fire Protection Requirements | Made by: P.S | Date: 2023/06/13 | Chd.: H.J |

## FIRE FLOW CALCULATIONS - INPUTS & ASSUMPTIONS

***Fire Flow Formula:*** $F = 220C\sqrt{A}$

*where*

F = Required Fire Flow (L/min.)

A = Effective Area ($m^2$)

C = Construction Type Coeffecient

*Fire Underwriters Survey (FUS)*
*Water Supply for Public Fire Protection*

***C - Construction Type Coefficient***

| | |
|---|---|
| 1.5 | Wood Frame |
| 1 | Ordinary Construction |
| 0.8 | Non-combustible Construction |
| 0.6 | Fire-resistive Construction |

All buildings for the Hangar District are assumed to meet fire-resistive construction (i.e. fully protected frame, floors, and roofs).

***A - Effective Area***

The total floor area (including all storeys, but excluding basements at least 50% below grade) in the building being considered. For fire-resistive buildings, consider the two largest adjoining floors plus 50% of each of any floors immediately above them up to eight, when the vertical openings are inadequately protected. If the vertical openings and exterior vertical communications are properly protected (one hour rating), consider only the area of the largest floor plus 25% of each of the two immediately adjoining floors.

All buildings for the Hangar District are assumed to meet fire-resistive construction, and therefore the value for A is considered to be the area of the largest floor plus 25% of the two adjoining floors, excluding basements. The podium for each building is up to two floors tall and is considered the largest floor area. Here, all these areas are assumed for Block D and will be revised upon receipt of relevant information.

***Reduction and Surcharge Factors:***

*1) Assessment of Contents Fire Hazard:*

The value calculated above can be reduced for occupancies having a low fire hazard, or increased for high fire hazard. According to the FUS Appendix, Apartments, Dwellings, Institutions, Libraries, Office Buildings, Public Buildings, and Schools are considered low hazard (-15%). Examples of high hazard occupancies include industrial items such as chemical works, solvent extracting, varnish and paint works, and woodworking.

| | | |
|---|---|---|
| -25% | Non-Combustible | **Low Hazard** |
| -15% | Limited Combustible | |
| 0% | Combustible | |
| 15% | Free Burning | |
| 25% | Rapid Burning | **High Hazard** |

Buildings for Block D are assumed to be 0% combustible.

*2) Sprinkler Reduction System:*

A reduction of up to 50% for complete automatic sprinkler protection (applied to the result after reduction/surcharge 1) depending upon adequacy of the system. The credit for the system with be a maximum of 30% for an adequately designed system confirming to NFPA 13 and other NFPA sprinkler standards. Additional credit of up to 10% may be granted if the water supply is standard for both the system and fire department hose lines required. The percentage reduction made for an automatic sprinkler system will depend upon the extent to which the system is judged to reduce the possibility of fires spreading within and beyond the fire area. Normally this reduction will not be the maximum allowed without proper system supervision including water flow and conrol valve alarm service. Additional credit may be given of up to 10% for a fully supervised system.

All buildings for the Block D of the Hangar District is assumed to have NFPA 13 sprinkler systems (30%). The water supply is a new network and therefore standard water connections are assumed to be provided (10%). System is assumed to be fully supervised (10%). A total credit of 50% reduction has been applied.

*3) Fire Separation Charge*

A surcharge (applied to the result after reduction/surcharge 1) applied for structures exposed within 45 meters of the fire area under consideration. The percentage shall depend on the height, area, and construction of the buildings being exposed, the separation, openings in the exposed buildings, length and height of exposure, provision of automatic sprinklers and/or outside sprinklers in the buildings exposed, the occupany of the exposed buildings, and the effect of hillside locations on the possible spread of the fire. The charge for any one side generally should not exceed the following limits:

| Separation | Charge |
|---|---|
| 0 to 3m | 25% |
| 3.1 to 10m | 20% |
| 10.1m to 20m | 15% |
| 20.1m to 30m | 10% |
| 30.1m to 45m | 5% |

The total percentage shall be the sum for all sides, but shall not exceed 75%.

For Block D of the Hangar District, the separation surcharges indicated above have been applied for adjacent buildings, not considering reductions for new construction and provision of automatic sprinklers.

| ARUP | Job No. | Sheet No. | Rev. |
|---|---|---|---|
| | 260341-00 | WAT-004 | |
| | Member/Location | City of Toronto | |
| Job Title: The Hangar District ZBA/DPS Re-submission | Drg. Ref. | | |
| Calculation: Block D - Fire Protection Requirements | Made by: P.S | Date: 2023/16/13 | Chd.: H.J |

## FIRE FLOW CALCULATIONS - BLOCK D SUMMARY

| Block | Fire Flow (L/s) |
|---|---|
| D | 111 |

## FIRE FLOW CALCULATIONS - Block D

*1) Fire Flow Formula:* $F = 220C\sqrt{A}$ — *Fire Underwriters Survey (FUS)*, *Water Supply for Public Fire Protection*

*where*

F = Required Fire Flow (L/min.)

A = Effective Area ($m^2$)

C = Construction Type Coeffecient

| | | |
|---|---|---|
| | 1.5 | Wood Frame |
| | 1 | Ordinary Construction |
| | 0.8 | Non-combustible Construction |
| ***Select*** | 0.6 | Fire-resistive Construction |

**Effective Area:** For fire-resistive buildings with 1-hour fire rating, the area shall be the total area of the largest floor plus 25% of the two adjoining floors.

| | | |
|---|---|---|
| **Largest Floor** | 2000 | $m^2$ |
| **Adjacent Floor** | 1000 | $m^2$ |
| **Adjacent Floor** | 1000 | $m^2$ |
| Total Floor Area, A = | 2500.0 | $m^2$ |

$F_1$ = 6600 L/min

$F_1$ = 7000 *(nearest 1000 L/min.)*

**Reduction and Surcharge Factors:**

*2) Assessment of Contents Fire Hazard:*

| | | |
|---|---|---|
| | -25% | Non-Combustible |
| | -15% | Limited Combustible |
| | 0% | Combustible |
| | 15% | Free Burning |
| ***Select*** | 25% | Rapid Burning |

Reduction (2) = 0 L/min

$F_2$ = 7000 L/min

*3) Sprinkler Reduction System:*

| | |
|---|---|
| 50% | Reduction for Automatic Sprinkler System per NFPA 13 |

Reduction (3) = -3500 L/min

$F_3$ = 3500 L/min

*4) Fire Separation Charge*

| Separation | Building Face | Quantity | Charge |
|---|---|---|---|
| 0 to 3m | | | 25% |
| 3.1 to 10m | N, NW | 1 | 20% |
| 10.1m to 20m | W | 1 | 15% |
| 20.1m to 30m | S | 1 | 10% |
| 30.1m to 45m | | | 5% |
| | Surcharge Factor (4) | | 45% |

$F_4 = F_2 \times$ Surcharge Factor

$F_4$ = 3150 L/min

*5) Fire Flow Requirements:*

F= **6650** L/min. $F = F_3 + F_4$ *(with reduction and surcharge factors)*

F= **7000** L/min. *(nearest 1000 L/min.)* *(2,000 L/min. < F < 45,000 L/min.)*

F= 1849 US GPM

F= 111 L/s

# Appendix 6: Water Hydraulic Modelling Results

# Baseline Model




**Legend**

- Reservoir
- Pump
- Pipe
- Junction
  Pressure Information
  (m head)

```
******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.2                            *
******************************************************************
```

Input File: Downsview- Hangar District - Baseline Scenario.inp

Link - Node Table:

| Link ID | Start Node | End Node | Length m | Diameter mm | |
|---|---|---|---|---|---|
| 28 | 4 | Block_K | 24.307 | 150 | |
| Dummy2 | 16 | 3 | 169.425 | 300 | |
| Dummy1 | 12 | 20 | 102.842 | 300 | |
| 25 | 5 | 29 | 88.764 | 300 | |
| 24 | 34 | 12 | 64.314 | 300 | |
| 23 | 33 | 34 | 83.863 | 300 | |
| 21 | 33 | 5 | 15.155 | 300 | |
| 13 | 2 | Block_F | 74.992 | 300 | |
| 12 | 26_FF | 2 | 33.462 | 300 | |
| 7 | 7_FF | 25 | 49.826 | 300 | |
| 3_2 | Block_C | 8 | 22.513 | 400 | |
| 15_2 | 29 | 20 | 165.441 | 300 | |
| 12_2 | Block_F | 12 | 100.031 | 300 | |
| 15_1 | 4 | 29 | 62.134 | 300 | |
| 7_2 | Block_B | 1_FF | 16.232 | 300 | |
| 7_1 | Block_A | Block_B | 45.847 | 300 | |
| 3_1 | 4 | Block_C | 98.133 | 400 | |
| 14 | Block_J | 19 | 154.111 | 300 | |
| 2 | Block_J | Block_I | 118.789 | 300 | |
| 1_2 | 19 | 4 | 97.206 | 400 | |
| 2_2 | Block_I | Block_H | 167.415 | 300 | |
| 2_1 | 4 | Block_I | 145.762 | 300 | |
| 11 | Block_E | Block_G | 34.271 | 300 | |
| 10 | 13 | Block_E | 88.09 | 300 | |
| 9 | Block_D | 13 | 76.361 | 300 | |
| 8 | 1_FF | Block_D | 108.203 | 300 | |
| 12_1 | Block_G | Block_F | 14.81 | 300 | |
| 6 | 6 | Block_A | 130.265 | 400 | |
| 5 | 14 | 6 | 42.256 | 400 | |
| 4 | 8 | 14 | 31.222 | 400 | |
| 3 | Block_B | 7_FF | 31.197 | 300 | |
| 1_1 | 3 | 19 | 92.865 | 400 | |
| 1 | 16 | Block_J | 104.01 | 300 | |
| 15 | Block_A | Studio_District | 14.927 | 300 | |
| P1 | R-1 | 3 | #N/A | #N/A | Pump |
| P2 | R-2 | 12 | #N/A | #N/A | Pump |

Energy Usage:

| Pump | Usage Factor | Avg. Effic. | Kw-hr /m3 | Avg. Kw | Peak Kw | Cost /day |
|---|---|---|---|---|---|---|
| P1 | 100.00 | 75.00 | 0.84 | 0.00 | 0.00 | 0.00 |
| P2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Demand Charge: 0.00
Total Cost: 0.00

Node Results:

| Node ID | Demand LPS | Head m | Pressure m | Quality | |
|---|---|---|---|---|---|
| Block_K | 0.00 | 229.25 | 37.05 | 0.00 | |
| Block_C | 0.00 | 229.25 | 36.85 | 0.00 | |
| 2 | 0.00 | 229.25 | 36.25 | 0.00 | |
| 34 | 0.00 | 229.25 | 37.05 | 0.00 | |
| 33 | 0.00 | 229.25 | 36.45 | 0.00 | |
| 5 | 0.00 | 229.25 | 36.85 | 0.00 | |
| 7_FF | 0.00 | 229.25 | 35.85 | 0.00 | |
| 29 | 0.00 | 229.25 | 37.85 | 0.00 | |
| Block_F | 0.00 | 229.25 | 37.45 | 0.00 | |
| 26_FF | 0.00 | 229.25 | 36.25 | 0.00 | |
| 25 | 0.00 | 229.25 | 36.05 | 0.00 | |
| Block_B | 0.00 | 229.25 | 35.85 | 0.00 | |
| 20 | 0.00 | 229.25 | 38.25 | 0.00 | |
| 19 | 0.00 | 229.25 | 37.65 | 0.00 | |
| Block_I | 0.00 | 229.25 | 37.85 | 0.00 | |
| Block_J | 0.00 | 229.25 | 37.25 | 0.00 | |
| 16 | 0.00 | 229.25 | 37.85 | 0.00 | |
| Block_H | 0.00 | 229.25 | 38.05 | 0.00 | |
| 14 | 0.00 | 229.25 | 36.45 | 0.00 | |
| 13 | 0.00 | 229.25 | 36.85 | 0.00 | |
| 12 | 0.00 | 229.25 | 37.65 | 0.00 | |
| Block_G | 0.00 | 229.25 | 37.25 | 0.00 | |
| Block_E | 0.00 | 229.25 | 37.05 | 0.00 | |
| Block_D | 0.00 | 229.25 | 36.45 | 0.00 | |
| 1_FF | 0.00 | 229.25 | 35.65 | 0.00 | |
| Block_A | 0.00 | 229.25 | 36.05 | 0.00 | |
| 6 | 0.00 | 229.25 | 36.45 | 0.00 | |
| 8 | 0.00 | 229.25 | 36.85 | 0.00 | |
| 4 | 0.00 | 229.25 | 37.25 | 0.00 | |
| 3 | 0.00 | 229.25 | 38.25 | 0.00 | |
| Studio_District | 0.00 | 229.25 | 36.05 | 0.00 | |
| R-1 | 0.00 | -2.33 | 0.00 | 0.00 | Reservoir |
| R-2 | 0.00 | -2.43 | 0.00 | 0.00 | Reservoir |

Link Results:

| Link ID | Flow LPS | Velocity m/s | Unit Headloss m/km | Status | |
|---|---|---|---|---|---|
| 28 | 0.00 | 0.00 | 0.00 | Open | |
| Dummy2 | 0.00 | 0.00 | 0.00 | Open | |
| Dummy1 | 0.00 | 0.00 | 0.00 | Open | |
| 25 | 0.00 | 0.00 | 0.00 | Open | |
| 24 | 0.00 | 0.00 | 0.00 | Open | |
| 23 | 0.00 | 0.00 | 0.00 | Open | |
| 21 | 0.00 | 0.00 | 0.00 | Open | |
| 13 | 0.00 | 0.00 | 0.00 | Open | |
| 12 | 0.00 | 0.00 | 0.00 | Open | |
| 7 | 0.00 | 0.00 | 0.00 | Open | |
| 3_2 | 0.00 | 0.00 | 0.00 | Open | |
| 15_2 | 0.00 | 0.00 | 0.00 | Open | |
| 12_2 | 0.00 | 0.00 | 0.00 | Open | |
| 15_1 | 0.00 | 0.00 | 0.00 | Open | |
| 7_2 | 0.00 | 0.00 | 0.00 | Open | |
| 7_1 | 0.00 | 0.00 | 0.00 | Open | |
| 3_1 | 0.00 | 0.00 | 0.00 | Open | |
| 14 | 0.00 | 0.00 | 0.00 | Open | |
| 2 | 0.00 | 0.00 | 0.00 | Open | |
| 1_2 | 0.00 | 0.00 | 0.00 | Open | |
| 2_2 | 0.00 | 0.00 | 0.00 | Open | |
| 2_1 | 0.00 | 0.00 | 0.00 | Open | |
| 11 | 0.00 | 0.00 | 0.00 | Open | |
| 10 | 0.00 | 0.00 | 0.00 | Open | |
| 9 | 0.00 | 0.00 | 0.00 | Open | |
| 8 | 0.00 | 0.00 | 0.00 | Open | |
| 12_1 | 0.00 | 0.00 | 0.00 | Open | |
| 6 | 0.00 | 0.00 | 0.00 | Open | |
| 5 | 0.00 | 0.00 | 0.00 | Open | |
| 4 | 0.00 | 0.00 | 0.00 | Open | |
| 3 | 0.00 | 0.00 | 0.00 | Open | |
| 1_1 | 0.00 | 0.00 | 0.00 | Open | |
| 1 | 0.00 | 0.00 | 0.00 | Open | |
| 15 | 0.00 | 0.00 | 0.00 | Open | |
| P1 | 0.00 | 0.00 | -231.58 | Open | Pump |
| P2 | 0.00 | 0.00 | 0.00 | Closed | Pump |

# Maximum Day + Fire Flow Demand Scenario




**Results**

Pipe - Velocity, m/s

- 0.00 - 0.20
- 0.20 - 0.96
- 0.96 - 1.81

Junction - Pressure, m head

- 15.84 - 17.3
- 15.84 - 17.3
- 15.84 - 17.3

```
******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                        Version 2.2                             *
******************************************************************
```

Input File: Downsview- Hangar District - MDD+FF.inp

Link - Node Table:

| Link ID | Start Node | End Node | Length m | Diameter mm | |
|---|---|---|---|---|---|
| 28 | 4 | Block_K | 24.307 | 150 | |
| Dummy2 | 16 | 3 | 169.425 | 300 | |
| Dummy1 | 12 | 20 | 102.842 | 300 | |
| 25 | 5 | 29 | 88.764 | 300 | |
| 24 | 34 | 12 | 64.314 | 300 | |
| 23 | 33 | 34 | 83.863 | 300 | |
| 21 | 33 | 5 | 15.155 | 300 | |
| 13 | 2 | Block_F | 74.992 | 300 | |
| 12 | 26_FF | 2 | 33.462 | 300 | |
| 7 | 7_FF | 25 | 49.826 | 300 | |
| 3_2 | Block_C | 8 | 22.513 | 400 | |
| 15_2 | 29 | 20 | 165.441 | 300 | |
| 12_2 | Block_F | 12 | 100.031 | 300 | |
| 15_1 | 4 | 29 | 62.134 | 300 | |
| 7_2 | Block_B | 1_FF | 16.232 | 300 | |
| 7_1 | Block_A | Block_B | 45.847 | 300 | |
| 3_1 | 4 | Block_C | 98.133 | 400 | |
| 14 | Block_J | 19 | 154.111 | 300 | |
| 2 | Block_J | Block_I | 118.789 | 300 | |
| 1_2 | 19 | 4 | 97.206 | 400 | |
| 2_2 | Block_I | Block_H | 167.415 | 300 | |
| 2_1 | 4 | Block_I | 145.762 | 300 | |
| 11 | Block_E | Block_G | 34.271 | 300 | |
| 10 | 13 | Block_E | 88.09 | 300 | |
| 9 | Block_D | 13 | 76.361 | 300 | |
| 8 | 1_FF | Block_D | 108.203 | 300 | |
| 12_1 | Block_G | Block_F | 14.81 | 300 | |
| 6 | 6 | Block_A | 130.265 | 400 | |
| 5 | 14 | 6 | 42.256 | 400 | |
| 4 | 8 | 14 | 31.222 | 400 | |
| 3 | Block_B | 7_FF | 31.197 | 300 | |
| 1_1 | 3 | 19 | 92.865 | 400 | |
| 1 | 16 | Block_J | 104.01 | 300 | |
| 15 | Block_A | Studio_District | 14.927 | 300 | |
| P1 | R-1 | 3 | #N/A | #N/A | Pump |
| P2 | R-2 | 12 | #N/A | #N/A | Pump |


Energy Usage:

| Pump | Usage Factor | Avg. Effic. | Kw-hr /m3 | Avg. Kw | Peak Kw | Cost /day |
|---|---|---|---|---|---|---|
| P1 | 100.00 | 75.00 | 0.78 | 656.03 | 656.03 | 0.00 |
| P2 | 100.00 | 75.00 | 0.77 | 131.95 | 131.95 | 0.00 |
| | | | | Demand Charge: | | 0.00 |
| | | | | Total Cost: | | 0.00 |

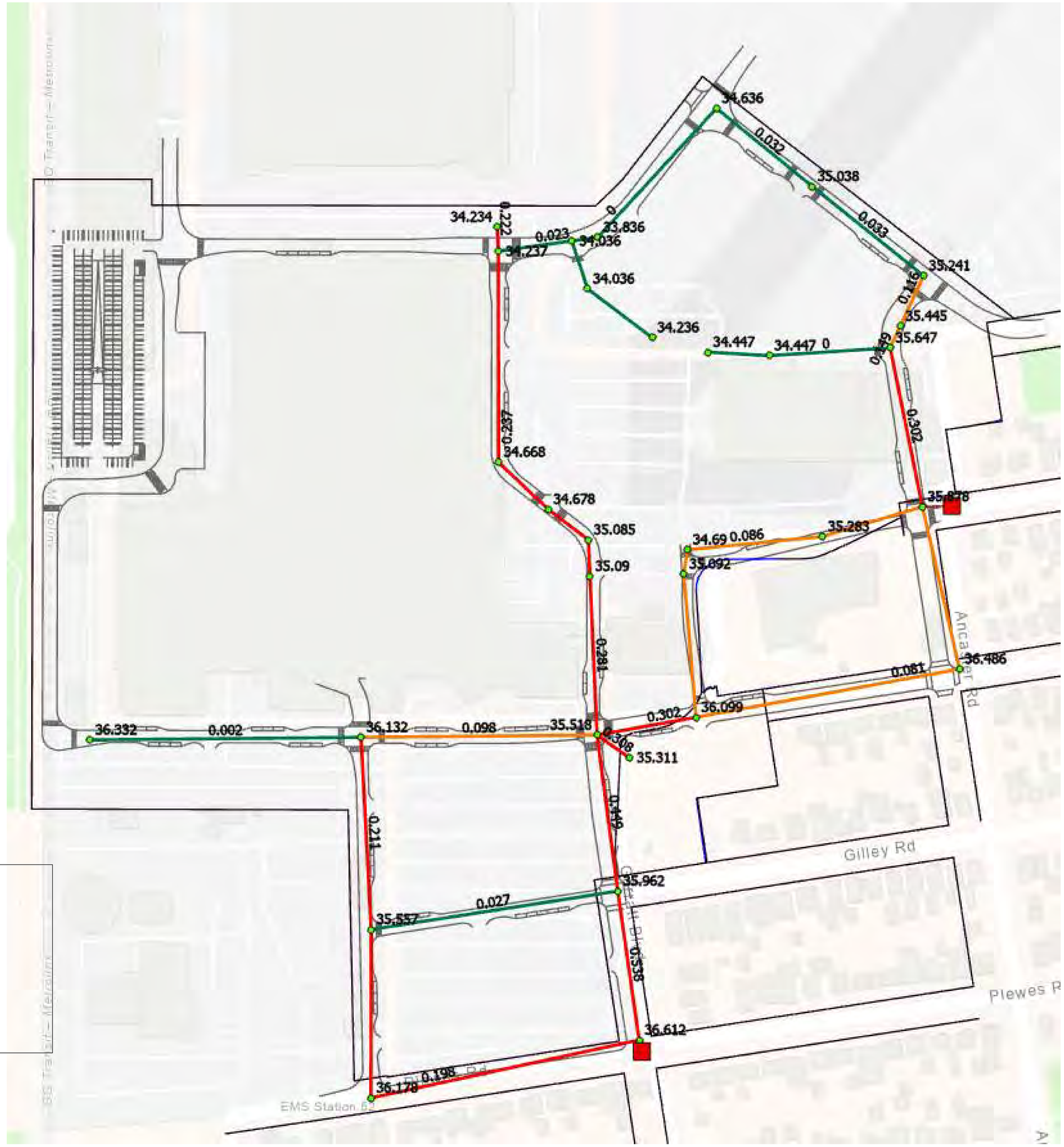
Node Results:

| Node ID | Demand LPS | Head m | Pressure m | Quality | |
|---|---|---|---|---|---|
| Block_K | 1.30 | 211.39 | 19.19 | 0.00 | |
| Block_C | 2.40 | 210.96 | 18.56 | 0.00 | |
| 2 | 0.00 | 209.70 | 16.70 | 0.00 | |
| 34 | 0.00 | 210.97 | 18.77 | 0.00 | |
| 33 | 0.00 | 211.06 | 18.26 | 0.00 | |
| 5 | 0.00 | 211.07 | 18.67 | 0.00 | |
| 7_FF | 83.00 | 209.30 | 15.90 | 0.00 | |
| 29 | 0.00 | 211.17 | 19.77 | 0.00 | |
| Block_F | 3.50 | 209.94 | 18.14 | 0.00 | |
| 26_FF | 64.00 | 209.59 | 16.59 | 0.00 | |
| 25 | 0.00 | 209.30 | 16.10 | 0.00 | |
| Block_B | 2.50 | 209.46 | 16.06 | 0.00 | |
| 20 | 0.00 | 211.01 | 20.01 | 0.00 | |
| 19 | 0.00 | 211.92 | 20.32 | 0.00 | |
| Block_I | 1.90 | 211.67 | 20.27 | 0.00 | |
| Block_J | 2.30 | 211.92 | 19.92 | 0.00 | |
| 16 | 0.00 | 212.12 | 20.72 | 0.00 | |
| Block_H | 1.30 | 211.66 | 20.46 | 0.00 | |
| 14 | 0.00 | 210.74 | 17.94 | 0.00 | |
| 13 | 0.00 | 209.71 | 17.31 | 0.00 | |
| 12 | 0.00 | 210.91 | 19.31 | 0.00 | |
| Block_G | 0.90 | 209.92 | 17.92 | 0.00 | |
| Block_E | 2.70 | 209.85 | 17.65 | 0.00 | |
| Block_D | 3.50 | 209.59 | 16.79 | 0.00 | |
| 1_FF | 83.00 | 209.44 | 15.84 | 0.00 | |
| Block_A | 13.72 | 210.01 | 16.81 | 0.00 | |
| 6 | 0.00 | 210.56 | 17.76 | 0.00 | |
| 8 | 0.00 | 210.87 | 18.47 | 0.00 | |
| 4 | 0.00 | 211.39 | 19.39 | 0.00 | |
| 3 | 0.00 | 212.46 | 21.46 | 0.00 | |
| Studio_District | 15.00 | 210.00 | 16.80 | 0.00 | |
| R-1 | -233.70 | -2.33 | 0.00 | 0.00 | Reservoir |
| R-2 | -47.32 | -2.43 | 0.00 | 0.00 | Reservoir |

Link Results:

| Link ID | Flow LPS | Velocity m/s | Unit Headloss m/km | Status | |
|---|---|---|---|---|---|
| 28 | 1.30 | 0.07 | 0.10 | Open | |
| Dummy2 | 48.65 | 0.69 | 1.96 | Open | |
| Dummy1 | 33.20 | 0.47 | 0.97 | Open | |
| 25 | 34.33 | 0.49 | 1.03 | Open | |
| 24 | 34.33 | 0.49 | 1.03 | Open | |
| 23 | 34.33 | 0.49 | 1.03 | Open | |
| 21 | 34.33 | 0.49 | 1.03 | Open | |
| 13 | 64.00 | 0.91 | 3.26 | Open | |
| 12 | 64.00 | 0.91 | 3.26 | Open | |
| 7 | 0.00 | 0.00 | 0.00 | Open | |
| 3_2 | 156.97 | 1.25 | 4.23 | Open | |
| 15_2 | 33.20 | 0.47 | 0.97 | Open | |
| 12_2 | 114.85 | 1.62 | 9.63 | Open | |
| 15_1 | 67.53 | 0.96 | 3.60 | Open | |
| 7_2 | 42.75 | 0.60 | 1.54 | Open | |
| 7_1 | 128.25 | 1.81 | 11.81 | Open | |
| 3_1 | 159.37 | 1.27 | 4.35 | Open | |
| 14 | 4.54 | 0.06 | 0.02 | Open | |
| 2 | 50.89 | 0.72 | 2.13 | Open | |
| 1_2 | 180.51 | 1.44 | 5.48 | Open | |
| 2_2 | 1.30 | 0.02 | 0.00 | Open | |
| 2_1 | 47.69 | 0.67 | 1.89 | Open | |
| 11 | 46.45 | 0.66 | 1.80 | Open | |
| 10 | 43.75 | 0.62 | 1.61 | Open | |
| 9 | 43.75 | 0.62 | 1.61 | Open | |
| 8 | 40.25 | 0.57 | 1.38 | Open | |
| 12_1 | 47.35 | 0.67 | 1.87 | Open | |
| 6 | 156.97 | 1.25 | 4.23 | Open | |
| 5 | 156.97 | 1.25 | 4.23 | Open | |
| 4 | 156.97 | 1.25 | 4.23 | Open | |
| 3 | 83.00 | 1.17 | 5.28 | Open | |
| 1_1 | 185.05 | 1.47 | 5.74 | Open | |
| 1 | 48.65 | 0.69 | 1.96 | Open | |
| 15 | 15.00 | 0.21 | 0.22 | Open | |
| P1 | 233.70 | 0.00 | -214.79 | Open | Pump |
| P2 | 47.32 | 0.00 | -213.34 | Open | Pump |

# Peak Hour Demand Scenario




**Results**

Pipe - Headloss, m/ km

- 0.0 - 0.033
- 0.033 - 0.149
- < 0.6m

Junction - Pressure, m head

- > 14.1 m

```
******************************************************************
*                          E P A N E T                           *
*                   Hydraulic and Water Quality                  *
*                   Analysis for Pipe Networks                   *
*                         Version 2.2                            *
******************************************************************
```

Input File: Downsview- Hangar District -PHD.inp

Link - Node Table:

| Link ID | Start Node | End Node | Length m | Diameter mm | |
|---|---|---|---|---|---|
| 15 | Block_A | Studio_District | 14.927 | 300 | |
| 1 | 16 | Block_J | 104.01 | 300 | |
| 1_1 | 3 | 19 | 92.865 | 400 | |
| 3 | Block_B | 7_FF | 31.197 | 300 | |
| 4 | 8 | 14 | 31.222 | 400 | |
| 5 | 14 | 6 | 42.256 | 400 | |
| 6 | 6 | Block_A | 130.265 | 400 | |
| 12_1 | Block_G | Block_F | 14.81 | 300 | |
| 8 | 1_FF | Block_D | 108.203 | 300 | |
| 9 | Block_D | 13 | 76.361 | 300 | |
| 10 | 13 | Block_E | 88.09 | 300 | |
| 11 | Block_E | Block_G | 34.271 | 300 | |
| 2_1 | 4 | Block_I | 145.762 | 300 | |
| 2_2 | Block_I | Block_H | 167.415 | 300 | |
| 1_2 | 19 | 4 | 97.206 | 400 | |
| 2 | Block_J | Block_I | 118.789 | 300 | |
| 14 | Block_J | 19 | 154.111 | 300 | |
| 3_1 | 4 | Block_C | 98.133 | 400 | |
| 7_1 | Block_A | Block_B | 45.847 | 300 | |
| 7_2 | Block_B | 1_FF | 16.232 | 300 | |
| 15_1 | 4 | 29 | 62.134 | 300 | |
| 12_2 | Block_F | 12 | 100.031 | 300 | |
| 15_2 | 29 | 20 | 165.441 | 300 | |
| 3_2 | Block_C | 8 | 22.513 | 400 | |
| 7 | 7_FF | 25 | 49.826 | 300 | |
| 12 | 26_FF | 2 | 37.861 | 300 | |
| 13 | 2 | Block_F | 74.992 | 300 | |
| 21 | 33 | 5 | 15.155 | 300 | |
| 23 | 33 | 34 | 83.863 | 300 | |
| 24 | 34 | 12 | 64.314 | 300 | |
| 25 | 5 | 29 | 88.764 | 300 | |
| Dummy1 | 12 | 20 | 102.842 | 300 | |
| Dummy2 | 16 | 3 | 169.425 | 300 | |
| 28 | 4 | Block_K | 24.307 | 150 | |
| P2 | R-2 | 12 | #N/A | #N/A | Pump |
| P1 | R-1 | 3 | #N/A | #N/A | Pump |

Energy Usage:

| Pump | Usage Factor | Avg. Effic. | Kw-hr /m3 | Avg. Kw | Peak Kw | Cost /day |
|---|---|---|---|---|---|---|
| P2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| P1 | 100.00 | 75.00 | 0.83 | 197.42 | 197.42 | 0.00 |
| | | | | Demand Charge: | | 0.00 |
| | | | | Total Cost: | | 0.00 |

Node Results:

| Node ID | Demand LPS | Head m | Pressure m | Quality | |
|---|---|---|---|---|---|
| Studio_District | 15.00 | 227.43 | 34.23 | 0.00 | |
| 3 | 0.00 | 227.61 | 36.61 | 0.00 | |
| 4 | 0.00 | 227.52 | 35.52 | 0.00 | |
| 8 | 0.00 | 227.49 | 35.09 | 0.00 | |
| 6 | 0.00 | 227.47 | 34.67 | 0.00 | |
| Block_A | 13.72 | 227.44 | 34.24 | 0.00 | |
| 1_FF | 0.00 | 227.44 | 33.84 | 0.00 | |
| Block_D | 5.41 | 227.44 | 34.64 | 0.00 | |
| Block_E | 5.27 | 227.44 | 35.24 | 0.00 | |
| Block_G | 1.56 | 227.45 | 35.45 | 0.00 | |
| 12 | 0.00 | 227.48 | 35.88 | 0.00 | |
| 13 | 0.00 | 227.44 | 35.04 | 0.00 | |
| 14 | 0.00 | 227.48 | 34.68 | 0.00 | |
| Block_H | 1.30 | 227.53 | 36.33 | 0.00 | |
| 16 | 0.00 | 227.58 | 36.18 | 0.00 | |
| Block_J | 4.33 | 227.56 | 35.56 | 0.00 | |
| Block_I | 3.65 | 227.53 | 36.13 | 0.00 | |
| 19 | 0.00 | 227.56 | 35.96 | 0.00 | |
| 20 | 0.00 | 227.49 | 36.49 | 0.00 | |
| Block_B | 4.29 | 227.44 | 34.04 | 0.00 | |
| 25 | 0.00 | 227.44 | 34.24 | 0.00 | |
| 26_FF | 0.00 | 227.45 | 34.45 | 0.00 | |
| Block_F | 5.57 | 227.45 | 35.65 | 0.00 | |
| 29 | 0.00 | 227.50 | 36.10 | 0.00 | |
| 7_FF | 0.00 | 227.44 | 34.04 | 0.00 | |
| 5 | 0.00 | 227.49 | 35.09 | 0.00 | |
| 33 | 0.00 | 227.49 | 34.69 | 0.00 | |
| 34 | 0.00 | 227.48 | 35.28 | 0.00 | |
| 2 | 0.00 | 227.45 | 34.45 | 0.00 | |
| Block_C | 3.18 | 227.49 | 35.09 | 0.00 | |
| Block_K | 2.41 | 227.51 | 35.31 | 0.00 | |
| R-2 | 0.00 | -2.43 | 0.00 | 0.00 | Reservoir |
| R-1 | -65.69 | -2.33 | 0.00 | 0.00 | Reservoir |

Link Results:

| Link ID | Flow LPS | Velocity m/s | Unit Headloss m/km | Status |
|---|---|---|---|---|
| 15 | 15.00 | 0.21 | 0.22 | Open |
| 1 | 14.11 | 0.20 | 0.20 | Open |
| 1_1 | 51.58 | 0.41 | 0.54 | Open |
| 3 | 0.00 | 0.00 | 0.00 | Open |
| 4 | 33.11 | 0.26 | 0.24 | Open |
| 5 | 33.11 | 0.26 | 0.24 | Open |
| 6 | 33.11 | 0.26 | 0.24 | Open |
| 12_1 | 12.14 | 0.17 | 0.15 | Open |
| 8 | 0.10 | 0.00 | 0.00 | Open |
| 9 | 5.31 | 0.08 | 0.03 | Open |
| 10 | 5.31 | 0.08 | 0.03 | Open |
| 11 | 10.58 | 0.15 | 0.12 | Open |
| 2_1 | 9.66 | 0.14 | 0.10 | Open |
| 2_2 | 1.30 | 0.02 | 0.00 | Open |
| 1_2 | 46.75 | 0.37 | 0.45 | Open |
| 2 | 14.61 | 0.21 | 0.21 | Open |
| 14 | 4.83 | 0.07 | 0.03 | Open |
| 3_1 | 36.29 | 0.29 | 0.28 | Open |
| 7_1 | 4.39 | 0.06 | 0.02 | Open |
| 7_2 | 0.10 | 0.00 | 0.00 | Open |
| 15_1 | 17.71 | 0.25 | 0.30 | Open |
| 12_2 | 17.71 | 0.25 | 0.30 | Open |
| 15_2 | 8.70 | 0.12 | 0.08 | Open |
| 3_2 | 33.11 | 0.26 | 0.24 | Open |
| 7 | 0.00 | 0.00 | 0.00 | Open |
| 12 | 0.00 | 0.00 | 0.00 | Open |
| 13 | 0.00 | 0.00 | 0.00 | Open |
| 21 | 9.00 | 0.13 | 0.09 | Open |
| 23 | 9.00 | 0.13 | 0.09 | Open |
| 24 | 9.00 | 0.13 | 0.09 | Open |
| 25 | 9.00 | 0.13 | 0.09 | Open |
| Dummy1 | 8.70 | 0.12 | 0.08 | Open |
| Dummy2 | 14.11 | 0.20 | 0.20 | Open |
| 28 | 2.41 | 0.14 | 0.31 | Open |
| P2 | 0.00 | 0.00 | 0.00 | Closed Pump |
| P1 | 65.69 | 0.00 | -229.94 | Open Pump |

# 5. Civil Stormwater Management Report

ARUP

121 Bloor Street East Suite 900
Toronto ON M4W 3M5
Canada

t +1 416 515 0915

arup.com

By email

July 6, 2023

Jinny Tran, Senior Development Manager
Northcrest Developments
161 Bay St., Suite 1305
Toronto, ON M5J 2S1

t 647-228-9086
e jtran@northcrestdev.ca

Dear Jinny,

## The Hangar District (formerly Taxiway West South Sub-District)
## Stormwater Management Report for the Proposed Redevelopment of 123 Garratt

Arup has been retained by Northcrest Developments ("Northcrest") to undertake civil engineering, including the design of the stormwater management for the Hanger District in support of the resubmission of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS"). A stormwater management report dated May 2022 was issued to the city of Toronto. This letter is being provided in lieu of an updated Stormwater Management Report for this resubmission, along with the May 2022 version of the Stormwater Management Report.

### Stormwater Management Approach

The stormwater management approach for the Hanger District builds on that presented in the May 2022 submission and is consistent with the preferred stormwater management approach that is proposed in the Master Environmental Servicing Report (MESP) for the Downsview Secondary Plan. As presented in at the Update Downsview Virtual Public Meeting & In-Person Open House held on May 29 to June 3, 2023, the MESP proposes:

- An integrated and decentralized stormwater management system,
- The use of green infrastructure across all aspects of the proposed development,
- Managing runoff from very infrequent major storm events across the Secondary Plan including in public and private open space and parks, avoiding the need for dedicated stormwater management facilities.

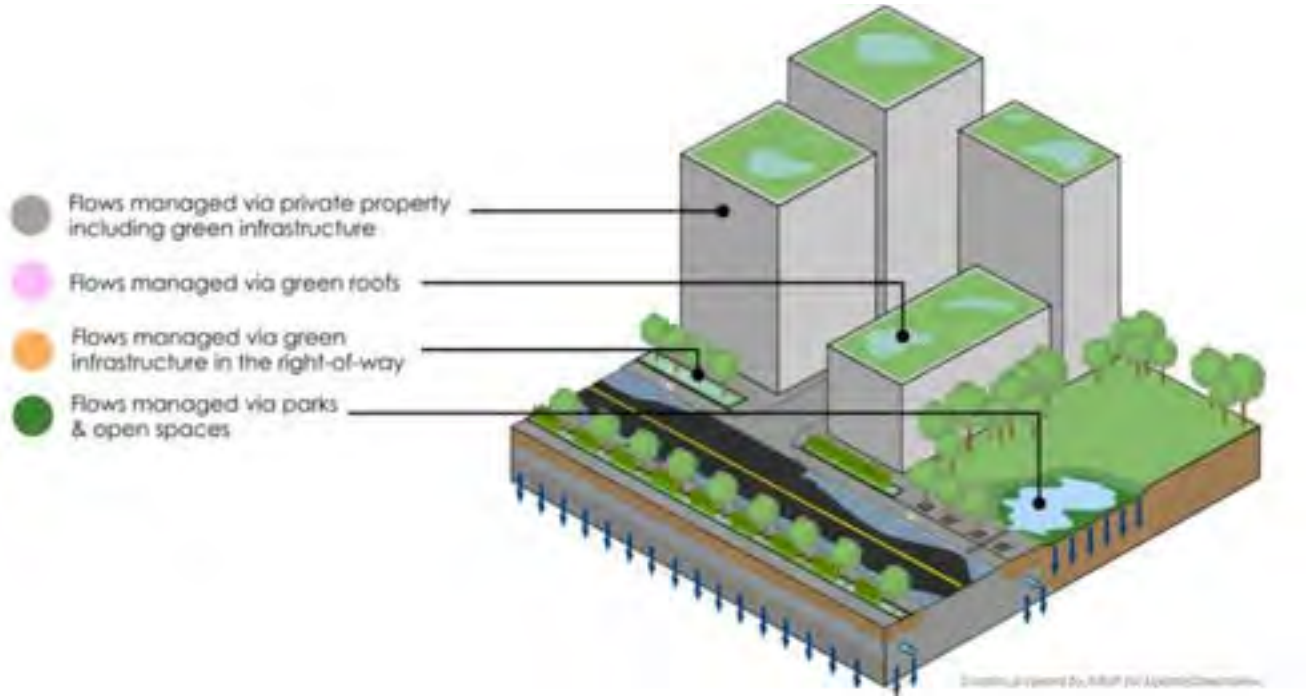
In keeping with this approach, the stormwater management approach for the Hangar District includes:

- A decentralized approach to managing stormwater,
- The use of green infrastructure throughout the District, including in the private development blocks, private streets, Publicly-Owned Private Spaces (POPS), public streets, and parks,
- The use of both public and private open space, including the proposed Garratt Boulevard Park, to manage water from very infrequent storm events.

### Updates to Design and Reports

A number of recent updates have been made to the Hanger District design, including to the configuration of public streets, open space and parks. Work is ongoing to update the stormwater

management strategy and design to reflect this and to ensure it is fully aligned with the strategy being finalised in the MESP. It is expected that an updated Stormwater Management Report will be provided to the City of Toronto for review in the coming months.




**Comprehensive decentralized stormwater management system (Update Downsview Information Boards – May 2023)**

We trust that this letter provides clarity on the current design approach and status of the analysis and reporting. We look forward to continuing working through the decentralized stormwater management approach with the City and will revisit this conversation in a Working Group Meeting with City staff in the future. If there are any questions, please contact me on the details provided.

Yours sincerely,

Henry Jeens, P.Eng.
Associate Principal

d +1-647-260-3482
e henry.jeens@arup.com

cc Alexandra Suchon, alexandra.suchon@arup.com; Joshua Battiston, Joshua.Battiston@arup.com

Appendix I Stormwater Management Report, dated May 2022

# Appendix I

ARUP

**Northcrest Developments**

# Taxiway West
# South Sub-District

## Stormwater Management Report for the Proposed Redevelopment of 123 Garratt Boulevard

Final | May 2022



This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

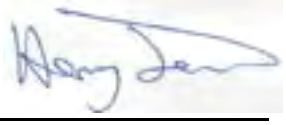
Job number 260341-00

**Arup Canada Inc.**
121 Bloor Street East, Suite 900
Toronto, ON M4W 3M5
Canada
arup.com

ARUP

# Document Verification

| | |
|---|---|
| **Project title** | Taxiway West<br>South Sub-District |
| **Document title** | Stormwater Management Report for the Proposed Redevelopment of 123 Garratt Boulevard |
| **Job number** | 260341-00 |
| **Document ref** | |
| **File reference** | |

| Revision | Date | | | | |
|---|---|---|---|---|---|
| Draft 1 | January 10, 2022 | **Description** | First draft submission based on Design Freeze #1 | | |
| | | | **Prepared by** | **Checked by** | **Approved by** |
| | | **Name** | Della Zhang<br>Angus Wan | Nick Copeland | Henry Jeens |
| | | **Signature** |  | | |
| Draft 2 | March 14, 2022 | **Filename** | | | |
| | | **Description** | Second draft submission based on Design Freeze #2 | | |
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| | | **Name** | Della Zhang<br>Angus Wan | Nick Copeland | Henry Jeens |
| | | **Signature** |  | | |
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| | | **Name** | Della Zhang<br>Angus Wan | Nick Copeland | Henry Jeens |
| | | **Signature** |  | | |

Issue Document Verification with Document ☑

# Executive Summary

Arup has been retained by Northcrest Developments ("Northcrest") to prepare this Stormwater Management Report in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application for the Taxiway West South Sub-District at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto.

This report presents the preliminary stormwater management design strategy for the proposed redevelopment of 22.5 hectares within the Downsview Airfield Lands in Toronto, Ontario. This development is the first of ten districts within the wider Downsview Framework Plan named the Taxiway West District and focuses on the South Sub-District ("Subject Area").

Arup performed a stormwater management analysis of the Subject Area, including an assessment of the existing conditions and its adjacent stormwater network, followed by an analysis of the impacts of the proposed development on this network. The stormwater management strategy described in this report has been formulated in accordance with City of Toronto's standards and guidelines and was based on the information made available to Arup at the time of the analysis. The proposed design methodology aims to meet the criteria of the three stormwater management targets set out in the Wet Weather Flow Management Guidelines: water balance, water quality, and water quantity.

In 2021, a Master Environmental Servicing Plan (MESP) was conducted in support of an Official Plan Amendment application for the Downsview Lands. To coincide with the stormwater management strategy set out in the MESP, Blue-Green Infrastructure (BGI) will be the key objective integrated into the approach to provide various environmental, social, and economic benefits. The proposed integrated system will help maintain the natural hydrological cycle, create amenities, mitigate or reduce flooding, and aim to provide an overall improvement in stormwater management and environmental conditions of the Subject Area.

The key design features and goals of the proposed stormwater management strategy for the Subject Area are summarized as follows:

- Maintain existing catchments, overall major flow routes, and the existing outfall
- Grading strategy to protect existing and proposed buildings for up to a 100-year storm
- Provide BGI in public streets for water quality and water balance control using an LID treatment train approach rather than oil grit separators (OGS) or stormwater management (SWM) ponds
- Manage water at source for private development blocks and streets utilizing enhanced Green Infrastructure (GI) such as green/blue roofs, soil cells, permeable pavement, bioretention, and geo-cellular storage units
- Utilize portions of Garratt Blvd Park for dedicated floodable space to provide flood alleviation from public street runoff during storms greater than 2-year
- The stormwater management strategy of the Subject Area is independent from the rest of the Downsview Land's proposed Districts and infrastructure

<u>Blue-Green Infrastructure</u>

The BGI strategy will be further developed in later stages of design, but will primarily involve a three-layered approach:

1. The first layer consists of locating smaller BGI features strategically throughout public and privately-owned spaces to manage typical storm events. These features can be in the form of green or blue roofs for

developments, permeable pavements, soil cells, geo-cellular storage units within private streets, bioretention planters, and similar features within public rights-of-way. Permeable surfaces within open spaces also contribute to this first layer of rainfall absorption.

2. The second layer is specifically for open spaces, public parks, and other outdoor recreational amenities which are proposed to be used to allow onsite retention via infiltration for frequent storms and temporarily store rainwater from larger storms before discharging back into the municipal stormwater systems when the capacity allows. Measures within these spaces such as bioswales and wetland zones will help alleviate stress from municipal infrastructure and increase the resiliency of the overall network. BGI within the public realm will follow the City of Toronto Design Criteria for Green Infrastructure in the Right-of-Way.

3. The third layer will include major park features used as dedicated flexible floodable spaces during extreme storm events to mitigate flooding risks of infrastructure and buildings in the Subject Area, as well as areas downstream. These dedicated areas will flood infrequently, but when inundated, the areas will drain within an allowable timeframe and discharge back to the municipal stormwater network at an attenuated rate to accommodate sewer capacity.

Storm Servicing

- Maintain the existing single stormwater network connection of the Subject Area (referred to as the outfall) to the municipal network under the Barrie GO rail line located west of the Subject Area.

Stormwater Management

- Water balance – The water balance target for the proposed development is to retain a minimum of 10 mm of rainfall for the entire Subject Area per Tier 2 requirements of the Toronto Green Standards v4.0. Water balance will be managed through LID features such as soil cells, bioretention planters, and permeable pavements.

- Water Quality – Retaining 10 mm on site as part of water balance requirements. In addition, a treatment-train approach involving LID features and possible OGS, where required, will ensure enhanced protection through an 80% long-term removal of total suspended solids from the runoff.

- Water Quantity – Water quantity targets will be met holistically, where over-control will be required for private development parcels and private roadways to not exceed the existing Subject Area outfall capacity. Water quantity may be controlled using underground detention storage units with an orifice to control the discharge from privately-owned parcels into the downstream municipal network. A dual drainage system design will also be implemented for the proposed public roadways to meet water quantity requirements.

- Erosion and Sediment Control – Permanent erosion control of 25 mm detention onsite for a minimum of 24 hours will be achieved by a combination of LID measures and detention storage.

Water balance, water quality, water quantity, and erosion and sediment control design for development parcels will be included as part of the future site plan applications for each parcel.

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# 1. Introduction

Arup has been retained by Northcrest Developments ("Northcrest") to prepare this Functional Servicing Report in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application for the Taxiway West South Sub-District at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto.

The Subject Area is owned by the PSPIB Downsview Investments Inc. ("PSP") and is comprised of 22.4 hectares (55.5 acres) of land consisting of the existing Bombardier hangars, offices and ancillary structures, surface parking lots, and a portion of the Downsview Airport taxiway. The Subject Area is located south of a proposed Film Studio Campus.

Together, the Subject Area and the Film Studio Campus are known as the Taxiway West District (herein referred to as "the District") in a proposed Framework Plan prepared by Northcrest and Canada Lands Company ("CLC"). The District seeks to implement the objectives and structuring elements of the broader Downsview Framework Plan; deliver a new employment hub that will create jobs and other economic opportunities; a range of diverse new housing options; a walkable environment that is well-connected to the surrounding areas including Downsview Park; and new parks and green spaces that support biodiversity and reflect the rich expressions of art and culture. Figure 1 illustrates the District and the Subject Area in context of the Downsview Framework Plan.




**Figure 1: Subject Area in Context of the Downsview Framework Plan**

## 1.1 Project Description

The Subject Area is located in Downsview, City of Toronto (formerly within the district of North York). It is 22.4 hectares (55.5 acres) in size and is located south of the proposed Film Studio Campus, west of the re-imagined Runway, east of the Barrie GO rail line (also known as the GO Transit Newmarket Subdivision line) and north of the Ancaster neighborhood. It is in the southwestern portion of the Downsview Framework Plan Area.

Northcrest is seeking to create a vibrant and livable community comprised of three distinct, but complementary character areas. The Hangars will be characterized by repurposing the existing buildings, which will create an innovative employment hub for a range of light industrial and office uses. The Village is envisioned as a vibrant, walkable, connected, and comfortable urban environment with places to live, work, and visit year-round. Ancaster West is a predominantly residential neighborhood that will sensitively integrate new housing options and community amenities, while transitioning to the existing Ancaster community.

Figure 2 illustrates the proposed character areas within the Subject Area.




**Figure 2: Subject Area and Taxiway West District**

The development of the South Sub-District involves the retrofit of the existing hangar buildings, as well as the construction of new residential, commercial, and community uses. Refer to Figure 3 for the proposed plan layout and key naming of the Subject Area.




**Figure 3: Proposed Development and Key Naming within Subject Area**

In total, the Subject Area proposes to accommodate approximately 368,365 square meters (3.97 million square feet) of employment, residential, retail, community, and institutional uses. These uses are supported by an interconnected network of fine-grained streets that connect the Subject Area with its surroundings. Streets will be designed to make walking, cycling, and accessing transit comfortable and convenient, while safely accommodating cars and commercial vehicles. A diverse system of open spaces is proposed consisting of public parks, plazas, and squares, privately owned publicly accessible spaces, interior open spaces, and a signature park bridge that will connect to Downsview Park over the Barrie GO rail line. The community will celebrate the rich history of the area and diverse local voices and be a place that is welcoming to all.

## 1.2 Scope & Objectives of Report

This report has been prepared to demonstrate that the Subject Area satisfies the City of Toronto and approval agencies' requirements for stormwater management (SWM). The goal of this study is to provide key SWM and drainage considerations for the future development of the Subject Area while recognizing the local design criteria and site conditions. The following are the key objectives for this study:

- Inventory the background information provided from the City of Toronto, landowners and adjacent developments related to the site and applicable downstream areas. This area is referred to as the "project study area" which can be defined by the limits of the 2011 Downsview Area Secondary Plan boundary illustrated in Figure 1. Verify and adapt the background information within the project study area to develop the drainage and stormwater management design.
- Identify the drainage and SWM design criteria associated with the project study area, which includes requirements for conveyance features, water quantity, water quality, water balance and erosion and sediment control.
- Establish the existing site drainage patterns and outfalls within the Subject Area. Document assumptions for existing soil conditions and drainage patterns.
- Evaluate the existing and proposed site hydrologic and hydraulic conditions within the Subject Area using the proposed site layout, grading scheme, and PCSWMM modelling software.
- Develop SWM strategies and recommendations associated with the development of the Subject Area in alignment with local design criteria defined in Section 1.4.1.
- Perform a preliminary site-specific water balance calculation based on the existing and proposed site development conditions in accordance with local design criteria defined in Section 1.4.1.
- Evaluate potential drainage conveyance features in the form of storm sewers for the proposed development condition using PCSWMM software. Identify required upgrades to the existing storm sewer system to service the proposed development.
- Develop a flood mitigation strategy that achieves an acceptable level of flood protection for the Subject Area and maintain, or where practical, reduce the risk of flooding to adjacent communities
- Maximize the use of Green Infrastructure (GI) and Low Impact Development (LID) to reduce levels of stormwater runoff, enhance the quality of stormwater runoff, and promote infiltration. GI standards defined in Section 1.4.1 will be followed.

## 1.3 Downsview Framework Plan Vision and Strategy

The Framework Plan is a document prepared in 2021 supporting the Official Plan Amendment (OPA) application for the proposed redevelopment of the Downsview Lands. It is a high-level, long-term planning framework intended to guide the physical transformation of the Downsview Lands and achieve the visions, principles, and structuring ideas. The Framework Plan is guided by the following six (6) over-arching guiding principles:

1. Establishing Complete Connected Communities
2. Achieving Sustainability and Resilience
3. Cultivating City-Nature
4. Connecting People and Places
5. Embedding Equity and Accessibility
6. Honoring the Uniqueness of the Place and its People

The 2021 Master Environmental Servicing Plan (MESP) Report expands on the guiding principles of the Framework Plan through its SWM visions and objectives. The report outlines the four pillars to the SWM vision as follows:

- **Natural:** Nature-based solutions for quality and quantity control
- **Topographic:** Terrain-based solutions for sustainable soil balance
- **Circular:** Retain and re-use stormwater locally
- **Resilient:** Reduce current and future flood risk

Blue-Green Infrastructure (BGI) is at the center of the Framework Plan's and MESP's SWM vision to provide multiple environmental, social, and economic benefits. The open space strategy for the redevelopment of Downsview Lands will provide opportunities for layered, multi-functional, and integrated BGI within public and private open spaces, parks, linear features, and rights-of-way as illustrated by examples in Figure 4. Being part of the first District to develop, the Subject Area will demonstrate the visions, objectives, and principles set forth in the Framework Plan and MESP through the implementation of BGI and various SWM features within the proposed SWM strategy. The proposed SWM strategy of the Subject Area will also align with the targets for Water Balance, Water Quality, Water Quantity, and Erosion Control mentioned in the MESP. These requirements are outlined in Section 1.5 of this report.




**Figure 4: Multi-Level Stormwater Management Examples**

## 1.4 Background Information

To properly establish the Subject Area's existing conditions and develop the proposed SWM and drainage design for this project, all relevant design standards and existing reports have been reviewed. The following sections describe the relevant standards and background information reviewed and considered for this study.

### 1.4.1 Standards

The stormwater management approach for the new development site is driven by the relevant federal, provincial, and municipal legislation, by-laws, and design guidelines and criteria. These include the following:

- City of Toronto, 2006. Wet Weather Flow Management Guidelines (WWFMG)
  - Guiding document for the Subject Area's stormwater management requirements
- City of Toronto, 2021. Design Criteria for Sewers and Watermains, second edition (DCSW)
  - Guiding document for the storm sewer design requirements
- City of Toronto, 2021. Design Criteria for Green Infrastructure in the Right-Of-Way
  - Standard drawings, construction specifications, and guidelines for green infrastructure implementation in the right-of-way
- City of Toronto, 2022. Toronto Green Standards, version 4 (TGS). To become effective in May 2022
  - Guiding document for the water balance requirement and Green Infrastructure design
- Toronto and Region Conservation Authorities (TRCA), 2010. Low Impact Development Stormwater Management Planning and Design Guide
  - Guiding document for the potential development of LID facilities within the Subject Area
- TRCA, 2012. Stormwater Management Guidelines and Criteria
  - Target criteria that will supplement the Subject Area's stormwater management requirements
- TRCA, 2019. Erosion and Sediment Control Guide for Urban Construction
  - Guiding document for the temporary erosion and sediment control during construction of the proposed development for the Subject Area

### 1.4.2 Reports

The relevant reports reviewed for this document are listed below:

- Stormwater Management Report – Stanley Greene Neighbourhood prepared by MMM Group Limited in 2016 for Parc Downsview Park Inc. 10-10019-001-SWM
- Stanley Greene External Flow Contributions Bombardier Lands – Hydraulic Analysis prepared by MMM Group Limited in 2015. MMM Project: 1010019-001-SWM [Memorandum]
- Stormwater Management Report Downsview Park prepared by MMM Group in 2008
- Functional Servicing Report Block G (Stanley Green Neighbourhood) prepared by MMM Group in 2015
- Downsview Area Secondary Plan Municipal Infrastructure and Site Servicing Due Diligence Report prepared by Stantec in 2019

- Draft Master Environmental Servicing Plan (MESP) for the Proposed Redevelopment of Downsview Lands, City of Toronto prepared by Arup, BA Group, and Golder in 2021
- Final Geotechnical Study / Hydrogeological Review for the Proposed Redevelopment of 123 Garratt Boulevard, prepared by Jacobs and to be finalized in May 2022.

### 1.4.3 Other Background Information

- Level B Subsurface Utility (SUE) investigation data collected by Callon Dietz in 2021
- CUMAP data provided by the City of Toronto in 2018 in DWG Format
- Verbal information from Bombardier Staff on site visits in 2019 and 2020
- Toronto Water Asset Group (TWAG) GIS files from City of Toronto
- Site Survey performed by J.D. Barnes in 2021
- Basement Flooding Area (BFA) 16 InfoWorks Model from City of Toronto
- BFA 19 InfoWorks Model from City of Toronto
- Bombardier As-Built Stormwater Drawings compiled in 2009
- LiDAR and topographic survey data collected by J.D. Barnes in 2019 and 2021.

## 1.5 Design Criteria

The Subject Area is classified as a "large development" per WWFMG and consists of proposed private and public spaces. The private spaces include development parcels, buildings, privately owned open spaces, and private laneways while public spaces include public streets, associated rights-of-way, and public parks or open spaces. Therefore, Table 1 outlines the design criteria for the SWM of the Subject Area based on private and public space classification and presents the relevant SWM requirements for each use.

**Table 1: Stormwater Management Design Requirements for the Subject Area**

| Target | Private Development Parcels, Streets & Laneways | | Public Rights-of-Way & Parks | |
|---|---|---|---|---|
| | Requirements | Reference | Requirements | Reference |
| **Water Balance Management** | At a minimum, following TGS V4 Tier 2 to retain runoff generated from a minimum of 10 mm depth of rainfall from all site surfaces through infiltration, evapotranspiration and water harvesting and reuse.<br>*Site will target to retain an aspirational 25 mm on site wherever feasible.* | TGS v4 – Tier 2, MESP | Same as Private properties | N/A |
| | Retain stormwater on-site, to the extent practicable, to achieve the same level of annual volume of overland runoff allowable from the development site under pre-development conditions. | WWFMG – Section 2.2.1.1 (b) | Same as Private Properties | N/A |

| Target | Private Development Parcels, Streets & Laneways | | Public Rights-of-Way & Parks | |
|---|---|---|---|---|
| | Requirements | Reference | Requirements | Reference |
| | If the allowable annual runoff volume from the development site under post-development conditions is less than the pre-development conditions, then the more stringent runoff control requirement becomes the governing target for the development site. The maximum allowable annual runoff volume from any development site is 50% of the total average annual rainfall depth. | WWFMG – Section 2.2.1.1 (c) | Same as Private Properties | N/A |
| **Water Quality Management** | Long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development site.<br><br>All watercourses and water bodies within TRCA's jurisdiction are classified as requiring an Enhanced level of water quality protection, equivalent to 80% TSS removal. | WWFMG – Section 2.2.2.1 (a)<br><br>TRCA SWM Criteria – Section 5.2 | Same as Private Properties | N/A |
| **Water Quantity – Flood Management** | Level of protection for properties, equivalent to the 100-year storm (where feasible), against surface flooding from ponding on streets, particularly in areas experiencing chronic basement flooding and/or when a proper major overland flow stormwater drainage system does not exist. | WWFMG – Section 2.2.3.1 (c) | Same as Private Properties | N/A |
| **Water Quantity – Erosion and Sediment Control** | For sites where it is not feasible* (this condition must be reviewed and agreed by City staff) to complete an Erosion Analysis Report (EAR), the 25 mm design storm must be detained on-site and released over a minimum of 24 hours.<br><br>**Physical site conditions may be considered "not feasible", such as proposed development is negligible with respect to the total drainage area of the receiving watercourse (e.g., less than 1%) and/or the watercourse is not sensitive to development – concrete channel, etc.* | WWFMG – Section 2.2.3.3 (c) | Same as Private Properties | N/A |
| | During construction, temporary erosion and sediment control must be provided on-site. | WWFMG – Section 2.2.3.5 (a) | Same as Private Properties | N/A |

| Target | Private Development Parcels, Streets & Laneways | | Public Rights-of-Way & Parks | |
|---|---|---|---|---|
| | Requirements | Reference | Requirements | Reference |
| **Water Quantity – Discharge Criteria to Municipal Infrastructure** | The allowable release rate to the municipal storm sewer system from the development site during a 2-year design storm event must not exceed the 2-year pre-development peak runoff rate from the development site, or the existing capacity of the receiving storm sewer, whichever is less. | WWFMG – Section 2.2.3.7 (a) | The minor system within local and collector roads in areas where storm and sanitary sewers are separated shall be designed to accommodate the runoff from a 2-year design storm under free flow conditions, or the existing level of protection, whichever is less. | DCSW – Chapter 3 – Storm Sewers |
| | When the percent imperviousness of the development site under pre-development conditions is higher than 50% (regardless of what the post-development condition is), the maximum value of C (Runoff Coefficient) used in calculating the pre-development peak runoff rate is limited to 0.5. | WWFMG – Section 2.2.3.8 (2) | Same as Private Properties | N/A |
| | All flow from the 2-year up to the 100-year storm events shall be stored on-site and released at the allowable release rate or the capacity of the existing minor system, whichever is less. | WWFMG – Section 2.2.3.8 (3) | Storm runoff, which exceeds the allowable release rate but complies with all other requirements (water balance, water quality, flood management and erosion control) is allowed to discharge off-site via overland flow routes with sufficient capacity up to the 100-year design storm.<br><br>In the existing conditions, overland flow from the Subject Area spills to an adjacent catchment in the Ancaster neighbourhood. This spill is reflected in the Area 16 and Area 19 Basement Flooding Protection Program (BFPP) InfoWorks models. | WWFMG – Section 2.2.3.8 (3) |

Based on analyses of the topographic survey and SUE information, the Subject Area is identified to be entirely within the Humber River Watershed Sub-Basin 46. This finding is consistent with the existing catchment boundary discussion in Section 6.4.2.2 of the MESP for Downsview Lands.

It was noted that per the WWFMG by City of Toronto and SWM criteria by TRCA, the unit flow rate shall be applied to determine the pre-development conditions for sites within the Humber River watershed not discharging to the main branches of the Lower, Main, East, Upper and West Humber. However, it is assumed that this is not a requirement for this study as the flows from the Subject Area discharges into subsequent SWM systems that has allowed for a certain peak flow release rate prior to discharging into Black Creek, a tributary of Humber River. Described in Section 2, these SWM systems include the Stanley Greene SWM pond and the Parc Downsview Park (PDP) Lake in Downsview Park. Based on background reports from MMM Group and an acknowledgement letter from Bombardier in November 2015, it was agreed between the two parties that the design of the Stanley Greene SWM pond has accounted for the maximum 100-year peak flow release rate of 1,100L/s through the existing storm pipe beneath the Barrie GO rail line. Therefore, the redevelopment of the Subject Area targets to maintain this 1,100 L/s peak flow release rate. In such case, the downstream discharge rates from the two SWM ponds into the TRCA water system will remain unchanged.

The proposed private and public roads will be primarily classified as local or collector roads. Private roads will also include laneways. The existing site is considered as a developed site with separated sewer systems. Hence, the minor system shall be able to convey the 2-year design storm as set out in the DCSW and as shown in Table 2.

**Table 2: Design Storm for Minor System per Road Classification**

| Type of Road | Minor Storm |
|---|---|
| Local | 2-year |
| Collector | 2-year |
| Arterial | 10-year |
| Highway | 10-year |
| Road Underpass | 10 to 25-year |

## 1.6 Key Assumptions

Based on the available information, the following assumptions have been adopted:

- To achieve water balance, water quality, and quantity (erosion) targets, the current SWM design will accommodate the native soil infiltration rates based on the latest available records. Jacobs has currently estimated the infiltration values of the Subject Area based on hydraulic conductivity values. These values are described in Section 2.5. Additional field tests may be required to further verify the infiltration rate to support LID design in the detailed design stage at the location and depth of proposed LIDs.
- The existing municipal stormwater network information is based on CUMAP data made available by the City of Toronto and selected SUE information. This information will be confirmed and revised based on SUE investigations at later stages of design when required.
- Based on Bombardier as-built plans, roof drainage for the existing hangar buildings is connected to the existing storm network. The roofs represent a significant area of impervious land and the roof parapets have resulted in various levels of ponding during rainfall events as noted by Bombardier Staff. Since the existing roofs have been observed to store rainwater to some degree, a model will be developed as the design advances to represent the existing storage behaviour of the roofs.
- The entirety of the Subject Area is assumed to be within the Humber River Watershed based on data records and preliminary topography assessments. The proposed development's contributing catchment will remain unchanged and continue to outfall into the Humber River Watershed. This has previously been discussed with both TRCA and the City of Toronto in February and July 2021 in relation to the Framework Plan.
- As the BFA 66 and BFA 45 InfoWorks models have not been completed by the City of Toronto, the existing downstream sewer capacity at the Subject Area outfall is assumed to match the capacity used in the Stanley Greene subdivision design and stated in record agreements by Bombardier. The discharge rate of the proposed stormwater network through the outfall will be designed to the peak flow rate of 1,100 L/s as discussed in Section 2.3.

# 2. Existing Site Conditions

The Subject Area was first developed for aviation uses in the 1950s, after De Havilland Canada (DHC) was given a 99-year lease of the land in 1952. In the decades following, DHC constructed most of the buildings that remain on the site today. In the 1970s, the federal government purchased DHC and operated it as Crown property. In 1985, the Subject Area was sold to Boeing, and the lands were sold again to Bombardier in the 1990s. The Subject Area is currently known as the Bombardier Aerospace facility.

The main buildings that currently exist in the Subject Area include Bays 1-6, the southern portion of Bay 11, Bay 12, the Administration Building, Cafeteria, Stores Building, Chemical Process Building, Fire Pump House, and Data Centre. The Subject Area also includes paved areas for circulation and surface parking, as well as a portion of the taxiway that currently connects these lands to the main runway.

Figure 5 illustrates the existing buildings, facilities, parking lots, and airport features within the Subject Area.




**Figure 5: Existing Buildings and Parking Lots within the Subject Area**

The land use of the Subject Area is currently classified as General Employment and Regeneration Area in accordance with Site and Area Specific Policy 596 (SASP 596). Along with the existing hangar buildings, the Subject Area primarily consists of impervious pavement areas including parking lots, laneways, the airport apron, and taxiway. Additional descriptions of the existing land use for the wider Downsview Lands can be found in

Section 6.5 of the MESP report. Figure 6 shows the existing catchments for the larger Downsview Area, which is taken from the Downsview MESP.

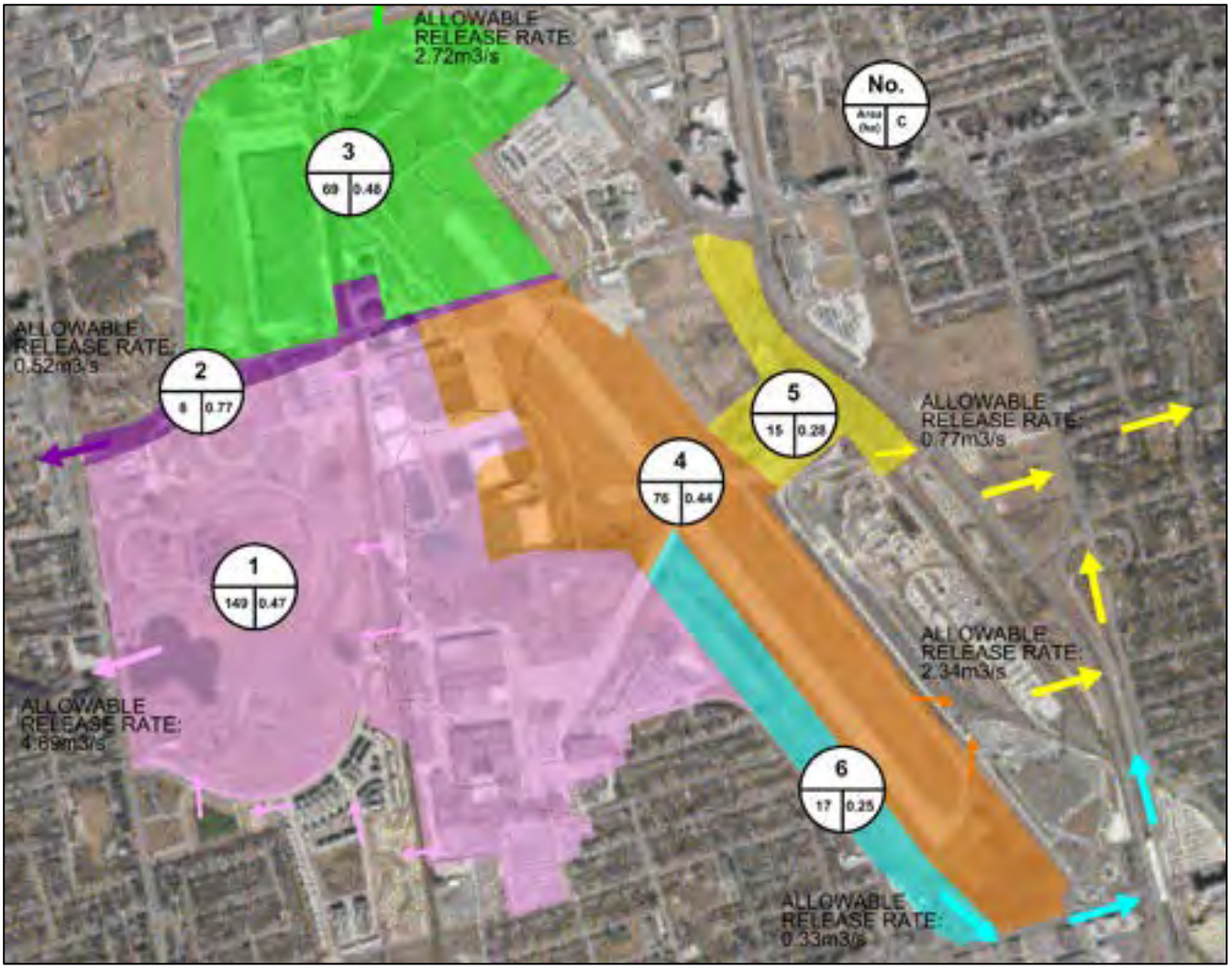



**Figure 6: Existing Catchment for the Downsview Lands from the MESP**

## 2.1 Existing Drainage Conditions

Existing stormwater management for the Subject Area is achieved by a combination of major and minor systems. The existing catchment plan and drainage conditions are shown in Figure 7

The topography of the Subject Area is generally sloping west towards the Barrie GO rail line, and south towards the existing Ancaster community. Illustrated in Figure 7 below, the major overland flow routes for the Subject Area drain south via the existing Ancaster neighbourhood and eventually southwest to the low point on Wilson Avenue. Per BFA 16 InfoWorks model, there are spill points located south of the existing parking lot on Plewes Road. Based on Google Street View shown in Figure 8, there are signs of channelized erosion south of the parking lot leading to Plewes Road. Hence, it is anticipated that the existing parking lot provides some retention via surface ponding during major flow events.

As shown in pink in Figure 7, the areas north and north east of the Suject Area including the existing north portion of Bay 11, Bay 7-10 (which is Phase B of the Future Film Studio Campus) and the runway area (Future Phase 2 development) are within the same drainage catchment as the Subject Area. These external areas flow south via the Subject Area towards the same existing outfall on Figure 7.




**Figure 7: Existing Stormwater Infrastructure and Overland Flow Routes**



**Figure 8: Channelized Erosion South of Existing Parking Lot on to Plewes Road (Google Maps Street View)**

## 2.2 Existing Stormwater Infrastructure

The Subject Area is located within an existing catchment area, highlighted in pink in Figure 7, which is serviced by an existing 525 mm diameter storm sewer outfall located on the southwest boundary. The area of the existing catchment is approximately 40.8 ha (101 acres) as previously delineated in the MESP based on a comprehensive review of existing data. Surface runoff within the catchment area is collected by a series of catchbasins primarily located at localized low points in paved areas and conveyed towards the outfall via a network of underground storm pipes. The pipe network converges into a 450 mm pipe on Hanover Road and expands into a 525 mm pipe prior to reaching the outfall.

For existing buildings, the Bombardier as-built plans for the stormwater system show that a series of roof drainage systems were installed on the existing buildings across the site including Bays 1 through 10, the Administration building, and the Data Centre facility. The roof drainage systems connect to storm sewers and discharges to the Bombardier storm sewer network via catchbasin structures adjacent to the buildings. For reference, the existing stormwater network for the Downsview Lands is attached in Appendix A.

Existing storm sewer capacity issues in the Subject Area have also been confirmed through preliminary assessments, modelling, and Bombardier Staff observations. Flooding occurs seasonally during moderate rainfall events and several changes to the storm network have been made to address the flooding over the years. Significant ponding volumes have also been identified to occur north Bay 6 requiring regrading of the area to prevent flooding into the hangars. This location is still considered an existing low point within the Subject Area.

## 2.3 Receiving Structure / Outfall

Depicted in Figure 7, an existing storm sewer serves as an outfall for the catchment area highlighted in pink. The catchment area consists of not only the Subject Area, but also existing Bay 11 north portion, Bay 7-10, and a portion of the existing runway area. This storm sewer, as shown in the SUE investigation for the Downsview Lands, is a 525 mm concrete circular pipe. The 525 mm outfall directs flows westward beneath the Barrie GO rail line and into a storm sewer on Frederick Tisdale Drive within the Stanley Greene neighbourhood. The Stanley Greene minor system discharges the flows into the Stanley Greene SWM pond, which then discharges into the Parc Downsview Park (PDP) Lake in Downsview Park via private sewers. The PDP Lake outfalls through municipal sewers into Black Creek, which is one of the tributaries of the Humber River.

Based on the Functional Servicing Report and Stormwater Management Report for Block G of the Stanley Greene neighbourhood (MMM Group, 2015 & 2016), the peak flow rate through the existing outfall during the 100-year storm event is 1,100L/s. This flow rate has been agreed and confirmed by Bombardier in a letter from November 2015 and will be used as a basis for the proposed storm sewer design of the Subject Area. The Bombardier agreement letter is attached in Appendix G for reference.

## 2.4 Adjacent Development: Stanley Greene Neighborhood

The Stanley Greene neighbourhood is a recently constructed subdivision development west of the Barrie GO rail line. The stormwater network within the neighbourhood receives surface runoff from the Downsview Lands via the existing 525 mm storm sewer outfall located underneath the rail line near Frederick Tisdale Drive. Per review of the Stanley Greene stormwater management reports, the design of the stormwater management pond in the Stanley Greene Neighbourhood took into consideration of flows originating from the Downsview Lands via the existing outfall shown in Figure 7. Flows via the existing outfall is limited to a maximum flow rate of 1,100 L/s up to 100-year storm events. The Stanley Greene stormwater management pond forebay design also provided water quality and erosion control for the runoff conveyed under the allowed maximum peak flow rate from the Downsview Lands via the existing outfall. For pond naming convention and location, see Figure 9.




**Figure 9: Stanley Greene and Downsview Park Stormwater Management Ponds and Lake**

Considered in the Stanley Greene design, the total contributing catchment area to the existing storm pipe beneath the Barrie GO rail line was 48 ha. This area is also referred to as the Bombardier Lands. During the development of the Downsview Framework Plan and the MESP, this existing catchment area has been determined to be 40.8ha as previously mentioned in Section 2.2 and illustrated in Figure 7. The re-evaluation of the catchment area was based on topographic surveys, hydraulic modelling, and the reports submitted as part of the Site Plan Application for Phase A of the Film Studio Campus (part of the Taxiway West North Sub-District).

It is noted that the Subject Area is 22.4 ha and only occupies a portion of the 40.8 ha catchment area draining to the existing outfall. Therefore, to maintain existing conditions and drainage patterns, the proposed SWM design will continue to manage flows from the remaining external areas within the existing 40.8 ha catchment area in addition to managing the Subject Area flows. As the BFA 66 InfoWorks Model has not been received from the City of Toronto, the Bombardier Lands outfall flow rate of 1,100L/s used by the Stanley Greene Neighbourhood SWM design will be considered as the existing downstream capacity constraints for this study at the current stage.

It was also noted that the existing storm sewer conveying flow between the two lands is referred to as a 600 mm culvert in the Stanley Greene report, but SUE investigations conducted for the Downsview Lands show an existing 525 mm storm sewer. This report will conservatively assume a size of 525 mm for hydraulic analysis purposes. Additional SUE will be undertaken at later design stages to re-confirm the size and elevation of this crossing.

## 2.5 Soil Properties

Based on the Final Geotechnical Study / Hydrogeological Review for the Subject Area prepared by Jacobs in May 2022, the infiltration rates for the combined fill/native material have been determined to range from approximately 32 to 40 mm/hr. This was estimated using an empirical relationship based on the review of site information and the existing hydraulic conductivity data of three shallow monitoring wells (PC-MW12, PC-MW13, and PC-MW20), with screened intervals ranging from 0.9 to 5.2 metres below ground surface (mbgs). Additional field tests may be required to further verify the infiltration rate to support LID design in the detailed design stage at the location and depth of proposed LIDs.

Based on the monitoring well information listed in Jacobs' findings, the site stratigraphy included the following: The topsoil ranged from 50 to 100 mm thickness, consisted of fine sandy silt and was typically brown and moist with rootlets. Asphalt and concrete pavement materials were encountered in all boreholes with asphalt thicknesses ranging from 20 mm to 250 mm, and concrete ranging from 150 mm to 180 mm. The fill material ranged from 0.3 to 3.4 mbgs and primarily consisted of sand and gravel, and disturbed native material (clayey silt or silty clay). Clayey silt till was encountered underlying the topsoil and fill material ranging from 1.2 to 14.8 mbgs. Other soil types encountered in monitoring wells included sand, silty sand, and sand till. Bedrock was not encountered during Jacobs' investigation with the deepest monitoring well extending to a depth of 15.9 mbgs. Groundwater elevations also ranged from 0.41 to 6.45 mbgs across the site.

# 3. Proposed Stormwater Management Strategy

## 3.1 Key Drivers

The proposed stormwater strategy aims to provide a resilient strategy to achieve an appropriate level of flood protection and to reduce the risk of flooding to adjacent sites. The strategy implements sustainable urban drainage principles with an emphasis on Blue-Green Infrastructure (BGI) implementation to best mimic natural hydrologic processes and leverage existing topography. This will provide a significant improvement to the existing conditions of the Subject Area as it currently experiences flooding due to the large expanses of impervious surfaces and relatively flat landform. Oversized infrastructure and pipe work will generally be avoided within the Stormwater Management Plan as they have significant embodied carbon, utilize larger space, and require greater maintenance. A decentralized approach will be taken for water quantity, where the Subject Area will be controlled holistically to meet the required allowable release rate and water quantity storage volumes.

The 2021 Master Environmental Servicing Plan (MESP) Report expands on the guiding principles of the Framework Plan through its SWM visions and objectives. The report outlines the four pillars to the SWM vision as follows:

- Natural: Nature-based solutions for quality and quantity control
- Topographic: Terrain-based solutions for sustainable soil balance
- Circular: Retain and re-use stormwater locally
- Resilient: Reduce current and future flood risk

The overall SWM and drainage strategy must consider proposed site discharge levels, infiltration rates, the capacity of existing sewers, the proposed landscape strategy, and the level of flood protection to be provided. The strategy will aim to maintain existing catchments, overall overland flow routes, drainage patterns, and the existing outfall. BGI will be woven into the open space and public realm systems of future communities to serve stormwater, micro-climate, ecosystem health, and recreational functions. Drainage improvements will be provided by managing water at-source by integrating GI in private development blocks and private streets. The proposed SWM strategy of the Subject Area will also align with the requirement targets for Water Balance, Water Quality, Water Quantity, and Erosion Control set by applicable governing regulations as described in previous sections.

## 3.2 Proposed Site Conditions

The Subject Area will be redeveloped as a primarily Mixed-Use development with public amenities including seven (7) public roadways, six (6) public parks and private areas including privately owned accessible spaces (POPS), private open spaces, the Taxiway, three (3) private streets, and seven (7) private laneways. The remaining areas such as the existing Hangar facilities will be Employment while a small southern portion of the Subject Area will be exclusively for Residential land use as shown in Figure 10. Figure 11 illustrates the demonstration plan of the proposed development.

Development parcels have been divided into blocks at the current stage and proposed massing will continue to evolve through the site plan process. The purpose of this report is to set the SWM requirements for the proposed development blocks. The detailed design of these blocks to meet those stormwater discharge requirements will be developed with the site plan submissions of each of those blocks. Runoff coefficients are not shown in the proposed drainage plan in Appendix C as details to understand the impervious levels of the proposed development parcels will be developed further as the design advances. Hence, only SWM requirements will be stated for the development parcels.

A preliminary grading design has been completed for the public and private roadways. The general rationale adopted for the proposed grading design is to maintain the existing drainage patterns where possible while eliminating certain local low points which pose flooding risks. The delineation between private roadway networks

and municipal (public) roadways is illustrated in Figure 12. The proposed private and public open spaces are illustrated in Figure 13.

Appendix B shows the proposed grading design for the public and private permanent roadways and Appendix C shows the proposed sub-catchments.

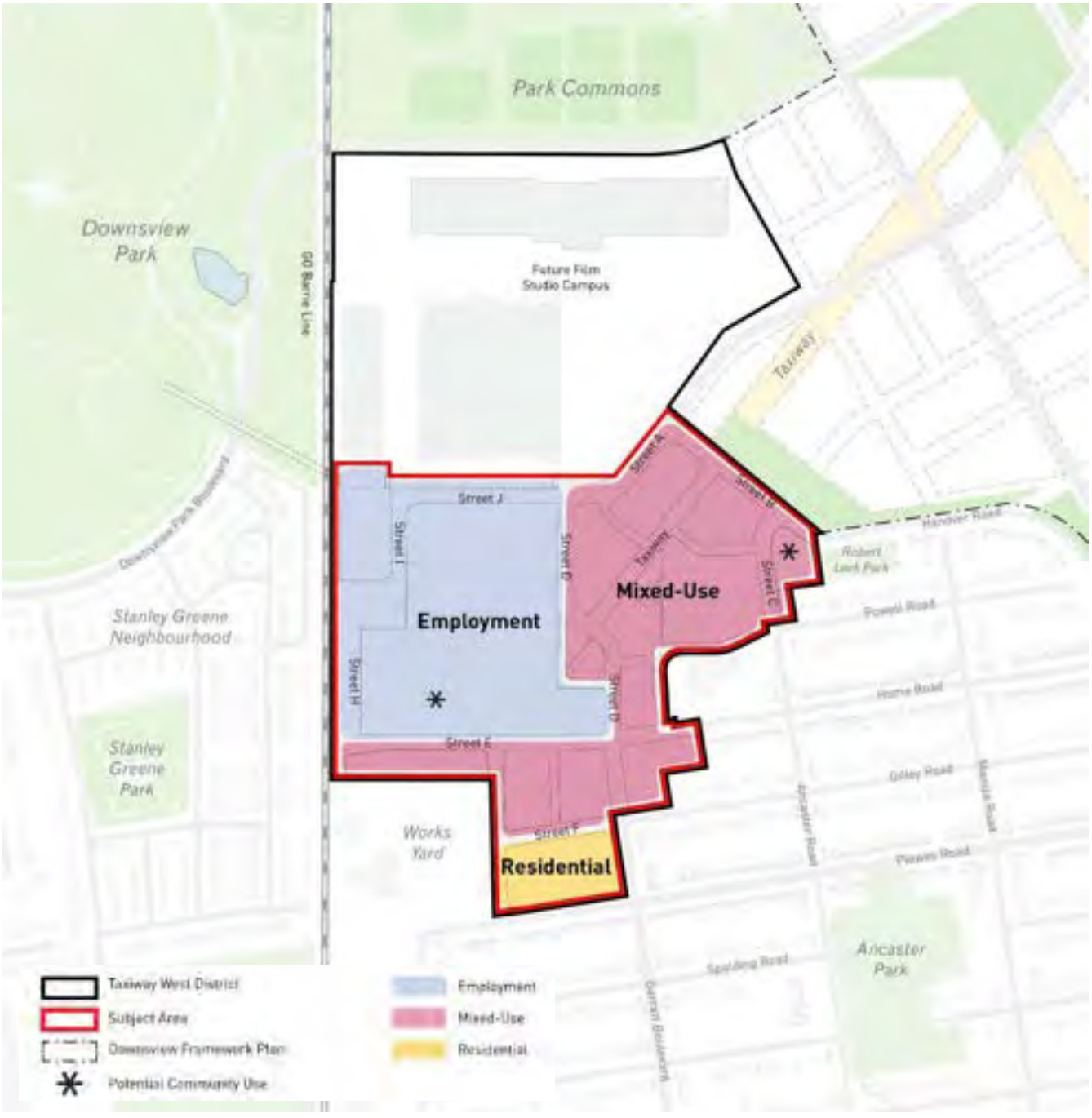



**Figure 10: Land Use for the Subject Area**




**Figure 11: Proposed Demonstration Plan for the Subject Area**

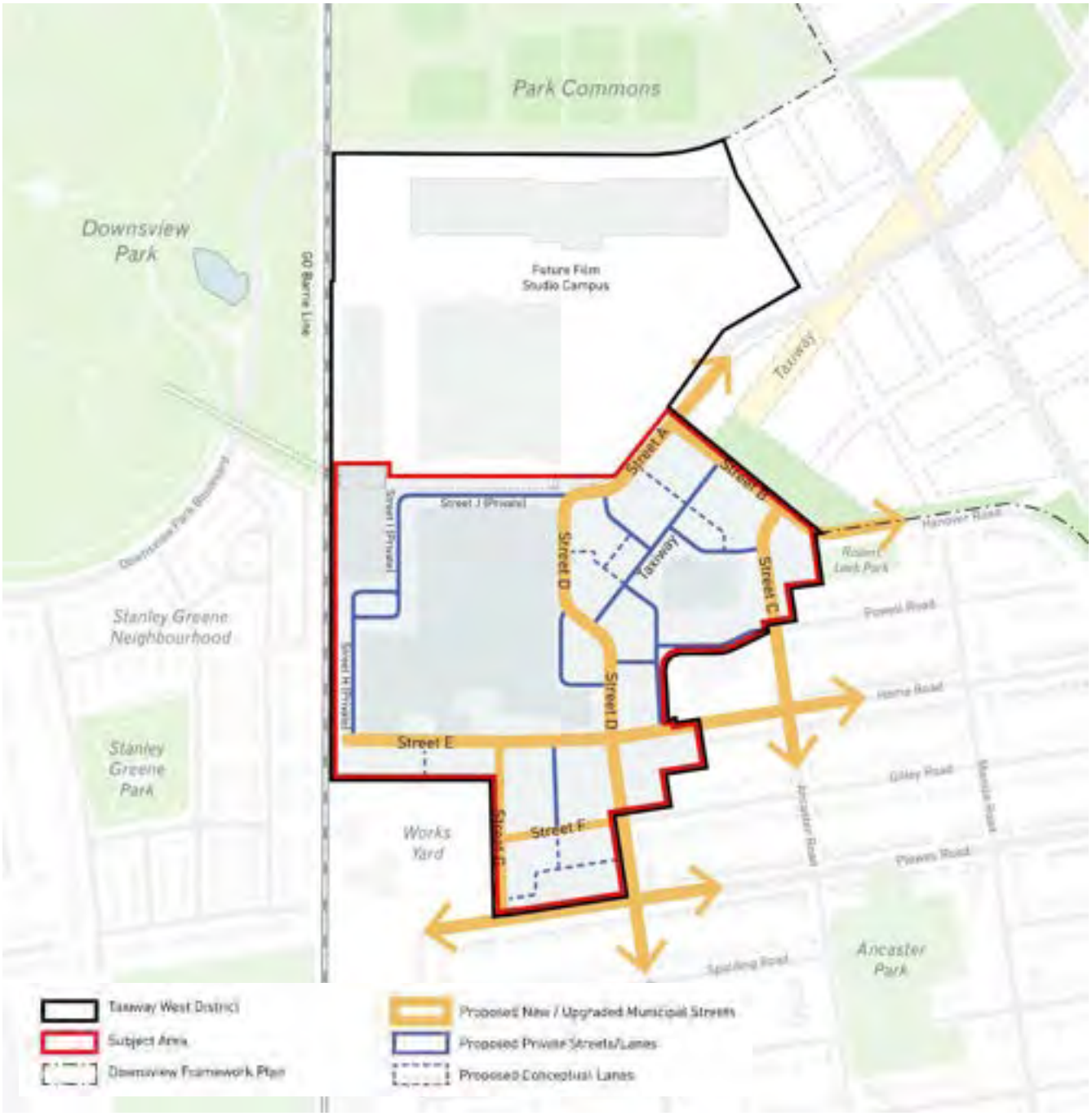



**Figure 12: Private and Public Road Networks in the Subject Area**




**Figure 13: Proposed Open Spaces of the Subject Area**

## 3.3 Phasing Overview

The proposed phasing for the Subject Area and adjacent areas is illustrated in Figure 14. The Taxiway West District is expected to be fully built out by 2031; however, within this timeframe, the specific dates for the completion of Phases A and B are not yet confirmed. Therefore, the SWM strategy for the Subject Area has proposed interim stormwater connections to Phase B to maintain the existing catchment area discharging to the outfall.

To the east, the Taxiway East District is expected to build out between 2031 to 2041 as part of Phase 2 of the Downsview Lands Framework Plan development. Since a portion of the runway area located within the future Taxiway East District is part of the existing catchment draining to the existing south outfall under the Barrie GO rail line, the SWM strategy for the Subject Area proposes temporary interim stormwater solutions in Section 3.4.3

to continue to manage existing flows from this runway area until the Taxiway East District is fully developed. The planned progression of the MESP will further support the SWM strategies of the future Districts and the Downsview Framework Plan.




**Figure 14: Overall Phasing for Taxiway West District**

## 3.4 Strategy Overview

The stormwater management strategy aims to meet WWFMG criteria for water balance, water quality, water quantity and conveyance by employing GI and LIDs in addition to traditional ("grey infrastructure") conveyance and storage measures. A decentralized approach is taken for water quantity, where the Subject Area will be controlled holistically to meet the required allowable release rate and water quantity storage volumes. The following sections will explain the water quantity strategy in detail.

The Subject Area is divided into two (2) main categories, private and public properties. The private property includes proposed development parcels and private roadways and laneways. The public property includes proposed public roadways and public parks. Correspondingly, and reflecting the structure of the design criteria described previously within Table 1 in Section 1.5, the proposed stormwater strategy has been divided for private and public areas in Sections 3.4.1 and 3.4.2, respectively. To note, proposed designs and SWM measures for the development parcels will be developed in future design stages. Hence, only requirements for stormwater

management will be stated for the development parcels. Figures are also provided to schematically demonstrate SWM measure examples that may be taken to control stormwater within development parcels.

Figure 15 summarizes the overall proposed SWM strategy for the Subject Area.




**Figure 15: Overall Stormwater Management Strategy for the Subject Area**

### 3.4.1 Private Development Parcels and Roadways

Each private development parcel and the private roadways will need to meet the SWM requirements specified in Section 1.5 prior to discharging into the municipal system. Achieving the requirements per development parcel will ensure that holistically, the Subject Area will maintain existing drainage patterns, outfall release rates, and provide improvements to existing drainage conditions where possible.

The existing land use of the Subject Area is mainly industrial, consisting of buildings, parking lots and portions of paved runways. These impervious areas cover more than 50% of the total site area and the runoff coefficient from the existing site is limited to 0.5 per WWFMG guidelines for water quantity assessment.

#### *3.4.1.1 Water Balance*

The SWM strategy for private areas of the Subject Area will aim to retain the first 10 mm of generated runoff from every storm event as per TGS v4 Tier 2 requirements (effective in May 2022). This target exceeds the current WWFMG requirement of retaining the first 5 mm on site for water balance. Additionally, the SWM strategy will evaluate areas where there are opportunities to meet the MESP water retention target of 25 mm.

The detailed design to meet the 10 mm runoff retention requirement within development parcels will be advanced during the site plan submission of each parcel. However, the implementation of BGI in private areas will be the overall strategy for achieving the water balance requirements. Strategically placed soil cells, bioretention planters, permeable pavements, and other LID features will provide the means to retain the first 10 mm of rainfall from all storm events. Illustrated in Figure 16, the conceptual cross section example of the Taxiway, a private roadway in the Subject Area with a width of 18.5 m, provides ample opportunities to integrate BGI features within the proposed green areas, as well as potential permeable pavements in low or local traffic areas and sidewalk zones.




**Figure 16: Conceptual Example of the Taxiway Cross Section with BGI Features**

### *3.4.1.2 Water Quality*

The enhanced water quality control requirement calls for long-term removal of 80% of TSS on annual loading from the runoff leaving the proposed development. One way to achieve the enhanced water quality control requirement without additional measures is to retain a minimum of 25 mm water on site per WWFMG. As mentioned previously in Section 3.4.1.1, where opportunities are present for 25 mm retention within private areas, the water quality requirements will also be met.

However, the majority of the private areas will target 10 mm for water retention on site as per the TGS V4.0 Tier 2 requirement. For these areas, an alternative approach employing a treatment train will be used to achieve water quality requirements for the site for both development parcels and private roadways. Figure 17 illustrates a schematic demonstrating the treatment train approach and where certain elements must be strategically located due to its dependence on site grading and the natural flow of water. Lot-level and conveyance stormwater management practices will be strategically woven into the open space and public realm systems of future communities to serve stormwater, micro-climate, ecosystem health, and recreational functions. End-of-pipe measure are also included to demonstrate the role of the existing PDP Lake for stormwater management prior to discharging to the receiving watercourse, Humber River.




**Figure 17: Schematic Treatment Train Approach**

The design to meet water quality requirements for development parcels will be advanced at the site plan submission stage for each development parcel. For private roads, the design will meet quality control requirements in the detailed design stage by utilizing a combination of pervious surfaces, GI, and LID facilities such as green roofs, bioretention planters, soil cells, permeable pavements, rain gardens and grassed swales, as well as OGS or filter-based treatment system to achieve 80% TSS removal targets. The combination of these features will be implemented where possible to encourage retention via infiltration and evapotranspiration and will provide an integral solution to the treatment train approach as illustrated schematically in Figure 19.

For development parcels, minimum GI footprint targets will be set for each parcel during the Site Plan Application process as it is expected that GI will play a significant role in the managing of stormwater.

Discussed in Section 2.5, the estimated native soil infiltration rate ranges from 32 to 40 mm/hr as per the geotechnical report for the Subject Area prepared by Jacobs. The estimations have been based on existing hydraulic conductivity data and therefore, it is recommended that additional permeameter or infiltrometer tests are conducted at the location and depth of the proposed LID design to improve data accuracy and inform the LID design.

#### *3.4.1.3 Water Quantity*

The development parcels will be designed to capture post-development 100-year runoff and discharge to the municipal storm system at the allowable release rate to meet the holistic water quantity requirement of the Subject Area. A preliminary storm pipe sizing calculation for the Subject Area using rational method was conducted. The calculation aimed to limit the peak flow at outfall to no more than 1,100 L/s and at the same time, conveying the 2-year flow without surcharging the proposed pipe. In order to achieve this target, the development parcels need to be controlled to release rates with an assumed C value of 0.27 under 2-year storm using the City of Toronto Intensity-Duration-Frequency (IDF) curve. Details of the calculation is shown in Appendix E. As the Downsview MESP progresses, the comprehensive hydraulic analysis for the wider Downsview Area will further verify the allowable release rates set for the development parcels within the District. The quantity control solution and details for water quantity design for the development parcels will be further developed once details of the parcel design including landscaping, building layout, grading, and other relevant information are available.

Figure 18 illustrates schematic examples of possible SWM strategies and measures that may be implemented to control stormwater to the allowable release rate at source prior to discharging into the municipal sewer. Green or blue roofs to reduce runoff, cisterns to store excess runoff for possible greywater reuse, and stormwater tanks for retention and attenuation are all measures that may be incorporated into private development parcel designs once the required information is received, and a better understanding of the development parcel design can be obtained. Also demonstrated conceptually in Figure 18, trench drains are proposed within private laneways with no curb lines to best convey drainage away from building frontages and towards underground storage, infiltration, or LID areas.

Detention storage will be provided on private property where discharge to the municipal storm sewer will be limited to the allowable release rate prescribed previously in Section 2.3. Underground geo-cellular storage will be provided underneath private roadways to capture the 100-year post-development runoff before releasing to the municipal storm sewer system at the allowable release rate, which are to be developed as the design progresses. Figure 19 illustrates a conceptual example of the LID treatment train approach details in Section 3.4.1.2 and an underground geo-cellular storage for private roadways. Details of the storage design will be developed further at the detailed design stage.

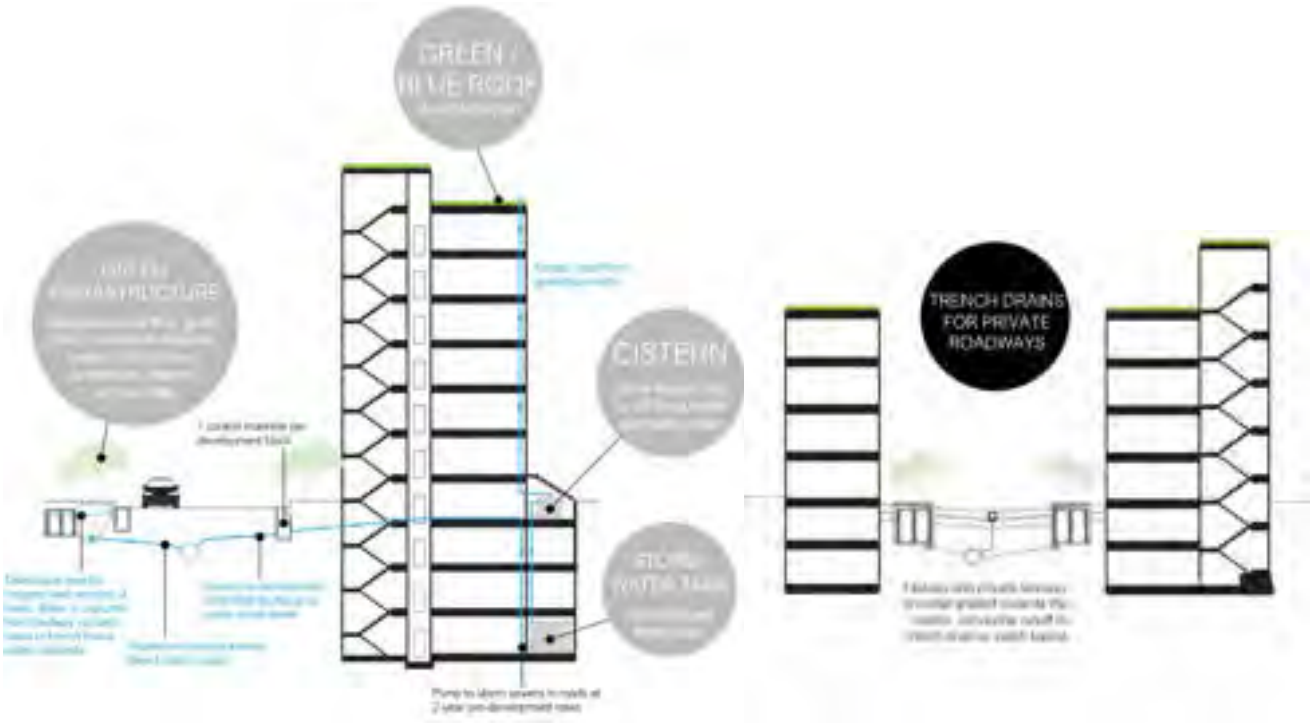



**Figure 18: Stormwater Management Options for Development Parcels and Private Roadways**

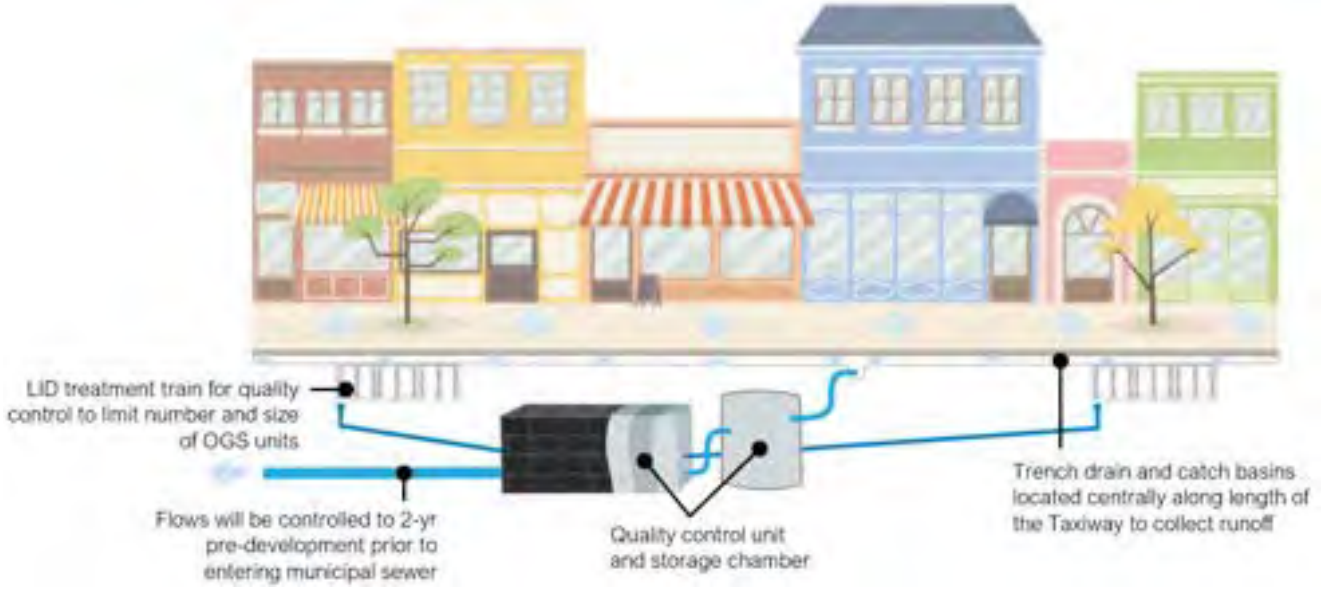



**Figure 19: Example of LID Treatment Train and Underground Geo-cellular Storage for Private Roadways**

### 3.4.2 Public Roadways and Public Parks

As part of the Subject Area, seven (7) new municipal roadways and six (6) public parks are proposed as shown previously in Figure 12 and Figure 13. The public roadways and parks will need to meet the SWM requirements specified in Section 1.5. Similar to private areas, the runoff coefficient from the existing site will be limited to 0.5 per WWFMG guidelines for water quantity assessment.

### *3.4.2.1 Water Balance*

The stormwater management strategy for public roadways and parks in the Subject Area will target to achieve a minimum of 10 mm retention and maximize retention with GI or LID to support the Framework Plan and MESP target of 25 mm from all storm events. The 10mm minimum retention target exceeds the current TGS V4 Tier 1 and WWFMG requirements of retaining the first 5 mm on site for water balance.

Strategically placed soil cells, bioretention planters, and other LID or GI features within the public ROW will provide the means to maximize retention to capture the first 25 mm of rainfall from all storm events wherever feasible. An example schematic of a public roadway cross section is shown in Figure 21. The figure demonstrates how GI features located on both sides of the roadway within the ROW collects road runoff and provides temporary and permanent water retention functions to meet the water balance requirements.

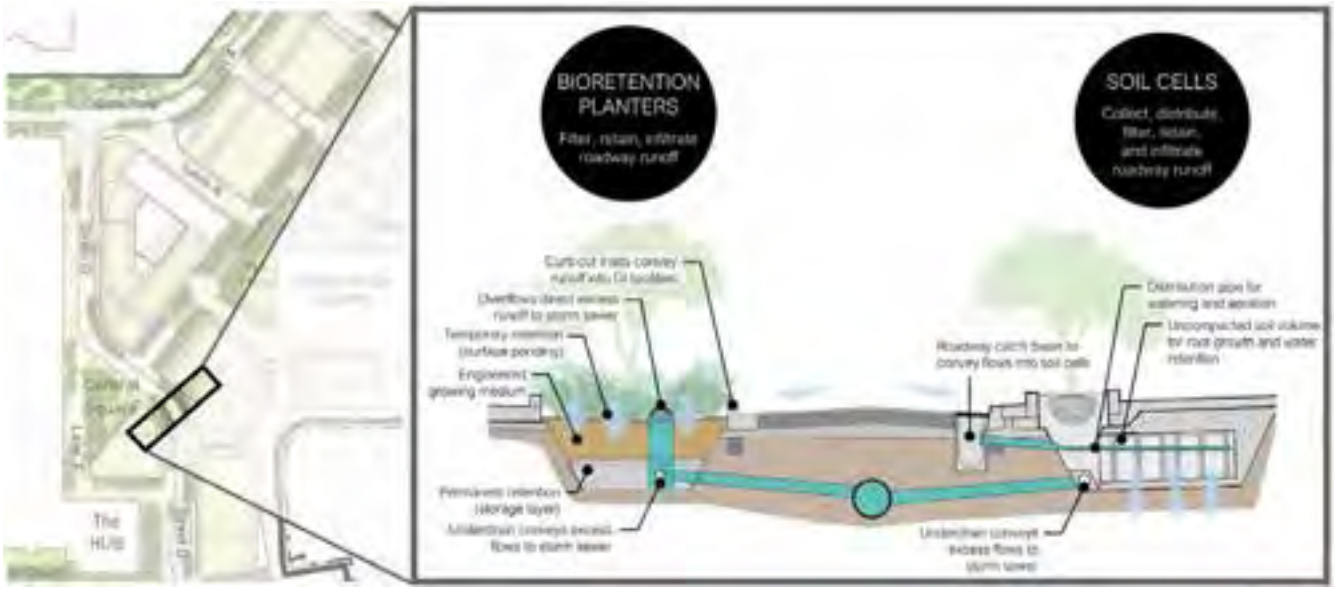



**Figure 20: Schematic Example of a Public Roadway Cross Section with Green Infrastructure**

Details of the GI and LID design to verify the retention provided will be further developed and modelled in the detail design stage.

### *3.4.2.2 Water Quality*

The enhanced water quality control requirement calls for long-term removal of 80% of TSS on annual loading from the runoff leaving the proposed development. One way to achieve the enhanced water quality control requirement without additional measures is to retain a minimum of 25 mm water on site per WWFMG. Where opportunities are present for 25 mm retention within public roadways, the water quality requirements will also be met.

However, for areas where retention of 25 mm cannot be achieved locally, the LIDs will be designed to detain the first 25 mm temporarily and release any overflows to the minor system within 24 hours via a perforated overflow pipe. For areas where the above measure is not practical, a combination of LID facilities and OGS or filter-based treatment system will be utilized to achieve 80% TSS removal targets. Figure 21 and Figure 22 illustrate schematic examples for the implementation of bioretention planters, bioswales and soil cells as GI features in green areas adjacent to public roadways and abutting public parks or open spaces. This strategy allows ROW runoff to be conveyed to other public spaces or dedicated flexible floodable areas to reduce downstream flooding impacts. The detailed design of the GI features will be developed at a later stage, but will be incorporated where feasible in the ROW.

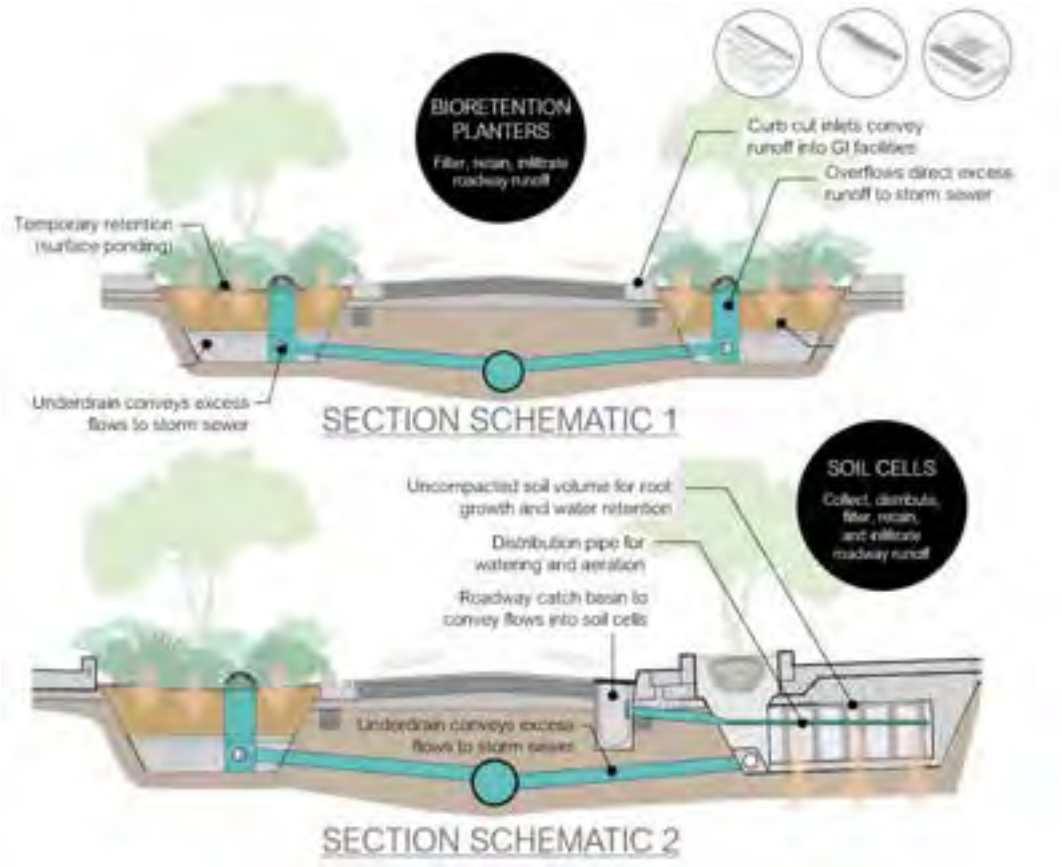



**Figure 21: Example of Roadway Sections with Green Infrastructure Features**




**Figure 22: Bioswale Example Abutting Public Parks and Receiving Flows from Roadways**

As discussed in Section 2.5, the estimated native soil infiltration rate ranges from 32 to 40 mm/hr as per the Geotechnical Study / Hydrogeological Review for the Subject Area prepared by Jacobs. The estimations have been based on existing hydraulic conductivity data and therefore, as the design progresses, it is recommended that additional permeameter or infiltrometer tests are conducted at the location and depth of the proposed LID design to improve data accuracy and inform LID design.

#### *3.4.2.3 Water Quantity*

The drainage and stormwater design of the municipal roadways will be based on the dual drainage system approach such that runoff will be conveyed by a combination of the major and minor systems. The storm sewers, referred to as the minor system, underneath the municipal roadways will be designed to convey the 2-year storm event according to City of Toronto DCSW. The nature of GI and LIDs within the ROW will help reduce the surface runoff volume, which will help in reducing the peak runoff rate to the outfall under 2-year storm. Per current rational method calculation for storm sewer pipe sizing, it is assumed that the public streets and public parks have a runoff coefficient of 0.74 and 0.25, respectively. The preliminary rational calculation is shown in Appendix E. The LIDs will be further designed and modelled in detailed design stage to verify the impact on reducing surface runoff and peak runoff flow rate to confirm the target of allowable release rate of 1,100 L/s at the existing outfall.

Any runoff exceeding the 2-year storm event will be conveyed by gravity on the roadway surface acting as open channels, which is referred to as the major system or overland flow routes. The surface runoff will follow the existing major overland flow routes to the existing Ancaster neighborhood. Underground storage for quantity control of the municipal roadways is not preferred as this will incur additional maintenance cost requirements for the City.

The dual drainage system shall provide 100-year flood protection per WWFMG. Hence, under 100-year storm event, the depth of ponding and the velocity of the overland flow within the proposed public ROW shall meet the criteria as indicated by DCSW, which is summarized in Table 3 below. These depth and velocity parameters are in accordance with the flood protection requirements in WWFMG to reduce overland flow route risks to the public.

**Table 3: Permissible Velocity and Flood Depth**

| Water Velocity (m/s) | Permissible Depth (m) |
|---|---|
| 0.5 | 0.80 |
| 1.0 | 0.32 |
| 2.0 | 0.21 |
| 3.0 | 0.09 |

As mentioned in Section 3.4.1, the SWM strategy for privately owned areas will be committing to controlling the private development parcels and providing underground geo-cellular storage for private roads prior to discharging into the municipal system. This will already provide a betterment from a water quantity control perspective as it provides storage volumes in addition to detention on existing roof parapets and surface ponding within parking lots under existing conditions. The private roads and development parcels will also be overcontrolled so the Subject Area will holistically meet the existing downstream capacity at the outfall. Hence, the public roads alone are not committed to any water quantity control targets.

The proposed SWM strategy will also provide additional storage for the municipal roadways by utilizing the public parks or public open spaces for flood relief under major storm events. These dedicated flexible floodable areas will only be used during storm events greater than 2-year and will help reduce the existing downstream flooding by providing temporary stormwater storage. This strategy will align with the visions presented in the Framework Plan and MESP report by allowing open spaces to be multi-functional and using a series of hybrid/decentralized mechanisms to manage stormwater. Adopted from the MESP, Figure 23 depicts examples of what these flexible dedicated floodable areas within public spaces may look like.



**Figure 23: Examples of Flexible Dedicated Floodable Areas in Public Spaces**

One of the public parks in the Subject Area, Garratt Blvd Park, is proposed to be a dedicated flexible floodable space due to its optimal downstream position. Located near the downstream junction of multiple storm sewers and within the path of overland flow routes, Garratt Blvd Park presents the opportunity to capture runoff from the park areas and adjacent City ROWs for the purpose of providing flood relief for storm events greater than 2-year. Weir mechanisms within the sewer network will limit flows into the park up to an allowable ponding depth. This dedicated area will flood infrequently or drain quickly during smaller events. When major storm events or higher return period storms occur, temporarily stored stormwater volume within the park will discharge back to the storm network at an attenuated rate through an outlet as the storm subsides or when downstream capacity within the system allows. A high-level schematic is also shown in Figure 24.




**Figure 24: Schematic Example for Using Garratt Blvd Park as Opportunity for Flood Relief**

Overland flows from public ROWs may also enter public park spaces in a similar fashion to ROW LID facilities illustrated in the previous section or through more suburban applications of GI such as using trench drains to convey roadway runoff into bioswale features abutting the park as shown previously in Figure 22.

This strategy provides resiliency to the stormwater network during major storm events, manages existing overland flows, provides flood relief in downstream areas already susceptible to flooding in existing conditions, and allows

the Subject Area to meet water quantity requirements and outfall release rates. The proposed strategy will help control flooding within the public ROW using public infrastructure while providing benefits for easier maintenance access and reducing utility congestions under the public ROW. Implementing this strategy in the Subject Area will also align with the SWM strategy outlined in the MESP and will lead the way for the development of future Districts within the Downsview Lands. Details of this strategy and design will be further developed in the detail design stage.

### 3.4.3 External Catchment Areas

As described previously in Section 2.1, the stormwater pipe located underneath the Barrie GO rail line at the southwest boundary of the Subject Area serves as an outfall for 40.8 ha catchment area. The contributing catchment to the outfall includes not only the 22.4 ha Subject Area, but also existing FlightSafety International facility, the Phase B for the Future Film Studio Campus, and the Taxiway area which will be part of the Taxiway East District in Phase 2. As the development of Phase B and the Taxiway areas do not coincide with the completion of the Subject Area, their flows must be managed via the Subject Area to maintain existing drainage patterns during interim condition. Figure 25 illustrates the external catchment areas which are primarily located upstream of the Subject Area with a small portion east of the Subject Area. The external catchment areas are assumed to continue to contribute to the existing south outfall and together with the proposed developments, be controlled to holistically meet the maximum allowable release rate of 1,100 L/s at the south outfall.

Located outside the eastern edge of the Subject Area boundary, there is an external existing area catchment which encompasses the FlightSafety International facility and associated parking lot. The flows from this catchment will be managed by reconnecting existing storm sewer infrastructure from the FlightSafety International facility to the proposed storm network in the Subject Area. Proposed grading adjacent to this area and in surrounding roadways will ensure that existing drainage patterns and overland flow routes are maintained.

A larger external catchment area is located north of the Subject Area which includes portions of the existing Taxiway and the proposed Phase B development in the North Sub-District for the Film Studio Campus. The flows from Phase B will be managed by connecting the existing storm sewers in the area to the upstream end of the proposed storm network for the Subject Area. This will maintain existing drainage patterns prior to any alterations or changes made through future studies for Phase B. Grading adjacent to Phase B will ensure that overland flow routes are managed as it enters the Subject Area. Existing storm sewers running parallel to the Taxiway have been identified by Bombardier to be in poor condition due to the aging infrastructure and have largely been abandoned, decommissioned, or have become inoperable. Currently, this area primarily relies on a series of swales and ditches to manage stormwater prior to entering the existing storm network adjacent to Bay 12. In the interim condition prior to District developments immediate to the Subject Area (i.e., Taxiway East District), a downstream receiving structure is proposed to control and convey flows from this area into the proposed storm network within the Subject Area. Grading and the addition of temporary swales will be designed to direct flows from this external catchment area to the receiving structure. Therefore, temporary infrastructure and localized temporary measures will be required as an interim solution to convey flows to the proposed stormwater network prior to the build-out of the Taxiway East District. Taxiway East is planned to be developed between 2031 and 2041 as part of the second phase of the MESP and Framework Plan. As the adjacent Districts build out, flows will be reconnected into future stormwater systems and managed based on each District's SWM strategy. Since there is currently no stormwater control in the existing condition, the proposed interim management of stormwater will significantly improve existing drainage patterns and help reduce downstream flooding.

Appendix C Post-Development Drainage Plan illustrates the external catchments and required modification to existing storm network to reconnect the external areas back into the storm sewer system.

The level of control required for the existing area is primarily assessed based on rational method and verified using the existing condition PCSWMM model developed previously for Phase B (Taxiway West North Sub-District). Per rational method calculation attached in Appendix E, the external area north (External-2) and northeast (External-1) of the Subject Area needs to be controlled to release rates calculated using an assumed C value of 0.25 following the 2-year City of Toronto IDF curve. This value is less than the existing conditions and will avoid flooding the downstream sewers. For the external area (External-3) northwest of the Subject Area, the maximum

allowable release rate under 2-year will be needed to maintain the existing condition as analyzed in the PCSWMM model. The FlightSafety International facility needs to be controlled to an allowable release rate calculated using an assumed C value of 0.27 under the 2-year storm. The allowable release rates for the external catchment areas will be verified in detail design stage of the Subject Area.

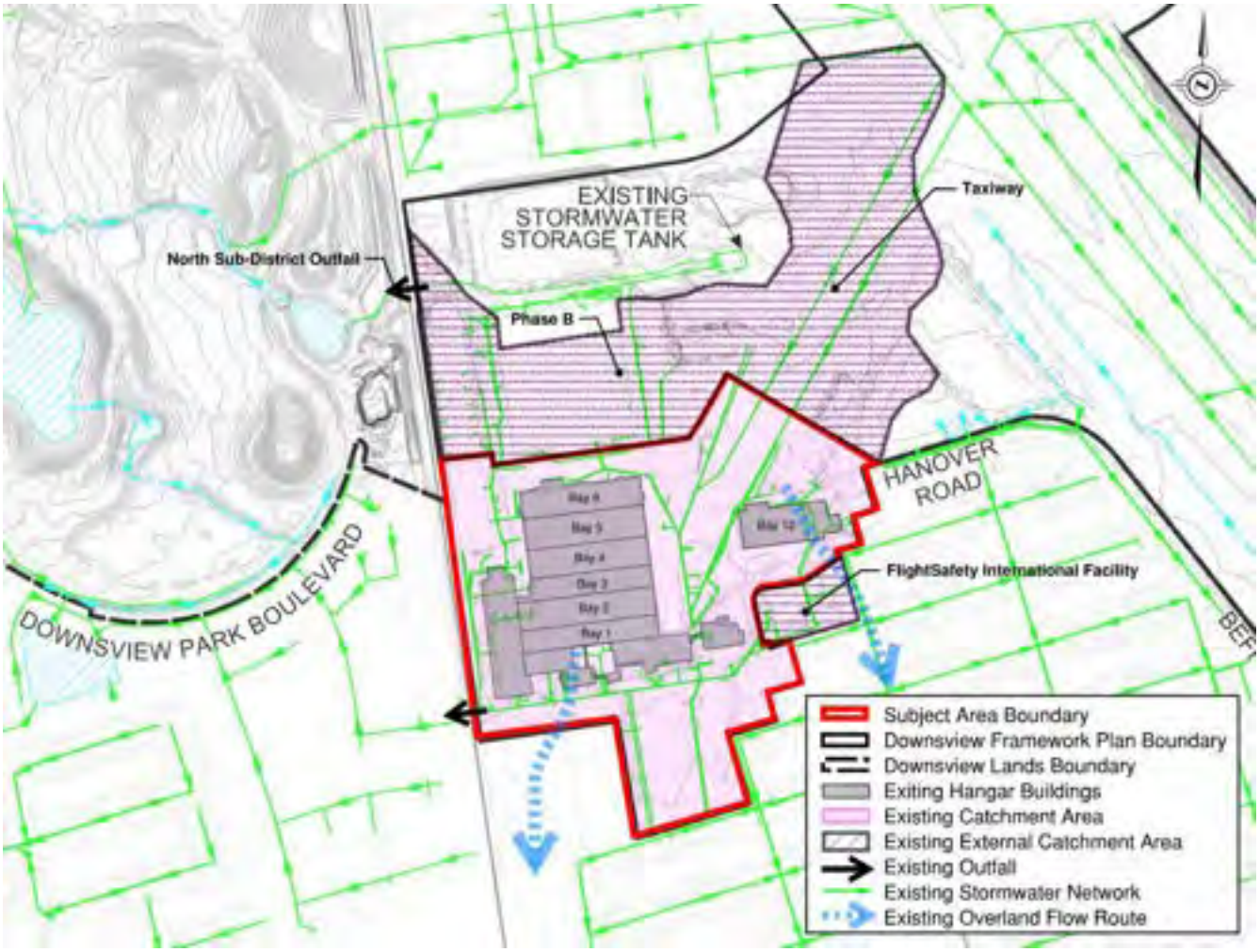



**Figure 25: External Catchment Areas**

### 3.4.4 Proposed Storm Sewer Design

The proposed storm sewers are designed to convey 2-year storm events as per the DCSW. The majority of the existing storm sewer system within the Subject Area will be replaced by new sewers due to the development. However, to maintain existing drainage patterns and the existing outfall location, the 525 mm storm pipe underneath the Barrie GO rail line will be maintained. Figure 26 illustrates the proposed stormwater network for the Subject Area. Preliminary sizing calculations for the proposed storm sewers are included in Appendix E.

The storm connection for existing development blocks and existing FlightSafety International facility will need to be retrofitted to reconnect to the new municipal storm sewer. A control maintenance hole will be required on the property boundary before discharging into the municipal storm system per Toronto DCSW. Refer to Appendix C for proposed storm sewer network plan for the Subject Area and the proposed locations of development block connections to the municipal sewer.

Provided that Ancaster Road and Home Road will be regraded to improve active transportation connections with the development of the Subject Area, a municipal storm sewer is proposed to be installed within the two roadways to maintain the existing catchment area and outfall location of the Subject Area. Shown in Figure 27, a parallel storm sewer will be installed on Ancaster Road to convey flows south towards the intersection of Ancaster and

Home Road. The existing storm sewer segment on Home Road will be replaced and the flows will be reversed to provide a connection west to the existing 450 mm storm pipe. Minimal downstream impacts are expected as the catchment area for the existing Home Road cul-de-sac is relatively small.




**Figure 26: Proposed Stormwater Network**

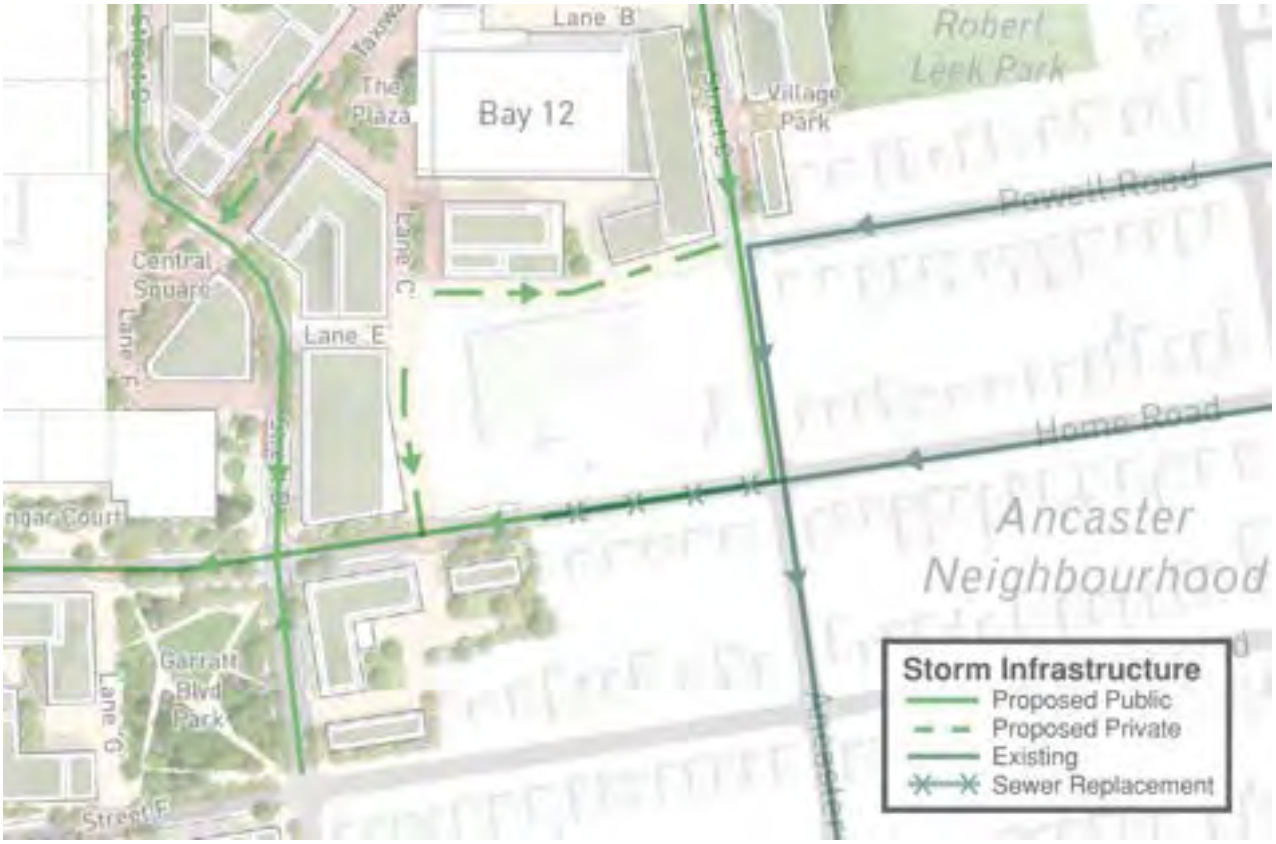



**Figure 27: Proposed Storm Sewer at the Intersection of Ancaster Road and Home Road**

### 3.4.5 Overland Flow Route

Described in the Downsview MESP and illustrated in Figure 28, there are existing overland flow routes generally heading south from the Subject Area towards the Ancaster neighbourhood. Spill points have also been identified in the PCSWMM model of the Subject Area and areas near the south boundary are prone to flooding risks in the existing condition. Although the proposed SWM strategy for the Subject Area aims to maintain existing catchment areas and drainage patterns, significant improvements to the existing drainage conditions will be provided through the implementation of BGI elements, SWM features, and the use of open spaces. The proposed strategy will seek to mitigate existing overland flow routes into Ancaster neighbourhood where feasible to provide an improvement of the existing conditions. The strategy to continue utilize the existing overland flow route was presented to the City of Toronto in the February 7, 2022 infrastructure workshop. The presentation slides and meeting minutes for the meeting is attached in Appendix H.

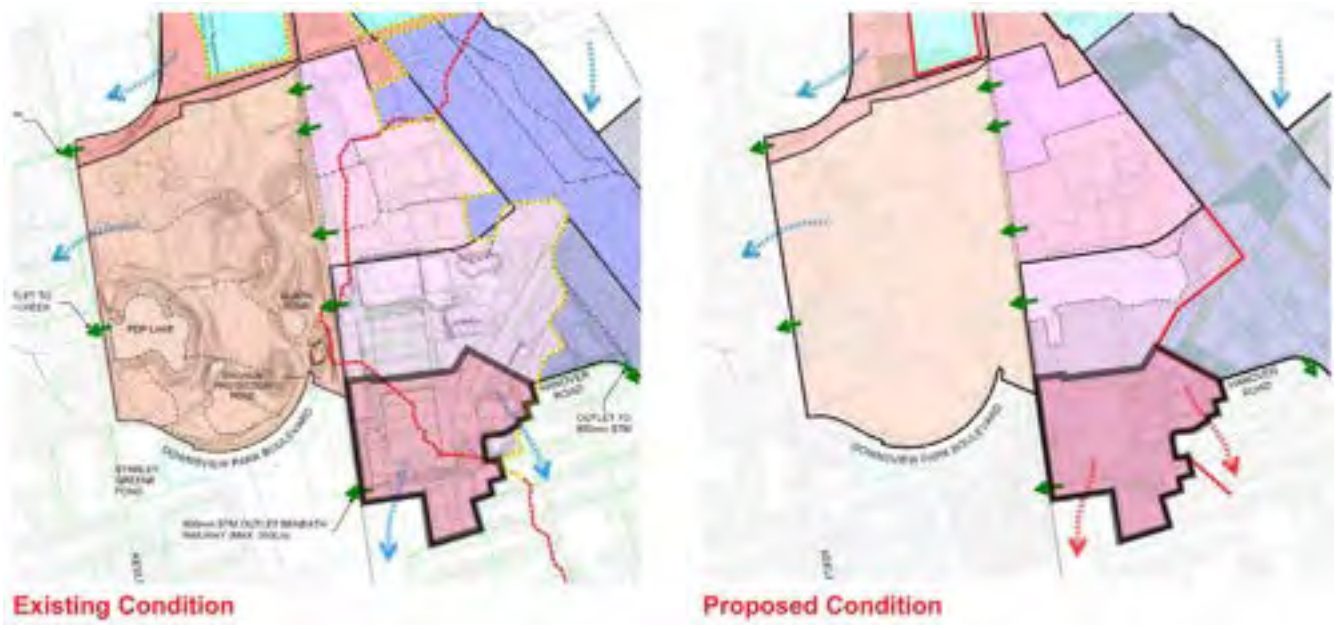



**Figure 28: Existing and Proposed Overland Flow Routes Presented in the MESP**

### 3.4.6 Erosion and Sediment Control

The permanent erosion control requires retaining the 25 mm storm on site and released over a minimum of 24-hour period. This will be achieved by a combination of minimum 10 mm water retention via LIDs and detention of the remaining flow in soil cells or storage structures on site to be released over 24 hours minimum.

Temporary erosion and sediment control will follow the WWFMG and TRCA ESC Guide for Urban Construction. The strategy and design of temporary ESC control for construction will be provided in detail design stage.

### 3.4.7 Groundwater

Should long-term groundwater discharge be required for basement structures, the property owners will be required to complete a Foundation Drainage Summary application to the City of Toronto. A Permit To Take Water (PTTW) will also be required from MECP if the daily discharge is greater than 50 $m^3$/day. The groundwater discharge strategy must follow the City of Toronto Foundation Drainage Policy and Guidelines which came into effect in January 1, 2022.

Some discharge options to consider include the following:

- Provide watertight basement structures
- On-site treatment system to treat water followed by re-infiltration on site where the water quality targets per City of Toronto WWFMG shall be met

- Discharge to the municipal storm system while meeting the water quality and quantity targets per City of Toronto WWFMG. This could be achieved by on-site treatment system to treat foundation drainage and then detaining the flows within the stormwater detention tanks so the controlled stormwater discharge offsite will not exceed the allowable downstream capacity.

At the current stage of the development process, the discharge methods have not been evaluated. It will be the responsibility of the property owners to provide a foundation drainage design that is compliant with the above-mentioned City of Toronto and MECP policies in separate development applications of each block.

# 4. Downstream Capacity Analysis

## 4.1 Hydraulic Modelling

A stormwater model is set up by simulating the hydrologic and hydraulic parameters of the Subject Area based on the available information and proposed site layout. PCSWMM software is selected as the modelling software.

The objective of modelling is to:

- Analyze the existing hydrology and hydraulic conditions for the Subject Area
- Establish proposed development scenarios to assess the hydraulic impacts to the downstream storm sewer network and flooding risks to adjacent properties
- Update the proposed stormwater management design based on the modelling results to achieve water balance, water quantity and water quality criteria for the Subject Area.
- Estimate the hydraulic capacity of the existing downstream receiving stormwater network.

The following assumptions were used to establish the existing and proposed models:

- The existing conditions model is built based on the previous hydrologic and hydraulic model developed for the Future Film Studio Campus Site Plan Application (SPA)
- The assumed roof drainage network was simplified for the purposes of existing condition modelling exercise. It is conservatively assumed that all building roofs have up to 150 mm of available roof storage. This was confirmed by Bombardier staff, as runoff is captured by parapets on most roof panel sections, with certain areas capturing up to 200 mm or more of depth
- Surface storage was assumed at low points in order to understand where there may be ponding during various rainfall events and spill to adjacent properties or municipal ROW under existing conditions
- The overland flows and spills to the existing Ancaster neighbourhood in the existing condition is verified using BFA 16 InfoWorks model received from City of Toronto
- The existing storm sewer network was created using the SUE by Callon Dietz in 2021, Bombardier As-built compiled in 2009 and site survey by J.D. Barnes in 2021
- External flows to the Subject Area under proposed condition are based on preliminary rational calculation and verified using the existing conditions model
- The proposed condition will use the designed proposed grading and proposed storm sewer network.

A more comprehensive hydrodynamic model will be conducted under the development of MESP for the Downsview Lands and the results will be used to calibrate and validate the existing and proposed PCSWMM models for the Subject Area.

### 4.1.1 Modelling Parameters

Hydrologic and hydraulic parameters of the site are essential components for setting up the stormwater management model. The design storm analysis is carried out based on the 6-hour Chicago distribution with 10-minute time step and a ratio to peak r = 0.38. The design storm rainfall information for the analysis was per the City WWFMG guideline, refer to Appendix D for 6-hour and 12-hour AES design storm details. The design rainfall events considered for modelling purpose are AES 6h and 12h – 2-year, 5-year, 10 year, 25-year, 50-year and 100-year respectively for water quantity results.

The catchment parameters are established based on available existing condition information including as-built drawings from Bombardier, existing surface per Topographic survey, and aerial view from open street map. The following lists the approaches for estimating the catchment parameters:

- Catchment areas – The sub-catchments are delineated based on the Bombardier as-built, existing surface from topographic survey, and the proposed surface
- Imperviousness – The existing percent of impervious was estimated based on land use per Bing Map hybrid view. The proposed percent imperviousness is assumed to be 75% within public roadways, 0% for public parks, and 75% for development plots. These assumptions will be verified at detail design stage for public roadways and parks and each development plots
- Slope – Assumed to be 0.5% as the lands are relatively flat per existing topographic survey
- Flow length – Estimated for each sub-catchment based on existing surface and Bing Map hybrid view with aerials
- Manning's n – It is assumed the pervious area to be grass with a Manning's n value of 0.013 and impervious area to be concrete pavement with a value of 0.15
- Initial abstraction/depression storage – For impervious and pervious area, assume a typical value of 1.2 mm and 5 mm respectively
- Runoff coefficients – The run-off coefficient value considered for pervious as 0.25 and for impervious area as 0.9. A weighted average value for each sub-catchment was assigned based on land use. Per City of Toronto WWFMG, the maximum runoff coefficient for an existing site should be 0.5 for calculations if there is more than 50% impervious under the existing condition. Refer to Appendix F for the hydrologic parameter details.

### 4.1.2 Model Set-up

The existing conditions model was adopted using the PCSWMM model developed in the SPA for the development of the Future Film Studio Campus where Phase A proposed condition was incorporated. The model was created using the CUMAP data received from the City of Toronto and verified using SUE and Bombardier as-built data. BFA 16 InfoWorks model just south of the Subject Area will be used to confirm the spills from the existing conditions PCSWMM model. Major overland flows in the existing model are included as means of storage on building roofs and in parking lots with spills to the south into the existing Ancaster neighbourhood, the same approach as adopted in the Future Film Studio Campus SPA PCSWMM modelling based on existing as-built, topography and conversation with Bombardier staff.

**Allowable Release Rates**

As explained in Section 2.3, the existing Subject Area outfall is limited to a maximum of 1,100 L/s for all storm events up to 100-year within the minor system following the agreement made between the Bombardier Lands and downstream Stanley Greene subdivision design. The agreement letter is attached in Appendix G. As the BFA 66 InfoWorks model which contains the Subject Area will not be made available to fit the timing of this project, the existing sewer capacity is assumed to be the flow rates adopted in the Stanley Greene subdivision design. Per WWFMG, the allowable release rate at the site outfall is the lesser of the pre-development 2-year or the existing

downstream capacity. As there is assumed ponding during 2-year storms within roofs and parking lots under the existing condition to prevent outfall flooding, the downstream capacity at the outfall is determined to be less than 2-year. Hence, the allowable release rate at the outfall shall be the existing downstream capacity (i.e., 1,100 L/s).

These allowable release rates will be verified with the hydrology and hydraulic analysis to be developed under the MESP at a later stage to confirm that the Subject Area is consistent with the wider Framework Plan.

**Major and Minor Systems**

The major system is established based on existing and proposed surfaces. It is included in the current model to provide the preliminary understanding of the surface ponding, potential spills to existing Ancaster neighbourhood, and impacts to the existing outfall.

The proposed internal storm sewer network is primarily based on the rational calculation as shown in Appendix E and created in the model to assess the impacts of the proposed development on the existing network. Initial assumptions for imperviousness (%) and detention storage volumes for each development blocks and private streets are made for the purpose of the model set up and the high-level understanding of the impacts of the proposed developments. These assumptions and models will need to be refined as the design progresses.

### 4.1.3 Model Results

The flows at the outfalls and existing surface runoff locations to the Ancaster neighbourhood have been estimated based on the current existing and proposed models established.

As shown in Table 4, the peaks flows are significantly reduced at the points discharging further downstream to the existing Ancaster neighbourhood under the AES 6 hour 100-year storm. The proposed peak flow at the existing south outfall under the Barrie GO rail line is also reduced from the existing condition and maintained under the 1100 L/s downstream capacity. The preliminary results demonstrate that with flow controls in each private development blocks and streets, the surface runoff to the existing Ancaster neighbourhood is expected to be reduced, which will improve the existing surface flooding condition to the downstream neighbourhood.

**Table 4: Existing and Proposed Condition Peak Flow Comparison at Key Locations (AES 6-hr 100-year)**

| Existing | | Proposed | | Location |
|---|---|---|---|---|
| Outfall | Flow [L/s] | Outfall | Flow [L/s] | |
| OF-ROW-East | 354.1 | OF-ROW-East-1 | 0 | Existing Ancaster Neighbourhood |
| | | OF-ROW-East-2 | 73 | |
| OF-ROW-South | 353 | OF-ROW-South-1 | 30.74 | Existing Ancaster Neighbourhood |
| | | OF-ROW-South-2 | 0 | |
| OF-South | 1077 | OF-South | 900.9 | Existing South Outfall under Barrie GO rail line |

*Note: For location of the outfalls, refer to Appendix F PCSWMM Model Overview existing and proposed conditions Figures.*

As the design progress, the model will need to be developed further to refine the results and further analyze the benefits of the LID and BGI features, landscape design, and refinement of storage requirements for each private blocks and streets. The existing network at critical locations (e.g. site outfall) will be confirmed in the future using additional SUE data. The final alignment and size of the proposed storm sewers will be designed and confirmed at the detailed design stage.

The existing and proposed PCSWMM model network figures, results and sewer profiles are provided in Appendix F.

The current hydraulic model will be further coordinated with the MESP being developed as part of Update Downsview. This would ensure hydrology and hydraulic analysis for the Subject Area are consistent with the wider MESP approach and strategy.

# 5. Conclusions and Summary

This report presents the proposed stormwater management strategy and design of the proposed development within the Subject Area. Technical requirements including Water Quantity, Water Quality, Water Balance, and Erosion Control have also been discussed and addressed as outlined in the City of Toronto Sewer and Watermain Design and Wet Weather Flow Management Guidelines (WWFMG).

The proposed water balance strategy will provide a minimum of 10 mm retention for the Subject Area while targeting to meet an aspirational 25 mm retention where feasible by implementing strategic grading strategies and maximizing Low Impact Developments (LIDs) and Blue-Green Infrastructure (BGI) to support the wider Master Environmental Servicing Plan (MESP) framework strategy.

The water quality targets the long-term 80% Total Suspended Solid (TSS) removal on an average annual loading basis from all runoffs leaving the proposed development site following the WWFMG. This will be achieved by utilizing BGI and LID features and water quality treatment units via a treatment-train approach.

The water quantity strategy for the private development blocks and private streets is to provide detention storage to control runoff from post-development 100-year storm to holistically meet the existing outfall capacity requirement of maximum peak flow of 1100 L/s for all storms up to 100-year. Storage requirements for each development block and private streets will be further refined as the design progress at the detail design stage.

Proposed public roads will be designed considering dual drainage methodology. The minor system will be sized based on 2-year storm events and according to the proposed road category. Any runoff exceeding the minor storm system design capacity shall be carried by major system via overland flows. It is expected the overland flow routes will follow and maintain the existing overland flows routes to the existing Ancaster neighbourhood. This approach was presented in a workshop with City of Toronto on February 7, 2022. Public open spaces such as parks are also proposed to be integrated within the stormwater management strategy, providing temporary storage during storm events greater than 2-year and dedicated floodable spaces for flood relief during extreme storm events.

Permanent erosion and sediment control is targeted to achieve 25 mm detention on site for a minimum of 24 hours by a combination of water retention via LID measures and temporary detention via soil cells or detention storages.

It is recommended that further field investigations are to be carried out to verify the infiltration rate on-site for the design of LID features in detail design stages. Additional Subsurface Utility Engineering (SUE) or topographic survey should also be carried out to verify missing or unclear existing storm sewer information, especially at the site outfall. The existing and proposed condition PCSWMM models will be further refined using additional SUE data in the future and as designs for the Subject Area progress in the detail design stage. LID features will be modelled in future detailed design stage to further refine the proposed condition model.

The future MESP hydrology and hydraulic analysis and modelling will be used to verify the Subject Area's hydrodynamic model results in the detail design stage to ensure that the Subject Area's hydrology and hydraulic strategy is consistent with the MESP framework.

The hydrodynamic model of the Subject Area will be validated and further evaluated with information from the future MESP hydrology and hydraulic analysis and as the design for the Subject Area progresses in the detail design stage.

# Appendix A: Existing Storm Sewer Network and As-Builts from Bombardier

22x34




## LEGEND:

- EXISTING STORM SEWER
- EXISTING STORM SEWER ABANDONED
- EXISTING SWALE
- EXISTING FORCEMAIN
- EXISTING STORM WATER MANAGEMENT POND
- DOWNSVIEW LANDS
- SUBJECT LANDS

NOTES:

1) DUE TO THE LIMITED AVAILABILITY OF COMPREHENSIVE SITE DATA, THE INFORMATION DISPLAYED ON THIS SHEET IS FOR CONCEPTUAL DESIGN PURPOSES ONLY. INFORMATION WILL BE VALIDATED IN LATER STAGES OF DESIGN.

ARUP

CANADA LANDS COMPANY

NORTHCREST DEVELOPMENTS

DRAFT DOWNSVIEW MASTER ENVIRONMENTAL SERVICING PLAN

EXISTING STORMWATER NETWORK

9/27/2021

SCALE: 1:8000

| JT | AW | FF | HJ |
|---|---|---|---|

SCHEMATIC DESIGN

| 272777-02 | MESP-013 | 1 |
|---|---|---|

MATCHLINE FOR CONTINUATION SEE DWG. No. P-3

MATCHLINE FOR CONTINUATION SEE BELOW LEFT

MATCHLINE FOR CONTINUATION SEE DWG. No. P-4

MATCHLINE FOR CONTINUATION SEE ABOVE RIGHT

BAY THREE

BAY TWO

BAY ONE

WEST EXTENSION

WASTE DISPOSAL

OIL INTERCEPTER

SERVICE STATION

UNDERGROUND FUEL OIL TANKS

SUBSTA

TRAILER

OFFICES

CAFETERIA

GREASE INTERCEPTOR

DATA CENTRE

GAS METER STATION

GUARD HOUSE

TEST FLIGHT

PARKING LOT 5

PARKING LOT 4

PARKING LOT 3

PARKING LOT 2

PARKING LOT 1

PUMP HOUSE & RESERVOIR

METRO TORONTO ROADS DEP'T.

HOME ROAD

GILLEY ROAD

GARRETT BLVD.

PLEWES ROAD

ANCASTER ROAD

CITY OF NORTH YORK BUILDING DEPARTMENT
REVIEWED FOR COMPLIANCE WITH O.B.C.
BUILDING PERMIT
APPN No. 296-COM
PERMIT No.
EXAM'D. BY MC DATE APR 16/96
THESE PLANS ARE SUBJECT TO MY SITE VISIT OF THE WORK SITE AND AVAILABLE AT ALL TIMES TO THE BUILDING CONSTRUCTOR OR HIS STAFF.
E. Y. LEVITON, P. ENG. BUILDING COMMISSIONER

LEGEND

- FENCE
- STORM SEWER, MANHOLE
- SANITARY SEWER, MANHOLE
- WATERMAIN, GATE VALVE
- FIRE MAIN, FIRE HYDRANT
- POST INDICATOR VALVE
- BELL TELEPHONE CABLE, MANHOLE
- GAS LINE
- AIR DUCT
- STEAM DUCT
- FRIDEN CABLE
- OVERHEAD HYDRO LINE, POLE
- FIRE ALARM CONDUITS
- ELECTRICAL DUCT, MANHOLE
- ELECTRICAL, BELL TELEPHONE DUCT

NOTES

1. INFORMATION IS BASED UPON PLANT ONE-DOWNSVIEW GROUND SERVICES PLAN, MARSHALL MACKLIN MONAGHAN LIMITED PROJECT No. 11016 AND AS BUILT DRAWINGS OF GIFFELS ASSOCIATES LIMITED PROJECT No. C8062.
2. FOR SITE ELECTRICAL DETAILS REFER TO GIFFELS DRAWING Nos. EL-300 TO EL-312 INCLUSIVE.

PROPOSED ADDITIONS JAN 1996

SCALE 10 m 20 m 30 m 40 m 50 m

| DATE | ISSUED FOR |
|---|---|
| | |

KEY PLAN N.T.S

Giffels
Giffels Associates Limited
Consulting Engineers

| | |
|---|---|
| PROJECT MANAGER E. J. FREE | DRAWN M.W. H.N. |
| PROJ. ENG./ARCH. R.A. LAIDLAW | CHECKED |
| DATE NOV. 1983 | APPROVED |

CLIENT
THE DE HAVILLAND AIRCRAFT OF CANADA LIMITED
DOWNSVIEW, ONTARIO

REVIEWED FOR BUILDING PERMIT
APP'N No. 96-79 E. Y. LEVITON, P.ENG. BUILDING COMMISSIONER
PERMIT No.
SUBMIT BY DATE Feb 7/96
THESE PLANS AND SPECIFICATIONS MUST BE KEPT ON THE WORK SITE AND AVAILABLE AT ALL TIMES TO THE BUILDING CONSTRUCTOR OR HIS STAFF.

SITE PLAN OF UNDERGROUND SERVICES - DOWNSVIEW SITE SOUTH AREA

CHECK SCALE (print may be photo-reduced)
0 1 inch 0 10mm.

| PROJECT NO. | DRAWING NO. |
|---|---|
| C806246 | P- |

MATCHLINE FOR CONTINUATION SEE DWG. No. P-3

TAXIWAY

CANADIAN FORCES BASE (TORONTO)

PROPOSED PAINT COMPLEX SITE

PROPOSED PARKING LOT 6B

PARKING LOT 6A

HANOVER ROAD

MANIZA ROAD

PARKING LOT

TEST FLIGHT

GUARD HOUSE

4056 L. FUEL SPILL TANK

INTERCONNECTING ROADWAY - DUFFERIN/HANOVER

CB

CB 8C

CB 4 TOP 195.17

CB 8B

CB 8A TOP 194.55

CB 8 TOP 193.93

CB 1 TOP 194.86

CB 2 TOP 195.39

CB 3 TOP 193.00

DI CB 1 TOP 193.50

DI CB 2 TOP 193.00

DICB 3 TOP 193.50

DICBMH 3 TOP 191.80

DI CBMH 1 TOP 193.55

MHS 1 TOP 194.207

MHS 2 TOP 194.522

MHS 3 TOP 194.20

MHS 4 TOP 194.38

MH

FH

ST 300 ø

ST 250 ø

ST 325 ø

ST 600 ø

SAN 200 ø

SAN 250 ø

SAN 300 ø

SCALE 1:500

10 m 20 m 30 m 40 m 50 m

MATCHLINE FOR CONTINUATION SEE DWG. Nº P-2

K&E 330 1-82

NOTE;
SEE DWG. No. P-2 FOR LEGEND AND NOTES.

| DATE | ISSUED FOR |
|---|---|
| | |

KEY PLAN
NTS

Giffels
Giffels Associates Limited
Consulting Engineers

| | |
|---|---|
| PROJECT MANAGER E.J. FREE | DRAWN M.W. H.N. |
| PROJ. ENG/ARCH. R.A. LAIDLAW | CHECKED |
| DATE NOV. 1983 | APPROVED |

CLIENT
THE DE HAVILLAND AIRCRAFT OF CANADA, LIMITED
DOWNSVIEW, ONTARIO

PROJECT

DRAWING TITLE
SITE PLAN OF UNDERGROUND SERVICES - DOWNSVIEW SITE
EAST AREA

CHECK SCALE (print may be photo-reduced)
0 1 inch 0 10mm

| PROJECT NO. | DRAWING NO. |
|---|---|
| C806246 | P-4 |

STPPL013

OUTSIDE TEST SITE

N/C PROFILER BLDG.

WAREHOUSE EXTENSION

WAREHOUSE

BAY TEN

BAY NINE

BAY EIGHT

BAY SEVEN

BAY SIX

BAY FIVE

BAY FOUR

DUMP TANK

RESERVOIR

PUMP ROOM

ELECT. STATION

FIRE PROTECTION WATER HOLDING TANK (U/G)

OIL SHED

ELECT. BOX

CONC. RAMP

TEST FIGHT

SERVICE TRENCH
25ø WATER SUPPLY
25ø AIR SUPPLY
100ø PUMPED SEWAGE
100ø HIGH PRESSURE STEAM
TELEX CABLE
BELL CABLE

MATCHLINE FOR CONTINUATION SEE DWG. No. P-2

MATCHLINE FOR CONTINUATION SEE DWG. No. P-4

NOTE:
SEE DWG. No. P-2 FOR LEGEND AND NOTES.

| DATE | ISSUED FOR |
|---|---|
| | |

KEY PLAN
NTS

Giffels
Giffels Associates Limited
Consulting Engineers

| | |
|---|---|
| PROJECT MANAGER E.J. FREE | DRAWN M.W. H.N. |
| PROJ. ENG/ARCH. R.A. LAIDLAW | CHECKED |
| DATE NOV. 1983 | APPROVED |

CLIENT
THE DE HAVILLAND AIRCRAFT OF CANADA, LIMITED
DOWNSVIEW, ONTARIO

PROJECT

DRAWING TITLE
SITE PLAN OF UNDERGROUND SERVICES - DOWNSVIEW SITE
NORTH AREA

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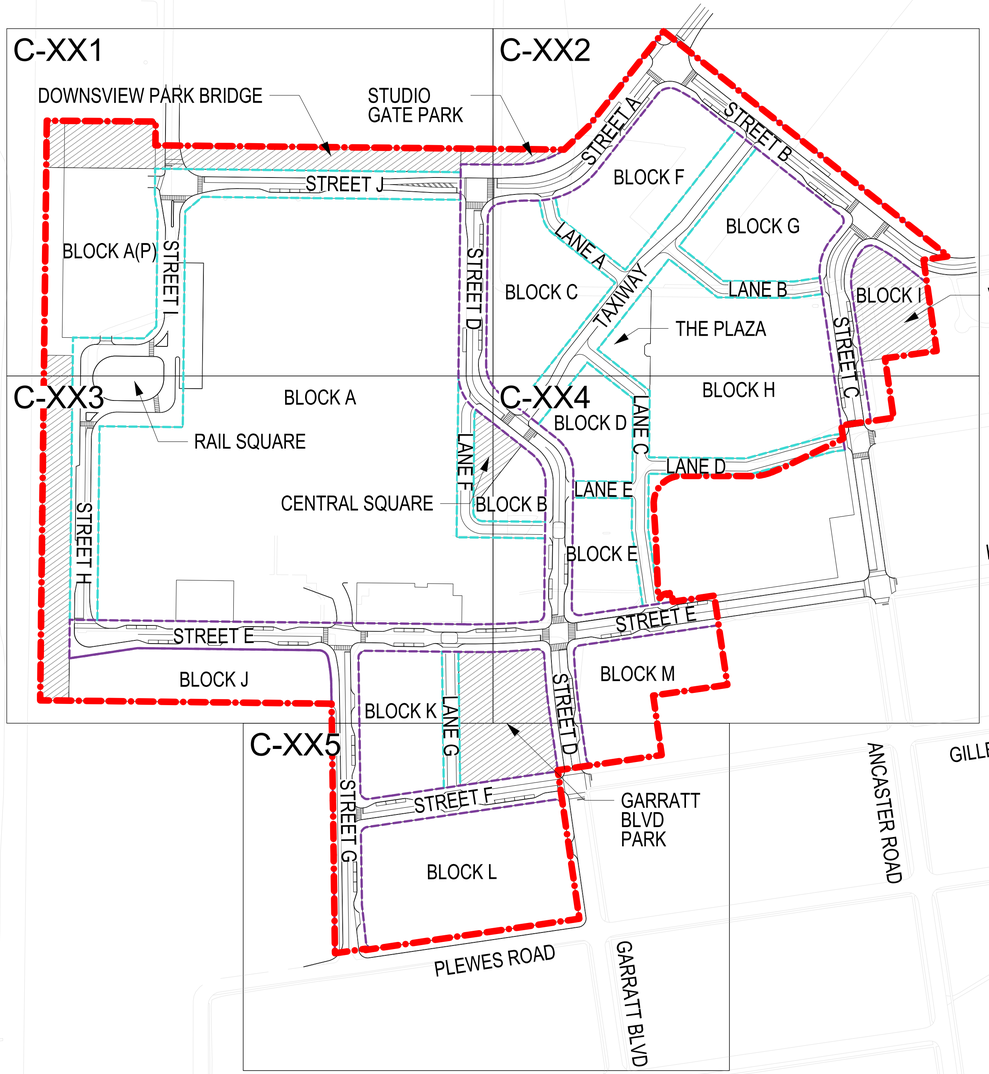
SCALE
10 m 20 m 30 m 40 m 50 m

| PROJECT NO. | DRAWING NO. |
|---|---|
| C806246 | P-3 |

STPPL012

K&E 255 3-82

# Appendix B: Proposed Grading Plans




NOTES:

1. ALL DRAWING SERIES FOLLOW THIS KEY PLAN WITH THE EXCEPTION OF THE FOLLOWING:

C-311 - SANITARY CATCHMENT MAP

C-60X SERIES - UTILITY SECTIONS

2. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
2022-05-16
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |

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121 Bloor Street East, Suite 900
Toronto ON M4W 3M5 Canada
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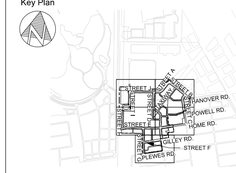
Client

NORTHCREST DEVELOPMENTS

Job Title

DOWNSVIEW TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



Drawing Title

KEY PLAN

Scale

SCALE: 1:2000 (0 50 80m)

| Drawn | Designed | Checked | Approved |
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| TI | PC | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-002 | 2 |

22x34

# LEGEND:

## GENERAL:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

## GRADING PLAN :

- EXISTING GRADE (xxx.xx)
- PROPOSED GRADE (xxx.xx)
- EXISTING CONTOUR LINES (xxx.xx)
- PROPOSED CONTOUR LINES (xxx.xx)
- MAJOR OVERLAND FLOW DIRECTION
- SLOPE DIRECTION (2%)

## UTILITIES PLAN:

- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN
- PRIVATE STORM INFRASTRUCTURE
- PROPOSED JOINT USE TRENCH (HYDRO & TELECOMS)
- PROPOSED WATERMAIN
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED GAS MAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- EXISTING UTILITIES TO BE ABANDONED
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN

# GENERAL NOTES:

## EROSION AND SEDIMENT CONTROL

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED OR REPLACED WITHIN 48 HOURS OF INSPECTION OR BOTH.
2. ALL DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
3. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREA. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS AND A TORONTO REGION CONSERVATION AUTHORITY ENFORCEMENT OFFICE SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
4. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE AND REFUELING WILL BE CONDUCTED A MINIMUM OF 30 M FROM THE WATER.
5. ALL GRADES WITHIN THE REGULATORY FLOOD PLAN WILL BE MAINTAINED OR MATCHED.

## ADDITIONAL GENERAL NOTES - GRADING AND DRAINAGE

1. ALL ELEVATIONS ARE OF EDGE OF PAVEMENT, UNLESS OTHERWISE NOTED.
2. ALL COORDINATES ARE IN METER AND REFERENCED TO ZONE 10 OF THE ONTARIO COORDINATE SYSTEM NAD-27.
3. CONNECTION TO EXISTING NETWORKS IS SUBJECT TO AGREEMENT WITH STATUTORY AUTHORITIES AND APPROVING BODIES.
4. LOCATION AND EXTENT OF EXISTING SERVICES IS INDICATIVE ONLY AND IS INTENDED TO IDENTIFY APPROXIMATE LOCATION OF MAIN SERVICE CORRIDORS. FOR FULL DETAILS REFER TO UTILITY PROVIDERS RECORD DRAWINGS OR TOPOGRAPHICAL SURVEY.
5. CONFLICTS WITH EXISTING UTILITIES AND OTHER PROPOSED WORKS SHOULD BE NOTIFIED TO THE ENGINEER OF RECORD.
6. CONTRACTOR SHALL CONFIRM EXACT LIMITS OF GRADING AND PROVIDE SMOOTH TIE-IN TO EXISTING SURFACES IN THE FIELD.
7. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SURFACES TOWARDS CATCHBASINS OR DRAINAGE FEATURES AT TIE-INS TO EXISTING SURFACES AND ALL LOCATIONS WITHIN PROJECT LIMITS. CONTRACTOR SHALL NOTIFY CONTRACT ADMINISTRATOR PRIOR TO COMMENCING WORKS IF SITE CONDITIONS DO NOT ACHIEVE POSITIVE DRAINAGE.
8. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SUB-GRADE TOWARDS SUBDRAINS AND A MINIMUM 0.5% SLOPE FOR SUBDRAIN AND ITS OUTLET PIPE.
9. CROSSFALLS AND ELEVATIONS PROVIDED IN TYPICAL SECTIONS DRAWINGS ARE FOR INFORMATION ONLY. REFER TO GRADING AND DRAINAGE DRAWINGS FOR DETAILS AND PROPOSED ELEVATIONS.

## ADDITIONAL GENERAL NOTES - REMOVALS

1. LIMITS OF WORK WILL INCLUDE REMOVALS OF AREAS AND OTHER INFRASTRUCTURE (RAILINGS, FURNITURE, ETC.) ON PRIVATE PROPERTY. EXACT LIMITS AND REQUIREMENTS WILL BE DETERMINED ON-SITE. CONTRACTOR TO COORDINATE WITH AFFECTED PROPERTY OWNERS ON REINSTATEMENT OF REMOVED PRIVATE ELEMENTS DISTURBED DURING PROJECT CONSTRUCTION.
2. UNLESS OTHERWISE NOTED, SALVAGE MATERIALS REMOVED FROM PRIVATE PROPERTY FOR REUSE / DISPOSAL BY OWNER.
3. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SITE FURNITURE (TRASH RECEPTACLES, BENCHES, SIGN POSTS, INFORMATION PILLARS, ETC.) WITHIN THE LIMITS OF WORK TO BE REMOVED BY THE CITY OF TORONTO (OR ITS AGENT).
4. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SIGNAGE WITHIN THE LIMITS OF WORK TO BE REMOVED FOR REUSE / RETURN TO THE CITY.
5. ALL REFUSE, DEBRIS AND MISCELLANEOUS ITEMS TO BE REMOVED, THAT ARE NOT TO BE STOCKPILED FOR LATER USE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF-SITE BY THE CONTRACTOR.
6. CONTRACTOR RESPONSIBLE FOR IDENTIFICATION, MAINTENANCE, PROTECTION, ETC. OF ANY PRIVATE IRRIGATION, ELECTRICAL AND LIGHTING SYSTEMS WITHIN THE PUBLIC AND PRIVATE RIGHT-OF-WAY THAT MAY BE ENCOUNTERED WHICH ARE NOT SHOWN ON THE DRAWINGS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND SHRUBS DESIGNATED TO REMAIN FOR THE LENGTH OF THE CONSTRUCTION PERIOD. REFER TO ARBORIST REPORTS FOR TREE REMOVAL AND PROTECTION. THE PLACEMENT OF PROTECTION DEVICES ADDITIONAL TO THOSE SPECIFIED SHALL, HOWEVER, BE AT THE CONTRACTORS DISCRETION.

## EXISTING UTILITIES GENERAL NOTES:

1. EXISTING UTILITIES SHOWN ARE BASED ON BACKGROUND INFORMATION SUPPLED BY CLIENT, UTILITY COMPANIES AND CITY OF TORONTO. INFORMATION INCLUDES BUT NOT LIMITED TO RECORD DESIGN DRAWINGS, AS-BUILT DRAWINGS, AND SUBSURFACE UTILITY ENGINEERING (SUE) INVESTIGATION INFORMATION BY CLIENT.
2. LOCATIONS AND SIZES OF ALL UTILITY SERVICE CONNECTIONS ARE BASED ON AVAILABLE RECORDS AND MUST BE FIELD VERIFIED PRIOR TO ANY CONSTRUCTION ACTIVITIES.

## SANITARY AND STORM SEWERS:

1. MAIN LINE PVC PIPE SHALL BE DR 35 UNLESS NOTED OTHERWISE.
2. SANITARY SERVICE CONNECTIONS SHALL BE SINGLE, 200 mm DIAMETER MINIMUM, PVC DR 28 INSTALLED AT 2 PERCENT.
3. BEDDING MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A NATIVE OR GRANULAR A RCM ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
4. BEDDING FOR RIGID PIPE SHALL BE CLASS B BEDDING MATERIAL ACCORDING TO OPSD 802.031 AND USING GRANULAR A NATIVE OR GRANULAR A RCM BEDDING MATERIAL ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98 % OF MAXIMUM DRY DENSITY.
5. MAINTENANCE HOLES SHALL BE ACCORDING TO T-701.010 (1200 mm), T-701.011 (1500 mm), T-701.012-1 (1800 mm) OR T-701.013 (2400 mm). FRAME AND COVER SHALL BE ACCORDING TO OPSD 401.010 TYPE A CLOSED (SANITARY AND STORM).
6. MAINTENANCE HOLE CHAMBER OPENINGS MUST BE LOCATED ON THE UPSTREAM SIDE OF THE MAINTENANCE HOLE UNLESS OTHERWISE SPECIFIED.
7. BENCHING DETAILS SHALL BE ACCORDING TO T-701.021 OR AS SHOWN ON THE DRAWINGS.
8. SANITARY MAINTENANCE HOLES SHALL HAVE WATERTIGHT FRAMES AND COVERS IN PONDING AREAS ACCORDING TO OPSD 401.030.
9. SINGLE CATCHBASINS SHALL BE ACCORDING TO T-705.010 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED. FRAME AND COVER SHALL BE ACCORDING TO OPSD 400.070.
10. SINGLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.010-1. DOUBLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.020-1.
11. DOUBLE CATCHBASINS SHALL BE ACCORDING TO T-705.020 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED.
12. CATCHBASIN LEADS TO BE 250 mm PVC DR 35 FOR SINGLE CATCHBASINS AND 300 mm PVC DR 35 FOR DOUBLE CATCHBASINS.
13. CONNECTION DETAIL FOR SEWER PIPE AT CATCHBASINS AND MAINTENANCE HOLES SHALL BE ACCORDING TO T-708.020.

## WATERMAINS

1. REMOVAL AND ABANDONMENT OF EXISTING TORONTO WATER INFRASTRUCTURE PER CITY OF TORONTO SPECIFICATION TS 510.
2. BACKFILLING IN PAVEMENT PER CITY OF TORONTO SPECIFICATION TS 4.60.07.02.03.
3. PVC WATERMAINS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPES RANGING IN SIZE FROM 100 mm TO 300 mm IN DIAMETER PRESSURE CLASS 235 AWWA C909-09. PVC PIPES RANGING IN SIZE FROM 350 mm THROUGH 600 mm IN DIAMETER, SHALL BE PRESSURE RATING 235, DR 18, ACCORDING TO AWWA C905-10.
4. EMBEDMENT MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
5. MINIMUM COVER ON WATERMAINS SHALL BE 1.8 m.
6. ALL HYDRANTS SHALL BE CONSTRUCTED ACCORDING TO T-1105.01.
7. HYDRANT LEADS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR PRESSURE CLASS 235 AWWA C909-09.
8. ALL SERVICE CONNECTIONS SHALL BE CONSTRUCTED ACCORDING TO T-1104.01, T-1104.02-1, T-1104.02-3, T-1105.02-1 AND T-1105.02-2.
9. SINGLE WATER SERVICE CONNECTIONS SHALL BE A MINIMUM OF 19mm DIA. TYPE "K" SOFT COPPER ACCORDING TO T-1104.01. WHEN SERVICE LENGTH EXCEEDS 30 m, THE DIAMETER SHALL BE 25 mm DIA.
10. ALL CURB AND VALVE BOXES TO BE LOCATED AT STREET LINE.
11. MECHANICAL THRUST RESTRAINTS SHALL BE INSTALLED AT ALL FITTINGS, BENDS, TEES, CROSSES, REDUCERS AND VALVES FOR ALL WATERMAIN SIZES. MECHANICAL RESTRAINTS AT JOINTS SHALL BE INSTALLED AT EVERY PIPE JOINT 6.1 m OF EITHER SIDE OF THE VALVE FOR WATERMAINS 100 mm DIAMETER OR LARGER UNLESS OTHERWISE NOTED.
12. ALL TEES, PLUGS, HORIZONTAL, VERTICAL BENDS, REDUCERS AND HYDRANTS USED WITH WATERMAIN DIAMETER UP TO 300mm TO HAVE CONCRETE THRUST BLOCKS ACCORDING TO T-1103.01 AND T-1103.020 UNLESS OTHERWISE NOTED.
13. WATERMAINS MUST FOLLOW THE ONTARIO MINISTRY OF THE ENVIRONMENT PROCEDURE F-6-1 THAT GOVERN THE SEPARATION OF SEWERS AND WATERMAINS. A MINIMUM VERTICAL CLEARANCE OF 0.30 m WHEN CROSSING OVER AND 0.5 m WHEN CROSSING UNDER SEWERS AND ALL OTHER UTILITIES IS REQUIRED. MUST ALSO MAINTAIN 2.5 m HORIZONTAL SEPARATION WITH SEWERS.
14. CITY IN-SERVICE WATER VALVES, CURB STOPS, FIRE HYDRANTS CAN ONLY BE OPERATED BY TORONTO WATER STAFF.
15. ALL NEW WATERMAINS SHALL BE INSULATED WHERE THE COVER IS LESS THAN 1.65 m ACCORDING TO T-708.01-4.
16. ALL SERVICE CONNECTIONS SHALL BE REPLACED UP TO PROPERTY LINES.

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NORTHCREST DEVELOPMENTS

Job Title
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SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
GENERAL NOTES AND LEGEND

Scale
NOT TO SCALE

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| Job No | Drawing No | Rev |
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| 260341-00 | C-003 | 2 |

22x34

FUTURE FILM STUDIO CAMPUS

DOWNSVIEW PARK BRIDGE

BLOCK A(P)

BLOCK A

STREET I

STREET J

STREET D

RAIL PARK

RAIL SQUARE

220+032
220+020
220+000
40+335
40+320
40+300
40+280
40+260
40+240
40+220
50+000
50+020
50+040
50+060
50+080
50+100
50+120
50+140
50+160
50+180
50+200
50+220
50+240
10+526
10+520
10+500
10+480
10+460
10+440
10+420
10+400



NOTES:

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GENERAL LEGEND ITEMS:

CITY ROW

PROPERTY LINE

PRIVATE ROW

PARKS




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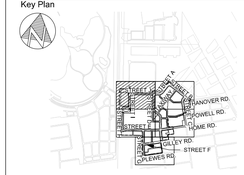

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NORTHCREST DEVELOPMENTS

Job Title

DOWNSVIEW TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title

GRADING PLAN
SHEET 1 OF 5

Scale: SCALE: 1:500 (0 5 10 15 20m)

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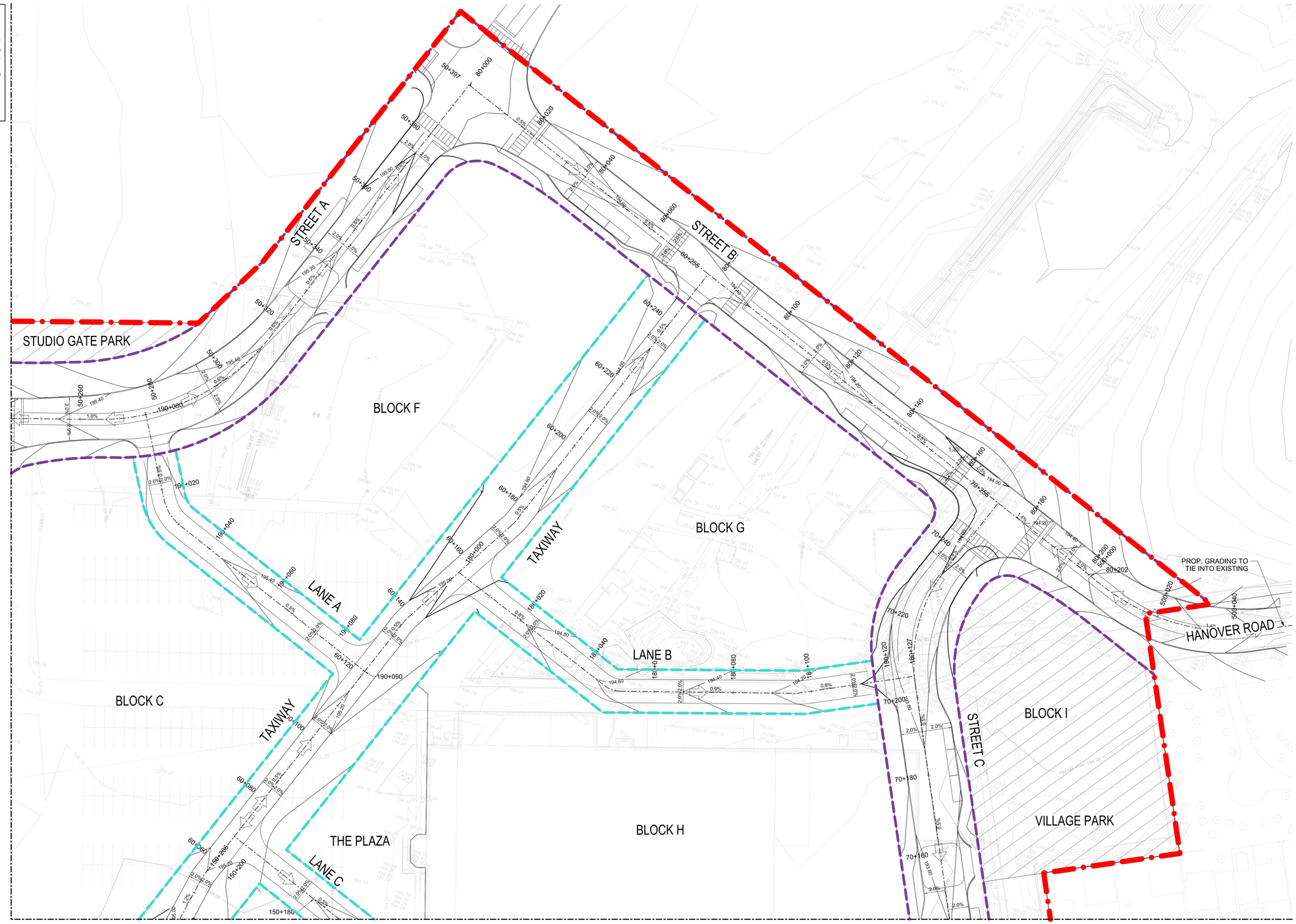
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FOR CONTINUATION SEE DWG.

MATCHLINE C-103
FOR CONTINUATION SEE DWG.

GRADING PLAN
NORTHWEST SIDE

1
C-101

22x34




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GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. R. T. JEENS
100517802
2022-05-16
PROVINCE OF ONTARIO

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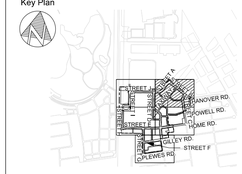
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123 GARRATT BOULEVARD

Key Plan




Drawing Title
GRADING PLAN
SHEET 2 OF 5

Scale
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Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

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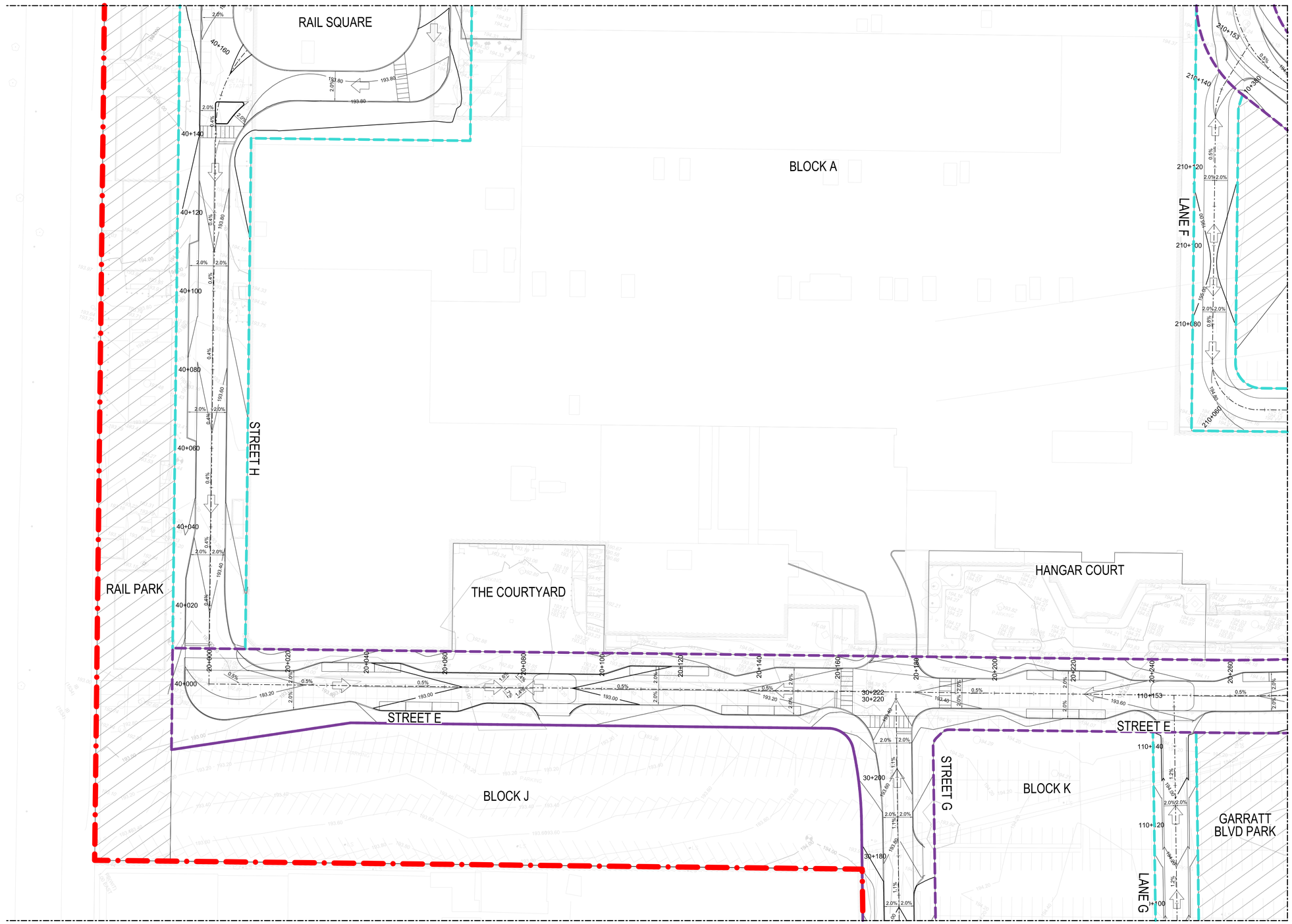
GRADING PLAN
NORTHEAST SIDE
1
C-102

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C-104
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22x34




## GRADING PLAN
SOUTHWEST SIDE

1
C-103

NOTES:

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GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
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- PARKS

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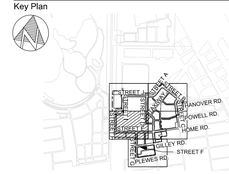
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Drawing Title
GRADING PLAN
SHEET 3 OF 5

Scale
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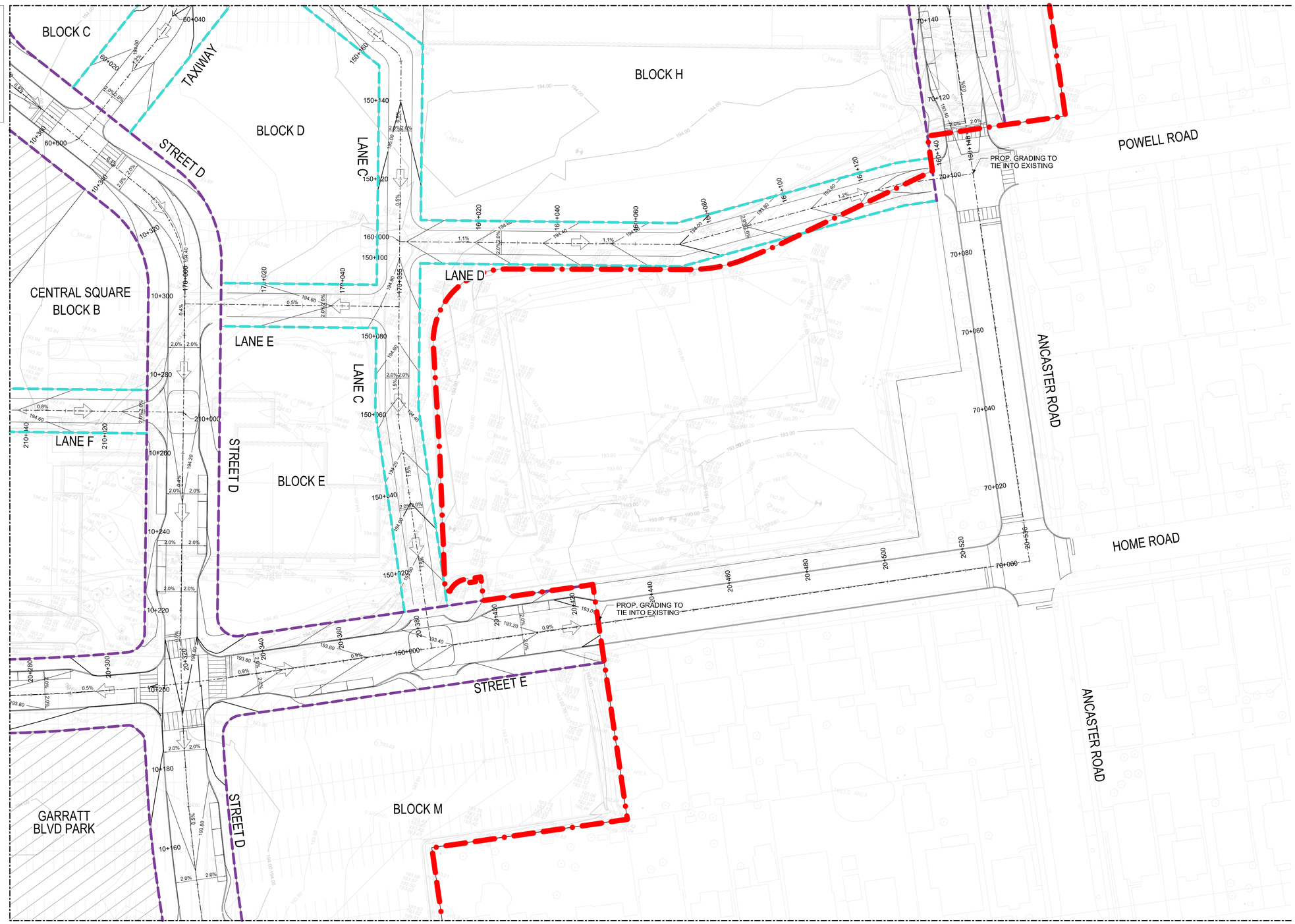


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**MATCHLINE**
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**MATCHLINE**
C-102




**MATCHLINE**
C-105
FOR CONTINUATION SEE DWG.

# GRADING PLAN
SOUTHEAST SIDE

1
C-104

NOTES:

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GENERAL LEGEND ITEMS:

- CITY ROW
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Drawing Title
GRADING PLAN
SHEET 4 OF 5

Scale
SCALE: 1:500
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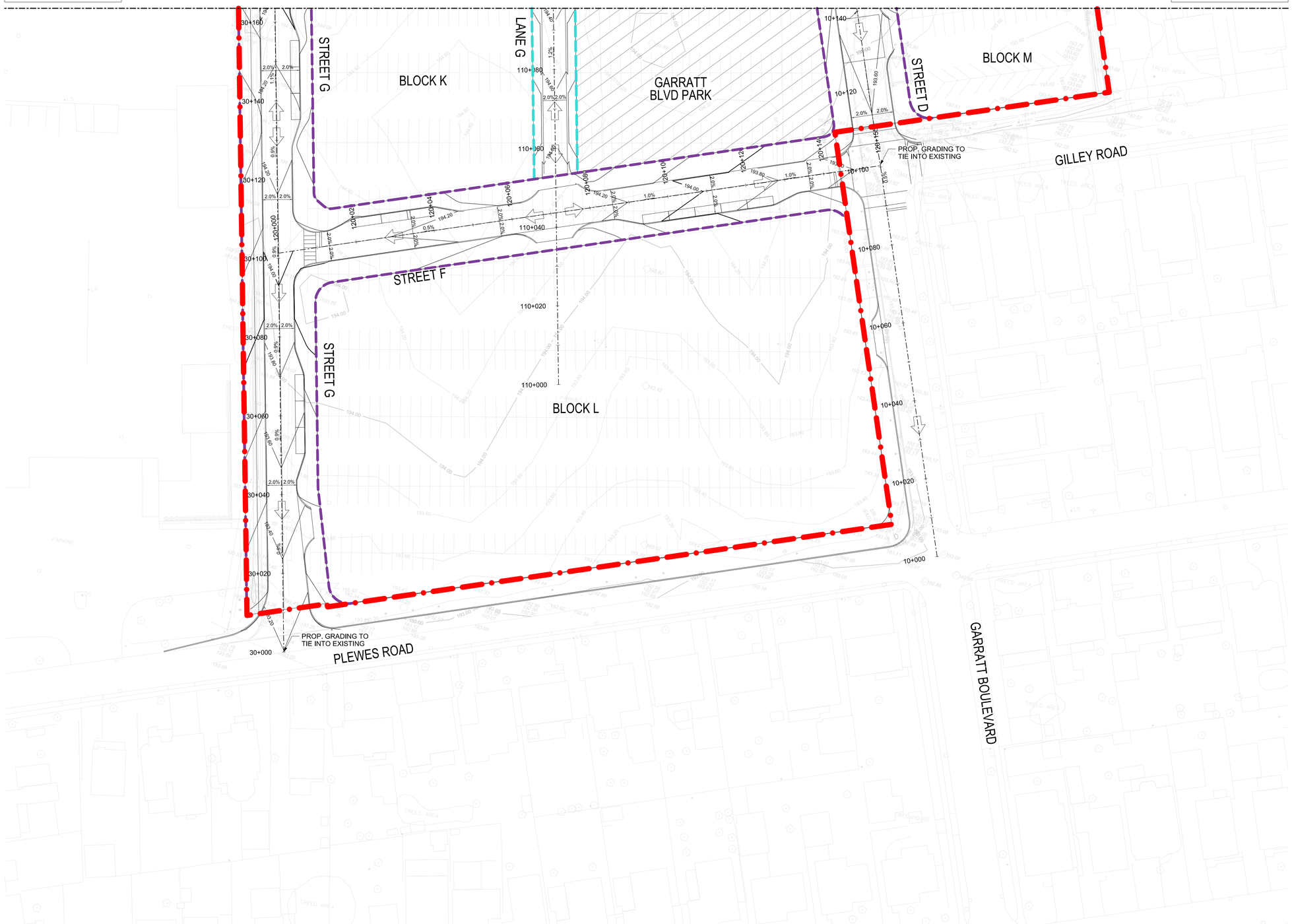
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**MATCHLINE**
C-103

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**MATCHLINE**
C-104




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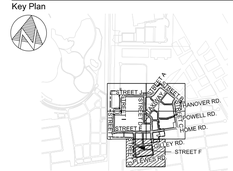

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t: +1 (416) 515 0915
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Drawing Title
GRADING PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
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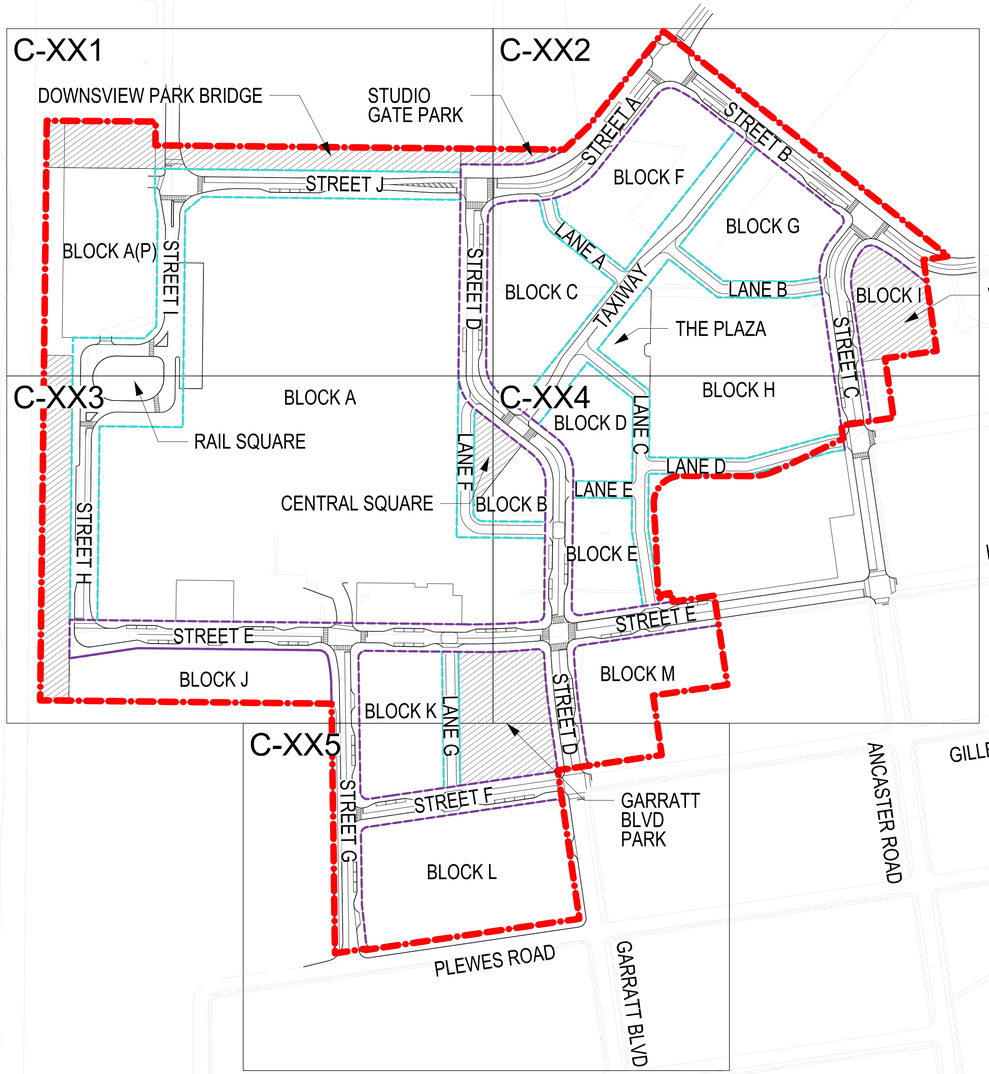
Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-105 | 3 |

## GRADING PLAN
SOUTH SIDE

1
C-105

# Appendix C: Proposed Drainage Network




NOTES:

1. ALL DRAWING SERIES FOLLOW THIS KEY PLAN WITH THE EXCEPTION OF THE FOLLOWING:

C-311 - SANITARY CATCHMENT MAP

C-60X SERIES - UTILITY SECTIONS

2. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
2022-05-16
PROVINCE OF ONTARIO

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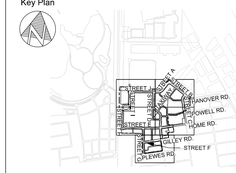
Client

NORTHCREST DEVELOPMENTS

Job Title

DOWNSVIEW TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



Drawing Title

KEY PLAN

Scale

SCALE: 1:2000 (0 50 80m)

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| TI | PC | PP | HJ |

Drawing Status

DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-002 | 2 |

22x34

# LEGEND:

## GENERAL:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

## GRADING PLAN :

- EXISTING GRADE (xxx.xx)
- PROPOSED GRADE (xxx.xx)
- EXISTING CONTOUR LINES (xxx.xx)
- PROPOSED CONTOUR LINES (xxx.xx)
- MAJOR OVERLAND FLOW DIRECTION
- SLOPE DIRECTION (2%)

## UTILITIES PLAN:

- PROPOSED STORM SEWER
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN
- PRIVATE STORM INFRASTRUCTURE
- PROPOSED JOINT USE TRENCH (HYDRO & TELECOMS)
- PROPOSED WATERMAIN
- PROPOSED HYDRANT
- PROPOSED WATER VALVE
- PROPOSED GAS MAIN
- PROPOSED SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- EXISTING UTILITIES TO BE ABANDONED
- EXISTING STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATERMAIN

# GENERAL NOTES:

## EROSION AND SEDIMENT CONTROL

1. EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED OR REPLACED WITHIN 48 HOURS OF INSPECTION OR BOTH.
2. ALL DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE, AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
3. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREA. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF A DELETERIOUS SUBSTANCE, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS AND A TORONTO REGION CONSERVATION AUTHORITY ENFORCEMENT OFFICE SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
4. ALL ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES, WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE AND REFUELING WILL BE CONDUCTED A MINIMUM OF 30 M FROM THE WATER.
5. ALL GRADES WITHIN THE REGULATORY FLOOD PLAN WILL BE MAINTAINED OR MATCHED.

## ADDITIONAL GENERAL NOTES - GRADING AND DRAINAGE

1. ALL ELEVATIONS ARE OF EDGE OF PAVEMENT, UNLESS OTHERWISE NOTED.
2. ALL COORDINATES ARE IN METER AND REFERENCED TO ZONE 10 OF THE ONTARIO COORDINATE SYSTEM NAD-27.
3. CONNECTION TO EXISTING NETWORKS IS SUBJECT TO AGREEMENT WITH STATUTORY AUTHORITIES AND APPROVING BODIES.
4. LOCATION AND EXTENT OF EXISTING SERVICES IS INDICATIVE ONLY AND IS INTENDED TO IDENTIFY APPROXIMATE LOCATION OF MAIN SERVICE CORRIDORS. FOR FULL DETAILS REFER TO UTILITY PROVIDERS RECORD DRAWINGS OR TOPOGRAPHICAL SURVEY.
5. CONFLICTS WITH EXISTING UTILITIES AND OTHER PROPOSED WORKS SHOULD BE NOTIFIED TO THE ENGINEER OF RECORD.
6. CONTRACTOR SHALL CONFIRM EXACT LIMITS OF GRADING AND PROVIDE SMOOTH TIE-IN TO EXISTING SURFACES IN THE FIELD.
7. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SURFACES TOWARDS CATCHBASINS OR DRAINAGE FEATURES AT TIE-INS TO EXISTING SURFACES AND ALL LOCATIONS WITHIN PROJECT LIMITS. CONTRACTOR SHALL NOTIFY CONTRACT ADMINISTRATOR PRIOR TO COMMENCING WORKS IF SITE CONDITIONS DO NOT ACHIEVE POSITIVE DRAINAGE.
8. CONTRACTOR SHALL ENSURE POSITIVE DRAINAGE OF ALL SUB-GRADE TOWARDS SUBDRAINS AND A MINIMUM 0.5% SLOPE FOR SUBDRAIN AND ITS OUTLET PIPE.
9. CROSSFALLS AND ELEVATIONS PROVIDED IN TYPICAL SECTIONS DRAWINGS ARE FOR INFORMATION ONLY. REFER TO GRADING AND DRAINAGE DRAWINGS FOR DETAILS AND PROPOSED ELEVATIONS.

## ADDITIONAL GENERAL NOTES - REMOVALS

1. LIMITS OF WORK WILL INCLUDE REMOVALS OF AREAS AND OTHER INFRASTRUCTURE (RAILINGS, FURNITURE, ETC.) ON PRIVATE PROPERTY. EXACT LIMITS AND REQUIREMENTS WILL BE DETERMINED ON-SITE. CONTRACTOR TO COORDINATE WITH AFFECTED PROPERTY OWNERS ON REINSTATEMENT OF REMOVED PRIVATE ELEMENTS DISTURBED DURING PROJECT CONSTRUCTION.
2. UNLESS OTHERWISE NOTED, SALVAGE MATERIALS REMOVED FROM PRIVATE PROPERTY FOR REUSE / DISPOSAL BY OWNER.
3. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SITE FURNITURE (TRASH RECEPTACLES, BENCHES, SIGN POSTS, INFORMATION PILLARS, ETC.) WITHIN THE LIMITS OF WORK TO BE REMOVED BY THE CITY OF TORONTO (OR ITS AGENT).
4. UNLESS OTHERWISE NOTED, ALL MUNICIPAL SIGNAGE WITHIN THE LIMITS OF WORK TO BE REMOVED FOR REUSE / RETURN TO THE CITY.
5. ALL REFUSE, DEBRIS AND MISCELLANEOUS ITEMS TO BE REMOVED, THAT ARE NOT TO BE STOCKPILED FOR LATER USE ON THE PROJECT OR DELIVERED TO THE OWNER SHALL BE LEGALLY DISPOSED OF OFF-SITE BY THE CONTRACTOR.
6. CONTRACTOR RESPONSIBLE FOR IDENTIFICATION, MAINTENANCE, PROTECTION, ETC. OF ANY PRIVATE IRRIGATION, ELECTRICAL AND LIGHTING SYSTEMS WITHIN THE PUBLIC AND PRIVATE RIGHT-OF-WAY THAT MAY BE ENCOUNTERED WHICH ARE NOT SHOWN ON THE DRAWINGS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING TREES AND SHRUBS DESIGNATED TO REMAIN FOR THE LENGTH OF THE CONSTRUCTION PERIOD. REFER TO ARBORIST REPORTS FOR TREE REMOVAL AND PROTECTION. THE PLACEMENT OF PROTECTION DEVICES ADDITIONAL TO THOSE SPECIFIED SHALL, HOWEVER, BE AT THE CONTRACTORS DISCRETION.

## EXISTING UTILITIES GENERAL NOTES:

1. EXISTING UTILITIES SHOWN ARE BASED ON BACKGROUND INFORMATION SUPPLED BY CLIENT, UTILITY COMPANIES AND CITY OF TORONTO. INFORMATION INCLUDES BUT NOT LIMITED TO RECORD DESIGN DRAWINGS, AS-BUILT DRAWINGS, AND SUBSURFACE UTILITY ENGINEERING (SUE) INVESTIGATION INFORMATION BY CLIENT.
2. LOCATIONS AND SIZES OF ALL UTILITY SERVICE CONNECTIONS ARE BASED ON AVAILABLE RECORDS AND MUST BE FIELD VERIFIED PRIOR TO ANY CONSTRUCTION ACTIVITIES.

## SANITARY AND STORM SEWERS:

1. MAIN LINE PVC PIPE SHALL BE DR 35 UNLESS NOTED OTHERWISE.
2. SANITARY SERVICE CONNECTIONS SHALL BE SINGLE, 200 mm DIAMETER MINIMUM, PVC DR 28 INSTALLED AT 2 PERCENT.
3. BEDDING MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A NATIVE OR GRANULAR A RCM ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
4. BEDDING FOR RIGID PIPE SHALL BE CLASS B BEDDING MATERIAL ACCORDING TO OPSD 802.031 AND USING GRANULAR A NATIVE OR GRANULAR A RCM BEDDING MATERIAL ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98 % OF MAXIMUM DRY DENSITY.
5. MAINTENANCE HOLES SHALL BE ACCORDING TO T-701.010 (1200 mm), T-701.011 (1500 mm), T-701.012-1 (1800 mm) OR T-701.013 (2400 mm). FRAME AND COVER SHALL BE ACCORDING TO OPSD 401.010 TYPE A CLOSED (SANITARY AND STORM).
6. MAINTENANCE HOLE CHAMBER OPENINGS MUST BE LOCATED ON THE UPSTREAM SIDE OF THE MAINTENANCE HOLE UNLESS OTHERWISE SPECIFIED.
7. BENCHING DETAILS SHALL BE ACCORDING TO T-701.021 OR AS SHOWN ON THE DRAWINGS.
8. SANITARY MAINTENANCE HOLES SHALL HAVE WATERTIGHT FRAMES AND COVERS IN PONDING AREAS ACCORDING TO OPSD 401.030.
9. SINGLE CATCHBASINS SHALL BE ACCORDING TO T-705.010 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED. FRAME AND COVER SHALL BE ACCORDING TO OPSD 400.070.
10. SINGLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.010-1. DOUBLE CATCHBASINS WITHOUT SUMP SHALL BE ACCORDING TO T-705.020-1.
11. DOUBLE CATCHBASINS SHALL BE ACCORDING TO T-705.020 COMPLETE WITH GOSS TRAP, WHERE SPECIFIED.
12. CATCHBASIN LEADS TO BE 250 mm PVC DR 35 FOR SINGLE CATCHBASINS AND 300 mm PVC DR 35 FOR DOUBLE CATCHBASINS.
13. CONNECTION DETAIL FOR SEWER PIPE AT CATCHBASINS AND MAINTENANCE HOLES SHALL BE ACCORDING TO T-708.020.

## WATERMAINS

1. REMOVAL AND ABANDONMENT OF EXISTING TORONTO WATER INFRASTRUCTURE PER CITY OF TORONTO SPECIFICATION TS 510.
2. BACKFILLING IN PAVEMENT PER CITY OF TORONTO SPECIFICATION TS 4.60.07.02.03.
3. PVC WATERMAINS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR MOLECULARLY ORIENTED POLYVINYL CHLORIDE (PVCO) PIPES RANGING IN SIZE FROM 100 mm TO 300 mm IN DIAMETER PRESSURE CLASS 235 AWWA C909-09. PVC PIPES RANGING IN SIZE FROM 350 mm THROUGH 600 mm IN DIAMETER, SHALL BE PRESSURE RATING 235, DR 18, ACCORDING TO AWWA C905-10.
4. EMBEDMENT MATERIAL FOR FLEXIBLE PIPE SHALL BE ACCORDING TO OPSD 802.010 AND USING GRANULAR A ACCORDING TO TS 1010 AND COMPACTED TO MINIMUM 98% OF MAXIMUM DRY DENSITY.
5. MINIMUM COVER ON WATERMAINS SHALL BE 1.8 m.
6. ALL HYDRANTS SHALL BE CONSTRUCTED ACCORDING TO T-1105.01.
7. HYDRANT LEADS SHALL BE MINIMUM DR 18 CLASS 235 (AWWA) C900-07 OR PRESSURE CLASS 235 AWWA C909-09.
8. ALL SERVICE CONNECTIONS SHALL BE CONSTRUCTED ACCORDING TO T-1104.01, T-1104.02-1, T-1104.02-3, T-1105.02-1 AND T-1105.02-2.
9. SINGLE WATER SERVICE CONNECTIONS SHALL BE A MINIMUM OF 19mm DIA. TYPE "K" SOFT COPPER ACCORDING TO T-1104.01. WHEN SERVICE LENGTH EXCEEDS 30 m, THE DIAMETER SHALL BE 25 mm DIA.
10. ALL CURB AND VALVE BOXES TO BE LOCATED AT STREET LINE.
11. MECHANICAL THRUST RESTRAINTS SHALL BE INSTALLED AT ALL FITTINGS, BENDS, TEES, CROSSES, REDUCERS AND VALVES FOR ALL WATERMAIN SIZES. MECHANICAL RESTRAINTS AT JOINTS SHALL BE INSTALLED AT EVERY PIPE JOINT 6.1 m OF EITHER SIDE OF THE VALVE FOR WATERMAINS 100 mm DIAMETER OR LARGER UNLESS OTHERWISE NOTED.
12. ALL TEES, PLUGS, HORIZONTAL, VERTICAL BENDS, REDUCERS AND HYDRANTS USED WITH WATERMAIN DIAMETER UP TO 300mm TO HAVE CONCRETE THRUST BLOCKS ACCORDING TO T-1103.01 AND T-1103.020 UNLESS OTHERWISE NOTED.
13. WATERMAINS MUST FOLLOW THE ONTARIO MINISTRY OF THE ENVIRONMENT PROCEDURE F-6-1 THAT GOVERN THE SEPARATION OF SEWERS AND WATERMAINS. A MINIMUM VERTICAL CLEARANCE OF 0.30 m WHEN CROSSING OVER AND 0.5 m WHEN CROSSING UNDER SEWERS AND ALL OTHER UTILITIES IS REQUIRED. MUST ALSO MAINTAIN 2.5 m HORIZONTAL SEPARATION WITH SEWERS.
14. CITY IN-SERVICE WATER VALVES, CURB STOPS, FIRE HYDRANTS CAN ONLY BE OPERATED BY TORONTO WATER STAFF.
15. ALL NEW WATERMAINS SHALL BE INSULATED WHERE THE COVER IS LESS THAN 1.65 m ACCORDING TO T-708.01-4.
16. ALL SERVICE CONNECTIONS SHALL BE REPLACED UP TO PROPERTY LINES.

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
2022-05-16
PROVINCE OF ONTARIO

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t: +1 (416) 515 0915
www.arup.com

Client
NORTHCREST DEVELOPMENTS

Job Title
DOWNSVIEW TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
GENERAL NOTES AND LEGEND

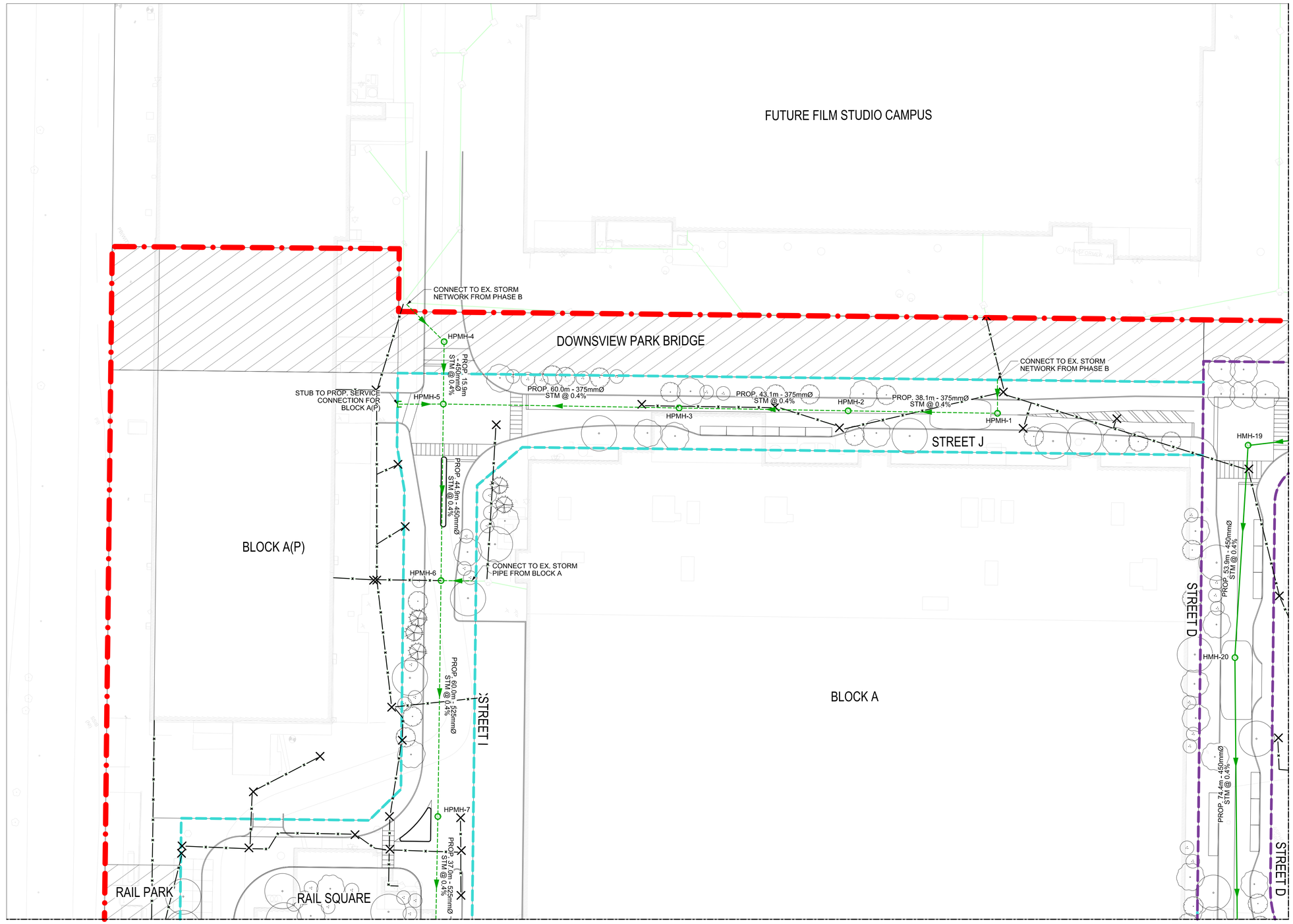
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Drawing Status
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| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-003 | 2 |

22x34




# STORM SERVICING PLAN
NORTHWEST SIDE

1
C-501

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
2022-05-16
PROVINCE OF ONTARIO

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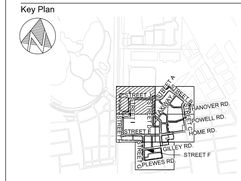

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Client
NORTHCREST DEVELOPMENTS

Job Title
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SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
STORM SERVICING PLAN
SHEET 1 OF 5

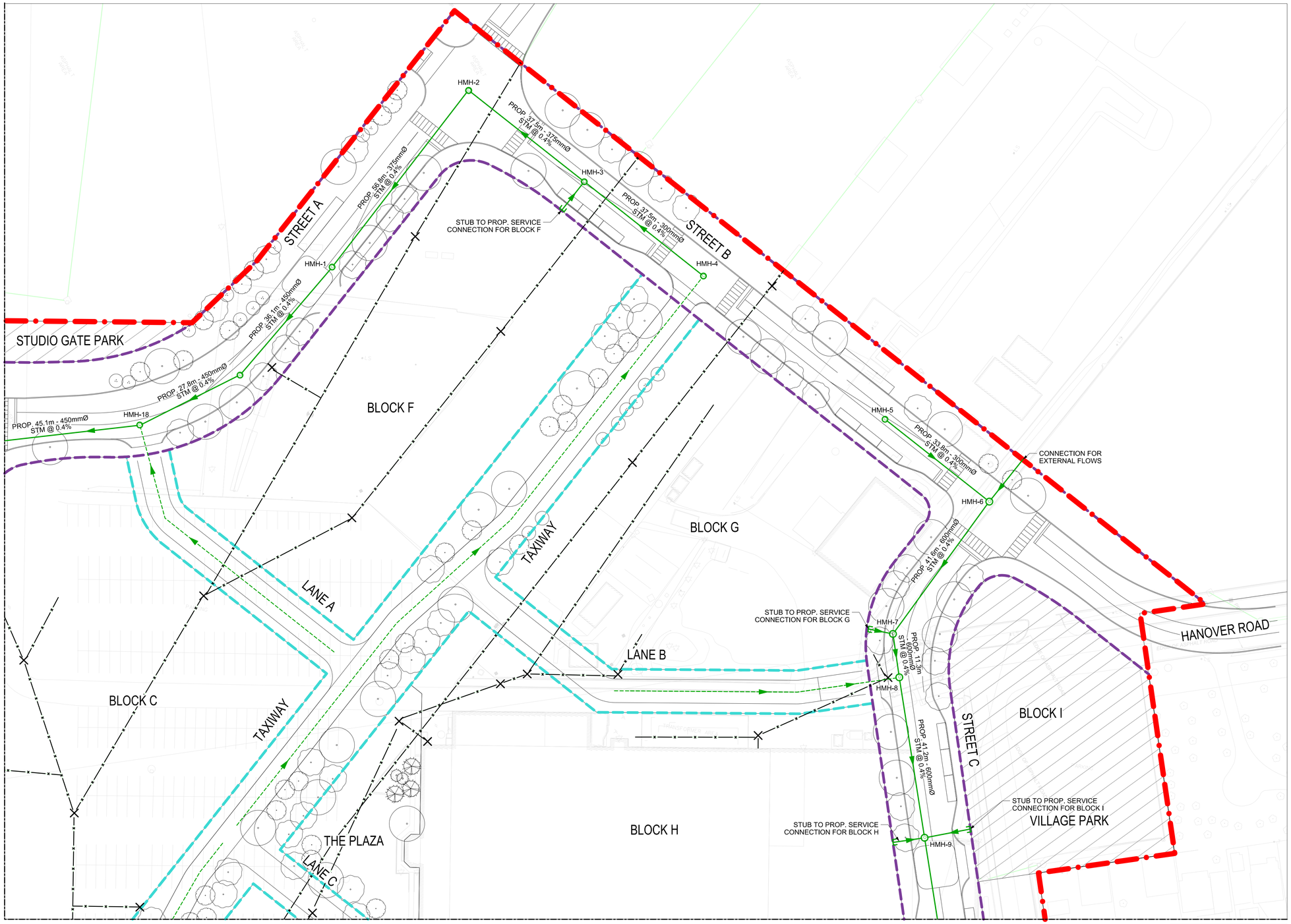
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Drawing Status
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| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-501 | 2 |

FOR CONTINUATION SEE DWG.
MATCHLINE
C-501




## STORM SERVICING PLAN
NORTHEAST SIDE

1
C-502

MATCHLINE
C-504
FOR CONTINUATION SEE DWG.

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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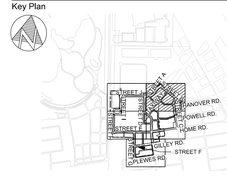
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123 GARRATT BOULEVARD

Key Plan




Drawing Title
STORM SERVICING PLAN
SHEET 2 OF 5

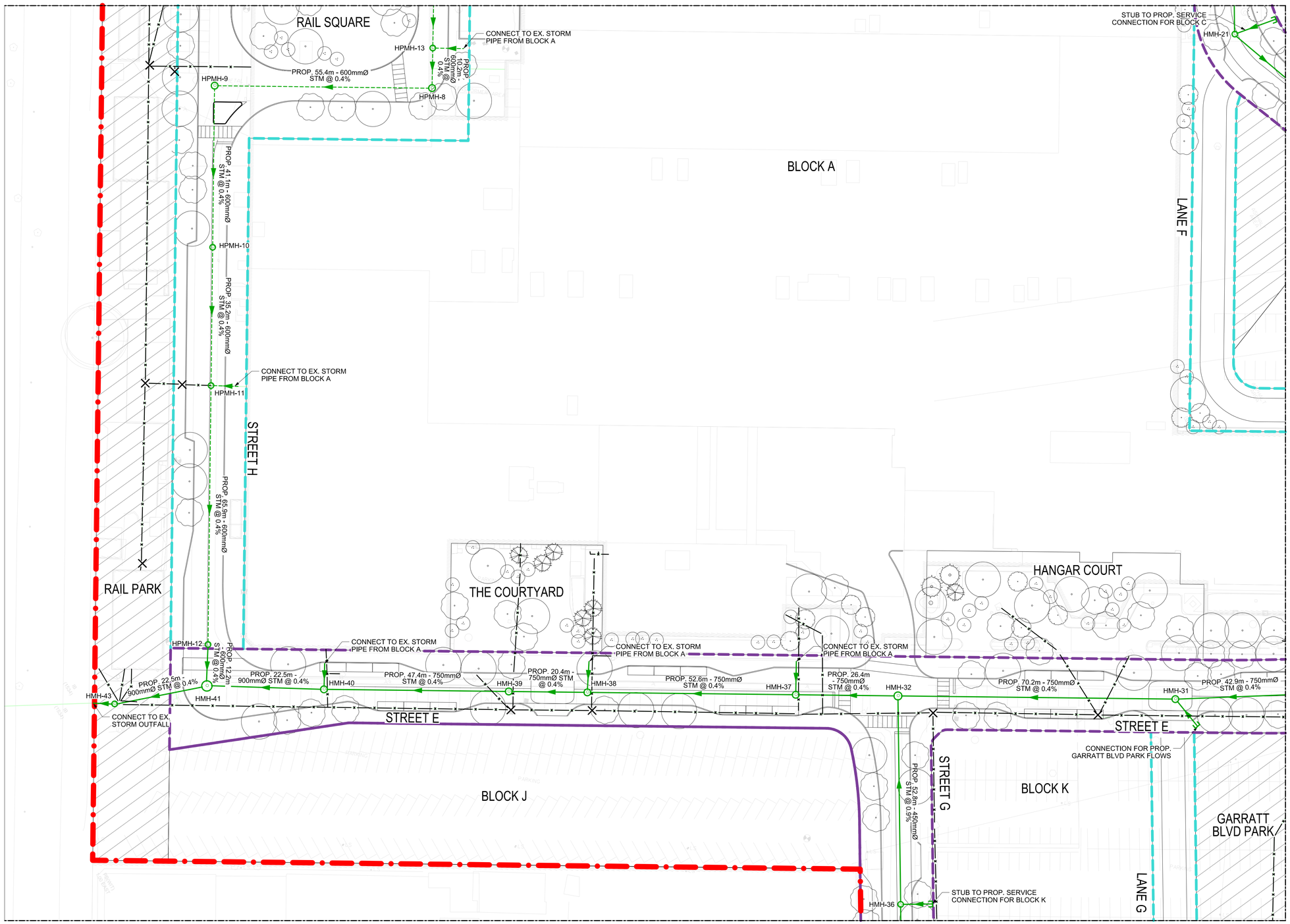
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| AW | DZ | PP | HJ |

Drawing Status
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| Job No | Drawing No | Rev |
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22x34




FOR CONTINUATION SEE DWG.
MATCHLINE
C-501

MATCHLINE
C-504
FOR CONTINUATION SEE DWG.

MATCHLINE
C-505
FOR CONTINUATION SEE DWG.

## STORM SERVICING PLAN
SOUTHWEST SIDE

1
C-503

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

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H. R. T. JEENS
100517802
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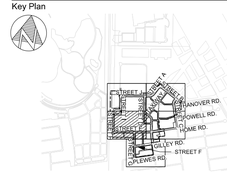
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SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan




Drawing Title
STORM SERVICING PLAN
SHEET 3 OF 5

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Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-503 | 2 |

22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-503

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-502

BLOCK C
TAXIWAY
BLOCK D
LANE C
BLOCK H
POWELL ROAD
PROP. 40.7m - 450mmØ STM @ 0.4%
HMH-22
PROP. 24.0m - 450mmØ STM @ 0.4%
STREET D
HMH-23
PROP. 13.6m - 525mmØ STM @ 0.4%
STUB TO PROP. SERVICE CONNECTION FOR BLOCK D
STUB TO PROP. SERVICE CONNECTION FOR BLOCK B
HMH-23-A
PROP. 60.0m - 525mmØ STM @ 0.4%
CENTRAL SQUARE
BLOCK B
HMH-24
LANE E
LANE C
PROP. 28.6m - 525mmØ STM @ 0.4%
HMH-25
LANE F
STREET D
BLOCK E
PROP. 35.5m - 525mmØ STM @ 0.4%
HMH-26
STUB TO PROP. SERVICE CONNECTION FOR BLOCK E
PROP. 34.9m - 525mmØ STM @ 0.4%
LANE D
CONNECT TO EX. STORM PIPE FROM FLIGHT SAFETY CENTRE
PROP. 61.8m - 600mmØ STM @ 0.4%
HMH-10
PROP. 59.3m - 600mmØ STM @ 0.4%
ANCASTER ROAD
HMH-11
PROP. 39.2m - 600mmØ STM @ 0.4%
HOME ROAD
PROP. 49.7m - 600mmØ STM @ 0.4%
HMH-12
HMH-13
PROP. 51.0m - 600mmØ STM @ 0.4%
HMH-14
PROP. 32.6m - 600mmØ STM @ 0.4%
PROP. 18.8m - 675mmØ STM @ 0.4%
HMH-15
HMH-16
PROP. 31.0m - 675mmØ STM @ 0.4%
HMH-17
PROP. 33.6m - 675mmØ STM @ 0.4%
PROP. 28.6m - 750mmØ STM @ 0.4%
HMH-29
HMH-30
STREET E
ANCASTER ROAD
PROP. 44.3m - 300mmØ STM @ 1.0%
STREET D
BLOCK M
GARRATT BLVD PARK
HMH-28
STUB TO PROP. SERVICE CONNECTION FOR BLOCK M

**MATCHLINE**
C-505
FOR CONTINUATION SEE DWG.

# STORM SERVICING PLAN
SOUTHEAST SIDE
1
C-504

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

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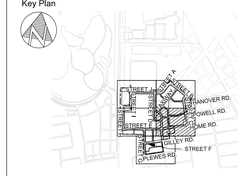
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Key Plan




Drawing Title
STORM SERVICING PLAN
SHEET 4 OF 5

Scale
SCALE: 1:500
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|---|---|---|---|
| AW | DZ | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-504 | 2 |


Ove Arup & Partners Consulting Engineers PC



PLOT BY:Angus.Wan PLOT TIME5/6/2022 11:03:29 AM FILE:J:\TOR\270000\272777-00\3 Design\3-04 BIM\3-04-06 Sheets\07 Hangar District Plan\07_STM_UTL_PR_04.dgn

22x34

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-503

FOR CONTINUATION SEE DWG.
**MATCHLINE**
C-504




# STORM SERVICING PLAN
SOUTH SIDE

1
C-505

NOTES:

1. FOR GENERAL NOTES AND LEGEND REFER TO SHEET C-003. GENERAL LEGEND ITEMS ARE PROVIDED BELOW FOR REFERENCE.

GENERAL LEGEND ITEMS:

- CITY ROW
- PROPERTY LINE
- PRIVATE ROW
- PARKS

LICENSED PROFESSIONAL ENGINEER
H. R. T. JEENS
100517802
2022-05-16
PROVINCE OF ONTARIO

| Rev | Date | Description |
|---|---|---|
| 2 | 16-05-22 | ISSUED FOR ZBA/DPS |
| 1 | 14-03-22 | DRAFT SUBMISSION |


ARUP

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Client
NORTHCREST DEVELOPMENTS

Job Title
DOWNSVIEW TAXIWAY WEST
SOUTH SUB-DISTRICT
123 GARRATT BOULEVARD

Key Plan



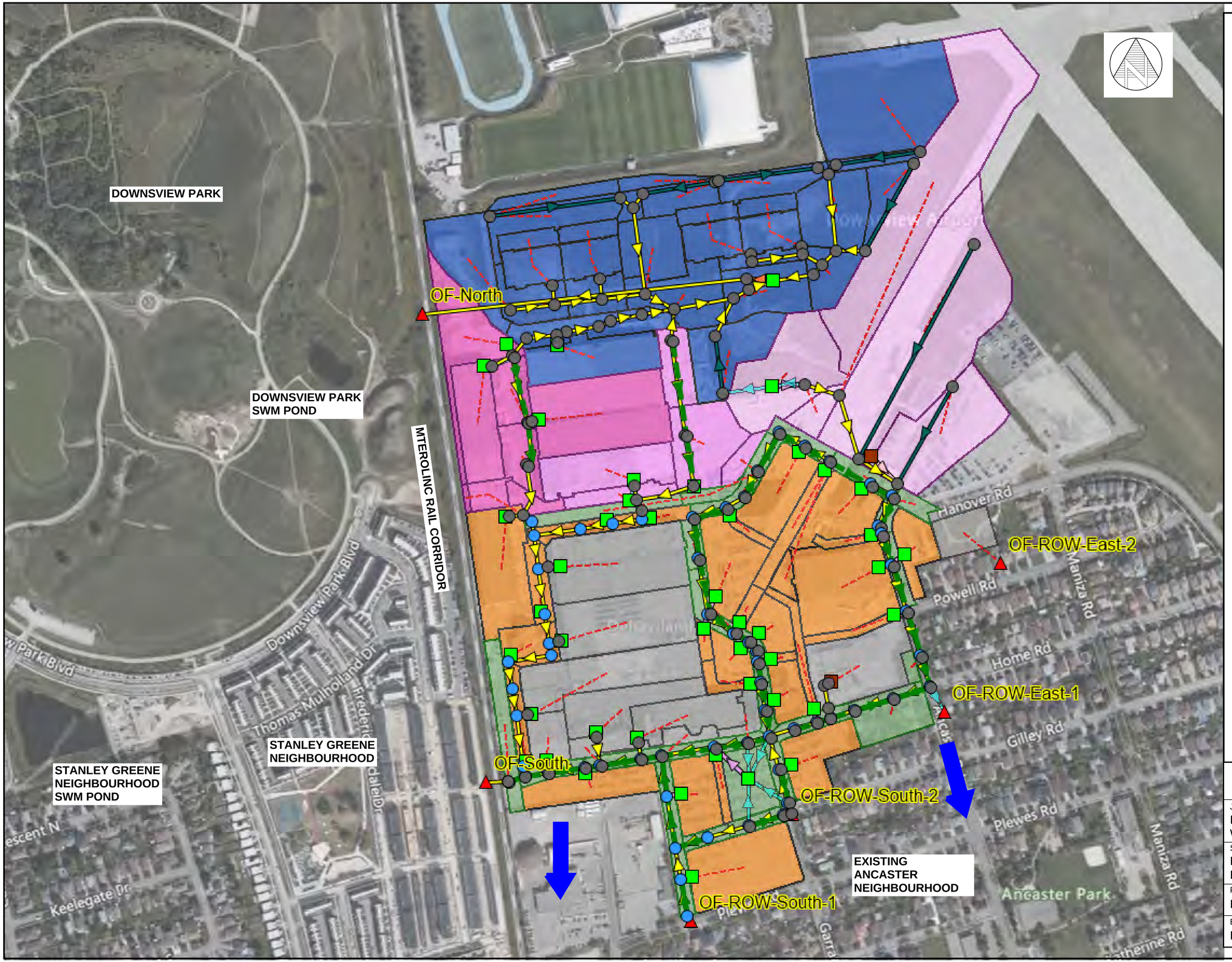

Drawing Title
STORM SERVICING PLAN
SHEET 5 OF 5

Scale
SCALE: 1:500
0 5 10 15 20m

| Drawn | Designed | Checked | Approved |
|---|---|---|---|
| AW | DZ | PP | HJ |

Drawing Status
DRAFT PLAN OF SUBDIVISION/ZONING BY-LAW

| Job No | Drawing No | Rev |
|---|---|---|
| 260341-00 | C-505 | 2 |




## LEGEND

- PHASE A
- PHASE B-EXTERNAL 1
- PHASE B-EXTERNAL 2
- PHASE B-EXTERNAL 3
- SUBJECT LANDS - PROPOSED PRIVATE DEVELOPMENT
- SUBJECT LANDS - PROPOSED PUBLIC STREETS & PARKS
- SUBJECT LANDS - EXISTING DEVELOPMENT TO REMAIN
- OUTFALL
- PROPOSED MH
- EXISTING MH
- STORM SEWER PIPE
- SWALE
- EXISTING OVERLAND FLOW ROUTES
- DETENTION STORAGE

ARUP

| | |
|---|---|
| Job Title: DOWNSVIEW - TAXIWAY WEST SOUTH SUB-DISTRICT | Job No.: 260341-00 |
| Sketch Title: Post Development Drainage Plan | Sketch No.: 1 |
| Purpose of Issue: DRAFT ZBA | Scale: NTS |

| By | Checked | Revision | Date |
|---|---|---|---|
| DZ | XXX | 1 | 04/12/2022 |

# Appendix D: Hydrology and Hydraulic Information

**Table D1: Rainfall Intensity Data - AES 6hr with 15min interval**

| Time Step (min) | Intensity (mm/hr) | | | | | |
|---|---|---|---|---|---|---|
| | 2- Year | 5- Year | 10-Year | 25-Year | 50-Year | 100-Year |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 30 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 45 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 60 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 75 | 4.32 | 5.74 | 6.68 | 7.87 | 8.76 | 9.64 |
| 90 | 4.32 | 5.74 | 6.68 | 7.87 | 8.76 | 9.64 |
| 105 | 12.24 | 16.25 | 18.94 | 22.3 | 24.82 | 27.3 |
| 120 | 12.24 | 16.25 | 18.94 | 22.3 | 24.82 | 27.3 |
| 135 | 33.12 | 43.98 | 51.24 | 60.35 | 67.16 | 73.88 |
| 150 | 33.12 | 43.98 | 51.24 | 60.35 | 67.16 | 73.88 |
| 165 | 9.36 | 12.43 | 14.48 | 17.06 | 18.98 | 20.88 |
| 180 | 9.36 | 12.43 | 14.48 | 17.06 | 18.98 | 20.88 |
| 195 | 5.04 | 6.69 | 7.8 | 9.18 | 10.22 | 11.24 |
| 210 | 5.04 | 6.69 | 7.8 | 9.18 | 10.22 | 11.24 |
| 225 | 2.88 | 3.82 | 4.46 | 5.25 | 5.84 | 6.42 |
| 240 | 2.88 | 3.82 | 4.46 | 5.25 | 5.84 | 6.42 |
| 255 | 1.44 | 1.91 | 2.23 | 2.62 | 2.92 | 3.21 |
| 270 | 1.44 | 1.91 | 2.23 | 2.62 | 2.92 | 3.21 |
| 285 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 300 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 315 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 330 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 345 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |
| 360 | 0.72 | 0.96 | 1.11 | 1.31 | 1.46 | 1.61 |

**Table D2: Rainfall Intensity Data - AES 12hr with 15min Interval**

| Time Step (min) | Intensity (mm/hr) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2- Year | 5- Year | 10-Year | 25-Year | 50-Year | 100-Year | 350-Year | 500-Year |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 2.1 |
| 30 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 2.1 |
| 45 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 2.1 |
| 60 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 2.1 |
| 75 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 90 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 105 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 120 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 135 | 2.52 | 3.26 | 3.76 | 4.39 | 4.85 | 5.31 | 6.837 | 4.9 |
| 150 | 2.52 | 3.26 | 3.76 | 4.39 | 4.85 | 5.31 | 6.837 | 4.9 |
| 165 | 2.52 | 3.26 | 3.76 | 4.39 | 4.85 | 5.31 | 6.837 | 4.9 |
| 180 | 2.52 | 3.26 | 3.76 | 4.39 | 4.85 | 5.31 | 6.837 | 4.9 |
| 195 | 7.14 | 9.25 | 10.66 | 12.43 | 13.74 | 15.05 | 19.378 | 7 |
| 210 | 7.14 | 9.25 | 10.66 | 12.43 | 13.74 | 15.05 | 19.378 | 7 |
| 225 | 7.14 | 9.25 | 10.66 | 12.43 | 13.74 | 15.05 | 19.378 | 7 |
| 240 | 7.14 | 9.25 | 10.66 | 12.43 | 13.74 | 15.05 | 19.378 | 7 |
| 255 | 19.32 | 25.02 | 28.84 | 33.63 | 37.17 | 40.71 | 52.416 | 9.8 |
| 270 | 19.32 | 25.02 | 28.84 | 33.63 | 37.17 | 40.71 | 52.416 | 9.8 |
| 285 | 19.32 | 25.02 | 28.84 | 33.63 | 37.17 | 40.71 | 52.416 | 9.8 |
| 300 | 19.32 | 25.02 | 28.84 | 33.63 | 37.17 | 40.71 | 52.416 | 9.8 |
| 315 | 5.46 | 7.07 | 8.15 | 9.5 | 10.5 | 11.51 | 14.82 | 7 |
| 330 | 5.46 | 7.07 | 8.15 | 9.5 | 10.5 | 11.51 | 14.82 | 7 |
| 345 | 5.46 | 7.07 | 8.15 | 9.5 | 10.5 | 11.51 | 14.82 | 7 |
| 360 | 5.46 | 7.07 | 8.15 | 9.5 | 10.5 | 11.51 | 14.82 | 7 |
| 375 | 2.94 | 3.81 | 4.39 | 5.12 | 5.66 | 6.2 | 7.983 | 8.4 |
| 390 | 2.94 | 3.81 | 4.39 | 5.12 | 5.66 | 6.2 | 7.983 | 8.4 |
| 405 | 2.94 | 3.81 | 4.39 | 5.12 | 5.66 | 6.2 | 7.983 | 8.4 |
| 420 | 2.94 | 3.81 | 4.39 | 5.12 | 5.66 | 6.2 | 7.983 | 8.4 |
| 435 | 1.68 | 2.18 | 2.51 | 2.92 | 3.23 | 3.54 | 4.558 | 7.7 |
| 450 | 1.68 | 2.18 | 2.51 | 2.92 | 3.23 | 3.54 | 4.558 | 7.7 |
| 465 | 1.68 | 2.18 | 2.51 | 2.92 | 3.23 | 3.54 | 4.558 | 7.7 |
| 480 | 1.68 | 2.18 | 2.51 | 2.92 | 3.23 | 3.54 | 4.558 | 7.7 |
| 495 | 0.84 | 1.09 | 1.25 | 1.46 | 1.62 | 1.77 | 2.279 | 6.3 |
| 510 | 0.84 | 1.09 | 1.25 | 1.46 | 1.62 | 1.77 | 2.279 | 6.3 |
| 525 | 0.84 | 1.09 | 1.25 | 1.46 | 1.62 | 1.77 | 2.279 | 6.3 |
| 540 | 0.84 | 1.09 | 1.25 | 1.46 | 1.62 | 1.77 | 2.279 | 6.3 |
| 555 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 6.3 |
| 570 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 6.3 |
| 585 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 6.3 |
| 600 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 6.3 |
| 615 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 630 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 645 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 660 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 675 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 690 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 705 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |
| 720 | 0.42 | 0.54 | 0.63 | 0.73 | 0.81 | 0.89 | 1.146 | 3.5 |

**Table D3 : Land Use Runoff Coefficients**

(Design Criteria for Sewers and Watermains)

| Land use | Runoff coefficient |
|---|---|
| forest and dense wooded areas | 0.10 - 0.25 |
| parks, open space and palygrounds | 0.25 |
| single family residential | 0.65 |
| semi-detached residential | 0.7 |
| townhouse or rowhousw | 0.75 |
| apartments or hi-rise residential | 0.75 - 0.85 |
| industrial | 0.85 |
| commercial | 0.9 |
| institutional | 0.75 |
| densely built, paved | 0.9 |
| asphalt, concrete, roof areas - without green roofs | 0.9 |

**Table D4: Manning' 'n' value for Different Pipe Materials**

| If pipe material is… | Then value of 'n' is… |
|---|---|
| concrete (CONC) | 0.013 |
| polyvinyl chloride (PVC) | 0.013 |
| high density polyethylene (HDPE) | 0.013 |
| corrugated steel pipe (CSP) | 0.024 |

**Table D5: Catch Basin Rating Curves**
**Reference: CoT InfoWorks Basement Flooding Model Studies Guideline, V5.0, July 2020**

| Single CB Horizontal Bars/Fishbone | | | |
|---|---|---|---|
| on grade | Discharge (m3/s) per Longitudinal Road Profile Slope | | |
| Head (m) | <=0.5% | 0.5-3.99% | >=4.0% |
| -0.5 | -0.5 | -0.5 | -0.5 |
| -0.11 | -0.042 | -0.061 | -0.057 |
| -0.104 | -0.036 | -0.056 | -0.052 |
| -0.1 | -0.034 | -0.052 | -0.049 |
| -0.09 | -0.023 | -0.04 | -0.041 |
| -0.08 | -0.013 | -0.029 | -0.032 |
| -0.07 | -0.01 | -0.018 | -0.022 |
| -0.065 | -0.008 | -0.014 | -0.017 |
| -0.06 | -0.005 | -0.01 | -0.012 |
| 0 | 0 | 0 | 0 |
| 0.0001 | 0.005 | 0.01 | 0.012 |
| 0.065 | 0.008 | 0.014 | 0.017 |
| 0.07 | 0.01 | 0.018 | 0.022 |
| 0.08 | 0.013 | 0.029 | 0.032 |
| 0.09 | 0.023 | 0.04 | 0.041 |
| 0.1 | 0.034 | 0.052 | 0.049 |
| 0.104 | 0.036 | 0.056 | 0.052 |
| 0.11 | 0.042 | 0.061 | 0.057 |
| 0.5 | 0.046 | 0.067 | 0.063 |

| Twin CB Horizontal Bars/Fishbone | | | |
|---|---|---|---|
| on grade | Discharge (m3/s) per Longitudinal Road Profile Slope | | |
| Head (m) | <=0.5% | 0.5-3.99% | >=4.0% |
| -0.5 | -0.5 | -0.5 | -0.5 |
| -0.11 | -0.051 | -0.08 | -0.092 |
| -0.104 | -0.045 | -0.07 | -0.082 |
| -0.1 | -0.042 | -0.065 | -0.075 |
| -0.09 | -0.026 | -0.049 | -0.058 |
| -0.08 | -0.016 | -0.033 | -0.041 |
| -0.07 | -0.012 | -0.022 | -0.026 |
| -0.065 | -0.009 | -0.017 | -0.02 |
| -0.06 | -0.006 | -0.01 | -0.012 |
| 0 | 0 | 0 | 0 |
| 0.0001 | 0.006 | 0.01 | 0.012 |
| 0.065 | 0.009 | 0.017 | 0.02 |
| 0.07 | 0.012 | 0.022 | 0.026 |
| 0.08 | 0.016 | 0.033 | 0.041 |
| 0.09 | 0.026 | 0.049 | 0.058 |
| 0.1 | 0.042 | 0.065 | 0.075 |
| 0.104 | 0.045 | 0.07 | 0.082 |
| 0.11 | 0.051 | 0.08 | 0.092 |
| 0.5 | 0.056 | 0.088 | 0.101 |

| Low Points (at Sags) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Head (m) | Horizontal | Grid | Honeycomb | Twin Horizontal | Twin Grid | Twin Honeycomb | Twin Honeycomb with Oriffice |
| -0.3 | -0.203 | -0.234 | -0.484 | -0.405 | -0.468 | -0.967 | -0.25 |
| -0.08 | -0.035 | -0.035 | -0.081 | -0.053 | -0.053 | -0.124 | -0.124 |
| -0.07 | -0.025 | -0.025 | -0.066 | -0.037 | -0.037 | -0.097 | -0.097 |
| -0.06 | -0.017 | -0.017 | -0.053 | -0.026 | -0.026 | -0.079 | -0.079 |
| -0.05 | -0.011 | -0.011 | -0.04 | -0.016 | -0.016 | -0.058 | -0.058 |
| -0.04 | -0.007 | -0.007 | -0.029 | -0.01 | -0.01 | -0.04 | -0.04 |
| -0.03 | -0.004 | -0.004 | -0.019 | -0.005 | -0.005 | -0.023 | -0.023 |
| -0.02 | -0.002 | -0.002 | -0.01 | -0.003 | -0.003 | -0.017 | -0.017 |
| -0.01 | 0 | 0 | -0.004 | -0.001 | -0.001 | -0.011 | -0.011 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0.01 | 0 | 0 | 0.004 | 0.001 | 0.001 | 0.011 | 0.011 |
| 0.02 | 0.002 | 0.002 | 0.01 | 0.003 | 0.003 | 0.017 | 0.017 |
| 0.03 | 0.004 | 0.004 | 0.019 | 0.005 | 0.005 | 0.023 | 0.023 |
| 0.04 | 0.007 | 0.007 | 0.029 | 0.01 | 0.01 | 0.04 | 0.04 |
| 0.05 | 0.011 | 0.011 | 0.04 | 0.016 | 0.016 | 0.058 | 0.058 |
| 0.06 | 0.017 | 0.017 | 0.053 | 0.026 | 0.026 | 0.079 | 0.079 |
| 0.07 | 0.025 | 0.025 | 0.066 | 0.037 | 0.037 | 0.097 | 0.097 |
| 0.08 | 0.035 | 0.035 | 0.081 | 0.053 | 0.053 | 0.124 | 0.124 |
| 0.09 | 0.046 | 0.046 | 0.097 | 0.071 | 0.071 | 0.148 | 0.148 |
| 0.1 | 0.06 | 0.06 | 0.113 | 0.091 | 0.091 | 0.172 | 0.172 |
| 0.11 | 0.073 | 0.073 | 0.131 | 0.108 | 0.108 | 0.195 | 0.195 |
| 0.12 | 0.085 | 0.086 | 0.149 | 0.126 | 0.126 | 0.22 | 0.22 |
| 0.13 | 0.097 | 0.098 | 0.168 | 0.142 | 0.142 | 0.245 | 0.245 |
| 0.14 | 0.108 | 0.109 | 0.188 | 0.155 | 0.156 | 0.269 | 0.25 |
| 0.15 | 0.118 | 0.122 | 0.208 | 0.168 | 0.173 | 0.296 | 0.25 |
| 0.2 | 0.157 | 0.173 | 0.321 | 0.244 | 0.268 | 0.499 | 0.25 |
| 0.25 | 0.181 | 0.208 | 0.45 | 0.324 | 0.372 | 0.803 | 0.25 |
| 0.3 | 0.203 | 0.234 | 0.484 | 0.405 | 0.468 | 0.967 | 0.25 |

# Appendix E: SWM Calculations

DOWNSVIEW FIRST DISTRICT STORM SEWER HYDRAULIC DESIGN SHEET - PROPOSED

Checking Date: 12/04/2022

Site location (Taxiway West South Sub-District)

n= 0.013

Designer: Della Zhang

Storm Event: 100-year

Design Storm: Rational Method

Reviewer: Henry Jeens

Rational Formula: Q = 2.78*CIA Concentration time: $t_c = t_i + t_f$ (minute) Where: ti: inlet time before pipe (minute) tf: time of flow in pipe (minute) tf = L/(60V) (minute)

Manning Equation: Qcap. = (D/1000)^2.667*(S/100)^0.5/(3.211*n)*1000 (L/s)

Where: Q: peak flow (L/s) C: runoff coefficient D: pipe size (mm) I: rainfall intensity (mm/h) S: slope (grade) of pipe (%) A: area (ha) n: roughness coefficient

Design Storm: 2 year

| | | | | Runoff | | | | | | | | Pipe | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subcatchment** | **Street** | **From** | **To** | **Area** | | **Section** | **Accum.** | | | **Peak Flow** | **Accum. peak Flow** | **Length** | **Pipe Invert** | | **Slope** | **N. D.** | **Qcap.** | **V** | | |
| | **Name** | | | **A** | **C*** | **AC** | **AC** | **tc** | **"I"** | **Q** | **Q** | **L** | **U/S MH** | **D/S MH** | **S** | **D** | **(full)** | **(full)** | **$t_f$** | **Q/Qcap. %** |
| | | MH/CB | MH/CB | (ha) | | (ha) | (ha) | (Min.) | mm/hr | (L/s) | (L/s) | (m) | (m) | (m) | m/m | (mm) | (L/s) | (m/s) | (Min.) | |
| Block_V6 | Hanover Rd | HMH-5 | HMH-6 | 0.66 | 0.31 | 0.20 | 0.20 | 10.00 | 88.2 | 49.8 | 49.83 | 31.6 | 192.9 | 192.7 | 0.004 | 300 | 61.08 | 0.86 | 0.61 | 82% |
| External 1 | | | | 10.20 | **0.25** | 2.55 | 2.55 | 28.47 | 39.0 | 276.4 | 276.37 | | | | | | | | | |
| Multiple Catchment | Hanover Rd | HMH-6 | HMH-7 | 0.34 | 0.31 | 0.10 | 2.86 | 28.47 | 39.0 | 11.3 | 309.67 | 41.6 | 192.4 | 192.3 | 0.004 | 600 | 387.95 | 1.37 | 0.51 | 80% |
| Block_V6 | Ancaster Rd | HMH-7 | HMH-8 | 0.66 | 0.31 | 0.20 | 3.06 | 28.97 | 38.5 | 21.7 | 327.18 | 11.3 | 192.3 | 192.2 | 0.004 | 600 | 387.95 | 1.37 | 0.14 | 84% |
| Multiple Catchment | Ancaster Rd | HMH-8 | HMH-9 | 0.18 | 0.31 | 0.06 | 3.12 | 29.11 | 38.3 | 6.0 | 331.97 | 41.2 | 192.2 | 192.1 | 0.004 | 600 | 387.95 | 1.37 | 0.50 | 86% |
| Multiple Catchment | Ancaster Rd | HMH-9 | HMH-10 | 1.69 | 0.31 | 0.52 | 3.63 | 29.61 | 37.8 | 54.4 | 381.97 | 63.0 | 192.1 | 191.8 | 0.004 | 600 | 387.95 | 1.37 | 0.77 | 98% |
| Multiple Catchment | Ancaster Rd | HMH-10 | HMH-11 | 0.35 | 0.31 | 0.11 | 3.74 | 30.37 | 37.1 | 10.9 | 385.35 | 59.3 | 191.8 | 191.6 | 0.004 | 600 | 387.95 | 1.37 | 0.72 | 99% |
| EX_AncasterN_1 | Ancaster Rd | HMH-11 | HMH-12 | 0.07 | 0.31 | 0.02 | 3.76 | 31.09 | 36.4 | 2.0 | 380.41 | 42.4 | 191.6 | 191.4 | 0.004 | 600 | 387.95 | 1.37 | 0.51 | 98% |
| | Home Rd | HMH-12 | HMH-13 | 0.00 | 0.31 | 0.00 | 3.76 | 31.61 | 35.9 | 0.0 | 375.57 | 49.4 | 191.4 | 191.2 | 0.004 | 600 | 387.95 | 1.37 | 0.60 | 97% |
| Ex_AncasterN_2 | Home Rd | HMH-13 | HMH-14 | 0.59 | 0.31 | 0.18 | 3.94 | 32.21 | 35.4 | 17.7 | 387.82 | 51.6 | 191.2 | 191.0 | 0.004 | 600 | 387.95 | 1.37 | 0.63 | 100% |
| | Home Rd | HMH-14 | HMH-15 | 0.00 | 0.31 | 0.00 | 3.94 | 32.84 | 34.9 | 0.0 | 382.04 | 33.2 | 191.0 | 190.9 | 0.004 | 600 | 387.95 | 1.37 | 0.40 | 98% |
| EX_FSC | Home Rd | HMH-15 | HMH-16 | 1.05 | 0.31 | 0.32 | 4.26 | 33.24 | 34.6 | 30.9 | 409.36 | 18.6 | 190.8 | 190.7 | 0.004 | 675 | 531.13 | 1.48 | 0.21 | 77% |
| Multiple Catchment | Home Rd | HMH-16 | HMH-17 | 0.29 | 0.31 | 0.09 | 4.35 | 33.45 | 34.4 | 8.4 | 415.77 | 30.6 | 190.7 | 190.6 | 0.004 | 675 | 531.13 | 1.48 | 0.34 | 78% |
| Home_Rd_2 | Home Rd | HMH-17 | HMH-29 | 0.12 | 0.31 | 0.04 | 4.39 | 33.79 | 34.1 | 3.6 | 416.05 | 33.4 | 190.6 | 190.5 | 0.004 | 675 | 531.13 | 1.48 | 0.37 | 78% |
| Multiple Catchment | Hanover Rd | HMH-4 | HMH-3 | 0.67 | 0.31 | 0.20 | 0.20 | 13.16 | 71.2 | 40.3 | 40.26 | 37.5 | 193.0 | 192.8 | 0.004 | 300 | 61.08 | 0.86 | 0.72 | 66% |
| Block_V5 | Hanover Rd | HMH-3 | HMH-2 | 0.68 | 0.31 | 0.21 | 0.41 | 13.88 | 68.3 | 39.4 | 77.98 | 37.5 | 192.8 | 192.6 | 0.004 | 375 | 110.76 | 1.00 | 0.62 | 70% |
| Studio_St_3 | Hanover Rd | HMH-2 | HMH-1 | 0.12 | 0.31 | 0.04 | 0.45 | 14.50 | 66.0 | 6.5 | 81.90 | 56.8 | 192.6 | 192.4 | 0.004 | 375 | 110.76 | 1.00 | 0.94 | 74% |
| Multiple Catchment | Studio St | HMH-1 | HMH-18 | 0.75 | 0.31 | 0.23 | 0.67 | 15 | 62.8 | 39.9 | 117.88 | 62.7 | 192.3 | 192.0 | 0.004 | 450 | 180.12 | 1.13 | 0.92 | 65% |
| Private_L-1 | Studio St | HMH-18 | HMH-19 | 0.08 | 0.31 | 0.02 | 0.70 | 16 | 60.0 | 4.1 | 116.82 | 45.1 | 192.0 | 191.9 | 0.004 | 450 | 180.12 | 1.13 | 0.66 | 65% |
| Studio_St_1 | Hangar St | HMH-19 | HMH-20 | 0.09 | 0.31 | 0.03 | 0.73 | 17.03 | 58.2 | 4.2 | 117.50 | 53.8 | 191.9 | 191.7 | 0.004 | 450 | 180.12 | 1.13 | 0.79 | 65% |
| Hangar_St_1 | Hangar St | HMH-20 | HMH-21 | 0.15 | 0.31 | 0.05 | 0.77 | 17.82 | 56.2 | 7.3 | 120.73 | 72.1 | 191.7 | 191.4 | 0.004 | 450 | 180.12 | 1.13 | 1.06 | 67% |
| Multiple Catchment | Hangar St | HMH-21 | HMH-22 | 0.80 | 0.31 | 0.25 | 1.02 | 18.89 | 53.7 | 36.7 | 152.13 | 42.2 | 191.4 | 191.2 | 0.004 | 450 | 180.12 | 1.13 | 0.62 | 84% |
| Multiple Catchment | Hangar St | HMH-22 | HMH-23 | 0.33 | 0.31 | 0.10 | 1.12 | 19.51 | 52.4 | 14.8 | 163.19 | 21.8 | 191.2 | 191.1 | 0.004 | 450 | 180.12 | 1.13 | 0.32 | 91% |
| Multiple Catchments | | HMH-23 | HMH-23-A | 0.61 | 0.31 | 0.19 | 1.31 | 19.83 | 51.7 | 26.8 | 187.91 | 14.2 | 191.03 | 190.98 | 0.004 | 525 | 271.71 | 1.26 | 0.19 | 69% |
| | Hangar St | HMH-23-A | HMH-24 | 0.00 | 0.31 | 0.00 | 1.31 | 19.83 | 51.7 | 0.0 | 187.91 | 15.0 | 190.98 | 190.92 | 0.004 | 525 | 271.71 | 1.26 | 0.20 | 69% |
| Multiple Catchment | Hangar St | HMH-24 | HMH-25 | 0.14 | 0.31 | 0.04 | 1.35 | 20.03 | 51.3 | 6.2 | 192.66 | 26.6 | 190.9 | 190.8 | 0.004 | 525 | 271.71 | 1.26 | 0.35 | 71% |
| Multiple Catchment | Hangar St | HMH-25 | HMH-26 | 0.18 | 0.31 | 0.05 | 1.41 | 20.38 | 50.6 | 7.7 | 197.78 | 35.4 | 190.8 | 190.7 | 0.004 | 525 | 271.71 | 1.26 | 0.47 | 73% |
| Multiple Catchment | Hangar St | HMH-26 | HMH-29 | 0.45 | 0.31 | 0.14 | 1.54 | 20.85 | 49.7 | 18.9 | 213.18 | 35.0 | 190.7 | 190.5 | 0.004 | 525 | 271.71 | 1.26 | 0.46 | 78% |
| | Garratt Blvd | HMH-27 | HMH-28 | 0.00 | 0.31 | 0.00 | 0.00 | 10 | 88.2 | 0.0 | 0.00 | 44.3 | 191.6 | 191.1 | 0.010 | 300 | 96.58 | 1.37 | 0.54 | 0% |
| Multiple Catchment | Garratt Blvd | HMH-28 | HMH-29 | 0.77 | 0.31 | 0.24 | 0.24 | 10.54 | 84.6 | 55.8 | 55.77 | 44.3 | 191.1 | 190.7 | 0.010 | 300 | 96.58 | 1.37 | 0.54 | 58% |
| | South St | HMH-29 | HMH-30 | 0.00 | 0.31 | 0.00 | 6.17 | 34 | 34.1 | 0.0 | 584.80 | 28.6 | 190.4 | 190.3 | 0.004 | 750 | 703.45 | 1.59 | 0.30 | 83% |
| H1-4 | South St | HMH-30 | HMH-31 | 0.15 | 0.31 | 0.05 | 6.21 | 34.09 | 33.9 | 4.4 | 585.21 | 42.9 | 190.3 | 190.1 | 0.004 | 750 | 703.45 | 1.59 | 0.45 | 83% |
| Multiple Catchment | South St | HMH-31 | HMH-32 | 0.62 | 0.31 | 0.19 | 6.40 | 34.54 | 33.5 | 17.7 | 596.99 | 70.2 | 190.1 | 189.8 | 0.004 | 750 | 703.45 | 1.59 | 0.73 | 85% |

DOWNSVIEW FIRST DISTRICT STORM SEWER HYDRAULIC DESIGN SHEET - PROPOSED

Checking Date: 12/04/2022

Site location (Taxiway West South Sub-District)

n= 0.013

Designer: Della Zhang

Storm Event: 100-year

Design Storm: Rational Method

Reviewer: Henry Jeens

Rational Formula: Q = 2.78*CIA Concentration time: $t_c = t_i + t_f$ (minute) Where: ti: inlet time before pipe (minute) tf: time of flow in pipe (minute) tf = L/(60V) (minute)

Manning Equation: Qcap. = (D/1000)^2.667*(S/100)^0.5/(3.211*n)*1000 (L/s)

Where: Q: peak flow (L/s) C: runoff coefficient D: pipe size (mm) I: rainfall intensity (mm/h) S: slope (grade) of pipe (%) A: area (ha) n: roughness coefficient

Design Storm: 2 year

| | | | | Runoff | | | | | | | | Pipe | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subcatchment** | **Street** | **From** | **To** | **Area** | | **Section** | **Accum.** | | | **Peak Flow** | **Accum. peak Flow** | **Length** | **Pipe Invert** | | **Slope** | **N. D.** | **Qcap.** | **V** | | |
| | **Name** | | | **A** | **C*** | **AC** | **AC** | **tc** | **"I"** | **Q** | **Q** | **L** | **U/S MH** | **D/S MH** | **S** | **D** | **(full)** | **(full)** | **$t_f$** | **Q/Qcap. %** |
| | | MH/CB | MH/CB | (ha) | | (ha) | (ha) | (Min.) | mm/hr | (L/s) | (L/s) | (m) | (m) | (m) | m/m | (mm) | (L/s) | (m/s) | (Min.) | |
| Murray_Ext_1 | Murrary St Ext | HMH-33 | HMH-34 | 0.17 | 0.31 | 0.05 | 0.05 | 10 | 88.2 | 12.9 | 12.90 | 47.6 | 191.7 | 191.3 | 0.008 | 300 | 86.39 | 1.22 | 0.65 | 15% |
| Block_A3 | Murrary St Ext | HMH-34 | HMH-35 | 1.14 | 0.31 | 0.35 | 0.40 | 10.65 | 84.0 | 81.2 | 93.51 | 41.9 | 191.2 | 190.9 | 0.008 | 375 | 156.64 | 1.42 | 0.49 | 60% |
| Gilley_Rd | Gilley Road | HMH-44 | HMH-45 | 0.14 | 0.31 | 0.04 | 0.44 | 11.14 | 81.1 | 9.8 | 100.11 | 46.5 | 0.0 | 0.0 | 0.008 | 375 | 156.64 | 1.42 | 0.55 | 64% |
| | Gilley Road | HMH-45 | HMH-46 | 0.00 | 0.31 | 0.00 | 0.44 | 11.69 | 78.1 | 0.0 | 96.44 | 54.8 | 0.0 | 0.0 | 0.008 | 375 | 156.64 | 1.42 | 0.64 | 62% |
| Gilley_Rd_5 | Gilley Road | HMH-46 | HMH-35 | 0.05 | 0.31 | 0.02 | 0.46 | 12.33 | 74.9 | 3.4 | 95.90 | 43.9 | 0.0 | 0.0 | 0.008 | 375 | 156.64 | 1.42 | 0.52 | 61% |
| Gilley_Rd_3 | Murrary St Ext | HMH-35 | HMH-36 | 0.06 | 0.31 | 0.02 | 0.42 | 11.14 | 81.1 | 4.2 | 94.48 | 67.3 | 190.9 | 190.3 | 0.008 | 375 | 156.64 | 1.42 | 0.79 | 60% |
| Multiple Catchment | Murrary St Ext | HMH-36 | HMH-32 | 0.75 | 0.31 | 0.23 | 0.65 | 11.93 | 76.8 | 48.9 | 138.47 | 52.8 | 190.3 | 189.9 | 0.009 | 375 | 166.14 | 1.50 | 0.59 | 83% |
| Multiple Catchment | South St | HMH-32 | HMH-37 | 0.38 | 0.31 | 0.12 | 7.05 | 34.54 | 33.5 | 10.8 | 657.43 | 26.4 | 189.8 | 189.7 | 0.004 | 750 | 703.45 | 1.59 | 0.28 | 93% |
| Multiple Catchment | South St | HMH-37 | HMH-38 | 0.77 | 0.31 | 0.24 | 7.29 | 34.82 | 33.3 | 21.9 | 675.25 | 52.6 | 189.7 | 189.5 | 0.004 | 750 | 703.45 | 1.59 | 0.55 | 96% |
| Multiple Catchment | South St | HMH-38 | HMH-39 | 0.99 | 0.31 | 0.30 | 7.59 | 35.37 | 32.9 | 27.7 | 694.76 | 20.4 | 189.5 | 189.4 | 0.004 | 750 | 703.45 | 1.59 | 0.21 | 99% |
| South_St_2 | South St | HMH-39 | HMH-40 | 0.19 | 0.31 | 0.06 | 7.65 | 35.58 | 32.8 | 5.2 | 696.73 | 47.4 | 189.4 | 189.2 | 0.004 | 750 | 703.45 | 1.59 | 0.50 | 99% |
| Block_A1 | | | | 0.63 | 0.31 | | | | | | 0.00 | | 0.0 | 0.0 | | | | | | |
| H1-1 | | | | 0.33 | 0.31 | | | | | | 0.00 | | 190.2 | 190.2 | | | | | | |
| Multiple Catchment | South St | HMH-40 | HMH-41 | 0.95 | 0.31 | 0.29 | 7.94 | 36.07 | 32.4 | 26.3 | 715.54 | 30.3 | 189.2 | 189.0 | 0.004 | 825 | 907.05 | 1.70 | 0.30 | 79% |
| External 2 | | | | 2.41 | **0.25** | 0.60 | 0.60 | 18 | 56.6 | 94.8 | 94.81 | | | | | | | | | |
| P-Studio_St_3 | Studio St (Private) | HPMH-1 | HPMH-2 | 0.11 | 0.31 | 0.03 | 0.64 | 18 | 56.6 | 5.2 | 99.99 | 38.1 | 192.3 | 192.1 | 0.004 | 375 | 110.76 | 1.00 | 0.63 | 90% |
| Multiple Catchment | Studio St (Private) | HPMH-2 | HPMH-3 | 0.28 | 0.31 | 0.09 | 0.72 | 18.30 | 55.1 | 13.2 | 110.46 | 43.1 | 192.1 | 191.9 | 0.004 | 375 | 110.76 | 1.00 | 0.72 | 99.7% |
| | Studio St (Private) | HPMH-3 | HPMH-5 | 0.00 | 0.31 | 0.00 | 0.72 | 19.01 | 53.4 | 0.0 | 107.20 | 60.0 | 191.9 | 191.7 | 0.004 | 375 | 110.76 | 1.00 | 1.00 | 97% |
| | | | | | | | | | | | | | 0.0 | 0.0 | | | | | | |
| External 3 | | | | 4.45 | **0.12** | 0.53 | 0.53 | 13 | 71.7 | 106.4 | 106.36 | | 0.0 | 191.9 | | | | | | |
| Block_H2 | Studio St (Private) | HPMH-4 | HPMH-5 | 1.10 | 0.31 | 0.34 | 0.87 | 13 | 71.7 | 67.1 | 173.42 | 17.4 | 191.9 | 191.8 | 0.004 | 450 | 180.12 | 1.13 | 0.26 | 96% |

DOWNSVIEW FIRST DISTRICT STORM SEWER HYDRAULIC DESIGN SHEET - PROPOSED

Checking Date: 12/04/2022

Site location (Taxiway West South Sub-District)

n= 0.013

Designer: Della Zhang

Storm Event: 100-year

Design Storm: Rational Method

Reviewer: Henry Jeens

Rational Formula: Q = 2.78*CIA Concentration time: $t_c = t_i + t_f$ (minute) Where: ti: inlet time before pipe (minute) tf: time of flow in pipe (minute) tf = L/(60V) (minute)

Manning Equation: Qcap. = (D/1000)^2.667*(S/100)^0.5/(3.211*n)*1000 (L/s)

Where: Q: peak flow (L/s) C: runoff coefficient D: pipe size (mm) I: rainfall intensity (mm/h) S: slope (grade) of pipe (%) A: area (ha) n: roughness coefficient

Design Storm: 2 year

| | | | | Runoff | | | | | | | | Pipe | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Subcatchment** | **Street** | **From** | **To** | **Area** | | **Section** | **Accum.** | | | **Peak Flow** | **Accum. peak Flow** | **Length** | **Pipe Invert** | | **Slope** | **N. D.** | **Qcap.** | **V** | | |
| | **Name** | | | **A** | **C*** | **AC** | **AC** | **tc** | **"I"** | **Q** | **Q** | **L** | **U/S MH** | **D/S MH** | **S** | **D** | **(full)** | **(full)** | **$t_f$** | **Q/Qcap. %** |
| | | MH/CB | MH/CB | (ha) | | (ha) | (ha) | (Min.) | mm/hr | (L/s) | (L/s) | (m) | (m) | (m) | m/m | (mm) | (L/s) | (m/s) | (Min.) | |
| | West St (Private) | HPMH-5 | HPMH-6 | 0.00 | 0.31 | 0.00 | 1.59 | 19.01 | 53.4 | 0.0 | 236.44 | 43.4 | 191.6 | 191.4 | 0.004 | 525 | 271.71 | 1.26 | 0.58 | 87% |
| H1-9 | West St (Private) | HPMH-6 | HPMH-7 | 1.51 | 0.31 | 0.46 | 2.05 | 19.59 | 52.2 | 67.2 | 298.16 | 60.0 | 191.4 | 191.1 | 0.004 | 600 | 387.95 | 1.37 | 0.73 | 77% |
| P-West_St_1 | West St (Private) | HPMH-7 | HPMH-13 | 0.29 | 0.31 | 0.09 | 2.14 | 20.32 | 50.7 | 12.4 | 302.15 | 37.0 | 191.1 | 191.0 | 0.004 | 600 | 387.95 | 1.37 | 0.45 | 78% |
| H1-8 | West St (Private) | HPMH-13 | HPMH-8 | 1.27 | 0.31 | 0.39 | 2.53 | 20.77 | 49.9 | 53.7 | 350.76 | 16.3 | 191.0 | 190.9 | 0.004 | 600 | 387.95 | 1.37 | 0.20 | 90% |
| | West St (Private) | HPMH-8 | HPMH-9 | 0.00 | 0.31 | 0.00 | 2.53 | 20.96 | 49.5 | 0.0 | 348.18 | 55.3 | 190.9 | 190.7 | 0.004 | 600 | 387.95 | 1.37 | 0.67 | 90% |
| P-West_St_2 | West St (Private) | HPMH-9 | HPMH-10 | 0.36 | 0.31 | 0.11 | 2.64 | 21.64 | 48.3 | 14.9 | 354.59 | 35.1 | 190.7 | 190.6 | 0.004 | 600 | 387.95 | 1.37 | 0.43 | 91% |
| | West St (Private) | HPMH-10 | HPMH-11 | 0.00 | 0.31 | 0.00 | 2.64 | 22.06 | 47.6 | 0.0 | 349.23 | 35.2 | 190.6 | 190.4 | 0.004 | 600 | 387.95 | 1.37 | 0.43 | 90% |
| H1-7 | West St (Private) | HPMH-11 | HPMH-12 | 1.15 | 0.31 | 0.35 | 2.99 | 22.49 | 46.9 | 45.9 | 389.92 | 65.9 | 190.3 | 190.1 | 0.004 | 675 | 531.13 | 1.48 | 0.74 | 73.41% |
| P-West_St_3 | West St (Private) | HPMH-12 | HMH-41 | 0.25 | 0.31 | 0.08 | 3.07 | 23.23 | 45.7 | 9.8 | 389.98 | 12.2 | 190.1 | 190.0 | 0.004 | 675 | 531.13 | 1.48 | 0.14 | 73.42% |
| South_St_3 | South St | HMH-41 | MH-43 | 0.18 | 0.31 | 0.05 | 11.01 | 36 | 32.4 | 4.8 | 992.18 | 22.5 | 189.0 | 188.84 | 0.006 | 900 | 1374.37 | 2.16 | 0.17 | 72% |
| Rail_Park | | MH-43 | OUTFALL | 0.43 | 0.31 | 0.13 | 11.14 | 36.25 | 32.30 | 11.88 | 1000.35 | 27.57** | TBD** | TBD** | 0.01 | 525 | 429.62 | 1.9846 | 0.23 | 233% |

*Runoff Coefficient C is composite of the entire Subject Area assumed C values in order to achieve the downstream capacity at outfall of no greater than 1100 L/s

**Pipe Length and invert elevations at the outfall need to to verified and updated based on additional SUE data in the future

# Appendix F: PCSWMM Modeling Results




**Figure F1 PCSWMM Model Overview - Existing Condition**




**Figure F2 PCSWMM Model Overview - Proposed Condition**

**Table F1: Hydrologic Parameters – Existing Condition**

| Name | Imperv. (%) | N Imperv | N Perv | Dstore Imperv | Dstore Perv | Zero Imperv | Subarea Routing | Description |
|---|---|---|---|---|---|---|---|---|
| A-SC-01 | 71 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-02 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-03 | 71 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-04 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-05 | 73 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-06 | 71 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-07 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-08 | 71 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-09 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-10 | 54 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| A-SC-11 | 62 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-12 | 50 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| A-SC-13 | 92 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-14 | 94 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-15 | 83 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-16 | 48 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| A-SC-17 | 6 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| A-SC-18 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-19 | 77 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| A-SC-20 | 92 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| A-SC-21 | 79 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| SC-01 | 53 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| SC-02 | 0 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| SC-03 | 0 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| SC-04 | 0 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| SC-05 | 18 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase A |
| SC-06 | 98 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| SC-07 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| SC-24 | 65 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase A |
| SC-09 | 56 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-10 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-11 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-12 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-14 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-15 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-22 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-23 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-25 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-27 | 38 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Phase B |
| SC-28 | 79 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-48 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Phase B |
| SC-29 | 7 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Runway |
| SC-30 | 56 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Runway |
| SC-33 | 77 | 0.01 | 0.15 | 1 | 5 | 25 | PERVIOUS | Runway |
| SC-13 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-16 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-17 | 76 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-18 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-19 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-20 | 94 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-21 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-26 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-31 | 88 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-32 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-34 | 82 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |

**Table F1: Hydrologic Parameters – Existing Condition**

| Name | Imperv. (%) | N Imperv | N Perv | Dstore Imperv | Dstore Perv | Zero Imperv | Subarea Routing | Description |
|---|---|---|---|---|---|---|---|---|
| SC-35 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-36 | 92 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-37 | 96 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-38 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-39 | 82 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-40 | 47 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-41 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-42 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-43 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-44 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-45 | 92 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-46 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-47 | 98 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-49 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-50 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-51 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-52 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-53 | 76 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-54 | 78 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-55 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-56 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-57 | 84 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-58 | 94 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-59 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-60 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-61 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-62 | 100 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |
| SC-63 | 91 | 0.01 | 0.15 | 1 | 5 | 25 | OUTLET | Subject Area |

Notes:
1.N Values = Manning’s value
2.Dstore = Initial Abstraction
3.%Zero impervious = % of area with zero depression storage

**Table F2: Hydrologic Parameters – Proposed condition**

| Name | Imperv. (%) | N Imperv | N Perv | Dstore Imperv (mm) | Dstore Perv (mm) | Zero Imperv (%) | Subarea Routing | Description | |
|---|---|---|---|---|---|---|---|---|---|
| A-SC-01 | 71 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-02 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-03 | 71 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-04 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-05 | 73 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-06 | 71 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-07 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-08 | 71 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-09 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-10 | 54 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-11 | 62 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-12 | 50 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-13 | 92 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-14 | 94 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-15 | 83 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-16 | 48 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-17 | 6 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-18 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-19 | 77 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-20 | 92 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| A-SC-21 | 79 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| EX_AncasterN_1 | 3 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | EX Ancaster Neighbourhood | External |
| Ex_AncasterN_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | EX Ancaster Neighbourhood | External |
| EX_FSC | 100 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| EX_Robert_Leek_ Park | 3 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | EX. Development | External |
| H1-1 | 100 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| H1-2_1 | 100 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| H1-2_2 | 3 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | EX. Development | External |
| H1-3 | 92 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| H1-4 | 47 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| H1-5 | 84 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | EX. Development | External |
| H1-6 | 94 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| H1-7 | 100 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| H1-8 | 100 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| H1-9 | 100 | 0.013 | 0.15 | 1.2 | 5 | 25 | OUTLET | EX. Development | External |
| SC-01 | 53 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| SC-02 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| SC-03 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| SC-04 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| SC-05 | 18 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| SC-06 | 98 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| SC-07 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| SC-09 | 56 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-10 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-11 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-12 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-13 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-14 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-15 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-17 | 76 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 3 | External |
| SC-21 | 38 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External | External |
| SC-22 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 2 | External |
| SC-23 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 2 | External |
| SC-25 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 2 | External |
| SC-27 | 38 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 1 | External |
| SC-28 | 79 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 1 | External |
| SC-29 | 7 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 1 | External |
| SC-30 | 56 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 1 | External |

**Table F2: Hydrologic Parameters – Proposed condition**

| Name | Imperv. (%) | N Imperv | N Perv | Dstore Imperv (mm) | Dstore Perv (mm) | Zero Imperv (%) | Subarea Routing | Description | |
|---|---|---|---|---|---|---|---|---|---|
| SC-33 | 77 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 1 | External |
| SC-48 | 100 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | External 2 | External |
| Ancaster_Rd_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Ancaster_Rd_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Block_A1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_A2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_A3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | PERVIOUS | Block | Subject Area |
| Block_A4 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_H2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V4 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V5 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V6 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V7 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Block_V8 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |
| Downsview_Park_Bridge | 0 | 0.013 | 0.15 | 1.2 | 5 | 0 | PERVIOUS | Public Park | Subject Area |
| Garratt_Blvd | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Gilley_Rd | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Gilley_Rd_3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Gilley_Rd_5 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hangar_St | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hangar_St_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hangar_St_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hangar_St_3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hangar_St_4 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hanover_Rd_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hanover_Rd_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Hanover_Rd_3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Home_Rd_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Home_Rd_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Murray_Ext_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Murray_Ext_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| New_Ancaster_Pa | 0 | 0.013 | 0.15 | 1.2 | 5 | 0 | PERVIOUS | Public Park | Subject Area |
| Private_L-1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Private_L-2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Private_L-3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Private_L-4 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Private_L-5 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Private_L-6_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Private_L-6_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Private_L-7 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| P-Studio_St_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| P-Studio_St_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| P-Studio_St_3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| P-West_St_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| P-West_St_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| P-West_St_3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Rail_Park | 0 | 0.013 | 0.15 | 1.2 | 5 | 0 | PERVIOUS | Public Park | Subject Area |
| SC-24 | 65 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Phase A | External |
| South_St_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| South_St_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| South_St_3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Studio_Gate | 0 | 0.013 | 0.15 | 1.2 | 5 | 0 | PERVIOUS | Public Park | Subject Area |
| Studio_St_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Studio_St_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Studio_St_3 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Public ROW | Subject Area |
| Taxiway_1 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |
| Taxiway_2 | 75 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | P-RD | Subject Area |

**Table F2: Hydrologic Parameters – Proposed condition**

| Name | Imperv. (%) | N Imperv | N Perv | Dstore Imperv (mm) | Dstore Perv (mm) | Zero Imperv (%) | Subarea Routing | Description | |
|---|---|---|---|---|---|---|---|---|---|
| The_Plaza | 3 | 0.013 | 0.15 | 1.2 | 5 | 0 | OUTLET | Block | Subject Area |

Notes:
1.N Values = Manning's value
2.Dstore = Initial Abstraction
3.%Zero impervious = % of area with zero depression storage

**Table F3: Catchment Parameters – Existing Condition**

| Name | Imperv. (%) | Outlet | Area (ha) | Slope (%) | Description |
|---|---|---|---|---|---|
| A-SC-01 | 71 | A-SC-02 | 0.17 | 0.5 | Phase A |
| A-SC-02 | 100 | A-MH-02 | 0.37 | 0.5 | Phase A |
| A-SC-03 | 71 | A-SC-04 | 0.17 | 0.5 | Phase A |
| A-SC-04 | 100 | A-MH-03 | 0.36 | 0.5 | Phase A |
| A-SC-05 | 73 | A-MH-07 | 0.63 | 0.5 | Phase A |
| A-SC-06 | 71 | A-SC-07 | 0.17 | 0.5 | Phase A |
| A-SC-07 | 100 | A-MH-11 | 0.37 | 0.5 | Phase A |
| A-SC-08 | 71 | A-SC-09 | 0.17 | 0.5 | Phase A |
| A-SC-09 | 100 | A-MH-12 | 0.37 | 0.5 | Phase A |
| A-SC-10 | 54 | A-SW-01 | 0.61 | 1 | Phase A |
| A-SC-11 | 62 | A-MH-01 | 0.11 | 1 | Phase A |
| A-SC-12 | 50 | A-SW-03 | 0.35 | 1 | Phase A |
| A-SC-13 | 92 | A-MH-05 | 0.44 | 1 | Phase A |
| A-SC-14 | 94 | A-MH-06 | 0.37 | 1 | Phase A |
| A-SC-15 | 83 | A-MH-08 | 0.75 | 1 | Phase A |
| A-SC-16 | 48 | A-SW-05 | 0.43 | 1 | Phase A |
| A-SC-17 | 6 | A-SW-07 | 0.17 | 1 | Phase A |
| A-SC-18 | 100 | A-MH-09 | 0.83 | 1 | Phase A |
| A-SC-19 | 77 | A-SW-09 | 0.35 | 1 | Phase A |
| A-SC-20 | 92 | A-MH-13 | 0.20 | 1 | Phase A |
| A-SC-21 | 79 | A-MH-15 | 0.43 | 1 | Phase A |
| SC-01 | 53 | A-MH-04 | 0.84 | 1 | Phase A |
| SC-02 | 0 | A-SW-01 | 0.27 | 1 | Phase A |
| SC-03 | 0 | A-SW-03 | 0.16 | 1 | Phase A |
| SC-04 | 0 | A-SW-07 | 0.58 | 1 | Phase A |
| SC-05 | 18 | SW-05 | 0.71 | 1 | Phase A |
| SC-06 | 98 | MH-01 | 0.62 | 1 | Phase A |
| SC-07 | 100 | SRD-10 | 0.87 | 0.5 | Phase A |
| SC-24 | 65 | SW-08 | 0.83 | 1 | Phase A |
| SC-09 | 56 | SMH-02 | 0.97 | 1 | Phase B |
| SC-10 | 100 | MH-03-S | 0.40 | 1 | Phase B |
| SC-11 | 100 | MH-04-S | 0.39 | 1 | Phase B |
| SC-12 | 100 | SRD-11N | 0.75 | 0.5 | Phase B |
| SC-14 | 100 | MH-07-S | 0.30 | 1 | Phase B |
| SC-15 | 100 | SRD-8,9 | 1.63 | 0.5 | Phase B |
| SC-22 | 100 | MH-13-S | 0.40 | 1 | Phase B |
| SC-23 | 100 | MH-14-S | 0.95 | 1 | Phase B |
| SC-25 | 100 | SMH-17 | 0.47 | 1 | Phase B |
| SC-27 | 38 | SMH-18 | 1.39 | 1 | Phase B |
| SC-28 | 79 | SMH-20 | 1.49 | 1 | Phase B |
| SC-48 | 100 | SRD-7 | 0.87 | 0.5 | Phase B |
| SC-29 | 7 | MH-21 | 2.89 | 1 | Runway |
| SC-30 | 56 | SW-06 | 4.37 | 1 | Runway |
| SC-33 | 77 | SW-10 | 1.45 | 1 | Runway |
| SC-13 | 100 | SRD-11S | 0.75 | 0.5 | Subject Area |
| SC-16 | 100 | MH-09-S | 0.56 | 1 | Subject Area |
| SC-17 | 76 | MH-11-S | 0.47 | 1 | Subject Area |
| SC-18 | 100 | MH-10 | 0.25 | 1 | Subject Area |
| SC-19 | 100 | SRD-5,6 | 1.42 | 0.5 | Subject Area |
| SC-20 | 94 | MH-12-S | 0.56 | 1 | Subject Area |
| SC-21 | 100 | SRD-4 | 1.42 | 0.5 | Subject Area |
| SC-26 | 100 | SRD-3 | 1.17 | 0.5 | Subject Area |
| SC-31 | 88 | SMH-26 | 0.59 | 1 | Subject Area |
| SC-32 | 100 | SMH-25 | 0.48 | 1 | Subject Area |

**Table F3: Catchment Parameters – Existing Condition**

| Name | Imperv. (%) | Outlet | Area (ha) | Slope (%) | Description |
|---|---|---|---|---|---|
| SC-34 | 82 | SMH-30 | 0.84 | 1 | Subject Area |
| SC-35 | 100 | SRD-Stores | 0.35 | 0.5 | Subject Area |
| SC-36 | 92 | MH-32 | 0.71 | 1 | Subject Area |
| SC-37 | 96 | SMH-33 | 0.21 | 1 | Subject Area |
| SC-38 | 100 | SRD-12 | 0.75 | 0.5 | Subject Area |
| SC-39 | 82 | SMH-34 | 0.45 | 1 | Subject Area |
| SC-40 | 47 | MH-38 | 0.40 | 1 | Subject Area |
| SC-41 | 100 | MH-15 | 0.37 | 1 | Subject Area |
| SC-42 | 100 | MH-48 | 0.52 | 1 | Subject Area |
| SC-43 | 100 | MH-44 | 0.25 | 1 | Subject Area |
| SC-44 | 100 | MH-39 | 0.29 | 1 | Subject Area |
| SC-45 | 92 | MH-40 | 0.18 | 1 | Subject Area |
| SC-46 | 100 | MH-47 | 0.79 | 1 | Subject Area |
| SC-47 | 98 | MH-42 | 0.50 | 1 | Subject Area |
| SC-49 | 100 | SMH-17 | 0.33 | 1 | Subject Area |
| SC-50 | 100 | MH-23 | 0.74 | 1 | Subject Area |
| SC-51 | 100 | MH-26 | 0.27 | 1 | Subject Area |
| SC-52 | 100 | MH-35 | 0.19 | 0.5 | Subject Area |
| SC-53 | 76 | SMH-51 | 0.49 | 1 | Subject Area |
| SC-54 | 78 | MH-28 | 0.16 | 1 | Subject Area |
| SC-55 | 100 | MH-06 | 0.62 | 1 | Subject Area |
| SC-56 | 100 | SRD-Safety | 0.30 | 0.5 | Subject Area |
| SC-57 | 84 | SRD-Admin | 0.63 | 0.5 | Subject Area |
| SC-58 | 94 | SRD-1,2 | 0.85 | 0.5 | Subject Area |
| SC-59 | 100 | MH-45 | 0.34 | 1 | Subject Area |
| SC-60 | 100 | MH-46 | 0.34 | 1 | Subject Area |
| SC-61 | 100 | MH-37 | 0.40 | 1 | Subject Area |
| SC-62 | 100 | MH-49 | 0.14 | 1 | Subject Area |
| SC-63 | 91 | MH-29 | 0.54 | 1 | Subject Area |

**Table F4: Catchment Parameters – Proposed Condition**

| Name | Imperv. (%) | Outlet | Area (ha) | Slope (%) | Description | |
|---|---|---|---|---|---|---|
| A-SC-01 | 71 | A-SC-02 | 0.17 | 0.5 | Phase A | External |
| A-SC-02 | 100 | A-MH-02 | 0.37 | 0.5 | Phase A | External |
| A-SC-03 | 71 | A-SC-04 | 0.17 | 0.5 | Phase A | External |
| A-SC-04 | 100 | A-MH-03 | 0.36 | 0.5 | Phase A | External |
| A-SC-05 | 73 | A-MH-07 | 0.63 | 0.5 | Phase A | External |
| A-SC-06 | 71 | A-SC-07 | 0.17 | 0.5 | Phase A | External |
| A-SC-07 | 100 | A-MH-11 | 0.37 | 0.5 | Phase A | External |
| A-SC-08 | 71 | A-SC-09 | 0.17 | 0.5 | Phase A | External |
| A-SC-09 | 100 | A-MH-12 | 0.37 | 0.5 | Phase A | External |
| A-SC-10 | 54 | A-SW-01 | 0.61 | 1 | Phase A | External |
| A-SC-11 | 62 | A-MH-01 | 0.11 | 1 | Phase A | External |
| A-SC-12 | 50 | A-SW-03 | 0.35 | 1 | Phase A | External |
| A-SC-13 | 92 | A-MH-05 | 0.44 | 1 | Phase A | External |
| A-SC-14 | 94 | A-MH-06 | 0.37 | 1 | Phase A | External |
| A-SC-15 | 83 | A-MH-08 | 0.75 | 1 | Phase A | External |
| A-SC-16 | 48 | A-SW-05 | 0.43 | 1 | Phase A | External |
| A-SC-17 | 6 | A-SW-07 | 0.17 | 1 | Phase A | External |
| A-SC-18 | 100 | A-MH-09 | 0.83 | 1 | Phase A | External |
| A-SC-19 | 77 | A-SW-09 | 0.35 | 1 | Phase A | External |
| A-SC-20 | 92 | A-MH-13 | 0.20 | 1 | Phase A | External |
| A-SC-21 | 79 | A-MH-15 | 0.43 | 1 | Phase A | External |
| EX_AncasterN_1 | 3 | HMH-11-S | 0.07 | 0.5 | EX Ancaster Neighbourhood | External |
| Ex_AncasterN_2 | 75 | HMH-13-S | 0.59 | 0.5 | EX Ancaster Neighbourhood | External |
| EX_FSC | 100 | SRD-Safety | 1.05 | 1 | EX | External |
| EX_Robert_Leek_Park | 3 | OF-ROW-East-2 | 0.38 | 1 | EX | External |
| H1-1 | 100 | SRD-Stores | 0.33 | 0.5 | EX | External |
| H1-2_1 | 100 | HMH-38-S | 0.14 | 0.5 | EX | External |
| H1-2_2 | 3 | HMH-37-S | 0.14 | 0.5 | EX | External |
| H1-3 | 92 | HMH-32-S | 0.13 | 1 | EX | External |
| H1-4 | 47 | hmh-30-S | 0.15 | 1 | EX | External |
| H1-5 | 84 | SRD-Admin | 0.63 | 0.5 | EX | External |
| H1-6 | 94 | SRD-1,2 | 0.85 | 0.5 | EX | External |
| H1-7 | 100 | SRD-3 | 1.15 | 0.5 | EX | External |
| H1-8 | 100 | SRD-4 | 1.27 | 0.5 | EX | External |
| H1-9 | 100 | SRD-5,6 | 1.51 | 0.5 | EX | External |
| SC-01 | 53 | A-MH-04 | 0.83 | 1 | Phase A | External |
| SC-02 | 75 | A-SW-01 | 0.27 | 1 | Phase A | External |
| SC-03 | 75 | A-SW-03 | 0.16 | 1 | Phase A | External |
| SC-04 | 75 | A-SW-07 | 2.30 | 1 | Phase A | External |
| SC-05 | 18 | SW-05 | 0.71 | 1 | Phase A | External |
| SC-06 | 98 | MH-01 | 0.62 | 1 | Phase A | External |
| SC-07 | 100 | SRD-10 | 0.87 | 0.5 | Phase A | External |
| SC-09 | 56 | SMH-02 | 0.89 | 1 | External 3 | External |
| SC-10 | 100 | MH-03-S | 0.40 | 1 | External 3 | External |
| SC-11 | 100 | MH-04-S | 0.39 | 1 | External 3 | External |
| SC-12 | 100 | SRD-11N | 0.75 | 0.5 | External 3 | External |
| SC-13 | 100 | MH-07 | 0.18 | 0.5 | External 3 | External |

**Table F4: Catchment Parameters – Proposed Condition**

| Name | Imperv. (%) | Outlet | Area (ha) | Slope (%) | Description | |
|---|---|---|---|---|---|---|
| SC-14 | 100 | MH-07 | 0.17 | 1 | External 3 | External |
| SC-15 | 100 | SRD-8,9 | 1.63 | 0.5 | External 3 | External |
| SC-17 | 76 | SC-13 | 0.03 | 1 | External 3 | External |
| SC-21 | 38 | HMH-1-S | 0.17 | 1 | External | External |
| SC-22 | 100 | MH-13-S | 0.40 | 1 | External 2 | External |
| SC-23 | 100 | MH-14-S | 0.86 | 1 | External 2 | External |
| SC-25 | 100 | SMH-17 | 0.28 | 1 | External 2 | External |
| SC-27 | 38 | SMH-18 | 1.38 | 1 | External 1 | External |
| SC-28 | 79 | MH-18 | 0.25 | 1 | External 1 | External |
| SC-29 | 7 | MH-21 | 3.31 | 1 | External 1 | External |
| SC-30 | 56 | SW-06 | 3.82 | 1 | External 1 | External |
| SC-33 | 77 | SW-10 | 1.44 | 1 | External 1 | External |
| SC-48 | 100 | SRD-7 | 0.87 | 0.5 | External 2 | External |
| Ancaster_Rd_1 | 75 | HMH-8-S | 0.09 | 0.5 | Public ROW | Subject Area |
| Ancaster_Rd_2 | 75 | HMH-10-S | 0.20 | 0.5 | Public ROW | Subject Area |
| Block_A1 | 75 | SU13 | 0.63 | 2 | Block | Subject Area |
| Block_A2 | 75 | SU11 | 0.54 | 2 | Block | Subject Area |
| Block_A3 | 75 | SU12 | 1.14 | 2 | Block | Subject Area |
| Block_A4 | 75 | SU10 | 0.60 | 2 | Block | Subject Area |
| Block_H2 | 75 | SRD-11S | 1.10 | 2 | Block | Subject Area |
| Block_V1 | 75 | SU6 | 0.72 | 2 | Block | Subject Area |
| Block_V2 | 75 | SU7 | 0.34 | 2 | Block | Subject Area |
| Block_V3 | 75 | SU9 | 0.27 | 2 | Block | Subject Area |
| Block_V4 | 75 | SU8 | 0.32 | 2 | Block | Subject Area |
| Block_V5 | 75 | SU2 | 0.68 | 2 | Block | Subject Area |
| Block_V6 | 75 | SU3 | 0.66 | 2 | Block | Subject Area |
| Block_V7 | 75 | SU4 | 1.30 | 2 | Block | Subject Area |
| Block_V8 | 75 | SU5 | 0.39 | 2 | Block | Subject Area |
| Downsview_Park_Bridge | 0 | Studio_Gate | 0.33 | 1 | Public Park | Subject Area |
| Garratt_Blvd | 75 | HMH-27-S | 0.17 | 0.5 | Public ROW | Subject Area |
| Gilley_Rd | 75 | GMH-1-S | 0.14 | 0.5 | Public ROW | Subject Area |
| Gilley_Rd_3 | 75 | HMH-35-S | 0.06 | 0.5 | Public ROW | Subject Area |
| Gilley_Rd_5 | 75 | GMH-3-S | 0.05 | 0.5 | Public ROW | Subject Area |
| Hangar_St | 75 | HMH-26-S | 0.12 | 0.5 | Public ROW | Subject Area |
| Hangar_St_1 | 75 | HMH-20-S | 0.15 | 0.5 | Public ROW | Subject Area |
| Hangar_St_2 | 75 | HMH-22-S | 0.23 | 0.5 | Public ROW | Subject Area |
| Hangar_St_3 | 75 | HMH-24-S | 0.10 | 0.5 | Public ROW | Subject Area |
| Hangar_St_4 | 75 | HMH-25-S | 0.05 | 0.5 | Public ROW | Subject Area |
| Hanover_Rd_1 | 75 | HMH-6-S | 0.12 | 0.5 | Public ROW | Subject Area |
| Hanover_Rd_2 | 75 | HMH-6-S | 0.22 | 0.5 | Public ROW | Subject Area |
| Hanover_Rd_3 | 75 | HMH-4-S | 0.21 | 0.5 | Public ROW | Subject Area |
| Home_Rd_1 | 75 | HMH-16-S | 0.09 | 0.5 | Public ROW | Subject Area |
| Home_Rd_2 | 75 | hmh-17-S | 0.12 | 0.5 | Public ROW | Subject Area |
| Murray_Ext_1 | 75 | HMH-33-S | 0.17 | 0.5 | Public ROW | Subject Area |
| Murray_Ext_2 | 75 | HMH-36-S | 0.21 | 0.5 | Public ROW | Subject Area |
| New_Ancaster_Park | 0 | Garrat-Park-Storage | 0.52 | 1 | Public Park | Subject Area |
| Private_L-1 | 75 | SU28 | 0.08 | 0.5 | P-RD | Subject Area |
| Private_L-2 | 75 | HMH-8 | 0.09 | 0.5 | P-RD | Subject Area |
| Private_L-3 | 75 | SU19 | 0.20 | 0.5 | P-RD | Subject Area |

**Table F4: Catchment Parameters – Proposed Condition**

| Name | Imperv. (%) | Outlet | Area (ha) | Slope (%) | Description | |
|---|---|---|---|---|---|---|
| Private_L-4 | 75 | SU16 | 0.04 | 0.5 | P-RD | Subject Area |
| Private_L-5 | 75 | SU15 | 0.15 | 0.5 | P-RD | Subject Area |
| Private_L-6_1 | 75 | SU20 | 0.08 | 0.5 | P-RD | Subject Area |
| Private_L-6_2 | 75 | SU21 | 0.13 | 0.5 | P-RD | Subject Area |
| Private_L-7 | 75 | SU27 | 0.10 | 0.5 | P-RD | Subject Area |
| P-Studio_St_1 | 75 | SU23 | 0.20 | 0.5 | P-RD | Subject Area |
| P-Studio_St_2 | 75 | SU22 | 0.08 | 0.5 | P-RD | Subject Area |
| P-Studio_St_3 | 75 | SU22 | 0.11 | 0.5 | P-RD | Subject Area |
| P-West_St_1 | 75 | SU24 | 0.29 | 0.5 | P-RD | Subject Area |
| P-West_St_2 | 75 | SU25 | 0.36 | 0.5 | P-RD | Subject Area |
| P-West_St_3 | 75 | SU26 | 0.25 | 0.5 | P-RD | Subject Area |
| Rail_Park | 0 | MH-43-S | 0.43 | 0.5 | Public Park | Subject Area |
| SC-24 | 65 | SW-08 | 0.83 | 1 | Phase A | External |
| South_St_1 | 75 | HMH-32-S | 0.25 | 0.5 | Public ROW | Subject Area |
| South_St_2 | 75 | HMH-39-S | 0.19 | 0.5 | Public ROW | Subject Area |
| South_St_3 | 75 | HMH-39-S | 0.18 | 0.5 | Public ROW | Subject Area |
| Studio_Gate | 0 | HMH-1-S | 0.12 | 1 | Public Park | Subject Area |
| Studio_St_1 | 75 | HMH-19-S | 0.09 | 0.5 | Public ROW | Subject Area |
| Studio_St_2 | 75 | HMH-1-S | 0.13 | 0.5 | Public ROW | Subject Area |
| Studio_St_3 | 75 | HMH-2-S | 0.12 | 0.5 | Public ROW | Subject Area |
| Taxiway_1 | 75 | SU17 | 0.10 | 0.5 | P-RD | Subject Area |
| Taxiway_2 | 75 | SU14 | 0.33 | 0.5 | P-RD | Subject Area |
| The_Plaza | 3 | SU14 | 0.13 | 0.5 | Block | Subject Area |

Note:
1. Proposed Parks are assumed to be 100% pervious
2. Remaining Proposed Areas are assumed to be 75% impervious
3. The imperviousness will be updated as design progress

**Table D5: Run-off Results for AES 6hr 15min Interval 100-year Storm – Existing Condition**

| Subcatchments | Area (ha) | Slope (%) | Imperv. (%) | Precipitation (mm) | Runoff Volume (ML) | Peak Runoff (L/s) | Description |
|---|---|---|---|---|---|---|---|
| A-SC-01 | 0.17 | 0.50 | 71 | 80.31 | 0.12 | 33.63 | Phase A |
| A-SC-02 | 0.37 | 0.50 | 100 | 80.31 | 0.42 | 108.61 | Phase A |
| A-SC-03 | 0.17 | 0.50 | 71 | 80.31 | 0.13 | 33.89 | Phase A |
| A-SC-04 | 0.36 | 0.50 | 100 | 80.31 | 0.42 | 108.71 | Phase A |
| A-SC-05 | 0.63 | 0.50 | 73 | 80.31 | 0.47 | 127.05 | Phase A |
| A-SC-06 | 0.17 | 0.50 | 71 | 80.31 | 0.13 | 33.97 | Phase A |
| A-SC-07 | 0.37 | 0.50 | 100 | 80.31 | 0.42 | 109.13 | Phase A |
| A-SC-08 | 0.17 | 0.50 | 71 | 80.31 | 0.12 | 33.54 | Phase A |
| A-SC-09 | 0.37 | 0.50 | 100 | 80.31 | 0.42 | 108.42 | Phase A |
| A-SC-10 | 0.61 | 1.00 | 54 | 80.31 | 0.43 | 121.68 | Phase A |
| A-SC-11 | 0.11 | 1.00 | 62 | 80.31 | 0.08 | 22.16 | Phase A |
| A-SC-12 | 0.35 | 1.00 | 50 | 80.31 | 0.25 | 70.45 | Phase A |
| A-SC-13 | 0.44 | 1.00 | 92 | 80.31 | 0.34 | 89.68 | Phase A |
| A-SC-14 | 0.37 | 1.00 | 94 | 80.31 | 0.29 | 75.74 | Phase A |
| A-SC-15 | 0.75 | 1.00 | 83 | 80.31 | 0.58 | 153.65 | Phase A |
| A-SC-16 | 0.43 | 1.00 | 48 | 80.31 | 0.31 | 87.57 | Phase A |
| A-SC-17 | 0.17 | 1.00 | 6 | 80.31 | 0.11 | 34.17 | Phase A |
| A-SC-18 | 0.83 | 1.00 | 100 | 80.31 | 0.66 | 170.14 | Phase A |
| A-SC-19 | 0.35 | 1.00 | 77 | 80.31 | 0.26 | 70.41 | Phase A |
| A-SC-20 | 0.20 | 1.00 | 92 | 80.31 | 0.15 | 40.03 | Phase A |
| A-SC-21 | 0.43 | 1.00 | 79 | 80.31 | 0.33 | 88.38 | Phase A |
| SC-01 | 0.84 | 1.00 | 53 | 80.31 | 0.60 | 160.24 | Phase A |
| SC-02 | 0.27 | 1.00 | 0 | 80.31 | 0.17 | 53.35 | Phase A |
| SC-03 | 0.16 | 1.00 | 0 | 80.31 | 0.10 | 30.71 | Phase A |
| SC-04 | 0.58 | 1.00 | 0 | 80.31 | 0.35 | 87.36 | Phase A |
| SC-05 | 0.71 | 1.00 | 18 | 80.31 | 0.46 | 136.52 | Phase A |
| SC-06 | 0.62 | 1.00 | 98 | 80.31 | 0.49 | 126.27 | Phase A |
| SC-07 | 0.87 | 0.50 | 100 | 80.31 | 0.69 | 178.22 | Phase A |
| SC-24 | 0.83 | 1.00 | 65 | 80.31 | 0.61 | 166.00 | Phase A |
| SC-09 | 0.97 | 1.00 | 56 | 80.31 | 0.69 | 182.32 | Phase B |
| SC-10 | 0.40 | 1.00 | 100 | 80.31 | 0.32 | 81.82 | Phase B |
| SC-11 | 0.39 | 1.00 | 100 | 80.31 | 0.31 | 80.96 | Phase B |
| SC-12 | 0.75 | 0.50 | 100 | 80.31 | 0.60 | 154.24 | Phase B |
| SC-14 | 0.30 | 1.00 | 100 | 80.31 | 0.24 | 61.36 | Phase B |
| SC-15 | 1.63 | 0.50 | 100 | 80.31 | 1.30 | 334.83 | Phase B |
| SC-22 | 0.40 | 1.00 | 100 | 80.31 | 0.32 | 82.57 | Phase B |
| SC-23 | 0.95 | 1.00 | 100 | 80.31 | 0.76 | 194.57 | Phase B |
| SC-25 | 0.47 | 1.00 | 100 | 80.31 | 0.37 | 95.90 | Phase B |
| SC-27 | 1.39 | 1.00 | 38 | 80.31 | 0.95 | 267.84 | Phase B |
| SC-28 | 1.49 | 1.00 | 79 | 80.31 | 1.13 | 301.15 | Phase B |
| SC-48 | 0.87 | 0.50 | 100 | 80.31 | 0.69 | 178.65 | Phase B |
| SC-29 | 2.89 | 1.00 | 7 | 80.31 | 1.63 | 243.28 | Runway |
| SC-30 | 4.37 | 1.00 | 56 | 80.31 | 3.16 | 857.04 | Runway |
| SC-33 | 1.45 | 1.00 | 77 | 80.31 | 1.09 | 294.13 | Runway |
| SC-13 | 0.75 | 0.50 | 100 | 80.31 | 0.59 | 152.88 | Subject Area |
| SC-16 | 0.56 | 1.00 | 100 | 80.31 | 0.45 | 114.80 | Subject Area |
| SC-17 | 0.47 | 1.00 | 76 | 80.31 | 0.36 | 95.04 | Subject Area |
| SC-18 | 0.25 | 1.00 | 100 | 80.31 | 0.20 | 51.72 | Subject Area |
| SC-19 | 1.42 | 0.50 | 100 | 80.31 | 1.13 | 290.65 | Subject Area |
| SC-20 | 0.56 | 1.00 | 94 | 80.31 | 0.44 | 115.57 | Subject Area |
| SC-21 | 1.42 | 0.50 | 100 | 80.31 | 1.14 | 292.31 | Subject Area |
| SC-26 | 1.17 | 0.50 | 100 | 80.31 | 0.93 | 238.97 | Subject Area |
| SC-31 | 0.59 | 1.00 | 88 | 80.31 | 0.46 | 120.20 | Subject Area |
| SC-32 | 0.48 | 1.00 | 100 | 80.31 | 0.38 | 98.63 | Subject Area |
| SC-34 | 0.84 | 1.00 | 82 | 80.31 | 0.65 | 171.87 | Subject Area |
| SC-35 | 0.35 | 0.50 | 100 | 80.31 | 0.28 | 71.25 | Subject Area |
| SC-36 | 0.71 | 1.00 | 92 | 80.31 | 0.56 | 145.83 | Subject Area |
| SC-37 | 0.21 | 1.00 | 96 | 80.31 | 0.17 | 42.80 | Subject Area |
| SC-38 | 0.75 | 0.50 | 100 | 80.31 | 0.60 | 154.28 | Subject Area |

**Table D5: Run-off Results for AES 6hr 15min Interval 100-year Storm – Existing Condition**

| Subcatchments | Area (ha) | Slope (%) | Imperv. (%) | Precipitation (mm) | Runoff Volume (ML) | Peak Runoff (L/s) | Description |
|---|---|---|---|---|---|---|---|
| SC-39 | 0.45 | 1.00 | 82 | 80.31 | 0.35 | 92.38 | Subject Area |
| SC-40 | 0.40 | 1.00 | 47 | 80.31 | 0.28 | 79.37 | Subject Area |
| SC-41 | 0.37 | 1.00 | 100 | 80.31 | 0.30 | 76.06 | Subject Area |
| SC-42 | 0.52 | 1.00 | 100 | 80.31 | 0.42 | 107.58 | Subject Area |
| SC-43 | 0.25 | 1.00 | 100 | 80.31 | 0.20 | 51.06 | Subject Area |
| SC-44 | 0.29 | 1.00 | 100 | 80.31 | 0.23 | 58.61 | Subject Area |
| SC-45 | 0.18 | 1.00 | 92 | 80.31 | 0.14 | 36.91 | Subject Area |
| SC-46 | 0.79 | 1.00 | 100 | 80.31 | 0.63 | 161.96 | Subject Area |
| SC-47 | 0.50 | 1.00 | 98 | 80.31 | 0.40 | 102.59 | Subject Area |
| SC-49 | 0.33 | 1.00 | 100 | 80.31 | 0.26 | 67.70 | Subject Area |
| SC-50 | 0.74 | 1.00 | 100 | 80.31 | 0.59 | 151.00 | Subject Area |
| SC-51 | 0.27 | 1.00 | 100 | 80.31 | 0.22 | 56.33 | Subject Area |
| SC-52 | 0.19 | 0.50 | 100 | 80.31 | 0.15 | 38.40 | Subject Area |
| SC-53 | 0.49 | 1.00 | 76 | 80.31 | 0.37 | 98.86 | Subject Area |
| SC-54 | 0.16 | 1.00 | 78 | 80.31 | 0.12 | 32.35 | Subject Area |
| SC-55 | 0.62 | 1.00 | 100 | 80.31 | 0.49 | 127.09 | Subject Area |
| SC-56 | 0.30 | 0.50 | 100 | 80.31 | 0.24 | 60.64 | Subject Area |
| SC-57 | 0.63 | 0.50 | 84 | 80.31 | 0.49 | 128.54 | Subject Area |
| SC-58 | 0.85 | 0.50 | 94 | 80.31 | 0.67 | 173.69 | Subject Area |
| SC-59 | 0.34 | 1.00 | 100 | 80.31 | 0.27 | 69.84 | Subject Area |
| SC-60 | 0.34 | 1.00 | 100 | 80.31 | 0.27 | 69.88 | Subject Area |
| SC-61 | 0.40 | 1.00 | 100 | 80.31 | 0.32 | 82.70 | Subject Area |
| SC-62 | 0.14 | 1.00 | 100 | 80.31 | 0.11 | 28.05 | Subject Area |
| SC-63 | 0.54 | 1.00 | 91 | 80.31 | 0.43 | 111.43 | Subject Area |

**Table F6: Run-off Results for 6hr 100-year Storm – Proposed Condition**

| Subcatchments | Area (ha) | Slope (%) | Imperv. (%) | Precipitation (mm) | Runoff Volume (ML) | Peak Runoff (L/s) | Description |
|---|---|---|---|---|---|---|---|
| Block_A1 | 0.627362 | 2 | 75.00 | 80.31 | 0.47 | 127.72 | Block |
| Block_A2 | 0.540221 | 2 | 75.00 | 80.31 | 0.41 | 109.75 | Block |
| Block_A3 | 1.137728 | 2 | 75.00 | 80.31 | 0.85 | 230.18 | Block |
| Block_A4 | 0.602658 | 2 | 75.00 | 80.31 | 0.45 | 122.59 | Block |
| Block_H2 | 1.100195 | 2 | 75.00 | 80.31 | 0.83 | 223.42 | Block |
| Block_V1 | 0.72131 | 2 | 75.00 | 80.31 | 0.54 | 146.77 | Block |
| Block_V2 | 0.335655 | 2 | 75.00 | 80.31 | 0.25 | 68.35 | Block |
| Block_V3 | 0.273887 | 2 | 75.00 | 80.31 | 0.21 | 55.77 | Block |
| Block_V4 | 0.324081 | 2 | 75.00 | 80.31 | 0.24 | 65.98 | Block |
| Block_V5 | 0.678064 | 2 | 75.00 | 80.31 | 0.51 | 137.94 | Block |
| Block_V6 | 0.664644 | 2 | 75.00 | 80.31 | 0.5 | 135.1 | Block |
| Block_V7 | 1.29712 | 2 | 75.00 | 80.31 | 0.98 | 263.52 | Block |
| Block_V8 | 0.394207 | 2 | 75.00 | 80.31 | 0.3 | 80.25 | Block |
| The_Plaza | 0.126459 | 0.5 | 3 | 80.31 | 0.08 | 21.85 | Block |
| EX_FSC | 1.053137 | 1 | 99.97 | 80.31 | 0.84 | 215.84 | EX. Development |
| EX_Robert_Leek_Park | 0.379764 | 1 | 3.00 | 80.31 | 0.24 | 73.32 | EX. Development |
| H1-1 | 0.326135 | 0.5 | 100.00 | 80.31 | 0.26 | 66.93 | EX. Development |
| H1-2_1 | 0.142626 | 0.5 | 100.00 | 80.31 | 0.11 | 29.27 | EX. Development |
| H1-2_2 | 0.142626 | 0.50 | 3.00 | 80.31 | 0.09 | 27.43 | EX. Development |
| H1-3 | 0.127723 | 1 | 92.13 | 80.31 | 0.1 | 26.15 | EX. Development |
| H1-4 | 0.153393 | 1 | 46.74 | 80.31 | 0.11 | 30.93 | EX. Development |
| H1-5 | 0.629884 | 0.5 | 84.49 | 80.31 | 0.48 | 128.51 | EX. Development |
| H1-6 | 0.847748 | 0.50 | 94.18 | 80.31 | 0.67 | 173.64 | EX. Development |
| H1-7 | 1.15146 | 0.5 | 100.00 | 80.31 | 0.92 | 235.39 | EX. Development |
| H1-8 | 1.266877 | 0.5 | 100.00 | 80.31 | 1.01 | 259.9 | EX. Development |
| H1-9 | 1.513426 | 0.5 | 100.00 | 80.31 | 1.2 | 310.45 | EX. Development |
| EX_AncasterN_1 | 0.0661 | 0.5 | 3.00 | 80.31 | 0.04 | 12.99 | EX Ancaster Neighbourhood |
| Ex_AncasterN_2 | 0.5885 | 0.5 | 75.00 | 80.31 | 0.44 | 119.46 | EX Ancaster Neighbourhood |
| SC-21 | 0.170964 | 1 | 38.35 | 80.31 | 0.12 | 34.41 | External |
| SC-27 | 1.382003 | 1 | 38.35 | 80.31 | 0.95 | 265.89 | External 1 |
| SC-28 | 0.247026 | 1 | 79.12 | 80.31 | 0.19 | 50.37 | External 1 |
| SC-29 | 3.312725 | 1 | 7.48 | 80.31 | 1.86 | 275.98 | External 1 |
| SC-30 | 3.815226 | 1 | 56.05 | 80.31 | 2.75 | 752.96 | External 1 |
| SC-33 | 1.439775 | 1 | 76.79 | 80.31 | 1.09 | 292.76 | External 1 |
| SC-22 | 0.402361 | 1 | 99.60 | 80.31 | 0.32 | 82.56 | External 2 |
| SC-23 | 0.858033 | 1 | 100.00 | 80.31 | 0.68 | 176.08 | External 2 |
| SC-25 | 0.279884 | 1 | 100.00 | 80.31 | 0.22 | 57.43 | External 2 |
| SC-48 | 0.870444 | 0.5 | 100.00 | 80.31 | 0.69 | 178.56 | External 2 |
| SC-09 | 0.89494 | 1 | 55.53 | 80.31 | 0.64 | 170.31 | External 3 |
| SC-10 | 0.398616 | 1 | 100.00 | 80.31 | 0.32 | 81.8 | External 3 |
| SC-11 | 0.394446 | 1 | 100.00 | 80.31 | 0.31 | 80.95 | External 3 |
| SC-12 | 0.751491 | 0.5 | 100.00 | 80.31 | 0.6 | 154.19 | External 3 |
| SC-13 | 0.18109 | 0.5 | 100.00 | 80.31 | 0.16 | 42.4 | External 3 |
| SC-14 | 0.169232 | 1 | 100.00 | 80.31 | 0.13 | 34.73 | External 3 |
| SC-15 | 1.63145 | 0.5 | 100.00 | 80.31 | 1.29 | 334.69 | External 3 |
| SC-17 | 0.025694 | 1 | 76.26 | 80.31 | 0.02 | 5.24 | External 3 |
| A-SC-01 | 0.165532 | 0.5 | 71.31 | 80.31 | 0.12 | 33.61 | Phase A |
| A-SC-02 | 0.365657 | 0.5 | 100.00 | 80.31 | 0.41 | 108.59 | Phase A |
| A-SC-03 | 0.166855 | 0.5 | 71.49 | 80.31 | 0.13 | 33.88 | Phase A |
| A-SC-04 | 0.364846 | 0.5 | 100.00 | 80.31 | 0.41 | 108.7 | Phase A |
| A-SC-05 | 0.62557 | 0.5 | 72.54 | 80.31 | 0.47 | 127.03 | Phase A |
| A-SC-06 | 0.167318 | 0.5 | 70.96 | 80.31 | 0.13 | 33.97 | Phase A |
| A-SC-07 | 0.36653 | 0.5 | 100.00 | 80.31 | 0.42 | 109.13 | Phase A |
| A-SC-08 | 0.165133 | 0.5 | 70.93 | 80.31 | 0.12 | 33.53 | Phase A |
| A-SC-09 | 0.365148 | 0.5 | 100.00 | 80.31 | 0.41 | 108.4 | Phase A |
| A-SC-10 | 0.608331 | 1 | 53.54 | 80.31 | 0.44 | 121.66 | Phase A |
| A-SC-11 | 0.10931 | 1 | 62.05 | 80.31 | 0.08 | 22.16 | Phase A |
| A-SC-12 | 0.35015 | 1 | 50.31 | 80.31 | 0.25 | 70.48 | Phase A |
| A-SC-13 | 0.437941 | 1 | 92.27 | 80.31 | 0.34 | 89.66 | Phase A |
| A-SC-14 | 0.369646 | 1 | 94.49 | 80.31 | 0.29 | 75.74 | Phase A |
| A-SC-15 | 0.752837 | 1 | 82.52 | 80.31 | 0.58 | 153.61 | Phase A |
| A-SC-16 | 0.434756 | 1 | 47.52 | 80.31 | 0.31 | 87.62 | Phase A |
| A-SC-17 | 0.171465 | 1 | 6.16 | 80.31 | 0.11 | 34.16 | Phase A |

**Table F6: Run-off Results for 6hr 100-year Storm – Proposed Condition**

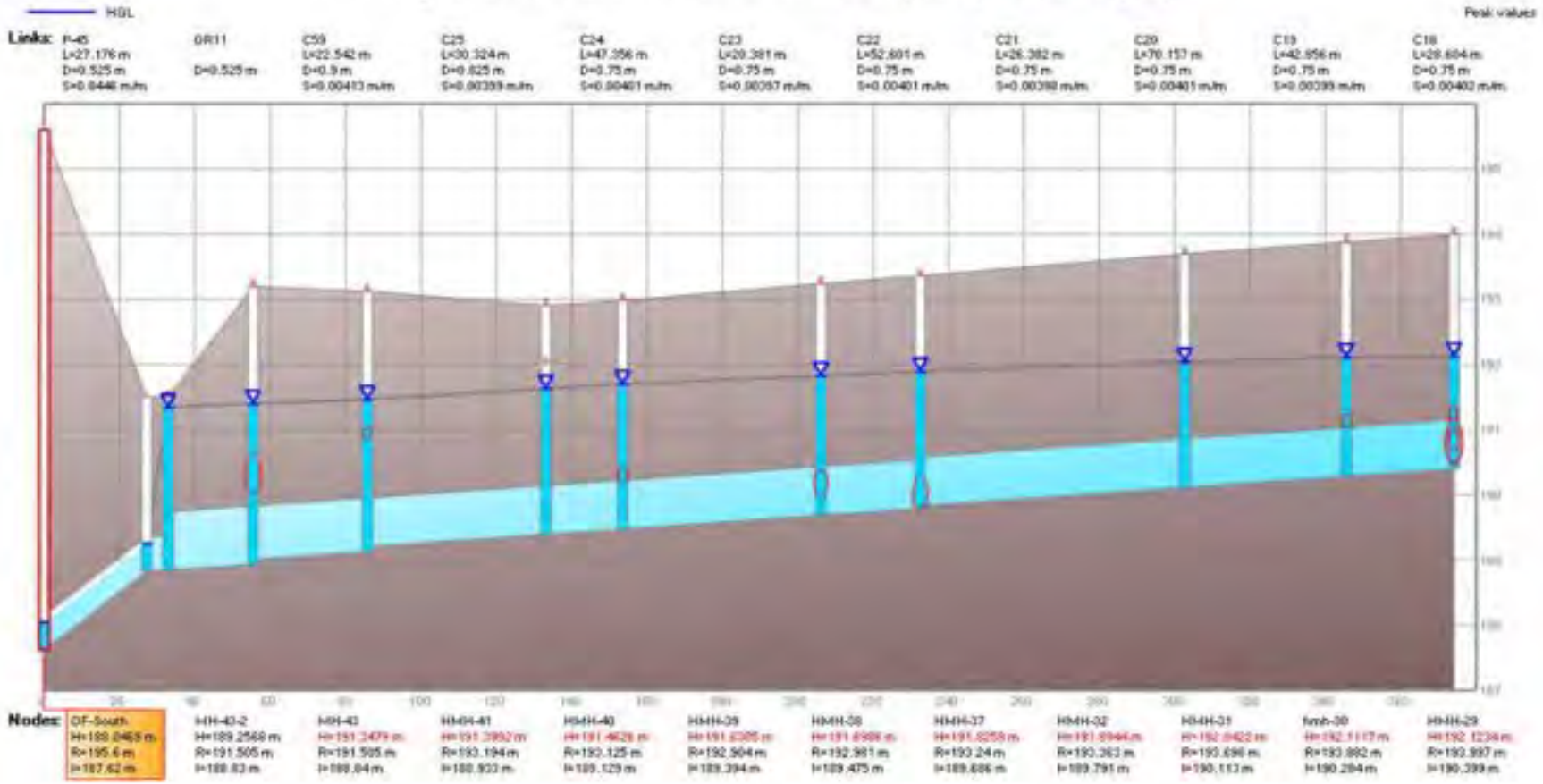
| Subcatchments | Area (ha) | Slope (%) | Imperv. (%) | Precipitation (mm) | Runoff Volume (ML) | Peak Runoff (L/s) | Description |
|---|---|---|---|---|---|---|---|
| A-SC-18 | 0.828915 | 1 | 99.82 | 80.31 | 0.66 | 170.1 | Phase A |
| A-SC-19 | 0.346141 | 1 | 76.56 | 80.31 | 0.26 | 70.48 | Phase A |
| A-SC-20 | 0.195471 | 1 | 92.12 | 80.31 | 0.15 | 40.03 | Phase A |
| A-SC-21 | 0.433619 | 1 | 78.71 | 80.31 | 0.33 | 88.36 | Phase A |
| SC-01 | 0.828926 | 1 | 53.13 | 80.31 | 0.59 | 159.15 | Phase A |
| SC-02 | 0.269657 | 1 | 75.00 | 80.31 | 0.2 | 54.93 | Phase A |
| SC-03 | 0.155372 | 1 | 75.00 | 80.31 | 0.12 | 31.65 | Phase A |
| SC-04 | 2.303886 | 1 | 75.00 | 80.31 | 1.72 | 436.14 | Phase A |
| SC-05 | 0.7082 | 1 | 18.22 | 80.31 | 0.47 | 136.49 | Phase A |
| SC-06 | 0.615522 | 1 | 98.08 | 80.31 | 0.49 | 126.25 | Phase A |
| SC-07 | 0.868295 | 0.5 | 100.00 | 80.31 | 0.69 | 178.12 | Phase A |
| SC-24 | 0.828513 | 1 | 65.42 | 80.31 | 0.61 | 165.98 | Phase A |
| Private_L-1 | 0.081203 | 0.5 | 75.00 | 80.31 | 0.06 | 16.45 | P-RD |
| Private_L-2 | 0.093031 | 0.5 | 75.00 | 80.31 | 0.07 | 18.82 | P-RD |
| Private_L-3 | 0.2017 | 0.5 | 75.00 | 80.31 | 0.15 | 39.83 | P-RD |
| Private_L-4 | 0.043756 | 0.5 | 75.00 | 80.31 | 0.03 | 8.9 | P-RD |
| Private_L-5 | 0.14589 | 0.5 | 75.00 | 80.31 | 0.11 | 29.21 | P-RD |
| Private_L-6_1 | 0.082975 | 0.5 | 75.00 | 80.31 | 0.06 | 16.81 | P-RD |
| Private_L-6_2 | 0.126741 | 0.5 | 75.00 | 80.31 | 0.1 | 25.48 | P-RD |
| Private_L-7 | 0.099465 | 0.5 | 75.00 | 80.31 | 0.07 | 20.1 | P-RD |
| P-Studio_St_1 | 0.198685 | 0.5 | 75.00 | 80.31 | 0.15 | 40.08 | P-RD |
| P-Studio_St_2 | 0.083032 | 0.5 | 75.00 | 80.31 | 0.06 | 16.88 | P-RD |
| P-Studio_St_3 | 0.107534 | 0.5 | 75.00 | 80.31 | 0.08 | 21.84 | P-RD |
| P-West_St_1 | 0.286599 | 0.5 | 75.00 | 80.31 | 0.22 | 57.63 | P-RD |
| P-West_St_2 | 0.362158 | 0.5 | 75.00 | 80.31 | 0.27 | 73.59 | P-RD |
| P-West_St_3 | 0.251723 | 0.5 | 75.00 | 80.31 | 0.19 | 50.36 | P-RD |
| Taxiway_1 | 0.103885 | 0.5 | 75 | 80.31 | 0.08 | 21.11 | P-RD |
| Taxiway_2 | 0.332487 | 0.5 | 75 | 80.31 | 0.25 | 65.98 | P-RD |
| Downsview_Park_Bridge | 0.328277 | 1 | 0.00 | 80.31 | 0.21 | 64.42 | Public Park |
| New_Ancaster_Par | 0.522012 | 1 | 0.00 | 80.31 | 0.33 | 95.73 | Public Park |
| Rail_Park | 0.432492 | 0.5 | 0.00 | 80.31 | 0.24 | 38.44 | Public Park |
| Studio_Gate | 0.121255 | 1 | 0 | 80.31 | 0.29 | 87.58 | Public Park |
| Ancaster_Rd_1 | 0.090862 | 0.5 | 75.00 | 80.31 | 0.07 | 18.47 | Public ROW |
| Ancaster_Rd_2 | 0.200049 | 0.5 | 75.00 | 80.31 | 0.15 | 40.35 | Public ROW |
| Garratt_Blvd | 0.17227 | 0.5 | 75.00 | 80.31 | 0.13 | 34.84 | Public ROW |
| Gilley_Rd | 0.1428 | 0.5 | 75.00 | 80.31 | 0.11 | 28.94 | Public ROW |
| Gilley_Rd_3 | 0.0611 | 0.5 | 75.00 | 80.31 | 0.05 | 12.43 | Public ROW |
| Gilley_Rd_5 | 0.0536 | 0.5 | 75.00 | 80.31 | 0.04 | 10.91 | Public ROW |
| Hangar_St | 0.122495 | 0.5 | 75.00 | 80.31 | 0.09 | 24.86 | Public ROW |
| Hangar_St_1 | 0.153215 | 0.5 | 75.00 | 80.31 | 0.12 | 31.03 | Public ROW |
| Hangar_St_2 | 0.229561 | 0.5 | 75.00 | 80.31 | 0.17 | 46.16 | Public ROW |
| Hangar_St_3 | 0.098593 | 0.5 | 75.00 | 80.31 | 0.07 | 20.04 | Public ROW |
| Hangar_St_4 | 0.052958 | 0.5 | 75.00 | 80.31 | 0.04 | 10.78 | Public ROW |
| Hanover_Rd_1 | 0.12176 | 0.5 | 75.00 | 80.31 | 0.09 | 24.73 | Public ROW |
| Hanover_Rd_2 | 0.218027 | 0.5 | 75.00 | 80.31 | 0.16 | 44.02 | Public ROW |
| Hanover_Rd_3 | 0.20618 | 0.5 | 75.00 | 80.31 | 0.16 | 41.67 | Public ROW |
| Home_Rd_1 | 0.085819 | 0.5 | 75.00 | 80.31 | 0.06 | 17.45 | Public ROW |
| Home_Rd_2 | 0.123196 | 0.5 | 75.00 | 80.31 | 0.09 | 25 | Public ROW |
| Murray_Ext_1 | 0.172041 | 0.5 | 75.00 | 80.31 | 0.13 | 34.79 | Public ROW |
| Murray_Ext_2 | 0.20856 | 0.5 | 75.00 | 80.31 | 0.16 | 42.03 | Public ROW |
| South_St_1 | 0.249969 | 0.5 | 75.00 | 80.31 | 0.19 | 50.14 | Public ROW |
| South_St_2 | 0.187626 | 0.5 | 75.00 | 80.31 | 0.14 | 37.89 | Public ROW |
| South_St_3 | 0.175839 | 0.5 | 75 | 80.31 | 0.13 | 35.55 | Public ROW |
| Studio_St_1 | 0.085848 | 0.5 | 75 | 80.31 | 0.06 | 17.46 | Public ROW |
| Studio_St_2 | 0.126879 | 0.5 | 75 | 80.31 | 0.1 | 25.74 | Public ROW |
| Studio_St_3 | 0.116534 | 0.5 | 75 | 80.31 | 0.09 | 23.66 | Public ROW |



Figure F3 Storm Sewer Profile - Home Road - Existing (AES 6hr 100-year)



Figure F4 Storm Sewer Profile - Home Road - Proposed (AES 6hr 100-year)



# Appendix G: Bombardier Letter Agreement

TORONTO SITE

**BOMBARDIER AEROSPACE**
123 GARRATT BLVD, TORONTO, ON, M3K 1Y5
TEL 416-633-7310
www.bombardier.com

BOMBARDIER
the evolution of mobility

November 13, 2015

City of Toronto
Engineering and Construction Services
Engineering Review
Development Engineering, North York District
North York Civic Centre
5100 Yonge Street, North York, Ontario
M2N 5V7

Attention: Mr. Doug Bleaney, P. Eng.
Manager, North York District

**Storm Discharge from Bombardier Aerospace Facility**
**to Stanley Greene Subdivision through existing 600mm Outlet**
**Bombardier Aerospace – Downsview Facility**
**Toronto (North York), Ontario**

Dear Mr. Bleaney,

We understand that the City of Toronto has stipulated as a condition of the Stanley Greene Subdivision approval that Bombardier Aerospace is to confirm the peak flow rate from the Bombardier Aerospace Facility being directed to the Stanley Greene Subdivision through the existing 600mm storm pipe under the Metrolinx Railway.

A Master Drainage Study was completed for the Bombardier Lands in March 2011 and during that study an InfoWorks CS model of the Bombardier Aerospace storm sewer system was developed. An analysis has been completed using this model with the proposed downstream storm sewers within the Stanley Greene Subdivision considered to be operating under the ultimate free flow condition with the 600mm storm sewer under the Metrolinx Railway operating under an outlet control condition.

The peak flow rate during the 100 year storm event under a surcharge condition through the existing 600mm storm pipe under the Metrolinx Railway to the Stanley Greene Subdivision storm sewer system has been determined as 1.10 cubic metres per second. The 2-year storm event through this same storm pipe has been calculated to be 0.711 cubic metres per second.

Furthermore, we understand that if a request is submitted by Bombardier Aerospace to increase the storm flow through the Stanley Greene Subdivision over and above 1.10 cubic metres per second in the future that it will need to be accompanied by a study to demonstrate the impact of the increased flows and that all costs for any necessary improvements will be borne entirely by Bombardier.

TORONTO SITE
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the evolution of mobility

Bombardier Aerospace understands and accepts that the 2-year design storm flow of 0.711 cubic metres per second is being used for sizing of the Stanley Greene storm sewer system but that there is capacity in the proposed storm sewer system to convey the 100-year storm flow of 1.10 cubic metres per second from the Bombardier Aerospace Facility 600mm outlet pipe.

We trust this is satisfactory.

Yours truly,

Kaushik Gupta, P. Eng, PMP, MBA
Manager, Engineering Services
Facilities & Site Development
Bombardier Aerospace

cc David Anselmi, Parc Downsview Park
Hasanka Attanapola, Bombardier
Anthony Di Stefano, exp Services Inc.
Martin Ennis, MMM Group

# Appendix H: Meeting Minutes for Infrastructure Workshop with City of Toronto




Northcrest
1st District
Working.Together.

# Taxiway West South Sub-District Infrastructure Workshop

February 7, 2022

Northcrest

ARUP

# Agenda

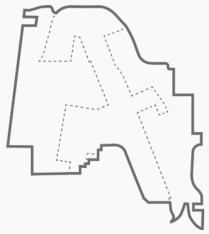
1. Project Overview
2. Sanitary Servicing
3. Water Servicing
4. Sanitary/Water Assumptions
5. Stormwater Management
6. Implementation of MESP Infrastructure

ARUP

# Project Overview

# Various Approval Processes are Underway

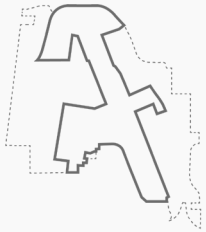
ARUP



City of Toronto

DASP Review

City of Toronto Review of Downsview Area Secondary Plan



Northcrest + CLC

id8Downsview OPA

id8Downsview Community Engagement

Developing a Vision for the Downsview Lands "Framework Plan"

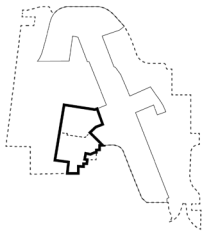
Official Plan Amendment (OPA) Application Submission

City of Toronto Review of Official Plan Amendment (OPA)

MAR 2020 – SEP 2021

SEP 2021

WE'RE HERE



Northcrest

1st District

1st District Community Engagement

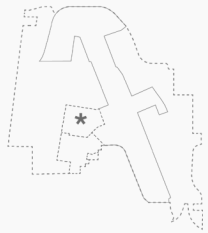
Developing 1st District Plan

1st District Plan Submission

City of Toronto Review of the 1st District Plan

NOV 2021 – MAY 2022

MAY 2022



Northcrest

Film Studios Site Plan Application

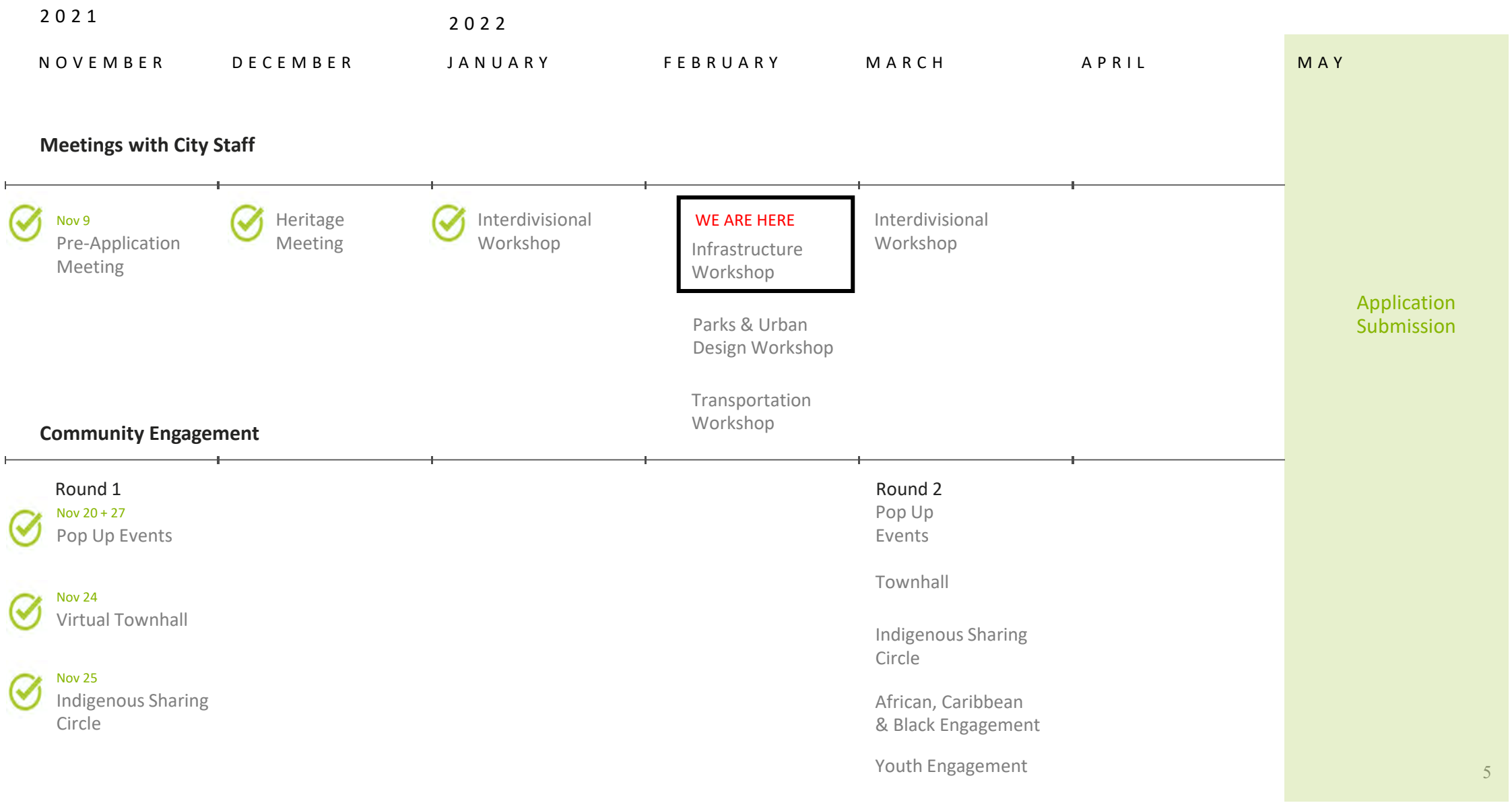
Site Plan Application for Film Studios

City of Toronto Review of Film Studio Site Plan

OCT 2021

# Next Steps

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# District Themes



JOBS AND OPPORTUNITIES



HOMES AND AMENITIES



WALKABLE AND CONNECTED



SUSTAINABLE AND HEALTHY



VIBRANT PUBLIC SPACES AND CULTURE

# Structuring Elements of the District

ARUP

01
Build off existing assets



02
Extend City Nature through the District



03
Re-weave the urban fabric



04
Introduce a fine-grained network of streets



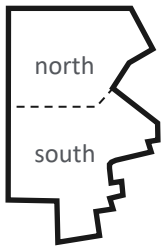
05
Establish district character areas



06
Create special, memorable places



# 1st District at a Glance




**2** sub-districts

**1** future film studio campus

**3** character areas

**4,300** residents

**6,500** direct jobs

**2.5 ha** open space




*This Demonstration Plan has been prepared for illustrative purposes only*

# Sanitary Servicing

## Proposed Strategy & Analysis Assumptions



# Proposed Sanitary Strategy

ARUP

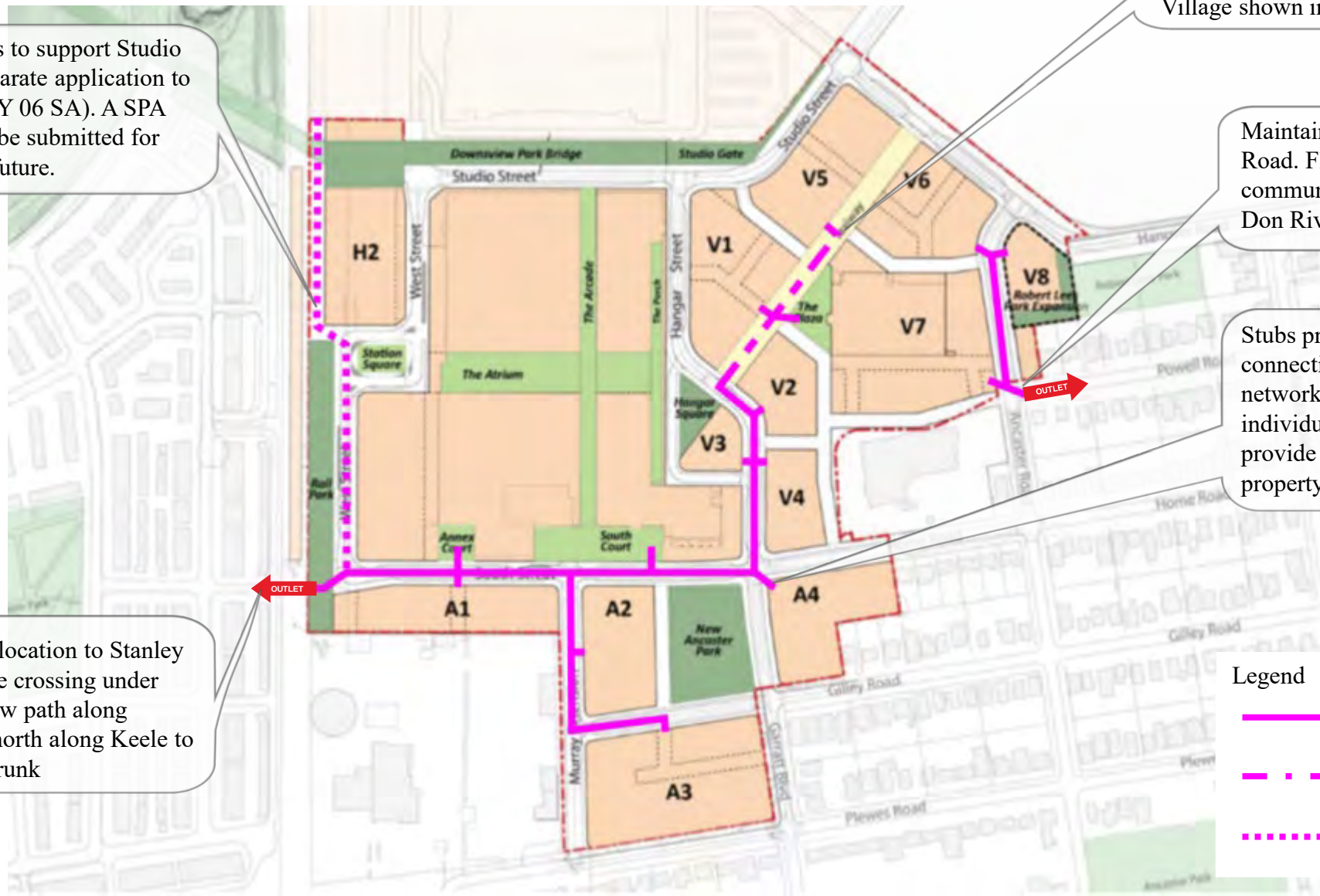
Proposed sanitary sewers to support Studio Campus are part of a separate application to the City (21-230911 NNY 06 SA). A SPA and minor variance will be submitted for the second phase in the future.

Sewers within Superblock under Taxiway to service blocks within the Village shown indicatively.

Maintain existing connection at Powell Road. Flow path through Ancaster community, along Wilson Ave, east to Don River (West Don Sewershed).

Stubs provided at proposed block connection locations. Internal sanitary network per block to be approved through individual SPA applications. Blocks to provide control manhole within block at property boundary

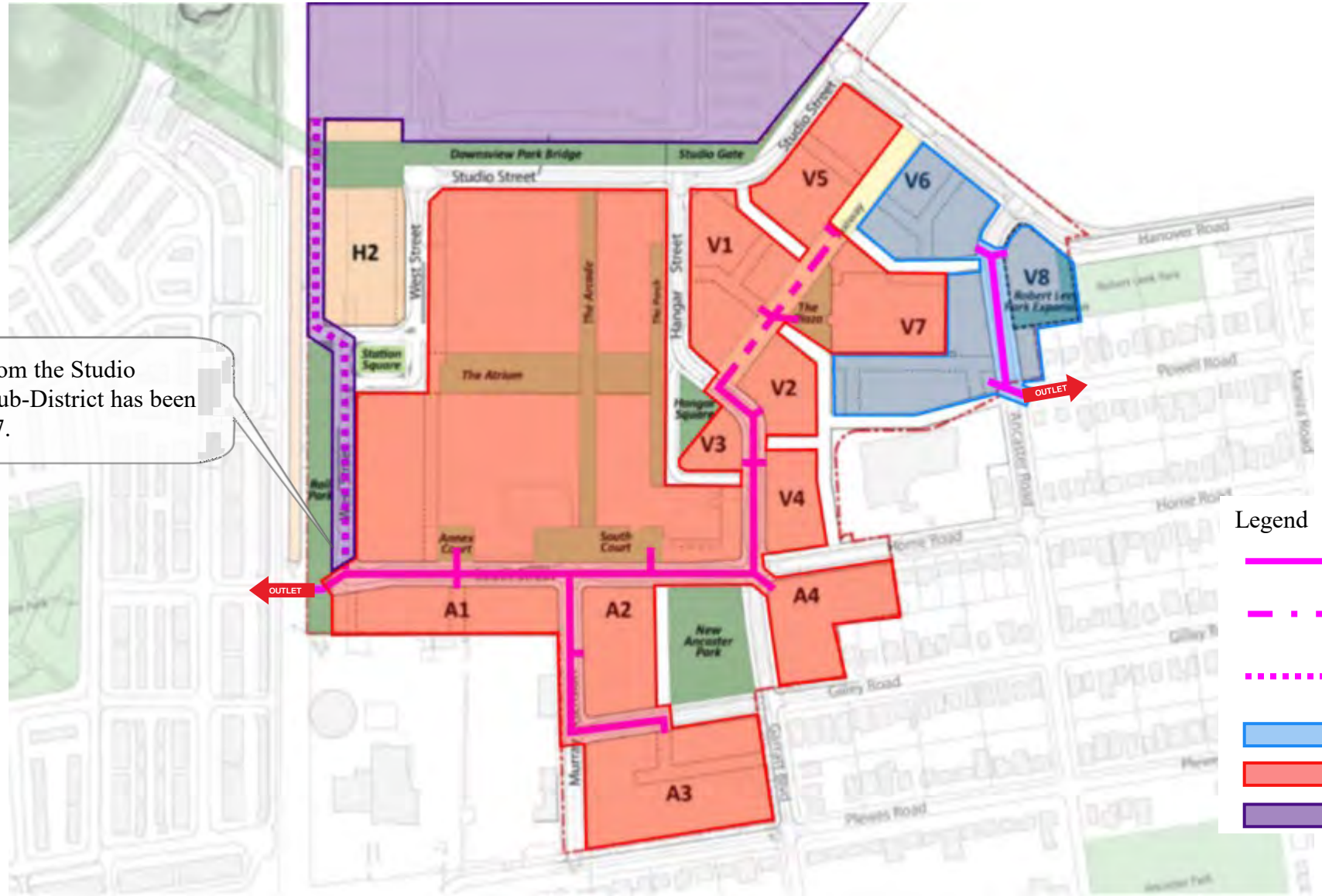
Maintain existing outlet location to Stanley Greene. Upgrades to pipe crossing under the railway required. Flow path along Downsview Park Blvd, north along Keele to Maryport Avenue Sub-Trunk



# Proposed Sanitary Catchments

ARUP

Allowance for flows from the Studio Campus in the North Sub-District has been made. Refer to Slide 17.



# Proposed Sanitary Design Requirements and Assumptions

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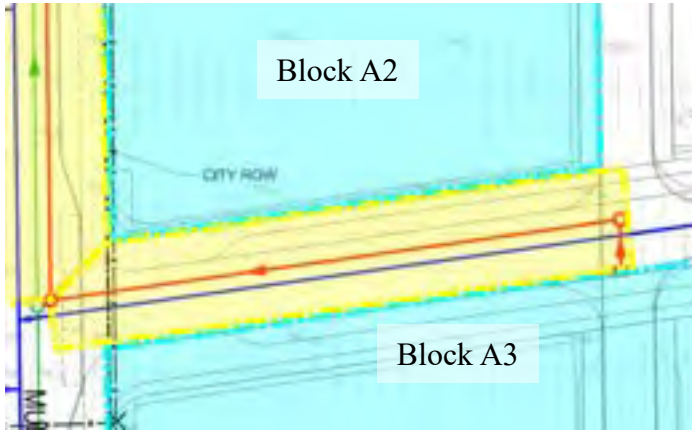
## Residential Flow

- Populations per DCSW Ch 2 Table 4
- Peaking Factor per Harmon Equation
- 450 L/capita/day for sizing new sewers
- 240 L/capita/day for downstream analysis

| Type | Population |
|---|---|
| Studio | 1.4 |
| 1 Bedroom | 1.4 |
| 2 Bedroom | 2.1 |
| 3 Bedroom | 3.1 |
| Townhouse | 2.7 |
| Hotel | 1 person/bed/30m2 GFA |

## Infiltration & Inflow

- 0.26 L/s/ha per block (blue)
- 0.26 L/s/ha along length of pipe in ROW width (yellow)




## Comm/Ind/Inst Flow

- 180,000 L/ floor ha/day including peaking factor
- Where GFA<Block Area, assumed floor area to be GFA
- Where GFA>Block Area, assumed floor area to be Block Area






# Flow Monitoring

ARUP



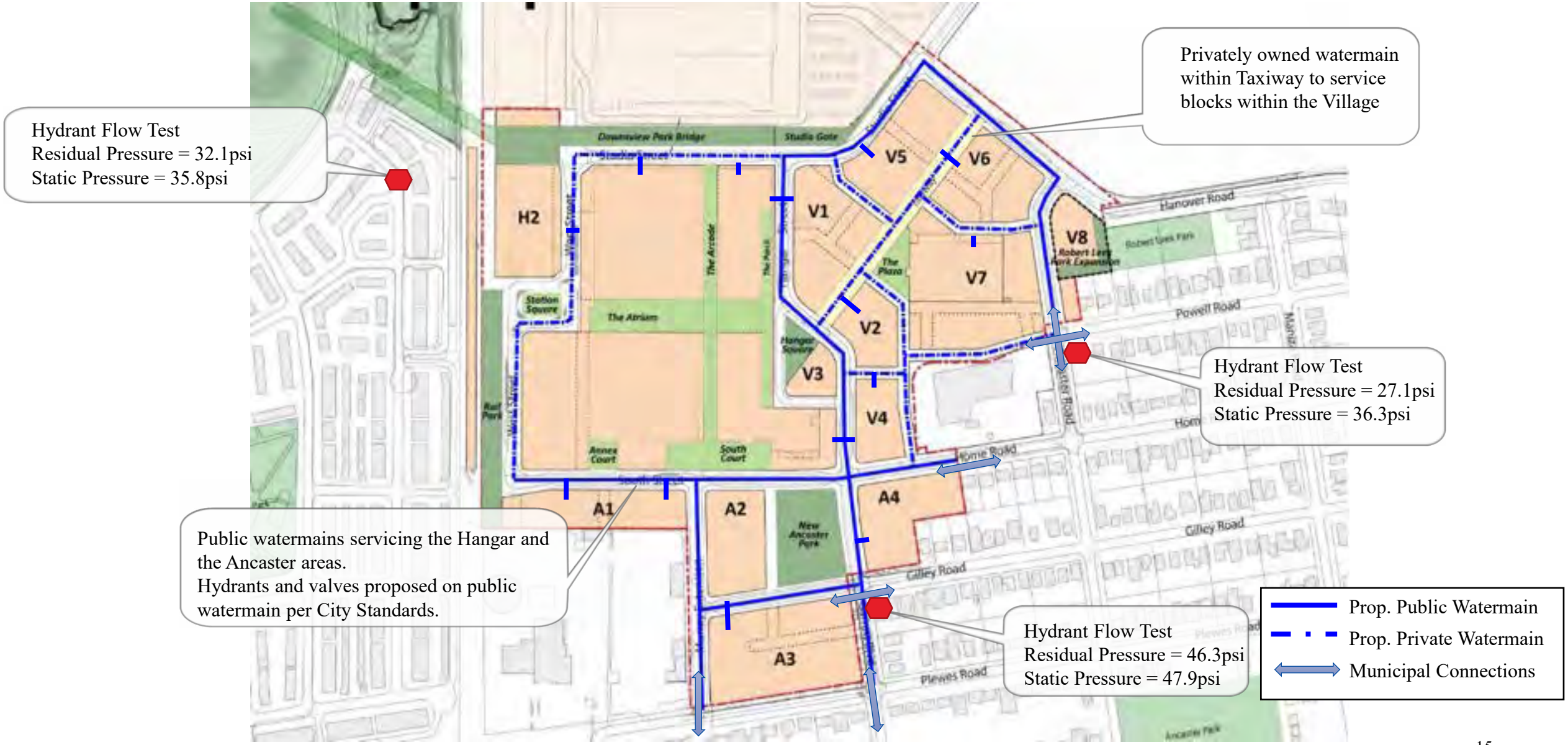
# Water Servicing

## Proposed Strategy & Analysis Assumptions



# Proposed Water Servicing Strategy

ARUP



# Proposed Water Servicing Design Criteria and Assumptions

ARUP

## Residential Average Day Demand

- Multi-unit: high rise or low-rise buildings - 190 L/ca/day
- Row housing – 310 L/ca/day
- Reference – Table 28, DCSW

## Comm/Ind/Inst Water Demand

- 180,000 L/ floor ha/day including peaking factor
- Where GFA<Block Area, assumed floor area to be GFA
- Where GFA>Block Area, assumed floor area to be Block Area
- Reference – Table 5, DCSW

## Fire Demand

- Will be estimated using Fire Underwriters Survey method.
- Assumed fire flow demand of 19,000 L/min.

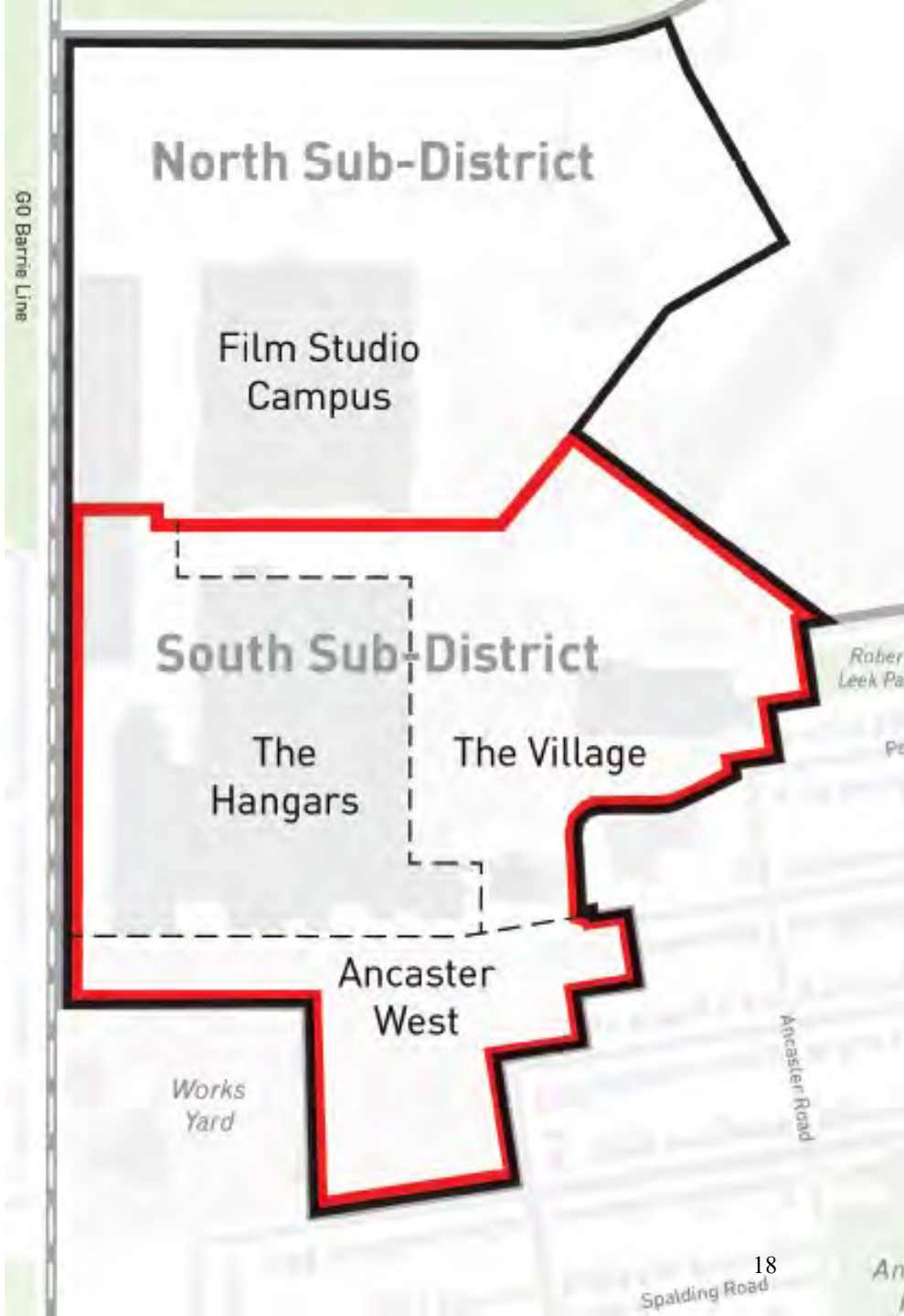
# Assumptions and Considerations

- North Sub-District (Film Studios) Design Assumptions
- Toronto Green Standards for Water Efficiency



# North Sub-District (Film Studios)

- A Site Plan Application has been submitted for first phase of the Film Studio Campus (21-230911 NNY 06 SA). A SPA and Minor Variance will be submitted for the second phase in the future.
- For this District Draft Plan, considering water demand and sanitary flows from the Film Studio Campus based on based on Table 5 of DCSW (Commercial Area: 180,000 L/floor ha/day)



# Toronto Green Standards for Water Efficiency, Tier 2 v4

ARUP

WQ 2.1 Water Efficient Fixtures - Target to achieve 40% reduction in potable water consumption for the building (excl. irrigation) over the building water fixtures.

WQ 2.2 Efficient Irrigation – Reduce potable water use for irrigation by 60%.

Targets applicable to building design. Site servicing strategies to be designed per City of Toronto's Design Criteria.

How does the 40% consumption reduction affect the servicing and sizing calculations with respect to district infrastructure if the proposed buildings are committed to meeting these requirements?

# Stormwater Management

## Requirements, Proposed Strategy & Items for Further Discussion



# SWM Requirements

**Private Development Block & Right-of-Way**

## Private Development Block & Laneway Requirements

1. **Water Balance**
   - Current WWFMG requirement (5mm retention)
   - Retain at least first 10mm on site
   - Opportunities to meet MESP target (25mm retention)
2. **Water Quality**
   - 80% TSS removal with BGI & SWM features
3. **Water Quantity**
   - Control 100-yr storm runoff to 2-yr pre-development rate
   - Maximum pre-development C value of 0.5
   - Flood protection up to 100-yr storm

## Right-of-Way Requirements

1. **Water Balance**
   - Maximize retention with green infrastructure to support the framework plan (MESP) target of 25mm
2. **Water Quality**
   - 80% TSS removal with BGI & SWM features
3. **Water Quantity**
   - Flood protection up to 100-yr storm with dual-drainage system and target to reduce existing overland flows by utilizing public spaces (parks, roads) for GI
4. **Minor System**
   - 2-year design storm

# Proposed SWM Strategy

The SWM strategy of this District is independent from rest of the Framework Lands' Districts and infrastructure



Grading strategy to protect existing and proposed buildings for >100-year storm



Maintain existing catchments, overall flow routes and outfall








BGI in public streets for quality control and water balance using LID treatment train approach, rather than OGS units or SWM ponds

Manage water at source including enhanced GI in development blocks and private streets (e.g., green roofs, bioretention, and geo-cellular storage)



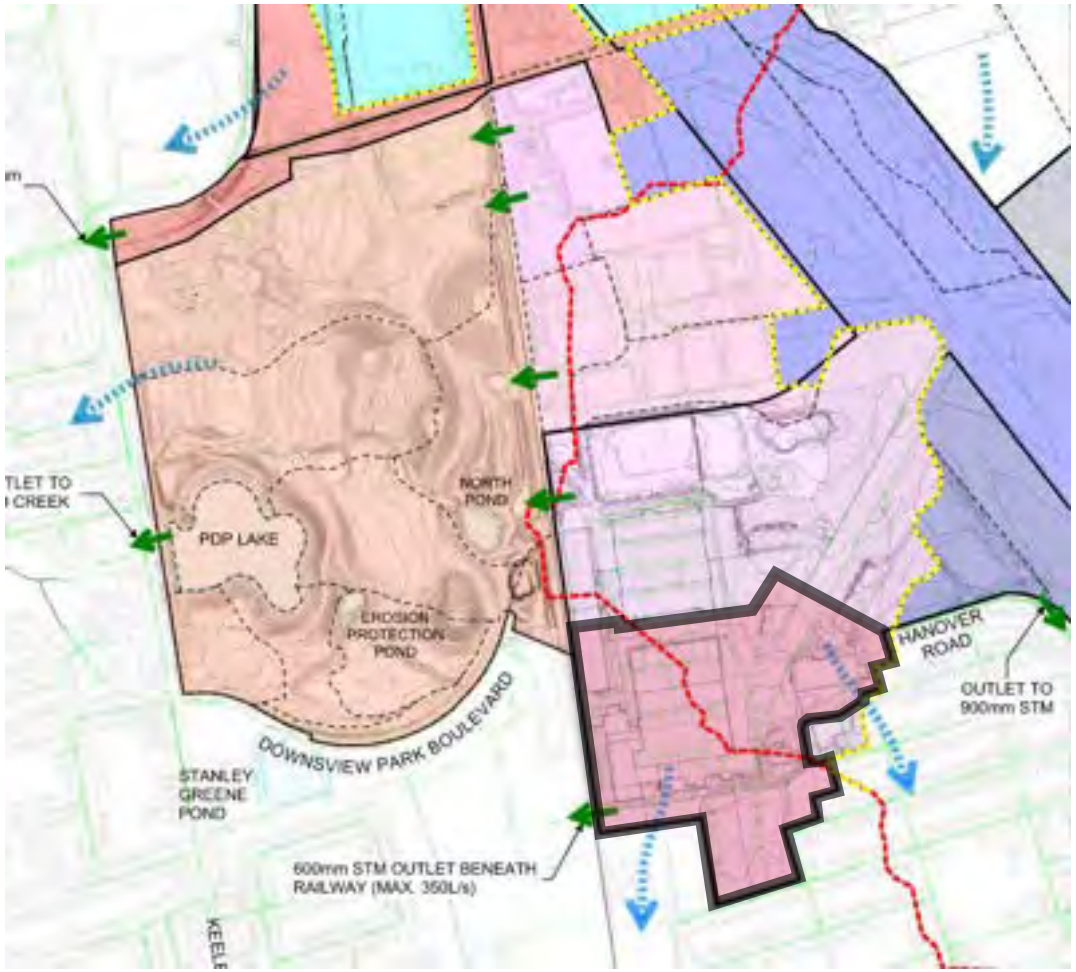




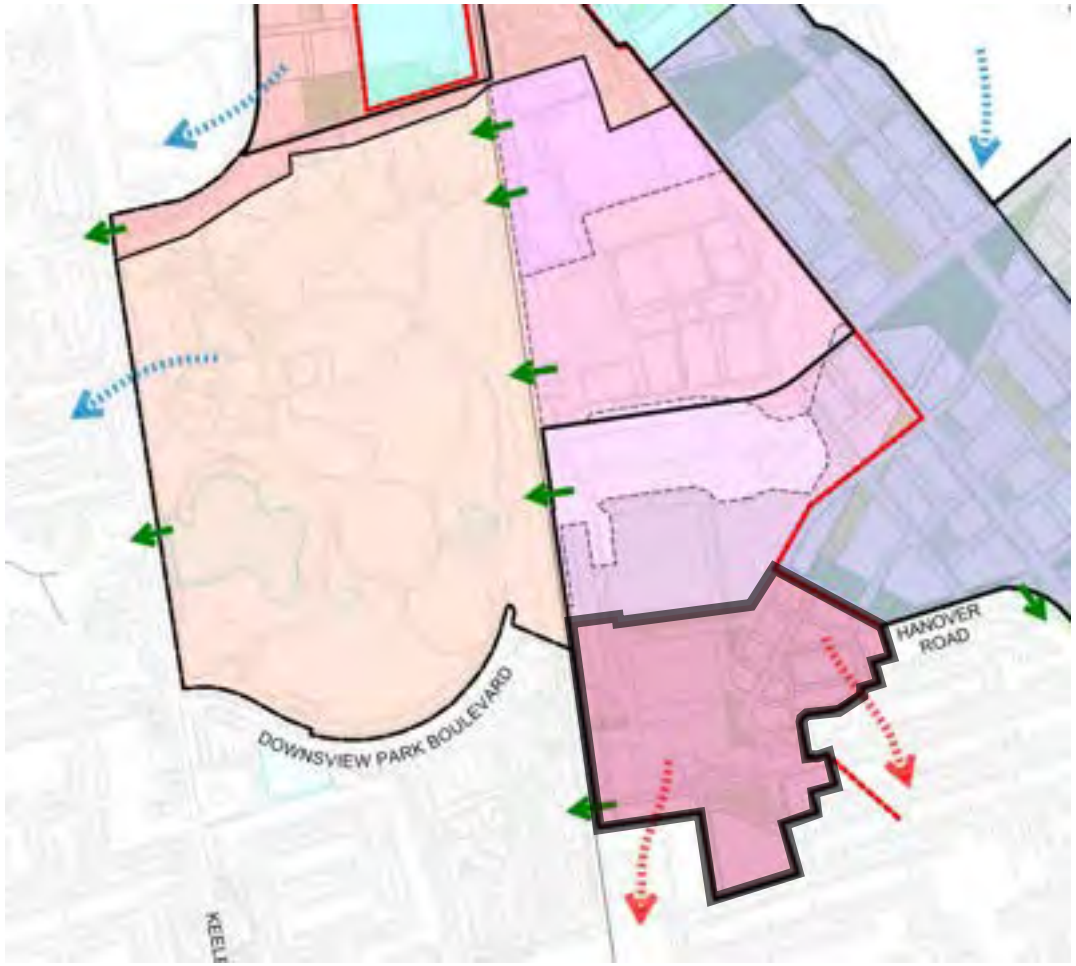
Stormwater from public streets diverted to New Ancaster Park for a dedicated floodable space during intense storms (>10-year)

# Proposed SWM Strategy

Building on MESP principles, managing and mitigating existing overland flows / spillage into Ancaster where possible




**Existing Condition**



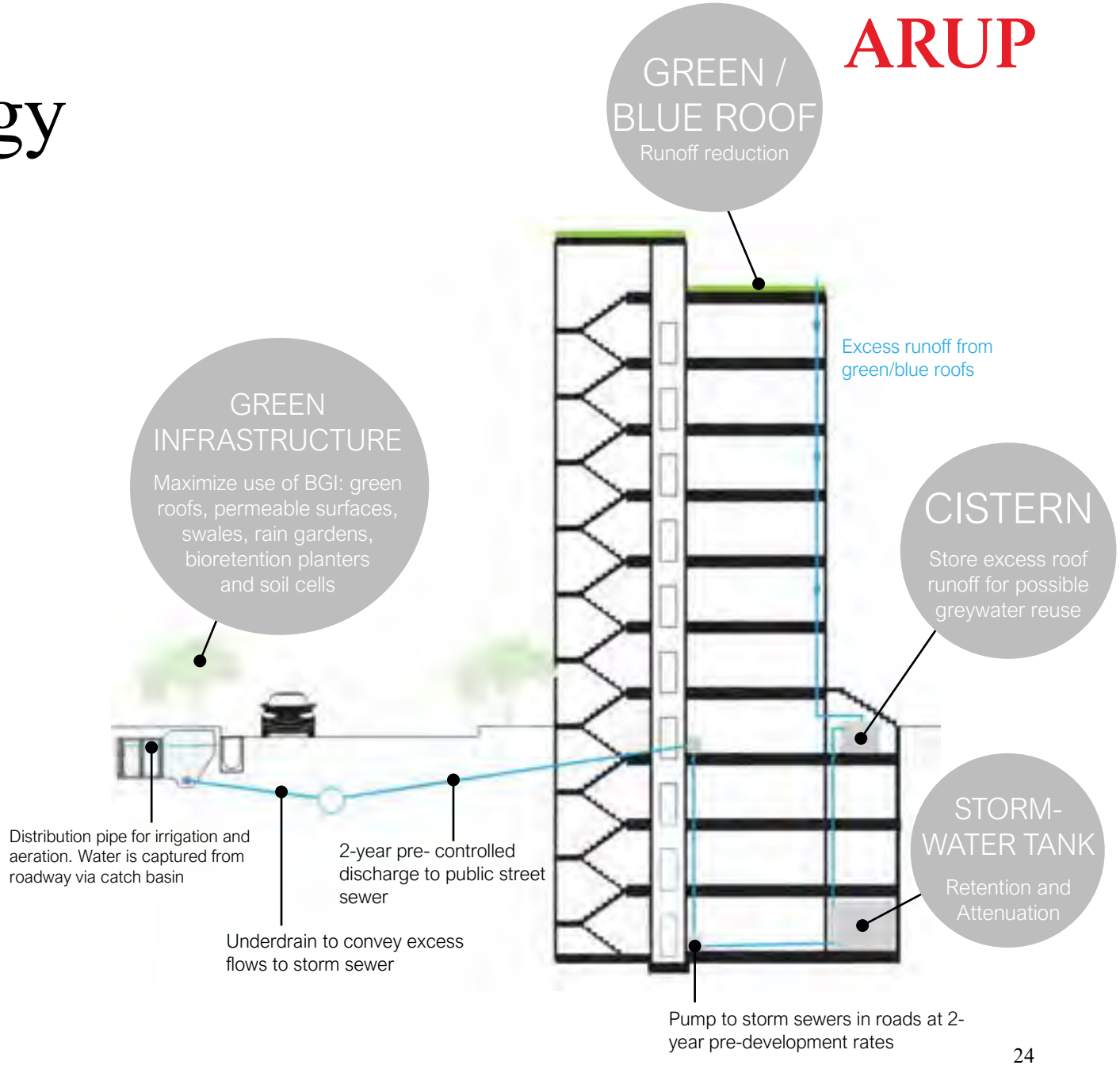

**Proposed Condition**

# Proposed SWM Strategy

## Private Development Blocks (New Construction)

- Private development blocks will control from 100-yr to 2-yr pre-development rates
- One discharge point per development block to municipal sewer



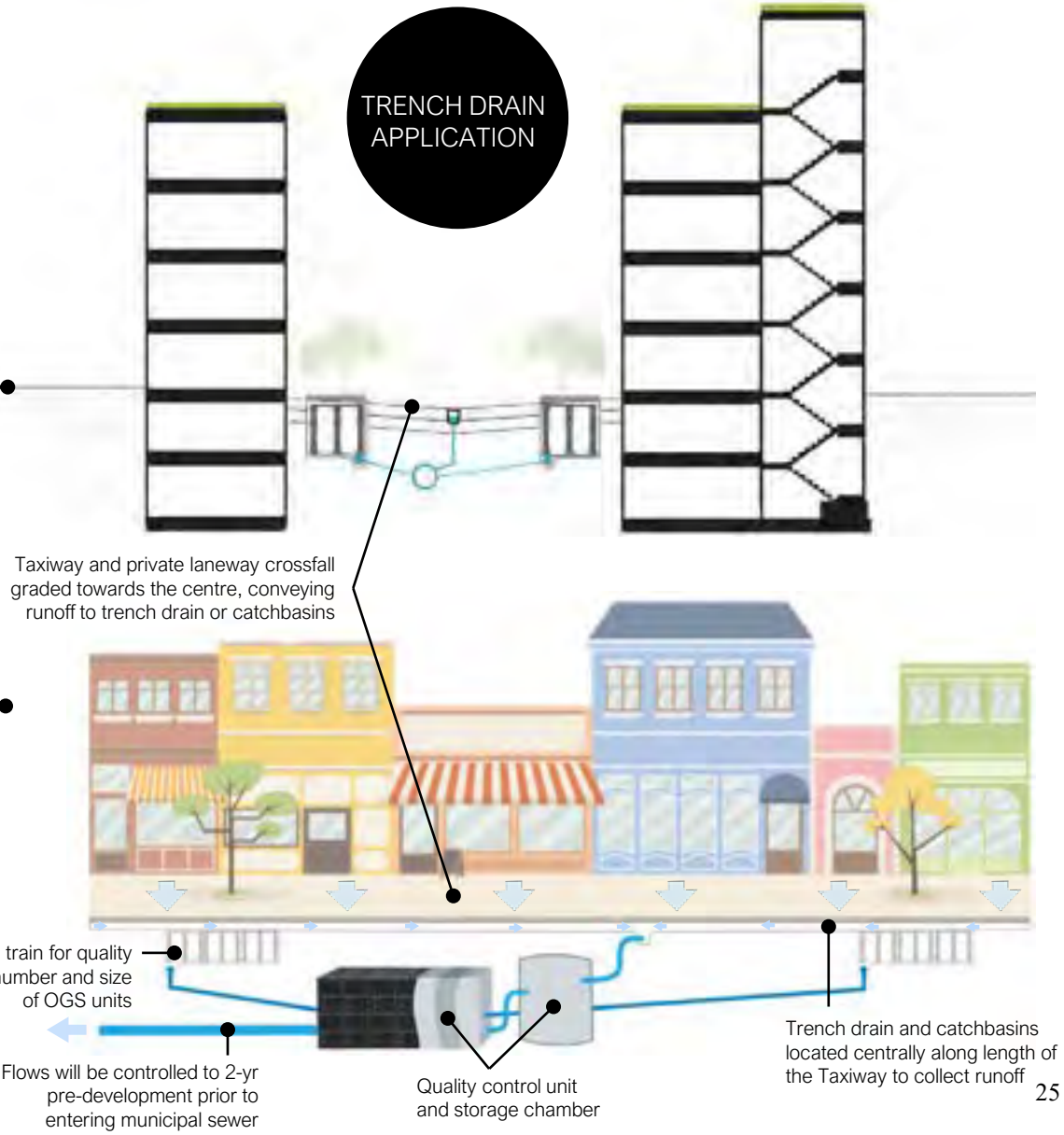
# Proposed SWM Strategy

## Private Laneways & The Taxiway

- Private laneways will control from 100-yr to 2-yr pre-development rates




TRENCH DRAIN APPLICATION

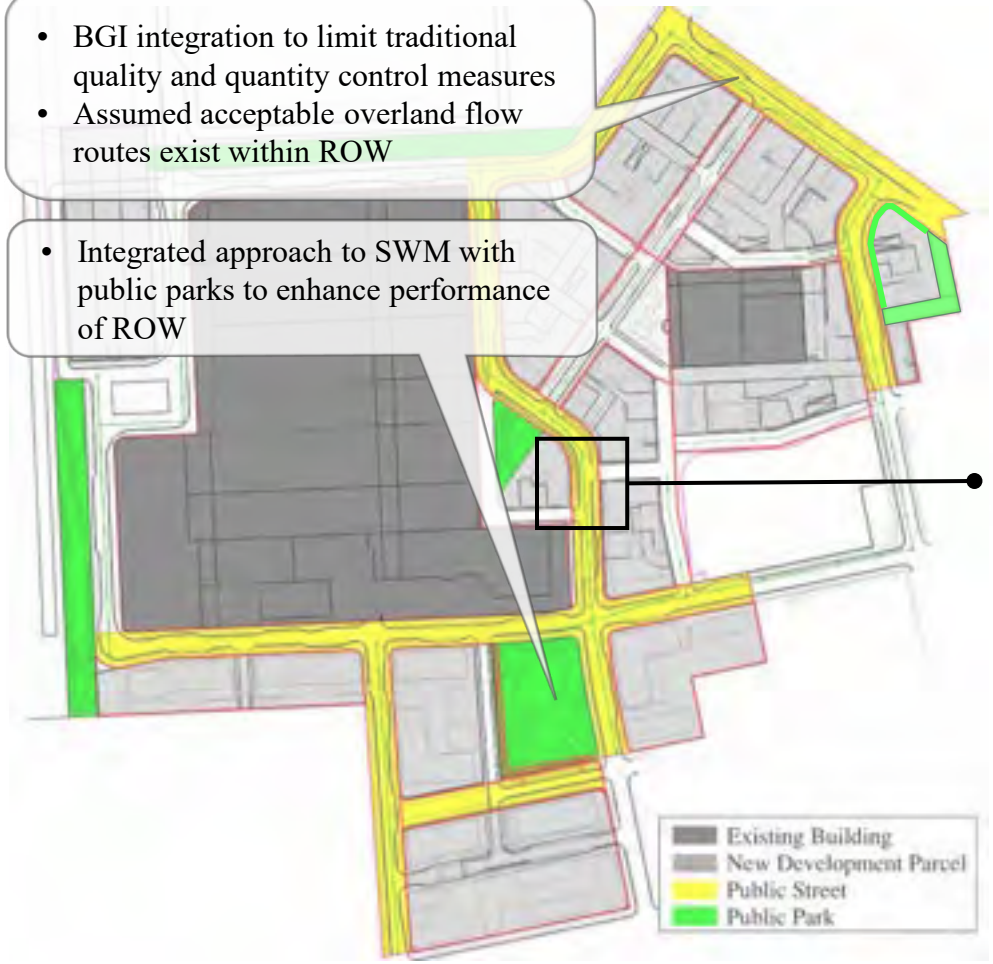


# Proposed SWM Strategy

## Right-of-Way & Public Parks

- BGI integration to limit traditional quality and quantity control measures
- Assumed acceptable overland flow routes exist within ROW

- Integrated approach to SWM with public parks to enhance performance of ROW

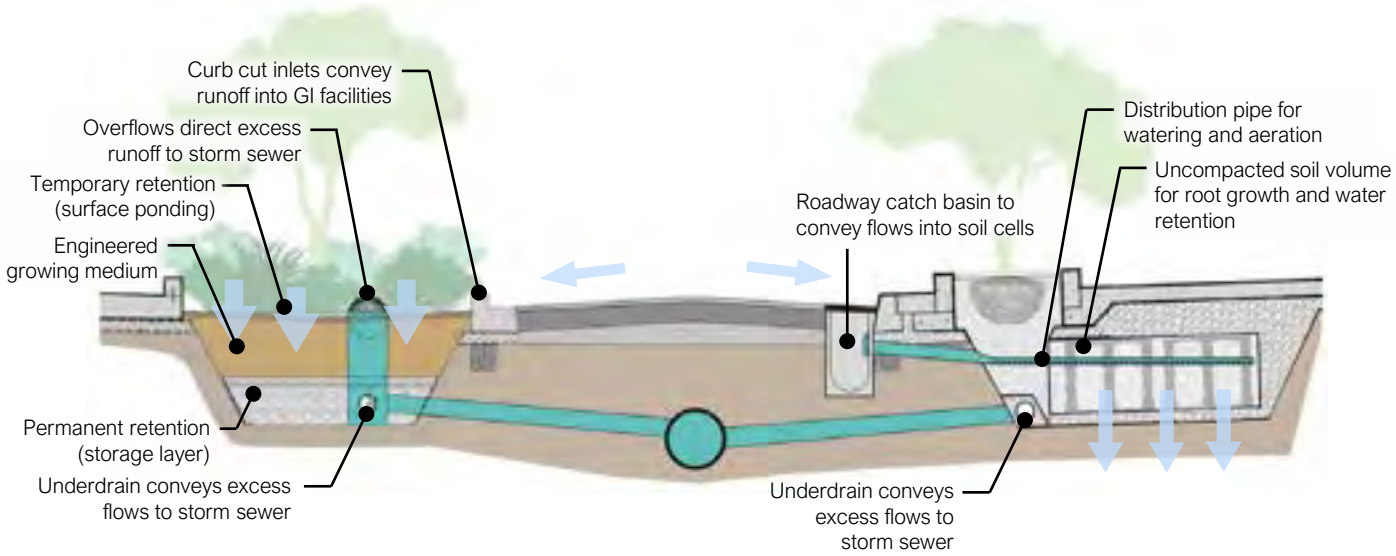



**BIORETENTION PLANTERS**

Filter, retain, infiltrate roadway runoff

**SOIL CELLS**

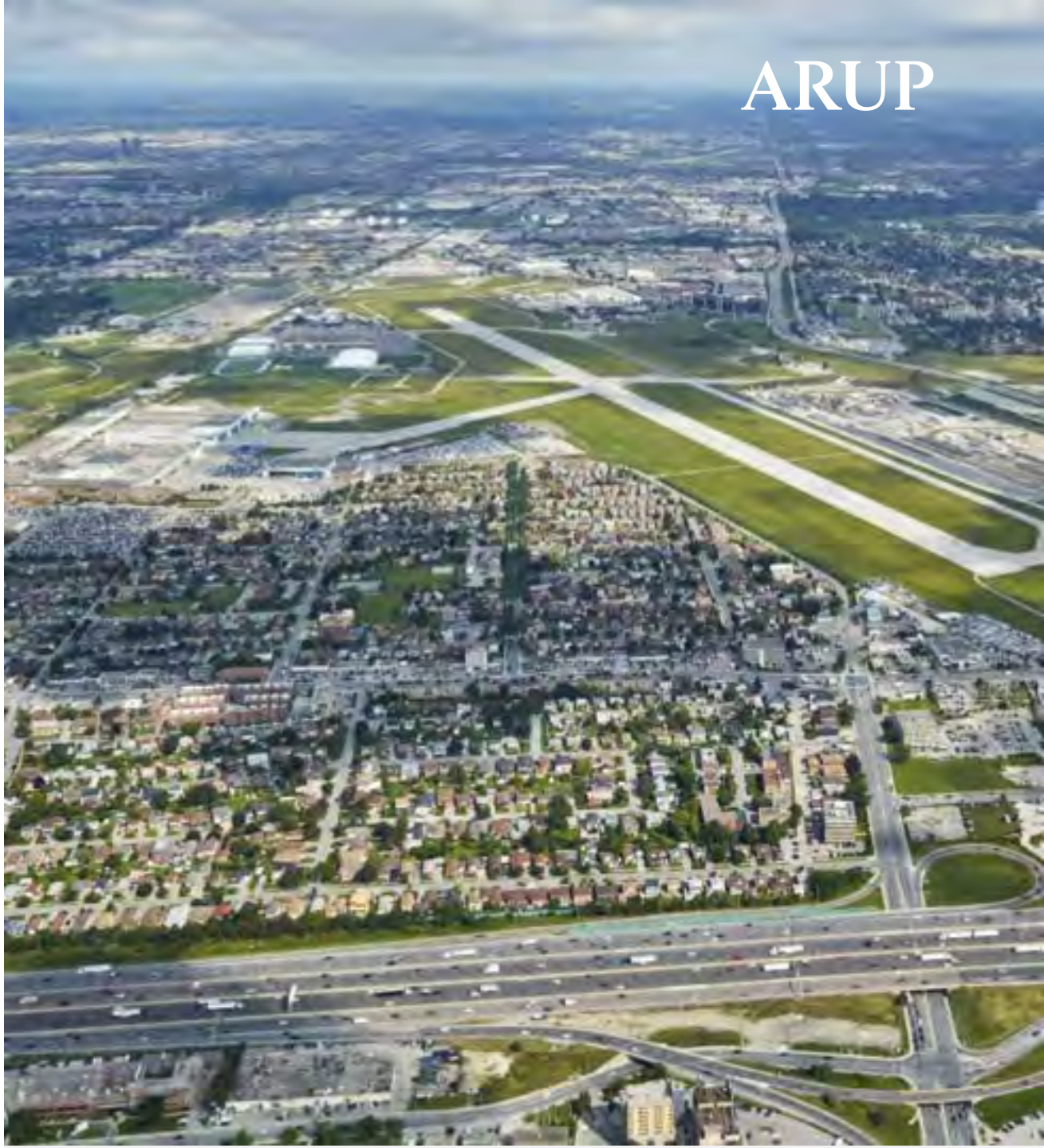
Collect, distribute, filter, retain, and infiltrate roadway runoff



# Additional Stormwater Management Items

## BGI Integration and Assumptions

- SWM Requirements
- BGI & SWM Strategy
- Modelling Approach



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# Additional Stormwater Management Items

## Stormwater Management Requirements

- Quantity Control Requirements for ROW
  - assumed acceptable overland flow route via. Ancaster neighbourhood
- Allowable release rate at outfall
  - Assume peak flow rate per Stanley Greene neighborhood design



# Additional Stormwater Management Items

## Blue-Green Infrastructure & Stormwater Management Strategy



### Parallel sewer on Ancaster Road




- Addition of a Second Storm sewer running in Parallel to existing storm sewer on Ancaster Road
- Replacement of existing Home Road storm sewer
- Existing outfall to Stanley Greene remains unchanged

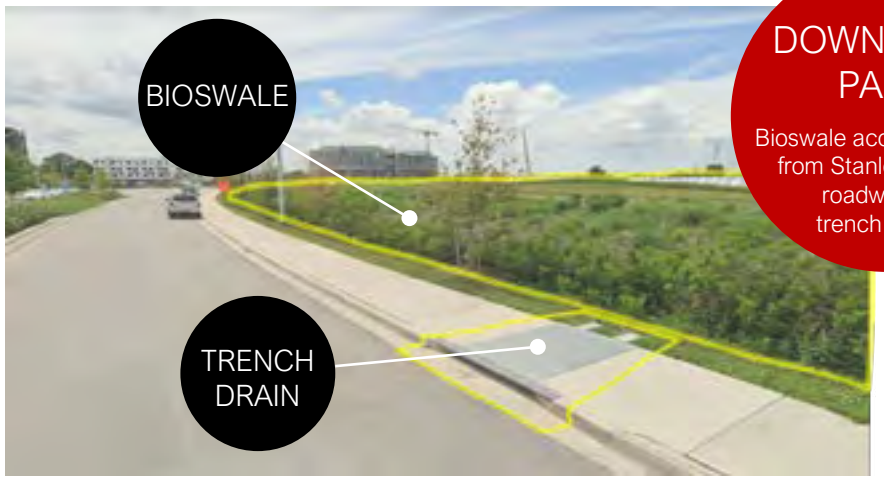
ARUP

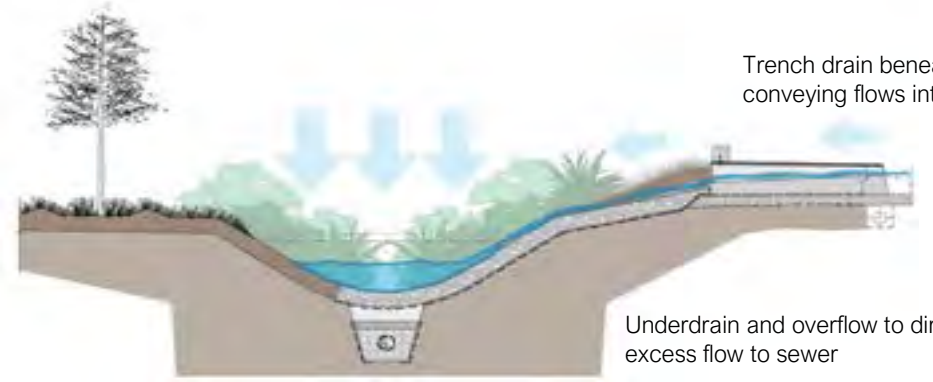
# Additional Stormwater Management Items

**Blue-Green Infrastructure & Stormwater Management Strategy**

- Public Park overflow/storage options for ROW flows in large storms



Trench drain beneath sidewalk conveying flows into bioswale

Underdrain and overflow to direct excess flow to sewer

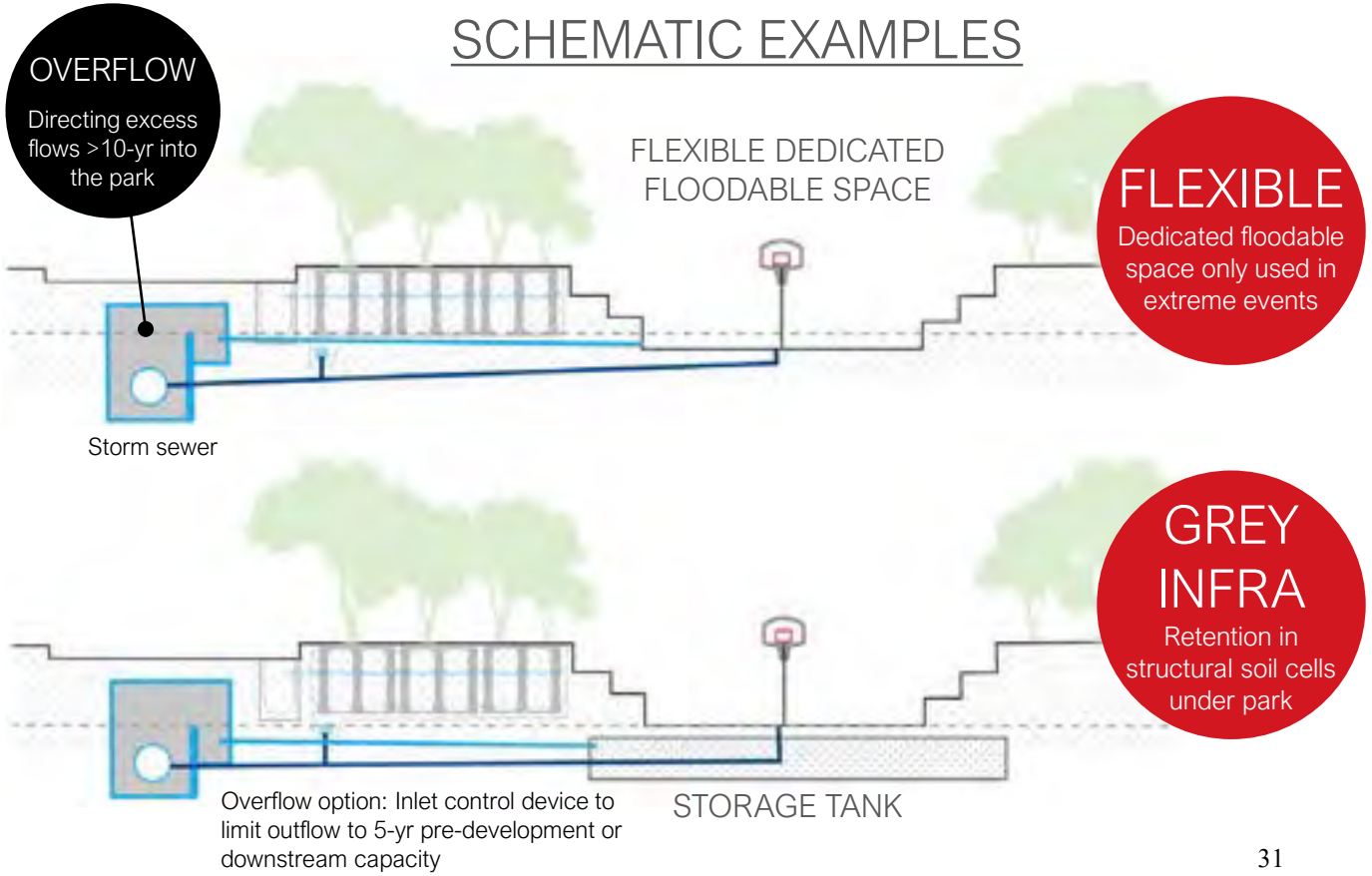
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# Additional Stormwater Management Items

**Blue-Green Infrastructure & Stormwater Management Strategy**

- Public Park overflow/storage options for ROW flows in large storms



ARUP

# Additional Stormwater Management Items

## Modelling Approach

- Assumptions and strategy for hydraulic modelling and downstream capacity analysis for existing conditions
  - Assumed storage in existing roof and parking lots
- Acceptable overland flow route for existing & proposed condition
  - Spill points at existing Hangars per BFA 16 InfoWorks Model
  - Target to reduce that spill volume with proposed SWM strategy for Hangars District (GI, grading, control in development blocks, etc.)

ARUP

# Integration of MESP Infrastructure

- Framework infrastructure implementation will be triggered by growth in demand via Secondary Plan process.
- Servicing strategy for the Taxiway West District is not dependent on Framework infrastructure.

ARUP

# Minutes

| | |
|---|---|
| **Project title** | Taxiway West South-Subdistrict |
| **Job number** | 260341-11 |
| **Meeting name & number** | City of Toronto Infrastructure Workshop, 001 |
| **File ref** | |
| **Time and date** | 2:30pm - 3:30pm, February 7, 2022 |
| **Location** | Teleconference |
| **Purpose of meeting** | Introduction to infrastructure and servicing strategy for upcoming ZBA/DPS submission for the South Sub-District |
| **Present** | Perry Korouyenis (City of Toronto)<br>Jessica Krushnisky (City of Toronto)<br>Vivian Yao (City of Toronto)<br>Mijin Lee (City of Toronto)<br>Al Rezoski (City of Toronto)<br>Jesse Zuker (Northcrest)<br>Trajce Nikolov (Northcrest)<br>Kristy Shortall (Northcrest)<br>Jinny Tran (Northcrest)<br>Henry Jeens (Arup)<br>Alexandra Suchon (Arup)<br>Della Zhang (Arup)<br>Poyani Sheth (Arup)<br>Angus Wan (Arup)<br>Lauren Haein An (USI) |
| **Apologies** | Sheila Gonbadi (City of Toronto)<br>Kevin Tudhope (City of Toronto)<br>Michel Trocme (USI)<br>Christine Fang-Denissov (USI) |
| **Circulation** | Those present |

| **Topic** | **Action** |
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| **1. Introduction** | |
| Kristy Shortall (Northcrest) provided a brief project overview of the Taxiway West South Sub-District. Refer to shared slide deck | Info |

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| **Project title** | Taxiway West South-Subdistrict |
| **Job number** | 260341-11 |
| **Date of Meeting** | February 7, 2022 |

| Topic | Action |
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| • Note: District is independent from the rest of the Framework Plan and will not require servicing from infrastructure planned in future Framework Plan development phases. | |
| **2. Sanitary Servicing** | |
| Alexandra Suchon (Arup) discussed the proposed sanitary strategy, catchments, design requirements and assumptions, and flow monitoring. | Info |
| • Clarification (Vivian Yao, City of Toronto): proposed public sewers are shown in a solid line and exist within the public ROW, dashed exist within private roadways. | Info |
| • Clarification (Mijin Lee, City of Toronto): Block H2 is a parking deck structure, not currently showing a sanitary connection. **Action:** Arup to look into suggestion from City to include this block for I/I in analysis. | **Arup** |
| • Clarification (Vivian Yao, City of Toronto): Drainage areas are generally consistent with what was shown for MESP. Exact areas are being refined through the design process. | Info |
| **Public Roadways without Sanitary Services:** | |
| • Alexandra Suchon (Arup) clarified that sanitary sewers are located as required for servicing where sanitary connections are anticipated from development blocks. This is a strategy that may change depending on the design of the blocks and phasing. Kristy Shortall (Northcrest) commented that the goal is to aim towards sustainability as a key principle for the design approach. Excess infrastructure is not recommended to be built if it will not be leveraged. | Info |
| • Vivian Yao (City of Toronto) stated that as a general rule, there should be public utility services along every public road to allow for future expansion/development. If the design does not warrant all public roadways to be fully serviced, further discussions with the City should be held. | Info |
| • Jesse Zuker (Northcrest) added that the servicing intent and key principle of the MESP presented in the introduction explains that the first District will connect to the existing sewers at the boundaries. Sanitary sewers on every public street will not provide full utility in the future as future districts will be connected to a central main discharging to upcoming Keele sewer. | Info |
| **Avoid Private Services:** | |
| • Mijin Lee (City of Toronto) noted that where possible, avoid private services on private roads (i.e. what was shown in the Taxiway) as the City infrastructure should be in public ROW. The City would like to avoid obtaining easement agreements where possible. | Info |
| • Alexandra Suchon (Arup) responded that evaluations of depth constraints are ongoing, and that the comment is noted. | Info |

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| **Flow Monitoring:** | |
| • Henry Jeens (Arup) confirmed that permitting for flow monitoring was obtained through sub-consultants | Info |
| • Flow monitor locations and approvals were reviewed with Mike Collins and Sheila Gonbadi through the MESP process. **Action:** Correspondence to be forwarded to Vivian and Mijin (City of Toronto) | **Northcrest** |
| • Henry Jeens (Arup) clarified that flow monitors will be placed until sufficient data is received on all required storm events. Extent of data required to be confirmed through MESP/Framework level. | Info |
| **3. Water Servicing** | |
| Poyani Sheth (Arup) discussed the proposed water servicing strategy and the design criteria and assumptions. | Info |
| • Clarification (Vivian Yao, City of Toronto): Solid lines represent public watermains on public roads, dashed lines represented private watermains on private roads. | Info |
| • Clarification (Vivian Yao, City of Toronto): Dead end watermain configuration at southwest corner will be developed in detail in future stages. Currently intended to follow City standard for capped end with a hydrant. Watermain will not extend past the railway. **Action:** Arup to consider water age in analysis at dead end. | **Arup** |
| **Info Request to City:** | |
| • Poyani Sheth (Arup) noted that Arup is requesting the City for information on the status of construction, tentative operational timeline and locations of the new watermains installed on Garratt Blvd and Gilley Road to support the design. **Action:** City staff to provide update. | **City of Toronto** |
| **Low Demand Pressure:** | |
| • Vivian Yao (City of Toronto) noted that the design needs to consider the highest pressure when the water demand is low. **Action:** Arup to consider minimum flow, especially for non-residential demands, to ensure pressure does not exceed maximum | **Arup** |
| **4. Sanitary/Water Assumptions** | |
| **North Sub-District (Film Studios):** | |
| • Alexandra Suchon (Arup) confirmed that the treatment of the adjacent areas (Film Studio) will be refined through future submissions. Mijin Lee (City of Toronto) noted the comment. | Info |

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| **TGS for Water Efficiency:** | |
| • Mijin Lee (City of Toronto) stated that there is currently no compensation criteria/program for reduced demand and/or high efficiency fixtures. The City is trying to remain conservative. | Info |
| • Topic to be added to future MESP subject matter meetings to ensure costs of going to higher TGS standard are justified from an infrastructure perspective and that excess infrastructure is not being built where not needed. Northcrest/Arup would like to collaborate further towards this opportunity for the MESP level. | Info |
| **5. Stormwater Management** | |
| Della Zhang (Arup) discussed the stormwater management (SWM) requirements, proposed SWM strategy, and additional SWM items including other SWM requirements, Blue-Green Infrastructure (BGI) & SWM Strategy, and the modelling approach. | Info |
| • Clarification (Mijin Lee, City of Toronto): The intention is to replace existing sewer in Home Road and reverse direction. | Info |
| • Clarification (Vivian Yao, City of Toronto): ROW is designed to generally adhere to Development Infrastructure Policy and Standards (DIPS), however, there are different ROW widths proposed for this district (18.5m – 23m) to account for the specific street functions, landscaping, and green infrastructure within ROW. Jinny Tran (Northcrest) noted that not all ROWs have the same cross sections, and that these are currently being developed and will be shared with the City at a later date. | Info |
| • Clarification (Mijin Lee, City of Toronto): Options for groundwater and building foundation drainage are being considered and the initial approach was to determine how to improve the quality high enough for re-use and/or discharge. Arup will mandate requirements for the blocks first (not assign specific design measures), then continue to work with the City to further develop these measures. | Info |
| **Approach Discussion with Parks:** | |
| • Henry Jeens (Arup) explained that conversations did occur with the Parks Division at a Framework Level and the general approach to SWM integration with parks was understood. For next steps, Arup would like to continue the conversation with the City on the proposed Ancaster Park example, evaluate options, work through more details, and receive feedback from the City. **Action:** Arup to share the correspondence between Parks staff with the City (Vivian and Mijin). | **Arup** |

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| **6. Integration of MESP Infrastructure** | |
| Alexandra Suchon (Arup) noted that in general, growth/demand will trigger the need for infrastructure. This District does not trigger other infrastructure and it is not dependent on later phases for framework level infrastructure. Jesse Zuker (Northcrest) added that the design avoids building infrastructure too far in advance before it is needed. | Info |
| **7. Additional Comments** | |
| **Future meetings:** Mijin Lee (City of Toronto) requests that for future meetings, it would be helpful to receive all meeting materials and slide deck a few business days prior to the meeting | Info |
| • Jinny Tran (Northcrest) noted that future presentation material and slide decks will be sent to the City a few business days in advance. | Info |
| **Green infrastructure:** Mijin Lee (City of Toronto) noted that there is a separate City group for GI and the point of contact from the City is Niloufar Mohajerani. If there are further discussions involving GI and SWM strategies in general, Niloufar should be included in future discussions. | Info |
| **Slide Deck:** Jinny Tran (Northcrest) noted that minor updates have been made to the presentation slides after circulation. **Action:** The updated slide deck will be re-circulated to all attendees following the meeting. | **Northcrest** |

# 6. Comment Response Table

July 7, 2023

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| **Project:** | **The Hangar District (formerly known as the Taxiway West South Sub-District)**<br>Draft Plan of Subdivision and Zoning By-law Amendment Application |
| **City Application #:** | 22 148583 NNY 06 SB & 22 148540 NNY 06 OZ |

| Reviewing Agency | No. | Comment | Formal Applicant Response |
|---|---|---|---|
| Parks, Forestry & Recreation (Oct-06-2022)<br><br>Contact: Natasha Petzold (Natasha.Petzold@toronto.ca) | 1 | **Central Square Park**<br>We understand that this park is envisioned to function as a prominent landing spot and meeting place, transitioning between significant elements of the public realm, and we are supportive of this vision. The provision of a larger, potentially full block park in this location would create a more significant terminus for the Taxiway and public forecourt for the Hangars and further support this objective. An expanded park would not preclude the inclusion of small scale structures or (as appropriate) adjacent buildings to assist in animating the space. PFR encourages the applicant to explore alternative ways to achieve an active park space without restricting its dimensions.<br><br>PFR understands the laneway adjacent to the park is proposed for vehicular use. Additional information is needed regarding building design, access, and the location of loading spaces and garages in order to inform potential future programming. The Official Plan directs development to locate parking, access, loading, servicing, storage, and utilities to minimize their impact on the public realm, including parkland. The need for a workshop to discuss park programming has been identified, and should be held at a future stage in the process. | In consideration of staff's comments, we have expanded Central Square to include the former adjacent Block B, to create a larger, central terminus of the Taxiway Street in front of the Hangars. We look forward to continue collaborating with City staff on the design and programming of this key park space in the district. Furthermore, the former Lane F has been removed to further expand Central Square and minimize vehicular traffic in this space. |
| | 2 | **Garratt Boulevard Park**<br>PFR agrees in principle to the inclusion of green infrastructure features within parks. However, the intent and purpose of specific green or blue-green infrastructure must be balanced with the various services and functions parks are required to provide. The Stormwater Management Report submitted as part of this application currently proposes the use of Garratt Boulevard Park as a dedicated floodable space to provide flood alleviation from public street runoff during 2-year storms and greater. Among other matters, this would have significant impacts on the utility and programmability of the largest proposed park in the District. Staff cannot support the proposed approach for Garratt Boulevard Park at this time.<br><br>Further review and discussion on the role of Green Infrastructure in parks is required and is being undertaken through the Secondary Plan process. PFR also requires clarity on the intended role that parks will play in managing the overall stormwater flows across the site, within the context of the broader stormwater management system. This work will inform the ultimate approach applied to parks in the Taxiway West South Sub-District.<br><br>Finally, similar to Central Square Park, more information is needed regarding building design, access, and the location of loading spaces and garages along Lane G in order to inform potential future programming of Garratt Boulevard Park in accordance with the policy direction of the Official Plan. | Discussions with City Staff have continued on the topic of stormwater management features at the MESP level and the co-proponents have presented a decentralized stormwater management solution for the Downsview Lands that leverages parks and open space as part of the stormwater management system. The MESP will contain specific rules and guidelines that the District SWM report will follow and implement in a future resubmission.<br><br>For the purpose of this resubmission, the Applicant team is recommending a workshop series to collectively design a stormwater management approach that implements the recommendations and guidelines from the Master Environmental Servicing Plan at the Secondary Plan level.<br><br>Location of loading spaces and garages will be determined at the site plan level, but will be entirely within the private development block and will not impact pedestrian connectivity and ability to program Garratt Boulevard Park. |

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| | 3 | **Downsview Park Bridge**<br>The Downsview Park Bridge will provide an important east-west connection that will allow pedestrians and cyclists to effectively navigate to and through the site and surrounding areas, including Downsview Park. PFR supports the integrated design of this feature as a connector between parks and open spaces and looks forward to better understanding how the design of the bridge may contribute to the proposed open space network. It has been suggested that this infrastructure may be able to provide a number of environmental and ecological benefits. The applicant should explore what is possible to achieve given financial, operational or other considerations, and provide expert analysis to support its functionality and viability over the long-term. PFR encourages high-quality design, but does not object to a utilitarian bridge.<br><br>Staff's primary interest in securing local parkland is to ensure that the lands conveyed maximize the City's ability to deliver high-quality parks to meet current and future needs. While the bridge may offer a degree of green amenity, its primary function is to provide a physical connection across the rail corridor. As a piece of infrastructure, it is limited in its functionality as parkland and its flexibility over the long term. The proposed parkland is narrow, has minimal public street frontage and is proposed to be stratified, including space on top of a parking garage. As proposed, it would not be considered part of the area's parkland dedication.<br><br>PFR staff appreciate the value of achieving this connection and look forward to working with other relevant City Divisions and the applicant to discuss the appropriate approach to matters of design, jurisdiction and maintenance to deliver this piece of infrastructure under public ownership. | The Downsview Park Bridge continues to be one of the District's signature parks and infrastructure moves and as such, the general size, location and design including the proposed landscape + open space integration has been maintained in this resubmission to ensure it continues to provide environmental, ecological, and arts & culture benefits.<br><br>Following conversatons with City Parks team, we have revised the proposal to convert the Park Bridge to a POPS space that will be publicly accessible, but privately maintained to address the City's concerns tied to public parkland conveyance and integration with a parking garage. Furthermore, as suggested by City transportation staff, the applicant will continue to work with the City on alternate design options, and hope to land on a preferred design approach and implementation strategy in the coming months. |
| | 4 | **Village Park**<br>PFR supports the consolidation and expansion of existing parks and open space wherever possible within the District and broader OPA area, including the expansion of Robert Leek Park. The location of Village Park supports these principles. We encourage the applicant to retain Village Park in this location at the previously proposed size of 0.33 ha (or greater) to meet these objectives and explore opportunities to locate the proposed community uses on adjacent blocks. As currently proposed, the location of the community hub on this site would further reduce the amount of parkland per person being proposed in the District. | The design of Village Park (now referred to Robert Leek Park Expansion) has been revised in accordance with suggestions by City staff at the District Workshop held on April 28th. The parkland component is now on the north end, creating an improved visual connection from Hanover Road into the District, and acts as an expansion of Robert Leek Park. The remaining area to the south is proposed to be a smaller, mixed-use residential block. |
| | 5 | **Rail Park**<br>The utility of this space to function as a public park is limited by a lack of public frontage, proximity to the rail corridor, and the size/configuration of the block. Official Plan policies direct public parks to be visible and accessible from adjacent public streets to promote the safe use of the park. Staff have expressed concerns about safety, access, and views to and from the park from the public realm. This park's limited frontage on a public street does not align with the objectives of the Official Plan or expectations of PFR staff.<br><br>Further, it is the City's responsibility to balance interests including public health and the viability of transportation corridors. As detailed in the Metrolinx – Go Transit Adjacent Development Guidelines, Metrolinx requires setbacks from its infrastructure, including the Barrie GO Line. Locating parkland within any of these setbacks limits its usability and programmability, as well as planting opportunities, as outlined in the Metrolinx Vegetation Guidelines. Should there be a need to expand the Barrie GO Line in the future, it will disrupt the function of the parkland and reduce its size. Additionally, the applicant would no longer be in compliance with the statutory parkland dedication requirements for this development application. The location of parkland within a Metrolinx setback is therefore viewed as an encumbrance and is unacceptable. PFR understands the rail safety report, provided as part of the OPA submission, is undergoing peer review and we request to be kept apprised of updates.<br><br>Staff appreciate that these lands will exist in order to meet other development requirements. As noted above, staff require further information to address the highlighted concerns and evaluate alternatives to better integrate these lands into the overall open space network. | While we believe a linear park along the rail corridor can provide added benefits to create a connected public realm, and provide additional amenities to the surrounding employment and residential uses, we acknowledge City staff's position on this issue. As discussed at the workshop with the City, we have revised the plan to eliminate Rail Park (and Rail Square) and have concentrated public parkland infrastructure elsewhere in the district, including expanding Central Square and Garratt Blvd Park.<br><br>It should be noted that parks and open spaces are permitted uses adjacent to the rail corridor (and many of them exist in the City of Toronto). There are related guidelines that speak to the planting approach within close proximity to the rail which will be respected as part of our proposal. |

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| **Metrolinx (Sep-7-2022)** | 6 | **PLN Block Context Plan - s. 4.3.2 (Comment By Evan Brazeau, Stations Planning)**<br>I really like the emphasis the development places on a multi-modal mobility network with a particular focus on a robust active transportation network. My only comment here is to ensure that this network stretches up to Downsview Park GO station. As there is no parking and a limited PUDO area I think active transportation is the key access element to get people to/from this development from the station. At this point the network seems to stop at the north end of the station, so just want to ensure that the plan is to stretch it to Downsview Park GO and integrate the paths/streets into the overall Downsview Park mobility network. | As part of the mobility strategy for the district, we are proposing temporary roads and multi-use paths to connect to Downsview Park TTC & GO Station and Wilson TTC station to allow for PUDO trips, TTC / private shuttle bus trips or cycling trips. We will continue to work with the City, Metrolinx and TTC to ensure the proposed network is integrated and to ensure active transportation is prioritized. |
| | 7 | **PLN Block Context Plan - s. 4.3.5 (Comment By Evan Brazeau, Stations Planning)**<br>Will the proposed private shuttle service be on-demand? Or will frequency and coverage be based on future demand projections? It is really important to ensure fast, reliable, convenient transit access for people right from the start so that their habits are geared towards taking transit as soon as possible. While on-demand can certainly do this, it is also challenging to inform people of the service itself. Will the shuttle service go right to Downsview Park station or will it link up with TTC bus service east of the site? The private shuttle is a really nice idea, but it creates another layer of transit required for people to get to their destination. So if they are going to Union Station they will take a shuttle to a bus to the GO station and then down to Union. Same goes for subway access. That many change in service vehicles may entice people to take other forms of transportation - potentially driving which nobody wants to see. | The Applicant team agrees that all of these considerations are quintessential to ensuring that the first-mile last-mile portion of the regional and city-wide transit trips is successfully implemented.<br><br>To confirm, the Applicant team also sees the private shuttle as a frequent, convenient, and rider-friendly mode of transportation that closes the first-mile last-mile gap to both the GO system and the TTC Subway. The Applicant team would like to discuss the specifics of the private transit system with both Metrolinx and the TTC to ensure it is implemented in a manner that maximizes appeal to riders, and minimizes impact. |
| | 8 | **General (Comment By Evan Brazeau, Stations Planning)**<br>Will space be saved for a potential additional GO Rail station that the City was exploring to the south side of Downsview Park near the Garratt Blvd development? If so then the transportation network (especially the transit network, AT network, and complete streets) should have the potential to expand towards the proposed station and connect future riders to the development and beyond. | A future GO rail station is currently being contemplated by the City farther south of the District. The District Plan does not preclude this future GO rail station to the south, should it advance, the District will connect via the existing public street network. |
| | 9 | **A-002a,003,005,009, and A-006a (Comment by N.T,B&S)**<br>Please provide dimensions, distances, as well as clearances, and clarify if dewatering/excavations are involved for all the pipe installations and structures? If dewatering/excavations are required, how would the track be protected against settlement and stability? | Acknowledged. The requested information shall be provided for areas within the Mx Zone-of-Influence at the appropriate time. |
| | 10 | **General (Comment by N.T,B&S)**<br>All voided structures (i.e. culverts, pipes, etc.), permanent and temporary retaining structures within the MX Line of Influence (450mm from edge of tie, 2H:1V downward projection) shall be designed for Cooper E-80 railway loading and satisfy all applicable requirements as per MX General Guidelines. | Acknowledged. Detailed calculations and the remainder of the requested information shall be provided for areas within the Mx Zone-of-Influence at the appropriate time. All voided structures within the Mx Zone-of-Influence shall be designed to satisfy Cooper E-80 loading. |
| | 11 | **General (Comment by N.T,B&S)**<br>Further review will be provided once the structural scope of work adjacent to MX railway corridor is provided. | Acknowledged. |
| | 12 | **Drawing A-003 Concept Site and Landscape Plan (Comment by Tishya Modwal, TOC/Development)**<br>Beyond technical requirements for the pedestrian bridge crossing, Metrolinx would require the proponent to enter into an easement and/or provide compensation for air rights in an agreed upon commercial agreement. | Noted, we would like to initiate discussions to understand potential easement and/or compensation for air rights requiremnets. As part of the wider plan, there are several rail crossings proposed. Metrolinx has been part of, and will continue to be involved in the conversation through the Secondary Plan process |
| | 13 | **General (Comment by Harrison Rong, TPPR)**<br>In accordance with Metrolinx's Adjacent Development Guidelines, sensitive uses with direct exposure to the rail corridor must provide derailment protection – which includes a safety barrier in conjunction with the aforementioned 30 metre horizontal setback. The safety barrier must be designed to the satisfaction of Metrolinx and its engineering consultant, AECOM, and demonstrate that the proposed development will be protected in the event of a train derailment scenario. | Acknowledged. AECOM has been engaged and peer review comments have been received. Arup issued a Rail Safety Justification Memorandum in response to the peer review comments on May 16, 2023 (also enclosed with this resubmission in Attachment 3 of the Rail Study Response Memo). We will continue to work with Metrolinx and AECOM to resolve any outstanding concerns. |

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| | 14 | **Rail Safety and Risk Mitigation Report Section 5.2(Comment by Harrison Rong, TPPR)**<br>Metrolinx has reviewed the Rail Safety and Risk Mitigation Report prepared by ARUP and dated May 2022. Under Section 5.2 of the study, it notes that all industrial uses are considered non-sensitive/high occupancy uses where no assessment or mitigation is required. Metrolinx requests that this section is revised as industrial uses that involve high levels of human occupancy for prolonged periods of time are still considered sensitive uses that require some form of rail protection. | Industrial uses are well established as low occupancy and the guidelines were not written with the intent to include this type of land use. This is similar to open space and parks which are an established use adjacent to railway even though these also allow people to gather or may have localised higher levels of occupancy. Please see the Rail Safety Justification Memorandum initially provided on May 16, 2023 for specific details relevant to this site (also enclosed with this resubmission in Attachment 3 of the Rail Study Response Memo). |
| | 15 | **Rail Safety and Risk Mitigation Report(Comment by Harrison Rong, TPPR)**<br>The Rail Safety and Risk Mitigation Report will require review by Metrolinx's Technical Advisor, AECOM. The applicant is advised to contact Metrolinx Project Manager, Third Party Projects Review – Adjacent Development Review **(Alexandra.Goldstein@metrolinx.com**) to initiate coordination between the proponent and AECOM for their technical review | Acknowledged. The initial Rail Safety Report has been reviewed by AECOM. Arup issued a Rail Safety Justification Memorandum in response to the peer review comments on May 16, 2023 (also enclosed with this resubmission in Attachment 3 of the Rail Study Response Memo). We will continue to work with Metrolinx and AECOM to resolve any outstanding concerns. |
| | 16 | **SWM Report (Comment by Harrison Rong, TPPR)**<br>Please note that Metrolinx and Metrolinx's Technical Advisor, AECOM will need to review the stormwater management plan and stormwater management report for the site to ensure there is no additional drainage onto the rail corridor. | The stormwater management plan and report have been provided to AECOM for their review. |
| | 17 | **Landscape Plans (Comment by Harrison Rong, TPPR)**<br>Please note that as part of Metrolinx's GO Expansion program, a 3.5m setback from the rail corridor has been established where tall-growing vegetation (such as trees) can not be permitted. Some low-lying vegetation, such as shrubs or ornamental grasses, may be appropriate, subject to Metrolinx review. | Noted. No tall-growing vegetation is proposed along the setback. |
| | 18 | **General (Comment by Harrison Rong, TPPR)**<br>Please note that depending on the manner of construction, the Owner may be required to enter into Construction Agreements (i.e. Crane Swing Agreement and Tieback Agreement) with Metrolinx. Any construction activity including shoring, tie-backs, crane swing within or immediately adjacent to Metrolinx's rail corridor must be reviewed and coordinated with our Technical Advisor (AECOM).<br><br>In addition to the technical review, it should be noted that various Metrolinx permits/approvals/agreements with associated fees may be required for implementation/construction. For example, this includes, but not limited to, private property when works are proposed within 30ft of an active rail. As such, these permits/approvals/agreements with their required fees and processing timelines in advance of proposed work, should be factored into your construction cost and schedule accordingly. More detail can be provided as the application and details progress. | Acknowledged. |
| | 19 | **Noise Impact Study (Comment by Harrison Rong, TPPR)**<br>Metrolinx supports the inclusion of a warning clause, as recommended in Section 8. Please revise the report to include the following warning clause:<br><br>Warning: Metrolinx and its assigns and successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that Metrolinx or any railway entering into an agreement with Metrolinx to use the right-of-way or their assigns or successors as aforesaid may expand their operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way. | Acknowledged. A clause will be reflected in the final updated noise report to be submitted at a later date. |

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| | 20 | **General (Comment by Harrison Rong, TPPR)**<br>The Proponent shall enter an Adjacent Development Agreement with Metrolinx to ensure Metrolinx's concerns are addressed. The Agreement will include an environmental easement for operational emissions, which is to be registered on title for all uses within 300 metres of the rail right-of-way. Included is a copy of the form of easement for the Proponent's information. The Proponent may contact Harrison.Rong@Metrolinx.com with questions and to initiate the registration process. | Acknowledged. We will review a copy of the Adjacent Development Agreement including environmental easement and will provide comments to Metrolinx at a later date. |
| **Metrolinx / AECOM Peer Review**<br><br>**(Jan 27, 2023)** | 21 | Third Party Projects Review Team<br>As a reminder, all submittals/design drawings/calculations shall be stamped, signed, and dated by a Professional Engineer licensed in the Province of Ontario. | Noted. The work is being prepared by or under the supervision of a Professional Engineer and all final work will be stamped. |
| | 22 | Third Party Projects Review Team<br>Any applicable agreements (i.e., adjacent development, crane swing, tieback/shoring, etc.) required to carry out the proposed work shall be coordinated directly with Metrolinx;<br>i. Please note any temporary or permanent structure to be constructed within Metrolinx Right-of-Way require an agreement between the Proponent / Developer and Metrolinx. | Noted. All items related to construction and approach to construction will be developed at a later date. |
| | 23 | Third Party Projects Review Team<br>The design shall consider a high-security fence between Metrolinx property and adjacent property. The high-security fence height shall be above ground 2.4m at the minimum, attached requirement. | There is already an existing fence located along the corridor between Metrolinx and the existing Downsview Airport Lands. We understand Metrolinx are undertaking improvements to the rail corridor and this may include new fence work along certain segements. Should new fencing or upgrades to fencing be required as part of our district application, we will ensure it meets Metrolinx' requirements. |
| | 24 | Third Party Projects Review Team<br>Please confirm that all drainage from the subject adjacent development will be directed away from the Metrolinx drainage ditches and Right-of-Way. The project and its construction should have no adverse affects on the existing and future Metrolinx drainage facilities / ditches / grading;<br>a. Please advise if drainage of water against the Metrolinx corridor has been addressed and what provisions are being made, if any;<br>b. please provide Storm water report if available for our review. | a) Subsequent submissions will provide further clarity regarding drainage and grading interfaces along the Mx Corridor. The design intent shall be to match or improve the existing conditions by capturing all stormwater originating within the project's extents.<br><br>b) The SWM Report has been submitted for review together with responses to comments. |
| | 25 | Third Party Projects Review Team<br>Include Metrolinx Mileage (Mile 9.55 ) and Subdivision (Newmarket Subdivision) on all drawings and documents; | Noted. Mileage and Subdivision will be included on detailed design drawings and documents. |
| | 26 | Third Party Projects Review Team<br>Submit 'As-Built' drawing(s) no later than 30 days after the completion of the proposed work within the Railway Right-of-Way. As-Built Drawings shall be submitted in Georeferened CAD file (NAD 83 MTM 10 format); | Acknowledged. As-built drawings will be provided at the appropriate stage. |

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| **Project:** | **The Hangar District (formerly known as the Taxiway West South Sub-District)**<br>Draft Plan of Subdivision and Zoning By-law Amendment Application |
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| Reviewing Agency | No. | Comment | Formal Applicant Response |
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| | 27 | Third Party Projects Review Team<br>Please include the following notes on the Drawings:<br>a. Prior to commencing any work within, over, under, or adjacent to the GO Transit / Metrolinx Right-of-Way, the Contractor shall apply for and receive a GO Transit / Metrolinx Work Permit;<br>i) When submitting the Work Permit Application(s), the Contractor shall allow for sufficient time for Work Plan review, revision, and coordination with Metrolinx internal stakeholders;<br>b. The Contractor shall conform to the GO Transit / Metrolinx Work Permit and submit all requested and required information for review and acceptance (from the Contract Administrator and AECOM / GO Transit / Metrolinx);<br>c. At the discretion of AECOM / GO Transit / Metrolinx, it may be required to complete certain construction activities outside of Railway Service Hours (i.e. certain works may be restricted to overnight or weekend hours) as applicable;<br>i) Allowable hours of work are dependent on the task and proposed work methodology and will be confirmed by AECOM / GO Transit / Metrolinx after review of the Contractor's Work Permit Application and associated Work Plan Methodology;<br>ii) The proponent shall allow sufficient time for Track Block coordination (if applicable);<br>1. A valid GO Transit / Metrolinx Work Permit is required prior to the submission of a Track Block request;<br>2. Track Block requests shall be submitted in advance of the proposed work and are subject to GO Transit / Metrolinx approval;<br>d. The Contractor is required to submit the following for review and acceptance (from the Contract Administrator and GO Transit / Metrolinx) prior to construction:<br>i) Detailed Work Plan Methodology for construction;<br>ii) Methodology for any temporary excavation protection;<br>iii) Any de-watering schemes on or adjacent to GO Transit / Metrolinx Right-of-Way;<br>e. The Contractor shall verify all dimensions and elevations shown on structural drawings against site conditions and report any discrepancies to the Contract Administrator / GO Transit / Metrolinx / AECOM before proceeding with work, AECOM on behalf of GO Transit / Metrolinx to be copied on all correspondence;<br>f. The Contractor is required to conform to the GO Transit / Metrolinx Operational Constraints and submit all the required information for review and acceptance (from the Contract Administrator and AECOM / GO Transit / Metrolinx) prior to construction;<br>g. The Contractor is fully responsible for the adequate protection of all utilities, services, structures, roadways, railway tracks, etc. during construction operations. Contractor's method of protection shall be submitted to the Contract Administrator and GO Transit / Metrolinx for review and acceptance before proceeding with works;<br>h. Proposed works must not affect existing drainage from, or within GO Transit / Metrolinx Right-of-Way;<br>i) No water shall be diverted towards the Track Structure or onto GO Transit / Metrolinx Right-of-Way;<br>i. The Contractor shall install protective measures and working platforms (scaffolding, platforms, heavy polyethylene sheets, etc.), engineered where applicable, to prevent any debris, cutting water / slurry and fine debris falling onto railway tracks. Contractor to submit proposal for protective measures to AECOM / GO Transit / Metrolinx for review and acceptance;<br>j. Spoils and debris shall not be directed toward or within GO Transit / Metrolinx Right-of-Way;<br>k. Materials (of any kind) shall not be stored within GO Transit / Metrolinx Right-of-Way;<br>l. Movement Monitoring Plan must be submitted to AECOM / GO Transit and accepted prior to construction;<br>m. Work within and adjacent to GO Transit / Metrolinx Railway Right-of-Way shall be performed under Railway Flagging Protection; | These notes will be included on drawings as they are prepared in relation to works within the Metrolinx Right of Way. |
| | 28 | Third Party Projects Review Team<br>Under "4 Standards and Guidelines" - please include - The proposed design is in compliance with FCM's / RAC's "Guidelines for New Development in Proximity to Railway Operations" and "Metrolinx Adjacent Development Guidelines GO Transit Heavy Rail Corridors Third-Party Projects Review (TPPR) , Version 4.0 – December 2022".<br>-Please find the Metrolinx updated Guideline here :<br>https://assets.metrolinx.com/image/upload/v1674758859/Images/Metrolinx/Adjacent_Development_Guidelines_Final_EN_xltyzv.pdf | The Rail Safety Report dated May 2022 provided with the initial submission details how the standards that have been considered are applied. |
| | 29 | Third Party Projects Review Team<br>As per the Figure 6, from provided Rail Safety Report - We understand that the new Sanitary pipe dia 375 will be installed under Metrolinx rail. Please advise if this work will be performed under same project. | Yes. Please see the Functional Servicing Report that has been provided with the resubmission for further detail, as well as specific meetings with Metrolinx to discuss these works. |

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| | 30 | Third Party Projects Review Team (Rail Study comment)<br>It is stated under Section 5 - Conclusion - "Specific Physical Rail safety measurements such as berms or crash walls are not required in the subject area" - Please be advised that as per Metrolinx Adjacent Development Guidelines GO Transit Heavy Rail Corridors Third-Party Projects Review (TPPR) , Version 4.0 – December 2022" guideline - Section 5.1 - Rail Safety Measures – "Setbacks and Safety Barriers - Setbacks and safety barriers are typically required for development located immediately adjacent to Rail Corridors" - Hence the proposed construction without the safety barrier shall further require Metrolinx direction. | Please see further comments, responses and supporting documents provided later in this review, which provide a more specific review of the proposals. |
| | 31 | Structural Engineer Comments<br>Structural Review was conducted for rail safety only, and only the primary Rail Safety Report is reviewed and commented on. The Rail Safety report in Appendix A is only reviewed in the context of it informing the primary document. | Acknowledged. |
| | 32 | Structural Engineer Comments<br>Metrolinx Guidelines require both a setback and a safety barrier as the standard mitigation for sensitive and high occupancy uses inside 120m from Mx corridor. Setbacks of marginally more than 30m are not sufficient to waive the requirement for a safety barrier in accordance with Metrolinx standards. If the proponent wants to deviate from the standards this has the potential to be considered under the deviation process and be further coordinated with Metrolinx. | As discussed with Metrolinx, a specific report has been prepared elaborating on this approach and the associated justification. Please see the enclosed Rail Safety Justification Memorandum, dated May 16, 2023 which is included as Attachment 3 to the Rail Study Response Memo. |
| | 33 | Structural Engineer Comments<br>Employment use or mixed use are planning designations and do not sufficiently reflect the use of space to determine if they are sensitive or high occupancy. Further, the use of those designations in zoning may mean that while current proposed uses are non-sensitive, long term use of that space may change to include sensitive or high occupancy uses without any review by Metrolinx. Metrolinx Adjacent Development Guidelines - GO Transit Heavy Rail Corridors dated December 2022 clearly defines Metrolinx' position on the definition of sensitive or high occupancy use (and for some time now and as indicated in Appendix A to this document spaces and Mr. Rong's previous comments, such as regularly occupied offices and retail front of house are included in that type of space.) Please comment on use of space within 120m of the rail corridor in the context of the Metrolinx guideline's definition of sensitive and high occupancy uses. | Please see the enclosed Rail Safety Justification Memorandum, dated May 16, 2023 which is included as Attachment 3 to the Rail Study Response Memo that described the uses in the existing building. |
| | 34 | Structural Engineer Comments<br>Agree that the bridge extension and utility crossings must be reviewed by Metrolinx; however, those are beyond the scope of this current review. | Noted. |
| | 35 | SWM Engineer Comments (on the SWM Report)<br>Section 3.4.1.3-- states that the allowable release rate through the 525 mm under the rail tracks is 1.1 m3/s, and the 100-year discharge from the site will be limited to this rate through various control measures (roof storage, cisterns, stormwater tanks, trench drains. Specific details and siziing is deferred to detailed design. Will Metrolinx be given the opportunity to comment during detailed design? | Acknowledged. Metrolinx shall be given the opportunity to comment during detailed design. |
| | 36 | SWM Engineer Comments (on the SWM Report)<br>Section 3.4.2.3 - in addition to LID, future 100-year peak flows are proposed to be attenuated to the 525 mm pipe capacity with private onsite storage, and storage in public parks and public open spaces. There are no specific design details or sizing provided. | Acknowledged. Subsequent resubmissions shall provide additional detail and sizing at the appropriate granular detail. |
| | 37 | SWM Engineer Comments (on the SWM Report)<br>Similarly, there are no grading details provided for the road parallel to the rail. We woud normally expect to see grading to assess the potential for storm drainage to spill to the rail ROW, or conversely the potential for overland drainage from the rail corridor to spill to the site. | Subsequent submissions shall provide further clarity regarding drainage and grading interfaces along the Metrolinx Corridor. The design intent shall be to match or improve the existing conditions by capturing all stormwater originating within the Project extents within the Projects dedicated stormwater design through grading and drainage system interventions. |

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| | 38 | SWM Engineer Comments (on the SWM Report)<br>Section 3.4.5 - the report describes existing overland flow routes to the Ancaster neighbourhood, which will be maintained. But the storm design is described earlier as capturing the entire 100-year storm and conveyeing it to the 525 mm outlet across the rail tracks at a controlled rate. Please clarify the intended funciton of the overflow route to the Ancaster neighbourhood. Is it only to function during system overflows or when flows exceed the 100-year event? What is the ultimate outlet? Does it enter Metrloinx property? | No overland flow route is proposed to the Metrolinx Corridor during the 100-year storm. The proposed condition shall be improved through the proposed stormwater management controls such as use of floodable open space at Garrat Blvd Park, super-pipe storage along the main trunk sewers, green infrastructure, and development block storage. Further details shall be provided in subsequent submissions. |
| | 39 | SWM Engineer Comments (on the SWM Report)<br>We note that the proposed 1.1 m3/s outflow rate through the existing 525 mm pipe under the rail tracks will result in a velocity of 5.1 m/s. The City of Toronto sewer design standards identify that, where velocities exceed 3 m/s, additional design factors shall be taken to protect against pipe displacement, scouring, erosion, and hydraulic jumps. We are flagging this as a concern for Metrolinx infrastructure to be addressed in design | A design flow of 1.1m3/s is part of the agreed design and construction of the Stanley Greene neigbouhood. It is part of the existing conditions and capacities within the network. The Hanger District intends to connect to this pipe making use of these existing cacities. Upgrades to the pipe are not proposed. |
| | 40 | SWM Engineer Comments (on the SWM Report)<br>Section 4.1.3 notes that the PC SWMM results were generated with an AES 6-hr 100-year storm. The City of Toronto sewer design standards reference a 6 hr Chicago storm distribution with a 10 minute time step for sewer design. We are concerned with potentially even higher velocities in the 525 mm rail crossing pipe. | The proposed design meets the limiting design criteria of 6 m/s. The model shall be submitted based on a Chicago design storm with a 10min timestep to meet City standards. |
| | 41 | Metrolinx Adjacent Development Team (PLN Block Context Plan - s. 4.3.2)<br>I really like the emphasis the development places on a multi-modal mobility network with a particular focus on a robust active transportation network. My only comment here is to ensure that this network stretches up to Downsview Park GO station. As there is no parking and a limited PUDO area I think active transportation is the key access element to get people to/from this development from the station. At this point the network seems to stop at the north end of the station, so just want to ensure that the plan is to stretch it to Downsview Park GO and integrate the paths/streets into the overall Downsview Park mobility network. | See response to Metrolinx' comment (Comment No. 6). |
| | 42 | Metrolinx Adjacent Development Team (PLN Block Context Plan - s. 4.3.5)<br>Will the proposed private shuttle service be on-demand? Or will frequency and coverage be based on future demand projections? It is really important to ensure fast, reliable, convenient transit access for people right from the start so that their habits are geared towards taking transit as soon as possible. While on-demand can certainly do this, it is also challenging to inform people of the service itself. Will the shuttle service go right to Downsview Park station or will it link up with TTC bus service east of the site? The private shuttle is a really nice idea, but it creates another layer of transit required for people to get to their destination. So if they are going to Union Station they will take a shuttle to a bus to the GO station and then down to Union. Same goes for subway access. That many change in service vehicles may entice people to take other forms of transportation - potentially driving which nobody wants to see. | See response to Metrolinx' comment (Comment No. 7). |
| | 43 | Metrolinx Adjacent Development Team<br>Will space be saved for a potential additional GO Rail station that the City was exploring to the south side of Downsview Park near the Garratt Blvd development? If so then the transportation network (especially the transit network, AT network, and complete streets) should have the potential to expand towards the proposed station and connect future riders to the development and beyond. | See response to Metrolinx' comment (Comment No. 8). |
| | 44 | Metrolinx Adjacent Development Team (A-002a,003,005,009, and A-006a)<br>1: Please provide dimensions, distances, as well as clearances, and clarify if dewatering/excavations are involved for all the pipe installations and structures? If dewatering/excavations are required, how would the track be protected against settlement and stability? | See response to Metrolinx' comment (Comment No. 9). |

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| | 45 | Metrolinx Adjacent Development Team<br>2:All voided structures (i.e. culverts, pipes, etc.), permanent and temporary retaining structures within the MX Line of Influence (450mm from edge of tie, 2H:1V downward projection) shall be designed for Cooper E-80 railway loading and satisfy all applicable requirements as per MX General Guidelines. | See response to Metrolinx' comment (Comment No. 10). |
| | 46 | Metrolinx Adjacent Development Team<br>3: Further review will be provided once the structural scope of work adjacent to MX railway corridor is provided. | See response to Metrolinx' comment (Comment No. 11). |
| | 47 | Metrolinx Adjacent Development Team (Drawing A-003 Concept Site and Landscape Plan)<br>Beyond technical requirements for the pedestrian bridge crossing, Metrolinx would require the proponent to enter into an easement and/or provide compensation for air rights in an agreed upon commercial agreement. | See response to Metrolinx' comment (Comment No. 12). |
| | 48 | Metrolinx Adjacent Development Team<br>In accordance with Metrolinx's Adjacent Development Guidelines, sensitive uses with direct exposure to the rail corridor must provide derailment protection – which includes a safety barrier in conjunction with the aforementioned 30 metre horizontal setback. The safety barrier must be designed to the satisfaction of Metrolinx and its engineering consultant, AECOM, and demonstrate that the proposed development will be protected in the event of a train derailment scenario. | See response to Metrolinx' comment (Comment No. 13). |
| | 49 | Metrolinx Adjacent Development Team (Rail Report Section 5.2)<br>Metrolinx has reviewed the Rail Safety and Risk Mitigation Report prepared by ARUP and dated May 2022. Under Section 5.2 of the study, it notes that all industrial uses are considered non-sensitive/high occupancy uses where no assessment or mitigation is required. Metrolinx requests that this section is revised as industrial uses that involve high levels of human occupancy for prolonged periods of time are still considered sensitive uses that require some form of rail protection. | See response to Metrolinx' comment (Comment No. 14). |
| | 50 | Metrolinx Adjacent Development Team (Rail Report)<br>The Rail Safety and Risk Mitigation Report will require review by Metrolinx's Technical Advisor, AECOM. The applicant is advised to contact Metrolinx Project Manager, Third Party Projects Review – Adjacent Development Review (Alexandra.Goldstein@metrolinx.com) to initiate coordination between the proponent and AECOM for their technical review | See response to Metrolinx' comment (Comment No. 15). |
| | 51 | Metrolinx Adjacent Development Team (SWM)<br>Please note that Metrolinx and Metrolinx's Technical Advisor, AECOM will need to review the stormwater management plan and stormwater management report for the site to ensure there is no additional drainage onto the rail corridor. | See response to Metrolinx' comment (Comment No. 16). |
| | 52 | Metrolinx Adjacent Development Team (Landscape Plans)<br>Please note that as part of Metrolinx's GO Expansion program, a 3.5m setback from the rail corridor has been established where tall-growing vegetation (such as trees) can not be permitted. Some low-lying vegetation, such as shrubs or ornamental grasses, may be appropriate, subject to Metrolinx review. | See response to Metrolinx' comment (Comment No. 17). |
| | 53 | Metrolinx Adjacent Development Team<br>Please note that depending on the manner of construction, the Owner may be required to enter into Construction Agreements (i.e. Crane Swing Agreement and Tieback Agreement) with Metrolinx. Any construction activity including shoring, tie-backs, crane swing within or immediately adjacent to Metrolinx's rail corridor must be reviewed and coordinated with our Technical Advisor (AECOM).<br><br>In addition to the technical review, it should be noted that various Metrolinx permits/approvals/agreements with associated fees may be required for implementation/construction. For example, this includes, but not limited to, private property when works are proposed within 30ft of an active rail. As such, these permits/approvals/agreements with their required fees and processing timelines in advance of proposed work, should be factored into your construction cost and schedule accordingly. More detail can be provided as the application and details progress. | Acknowledged. See response to Metrolinx' comment (Comment No. 18). |

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| | 54 | Metrolinx Adjacent Development Team (Noise Report)<br>Metrolinx supports the inclusion of a warning clause, as recommended in Section 8. Please revise the report to include the following warning clause:<br><br>Warning: Metrolinx and its assigns and successors in interest has or have a right-of-way within 300 metres from the land the subject hereof. There may be alterations to or expansions of the rail facilities on such right-of-way in the future including the possibility that Metrolinx or any railway entering into an agreement with Metrolinx to use the right-of-way or their assigns or successors as aforesaid may expand their operations, which expansion may affect the living environment of the residents in the vicinity, notwithstanding the inclusion of any noise and vibration attenuating measures in the design of the development and individual dwelling(s). Metrolinx will not be responsible for any complaints or claims arising from use of such facilities and/or operations on, over or under the aforesaid right-of-way. | Acknowledged. See response to Metrolinx' comment (Comment No. 19). |
| | 55 | Metrolinx Adjacent Development Team<br>The Proponent shall enter an Adjacent Development Agreement with Metrolinx to ensure Metrolinx's concerns are addressed. The Agreement will include an environmental easement for operational emissions, which is to be registered on title for all uses within 300 metres of the rail right-of-way. Included is a copy of the form of easement for the Proponent's information. The Proponent may contact Harrison.Rong@Metrolinx.com with questions and to initiate the registration process. | Acknowledged. See response to Metrolinx' comment (Comment No. 20). |
| | 56 | General Comments<br>It is the contractor(s) responsibility to comply with Metrolinx requirements and obtain approvals prior to any work within 30 feet of Metrolinx Live Rail, and / or on Metrolinx Right-of-Way (Refer to the link: http://www.metrolinx.com/en/projectsandprograms/constructionanddevelopment/permits-and-guidelines.aspx); | Acknowledged. |
| | 57 | General Comments<br>Please note, anyone working adjacent to, over, under, and within the GO Transit's / Metrolinx's Right-of-Way shall complete the new Metrolinx Personal Track Safety (PTS) Course which can be found in the link: http://www.metrolinx.com/en/projectsandprograms/constructionanddevelopment/personal-track-safety-program.aspx; | Acknowledged. |
| | 58 | General Comments<br>Please note, anyone working in Metrolinx Right-of-Way / Corridor, shall follow Metrolinx standard for Personal Protective Equipment (PPE) – attached herewith;<br>a. The purpose of the main changes to the PPE requirements is to increase the visibility of personnel and vehicles when working in the rail corridor and in proximity to vehicles, machinery, and equipment, in order to better protect all people; | Acknowledged. |
| | 59 | General Comments<br>As per Metrolinx direction, the health and safety measures shall be included in work plans during this ongoing health crisis (COVID-19). The supplemental health and safety measures regarding COVID-19 (such as health prescreening, hand washing stations, potable washroom, safe distancing, possible case of COVID-19 in the worksite, etc.) shall be implemented during the proposed work.<br>a. Please ensure that all parties follow Metrolinx requirements when working inside Metrolinx ROW. Please find the enclosed documents for your review and reference;<br>i. Metrolinx mandatory face-covering policy;<br>ii. COVID-19 site guidance for employees;<br>iii. COVID-19 Construction H&S Protocols; | Acknowledged. |

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| | 60 | General Comments<br>Please be advised, all Contractors must first complete COVID-19 screening measures prior to work on Metrolinx property. As of December 2020, Metrolinx has rolled out an online screening tool. Mandatory online screening form can be found in the link: https://metrolinx.service-now.com/login.do; | Acknowledged. |
| | 61 | General Comments<br>Please note, if the proposed work requires any ground disturbance (i.e., the breaking of any ground to include installation of stakes / spikes, grading, stripping, excavations, etc.) within the Metrolinx Railway Right-of-Way and / or 30 feet from the nearest track, the proponent / contractor would need to have full valid locates – i.e. Ontario One Call, PNR (i.e. for Metrolinx), and CN;<br>a. It is a mandatory requirement to have full valid locates before any ground disturbance with severe consequences if not adhered to; | Acknowledged. |
| | 62 | General Comments<br>Please note, work within and adjacent to Metrolinx Railway Right-of-Way shall be performed under Railway Flagging Protection and all flagging protection will be at the proponent's expense; | Acknowledged. |
| **City / Entuitive Peer Review of Rail Safety Study**<br><br>**(March 24, 2023)** | 63 | It is noted that this report is to be read in conjunction with Rail Safety and Risk Mitigation Report for the Proposed Redevelopment of Downsview Lands (report dated September 27th, 2021). Please refer to all open comments provided by Entuitive during the Peer Review of the specified report; these comments should be closed before any other reports' if the original report is referenced. | Acknowledged. Please refer to the Rail Safety OPA Comment Responses shared with the City / which is appended as Attachment 1 to the the Rail Study Response Memo. |
| | 64 | We understand that this report is specific to the Taxiway West South Sub-District which includes the area west of the rail corridor (south of Phase B and north of the Works Yard). | Acknowledged. |
| | 65 | Please provide sections of the buildings closest to the rail corridor, with occupancies labelled. | A Rail Safety Justification memo dated May 16, 2023 has been prepared to respond to Metrolinx' comments to further support the approach to rail safety. A copy was provided to the City of Toronto City Planner in May 2023 and it has been enclosed with this resubmission as Attachment 3 of the Rail Study Response Memo. This includes further information on the existing and proposed occupancies adjacent to the railway. |
| | 66 | We understand that CN freight activity is not considered because it is infrequent. Please provide communication or confirmation from CN to support this. | Enclosed with this resubmission is a general response that was obtained from CN for this corridor dated July 10, 2020 together with communications from Metrolinx, dated May 25, 2020. It is understood that freight levels reduce as you move south along the corridor and that through engagement with Metrolinx that freight will continue to become less common as the passenger service becomes more frequent. Please refer to Attachment 2 of the Rail Study Response Memo. |
| | 67 | We understand that "The Hangars" building is proposed at "Light Industrial Use" please define the types of use more specifically. The 2022 Metrolinx Adjacent Development Guidelines defines industrial use as Low and High Occupancy, and there are different setback requirements for each. Is The Hangars building categorized as Low or High Industrial Occupancy? | Please see the enclosed Rail Safety Justification Memo dated May 16, 2023 that further described the existing and proposed uses of the existing building on the site. It shows that the hangar building, an existing building, continues to propose low occupancy light industrial use and the latest resubmission materials continue to reflect this. More details on the existing building can be found in section 2.1 of the memo, which is appended as Attachment 3 to the Rail Study Response Memo. |
| | 68 | Is the west side of The Hangars structurally dependent on the east side? In the case of a derailment and impact to the west side of the building, would a progressive collapse be caused? | The existing buildings on the site were built over time. Details sourced from the structural engineers is included in the Rail Study Response Memo in Appendix 2 confirming that the closest building on the west end (the existing Superstore) is structuerally independent from the rest of the existing hangars. |

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| | 69 | Is the described park space and supporting retail meant to be accessed by the public? The City of Toronto does not support the idea of a public park within 30m of the rail corridor. The City would support this space as transient-use but not as programmed park space. | Park spaces have inherently lower occupancy and primarily a transient space, similar to multi use trails and other spaces that are established uses adjanct to Toronto's railways. The City of Toronto's preference on park location are a planning not rail safety consideration. Notwistanding, the formerly proposed Rail Park and Rail Square have been removed, as shown in the Rail Safety Justification and no public park space is proposed in that area (enclosed in Attachment 3 of the Rail Study Response Memo). |
| | 70 | The 2022 Metrolinx Adjacent Development Guidelines describe commercial space as sensitive-use. Does Metrolinx consider the small-scale retail proposed sensitive? If so, what are the rail safety mitigating measures required? | There is no dedicated retail space proposed adjacent to the rail corroridor. The mention of potential small-scale retail activities refers to the opportunity to have small kiosks or temporary events within park spaces to activate the area. As the proposed Rail Park and Rail Square have been removed from the plan, there are no retail activities propsoed within the immediate area. |
| | 71 | We understand that no physical safety measure is being proposed. We also understand that increased derailment angles have been tested for.<br>1. Have accidental increased train speeds also been considered?<br>2. Please provide a reason to why a 10-degree derailment angle was not tested for. | The approach and justificaition has been expanded in reponse to a request from Metrolinx. Please see the Rail Safety Justification Memo enclosed with this resubmission for further details (included as Attachment 3 of the Rail Study Response Memo). In summary, additional trains speeds have been considered as well as increased angles. |
| | 72 | Without rail safety mitigating measures, the parking structure will be completely sacrificial in the event of a derailment. Please confirm the proponent understands. | Noted, however also note that the parking structure is also proposed to support a pedestrian overpass. This bridge will be designed in consideration of AREMA and other applicable code that may result in increased robustness for the parking structure. This design will be subject to a separate design process. |
| | 73 | An anti-trespassing fence is required but not mentioned. Additionally, Metrolinx requires specific anti-trespassing measures. How will the risk of trespassing be mitigated? | There is an existing fence along the corridor and the site is currently an active developed site. Metrolinx is currently undertaking works through the corridor and this includes proposed fencing improvements or change to meet thier current standards. Generally the development does not intend to remove Metrolinx' fence, but should this be the case, it will be replaced with the same specs. |
| | 74 | Are any additional mitigating measures considered for the mixed-use building (i.e. structural redundancy)? The FCM/RAC Guidelines recommend both a 30m setback and a berm, the proposed mitigating measure is a 38m setback. | The mixed-use residential building has now been converted to an employment use. The building itself has not be designed yet (will be done through the site plan approval process). Within the initial reporting some recommendations have been included for this building in the form of structural improvements or redundancy to be considered based on the final design and location of uses. |
| | 75 | Additional hazards to consider:<br>1. Excess train speed<br>2. Debris (air and ground borne)<br>3. Smoke/Exhaust<br>4. Trespassing | Not all of these hazards would necessarily lead to derailments. Excess train speed has been considered in the Rail Safety Justification Memo enclosed with this resubmission (see Attachment 3 to the Rail Study Response Memo). Fire and debris were included in the original assessment and risk was considered neglibible. In relation to trespassing, there is an existing fence along the rail corridor and Metrolinx have proposals for some changes or improvement to the fencing as part of their works. The development site is actively occupied now and will be in the future and as such, no changes to fencing or trespassing provisions are proposed. |
| | 76 | In the case of freight train derailment risk, the OPA Rail Report is referenced. Please close all comments related to this report before referencing it. | Please refer to response to OPA Rail Report comments, dated 26/09/22, located in Attachment 1 of the Rail Study Response Memo enclosed with the resubmission. Note that the justrificatio memo considers both freight and passenger derailment noting the worse case if from a passenger train. |

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| **Enbridge**<br>**(Jun-14-2022)**<br><br>**Contact: Casey O'Neil** | 77 | Enbridge Gas Inc. does not object to the proposed application(s) however, we reserve the right to amend or remove development conditions.<br><br>This response does not constitute a pipe locate, clearance for construction or availability of gas.<br><br>The applicant shall contact Enbridge Gas Inc.'s Customer Connections department by emailing SalesArea10@Enbridge.com to determine gas availability, service and meter installation details and to ensure all gas piping is installed prior to the commencement of site landscaping (including, but not limited to: tree planting, silva cells, and/or soil trenches) and/or asphalt paving.<br><br>If the gas main needs to be relocated as a result of changes in the alignment or grade of the future road allowances or for temporary gas pipe installations pertaining to phased construction, all costs are the responsibility of the applicant.<br><br>In the event that easement(s) are required to service this development, and any future adjacent developments, the applicant will provide the easement(s) to Enbridge Gas Inc. at no cost.<br><br>The applicant will contact Enbridge Gas Inc.'s Customer Connections department by emailing SalesArea10@Enbridge.com prior to any site construction activities to determine if existing piping facilities need to be relocated or abandoned. | All new construction in the District is proposed to be all-electric, but this does not include existing buildings that are already powered by gas. We will coordinate with Enbridge to confirm any changes to Enbridge infrastructure onsite to facilitate the development of the district. |
| **Canada Post**<br>**(Jun-16-2022)**<br><br>**Contact: Mike Monteleone**<br>**michael.monteleone@canadapost.ca** | 78 | Canada Post Corporation appreciates the opportunity to comment on the above noted application and wishes to convey that the Corporation has no objections, nor wishes to impose conditions with respect the to the proposal.<br><br>Should the approval of the proposal result in site plan applications for any of the proposed 15 lots, Canada Post requests to be circulated for comments and will convey specific conditions for service related to each application. | Acknowledged. |
| **TTC**<br>**(Jul-06-2022)**<br><br>**Contact: Arno van Dijk**<br>**arno.vandijk@ttc.ca** | 79 | This section of the development site is outside of the TTC's 60 metre development review zone. However, future district developments within the Downsview Airport Lands may be in close proximity to TTC Line 1 (Yonge-University-Spadina) Subway, Downsview Park, Sheppard West and Wilson stations and the TTC Wilson Yard and the TTC will have more fulsome comments for those particular applications.<br><br>Property, Planning and Development (PPD) provided comments on this project in a letter dated January 31, 2022. The comments dated January 31, 2022, continue to apply to the subject development, however, modified comments have been provided below.<br>Please incorporate the following PPD comments and conditions into your response to City Planning.<br><br>**Draft Plan of Subdivision Comments**<br>The proposed draft plan shall be updated to reflect any alternative configurations of the development, public road and/or TTC loop, that arise out of discussion with the TTC Planning, Development and Projects. | We have reviewed the referenced Letter dated Janaury 31, 2022 which provides comments for the separate but concurrent Official Plan Amendment Application for the entire Downsview Airport Lands ("Downsview Centre Lands").<br><br>Upon our review, our understanding is that the letter applies to the entire lands and not the Hangar District specifically as the district is located well beyond 60 metres away from any existing TTC infrastructure.<br><br>The District's Draft Plan will be updated, as needed, to reflect any alternative configurations of the development, road network and/or proposed TTC route. We would be pleased to meet with the TTC team to discuss comments on the District Plan. |
| **Engineering & Construction Services**<br>**(Jul-22, 2022)** | 80 | **Functional Services Report**<br>Executive Summary: Please replace "Stormwater Management Report" with "Functional Servicing Report". | Noted. |

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| Contact: Vivian Yao<br>416-394-8081<br>Vivian.Yao@toronto.ca | 81 | **Functional Services Report**<br>Please add a chapter regarding how green street requirements (WQ 1.2 Green Streets) will be implemented in the application. Please at-grade Bioretention facilities provided shall capture and control 75% of runoff from on-site hardscape surfaces. | Compliance with WQ 1.2 Green Streets and WQ 1.3 On-site Green Infrastructure shall be further detailed in a future resubmission of the SWM Report and drawing package. Drawings for the Public ROW shall be detailed to indicate the selective placement of Green Infrastructure elements in support of the wider MESP and Downsview Framework Plan for water quality and water balance. The District shall target full retention of the runoff associated with the 25mm storm from public/private ROW areas. As recommended the Applicant team would like to work with City Staff to collective create a stormwater management strategy that best implements the recommendations and guidelines from the MESP. |
| | 82 | **Functional Services Report**<br>The total area is 41.4ha in Table 3 and 35.49ha in Table 4. Please verify. | The proposed sanitary catchment area is smaller than the existing catchment area as it only account for I/I within the ROW where there is a sanitary pripe present - not across the whole site as was considered in the existing condition. Refer to updated Figure 7 for further detail. |
| | 83 | **Functional Services Report**<br>Delineate the west and east existing contributing drainage areas in Figure 5. | The updated Funcitonal Servicing Report has been revised accordingly. |
| | 84 | **Functional Services Report**<br>Delineate the west and east proposed contributing drainage areas in Figure 7. | The updated Funcitonal Servicing Report has been revised accordingly. |
| | 85 | **Functional Services Report**<br>If TGS Tier 2 (such as 40% reduction in potable water) is pursued, a 3rd party verifiers will be required to demonstrate such targets can be met. | The Third Party Verifier Process will be followed for all private development sites at 50% CD, per the City's requirements. Third Party Review is not required at this time. |
| | 86 | **Functional Services Report**<br>Page 16: Please provide a calculation regarding how the conservative 19,000 L/min fire flow was derived. | A fire demand of 19,000L/min is a conservative fire demand referenced from the DCSW. It is not an estimated value but an adopted value as a test to identify any critical locations. |
| | 87 | **Functional Services Report**<br>For multiple towers (including shared underground, shared one podium) category and is subjected to the following servicing requirements:<br>8.1 Each tower is to have its own set of water, sanitary & storm service connections to municipal systems;<br>8.2 Shared podium is to have its own set of water, sanitary & storm service connections to municipal systems;<br>8.3 Each tower/podium is to have its own SWM facility. Shared SWM facility if not reasonable to separate, provided:<br>- Each tower/podium to have its own stormwater collection pipe system; and<br>- Each collection pipe system to have its own monitoring system installed; | At this stage, the materials are identifying required municipal infrastructure to support the development blocks. Additional detail regarding individual servicing connections to towers to be provided at a later stage of design. It would be helpful to work with ECS staff to understand where exceptions can be permitted to allow for shared servicing connections where it cannot be accomodated or for efficiency purposes. |
| | 88 | **Functional Services Report**<br>For townhouse development (including stacked townhouses) category and is subjected to the following servicing requirements:<br>9.1 Each condominium corporation is to have its own set of water, sanitary & storm service connections to municipal systems<br>9.2 Each condominium corporation is to have its own SWM facility. Shared SWM facility if not reasonable to separate, provided:<br>9.3 Each condominium corporation shall have its own stormwater collection pipe system; and<br>9.4 Each collection pipe system shall have its own monitoring system installed. | At this stage, the materials are identifying required municipal infrastructure to support the development blocks. Additional detail regarding individual servicing connections to towers to be provided at a later stage of design. It would be helpful to work with ECS staff to understand where exceptions can be permitted to allow for shared servicing connections where it cannot be accomodated or for efficiency purposes. |

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| | 89 | **Functional Services Report**<br>Figure 11: hydraulic modeling analysis should only account for the watermains within the public roads. Please revise for further review. | The updated Funcitonal Servicing Report has been revised accordingly. |
| | 90 | **Functional Services Report**<br>Figure 13: Illustrate the overland flow directions in the adjacent areas. | Figure 13 has been removed from the updated Functional Servicing Report. |
| | 91 | **Functional Services Report**<br>4.3.1 Required Network Upgrades: Please confirm whether Ancaster Road and Home Road will be regraded to improve active transportation connections with the development of the Subject Area. | We are not proposing to regrade Ancaster Road and Home Road to support the stormwater management strategy, but expect there will be some minor grading work to upgrade the existing right of way to install bike lanes, bus infrastructure, new sidewalks, etc. |
| | 92 | **Functional Services Report**<br>Figure 17: Illustrate the overland flow directions. The figure indicates multiple discharge outlets which are different from the two OLF in figure 13. | Acknowledged. Please note that this section will be removed in subsequent revisions of the FSR. |
| | 93 | **Functional Services Report**<br>Drawing C-311: Add a north arrow in the plan. | Noted. North arrow has been added. |
| | 94 | **Functional Services Report**<br>Clearly state the existing and proposed population within the site. | Proposed populations within the site are described in Table 1 of the original FSR submitted in May 2022. As the site is an operating Bombardier aerospace facility and runway, there are no existing residents on site. |
| | 95 | **Functional Services Report**<br>Please continue providing up-to-date flow monitoring information for further review. | No additional flow monitoring is being procured for this District. All flow monitoring data is being collected through the MESP process. |
| | 96 | **Functional Services Report**<br>When the sanitary flow depth in the sewer, under peak flow, will not be 0.3 of the pipe diameter or greater, the actual flow velocity at the peak flow should be calculated. | Acknowledged. Calculation sheets have been updated to address the comment and a note added to the FSR text. |
| | 97 | **SWM Report**<br>The approach of retaining 25mm water to achieve the stormwater quality target (80% TSS removal) is under review by TW staff. Comments will be provided when available. | Acknowledged. Please provide further comments as they are available. |
| | 98 | **SWM Report**<br>The proposal of dedicating Garratt Blvd Park as a floodable space is under review by PF&R staff. Comments will be provided when available. | Acknowledged, we look forward to discussing more with PF&R staff through District SWM workshops. |
| | 99 | **SWM Report**<br>Please be advised the Foundation Drainage Policy and Guidelines will apply to all new development applications received by the City of Toronto under the Ontario Planning Act, including all new Official Plan Amendments, Zoning By-Law Amendments, Plan of Subdivision applications, as well as new Site Plan applications, except for Committee of Adjustment applications, starting January 1, 2022. Please refer to the City website for the policy, guidelines and other information. | Noted. |
| | 100 | **SWM Report**<br>4.1.1 Modelling Parameters: Parks should use more than 0% imperviousness. PF&R staff will provide specific imperviousness requirements when available. | Acknowledged. Please provide further comments as they are available. The PCSWMM model shall be revised to indicate a 20% imperviousness value for parks as a starting point recognizing the level of imperviousness will differ from park to park depending on programming and functions. |
| | 101 | **SWM Report**<br>4.1.1 Modelling Parameters: Only 1.0mm IA in the impervious area is recognized by the City. | Acknowledged. The modelling will be updated to reflect this change. |
| | 102 | **SWM Report**<br>Please note while a detailed Stormwater Management (SWM) Report for each private site is only needed at Site Plan Application Stage, a detailed SWM report for the proposed ROW area is required at the zoning and subdivision review stage. Please continue to provide detailed design information in the upcoming submissions. | Acknowledged. Further detail for the ROW areas shall be provided as subsequent revisions to the SWM report. Please note that the water quality and water balance strategy shall be developed as a subsequent revision to align the design development with the concurrent progression of the MESP process which is under active engagement as of the writing of this response. |

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| | 103 | **Draft Plan of Subdivision**<br>Include the following Draft Approval Certificate on each plan submitted at time of application (REFER TO COMMENTS LETTER FOR TEMPLATE) | The Draft Approval Certificate has been added to the updated Draft Plan of Subdivision enclosed with the resubmission. |
| | 104 | **Draft Plan of Subdivision**<br>Dimension all the proposed road and laneway width, corner roundings, daylighting Triangles and reserves (if applicable). | Noted, all necessary dimensions have been added. |
| | 105 | **Draft Plan of Subdivision**<br>Show natural and artificial features in the southwest area adjacent to the land to be subdivided. | Linework illustrating adjacent artificial features areas have been added to the Draft Plan enclosed with this resubmission. |
| | 106 | **Civil Drawings (Grading, Servicing, Public Utilities)**<br>Please be advised that the detailed engineering drawing set will be reviewed under a separate process after the draft plan approval has been issued by City Planning. The applicant should submit drawings directly to Development Engineering (not through Planning) for proper circulation and review. | Acknowledged. |
| **Solid Waste Management Services** | 107 | Solid Waste is unable to provide comments at this time. More detailed comments will be provided in the future. | Acknowledged. |
| | 108 | Please ensure that there is proper access for waste collection vehicles and that buildings are designed with waste management infrastructure as per City of Toronto and Solid Waste Management Services Requirements as amended from time to time. | Acknowledged. Access for a City of Toronto waste collection vehicle has been accommodated at the loading bays serving residential uses via typical solid waste requirements (3-point turn and internalized maneuvering to allow a garbage truck to exit onto a public street in a forward motion). More detail on building design will be provided through future site plan applications including truck swept path diagrams. |
| | 109 | Any blocks (likely L and M) that will be proposing developments that would utilize curbside collection may require a specific clause to be added in relation to waste collection. Please contact SWMS staff to discuss. | Acknowledged. The need for curbside collection for certain blocks will be confirmed at a later more detailed stage of the design. We will coordinate with SWMS to ensure appropriate clauses are provided for this possible condition, as needed. |
| **Toronto Catholic District School Board**<br>**(Jul-22-2022)**<br><br>**Contact: Micael Loberto** | 110 | Please be advised the Planning Rationale report submitted with the proposal prepared by Northcrest Developments states that:<br><br>*"Specifically, the Toronto District School Board ("TDSB") and Toronto Catholic District School Board ("TCDSB") have informed Northcrest that existing schools in the immediate vicinity of the Subject Area have existing and longer-term capacity to accommodate expected pupil yields from the Subject Area."*<br><br>The above statement is not correct as the TCDSB does not have existing and long-term capacity to accommodate expected pupil yields from this subject area. Additionally, the introduction of an additional 9 Districts as part of the iD8 Lands will further exacerbate enrolment concerns in this area. The TCDSB requests that the above statement be corrected to stating: *"The TCDSB does not have sufficient capacity in existing schools surrounding the Downsview development. TCDSB continues efforts to secure appropriate sites within the iD8 Lands to address accommodation needs resulting from this development"*<br><br>As mentioned in previous correspondence the TCDSB has been actively involved in the engagement process, participating in multiple Community and Social Infrastructure Engagement sessions beginning in 2020 into 2022 for the iD8 Downsview Lands. At these sessions the TCDSB identified the need for multiple school sites within and surrounding the Downsview Secondary Plan Area and iD8 Lands. | Acknowledged. The Applicant will revise the langage upon issuance of the final Planning Rationale Report.<br><br>Coming out of discussions with TDSB and TCDSB at the Secondary Plan level, it is understood that no new schools have been identified for this first district, and that for TDSB schools, there will be a subsequent review on the potential expansion of existing schools to address accomodation needs resulting from this development and future developments.<br><br>We are committed to ongoing conversations with the TCDSB and the TDSB, to ensure that future communities at Downsview are appropriately served by elementary and secondary schools. |
| | 111 | Due to concerns associated with school accommodation, the Toronto Catholic District School Board wishes to advise that should the development proceed without accommodation for school buildings, that the attached clauses be included in the City's conditions of approval and subsequently within any agreements of purchase and sale for the proposed units of this plan. (REFER TO COMMENTS LETTER FOR CONDITIONS) | Acknowledged, will be included in agreements of purchase and sale. |

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| **Toronto District School Board & TLC**<br>**(Jul-26-2022)**<br><br>**Contact: Matt Bagnall**<br>**mbagnall.tlc@tdsb.on.ca** | 112 | Toronto Lands Corporation (TLC) and the Toronto District School Board<br>(TDSB) continue to work with the applicants and their consultant team, as well as the City's 'Update Downsview' team, to determine new school requirements within the Downsview lands, including requirements within Phase<br><br>1. Indeed, the Planning Act (s.51(24)(j)) states that, in considering a draft plan of subdivision, regard shall be had to, among other matters, "the adequacy of school sites".<br><br>As more detailed information regarding population/residential unit projections is provided and assessed, TLC/TDSB will be able to advise on location and timing of new school space, which may include lands within Phase 1.<br><br>TLC requests to be notified on all future public notices, resubmissions, appeals and other matters and requests to be included on the Interested Parties List with respect to these applications. | Acknowledged, subsequent meetings with TDSB have been held and our understanding is that no new school is required for this district. Plans for expansions of existing schools to increase capacity are being reviewed by TDSB. |
| **Environment & Energy Division**<br>**(Jul-26-2022)**<br><br>**Contact: Austin Barton**<br>**(Austin.barton@toronto.ca)** | 113 | EED staff reviewed and deemed complete the initial Energy Strategy Report on May 2022, noting our interest to continue working with the applicant in several areas:<br>1. Further exploration of renewable thermal energy solutions.<br>2. Strategies to achieve Toronto Green Standard Version 4 Tier 3, especially reducing emissions, as the site evolves through design development.<br>3. Alignment with Toronto Hydro on expected electrical demands.<br>4. The implementation strategy for energy solutions, including the potential for partnering with third-party utilities (i.e. energy developers). | 1. We will continue to explore renewable thermal energy solutions as part of a new working group initiated in early 2023 and will invite Environment & Energy Dvision to particpate in this working group.<br>2. We will continue to strive to maximize performance levels under the Toronto Green Standard performance including building energy performance, GHG emission reduction, among other standards. It is important to recognize that the highest level may not always be technically and financially feasible, and will be further evaluated through the process. We have committed to achieving Tier 2 of the Toronto Green Standards as the minimum benchmark, and will continue to work towards exceeding these thresholds.<br>3. A Demand Justification Report was developed in close consultation and on behalf of Toronto Hydro and submitted to IESO in Spring 2022. This report will be used by IESO to assist in the long-term planning for capital improvements to the transmission system. We expect further collaboration to start again in early 2023 and would like to invite Environment & Energy Dvision to particpate in this working group.<br>4. Energy solutions are being explored as part of a new collaborative working group beginning in early 2023 and will invite Environment & Energy Division to particpate in this working group. |
| | 114 | The applicant is encouraged to coordinate with EED staff as they progress through design development, and address the following in any future resubmission:<br><br>2.1 Opportunities for a low-carbon thermal energy network (district energy system) serving some or all of the buildings, engaging with an energy developer to explore opportunities for connecting the Taxiway West South Sub-district with the rest of the Downsview redevelopment. If not feasible, the applicant is encouraged to design building mechanical systems for future connection (district energy-ready). | We are currently exploring the techincal and financial feasibility of a district energy system and will continue to coordinate with EDD Staff. |
| | 115 | 2.2 Identify opportunities for heat recovery from municipal infrastructure such as trunk sewers, and from any nearby waste heat sources. | We are currently exploring the techincal and financial feasibility of a district energy system. We would greatly appreciate if the City provide the contact with the appropriate City resources to further explore sewer heat recovery. |
| | 116 | 2.3 Ongoing engagement with Toronto Hydro to discuss electrical distribution system design options to support decarbonization and resilience. | Energy solutions are being explored as part of a new collaborative working group which began in early 2023 and will invite Environment & Energy Dvision to particpate in this working group. |

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| | 117 | **2.4 Low Embodied Carbon**<br>Conduct a Material Emissions Assessment for the structure and envelope in accordance with the Canada Green Building Council (CaGBC) Zero Carbon Building Standard v2 methodology for the Upfront Carbon lifecycle stage (A1-5). Identify low-carbon sustainable material alternatives to the proposed structure or envelope for use in the building project.<br><br>- Following the CaGBC Zero Carbon Building Standard v2 or later embodied carbon tracking methodology, calculate the total embodied carbon in kilograms of carbon dioxide equivalent (kg CO2e) and express the building average in kgCO2e/m2 for the cradle-to-substantial completion (upfront emissions) lifecycle stage (A1-A5) and complete a contribution analysis by building assembly or material type for the proposed building.Follow the CaGBC standard's object of assessment which is as follows: INCLUDE: envelope and structural elements including footings and foundations, complete structural wall assemblies (from cladding to interior finishes, including basement), structural floors and ceilings (not including finishes), roof assemblies, stairs, and parking structures.EXCLUDE: Excavation and other site developments, partitions, building services (electrical, mechanical, fire detection, alarm systems, elevators, etc.), fixtures and fitting, surface parking lots, and associated building site improvements.<br><br>- Complete and submit the Embodied Carbon Reporting Template and include the LCA software used, input assumptions, and results of the preliminary assessment identifying what changes were made to the proposed buildings in order to minimize the embodied carbon impact and further reductions. | Noted. A material emissions assessment will be provided, as needed, at the site plan approval stage. |
| | 118 | 2.5 All proposed development on a site with an existing building subject to demolition should be evaluated to: identify opportunities for reuse of demolition waste; and assess embodied emissions from materials. | Noted. Material reuse of demolition waste and assessment of embodied emissions will be considered and reviewed at a later stage of development, at the site plan approval stage. |
| **Urban Forestry**<br>**(Aug-08-2022)**<br><br>**Contact: Nick Biffis**<br>**nick.biffis@toronto.ca** | 119 | <u>Toronto Green Standard Version 4; Tree Planting and Soil Volumes:</u><br>The Landscape Plans do not provide complete soil volume calculations for proposed trees, or the required landscape sections as per the terms of reference. Provide revised Landscape Plans that:<br>a) Ensure the total soil volumes that meet the minimum requirement for each site;<br>b) State the total and per-tree soil volumes for each distinct tree planting area,<br>i.State the dimensions (depth and either area or width and length) used for calculating the soil volumes,<br>ii.Provide a completed Soil Volume for Tree Planting statistics template, and<br>iii.Label each individual soil area to correlate to soil volume calculations in the Soil Volume for Tree Planting Statistics template.<br>c) A minimum of 30m3 of soil per tree,<br>d) Tree species representing a diversity of large-growing shade trees,<br>e) A minimum planting size of 60mm caliper (balled and burlapped),<br>f) A minimum of 1.0m clearance between the tree trunk and property line,<br>g) A minimum of 3.0m horizontal clearance between the tree trunk and any portion of the building, including overhead canopies/outlines, and<br>h) A soil depth between 0.80m and 1.60m throughout each tree planting area. | Noted. Tree Planting and Soil Volume plan(s) will be provided at the next submission once design of the public ROWs have advanced with the City. |

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| | 120 | Continuous Soil Trench Sections:<br>Site-specific Landscape Sections of the continuous soil trenches at the trees and in between trees are required to ensure that the proposal is feasible and that tree planting, soil, and soil infrastructure (e.g. soil cells, concrete bridging supports, etc.) will not conflict with other structures/elements such as building canopies/overhangs, underground structures, and underground or overhead utilities. Provide scaled, site-specific sections that:<br><br>a) If applicable, reference on the Landscape Plans and site-specific sections applicable standard details from either the Tree Planting Solutions in Hard Boulevard Surfaces: Best Practices Manual (February 8, 2013) or the Design Options for Tree Planting in Hard Surfaces (available on the City's Green Streets webpage),<br>i. Copies of the applicable standard details may be included on the Plans to supplement the site-specific sections,<br><br>b) Illustrate and specify all applicable components of a functional suspended pavement system including, but not limited to:<br>i. Granular base and sub-drainage,<br>ii. Applicable bridging/support system (cast-in-place or pre-cast structural concrete panels or soil cells),<br>iii. Geo-textiles and/or geo-grids,<br>iv. Root barriers, if applicable,<br>v. Edge restraints, if applicable,<br>vi. Overlying pavement assembly,<br>vii. Irrigation/aeration collection and distribution system – including at-grade catchment device(s) to be shown on applicable sections and plans,<br>viii. Soil inspection ports (min. 1 port per 4 trees) – also show location(s) on applicable plans,<br><br>c) Label at-grade passive irrigation catchment device on applicable section(s) and plan(s) as: "Passive irrigation/aeration catchment and distribution system to meet City standards",<br>i. Illustrate trench conditions at the trees (with tree location(s) shown) and in between trees,<br>ii. Illustrate (at an accurate size, height/depth, and location) and label all overhead and underground utilities,<br>iii. Illustrate (at an accurate size, height/depth, and location) all building components such as canopies/overhangs and underground structures,<br>iv. Illustrate and label all property lines,<br>v. Dimension all pertinent measurements including, but not limited to:<br>vi. Widths of open tree planter and extents of available soil underground,<br>vii. Widths and depths of available soil for each portion of a given section where the depth is different (e.g. at tree opening/planter, at soil extending under suspended pavement, etc.), | Noted. Detailed cross sections illustrating continuous soil trenches/ soil cells will be provided together with the Tree Planting and Soil Volume plan(s) at the next submission. |

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| **Project:** | **The Hangar District (formerly known as the Taxiway West South Sub-District)**<br>Draft Plan of Subdivision and Zoning By-law Amendment Application |
| **City Application #:** | 22 148583 NNY 06 SB & 22 148540 NNY 06 OZ |

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| | 121 | Planting Soil Specification:<br>The Landscape Plans must provide a soil specification for tree planting that matches the City of Toronto standard Construction Specification for Growing Medium (TS 5.10, April 2014), and indicate whether soil is retained on-site or adjusted or replaced with soil of equal or better quality. Provide Landscape Plans with a note specifying the following soil(s) for each specific tree planting condition (all components to match parameters as specified in TS 5.10):<br><br>a) *Type I – Standard Mix (for trees planted in turf):* Texture to be 50-60% sand, 20-40% silt, and 6-10% clay; organic matter 2-5% by dry weight; pH 6.0-7.8; phosphorus 10-60ppm; potassium 80-250ppm; calcium < 5000ppm; magnesium 100-300ppm; soluble salt < 1.5mmhos/cm; infiltration/permeability/hydraulic conductivity 50-75mm/hr (at 85% Proctor density), and<br><br>b) *Type III – Boulevard Mix (for trees planted in hardscaped boulevards and over underground structures):* Volumetric mix of 40-45% topsoil, 40-50% coarse sand, and 12-15% pine bark compost; particle size distribution of > 45% medium-coarse sand (0.25-2mm) plus gravel (2-5mm), 18-35% total combined silt and clay; organic matter 3-5% by dry weight; pH 6.0-7.8; phosphorus 10-60 ppm; potassium 80-250ppm; calcium < 5000ppm; magnesium 100-300ppm; soluble salt < 1.5mmhos/cm; infiltration/permeability/hydraulic conductivity 50-75mm/hr (at 85% Proctor density).<br><br>c) Indicate whether soil is retained on-site or adjusted or replaced with soil of equal or better quality | Noted. Planting soil specification will be provided together with the Tree Planting and Soil Volume plan(s) at the next submission. |
| | 122 | Potential Tree-Utility Conflicts (BLOCK L):<br>Provide confirmation of the absence of conflicts between proposed new street trees and proposed and existing utilities as follows:<br>a) Perform investigative daylighting to confirm accurate depths and locations of existing utilities and report the results to Urban Forestry,<br>b) Submit the plans (with utilities shown as per daylighting data) to the Public Utilities Coordination Committee (PUCC) for their review and approval and provide the results of the PUCC review to Urban Forestry, and<br>c) If applicable, consultation with Toronto Water is highly recommended to confirm that the proposed continuous soil trench infrastructure above Toronto Water assets (if any) meets applicable setbacks. | Noted. Plan(s) illustrating tree-utility conflict will be provided at the next submission. |
| | 123 | Urban Forestry expects that all efforts will be undertaken early in the planning process to resolve utility-tree conflicts so that the tree planting requirements are met. If a utility conflict prevents the implementation of the proposed street tree planting, Urban Forestry may not issue a tree removal permit for the existing City-owned street trees, if present. | Acknowledged. |
| | 124 | TREES ON CITY PROPERTY<br>Application to Injure or Remove Tree(s): The plans and report show that the development proposes the removal of twenty-seven (27) City-owned trees identified as Trees #53-55, 63, 72-77, 79, 80, 84, 85, 87, 89, 90-92, 94-98, 100, 101 and 113. If approved, an Application to Injure or Remove Tree(s) and an application fees for twenty-seven (7) City-owned trees is required in an amount to be determined at a later date. | Acknowledged. |
| | 125 | TREES ON CITY PROPERTY<br>Tree Loss Payment: The plans and report show that the development proposes the removal of twenty-seven (27) City owned trees identified as Trees #53-55, 63, 72-77, 79, 80, 84, 85, 87, 89, 90-92, 94-98, 100, 101 and 113. If approved, Urban Forestry will require a Tree Loss Payment for the twenty-seven (27) trees, determined by their appraisal value in an amount to be determined at a later date. | Acknowledged. |
| | 126 | TREES ON CITY PROPERTY<br>Tree Survival Guarantee: The plans and report show that the development proposes the protection of nine (9) City-owned trees identified as Trees #56, 78, 81, 82, 83, 86, 88, 93 and 99. If approved, Urban Forestry will require a Tree Survival Guarantee deposit to ensure the protection of the nine (9) trees in an amount to be determined at a later date. | Acknowledged. |

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| | 127 | TREES ON CITY PROPERTY<br>Tree Planting Deposit: Urban Forestry requires a Tree Planting Deposit for proposed new City trees proposed in an amount to be determined at a later date to ensure the planting of the new City trees required to be shown in the proposed Landscape Plan. The Tree Planting Deposit must be submitted to the attention of David Bostock, Acting Supervisor of Urban Forestry, and Tree Protection & Plan Review. The deposit will be drawn upon to cover all costs incurred by the City of Toronto in enforcing and ensuring that the trees are planted and kept in a healthy and vigorous state during the two-year guarantee period. The General<br>Manager of Parks, Forestry & Recreation shall hold the tree planting security deposit for the duration of the renewable guarantee period. | Acknowledged. |
| | 128 | TREES ON CITY PROPERTY<br>Contractors agreement: The applicant will need to submit a complete "Agreement for Private Contractor to Perform Work on City-owned Trees" and certificate of insurance prior to removing any City-owned trees. | Acknowledged. |
| | 129 | TREES ON PRIVATE PROPERTY<br>Application to Injure or Remove Tree(s): The above noted plans show that the development proposes the removal of one (1) tree identified as Tree #18 and injury of three (3) trees identified as Trees #1-3 that are over 30cm in diameter on privately-owned property. If approved, an Application to Injure or Remove Tree(s) and an application fees for five (5) trees will be required in an amount to be determined at a later date. | Acknowledged. |
| | 130 | TREES ON PRIVATE PROPERTY<br>Replanting: Urban Forestry administers two tree planting requirements: planting of trees as required under the Toronto Green Standard (TGS) Version 4, and planting of trees required under the city's tree by-laws as a consequence of the removal of protected trees. Based on standard requirement, Urban Forestry requires new large growing native shade trees to be planted on private property to replace the one (1) private tree proposed for removal at a replacement ratio of 3:1. | Acknowledged. Appropriate location of the replacement trees will be determined in conjuction with the tree planting and soils plan to be provided with the next submission. |
| | 131 | TREES ON PRIVATE PROPERTY<br>The applicant is advised that once a completed application is submitted, a notice of application may be posted at the site for 14 days to provide an opportunity for the community to submit comments. Once the notice expires, Urban Forestry consults with the Ward Councillor to determine if a permit to destroy trees should be issued. Urban Forestry may be required to submit a report to North York Community Council to consider the application. Submission of an application does not guarantee a permit will be issued. As part of the review process, you may be required to submit revised plans to address the intent of the tree by-laws as indicated above. | Acknowledged. |
| | 132 | ITEM# Performance Measure Met / Not Met / NA<br>EC1.1 Tree Planting Areas and Soil Volume **- Not Met**<br>EC1.2 Trees Along Street Frontages - **Not Met**<br>EC1.3 Parking Lots - **Not Met**<br>EC1.4 Watering Program for Trees **- Not Met**<br>EC2.2 Native and Pollinator Supportive Species - **Not Met** | These will be addressed at the next submission when the Tree Planting and Soils Plan is prepared. |
| **Bell Canada**<br>**(Jun-06-2022)**<br><br>**Contact: Ryan Courville**<br>**planninganddevelopment@bell.ca** | 133 | No Comments. See Draft Conditions of Approval Tab. | Acknowledged. |

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| **Hydro One**<br>**(Jun-16-2022)**<br><br>**Contact: Kitty Luk**<br>**landuseplanning@hydroone.com** | 134 | We are in receipt of your Draft Plan of Subdivision Application, 22 148540 NNY 06 OZ dated June 3, 2022. We have reviewed the documents concerning the noted Plan and have no comments or concerns at this time. Our preliminary review considers issues affecting Hydro One's 'High Voltage Facilities and Corridor Lands' only. | Acknowledged. |
| **Toronto Hydro**<br>**(Jun-08-2022)** | 135 | Toronto Hydro is in receipt of your email sent to utility.circulations@torontohydro.com. The information and comments provided herein are for INFORMATION PURPOSES ONLY and may NOT be used for the purposes of a Full-Stream Permit Application pursuant to the City of Toronto's Municipal Consent Requirements.<br><br>The drawing attached hereto is being provided for the purposes of planning only, and must not be used for construction. The Applicant shall be liable for and shall indemnify and hold harmless Toronto Hydro for any damages, losses, liabilities, costs, expenses, including legal fees and consequential damages relating to any act or omission by the Applicant in the use of the attached drawing(s) for any purposes apart from planning on behalf of the Applicant.<br><br>NOTICE TO CITY OF TORONTO: Toronto Hydro has NOT provided its sign-off pursuant to the Municipal Consent Rquirements as of the date written above. Do NOT grant a Full-Stream Permit to the Applicant at this time.<br><br>In order to identify Toronto Hydro infrastructure in the drawing, locates must be completed in the field.<br><br>All proposed work must maintain the minimum horizontal and vertical clearances as per Toronto Hydro Construction Standard 31-0100, 31-0500 & 31-0700, attached hereto. Clearance measurements are taken from the edge of the hydro plant to the edge of the proposed work.<br><br>Once the Applicant's planning is complete, the Applicant must submit its drawings to Toronto Hydro once again pursuant to the Circulation and Sign-Offs procedure under the City of Toronto's Municipal Consent Requirements in order to receive Toronto Hydro's sign-off for the purposes of a Full-Stream Application. | Acknowledged. |
| | 136 | PRIOR TO CONSTRUCTION<br>Request locates from Ontario One Call at 1-800-400-2255 or online at http://www.on1call.com.<br><br>Review the ESA/TSSA Guideline for Excavation in the Vicinity of Utility Lines, available on the ESA Electrical Distribution Safety website: http://www.esaeds.info.<br><br>Please contact our Customer Offers and Sustainment (COS) Dept. at 416-542-2533 for disconnecting power or Toronto Hydro plant removal before any demolition. | Acknowledged. |
| | 137 | PRIOR TO CONSTRUCTION<br><u>Relocations</u><br>Toronto Hydro assets can be relocated at the expense of the Applicant.<br><br>If the relocation of Toronto Hydro assets is necessary, please contact Utility Relocations group at utility.relocations@torontohydro.com to begin a relocation request.<br><br>After sufficient information has been received to process a relocation request, Toronto Hydro relocation projects typically require 12 to 18 months to be completed.<br><br>Toronto Hydro will require a deposit or full payment in advance of doing the work. | Acknowledged. |

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| | 138 | PRIOR TO CONSTRUCTION<br>Overhead Toronto Hydro Assets – General Guidelines:<br>Mechanical equipment such as crane and hoist shall not be operated within 3 m of lines or equipment.<br><br>No awning, billboard, antenna mast, flag, roof or similar structure shall be installed on the public allowance or immediately adjacent to private property that is within 3 m of lines or equipment. | Acknowledged. |
| | 139 | PRIOR TO CONSTRUCTION<br>Underground Toronto Hydro Assets – General Guidelines:<br>For heavy equipment operation in the vicinity of Toronto Hydro underground plant, ensure the requirements from Toronto Hydro Distribution Construction Standard 31-0500 are met.<br><br>Breaking into, or accessing, cable chambers, vaults and handwells is not permitted without consent from the relevant Toronto Hydro Dept., and anyone found to have so done will be prosecuted to the fullest extent of the law and pursued civilly for any damage.<br><br>Tunneling within 3m is deemed a conflict that requires a Professional Engineering report to resolve. | Acknowledged. |
| **Toronto and Region Conservation Authority (Nov-2-2022)**<br><br>**Contact: Mark Rapus**<br>**437-880-2417**<br>**mark.rapus@trca.ca** | 140 | **Ecology Comments**<br><br>Section 4.5.1 of the District Plan identifies high level principles to create City Nature. While these high level principles would seem in general to be positive, it's unclear how the layout and implementation of the proposal will facilitate these principles. Of particular concern are the principles of wildlife habitat connectivity and the creation of new, viable habitat patches within the broader Downsview Airport Lands area. This would include the creation of a large forest parcel (>2ha) in a to be determined appropriate location within the Downsview Airport Lands. As the details related to these opportunities continue to be discussed for the larger area, it's unclear how the 123 Garratt Blvd proposal considers these and ensures that it is maximizing opportunities within the Garratt Blvd parcel while not precluding or prejudicing the decisions around where these opportunities would be best implemented. Please provide greater detail and direction related to specific design elements that will be incorporated into the Garratt Blvd parcel, demonstrate their effectiveness based on the life functions of the flora and fauna that these elements/areas are being designed to attract, and demonstrate compatibility with the broader MESP process for the Downsview Airport Lands. | The request to provide a large forest parcel on the Downsview Centre lands is being addressed through Secondary Plan process. It should be noted that it is not the intent of the Secondary Plan policy to identify a large forest area in each district, but if appropriate can be reviewed for feasibility at the district level. Given the constraints that the existing hangar buildings present, opportunities for large forest parcels are not feasible in this district.<br><br>The approach to biodiversity and ecology for the District focuses on providing diverse vegetative planting palette that can support green infrastructure functions and also provide food for pollinators and urban wildlife. |
| | 141 | **Water Resource Comments**<br><br>General – The report does not appear to consider the comments provided by TRCA related to the Draft MESP stormwater management, specifically those related to quantity control targets based on the 2020 Humber River SWM Quantity Control Criteria document. Please update the overall SWM strategy for the Downsview Park block plan to ensure that this subdivision is consistent with the overall strategy. Further, since the MESP has not been approved, advancement of the subdivision design will be at the risk of the proponent to re-design of the SWM practices to meet the SWM targets of the final MESP. | As agreed with the City of Toronto through the on-going development of the MESP, the Humber River document will not be added as a design criteria supporting the SWM design at this time. Consistent with the MESP, this project will utilize the 2-yr existing flow rate as the allowable release rate to existing municipal storm sewers, developed based on existing conditions and not a greenfield pre-development condition. The details surrounding the SWM strategy overall are to be resolved and finalized to be consistent with the Final MESP, the effort for which is actively occuring. |
| | 142 | **Water Resource Comments**<br><br>Section 1.4.1 – Please include the 2020 TRCA Humber River SWM Criteria Update with the list of documents to assist with the updated quantity storage volumes for the Humber River Watershed. Further, please include the TRCA LID wiki with the design guidelines, as the wiki provides more options and designs than the 2010 LID document: https://wiki.sustainabletechnologies.ca/wiki/Main_Page | As stated previously and agreed with the City of Toronto staff, the Humber River document will not be considered for establishing design criteria for the SWM strategy. The recommendation to reference the STEP Wiki shall be considered as a tool during detailed design to develop the final water quality strategy. |

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| | 143 | **Water Resource Comments**<br><br>Table 1 –Please note the following comments related to these specific areas:<br><br>Water Balance – Please note that the 2012 TRCA SWM Criteria document states that water balance for this area should provide best efforts to match the post development water budget with the pre-development, including runoff, infiltration, and evapotranspiration. TRCA Water Resources staff are encouraged by the target of retaining 25mm of rainfall on-site to reduce runoff volumes to receiving systems, however a site wide water balance assessment is still necessary to determine the potential water balance impacts proposed by the development, including an annual assessment of the site infiltration, evapotranspiration, and runoff volumes.<br><br>Water Quality – TRCA agrees with the treatment train approach to meeting the 80% TSS removal target, and encourage that the proponent consider using the LID Treatment Train Tool provided on the STEP website to confirm sizing and treatment requirements: https://sustainabletechnologies.ca/lid-ttt/<br><br>Water Quantity – The site is located upstream of sensitive FVAs and watershed based quantity control targets are necessary to confirm that the proposed development area will not exacerbate the downstream flooding situation. Please confirm the latest unit release rates are being used from the Humber River SWM Quantity Control Criteria Updates, 2020, report, including Regional controls as required for this area. These values should be clearly provided in this report as the target rates.<br><br>Erosion – Please note that the TRCA SWM Criteria document states that erosion controls should be based on the 25mm design storm released over 48 hours. Please update the criteria to show this target. | Water Balance - Acknowledged and understood. The details surrounding the SWM strategy are to be resolved and finalized within the Final MESP. However, it is anticipated that additional detail regarding the specific strategy to achieving the water balance requirements will be resolved through District Plan level analysis.<br><br>Water Quality - The Applicants appreciate the recommendation, and will consider use of this tool at appropriate locations within the OPA Lands.<br><br>Water Quantity - The peak flow rate target for the Taxiway West District is dictated by the allowed agreement with the Stanley Greene development to discharge 1100 L/s during the 100-year storm. The Humber River unit rate is ~8 times less than the maximum allowable peak flow rate allowed via the noted agreement. The Project will incorporate our own unit rates for watersheds based on existing conditions, not a greenfield pre-development condition. The existing condition shall be improved due to the numerous stormwater interventions that will be proposed as part of the project. Downstream flooding is not anticipated to be increased due to the Project. Additional areas of perviousness, SWM peak flow rates controls, and green infrastructure are all proposed to be added as part of an overall SWM contorl strategy. Note, the Applicants reemphasize that these types of restrictions will result in trade-offs. Notably, higher performance on quality and quantity control will result in less open space, reduce the ability to achieve the benefits of City Nature, and will result in higher levels of typical grey infrastructure. |
| | 144 | **Water Resource Comments**<br><br>Section 3.4.1 – The report states that SWM practices will be split into private and public lands. Please confirm how areas that have integrated runoff, such as private driveways draining to public roadways, will be considered. | Runoff criteria regarding quantity, quality, balance and erosion control shall be applied based on the design criteria table in the SWM report. In practical terms, the SWM design in private features shall include dedicated SWM practices that capture the appropriate amount of overland and piped flow. The piped system shall connect into the public system through direct piped connections that shall serve as both direct and indirect (i.e. overflow) connections from the private SWM infrastructure into the public SWM infrastructure. We will ctoninue to work with the City to implement the thinking from teh MESP to the Hangar District SWM Strategy. |
| | 145 | **Water Resource Comments**<br><br>Section 3.4 General – Overall, the report provides a high level SWM strategy without any actual design layouts specific to the proposed development confirming that the target values can be achieved. For this level of report prior to detail design, please provide a conceptual SWM strategy based on the proposed development to confirm that the SWM targets can be met within the proposed layout, including but not limited to:<br><br>a. Conceptual level design drawings showing SWM facility locations and conceptual facility type and layout, confirming drainage areas and facility sizing, outlet, and access.<br>b. Conceptual level sizing calculations, modelling and/or design calculations to meet target values.<br>c. Write-up in the body of the report summarizing the results of the design and calculations, including tables that compare the target quantity, quality, erosion, and water balance values with the proposed design mitigations. | The details surrounding the SWM strategy are to be resolved and finalized such that they are consistent with the Final MESP. The level of detail that is currently presented is intended to size the municipal storm sewers along the proposed public roadways and establish the location of concept level stormwater controls to meet Quantity Control criteria. Future submissions shall expand upon this to include parcel-specific water quality and water balance targets to achieve criteria compliance, and additional concept level detail presented in the SWM calculations. This will include conceptual figures and layouts for facilities within proposed public right-of-ways as well as parks and open spaces. |

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| **Community Services & Facilities (Jun-28-2022)**<br><br>**Contact: Susan Kitchen**<br>**416-397-4072**<br>**susan.kitchen@toronto.ca** | 146 | A Community Services and Facilities Report (the Report) was submitted to support the proposed Framework Plan for the Downsview Lands. The Report includes the typical contents of a CS&F Study – demographic profile, detailed inventory of CSF in the area, and a summary of service capacity. It also summarizes public and community engagement to date, examples of innovative and facility models, and identifies best practices in deliberate engagement with the service sector and local leaders towards a multidisciplinary approach to CSF planning and delivery. | Acknowledged. |
| | 147 | The Report acknowledges that larger scale developments provide opportunities for more land consumptive CSF such as CRCs, schools and libraries. These larger developments include the subject site, as well as development in the surrounding area such as Allen District East, William Baker Neighbourhood, the Tippet Road Regeneration Area and Yorkdale Mall Redevelopment. The Report notes that these developments will result in significant funding for additional services and facilities, involve community engagement on service needs and priorities, and are of a scale that makes them suitable for the transfer of land for CSF. | Acknowledged. |
| | 148 | The Report recognizes the need to continue with a collaborative approach to social infrastructure planning for the area that ensures alignment with existing initiatives that will serve the evolving needs of both existing and future residents. | Acknowledged. |
| | 149 | The Report provides an extensive review of existing CSF available and planned for in the surrounding area and provides preliminary analysis of potential need for both planned and future facilities to serve the magnitude of growth anticipated. It is intended to serve as the foundation for more detailed CSF studies to be completed through the District Plan process. | Acknowledged. |
| | 150 | The subject application will be reviewed concurrently with the Update Downsview Study process and related working groups that have been established on Community Services and Facilities, as well as Community Benefits and Economic Development. As the necessary analysis and consultations are undertaken to identify community service facility priorities and delivery strategies, Policy staff will provide further advice on potential CS&F contributions that may be made to support the creation of a livable, healthy and inclusive community as part of the subject site's redevelopment. | Acknowledged. We look forward to working with City staff on the community services and facilities plan for this district. |
| **Housing Policy (Jul-22-2022)**<br><br>**Contact: Graham Haines**<br>**416-392-8124**<br>**graham.haines@toronto.ca** | 151 | The provision of 983 (34.5%) two-bedroom units and 321 (11.3%) three-bedroom units supports the unit mix objectives of the Growing Up guidelines, Official Plan housing policies, and the Growth Plan's growth management and housing policies to accommodate within new development a broad range of households, including families with children. In line with the unit mix required for other neighbourhoods, we recommend that the final zoning by-law secures the following unit mix requirements:<br><br>a. At least 15% of the total units are two-bedroom units;<br>b. At least 10% of the total units are three-bedroom units; and<br>c. An additional 15% of the total units have at least two bedrooms. | Acknowledged. The updated District Plan continues to satisfy the unit mix requirements. Coordination with City Planning on the final zoning by-law will occur at a later date following this resubmission. |
| | 152 | The proposed average unit size of 74.3 square metres for two-bedroom apartment units and 75.7 square metres for two-bedroom townhouse units are both smaller than 87 square metres. The proposed average unit size of 100.3 square metres for three-bedroom units is greater 100 square metres. Further review, as detailed design advances will be required to determine if/how the proposal adequately supports the unit size objectives of the Growing Up guidelines to accommodate within new development a broad range of households, including families with children.<br><br>a. We recommend that the final zoning by-law secure a minimum number of two-bedroom units that are at least 87 square metres in size, and a minimum number of three-bedroom unit that are at least 100 square metres in size. | It is our intent to provide a range of housing sizes, including larger family-sized units, but imposing a strict minimum will result in inefficiencies in design and the inability for many of these larger units to be leased/sold in today's market.<br><br>Coordination with City Planning on the final zoning by-law will occur at a later date following this resubmission. |
| | 153 | The Housing Issues Report identifies that the affordable housing requirements of SASP 596 will be met either through the securing units as affordable rental units for a period of at least 20 years, and/or via the conveyance of the units to provide for permanent affordable housing. Such an approach is acceptable, and should be secured through one or more legal agreements. | Acknowledged. |

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| **Heritage**<br>**(Nov-08-2022)**<br><br>**Contact: Michael Seaman** | 154 | In combination with the CHRA, the HIA presents a detailed overview of the site, including its evolution through significant periods of expansion, and the role of individual structures. It also identifies key historical/associative values of the site:<br><br>• aviation history in Canada<br>• the aerospace industry's impact on the Canadian economy<br>• well-known aircraft manufacturers and production lines.<br><br>The HIA also presents an approach to the site which, in its retention of the majority of the structures on the site, presents an exciting beginning to plans for the site that understand and desire to integrate its remarkable history into its future.<br><br>After careful review and analysis of the CHRA and HIA, and in light of recent conversations about the runway which have understood the entire site as a potential cultural heritage landscape, Heritage Planning's comments are intended to expand on ERA's approach to Heritage Planning believes that an approach to 123 Garratt Boulevard by emphasizing an understanding of the site as an industrial aerospace complex which has evolved as it has produced aircraft consistently from the 1950s to the present. | Through discussions with Heritage staff at the Secondary Plan level, it is understood that neither the entire site nor the Runway are identified as being a cultural heritage landscapes and not referenced as so in Secondary Plan policy. Matters related to the Runway will continue to be addressed through the Secondary plan process. |
| | 155 | Heritage Planning believes that an approach to the site as an evolving complex of interrelated/interconnected structures better allows an understanding of its heritage value.<br><br>a) While the HIA limits strong historical/associative values to the pre-war and wartime history of De Havilland, and only partially ascribes value to the 1950s era structures in the Bombardier complex, Heritage Planning believes that values related to aviation history in Canada, the aerospace industry's impact on the Canadian economy, and well-known aircraft manufacturers and production lines extend to all elements of the complex constructed at least prior to the past 40 years. The innovative development of STOL technology, STEM technology, and the purchase of De Havilland by the Canadian government in the 1974 all support this approach.<br><br>i. Given that the site has continuously served aircraft production, any changes or alterations to buildings through that period are related to those values, and don't detract from them.<br><br>b) An approach to the site as a complex also supports clear contextual value to all elements of the complex, recognizing the visual, historical, and functional relationship between the distinct elements from the complex. | Refer to response provide in the heritage memo, dated January 27, 2023, provided separately to the City. |
| | 156 | Given Heritage Planning's approach to the site as an evolved industrial complex, and to the assignment of historical/associative and contextual values to all elements of the complex, Heritage Planning proposes to list the entire complex as having value as a complex. The future of all those elements will be determined, as per our usual process, in the context of a Planning Application. | Refer to response provide in the heritage memo, dated January 27, 2023, provided separately to the City. |
| | 157 | Heritage Planning is also holding open the conversation about whether any individual structures on the site may have design value. | Refer to response provide in the heritage memo, dated January 27, 2023, provided separately to the City. |
| | 158 | The subject applications affect the area referred to in the application materials as the Taxiway West South Sub-District which is distinguished by the Bombardier complex and the lower portion of the west taxiway. The applicant proposes to introduce a substantial amount of new development to support a new mixed-use community. | Refer to response provide in the heritage memo, dated January 27, 2023, provided separately to the City. |
| | 159 | The HIA indicates that none of the structures on the site are currently included on the City's Heritage Register nor designated under the Ontario Heritage Act and therefore the proposal does not contemplate demolition or removal under the OHA or the City of Toronto Municipal Code. To be clear, the conservation process relating to the Bombardier complex has already been initiated through the in-force Downsview Area Secondary Plan which identifies the complex as a heritage resource and recommends the complex for listing on the City's Heritage Register. As the complex has already been identified as having cultural heritage value, any demolition and/or removal of any of the buildings will require the submission of the relevant application upon listing on the Heritage Register. | Refer to response provide in the heritage memo, dated January 27, 2023, provided separately to the City. |

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| | 160 | In general, the evolution of the site with new and continued uses maintains the cultural heritage value of the Bombardier complex. The proposal seeks to retain the majority of the buildings within the complex but includes the full removal of the Cafeteria, Bay 11 and the Fire Pump House and partial removals of Bay 12, the Administration Building and the Superstore.<br><br>Staff generally accept the retention strategy described in the HIA but strongly encourage the applicant to retain the Cafeteria building. As indicated in the CHRA dated September 27, 2021, the Cafeteria is one of the original 1950's buildings within the complex, the function of which was to support the workers. It is also noted that the building information sheet in the CHRA recommends the Cafeteria be listed on the City's Heritage Register. Staff also believe the Cafeteria is an integral component of the complex and suggest the applicant consider its retention and rehabilitation and, instead, remove the 1980's addition on the east side of the Administration Building. | The matter of the Cafeteria building was discussed with Heritage Staff and the Applicant's project team through a series of meetings and workshops. It was confirmed that the removal of the Cafeteria was supportable, per email correspondence from Heritage Staff dated May 1, 2023. Northcrest will work with Heritage Staff to prepare a commemoration strategy for the Cafeteria at a later date. |
| | 161 | The CHRA also includes descriptions of six sub-areas within the larger Downsview site. The Runway is one such sub-area which is described as including the scale and orientation of the taxiway as a primary connection to the runway from the Bombardier complex. Staff believe this is an important relationship and one that should be conserved. As a way to conserve and emphasize the unique historical relationship between the complex and the taxiway/runway, staff recommend the applicant maintain an open space in the location that connects the Bombardier complex with the taxiway, shown in the following image. Whether it is a park, a central square or other type of open space, this can be discussed further. (Refer to PDF Comments Letter dated Nov 8, 2022) | This idea was considered in the original District Plan with the proposal of Central Square at the terminus of the Taxiway Street and the entrance to the hangar Atrium. Central Square as been significantly expanded to better reinforce this visual connection between the Taxiway Street, Bay 12 and the hangars. We believe this connection is further enhanced by the Plaza, another public open space located outside the Bay 12 building as well as the Taxiway Street which offers a physical and visual extension of the formal Taxiway which was determined to terminate at the eastern boundary of the District. |
| | 162 | Staff are not able to comment on the proposed changes to the individual buildings at this time since not enough information about those interventions has been provided in the application materials. Staff are aware, however, of the need for changes to the buildings necessary for their new and continued uses and look forward to those discussions as the project progresses. | Please refer to the Urban Design Guidelines provided with the initial application submission, in which there are guidelines that indicate how the retained buildings are to be repurposed and how adjacent new buildings, public realm and public art may respond to the site's industrial character. |
| **City Planning, Urban Design, Transportation Planning (Jan 13-2023)** | 163 | Final recommendations of the zoning by-law amendment and draft plan of subdivision applications are required to wait until the Official Plan Amendment for the Update Downsview Study comes into force and effect. | We acknowledge that final approval of the applications will have to follow approval of the Secondary Plan OPA. |
| | 164 | Staff are in discussions on the potential options/process of how to recommend approval of each district plan. This will be determined through the Update Downsview process. | Acknowledged. |
| | 165 | The proposed development blocks are to be informed by further discussions with regards to the matters related to cultural heritage, street network and the proposed parks and open spaces. Detailed discussions with regards to matters such as built form, massing and public realm within the development blocks will be determined after the proposed development blocks have fully been considered. | We acknowledge that the final form of the proposed development blocks will be impacted by discussions on the the street network, parks and open space, heritage matters, etc. but we hope to concurrently address any comments related to general built form, massing, and public realm within development blocks. |
| | 166 | Please do not colour the tops of all the buildings green. It is sometimes difficult to distinguish between the proposed parks and the proposed buildings. | For the illustrative site and landscape plan, the green portions are to indicate green roofs. For future iterations, we will modify the shade of green to clearly differentiate between parks and green roofs. |
| | 167 | Comments specific to the implementing draft Zoning By-law and draft Plan of Subdivision will be provided once the final form of development has been agreed upon. | We hope to work with staff on the general structure of the draft zoning by-law and draft plan of subdivision, with the understanding that details will be confirmed at a later stage. |
| | 168 | Staff are reviewing the proposed land use designations through the Official Plan Amendment application (File No. 21 225717 NNY 06 OZ) to ensure a full range of uses are provided so that complete communities can be achieved. | Noted, the proposed zoning shall be consistent with the land use designations proposed at the OPA level, and will be modified should there be any changes at that level. |

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| | 169 | The plans presently propose a Mixed Use Areas designation between the existing City works yard and the Bombardier Hangars. This area is more appropriate to be designated Employment Areas to provide for a continuous employment area along the western portion of the district, to ensure the long term viability of the Employment Areas designation to the north and south and that there are no compatibility issues in the future. | Although we believe a mixed-use zoning which allows for residential development on these lands (Block H, previously Block J) is appropriate and compatible with the surrounding uses, as determined by our land use compatibility study, we have revised the proposed designation for the lands to show Employment zoning as requested by staff to be consistent with the draft Secondary Plan, which expands the General Employment Area designation to these lands. Should the use and function of the City Works Yard and other uses along Murray Rd change from employment to a greater mix of uses in the future, the land use in this area could appropriately respond by rezoning these lands back to mixed-use to allow for a full range of compatible uses. |
| | 170 | Compatibility factors including air, noise, dust and vibration are being studied (peer reviewed) to understand how these impacts, as well as the rail corridor and City works yard may impact and be impacted by the planned adjacent Mixed Use Areas within the Secondary Plan. | Noted, our preliminary findings concluded that there are no adverse impacts, and mitigation measures can be employed to allow sensitive uses to operate adjacent to the rail corridor and works yard, similar to existing conditions.<br><br>The proposed development will include mechanical heating, ventilation, and air conditioning systems. These systems will be designed to ensure that the applicable MECP air quality regulations, standards and guidelines are met off-site and at the building itself. If required (depending on the type and size of systems used), an MECP ECA or EASR will need to be obtained. This is no different from any other similar development. |
| | 171 | The City recently adopted OPA 536 relating to Rail Infrastructure and Public Safety. Further information on these requirements can be found here:<br>a. http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2022.PH31.1 | Acknowledged. The applicant/owner has appealed OPA 536 with respect to the lands, and have resolved the issues through the mediation process. |
| | 172 | Parkland will be identified through the District Plan and secured through the approval of the draft Plan of Subdivision application. For detailed comments please refer to the Parks, Forestry and Recreation memo dated October 6, 2022. | Acknowledged. Responses have been provided above. |
| | 173 | Site and Area Specific Policy 596 requires:<br><br>a. "until the amount of non-residential gross floor area on the designated lands exceeds 371,500 square metres, non-residential uses will be developed prior to or concurrent with residential uses at a 1:1 ratio, such that the amount of residential gross floor area on the designated lands may not exceed the amount of non-residential gross floor area on the designated lands."<br><br>b. The uses in the Taxiway district are proposed at 207,406 square metres of residential, 131,156 square metres of employment, 28,568 square metres of retail and 1,236 square metres of community uses. The proposed film studio is 57,329 square metres. Additional discussion is required to determine phasing/tracking of the uses within the proposed development to comply with the requirements of SASP 596 noted above. | A summary of the proposed residential and non-residential gross floor area is outlined in the resubmission cover letter. Further discussion around the nature and timing of delivery on non-residential GFA to occur as part of advancing the Secondary Plan. |
| | 174 | The Update Downsview Study will identify the appropriate land use designation adjacent to the Ancaster neighbourhood. | Noted, the proposed zoning is consistent with the land use designations proposed through the draft Secondary Plan (Mixed Use Areas), and will be modified should there be any changes in the future. |
| | 175 | Consider addressing the need for housing unit flexibility to adapt to changing household needs and building configurations to support larger households/households with children (i.e. the ability to combine units, units with additional living space/washrooms, integrating courtyards or other open space in multi-unit buildings, etc.). | Acknowledged. The District Plan contemplates a variety of unit types, including larger 2- and 3-bedroom units (over 30% and 10% of the proposed units, respectively), as well as ground-related units that can accommodate larger households/households with children. Unit design details are difficult to consider at the district planning level, and will be considered at Site Plan stage. Many of the proposed multi-unit residential buildings do include courtyards, with their design to be further detailed at a later stage of the approvals process. |

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| | 176 | Consider multiplexes and ground related apartment building forms, in addition to townhouses, in the lower density area adjacent to the Ancaster neighbourhood. The proposed CRE zone abutting the Ancaster community is not appropriate. A transition must be established through an appropriate zone category to implement the ground related building forms. | The District features low-rise built-forms (up to 4 storeys) adjacent to the Ancaster Neighbourhood, which can be designed to incorporate ground-related units along appropriate frontages, with detailed typology and design details to be determined at site plan stage. These lower-scaled buildings will provide a sensitive built form transition, and at the same time, provide a greater range in housing option adjacent to the Ancaster neighbourhood, aligning with the City-wide initiative on Expanding Housing Options in Neighbourhoods. The intent for CRE zone in these areas are to permit a range of community supportive retail and live-work type uses. The proposed CRE zone is consistent with the Mixed Use Areas designation in the draft Secondary Plan for these lands. |
| | 177 | The Framework Plan from the OPA application proposes an overall density of 1.2 FSI for the Taxiway districts. This application proposes 1.64 FSI. Please provide further clarification with regards to the difference between the two proposed FSIs and how the proposed FSI fits into the context of the larger area. | The District includes both the North Sub-District (Film Studio Campus) and South Sub-District (now called the Hangar District). Although the Hangar District as a standalone proposes a FSI of 1.64, together with the North Sub-District, the blended FSI does not exceed the overall density cap of 1.2. |
| | 178 | Further discussions are required with respect to the size of each "density area" within the district. Generally density and the related height should be directed away from the Ancaster community with the interface area being at the lowest height and density. | Acknowledged. As discussed in detail in urban design meetings with staff since the initial submission, this is consistent with the general intent for height distribution within the District, with the lower heights up to four storeys proposed along the edges that interface with the Ancaster community to provide appropriate transition. However, there are also other factors driving height distribution in the District, keeping the height of buildings in other internal areas low: the adaptive reuse of hangar buildings (up to 4 storeys) that respect its original scale without adding vertical elements; the need to keep the building height low through the centre of the District in order to maintain the Official Plan view of the Downtown skyline from the Downsview Park Mound, which goes through the District. As a result, the height has been directed to the north east of the District towards the future Taxiway East District, generally away from the Ancaster community. |
| | 179 | Public Realm: (refer to attached Concept Diagram)The public realm is the fundamental organizing element of the city and its neighborhoods and plays an important role in supporting population and employment growth, health, liveability, social equity and overall quality of life. It is a key shared asset that draws people together and creates strong social bonds at the neighbourhood, city and regional levels.<br><br>The Downsview Taxiway District has many unique features, including the taxiway which is a fundamental organizing element and has the potential to be a great public space linking the Bombardier Hangars to the Runway.<br><br>Concept Diagram Comments:<br>1.Possibly reroute GarratBlvd extentiondirectly adjacent to hanger building by using grid streets.<br>2.Remove 1980s addition and retain the Cafeteria building.<br>3.Increase “Central Square” by removing Block B.<br>4.Align Powell Road to meet the small street in the district area.<br>5.Maintain the current Taxiway width throughout (referring to continuing the width of the Taxiway in the Taxiway East District).<br>6.Regularise streets crossing the Taxiway.<br>7.Ensure vehicles decrease speed when intersecting with Street A, perhaps have an intersection.<br>8.Consider the need for a structured above ground parking facility and its future uses. Consider a temporary structure and use.<br>9.Consider a public R.o.Wconnection from the north side of the Murray Works Yard as a pedestrian connection to the future GO Station.<br>10.Consider connections to Wilson via Ancaster and Garratt continuing cycling infrastructure.<br>11.Provide defined gateways to the district as well as views and vistas. | Through a series of meetings, including a full-day workshop with the City on April 28th, 2023, the following changes have been implemented in response to these 11 comments, in coordination with Staff:<br><br>**1.** It was confirmed by Heritage Staff per their email dated May 1, 2023, that the Cafeteria would not be required for preservation, and as such, the existing alignment of Street D is acceptable.<br>**2.** See response to comment #1.<br>**3.** Central Square has been expanded by removing Block B, increasing the size of the park to nearly four times its original size, from 1,046 m2 (0.26 acres) to 4,001 m2 (0.99 acres).<br>**4.** The extension of Powell Road has been revised to be more linear and extended to connect to Home Road (wrapping around the FlightSafety property). The previously proposed Lane E has become a municipal street and shifted north to align with the existing approach of Powell Road at Ancaster Road. Further design change was made to feature a link that provides a visual and pedestrian connection through to Central Square.<br>**5.** Through discussions with City Staff, the proposed 18.5 metre width and alignment of the Taxiway Street has been determined to be appropriate to provide a pedestrian-oriented street and a public realm, which is distinct in its role from the formal Taxiway, which terminates at the east edge of the District.<br>**6.** As discussed with City Staff, the applicant has agreed to provide a municipal public street crossing the Taxiway Street (Streets K and L)<br>**7.** It was confirmed with City Transportation staff that this comment has been addressed. No new intersection is required at Street A. |

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| | | | **8.** Noted. The District Plan is proposing aggressively low parking requirements and is actively working to promote the use of active transit and active transportation. The parking structure is needed to support the employment uses of the hangars, given that there will be no underground parking for the hangar buildings in order to retain these buildings. There are opportunities to convert this space from vehicular parking to serve a range of mobility/servicing/open space functions. As it is located within the 30m setback from a rail corridor, high-occupancy uses such as residential and commercial uses would not be permitted.<br>**9.** The plan has been revised to reflect a 20m reserve block within Block J to protect for a future extension of Murray Road to connect to proposed Street E within the District.<br>**10.** The proposed District Plan contemplates cycling facilities on Street D (Garratt Blvd. extension) and Street C (Ancaster Road extension). This is conducive to integrating with cycling infrastructure that the City may implement on Wilson Avenue and other streets external to the District's property boundaries. This street will operate with limited vehicular activity (primarily convenience pick-up/drop-off along the retail frontages of Taxiway Street) and function as southbound only.<br>**11.** A number of changes have been made to facilitate enhanced views from the external street network into the District. These include:<br>- a redesign of Block I to locate a public park on the north end of the block to improve the visual connection from Hanover Road and the existing Rober Leek Park into the District.<br>- a revised alignment of the former private Lanes A and B (now Streets K and L) as public ROW further extends this view corridor from Hanover Road/Rober Leek Park and Street C towards the Taxiway Street<br>- the revision to the Powell Road extension as described for Comment #4, to allow improved visual connection from Powell Road to Central Square.<br>- The District's Public Art Strategy outlined a number of locations for "gateway" opportunities. This strategy will be further refined at a later stage. |
| | 180 | **Public Realm:**<br>The proposed taxiway right-of-way width of 18.5 metres is too narrow to create a significant public space. The taxiway should be widened and further discussions/workshops are required to consider the width and design in the context of its cultural heritage attributes, and the proposed utility and programming of this space. | This has been resolved through meetings with City staff. It was determined with the City that the formal Taxiway terminates at the east edge of the District boundary. The proposed Taxiway Street is distinct in its design and function to the formal Taxiway but is intended to maintain the existing centerline and alignment to maintain a physical and visual connection towards the hangars. The proposed right-of-way for the Taxiway Street together with additional building setbacks (1.5m on either sides of the street) and adjacent parks/pops spaces have been determined sufficient to achieve the necessary functions and design intent. |
| | 181 | **Public Realm:**<br>The taxiway design should consider not only the programming but also the character of the space. Design considerations such as the spatial enclosure of built form, surface treatment, landscaping, lighting and historical references should be incorporated in detailed design phases. | Acknowledged, the conceptual design of the Taxiway Street proposes unique design elements which ties into the history and placemaking aspects of this space, as outlined in the UDG provided with the initial submission. |
| | 182 | **Public Realm:**<br>The future taxiway public realm extension should align with the existing taxiway to the east. | This item has been resolved with City staff through a series of workshops. Consistent with the Secondary Plan mapping, the formal Taxiway terminates outside of the district (in Taxiway East). The proposed District Plan facilitates a physical and visual 'extension' of The Taxiway as a shared street and is generally aligned to maintain continued mobility and view corridors. |
| | 183 | **Public Realm:**<br>Block B should be eliminated to provide a view terminus to the Bombardier Hangar building from the taxiway to reinforce its cultural heritage attribute.<br><br>Increase “Central Square” by removing Block B (refer to Concept Diagram) | In response to staff's comments, former Block B has been eliminated to expand Central Square. Lost office GFA has been redistributed in other development blocks. There will still need to be considerations for programming, landscaping, and other design considerations, and the applicant will continue to work with the City to advance the design. |

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| | 184 | **Public Realm:**<br>There are many diagonal streets, which do not promote or provide direct and visible connections to the adjacent neighbourhood. Explore the possibility of re-integrating the area back into the adjacent grid, and extend sight lines and view corridors. | The street network has been refined based on the discussions from the workshop held with City staff. All proposed public streets are logical extensions of existing street alignments. Notable changes since the original submission include the relocation of Robert Leek Park extension, alignment of Streets K and L, the creation of a mid-block connection through Block C, and expansion of Central Square. All of these improve sightlines and view corridors between the existing and proposed street network and communities. |
| | 185 | **Public Realm:**<br>Please also refer to the Heritage Planning comments dated November 8, 2022. | Responses to heritage comments have been provided under separate cover. |
| | 186 | **Public Realm:**<br>It appears that many of the streets within the district plan are proposed to be private. Policy 3.1.1.9 of the City's Official Plan states that "new streets will be public streets unless otherwise deemed appropriate by the City." Staff do not agree that the private streets proposed in the district plan are appropriate as public streets provide access and address for development, provide mobility options and connect essential services over the long term in an equitable manner that allows the public to enter freely. | The street network has been refined based on the discussions from the workshop held with City staff. Four streets have been converted to public streets (K, L, N and M). Please see the Street Network section of the TIS Addendum for an overview of each of the public and private streets, along with rationale for private streets as discussed/confirmed with City staff during the workshop. |
| | 187 | **Public Realm:**<br>Please provide conceptual illustrations of the street extensions within the adjacent districts. Transition between the Taxiway West District and other future districts needs to be cohesive and the character change needs to be gradual. | Street extensions beyond the district boundary are conceptually identified in the Secondary Plan, and diagrammatically in the District Plan. The street network in the District is designed to allow for direct connections to future districts. The detailed street design and alignment will be part of a future district planning exercise for the adjacent districts. The final street design and network for the District will be considered as an 'existing condition' for those future districts to tie into, with an emphasis on creating a cohesive and consistent extension to allow for seamless mobility and gradual transition in character between districts. |
| | 188 | **Public Realm:**<br>Further discussion regarding the appropriate right-of-way types, widths, locations, alignments, dimensions and features within the ROW is required. | A series of meetings have been held with City Staff to discuss the proposed ROWs and street network of the District Plan. The updates shown in the resubmission materials have been informed by these discussions, further City comments, and further technical analysis. |
| | 189 | **Public Realm:**<br>Staff would like to work with the applicant to determine "gateway" locations, and "view terminus" locations within the Taxiway district. | Through meetings with City staff the topic of gateways and view termini have been reviewed. The proposed updates to the streets and block network has further improved visual connectivity and sightlines through the site from the surrounding neighbourhood. This includes improving the view from Hanover Road through Street L towards the Taxiway Street, the removal of the former Block B office building to expand Central Square to improve the visual connection of the Taxiway Street to the Hangars, as well as the realignment and widening of the Powell Road extension (Street N) and pedestrian mid-block connection to improve sightlines through to Central Square.<br><br>In addition, the initial Public Art Master plan submitted in May 2022 identified opportunities for gateway public art features. We will continue to work with City staff further expand on the topic of gateways and view termini in the District. |
| | 190 | **Public Realm:**<br>Introducing a street through the proposed film studio campus lands should be considered if the proposed film studio does not proceed as planned, or if there is a future change in land use on the film studio campus lands. | The current design of the district allows for a number of road connections and accesses to the Film Studio Campus lands, to ensure that it can be well-integrated. Should there be changes to the film studio campus lands, the main access point will continue to be from the extension of Hanover (Street B). Additional public connections will be to the north, outside of the Hangar District. The District Plan, as submitted, does not preclude all the necessary access and servicing for the film studio campus or any other form of redevelopment. |

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| | 191 | **Public Realm:**<br>The applicant should explore the possibility for a multi-use rail-path extending south from the ravine underpass to the south end of the Northcrest lands (i.e. located between the film studio campus/proposed parking garage and the rail line), similar to the West Toronto Rail Path. This would help improve north-south connectivity across the Secondary Plan lands, and could be ultimately be extended south to Wilson, connecting to the planned Stanley Greene rail crossing and the potential GO Transit Station location, as well as north through the Park Commons. | The design of the district promotes north-south connectivity, connecting to the Downsview Park Bridge, and can be extended south to connect to the planned rail crossing and potential GO Transit Station location. However, due the existing Bay 11 building and significant grade change leading to the Ravine underpass, we have determined that it is not feasible to propose a multi-use path to extend north to the underpass and to the Park Commons. |
| | 192 | **Public Realm:**<br>The Taxiway should terminate at a focal point and space that is scaled to the requirements of both the district and the entire Downsview Plan area. In order to achieve this, Block B should be removed to increase the public realm of the "Central Square". This will provide an appropriately sized square that may be activated by the Hanger building's frontage and programming. A hierarchy of public spaces needs to be achieved to distinguish them from one another in character and function. | In consideration of staff's comments, we have revised the design of Central Square to include the adjacent former office block, to create a larger, central terminus of the Taxiway Street in front of the Hangars. We look forward to working with City staff on the design and programming of this key park space in the District. Furthermore, Lane F has been removed to further expand Central Square and minimize vehicular traffic in this space. |
| | 193 | **Public Realm:**<br>The Garratt and Ancaster street gateways to the district need to be clearly defined. | The Garratt and Ancaster street gateways are identified on the public art strategy. Our vision is to create a seamless interface between the District and the existing street network while also creating a welcoming condition to draw people into the District. Opportunities to define Garratt Blvd. and Ancaster Rd. as gateways will be further explored with Staff. |
| | 194 | **Public Realm:**<br>Legibility of connections leading up to the district from the outside should be considered. Appropriate planting and landscaping of streets and connections leading to the district gateways should be considered by the City in partnership with the district development in order to create defined routes leading to the district. | Public realm connection to existing conditions will be mindful of contextual cues to provide appropriate transition. These considerations will include, but not limited to adjacent uses, sidewalk width and location, boulevard width and location, and planting types. |
| | 195 | **Public Realm:**<br>The plan seems to be insular in nature and inward looking with little connection shown to the surrounding context such as the Film Studio to the north, the Taxiway East district and the Ancaster neighbourhood to the south. Show connections and interconnectivity with the context. | The street network is designed to allow for flexible, direct connections of public streets to other districts. The District Plan extends all existing public streets (Hanover Road, Powell Road, Home Road, Gilley Road, Ancaster Road and Garratt Boulevard), effectively stitching together the Ancaster neighbourhood to the south with the new District. Street extensions beyond the district boundary are conceptually identified in the Framework Plan and the Taxiway West District Plan.<br><br>Through discussion with staff, the street network has been modified to facilitate more direct physical and visual connections between surrounding streets and key public realm within the District (such as the Taxiway Street and Central Square). These changes include: re-aligning and widening previous lanes A and B and converting to 11-metre public ROW (currently Streets K and L), widening previous lane D and portion of lane C into 18.5m public ROW (currently Street N and M).<br><br>Please refer to the Context Plan and other drawings submitted with the application which illustrate the surrounding context and how the propose streets within the District connect to the surrounding existing street network. |
| | 196 | **Public Realm:**<br>Regularised connections to the existing neighbourhood should be shown. Connections should not be disjointed and should follow the regular street pattern that is established. | All existing streets have been logically extended into the District. Please note the change in alignment and ownership for the Powell Road extension and the east-west public ROW across the Taxiway Street (Street K and L on the updated District Plan) based on discussions with City staff. |

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| | 197 | **Public Realm:**<br>How will the edge and interface of the Taxiway West precinct interact with the Future Film Studio Campus? | The Hangar District currently contemplates three connections with the Film Studio Campus:<br>- one for private servicing (from private Street J)<br>- one for vehicular access on a future public street (extension from Street B)<br>- and one pedestrian-only access located within Studio Gate Park which is envisioned as a prominent gateway feature and opportunity to celebrate the Film Studio<br><br>The proposed entrances/access points are coordinated with the Film Studio based on their operational needs, which will be subject to a separate site plan application.<br><br>A significant length of this interface is lined by Downsview Park Bridge, which will feature landscaping, artistic murals, installations, and/or attractive screening which will provide privacy, security and a desireable public realm.<br><br>The fencing strategy along the private property of the Film Studio along Street A will be outlined through a separate site plan application. |
| | 198 | **Public Realm:**<br>The location and function of Rail Park and Rail Square may still need to be explored further in terms of safety. | Although it remains the applicant's position that Rail Park and Rail Square could have offered unique and desireable park and open space experiences, both have been removed from the District Plan. |
| | 199 | **Public Realm:**<br>The idea of the BGI infrastructure and storm water management is not shown in the street sections. This should be shown as the BGI will be a major contributor of storm water management for all districts and the Secondary Plan area as a whole. | There is sufficient width and space within the proposed rights-of-way to incorporate green infrastructure. It should be noted that not every portion of every street will have a significant green infrastructure component, and is dependent on its location, function and design. Opportunities for green infrastructure components such as tree trench with soil cells and open bioretention planters will be identified and explored in greater detail through the distict approval process.<br><br>The details surrounding the SWM strategy are to be resolved and finalized such that they are consistent with the Final MESP. The level of detail that is currently presented is intended to size the municipal storm sewers along the proposed public rights-of-way and establish the location of concept level stormwater controls to meet Quantity Control criteria. Future submissions shall expand upon this to include parcel-specific water quality and water balance targets to achieve criteria compliance, and additional concept level detail presented in the SWM calculations. This will include conceptual figures and layouts for facilities within proposed public right-of-ways as well as parks and open spaces. Typical details for facilities proposed on public lands will be provided as part of a subsequent submission. |
| | 200 | **Public Realm:**<br>As per the Downsview Area Secondary Plan, sites which terminate or frame important views will organize development and locate buildings and landscape to maintain and enhance the views and public access to such views. Views to the Bombardier Hangar building and the Runway when standing on the Taxiway must remain unobstructed. | The organisation of development fronting the Taxiway Street provides unobstructued views from a development standpoint and continuous pedestrian access to the Hangar buildings.<br><br>In addition, the building massing of building in Block C (previously Block D) adjacent to the Plaza has been pulled back at the ground floor to enhance the visibility of the Hangar building from the Taxiway Street and the Plaza. |
| | 201 | **Public Realm:**<br>The early co-ordination of utilities and other infrastructure elements with the soil volume and air space required to permit the growth of large growing trees is particularly important. The conditions for tree retention and planting must be considered integral to the design, planning and construction of projects. Cross sections are important to understand what fits into the proposed ROW – street trees, utilities, underground and above ground infrastructure, pedestrian zones, BGI, etc. | Noted. Plan(s) illustrating utility locations and continuous soil trenches/ soil cells will be provided together with the Tree Planting and Soil Volume plan(s) at the next submission. |

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| | 202 | **Built Form:**<br>Staff are continuing to review the submitted materials and will continue to work with the applicant in weekly workshops to discuss aspects of the proposal and to determine the appropriate amount of detail to assess built form at the Secondary Plan level, within the Zoning By-law and through District Plans. | Acknowledged. |
| | 203 | **Built Form:**<br>Detailed built form comments shall be provided after further direction and agreement on the overall land use, site organization, including the street, block and open space network. | Acknowledged. The applicant will continue to work with urban design staff concurrently to the this resubmission and review cycle. |
| | 204 | **Built Form:**<br>As per Heritage comments, the Cafeteria building should be retained. Remove 1980s addition and retain the Cafeteria building (refer to Concept Diagram). | As per email correspondence dated May 1, 2023, Heritage Staff have confirmed their support for the removal of the Cafeteria. The Applicant will continue to work with Heritage Staff on a commemoration strategy for the Cafeteria at a later date. |
| | 205 | **Built Form:**<br>Above grade parking is not generally supported by the City. Have underground parking options for the retained Hangar building been explored? If so, please provide the analysis. What is the need for the above ground structured parking in the north-west corner of the site? If there is no way to provide parking underground, how may the proposed parking structure be retrofitted in the future (i.e. floor to ceiling heights for servicing) and how may the structure be sleeved (i.e. retail or commercial on the facades) to allow for active edges. If the structure were to be retrofitted in the future, a public street would be required to give the building frontage. | The above-grade parking structure is to primarily service the Hangar buildings, but also provide an alternate means of accessing the Downsview Park Bridge. Underground parking below the existing hangar buildings is not a feasible alternative and presents risks to the structural integrity of the buildings.<br><br>There are opportunities to convert this transitional parking garage from vehicular parking to serve a range of mobility/servicing/open space functions. As it is located within the required 30m setback from a rail corridor, high-occupancy uses such as residential and commercial uses would not be permitted, thus address considerations is not a concern. As discussed and confirmed during the workshop, to preserve the employment uses within the existing Hangar buildings, it is necessary for Streets H, I and J to remain private. |
| | 206 | **Built Form:**<br>Building setbacks, massing, street wall heights, and maximum building heights will be evaluated and examined through the District Plans, and established through zoning. Additional information is required to be provided to further assess the proposed built form for this district. This includes a more detailed and dimensioned site plan drawing, additional building elevations and section drawings, as well as additional information within the Urban Design Guidelines to provide further clarity of the proposed built form, massing and then subsequently to land within the zoning bylaw. | Acknowledged. Ongoing meetings with planning and urban design staff on the proposed built form have been taking place since the initial submission and the City's issuance of comments. The team is looking forward to continue working with staff, and to a more detailed set of comments and conversations around built form, which staff have deferred until such a time that streets and blocks comments are resolved. As this application is at the district planning and rezoning/draft plan level, architectural drawings reflect this level of detail (massing rather than architecture). The team is looking forward to clarifying and providing further information that staff require to review the proposed built form and to advance the conversations on key parameters to be included in the Urban Design Guidelines and the Zoning By-law. |
| | 207 | **Built Form:**<br>Staff will ensure that any proposed built form adjacent to the taxiway, and/or parks and open spaces as well as streets have an appropriate height and massing to limit shadows and wind with the intent of improving pedestrian climatic conditions, including the winter season, to protect views and to reinforce the importance of the taxiway. The Taxiway should achieve a 1:1 ratio from building edge to building edge when compared to building base height. Any additional height would require step-backs to allow for increased natural light at grade level. As noted above, more detailed comments on the built form, the sun shadow study and the wind study, including the Urban Design Guidelines will be provided after further direction and agreement on the overall land use, site organization, including the street, block and open space network. | This has been resolved through the City Planning and Urban Design workshop. The streetwalls along the Taxiway has been adjusted to meet the maximum 1:1 ratio from the building edge to building edge (21.5 metres). The height and massing strategy takes into consideration shadow impacts, wind mitigation and general thermal comfort. A sun/shadow study addendum and a wind study addendum have been submitted with this resubmission. |
| | 208 | **Built Form:**<br>The application should demonstrate the ability to meet the highest level of the Toronto Green Standard. | We will continue to strive to maximize performance levels under the Toronto Green Standard performance including building energy performance, GHG emission reduction, among other standards. It is important to recognize that the highest level may not always be technically and financially feasible, and will be further evaluated through the process. We have committed to achieving Tier 2 of the Toronto Green Standards for new construction as the minimum benchmark, and will continue to work towards exceeding these thresholds. |

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| | 209 | **Public Art:**<br>As per the Downsview Area Secondary Plan, new developments of significant scale or in prominent locations are encouraged to provide on-site public art in publicly visible and accessible locations in accordance with the City's guidelines. | Acknowledged, the proposal contemplates on-site public art opportunities in prominent locations of the district.<br><br>This is reflected in the District's draft public art master plan that will be coordinated with the broader Downsview Secondary Plan and Public Art Strategy. The District's master plan provides a site-specific lens and assesses the appropriate amount, scale and location of future public art opportunities among other details. |
| | 210 | **Public Art:**<br>As per the Downsview Area Secondary Plan, the identification of potential public art locations and opportunities will be included in District Plans in accordance with the policies of this Secondary Plan. | Acknowledged. The District public art master plan will be coordinated with the broader Downsview Secondary Plan and Public Art Strategy. Currently, the district's master plan identifies potential types and location of possible public art opportunities. |
| | 211 | **Public Art:**<br>The proposed development is of a scale and prominence to warrant participation in the Percent for Public Art Program. Refer to the Percent for Public Art Program Guidelines. Refer to the following link below:<br>https://www.toronto.ca/wp-content/uploads/2017/11/9090-aoda-public-art-guidelines.pdf | Given recent changes as a result of Bill 23, it is our understanding that the Percent for Public Art program is no longer in force. However, given the opportunity for public art that a development of this scale presents, the Applicant is committed to delivering a robust Public Art plan on the lands. The broader Public Art Strategy that will be submitted as part of the OPA application will address the opportunities that are provided as a result of a development of this scale and subsequently the district Public Art master plan will be coordinated accordingly with the strategy. |
| | 212 | **Public Art:**<br>Staff are reviewing the submitted Public Art Plan for the district, and will provide consolidated comments in a further memo. | Acknowledged. |
| | 213 | **Parking and Servicing:**<br>Development will locate and organize vehicle parking, vehicular access and ramps, loading, servicing, storage areas, and utilities to minimize their impact and improve the safety and attractiveness of the public realm. | Access to development loading and parking are organized off of side streets/lanes with minimal curbcut interruption along the main boundary public road system wrapping around the Village. The site plan review demonstration of each building will be detailed and presented at the SPA application stage. |
| | 214 | Parking and Servicing:<br>All parking should be provided underground. Above-grade/structured and surface parking will only be permitted in limited circumstances and in very specific locations, with specific design and transitional requirements. City staff are comfortable with the proposed above grade parking structure, however, further discussion is required on the location and the possibility of converting this structure into another use in the future. | Noted. The parking structure is needed to support the employment uses of the existing Hangar buildings being preserved. There are opportunities to convert this space from vehicular parking to serve a range of mobility/servicing/open space functions. As it is located within the 30m setback from a rail corridor, high-occupancy uses such as residential and commercial uses would not be permitted. |
| | 215 | **Parking and Servicing:**<br>Parking rates should reflect PZA Downtown City rates, not PA2. It is recommended that the amount of parking above PZA rates to be located in transitional parking structures to be shared by surrounding developments. Toronto Parking Authority (TPA) discussions will assist in informing ownership for the transitional parking structures through the TMP. | Please see the Parking Assessment section of the WSP TIS Addendum. Based on the development of By-law 89-2022 and with consideration of the site location to higher order transit (requiring an intermediate surface transit connection), Parking Zone B rates are the most appropriate as a benchmark for the Taxiway West South Sub-District. |
| | 216 | **Parking and Servicing:**<br>Urban Design Guidelines should address servicing and loading, as well as how blocks are serviced. As a general principle, back of house matters should be directed away from the public realm, in rear conditions, away from the parks and other open spaces. | Please refer to the Urban Design Guidelines provided with the initial application submission. Guidelines have been provided for loading, servicing and parking access, including a guideline on loading, servicing and parking access being encouraged to be located away from parks and open space frontages. |
| | 217 | **Parking and Servicing (refer to Concept Diagram):**<br>Consider the need for a structured above ground parking facility and its future uses. Consider a temporary structure and use. | Noted. The parking structure is needed to support the employment uses of the existing Hangar buildings being preserved. There are opportunities to convert this space from vehicular parking to serve a range of mobility/servicing/open space functions. As it is located within the 30m setback from a rail corridor, high-occupancy uses such as residential and commercial uses would not be permitted. |

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| | 218 | **Landscape & Infrastructure:**<br>The application should demonstrate the ability to meet the highest level of the Toronto Green Standard. | We will continue to strive to maximize performance levels under the Toronto Green Standard performance including building energy performance, GHG emission reduction, among other standards. It is important to recognize that the highest level may not always be technically and financially feasible, and will be further evaluated through the process. We have committed to achieving Tier 2 of the Toronto Green Standards for new construction as the minimum benchmark, and will continue to work towards exceeding these thresholds. |
| | 219 | **Landscape & Infrastructure:**<br>This district may be a suitable candidate for district energy. Further meetings with appropriate staff and an understanding of this is necessary within this process. | Acknowledged. We are currently undertaking technical and financial feasibility analysis and will determine our course of action when our analysis is complete. |
| | 220 | **Environmental Planning/Sustainability/Energy:**<br>Staff strongly support the introduction of circularity and green blue infrastructure into the planning of Downsview. | Acknowledged. The applicant and project team look forward to working with the City to further refine the use of green infrastructure in the District. |
| | 221 | **Environmental Planning/Sustainability/Energy:**<br>Given the emphasis on Green Streets, City staff will be looking at developing new cross sections to include green infrastructure. Development Infrastructure Policy and Standards (DIPS) cross sections have been flagged as problematic for implementation of green infrastructure in the right-of-way. Further discussion/workshops with appropriate staff is required and will be completed through the Update Downsview process. | Acknowledged, in addition to the new cross sections being developed through the Update Downsview process, general cross sections for local streets and laneways have been provided at the District level. Opportunities for green infrastructure integration will be identified through the ongoing design process. We look forward to coordinating with City staff on this matter concurrent to this resubmission review cycle. |
| | 222 | **Environmental Planning/Sustainability/Energy:**<br>It appears that all buildings will target Tier 2 of the Toronto Green Standards – it would be preferred that the highest Tier 3 be targeted, consistent with SASP 596. | We will continue to strive to maximize performance levels under the Toronto Green Standard performance including building energy performance, GHG emission reduction, among other standards. It is important to recognize that the highest level may not always be technically and financially feasible, and will be further evaluated through the process. We have committed to achieving Tier 2 of the Toronto Green Standards for new construction as the minimum benchmark, and will continue to work towards exceeding these thresholds. |
| | 223 | **Phasing & Implementation**:<br>The Secondary Plan will define the phases, what infrastructure, transit facilities, servicing and community services and facilities are required for each phase, and what needs to be completed in each phase before moving forward to the next phase. Further comment on the Taxiway District for this infrastructure will be provided once the overall direction in the Secondary Plan is established. | Acknowledged. The proposed development and phasing of development at the Hangar District are currently aligned with the infrastructure phasing strategy that is unfolding at the Secondary Plan & MESP level. Coordination will continue between the district and the Secondary plan phasing and implementation as that further unfolds. |
| | 224 | **Phasing & Implementation**:<br>It is anticipated that the Taxiway District will be phased. Holding provisions in the Taxiway District By-law will be used to implement the phasing strategy. | The applicant notes that holding provisions are not required to implement the proposed phasing strategy, and would like to explore alternative ways of implementation with the City to ensure the necessary agreements are entered into to secure relevant obligations. |
| | 225 | **Phasing & Implementation**:<br>Consideration needs to be given to the interim conditions between the phases within the District Plan. A phasing plan must be provided as part of the next submission which illustrates the overall phasing strategy that addresses the matters raised through the staff comments. | As discussed with Planning Staff on February 23, 2023, the phasing plan provided outlines the latest thinking on which development blocks, parks, and supporting infrastructure will be developed in the first phase. |

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| | 226 | **Other:**<br>Apart from opportunities for placekeeping, are there other components of this district that will be specifically addressing the needs of equity-deserving communities? (e.g. partnerships, community space etc.) This element in the district plan still seems very high level and it is unclear what is being contemplated. Additional clarity on the elements/space that will address the needs of equity deserving groups that we have heard through consultation, and that align with the emerging priorities of the community development plan is required. | In addition to creating a place that is welcoming to all and exploring placemaking and placekeeping opportunities in the public realm, the Hangar District will specifically prioritize jobs and economic opportunities for local and equity-deserving residents and businesses. In this regard, Northcrest has begun:<br><br>• Planning for a place-based workforce development program which connects local employment agencies and job-seekers to future employers through a local integrator;<br>• Developing social procurement initiatives that support local and diversely-owned businesses;<br>• Collaborating with Indigenous rights-holders on economic opportunities;<br>• Implementing site activation opportunities which promote diverse and local talent through programming initiatives; and<br>• Exploring opportunities for affordable spaces to encourage local and diverse entrepreneurship.<br><br>These initiatives will be advanced in collaboration with rights-holders and stakeholders, including targeted engagement with equity-deserving groups. |
| | 227 | **Transportation Planning:**<br>Update Downsview Study/Transportation Master Plan Update - This District Plan should continue to evolve and be updated to reflect the findings of the ongoing Update Downsview study/Transportation Master Plan update. | Acknowledged. |
| | 228 | **Street Connection & Design (refer to the Concept Diagram):**<br>Possibly reroute GarratBlvd extension directly adjacent to hanger building by using grid streets. | Please refer to response in Comment #179. |
| | 229 | **Street Connection & Design (refer to the Concept Diagram):**<br>Align Powell Road to meet the small street in the district area. | Please refer to response in Comment #179. |
| | 230 | **Street Connection & Design (refer to the Concept Diagram):**<br>Regularize streets crossing the Taxiway. | Please refer to response in Comment #179. |
| | 231 | **Street Connection & Design (refer to the Concept Diagram):**<br>Maintain the current Taxiway width throughout. | Please refer to response in Comment #179 |
| | 232 | **Street Connection & Design (refer to the Concept Diagram):**<br>Provide defined gateways to the district as well as views and vistas. | Please refer to response in Comment #179 |
| | 233 | **Street Connection & Design:**<br>A functional public street system should be provided on site to provide the appropriate infrastructure and block patterns to support the proposed development in context of the anticipated increase in population and employment in the district, a finer-grained public street network with enhanced public realm should be provided. | The proposed street network including public and private streets creates a fine-grained and highly walkable community with all areas of the District being reachable within a 2-to 5-minute walk, while optimizing opportunities to deliver an enhanced public realm. There are site-specific reasons for private streets (i.e., Streets H, I and J need to be private for the loading-related reasons for the hangars as agreed-upon with City staff). Please also see the Street Network section of the WSP TIS Addendum for further details. |
| | 234 | **Street Connection & Design:**<br>The new public street system on site is required to meet the City of Toronto's latest technical and design guidelines/standards/requirements (e.g. Green Streets, TGS.V4, Complete Streets, Road Engineering Design Guidelines, etc.). It should also be designed to connect to the adjacent Ancaster neighbourhood, integrate into the broader public street network, and implement other broader network improvements (e.g. potential new GO Station near Wilson Avenue, Caledonia Road extension, etc.) to be identified through the Update Downsview Transportation Master Plan study. | The District's public street system has been revised to incorporate City's comment to provide more direct connections to the broader network, including:<br>- the provision of a public street crossing the Taxiway Street,<br>- a revision to the alignment of the Powell Road extension and conversion of the extension to a public street, and,<br>- A 20m reserve block is proposed to allow for the future extension of Murray Road.<br><br>We will continue to work with the City on the design of the public streets to meet technical and design standards, and request flexibility where required. |

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| | 235 | **Street Connection & Design:**<br>What is the main/primary street for the Taxiway district connecting to the existing and emerging major streets? Connections south to Wilson Avenue using Ancaster Road and Garratt Boulevard must also consider continuing the cycling infrastructure. The emerging direction from the MESP would provide further direction and function of the public street network. We will need to determine the feasibility and the function to the existing network. | Cycling facility on Ancaster Road and Garratt Boulevard beyond the limits of the subject district are beyond the scope of the development application and at the City's discretion. The cycling designs proposed along the public streets allow the City to extend along existing streets in the future, which are typically done when there is a need for road resurfacing, servicing upgrades, etc. Notwithstanding, the district proposal already includes some offsite improvements (i.e., along active transportation and right-of-way improvements along existing segments of Home Road and Ancaster Road beyond the district boundary) to improve connectively immediately adjacent to the district. The eventual expansion of the cycling network<br>in the broader study area connecting to Wilson and other major transit stations is aligned with the multi-modal objective of this development. |
| | 236 | **Street Connection & Design:**<br>The function and design of Hanover Road and Beffort Road should be reviewed with an active transportation lens in anticipation of Dufferin Street extension. | This work is being advanced at the MESP level, tied to the delivery of Dufferin extension. The design of the district does not preclude the advancement of this effort at the MESP level, and the district initiatives will support the objective to improve active transportation connections. |
| | 237 | **Street Connection & Design:**<br>The function and design of Murray Road and Plewes Road should be reviewed in context of the Caledonia Road extension (i.e. one of the preferred solutions in the adopted Yorkdale Transportation Master Plan). | The Draft Plan has been revised to identify a reserve block to protect for a potential future extension of Murray Rd. The reserve block is 20m in width, consistent with the ROW of the existing Murray Road. The subject district does not contribute significant E-W multimodal demand to Plewes Road. |
| | 238 | **Street Connection & Design:**<br>Plewes Road – additional detail is required to understand the impact, right-of-way requirements, and relationship of the City's approved active bridge crossing with Plewes Road. This is part of the MESP review and further discussion is required. In addition, the City's Cycling unit has indicated that Plewes Road should be a future cycling connection from Murray Road to Beffort Road. | Plewes Road is outside the district boundary and the subject district does not contribute significant east-west multi-modal demand to Plewes Road. The subject designs do not preclude the City's ability to provide further connectivity in the future. |
| | 239 | **Street Connection & Design:**<br>Additional discussion required regarding ownership and maintenance of the bridge crossing, and the appropriate right-of-way and transition to the public street network. | Acknowledged, please also refer to response to Comment #3. The District Plan currently maintains the original design and location for the Downsview Park Bridge and proposes the landscaped, open space components as POPS. Discussions will continue with City Staff regarding the financing, ownership, maintenance and design of the Downsview Park Bridge. |
| | 240 | **Street Cross-sections & ROWs:**<br>The new public street system should be designed based on the applicable City Guidelines such as the Curb Radii, Lane Width, Truck Aprons, Curb Extension, and Raised Crosswalk Guidelines (City's Road Engineering Design Guidelines). | The proposed public street network conform with the city's guideline for radii with all new intersections formed featuring a radii of 5m to induce lower turning speeds. At the same time, the streets without shared cycling facilities propose a lane width of 3.3m to accommodate TTC bus movements.<br><br>Curb extensions, which are localized road narrowing for short sections where the pavement width is reduced by extending the curb into the roadway, is generally not necessary within the proposed street network. This is because the lane widths and pavement sections are already minimized where feasible. In addition, there are minimal auxiliary turn lanes proposed within the district street network. Therefore, the crossing distance for active transportation is already minimized.<br><br>Further refinements may be undertaken during the detailed design stage. |
| | 241 | **Street Cross-sections & ROWs:**<br>The applicant shall adhere to right-of-way policy direction resulting from the approved Secondary Plan. | Acknowledged, the District Plan adheres to the general principles of street design outlined in the Secondary Plan policies and further provides additional details to reflect local road design considerations. |
| | 242 | **Street Cross-sections & ROWs:**<br>Review and minimize lane widths (e.g. 3.3m curb lane and 3.0m middle/centre lane, where appropriate) and curb radii for all travel lanes and intersections (i.e. internal and external) on site, wherever applicable. | Noted, the proposed public streets without shared cycling facilities propose a lane width of 3.3m to accommodate TTC bus movements. Radii at new intersections formed are minimized to 5m. |

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| | 243 | **Street Cross-sections & ROWs (refer to Concept Diagram):**<br>Consider a public R.o.Wconnection from the north side of the Murray Works Yard as a pedestrian connection to the future GO Station. | The Draft Plan has been revised to identify a reserve block to protect for a potential future extension of Murray Rd. The reserve block is 20m in width, consistent with the ROW of the existing Murray Rd. |
| | 244 | **ROW at Midblock & Intersections:**<br>Lane configurations (e.g. exclusive left-turn lane at key intersections), pedestrian and cycling facilities (with appropriate buffer/separation) and high-level design requirements (e.g. protected intersection design for pedestrians and cyclists) at midblock and intersections should be reviewed, additional right-of-way space to accommodate the identified design elements, where appropriate, should be secured through the approval of the draft plan of Subdivision application. | Please see Section 5 of the TIS Addendum on the future lane configurations. In general, the new intersections proposed feature a basc one lane in each approach vehicular design. The rationale behind the two exceptions are provided in ths TiS Addendum. |
| | 245 | **ROW at Midblock & Intersections (refer to Concept Diagram):**<br>Ensure vehicles decrease speed when intersecting with Street A, perhaps have an intersection. | Street A forms 2 intersection within the district with Streets B and D. Street B/A would be signalized and Street D/A would be all-way stop. In addition, the radius are designed to accommodate the necessary bus movements in the future along Streets A, B and D. |
| | 246 | **Transit Improvements:**<br>The applicant should continue to work with the City and TTC with respect to how this district will contribute/implement the local surface transit improvements in the area (e.g. interim private shuttle/public transit, improvements on the local bus services/network and RapidTO corridors (such as Wilson Avenue), etc.). Please refer to TTC comments dated December 1, 2022. | Refer to response to TTC comments above.<br><br>Further coordination with City and TTC staff will occur in the next submission - particularly once the surrounding street network has been finalized/agreed upon. |
| | 247 | **Transit Improvements:**<br>Any development within this district shall not preclude development of a Wilson GO station. A public right-of-way connection south to the north side of the Murray works yard must be provided in perpetuity. | The Draft Plan has been revised to identify a reserve block to protect for a potential future extension of Murray Rd. The reserve block is 20m in width, consistent with the ROW of the existing Murray Rd. The terms would be negotiated and outlined in the subdivision agreement. |
| | 248 | **Transit Improvements:**<br>New connections to higher order transit stations in the area are essential. There needs to be solutions provided for first/last mile alternatives. Further discussions are required with the TTC and Metrolinx. | Refer to response to TTC comments above.<br><br>Further coordination with City and TTC staff will occur in the next submission - particularly once the surrounding street network has been finalized/agreed upon.<br><br>Plese also see the TDM section in the TIS Addendum for further discussion. |
| | 249 | **Active Transportation Network:**<br>Please refer to the City's Cycling Network Plan for the existing, planned near-term implementation programs, and City-wide cycling routes in the area. | The proposed cycling facilities in and around The Hangar District do not preclude the City's ability to expand cycling facilities along existing streets based on separate studies or re-prioritization exercises. The team also notes that the City is working with the applicant as coproponents at the MESP level, where surrounding cycling infrastructure is being advanced. |
| | 250 | **Active Transportation Network:**<br>Internal and external pedestrian/cycling accesses and connections, especially connections to existing/planned cycling facilities, should be reviewed and properly designed. Please review the City's Complete Street Guidelines, Bikeway design Guideline (On-going) and Multi-use trail design guidelines. | Noted, the emphasis of this resubmission has been to confirm the classification and alignment of various streets in the district. Refinements required to the cycling facility design will be completed in the next submission. It is anticipated that the changes will be to the allocation of the ROW rather than substantial changes to the street ROW widths. |
| | 251 | **Active Transportation Network:**<br>The design, type, and location of the proposed cycling facilities in this District should be planned and designed to fit into the City's broader cycling network. Transportation Services staff to provide further comment on design requirements and preferences for this district, general directions include but not limited to:<br><br>- For new facilities, elevated and separated unidirectional cycle tracks are preferred over bi-directional multi-use paths/trails. Unidirectional cycle tracks make for more intuitive intersections.<br>- At controlled intersections, there should be raised crossings or raised intersections. Especially if there is bi-directional cycle tracks or trails through them. Please refer to the City's Raised Crosswalk Guidelines.<br>- Appropriate buffer should be provided between cycling facilities and sidewalk. | Noted, the emphasis of this resubmission has been to confirm the classification and alignment of various streets in the district. Refinements required to the cycling facility design will be completed in the next submission. Although we believe the proposed cycling infrastructure in the district provides an adequate means for cyclists to ride in a separated condition along the boundary public roads, we are open to working with the City on potential reallocation within the proposed ROW should refinements be required on the configuration of the cycling facility. |

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| Reviewing Agency | No. | Comment | Formal Applicant Response |
|---|---|---|---|
| | 252 | **Active Transportation Network:**<br>Proposed "Designated Cycling Facilities" in the District Plan - Street D should also have proposed designated cycling facility to complete the network in this district. | The proposed cycling plan is shown in Figure 2-3. As shown in the diagram, the outer ring road along Streets A, B, C, existing segment of Garratt Boulevard and the segment of Street E between Garratt Boulevard and Home Ancaster Road are proposed to feature dedicated cycling facilities that separate cyclists from motorists (cycle track or multi-use path). The rationale is that higher speed cyclists should be arriving at/departing the district via these ring roads and that once cyclists have arrived within the gateways (i.e., Street E/D where a mobility hub is proposed for enhanced dedicated bicycle parking) that they would be either parking or riding in a shared street environment since they're at or close to their destination.<br><br>It is important to consider that once motorists have entered the district, slower vehicle operating speeds will be induced through the short link distance of Street D along with the all-way stop control at Streets A and E. As shown in Figure 4-2 in Section 4, the weekday peak hour volume on Street D is in the order of 140. When projected over an entire day, this would be approximately 1,500 vehicular trips along Street D. The speed and volume of motorized traffic are key factors influencing the context sensitive design of cycling facilities. The City's Complete Street Guideline references the guidance from OTM Book 18 (excerpt below). Based on the low operating speeds of vehicles and the low daily vehicular volumes, a shared roadway is appropriate. |
| | 253 | **Active Transportation Network (refer to Concept Diagram):**<br>Consider connections to Wilson via Ancaster and Garratt continuing cycling infrastructure. | The suggested improvement is beyond the district boundary and study /project scope. The designs completed within the district allows the City to expand further to Wilson in the future when the timing is appropriate (i.e., scheduled road resurfacing/improvements). |
| | 254 | **TDM Plan:**<br>The applicant shall identify the appropriate travel demand management strategy for the subject site to reduce the single occupancy auto vehicle trips generated by the proposed development. | Noted, in addition to the TDM section in the original TIS, further TDM write up are provided in the TDM section of the TIS Addendum. |
| | 255 | **TDM Plan:**<br>A comprehensive TDM Plan should be developed (instead of providing a list of measures to be "explored") for the subject district to identify the appropriate TDM measures/programs and implementation strategy (e.g. identify strategic locations and protect publicly accessible space for micro-mobility/shared mobility hubs). | Noted, please see TDM write up are provided in the TDM section of the TIS Addendum. Given the magnitude of the development, variety of use and stage of application, it is not feasible to define an exact TDM package. However, further breakdown of the TDM toolkit to apply to each of the land uses proposed are provided in the TIS Addendum. Subsequent SPA would get into the exact TDM measures for each block. |
| | 256 | **TDM Plan:**<br>All the TDM measures should be secured in an agreement with the City. | Acknowledged, further discussions will be had at the site plan stage. |
| | 257 | **Interim Shuttle/Transit Service:**<br>The applicant should work with the City and TTC staff in designing the interim shuttle/transit routes and services, consideration should also be given to provide interim shuttle/transit services to the Ancaster community and local destinations in addition to only providing connections between the site and TTC Subway/GO stations. | Understood, this will be coordinated with City and TTC staff. |
| | 258 | **EV Charging Stations/Spaces and Provision:**<br>In designing the new streets in the district, the provision of on-street/public EV charging infrastructure should be planned. | Acknowledged, provision of EV charging is planned for in the parking garages for vehicles, including exploration of EV Charging for scooters/bikes in the public realm.<br>Further details on EV on-street parking will be defined at a later stage. The current design does not preclude future EV infrastructure. |
| | 259 | **Zoning By-law:**<br>Additional discussion is required to determine the level of detail that is necessary within the zoning by-law. | Acknowleged. |
| | 260 | **Zoning By-law:**<br>Setbacks will need to be revisited once the proposed street right-of-ways widths are confirmed. | Acknowledged. |

| | |
|---|---|
| **Project:** | **The Hangar District (formerly known as the Taxiway West South Sub-District)**<br>Draft Plan of Subdivision and Zoning By-law Amendment Application |
| **City Application #:** | 22 148583 NNY 06 SB & 22 148540 NNY 06 OZ |

| Reviewing Agency | No. | Comment | Formal Applicant Response |
|---|---|---|---|
| | 261 | **Zoning By-law:**<br>Unit size requirements (i.e. minimum number of bedrooms) will need to reflect what is included in the District Plan. The City's position is for a minimum of 40% of units to have a minimum of 2 bedrooms (and of those 10% with a minimum of 3 bedrooms). The City will also be exploring securing a minimum GFA to apply to a set percentage of larger units. | The proposed minimums in the draft zoning by-laws meet the 25% large unit guideline in the Growing Up: Planning for Children in New Vertical Communities. The proposed application is aiming to exceed these minimums and provide up to 40% of units that are 2-bedrooms and larger. We continue to believe that no minimum GFA for units should be imposed. |
| | 262 | **Zoning By-law:**<br>Need to ensure that minimum landscaping/soft landscaping requirements fulfill the requirements for BGI – this may be captured in the implementing zoning by-law amendment to support meeting BGI requirements. | The applicant is committed to implementing the BGI within the District, and would like to explore implementation tools that the City can support (including the Urban Design Guidelines and TGS). However, the integration of green infrastructure in streets may vary from street to street, and is dependent on other factors such as grading and street function. It is therefore challenging to set out specific landscaping requirements on all streets in the implementing zoning by-law amendment. |
| | 263 | **Zoning By-law:**<br>In addition to the height indicated above, there are other instances where the proposed zoning does not fully align with the District Plan Demonstration Plan (i.e. orientation of townhouses). Please ensure future iterations are consistent. | The applicant has seeked clarification from staff as it is unclear where the misalignment referred to in the comment is. In any case, the draft zoning by-law amendment will be revised at a later date to reflect the final District Plan. |
| | 264 | **Zoning By-law:**<br>Will need holding provisions to ensure appropriate phasing for the purposes of infrastructure, community services and affordable housing, etc., which will be the subject of future discussions. | As discussed with City Planning, the applicant does not believe that holding provisions are required to implement the proposed Hangar District phasing strategy, and will continue to work with the City to ensure the necessary agreements are entered into to secure relevant obligations. |
| | 265 | **Zoning By-law:**<br>More detailed comments on specific zoning provisions will come at a later date, once comments related to the more structural components of the District Plan are addressed. | Acknowleged. |
| | 266 | **Draft Plan of Subdivision:**<br>A plan of subdivision must consider the adequacy of school sites, as identified in Section 51(24) of the Planning Act:<br>*"(24) In considering a draft plan of subdivision, regard shall be had, among other matters, to the health, safety, convenience, accessibility for persons with disabilities and welfare of the present and future inhabitants of the municipality and to,*<br>*(j) the adequacy of school sites;"*<br>Further discussions with the school boards are required. | Per discussion with TDSB and TCDSB staff, no new schools have been identified for this district. Should one be identified at a future date, the district plan and draft plan of subdivision would accommodate school site(s). |
| | 267 | **Draft Plan of Subdivision:**<br>One foot reserves are required for the proposed streets that abut existing public streets. | We understand planning staff is confirming this request with City legal. Once confirmed, we can adjust the draft plan accordingly. |
| | 268 | **Draft Plan of Subdivision:**<br>The draft plan of subdivision is to be revised to address the following:<br>a. requires the Chief Planner's signature box; and<br>b. revised to address the City's comments. | Please refer to the updated Draft Plan of Subdivision enclosed with this resubmission package which has been revised to addess the provided comments, including the inclusion of the Chief Planner's signature box. |
| | 269 | **Draft Plan of Subdivision:**<br>Show proposed phasing of the draft Plan of Subdivision in the phasing strategy. | A phased draft plan strategy will be prepared following confirmation on phasing approach at future resubmission. Please refer to the Architectural Package enclosed with the resubmission for a conceptual phasing plan. |
| | 270 | Further discussions and workshops on the topics raised in this letter will continue through 2022 and 2023 and the City will be presenting a draft Secondary Plan to City Council in Q2 of 2023. The District Plan, Zoning By-law and Draft Plan of Subdivision applications can be reported once Council has made a decision on the Update Downsview Study. A meeting will be organized to go through all of the above comments and questions. | Acknowledged. |
| RJ Burnside Peer Review of Compatiblity & Noise Study | 271 | Information regarding complaint history was mentioned for Teskey/Innocon Concrete Company, who received complaints in 2018. Complaint history regarding the rest of surrounding industry was not mentioned in the Compatibility Assessment; therefore, it is not clear whether information regarding complaints received by the City and/or the MECP concerning nearby Employment Areas wwas requested and considered. | Complaints were received by the City Councillor representing the area. Community meetings related to understanding the complaints and responding to the complaints were organized with Teskey and the City. Complaints related to the City Works yard have not been recieved by the City or the Works Yard directly. |

| | |
|---|---|
| **Project:** | **The Hangar District (formerly known as the Taxiway West South Sub-District)**<br>Draft Plan of Subdivision and Zoning By-law Amendment Application |
| **City Application #:** | 22 148583 NNY 06 SB & 22 148540 NNY 06 OZ |

| Reviewing Agency | No. | Comment | Formal Applicant Response |
|---|---|---|---|
| | 272 | NPC-300 refers to the essentials services as "activities related to essential services and maintenance of public facilities such as, but not limited to, roadways, parks and sewers, snow removal, road cleaning, road repair and maintenance, lawn mowing and maintenance, sewage removal, garbage collection". In our opinion, this definition applies to services in the public areas like roads, parks, sewers, etc. The on-site activities should be treated as regular daily activities needed to operate the Services Yard and should not be considered essential services until the equipment leaves the property to operate in public areas. Therefore, all noise sources associated with the on-site activities should be included in the model. | Please refer to the enclosed Noise Study Addendum prepared by Aercoustics. |
| | 273 | The worst-case operating scenario for all the on-site sources was included in the Noise Study as another operating scenario. Sound levels up to 67 dBA are anticipated at the most impacted sensitive receptors. Aercoustics noted that the plane of window limits applies to closed windows in the areas designated as Class 4. We agree with this statement; however, this distinction does not affect the prediction of plane of window sound levels and the applicable sound level limits must be met. Sound levels above 60 dBA exceed Class 4 limits. The assumption that residents will keep their windows closed during severe weather snow removal operations is reasonable but does not justify the exceedance. Mitigation measures should be assessed to ensure sound levels at all sensitive receptors will be below the applicable limits. | Please refer to the enclosed Noise Study Addendum prepared by Aercoustics. |
| | 274 | The assessment assumed a Class 4 area designation will be pursued for the proposed development. As a result, predicted sound levels were compared against Class 4 limits. Based on the information provided, we agree that the Site is a potential candidate for a Class 4 designation. However, sound levels due to the City of Toronto Works Yard operations have potential to exceed the applicable limits. We cannot support Class 4 area designation until it is confirmed that sound levels can be mitigated to meet the applicable limits at the proposed development. | Please refer to the enclosed Noise Study Addendum prepared by Aercoustics. |
| | 275 | Based on the comments above, the following items should be addressed, and further information provided:<br>1. Information regarding complaint history from surrounding employment lands should be included in the Compatibility Study.<br>2. Noise impacts at the Outdoor Living Areas should be assessed and mitigation measures to be recommended once the locations of these areas are identified (can be addressed at the Site Plan Approval stage).<br>3. Mitigation measures to reduce sound levels due to the Transportation Services Central Yard should be assessed and recommended to ensure sound levels will be below Class 4 limits.<br>4. As noted in the Noise Study, a detailed noise impact assessment from the on-site stationary sources should be carried out once information on mechanical equipment is available (can be addressed at the Site Plan Approval stage). | In response to 1) Neighbouring employment operators were contacted related to Complaint history. Information related to complaint history was included in the Report. For future submissions SLR will submit a Ministry of Environment, Conservation and Parks ("MECP") Freedom of Information (FOI) request for adjacent employment uses.<br><br>In response to 2-4, please refer to the enclosed Noise Study Addendum prepared by Aercoustics. |
| **Public Art Strategy comments (April 4, 2023)** | 276 | Cover Page - Title of the document should be evident i.e. Public Art Strategy | Please note that detailed comments have been received and taken into consideration. An updated District Public Art Masterplan will be provided at a later date after the finalization of the broader Public Art Strategy which will be submitted as part of the OPA resubmission. At that time the two documents should be read concurrently as the District will seek to implement the broader objectives of the Strategy and provide more site-specific guidance. |
| | 277 | Cover Page - A design for the cover page would be appreciated. something con-textural or artistic. | Acknowledged. Please refer to response to comment #276 |
| | 278 | Cover Page - The full address of the project site. | Acknowledged. Please refer to response to comment #276 |
| | 279 | include land acknowledgment | Please refer to response to comment #276. An appropriate land acknowledgement will be included in the final District Public Art Masterplan to be submitted at a later date. |
| | 280 | List of appendices and other relevant documents should be listed i.e. Downsview Secondary Plan etc., | Acknowledged. Please refer to response to comment #276 |

| | |
|---|---|
| **Project:** | **The Hangar District (formerly known as the Taxiway West South Sub-District)**<br>Draft Plan of Subdivision and Zoning By-law Amendment Application |
| **City Application #:** | 22 148583 NNY 06 SB & 22 148540 NNY 06 OZ |

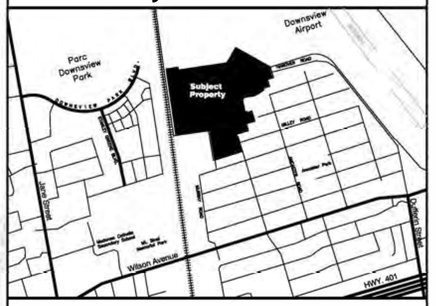
| Reviewing Agency | No. | Comment | Formal Applicant Response |
|---|---|---|---|
| | 281 | Land Acknowledgement is required to set the context | Please refer to response to comment #276. An appropriate land acknowledgement will be included in the final District Public Art Masterplan to be submitted at a later date. |
| | 282 | There seems to be an an interchange in words that isn't clear to me, is this a Strategy or a Master Plan? | Please refer to the response to comment #276. The updated public art master plan for the Hangar District will be revised to appropriately reference "Master Plan" only. |
| | 283 | Page 4 (introduction) - The introduction could talk about the ambitions of the proposed development (building a community including a strong presence for public art) the role of the developer, consultants and the city to bring the vision identified in this Public Art Strategy to fruition with the community. A seperate subheading about the project team would be more appropriate. The description of the team would include the developer, consultants and the city. | Acknowledged. Please refer to response to comment #276 |
| | 284 | Page 4 (introduction) - There needs to be an overall statement about the vision to implement a Public Art Strategy that meets the City's objectives of Diversity, Equity and Inclusion in the development, process and outcome of the plan. | Acknowledged. Please refer to response to comment #276 |
| | 285 | Page 4 (introduction) - There should also be recognition of the City's 10 Year Public Art Strategy to further our commitment to Truth and Reconciliation through public art. | Acknowledged. Please refer to response to comment #276 |
| | 286 | Page 4 (introduction) - Need to set the context with a bit of the planning and historical history of the site. This introduction dives right into the public art goals without setting the stage. The Public Art Strategy needs to be read as a standalone document without the benefit of the secondary plan. | Acknowledged. Please refer to response to comment #276 |
| | 287 | Page 4 (introduction) - Note this date will need to be updated once the OPA has been finalized. | Acknowledged. Please refer to response to comment #276 |
| | 288 | Page 4 (introduction) What about the social and economic drivers to produce and implement public art? | Acknowledged. Please refer to response to comment #276 |
| | 289 | Page 6 - This is an opportunity to address the inclusion of embedding truth and reconciliation throughout the public art process. In this case bringing in an indigenous curator/consultant to help with the content of this Public Art Strategy would be beneficial and in keeping with the city's goals. | Acknowledged. Please refer to response to comment #276 |
| | 290 | Page 7 - This context needs to be researched and the opportunities for the inclusion of cultural celebrations, gatherings need to be worked through from the on-set with indigenous representation. Indigenous communities and creators must be at the centre of the decision-making process. | Acknowledged. Please refer to response to comment #276 |
| | 291 | Page 13 - Other sites and opportunities should be identified within the blocks and/or a general statement. | Acknowledged. Please refer to response to comment #276 |
| | 292 | Page 26 - This is a great start but there needs to be further elaboration on the process engagement and the anticipated plan to bring forward in the future for further consideration. Who are the primary stakeholders etc., | Acknowledged. Please refer to response to comment #276 |
| | 293 | Page 27 - this section also needs to be further elaborated on too. What is the process here to engage artists. There need to be artists calls, competitions etc., describe what form they will take, including the anticipated decision making process. | Acknowledged. Please refer to response to comment #276 |

# 7. Draft Plan of Subdivision

# DRAFT PLAN OF SUBDIVISION

for
PART OF LOTS 12 AND 13
CONCESSION 3, WEST OF YONGE STREET
AND,
ALL OF LOTS 12 TO 24 (ALL INCLUSIVE), 51 TO 56 (ALL INCLUSIVE), 84 TO 90 (ALL INCLUSIVE), AND 120 TO 123 (ALL INCLUSIVE)
AND PART OF LOTS 25, 48, 49, 50 AND 57
AND PART OF BLOCK A
(FORMERLY POWELL ROAD, REGISTERED PLAN 1764, CLOSED AND RENAMED BY JUDGE'S ORDER)
AND PART OF HOME ROAD, GILLEY ROAD, POWELL ROAD, HANOVER ROAD, REGAL ROAD (ALSO KNOWN AS GARRATT BOULEVARD),
AND ANCASTER ROAD (CLOSED BY EXPROPRIATION PLAN 3409),
REGISTERED PLAN 1764
CITY OF TORONTO

**June 28, 2023**




Park
Employment
Residential
Residential
Residential
Residential
Residential
Residential
Employment
Employment
Residential

Block 13
Downsview Bridge Park
Privately-Owned Publicly Accessible Space (POPS)
0.55 ha

Block 15
Park
0.06 ha

Block 1
Mixed-use
(Commercial/Residential)
0.67 ha

Block 2
Mixed-use
(Commercial/Residential)
0.72 ha

Block 3
Mixed-use
(Commercial/Residential)
0.64 ha

Block 14
Park
0.13 ha

Block 4
Mixed-use
(Commercial/Residential)
0.26 ha

Block 5
Mixed-use
(Commercial/Residential)
2.18 ha

Block 19
(98 Powell Rd. future conveyance)
<0.01ha adjustment

Block 12
Employment
(Commercial/Industrial)
8.79 ha

Block 16
Park
0.40 ha

Block 10
Employment
(Commercial/Industrial)
0.33 ha

Block 11
Employment
(Commercial/Industrial)
0.27 ha

Block 8
Future Murray Rd.
Extension Reserve
0.07 ha

Block 7
Mixed-use
(Commercial/Residential)
0.68 ha

Block 17
Park
0.60 ha

Block 6
Mixed-use
(Commercial/Residential)
0.60 ha

Block 20
(134 Gilley Rd. future conveyance)
<0.01ha adjustment

Block 9
Residential
1.15 ha

Block 18
Corner rounding
<0.01ha

RAILWAY LINE (METROLINX)
STREET A
STREET B
STREET C
STREET D
STREET E
STREET F
STREET G
STREET K
STREET L
STREET M
STREET N
TAXIWAY STREET (PRIVATE ROW) STREET O
POWELL ROAD
HOME ROAD
ANCASTER ROAD
GILLEY ROAD
PLEWES ROAD

## ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT, R.S.O., 1990

( a ) AS SHOWN ON DRAFT PLAN
( b ) AS SHOWN ON DRAFT AND KEY PLANS
( c ) AS SHOWN ON DRAFT AND KEY PLANS
( d ) THE LAND IS TO BE USED ACCORDING TO THE SCHEDULE OF LAND USE
( e ) AS SHOWN ON DRAFT AND KEY PLANS
( f ) AS SHOWN ON DRAFT PLAN
( g ) AS SHOWN ON DRAFT AND KEY PLANS
( h ) MUNICIPAL WATER SUPPLY TO BE MADE AVAILABLE
( i ) SOIL IS SANDY CLAYEY SILT
( j ) AS SHOWN ON DRAFT PLAN
( k ) FULL MUNICIPAL SERVICES TO BE MADE AVAILABLE
( l ) AS SHOWN ON THE DRAFT PLAN

| LAND USE | BLOCK | AREA (ha) | AREA (ac) |
|---|---|---|---|
| Mixed-use (Comm./Res.) | Blocks 1 to 7 | 5.62 | 13.9 |
| Future Murray Rd. Ext. Reserve | Block 8 | 0.07 | 0.17 |
| Residential | Block 9 | 1.15 | 2.8 |
| Employment | Blocks 10 to 12 | 9.39 | 23.2 |
| Downsview Park Bridge (POPS) | Block 13 | 0.55 | 1.36 |
| Park | Blocks 14 to 17 | 1.19 | 2.94 |
| Corner Rounding | Block 18 | <0.01 | <0.1 |
| 98 Powell Rd. Future Conveyance | Block 19 | <0.01 | <0.1 |
| 134 Gilley Rd. Future Conveyance | Block 20 | <0.01 | <0.1 |
| Public ROW* | STREETS A-G & K-N | 4.01 | 9.91 |
| Private ROW | STREET O (TAXIWAY STREET) | 0.44 | 1.09 |
| | | 22.44 | 55.4 |

*Streets H,I,J not assigned

## OWNER'S AUTHORIZATION

I AUTHORIZE WSP CANADA LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF TORONTO FOR APPROVAL.

Kristy Shortall — June 30, 2023
Kristy Shortall, Senior Vice President, Development
Northcrest Developments — DATE

## SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

June 29, 2023
Sabir Ahluwalia, OLS
JDBarnes — DATE

Scale 1 : 1,500
(24 x 36)

THIS DRAFT PLAN OF SUBDIVISION IS APPROVED UNDER SECTION 51 OF THE PLANNING ACT THIS _____ DAY OF _____, 20___, SUBJECT TO THE CONDITIONS, SET FORTH IN LETTER DATED _____.

_____
CHIEF PLANNER AND THE EXECUTIVE DIRECTOR,
CITY PLANNING DIVISION, CITY OF TORONTO

## PLANNER'S CERTIFICATE

PLAN PREPARED BY

John Tassiopoulos, MCIP RPP
June 28, 2023
DATE

211-13527-00 P01

# 8. Housing Report Addendum Letter

N. Barry Lyon Consultants Ltd.

# Memorandum

**To:**

**From:**

**Client:** **Date:**

**RE:**

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  which may align with funding program requirements for new affordable housing delivery (e.g., through the National Housing Strategy such as RCFI or Co-Investment Fund).

-

# 9. Land Use Compatibility Addendum Letter

**SLR Consulting (Canada) Ltd.**
100 Stone Road West, Suite 201, Guelph, ON N1G 5L3

June 26, 2023

Attention: Jinny Tran
Senior Development Manager
Northcrest Developments
161 Bay St., Suite 1305,
Toronto ON M5J 2S1

SLR Project No.: 241.V30396.00001

**RE: Taxiway West South Sub-District ("The Hanger District")**
**City File Nos.: 22 148540 NNY 06 OZ & 22 148583 NNY 06 SB**
**123 Garratt Boulevard, North York, ON M3K 1Y5**

SLR Consulting (Canada) Ltd. (SLR), was retained by Northcrest Developments ("NC") to conduct an environmental air quality study in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application for The Hangar District at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto.

The Subject Area is owned by PSPIB Downsview Investments Inc. ("PSP") and is comprised of 22.4 hectares (55.5 acres) of land consisting of the existing Bombardier hangars, offices and ancillary structures, surface parking lots, and a portion of the Downsview Airport taxiway. The Subject Area is located south of a proposed Film Studio Campus. The SLR report was entitled "Taxiway West South Sub-District Compatibility & Mitigation Study, Air Quality, Dust, Odour, Noise & Vibration for the Proposed Redevelopment of 123 Garratt Boulevard, Toronto, ON", dated May 2022.

# Introduction

A peer review of the above noted report was completed by R.J. Burnside & Associates Limited ("Burnside"). A copy of the peer review is provided in **Attachment A**.

This memo has been prepared in response to the comment comments provided. SLR is responding only to comments related to air quality. The comments related to Noise and Vibration will be addressed in a separate response from the noise consultant, Aercoustics.

In general, the Burnside peer reviewer is in agreement with the approach and outcomes of the compatibility study. The following additional commentary is provided in response to a few items identified:

## Comment 1 – Complaint History

Information regarding complaint history from surrounding employment lands should be included in the Compatibility Study.

## SLR Response to Comment 1:

SLR recognizes that complaint history can be useful in evaluating land use compatibility. SLR typically only requests potential complaints information for facilities located within the Recommended Minimum Separation Distance or where an industry is known to have the potential to generate significant air emissions.

SLR submitted a request related to neighbourhood complaint history with MECP through their Environmental Property Information (EPI) Program for the following three property locations:

- City of Toronto Transportation Services Central Yard – 64 Murray Road;
- Teskey/Innocon Concrete Company – 20 Murray Road
- 416 Vactors Inc. – 3695 Dufferin Street

The results of the EPI requests are provided in **Attachment B**. Based on a review of the EPI results, there are records that may provide information related to complaints for each of the properties.

Therefore, SLR advanced an FOI request for each property to review these reports to determine if they relate to air or noise emissions. The document requested include air permits, noise permits, incident reports, and abatement and occurrence reports. SLR advanced an FOI request to review relevant reports from 2016 to Present. At the time of preparation of this report a response from the FOI requests has not been received. In addition, Teskey/Innocon Concrete Company has requested a 3rd party extension on the release of information, which will delay the release of the information.

Although follow-up information has not been received, the results of these reports are not anticipated to change the findings of this report.

## Additional Assessment

Further to the SLR report issued in May 2022, the Subject Area plan has been changed and the development block, located between the Hangars and the Works Yard, (formerly Block J, now labelled Block H1 and H2) will be converted from residential to employment use. The block is identified with a blue border in the image below:



Based on the screening level modelling analysis completed in the May 2022 report, SLR does not anticipate compatibility issues from an air quality perspective related to the City operations at the Subject Area. However, the potential exists for fugitive emissions of particulate from materials handling, and odour emissions from vehicle operations at the City yard.

By changing the Block from residential to employment uses, compatibility between the land uses is improved through the removal of sensitive land uses and the potential for units to be occupied 24 hours per day 7 days per week within the block. SLR continues to recommend that Block H1 and H2 be completed with a centralized HVAC system with air filtration, and that air intake locations be directed away from the City Yard and located on the building roof top.

Although Northcrest Developments have chosen to change the Block to employment, SLR confirms our earlier opinion that with the inclusion of recommended mitigation measures and a warning clause, residential uses as assessed in our previous study are supportable from a land use compatibility perspective.

# Statement of Limitations

This report has been prepared and the work referred to in this report has been undertaken by SLR Consulting (Canada) Ltd. (SLR) for Northcrest Developments, hereafter referred to as the "Client". It is intended for the sole and exclusive use of the Client. The report has been prepared in accordance with the Scope of Work and agreement between SLR and the Client. Other than by the Client and by the City of Toronto in its role as a land use planning authority, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted unless payment for the work has been made in full and express written permission has been obtained from SLR.

This report has been prepared in a manner generally accepted by professional consulting principles and practices for the same locality and under similar conditions. No other representations or warranties, expressed or implied, are made.

Opinions and recommendations contained in this report are based on conditions that existed at the time the services were performed and are intended only for the client, purposes, locations, time frames and project parameters as outlined in the Scope or Work and agreement between SLR and the Client. The data reported, findings, observations and conclusions expressed are limited by the Scope of Work. SLR is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. SLR does not warranty the accuracy of information provided by third party sources.

# Closure

Based on the SLR response to the peer review comments, and the additional information provided, SLR confirms their conclusion from the original compatibility assessment which states:

"With the addition of the above noted mitigation measures and warning clause, the development of the Subject Area is anticipated to be compatible with the surrounding employment land uses from an air quality, noise and vibration perspective. The Subject Area is not anticipated to limit the ability of the surrounding existing and proposed industries to obtain or maintain required MECP permits and approvals. From an air quality, noise and vibration perspective, there is no reason from an air quality, noise and vibration perspective why the development should not proceed."

Should you have any questions on the above, please do not hesitate to contact us.

Regards,

**SLR Consulting (Canada) Ltd.**

**Diane Freeman, P. Eng. FEC, FCAE**
Principal – Air Quality
dfreeman@slrconsulting.com

**Jenny Graham, P. Eng.**
Senior engineer – Air Quality
jgraham@slrconsulting.com

Attachments

# Attachment A – R.J. Burnside & Associates Limited Peer Review Comments

## Response to Peer Review

**Taxiway West South Sub-District**

**Northcrest Developments**

SLR Project No.: 241.V30396.00001

**R.J. Burnside & Associates Limited** 17345 Leslie Street, Suite 303 Newmarket ON L3Y 0A4 CANADA
**telephone** (905) 953-8967 **fax** (519) 941-8120 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

March 1, 2023

**Via: Email (Perry.Korouyenis@toronto.ca)**

Mr. Perry Korouyenis
Senior Planner, Community Planning
City Planning Division
North York District
5100 Yonge Street, Ground Floor
Toronto ON M2N 5V7

Dear Mr. Korouyenis:

**Re: Peer Review of the Compatibility & Mitigation Study and Noise and Vibration Impact Study**
**Proposed Redevelopment of 123 Garratt Boulevard, Toronto, ON**
**First Submission**
**Project No.: 300052960.0730**

R.J. Burnside & Associates Limited (Burnside) was retained by the City of Toronto (the City) to provide a peer review of the Compatibility and Mitigation Study and Noise and Vibration Impact Study prepared in support of the proposed redevelopment of 123 Garratt Boulevard property in Toronto (the Site). The following documents were reviewed as part of this undertaking:

- Compatibility & Mitigation Study, Air Quality, Dust, Odour, Noise & Vibration, For the Proposed Redevelopment of 123 Garratt Boulevard, Toronto, ON, dated May 2022, prepared by SLR Consulting (Canada) Ltd.
- Noise and Vibration Impact Study, Proposed Redevelopment of 123 Garratt Boulevard, Toronto, ON, dated April 14, 2022, prepared by Aercoustics Engineering Ltd.

## 1.0 Compatibility & Mitigation Study

The Compatibility & Mitigation Study (Compatibility Study) was prepared by SLR Consulting (Canada) Ltd. (SLR) in support of the proposed redevelopment application request for the property located at 123 Garratt Boulevard in Toronto.

Potential impacts from the following sources were considered in the Compatibility Study:

- Industrial air quality, odour, and dust emissions;
- Industrial noise; and
- Transportation-related noise and vibration.

Information regarding complaint history was mentioned for Teskey/Innocon Concrete Company, who received complaints in 2018. Complaint history regarding the rest of surrounding industry was not mentioned in the Compatibility Assessment; therefore, it is not clear whether information regarding complaints received by the City and/or the MECP concerning nearby Employment Areas was requested and considered.

The Compatibility Study was prepared following the Ministry of the Environment, Conservation and Parks (MECP) D-6 Guideline[1] and the City of Toronto Terms of Reference for Compatibility/Mitigation Study[2] requirements.

Industrial and commercial operations within 1 km of the proposed development were considered in the Compatibility Study. All facilities were summarized in Appendix B. The proposed development is located within the minimum separation distance of one Class II facility – Toronto – Transportation Services Central Yard. The Site is also located within the potential influence area of one Class II facility and two Class III facilities – Teskey/Innocon Concrete Company, TTC Wilson Complex and Coco Paving/Innocon, respectively. Impacts from these operations were discussed and assessed in further details.

***TTC Wilson Complex***

TTC Wilson Complex is a maintenance facility for subway vehicles and passenger buses. The facility is located 650 m from the Site; therefore, the proposed development will be located within the potential influence area of this facility. The facility operates under MECP Environmental Compliance Approval (ECA) and was noted to be expected to operate in compliance with air emission standards at the property line. Fugitive emission of dust and odour were not observed from this operation.

The proposed development is separated from the TTC operations by the existing runway which is going to be redeveloped in the near future. The existing sensitive receptors are located in closer proximity than the proposed development. Based on the separation distance and the existing sensitive land uses, we agree that the proposed development should be compatible with the TTC facility from an air quality perspective and should not restrict their operations more that it is currently restricted by the existing residential areas.

The Compatibility Study summarized noise impact from this operation based on the finding in the Noise and Vibration Impact Study (Noise Study). Further discussion on this topic is included under the Noise and Vibration Impact Study section of this peer review letter.

***Coco Paving/Innocon Inc.***

Coco Paving is a hot mix asphalt plant operating at 949 Wilson Avenue, 525 m away from the proposed development. Innocon Inc. is a ready-mix concrete plant operating at the same address. The facility is considered a Class III Industrial Facility and is located within the potential influence area of the Site but outside the minimum recommended separation distance.

The proposed development is over 500 m away from the facility; therefore, as noted in the Compatibility Study, it would not trigger Odour Management Plan Requirements for the facility. SLR noted that the majority of the air emission from the facility will be fugitive and will be dispersed at low elevations; therefore, potential elevated receptors at the Site are not expected to be impacted. It was concluded that the proposed development is anticipated to be compatible with the Coco Paving facility from an air quality perspective. We agree with this conclusion.

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[1] Guideline D-6 - Compatibility Between Industrial Facilities and Sensitive Land Uses. July 1995. Ontario Ministry of the Environment. PIBS 3272e.

[2] Application Support Material: Terms of Reference - https://www.toronto.ca/city-government/planning-development/application-forms-fees/building-toronto-together-a-development-guide/application-support-material-terms-of-reference/

The Compatibility Study summarized noise impacts from this operation based on the findings in the Noise Study. Further discussion on this topic is included under the Noise and Vibration Impact Study section of this peer review letter.

***Toronto – Transportation Services Central Yard***

Transportation Services Central Yard (Services Yard), located at 64 Murray Road and adjacent to the proposed development, provides the City of Toronto transportation and road maintenance services.

A screening level dispersion modelling was performed to assess particulate emissions associated with operations at this facility. It is our understanding that the operation details and assumptions were obtained from the staff member at the Services Yard. The results indicated that the highest predicted concentrations occur at the proposed development near the property line with the Services Yard. Based on the screening level modelling and review of existing conditions, SLR concluded that compatibility issues from an air quality are not anticipated. SLR, however, acknowledged that there is potential for fugitive emissions from materials handling, and odour emissions from vehicle operations at the Services Yard. Mitigation measures, as discussed in the Recommended Mitigation Measures section of this peer review letter, were recommended to eliminate potential complaints. We agree with this approach.

The Compatibility Study summarized noise impact from this operation based on the finding in the Noise Study. Further discussion on this topic is included under the Noise and Vibration Impact Study section of this peer review letter.

***Teskey/Innocon Concrete Company***

Teskey/Innocon Concrete Company is a ready-mix concrete batch plant operating at 20 Murray Road. The facility is 180 m away from the proposed development. A screening level dispersion modelling was performed to assess particulate emissions associated with operations at this facility. It is our understanding that the operation details and assumptions were obtained from a staff member at the facility. The results indicated that the concentrations at the proposed development are much lower than concentrations predicted at the Teskey/Innocon property line. Based on the screening level modelling results, the separation distance, and the prevailing winds, SLR concluded that dust and odour emissions from this facility are not anticipated at the proposed development. We agree with this conclusion.

The Compatibility Study summarized noise impact from this operation based on the finding in the Noise Study. Further discussion on this topic is included under the Noise and Vibration Impact Study section of this peer review letter.

***Taxiway West North Sub-District Area***

The Taxiway West North Sub-District Area is located immediately north of the proposed development. According to the Compatibility Study, the property will be used as a film studio campus. Based on a review of the proposed uses at this property, it was determined that the majority of uses would be considered Class I industrial classification with a minimum separation distance of 20 m and a potential influence area of 70 m. The proposed development will have a buffer between this property and the sensitive land use at the Site; therefore, the minimum separation distance requirement will be fulfilled. SLR noted that any activities with emissions to atmosphere would require MECP approval which will ensure all the limits will be met at the property line. We agree that sensitive land uses at the proposed development are expected to be compatible with the film studio operations.

***Transportation Related Air Pollution***

The proposed development was determined to be outside of the Transportation Related Air Pollution (TRAP) “exposure zone” of 500 m to Highway 401. We agree that a detailed TRAP assessment is not warranted for this development.

SLR acknowledged that GO Barrie Line runs along the west side of the proposed development. Considering there should be no idling of rail cars along this rail corridor stretch, air emissions from the GO Barrie Line are not anticipated to impact the proposed development.

## 2.0 Noise and Vibration Impact Study

A Noise and Vibration Impact Study was prepared by Aercoustics Engineering Ltd. (Aercoustics) to examine the existing and future acoustic environment and evaluate the impact on the proposed development.

***Transportation***

The dominant transportation noise source was identified as a rail line adjacent to the proposed development on the west side. Wilson Avenue located over 500 m and Highway 401 located over 900 m to the south of the Site were considered to be acoustically insignificant. We agree that the two roads at these large distances should not have significant contribution compared to the nearby rail line.

Sound levels were predicted at the most impacted representative locations. Aercoustics noted that a more detailed assessment of the impact on each individual building may be carried out at a later stage in the design process. The levels up to 75 dBA and 70 dBA were predicted at the plane of window receptors for day and nighttime periods, respectively. It is our understanding that Outdoor Living Areas are not defined at this stage and will be assessed once the locations are known.

Preliminary window glazing assessment was included in the Noise Study and windows with STC rating up to 37 will potentially be required for the proposed development.

***Stationary Noise***

The significant stationary noise sources in the vicinity with potential impact on the proposed development were identified at the following facilities:

- TTC Wilson Complex;
- City of Toronto Works Yard (referred to as Transportation Services Central Yard in the Compatibility Study);
- Teskey Concrete facility;
- Coco Paving/Innocon Inc. facility.

The facilities with dominant noise sources listed above were assessed and modelled individually. This is a standard approach following MECP NPC-300 guidance.

Sound levels predicted due to TTC Wilson Complex and Teskey Concrete facility operations were shown to be below the applicable limits. Assumptions used in assessment of both operations were found to be reasonable and acceptable.

A couple of approaches were taken to assess noise from operations at the Services Yard. Aercoustics referenced Ministry guidelines stating that activities related to essential services

and maintenance of public facilities are not considered stationary sources in the context of noise assessment for land use planning. It was noted that many of the regular activities within the Services Yard were related to snow removal, cleaning, maintenance, and repair of roads; therefore, would fall under the above-mentioned exemption. As a result, only so called "non-essential sources" comprising of rooftop equipment, front end loader, idling service pickup trucks, and maintenance/testing of standby generator were assessed in this case. Sound levels from these sources were shown to be below the applicable limits for both normal operation and emergency equipment testing.

NPC-300 refers to the essentials services as "activities related to essential services and maintenance of public facilities such as, but not limited to, roadways, parks and sewers, snow removal, road cleaning, road repair and maintenance, lawn mowing and maintenance, sewage removal, garbage collection". In our opinion, this definition applies to services in the public areas like roads, parks, sewers, etc. The on-site activities should be treated as regular daily activities needed to operate the Services Yard and should not be considered essential services until the equipment leaves the property to operate in public areas. Therefore, all noise sources associated with the on-site activities should be included in the model.

The worst-case operating scenario for all the on-site sources was included in the Noise Study as another operating scenario. Sound levels up to 67 dBA are anticipated at the most impacted sensitive receptors. Aercoustics noted that the plane of window limits applies to closed windows in the areas designated as Class 4. We agree with this statement; however, this distinction does not affect the prediction of plane of window sound levels and the applicable sound level limits must be met. Sound levels above 60 dBA exceed Class 4 limits. The assumption that residents will keep their windows closed during severe weather snow removal operations is reasonable but does not justify the exceedance. Mitigation measures should be assessed to ensure sound levels at all sensitive receptors will be below the applicable limits.

Coco Paving/Innocon Inc. facility was identified as a potential noise source. Based on separation distance of over 500 m, existing residential areas in closer proximity to the facility than the Site and Coco Paving's obligation to meet the applicable sound level limits at the nearest sensitive receptors, sound levels at the proposed development are expected to be acoustically insignificant. We agree with that conclusion.

A preliminary assessment of the stationary sources within the proposed development was discussed in the Noise Study. Reasonable assumptions were made for the sound power and operation duty cycles of the residential and commercial buildings rooftop units. Preliminary worst-case sound levels from the proposed development itself were shown to have potential to exceed the applicable limits. Recommendations pertaining to the noise sources to be considered during the design process were provided. As noted in the Noise Study, further analysis should be undertaken to ensure sound levels from the stationary noise sources within the development will be below the applicable limits at the surrounding sensitive receptors and the development itself.

The assessment assumed a Class 4 area designation will be pursued for the proposed development. As a result, predicted sound levels were compared against Class 4 limits. Based on the information provided, we agree that the Site is a potential candidate for a Class 4 designation. However, sound levels due to the City of Toronto Works Yard operations have potential to exceed the applicable limits. We cannot support Class 4 area designation until it is confirmed that sound levels can be mitigated to meet the applicable limits at the proposed development.

***Vibration***

The proposed development is located adjacent to the rail line. As recommended in Metrolinx and FCM/RAC Proximity Guidelines, vibration impacts were assessed. Measurements were taken at a distance of 20 m from the rail line over a period of one week. 20 worst-case train passes with highest recorded vibration levels were analyzed. The maximum of 0.32 mm/sec vibration level were recorded. It is our understanding that no buildings are propose at this short distance from the rail line. The nearest buildings are expected to be 50 m away. Vibration levels were adjusted to represent the situation at 50 m and shown to be below the applicable 0.14 mm/sec threshold value.

As noted by Aercoustics, if the Site Plan is revised and buildings are introduced at a distance of 30 m from the rail line, 0.14 mm/sec threshold can potentially be exceeded; therefore, mitigation of rail vibration impact is recommended.

## 3.0 Recommended Mitigation Measures

The Compatibility Study determined that following mitigation measure would be beneficial for the proposed development from an air quality perspective:

- Centralized HVAC system for some blocks at the development (refer to the Compatibility Study for details).
- Air intakes to be directed away from the Transportation Services Central Yard.
- Air filtration on fresh air intakes for some blocks (refer to the Compatibility Study for details).

The Noise Study recommended following mitigation measures:

- Enhanced window glazing for some blocks (refer to the Noise Study for details).
- A minimum of brick veneer or masonry equivalent construction for the exterior walls of the residential units adjacent to rail line.
- Warning clauses (refer to the Noise Study for details and sample wording).
- Mandatory central air conditioning for all residential units with facades exposed to the rail line.
- Potential receptor-based mitigation for the building closest to the Services Yard.

The Rail Park, adjacent to the rail line was not considered an Outdoor Living Area; however, Aercoustics acknowledged that it may be desirable to reduce sound levels in this area and recommended a 4 m high noise barrier to reduce sound levels to 70 dBA.

Outdoor Living Areas have not been identified within the proposed development at this stage; therefore, mitigation measures were not determined.

Based on the current Site Plan, the nearest building is located 50 m away from the rail line; therefore, no vibration mitigation measures are required. If any buildings are introduced within 30 m of the rail line, vibration mitigation should be considered.

## 4.0 Conclusions

Based on the comments above, the following items should be addressed, and further information provided:

1. Information regarding complaint history from surrounding employment lands should be included in the Compatibility Study.
2. Noise impacts at the Outdoor Living Areas should be assessed and mitigation measures to be recommended once the locations of these areas are identified (can be addressed at the Site Plan Approval stage).
3. Mitigation measures to reduce sound levels due to the Transportation Services Central Yard should be assessed and recommended to ensure sound levels will be below Class 4 limits.
4. As noted in the Noise Study, a detailed noise impact assessment from the on-site stationary sources should be carried out once information on mechanical equipment is available (can be addressed at the Site Plan Approval stage).

As outlined above, there are several items in Compatibility and Noise Studies that need to be addressed. Until these items are addressed, we cannot confirm that the proposed development is compatible with the surrounding environment.

Yours truly,

**R.J. Burnside & Associates Limited**



Kristina Zeromskiene, Ph.D., LEL
Senior Air & Noise Scientist
KZ:bs

cc: Harvey Watson, R.J. Burnside & Associates Limited (Via: Email)

# Attachment B – EOI Responses

## Response to Peer Review

**Taxiway West South Sub-District**

**Northcrest Developments**

SLR Project No.: 241.V30396.00001

**Ministry of the Environment, Conservation and Parks**

Corporate Management Division

**Ministère de l'Environnement, de la Protection de la nature et des Parcs**

Division de la gestion ministérielle

March 14, 2023

Diane Freeman
SLR Consulting Ltd.

Dear Diane Freeman
RE: Request #: EPI-2023-2000002132
Requestor provided Client Reference: 241.30396.00000
Site address: 64 Murray Road, North York

This letter confirms that, after conducting a thorough search of its source system applications, the ministry has identified potential records related to your property request. Our search indicates that the ministry may hold the following records:

- Waste Generator number/classes
- Correspondence, Abatement, Occurrence reports
- Inspections
- Incident Reporting
- Waste Management Systems Approval[1]
- Investigations
- Air Approval[1]
- Waste Site Approval[1]

If you would like to submit a Freedom of Information (FOI) request to the ministry, please return to the table on the Requests tab of the EPI application and select “Submit FOI” under the Actions column in the row identified by EPI-2023-2000002132.

If you have any questions regarding the matter, please contact the ministry at eproperty@ontario.ca.

Sincerely,

Environmental Property Information (EPI) Program

**Disclaimer**

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(MECP) cannot and does not guarantee that the information provided is current, accurate, complete, or free of errors. Any reliance upon this information is solely at the risk of the user.

[1] In addition to the core reports (e.g Environmental Compliance Approval), there may be extensive supporting documentation associated with this record type. When transferring your request over to FOI, we encourage you to refine the scope of your request to only the supporting documentation required for your purposes, as the inclusion of this additional documentation can add significant processing time.

**Ministry of the Environment, Conservation and Parks**

Corporate Management Division

**Ministère de l'Environnement, de la Protection de la nature et des Parcs**

Division de la gestion ministérielle

Le 14 mars 2023

Diane Freeman
SLR Consulting Ltd.

Madame,
Monsieur, Diane Freeman
Objet : No de demande : EPI-2023-2000002132
Le demandeur a fourni une référence client: 241.30396.00000
Adresse du site: 64 Murray Road, North York

La présente lettre confirme que, après avoir effectué une recherche exhaustive dans ses applications de système source, le ministère a circonscrit des dossiers potentiels reliés à votre demande concernant des biens immobiliers. Notre recherche indique que les dossiers suivants peuvent être en possession du ministère:

- Waste Generator number/classes
- Correspondence, Abatement, Occurrence reports
- Inspections
- Incident Reporting
- Waste Management Systems Approval[1]
- Investigations
- Air Approval[1]
- Waste Site Approval[1]

Si vous souhaitez soumettre une demande de liberté d'information (FOI) au ministère, veuillez retourner au tableau de l'onglet Requêtes de l'application EPI et sélectionner "Soumettre FOI" dans la colonne Actions de la ligne identifiée par EPI-2023-2000002132.

Si vous avez des questions concernant votre demande, nous vous invitons à communiquer avec le ministère à l’adresse électronique suivante : eproperty@ontario.ca.

Veuillez recevoir mes salutations les plus sincères,

Programme d’Information Environnementale de la propriété

**Avertissement**

Ce résultat de recherche est fourni uniquement à titre informatif et n’a aucunement pour but de donner des conseils particuliers ou des recommandations. Le ministère de l’Environnement de la Protection de la nature et des Parcs (MEPP) ne peut pas garantir que les renseignements fournis sont à jour, exacts, complets et exempts d’erreurs. L’utilisateur qui se fie à ces renseignements le fait à ses seuls risques.

[1] En plus des rapports de base (par exemple, l'approbation de conformité environnementale), il peut y avoir de nombreux documents justificatifs associés à ce type d'enregistrement. Lors du transfert de votre demande vers FOI, nous vous encourageons à affiner la portée de votre demande en ne tenant compte que des pièces justificatives requises pour vos besoins, car l'inclusion de ces documents supplémentaires peut ajouter un temps de traitement important.

Ontario

**Ministry of the Environment, Conservation and Parks**

Corporate Management Division

**Ministère de l'Environnement, de la Protection de la nature et des Parcs**

Division de la gestion ministérielle

March 14, 2023

Diane Freeman
SLR Consulting Ltd.

Dear Diane Freeman
RE: Request #: EPI-2023-2000002133
Requestor provided Client Reference: 241.30396.00000
Site address: 20 Murray Road, North York

This letter confirms that, after conducting a thorough search of its source system applications, the ministry has identified potential records related to your property request. Our search indicates that the ministry may hold the following records:

- Historical Investigation
- Waste Generator number/classes
- Correspondence, Abatement, Occurrence reports
- Air, Industrial, Noise, Sewage Approval[1]
- Prosecutions, Spills
- Abatement Response
- Incident Reporting, Facility Air Profile
- Investigations, IEB Referral
- Orders, Technical Support
- Pollution Incident Report

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March 14, 2023

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Requestor provided Client Reference: 241.30396.00000
Site address: 3695 Dufferin Street, North York

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- Waste Generator number/classes
- Groundwater
- Correspondence, Abatement, Occurrence reports
- Incident Reporting
- Pollution Incident Report

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Veuillez recevoir mes salutations les plus sincères,

Programme d’Information Environnementale de la propriété

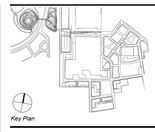
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# 10. Landscape Plan & Cross Sections




| NO. | DATE | DESCRIPTION |
|---|---|---|
| 05 | 2023-07-06 | ZBA/DPS SUBMISSION |
| 04 | 2022-05-05 | ZBA/DPS SUBMISSION |
| 03 | 2022-03-31 | FREEZE 3 SUBMISSION |
| 02 | 2022-03-07 | DRAFT SUBMISSION |
| 01 | 2022-02-28 | DRAFT SUBMISSION |

ISSUE RECORD

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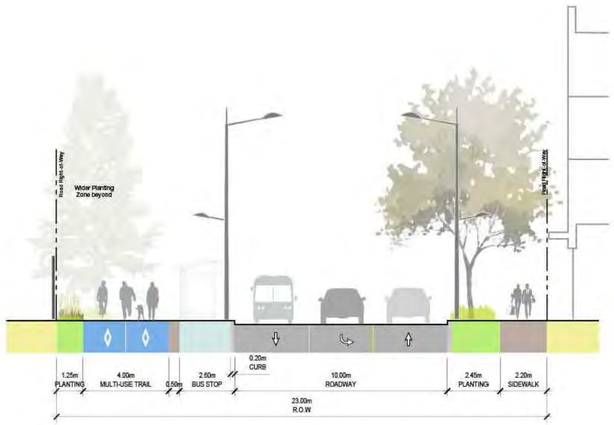
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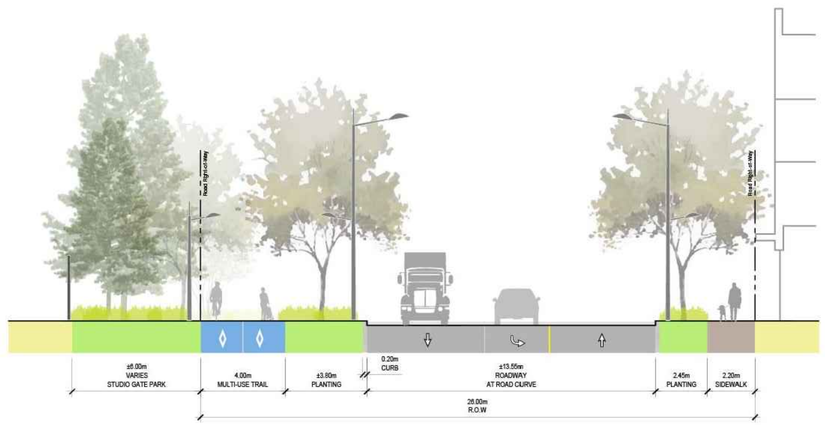
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| PROJECT NO. | 20-046-A |
| DRAWN BY: | SL |
| CHECKED BY: | |

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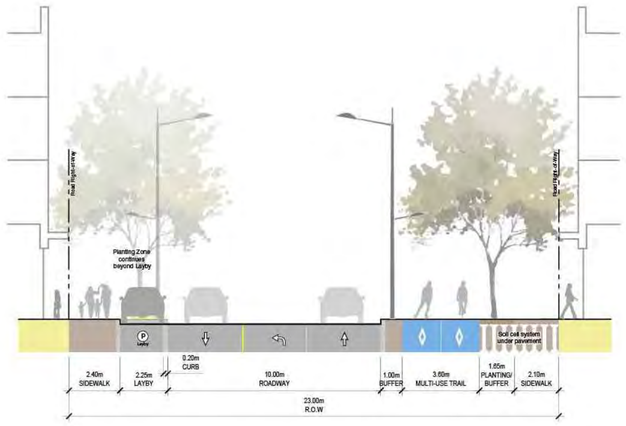
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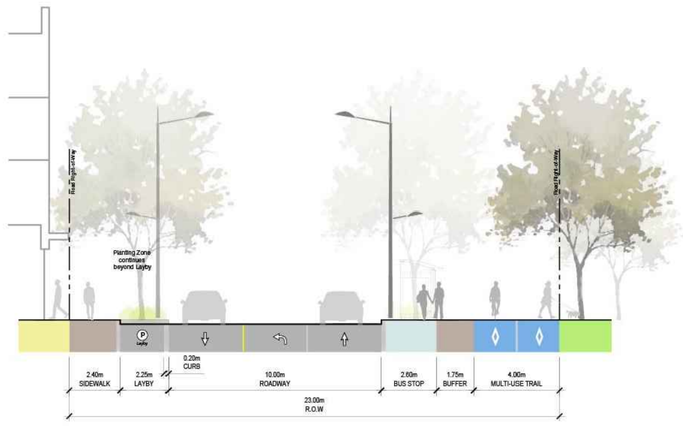

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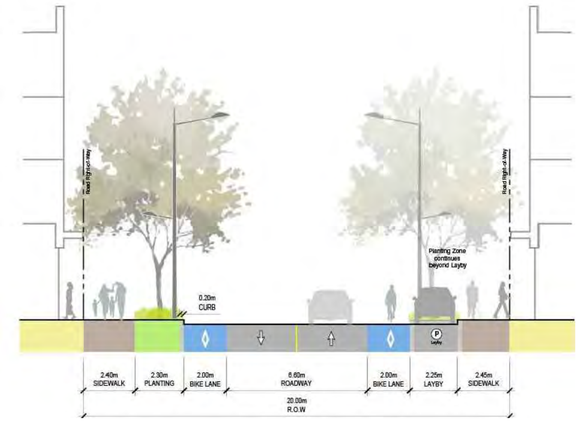

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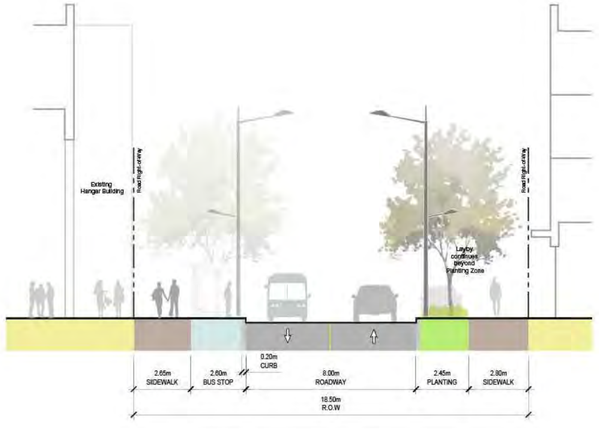

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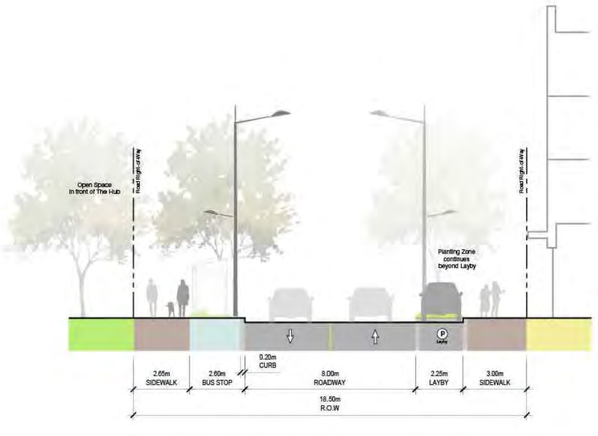

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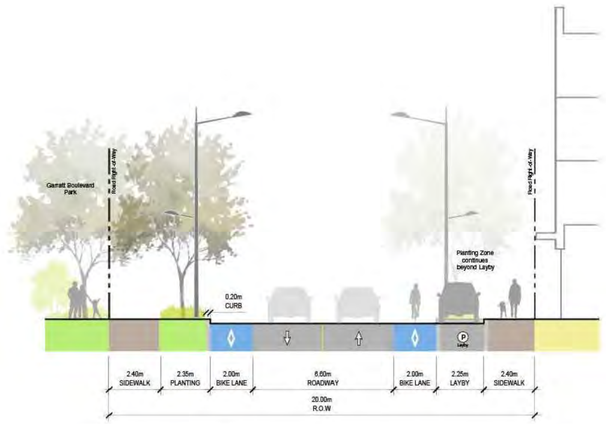

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6 STREET D - NORTH
1:100




7 STREET D - CENTRAL
1:100




8 STREET D - SOUTH
1:100

| NO. | DATE | DESCRIPTION |
|---|---|---|
| 05 | 2023-07-06 | ZBA/DPS SUBMISSION |
| 04 | 2022-05-05 | ZBA/DPS SUBMISSION |
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| 01 | 2022-02-28 | DRAFT SUBMISSION |

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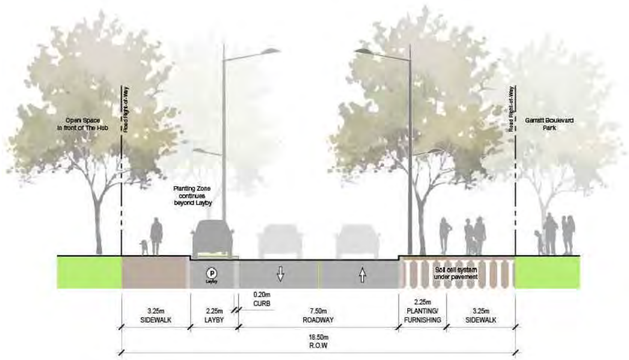
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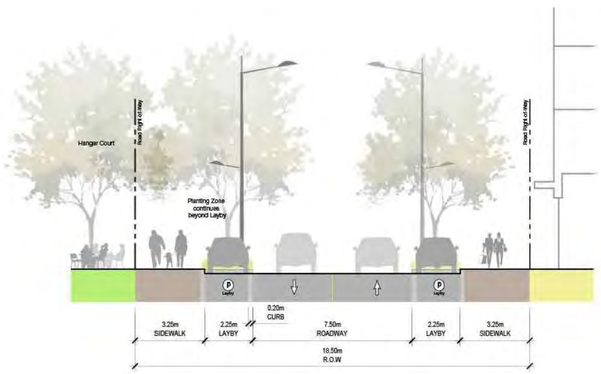
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SCALE: AS SHOWN
PROJECT NO. 20-046-A
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CHECKED BY:

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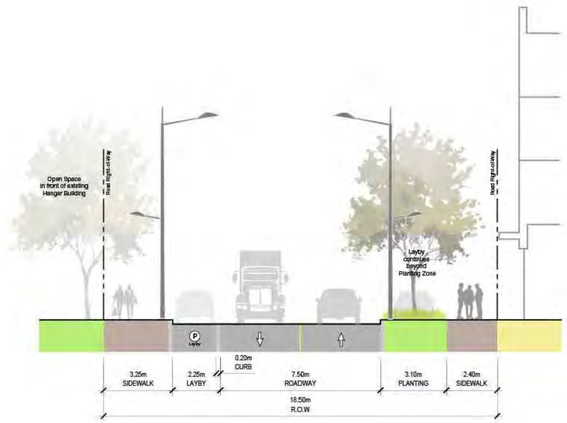
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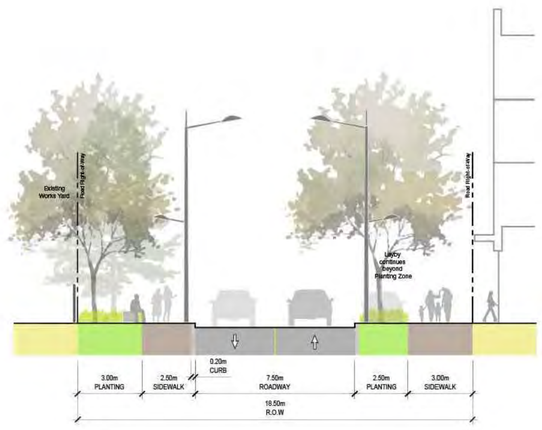

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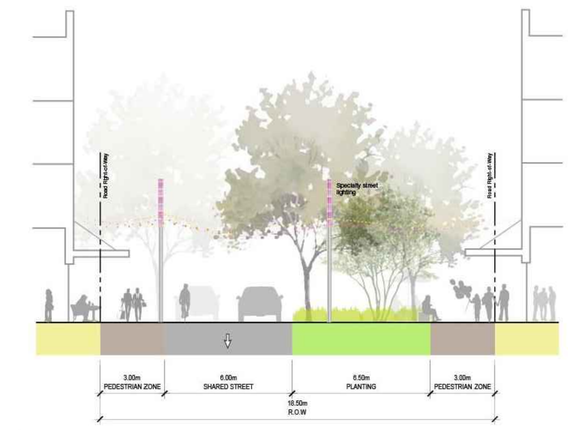

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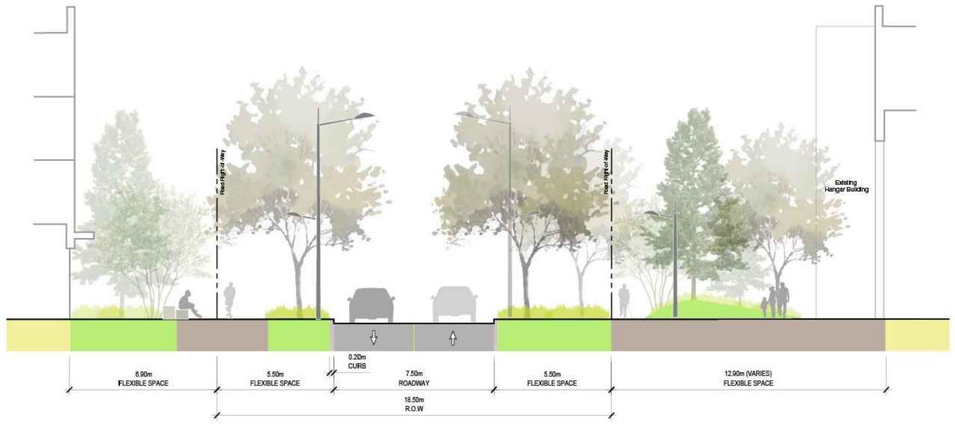

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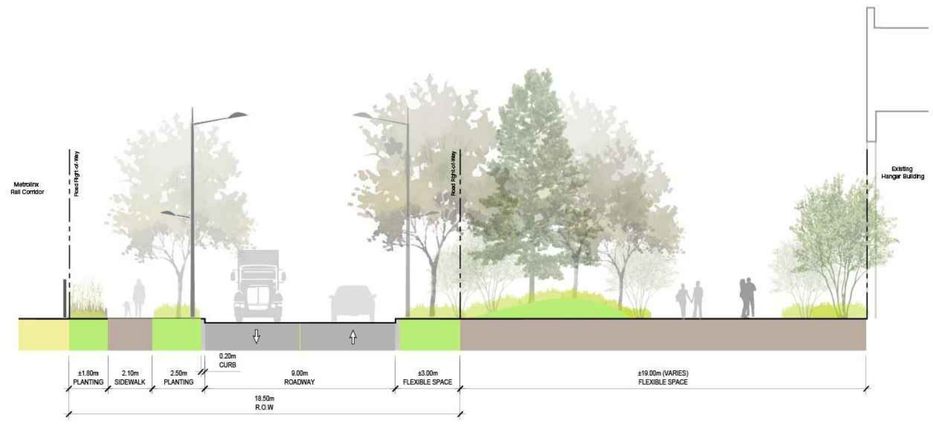

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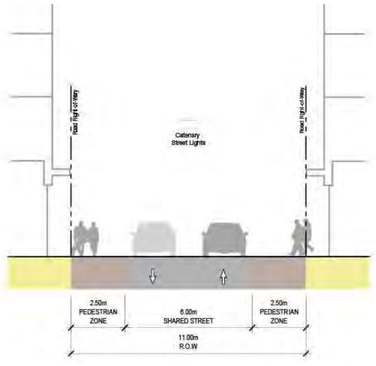

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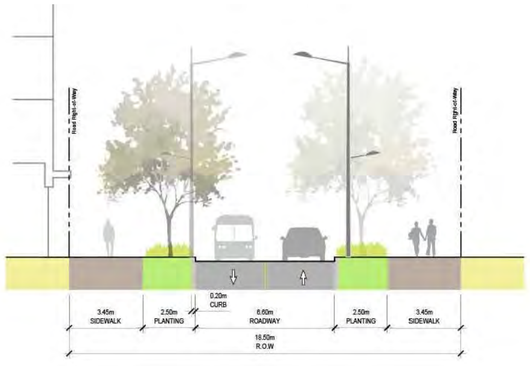

7 STREET I (PRIVATE STREET)
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8 STREET H (PRIVATE STREET)
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9 STREET K & STREET L
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10 STREET N
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| NO | DATE | DESCRIPTION |
|---|---|---|
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STREET SECTIONS

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SCALE: AS SHOWN
PROJECT NO. 20-046-A
DRAWN BY: SL
CHECKED BY:

L-501

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# 11. Noise Study Addendum

aercoustics

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

July 4, 2023 Aercoustics Project #: 20131.07

**Northcrest Developments**
161 Bay Street, Suite 1320,
Toronto, ON
M5J 2S1

ATTN: Jinny Tran, Northcrest Developments

CC: Arleigh Hack, Northcrest Developments
Derek Flake, Aercoustics

Subject: NVIS Addendum – Proposed Redevelopment of the Hangar District (Formerly the Taxi-way West South Sub-District)
Resubmission of Zoning By-law Amendment & Draft Plan of Subdivision Applications
City File Nos.: 22 148540 NNY 06 OZ & 22 148583 NNY 06 SB
123 Garratt Boulevard, North York, ON M3K 1Y5

# 1 Introduction

Aercoustics Engineering Limited (Aercoustics) was retained by Northcrest Developments (Northcrest) to prepare a noise and vibration impact study for the proposed redevelopment of 123 Garratt Boulevard in Toronto, Ontario.

The purpose of this letter is to identify the key changes within the Subject Development since the Noise and Vibration Impact Study prepared by Aercoustics Engineering Limited and dated April 14, 2022 (the “Original NVIS”).

This letter also serves to address peer review comments presented in a document titled “Peer Review of the Compatibility & Mitigation Study and Noise and Vibration Impact Study – Proposed Redevelopment of 123 Garratt Boulevard, Toronto, ON” prepared by RJ Burnside & Associates, dated March 1, 2023 (the “Peer Review Letter”).

# 2 Summary of Changes

## 2.1 Minor Changes to Building Blocking and Massing

Minor refinements to massing were reviewed and were determined not to change the conclusion of Aercoustics’ Original NVIS.

## 2.2 Conversion of Block H to Non-Residential Use

Buildings located within Block H (formally Block J), situated to the immediate north of the City of Toronto Works Yard, have been redesignated as non-residential.

These buildings were the most closely-situated sensitive uses to the City of Toronto Works Yard as well as the nearby Metrolinx Barrie rail line (the "Rail Line"). Following this redesignation to non-residential, the closest sensitive Points of Reception are those in Blocks I and J, which border the Works Yard to the east. Figure 1, below, illustrates the proposed uses for blocks surrounding the Works Yard.




Figure 1: Conversion of Block H to Non-Residential Use

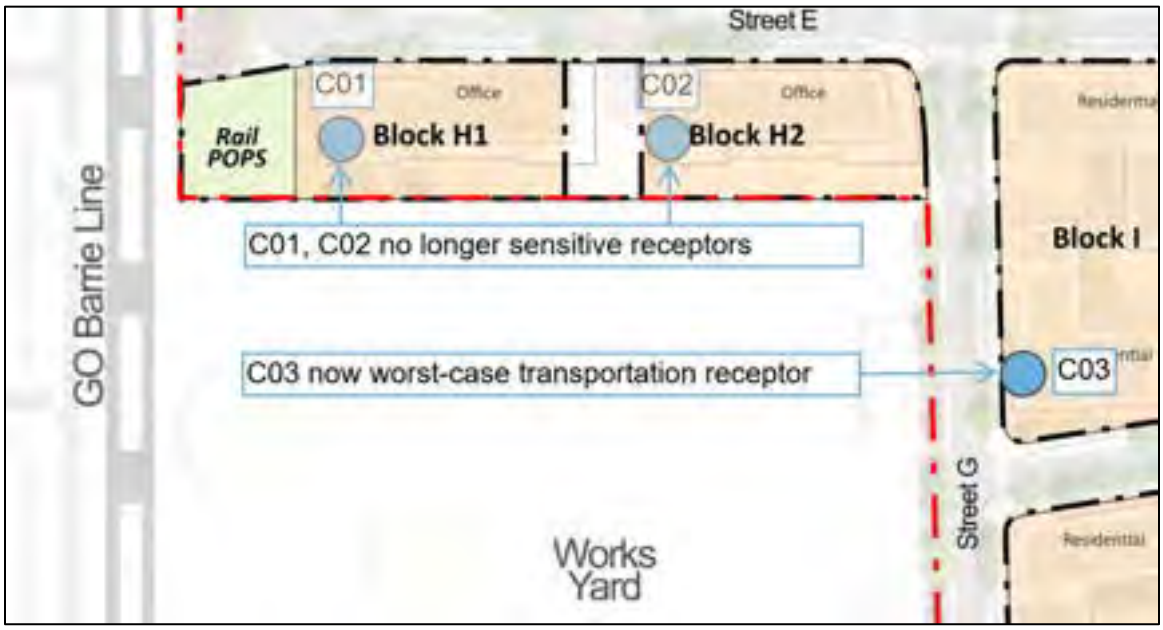
There are no concerns from a noise and vibration perspective regarding the proposed conversion to non-residential. Notwithstanding this change in use, sensitive uses within Block H are expected to be feasible with the implementation of noise controls.

### 2.2.1 Implications for Stationary Noise Impacts

The redesignation of Block H to a non-residential use means the most-impacted sensitive locations are dwelling units on the west facades of buildings in Block I and Block J. Based on a revised analysis discussed later in this letter, the worst-case stationary noise impact from the Works Yard at these receptors is predicted to be 55 dBA, falling below the MECP Class 4 sound level limits. A revised noise impact contour figure has been appended to this addendum letter.

### 2.2.2 Implications for Transportation Noise Impacts

The worst-case transportation noise impact from the nearby Metrolinx Barrie rail line now occur at the western façade of buildings in Blocks I and J, represented by Receptor C03 in the Original NVIS, as illustrated below.




The recommendation for window assembly construction meeting STC-28 performance remains for dwelling units on the west facades of buildings in blocks I and J.

# 3 Peer Review Comment Response

The following has been prepared to address comments related to the Original NVIS in a document titled "Peer Review of the Compatibility & Mitigation Study and Noise and Vibration Impact Study – Proposed Redevelopment of 123 Garratt Boulevard, Toronto, ON" prepared by RJ Burnside & Associates, dated March 1, 2023 (the "Peer Review Letter").

In this section, the relevant comment is presented in italics, with Aercoustics' response in regular lettering.

## 3.1 Comment – Works Yard Noise Impact & Exempt Sources

*A couple of approaches were taken to assess noise from operations at the Services Yard. Aercoustics referenced Ministry guidelines stating that activities related to essential*

*services and maintenance of public facilities are not considered stationary sources in the context of noise assessment for land use planning. It was noted that many of the regular activities within the Services Yard were related to snow removal, cleaning, maintenance, and repair of roads; therefore, would fall under the above-mentioned exemption. As a result, only so called "non-essential sources" comprising of rooftop equipment, front end loader, idling service pickup trucks, and maintenance/testing of standby generator were assessed in this case. Sound levels from these sources were shown to be below the applicable limits for both normal operation and emergency equipment testing.*

*NPC-300 refers to the essentials services as "activities related to essential services and maintenance of public facilities such as, but not limited to, roadways, parks and sewers, snow removal, road cleaning, road repair and maintenance, lawn mowing and maintenance, sewage removal, garbage collection". In our opinion, this definition applies to services in the public areas like roads, parks, sewers, etc. The on-site activities should be treated as regular daily activities needed to operate the Services Yard and should not be considered essential services until the equipment leaves the property to operate in public areas. Therefore, all noise sources associated with the on-site activities should be included in the model.*

*The worst-case operating scenario for all the on-site sources was included in the Noise Study as another operating scenario. Sound levels up to 67 dBA are anticipated at the most impacted sensitive receptors. Aercoustics noted that the plane of window limits applies to closed windows in the areas designated as Class 4. We agree with this statement; however, this distinction does not affect the prediction of plane of window sound levels and the applicable sound level limits must be met. Sound levels above 60 dBA exceed Class 4 limits. The assumption that residents will keep their windows closed during severe weather snow removal operations is reasonable but does not justify the exceedance. Mitigation measures should be assessed to ensure sound levels at all sensitive receptors will be below the applicable limits.*

A revised analysis has been carried out reflecting a new worst-case operating scenario associated with the City of Toronto Works Yard (the "Works Yard"). This scenario now considers the movements vehicles related to offsite snow removal including two front-end loaders operating near the salt dome towards the northwest of the site.

The revised analysis also importantly considers the redesignation of buildings to the immediate north of the Works Yard to non-residential uses. These buildings were previously designated as Mixed-Use and included sensitive Points of Reception approximately 60 m to the north of the salt dome & associated loader activity during a snow event. The closest sensitive receptors to the east are located approximately 200 m from the salt dome & associated loader activity.

The worst-case operating scenario of the Works Yard during a snow event is now 55 dBA at receptors to the east, which does not exceed the MECP Class 4 daytime and nighttime

sound level limits. An updated noise impact contour figure has been included with this letter.

### 3.2 Comment –Class 4 Designation with respect to Works Yard

*The assessment assumed a Class 4 area designation will be pursued for the proposed development. As a result, predicted sound levels were compared against Class 4 limits. Based on the information provided, we agree that the Site is a potential candidate for a Class 4 designation. However, sound levels due to the City of Toronto Works Yard operations have potential to exceed the applicable limits. We cannot support Class 4 area designation until it is confirmed that sound levels can be mitigated to meet the applicable limits at the proposed development.*

Per the response to Comment #1, above, the worst-case noise impacts remain below the applicable MECP Class 4 sound level limits.

## 4 Closure

Aercoustics has reviewed the materials related to the second submission for the proposed redevelopment of 123 Garratt Boulevard in Toronto, Ontario. Based on the discussed redesignation and refinements to massing , the conclusions of Aercoustics' original Noise and Vibration Impact Study dated April 14, 2022 remain unchanged. Responses to peer review comments have been provided above. Where appropriate, a revised analysis was carried out with results summarized in this letter.

Please do not hesitate to ask should there be any questions.

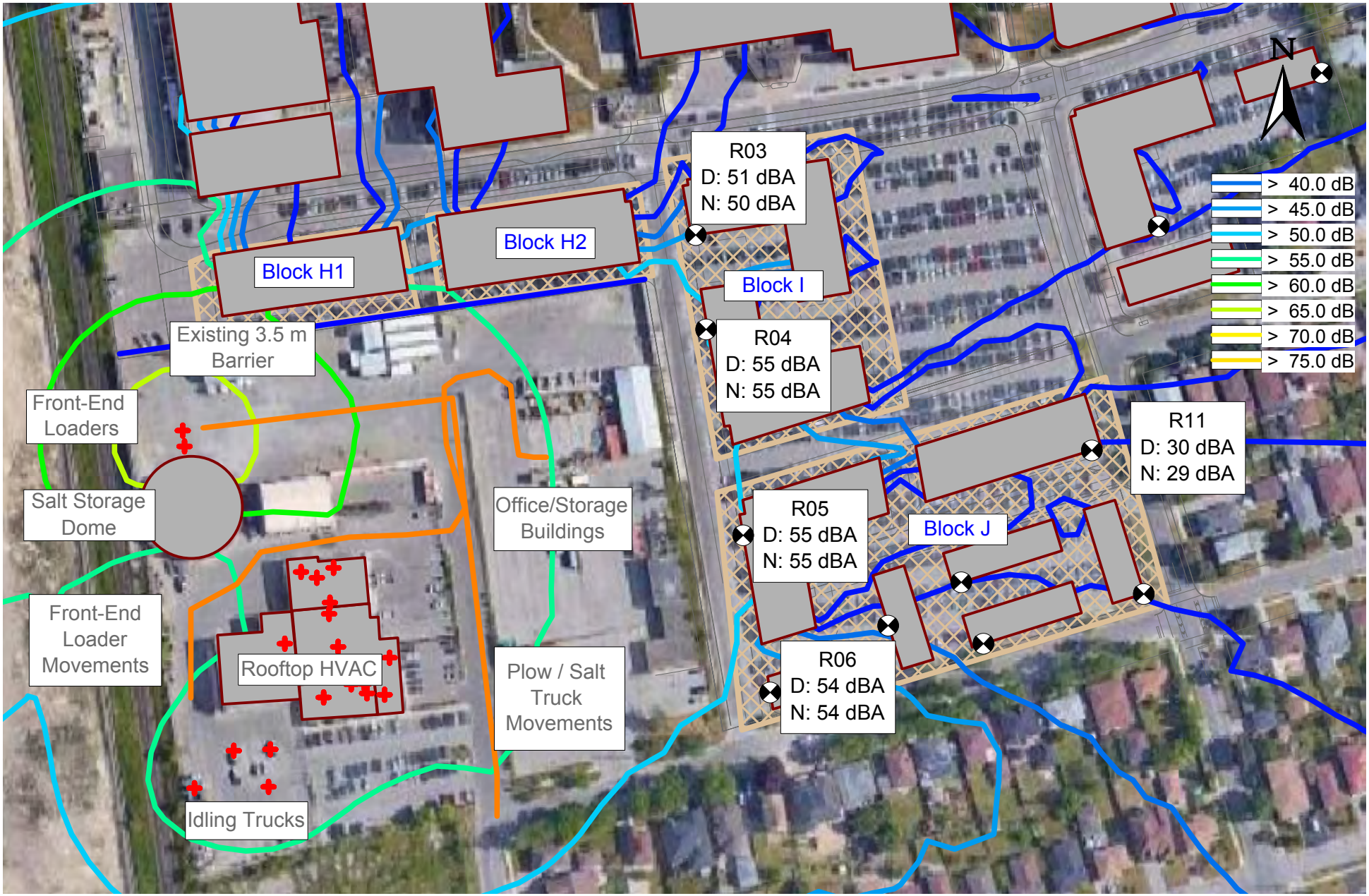
Sincerely,

**AERCOUSTICS ENGINEERING LIMITED**




Kohl Clark, B.Eng., P.Eng.

Derek Flake, M.Sc., P.Eng.




aercoustics

Project ID: 20131.07

Scale: As Indicated
Drawn by: KC
Reviewed by: DF
Date: June 26, 2023
Revision: 1

**Project Name**

Proposed Redevelopment of 123 Garratt Boulevard - NVIS Addendum

**Figure Title**

City Works Yard - Noise Impact Contours at 20.5 m Height

**Figure A1**

# 12. Pedestrian Level Wind Study Addendum

600 Southgate Drive
Guelph, ON N1G 4P6
Canada

Tel: +1.519.823.1311
Fax: +1.519.823.1316

July 7, 2023

**Northcrest Developments**
161 Bay St., Suite 1305
Toronto, ON M5J 2S1

**Re: The Hangar District (formerly the Taxiway West South Sub District)– Addendum Letter**
**Toronto, Ontario**
**RWDI Project #2101056**
*Resubmission of Zoning By-law Amendment & Draft Plan of Subdivision Applications*
*City File Nos.: 22 148540 NNY 06 OZ & 22 148583 NNY 06 SB*
*123 Garratt Boulevard, North York, ON M3K 1Y5*

In support for the resubmission of the above noted applications, Rowan Williams Davies & Irwin Inc. (RWDI) has prepared this letter to discuss the potential effects of recent design changes to the wind conditions on and around the proposed development at the Hangar District in Toronto, Ontario.

In support of the initial application submission completed in May 2022, RWDI prepared a wind assessment based on the proposed massing at the time (Image 1) using a computational fluid dynamics tool. Our findings and recommendations are presented in the report attached:

> *Taxiway West – South Sub-district, Toronto, Ontario, Pedestrian Wind Assessment, RWDI #2101056, May 2022, by Shivani Jariwala, Hanqing Wu and Stefan Gopaul.*

Wind conditions were assessed for the Existing and Proposed building configurations, based on the CFD simulations, the existing surroundings, the long-term wind data from Toronto Pearson International Airport and RWDI's extensive experience of wind studies on projects in Toronto and around the world. In general, the wind conditions were suitable for the intended usage in most areas with some recommendations for mitigation in selected areas as detailed in the attached report. At a later stage, physical scale-model tests in a boundary-layer wind tunnel or more detailed transient computational modeling would be required to address any further design changes.

For the current resubmission, the building massing and floor plans have been revised, as indicated by the design package received by RWDI on June 15, 2023. **Image 1** and **Image 2** compares the perspective views and site plans in May 2022 and June 2023, with added labelling for the 2023 drawing to facilitate the discussions below.



**Image 1: Perspective views in May 2022 (top) and June 2023 (bottom)**

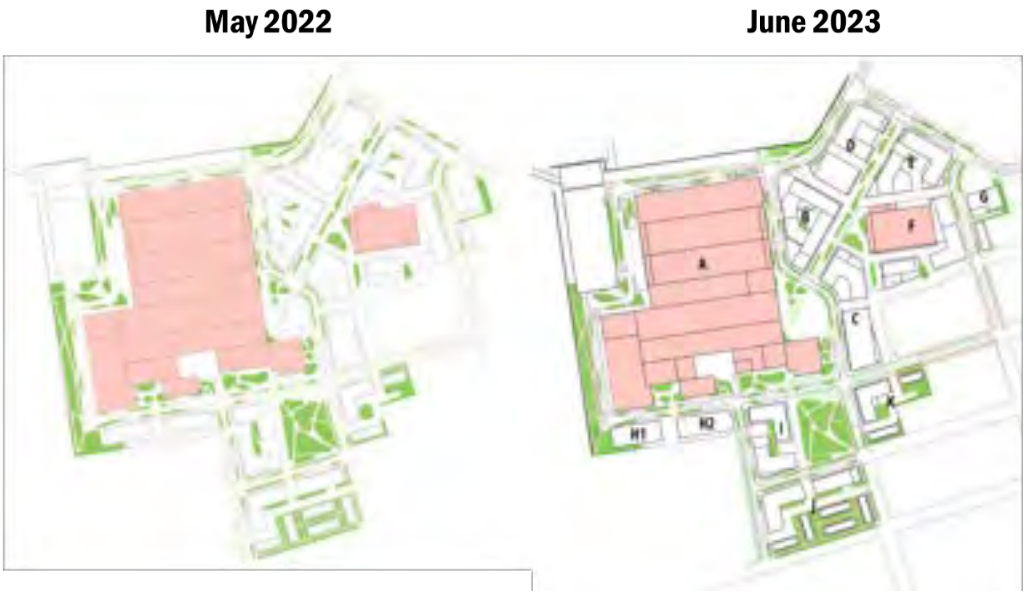



**Image 2: Site Plans in May 2022 (left) and June 2023 (right)**

A detailed comparison suggests that most proposed buildings have similar plans and heights (±2 floors) between the designs in May 2022 and June 2023. Therefore, similar wind conditions are generally expected around the site. Some of the more notable comments regarding the massing updates are summarized below:

- Where building heights have increased more substantially (e.g., north portion of Block D), uncomfortable wind conditions are expected to remain. Wind mitigation concepts can be used to decrease wind level to appropriate levels. These concepts could include building articulation, landscaping, or hardscaping. Further, the development of the adjacent Taxiway East District to the north will introduce additional built form and landscaping which will offer future opportunities to further improve wind conditions.
- Where buildings have decreased in height (e.g., Blocks H1, H2 and I) wind conditions are expected to experience local improvements at grade.
- Buildings that have had a moderate increase or decrease in height are expected to experience similar wind conditions as presented in the attached report.

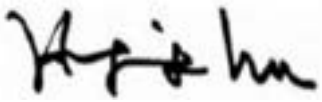
Overall, due to the similarity in building massing, the potential wind conditions around the currently proposed design of Hangar District for resubmission in July 2023 are expected to be similar to those presented in RWDI's report in May 2022. The conclusions and recommendations are still applicable in general and include:

- The project is not expected to have a notable adverse influence on wind conditions on other properties. When compared to the existing conditions, reduced wind conditions are expected on the east and south side of the Subject Area, therefore improving wind conditions in these areas.
- Wind conditions at ground level areas assessed, including the sidewalk areas, proposed parks, pedestrian bridge, POPS, and private open spaces are expected to be appropriate for the intended usage.
- Potentially uncomfortable wind speeds are expected around two blocks at the North and west perimeters in the winter. Wind control measures have been suggested to reduce wind impacts.

At a later stage, physical scale-model tests in a boundary-layer wind tunnel or more detailed transient computational modeling would be required to address any further design changes.

We trust this letter satisfies your current needs. Please do not hesitate to contact us if you need further assistant.

Yours truly,
**Rowan Williams Davies & Irwin Inc. (RWDI)**





**Hanqing Wu, Ph.D., P.Eng.**
Senior Technical Director / Principal

**Jordan Gilmour, P.Eng.**
Project Delivery Manager

# APPENDIX A

# TAXIWAY WEST
# SOUTH SUB-DISTRICT

**TORONTO, ONTARIO**

## PEDESTRIAN WIND ASSESSMENT

**PROJECT #2101056**
**MAY 2022**

**SUBMITTED TO**

**Northcrest Developments**

**SUBMITTED BY**

**Shivani Jariwala, M.E.Sc.**
Technical Coordinator
Shivani.Jariwala@rwdi.com

**Hanqing Wu, Ph.D., P.Eng.**
Senior Technical Director | Principal
Hanqing.Wu@rwdi.com

**Stefan Gopaul, M.A.Sc., P.Eng.**
Project Manager | Senior Engineer
Stefan.Gopaul@rwdi.com

**RWDI**
600 Southgate Drive
Guelph, ON, N1G 4P6
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**rwdi.com**

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# 1. INTRODUCTION

Rowan Williams Davies & Irwin Inc. (RWDI) was retained to assess the potential wind conditions at pedestrian levels on and around the proposed project at Taxiway West – South Sub-District at 123 Garratt Boulevard ("the Subject Area") in Toronto, Ontario. The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development in support of the Zoning By-Law Amendment (ZBA) application.

The Subject Area is comprised of 22.4 hectares (55.5 acres) of land consisting of the existing Bombardier hangars, offices and ancillary structures, surface parking lots, and a portion of the Downsview Airport taxiway. The Subject Area is located south of a proposed Film Studio Campus; located to the east of Downsview Park Blvd, and on the northeast side of the intersection of Keele Street and Wilson Avenue. The Subject Area is surrounded by low-rise suburban neighbourhoods (Image 1) with an open field to the northwest and a fairly open airport runway to the northeast.

The Subject Area proposes to accommodate low-rise and mid-rise developments intended for employment, residential, retail, community, and institutional uses. In addition to sidewalks and properties near the project Subject Area, key areas of interest for this assessment include building entrances, the proposed parks, POPS, private open spaces, the pedestrian bridge, and the above grade podiums and roofs. (Image 3).




**Image 1: Aerial view of the Subject Area and surroundings**
Credit: Google Maps




**Image 2: Conceptual massing**

# 1. INTRODUCTION



# 2. METHODOLOGY

## 2.1 Objective

The objective of this assessment is to provide an evaluation of the potential wind impact of the proposed development on pedestrian areas around it. The assessment is based on the following:

- A review of the regional long-term meteorological data from Toronto Pearson International Airport, which is the closest airport with current and long-term wind data of reliable quality;
- Electronic 3D model of the proposed project and updated site plans dated May 5, 2022;
- The use of *Orbital Stack*, an in-house computational fluid dynamics (CFD) tool, to aid in the assessment of wind comfort levels;
- The use of RWDI's proprietary tool WindEstimator[1] for estimating the potential wind conditions around generalized building forms;
- The RWDI wind comfort and safety criteria;
- Wind tunnel studies completed by RWDI for similar projects in Toronto; and,
- Our engineering judgment, experience, and expert knowledge of wind flows around buildings[1-3].

Note that other microclimate issues such as those relating to cladding and structural wind loads, door operability, building air quality, snow impact, noise, vibration, etc. are not part of the scope of this assessment

## 2.2 CFD for Wind Simulation

CFD is a numerical technique for simulating wind flow in complex environments. For modelling winds around buildings, CFD techniques are used to generate a virtual wind tunnel where flows around the site, surroundings and the study building are simulated at full scale. The computational domain that covers the site and surroundings are divided into millions of small cells where calculations are performed, which allows for the "mapping" of wind conditions across the entire study domain. CFD excels as a tool for wind modelling and presentation for providing early design advice, comparing different design and site scenarios, resolving complex flow physics, and helping diagnose problematic wind conditions.

Gust conditions are infrequent but deserve special attention due to their potential impact on pedestrian safety. The computational modeling method used in the current assessment does not quantify the transient behaviour of the wind, including wind gusts. The effect of gust, i.e., wind safety, is predicted qualitatively in this assessment using analytical methods and wind-tunnel-based empirical models[1]. The assessment has been conducted by experienced microclimate specialists in order to provide an accurate prediction of wind conditions.

In order to quantify the transient behavior of wind and refine any conceptual mitigation measures, physical scale-model tests in a boundary-layer wind tunnel or more detailed transient computational modeling would be required; however, more detailed analyses are not recommended at this time due to the high-level nature of a district plan design.

It is our understanding that Urban Design Staff have confirmed that a CFD analysis is acceptable, per conversations in October 2021.

# 2. METHODOLOGY

## 2.3 Simulation Model

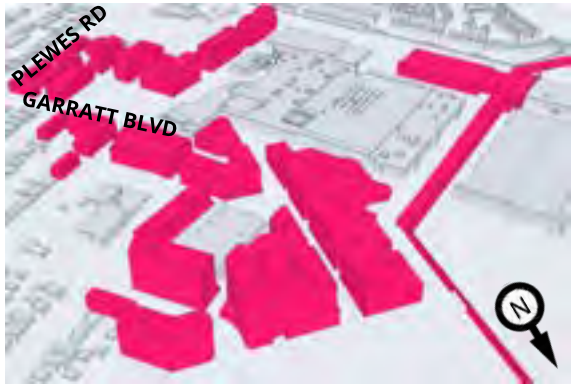
Wind flows were simulated using Orbital Stack, an in-house computational fluid dynamics (CFD) tool, for the Existing and Proposed site configurations with the existing surroundings.

The computer model of the proposed buildings and the existing site with the proximity model are shown in Images 4 and 5, respectively. For the purposes of this computational study, the 3D models were simplified to include only the necessary building and terrain details that would affect the local wind flows in the area and around the site. Landscaping and other smaller architectural and accessory features were not included in the computer model in order to provide more conservative wind conditions (as is the norm for this level of assessment).

The wind speed profiles in the atmospheric boundary, approaching the modelled area were simulated for 16 directions (starting at 0°, at 22.5° increments around the compass). Wind data in the form of ratios of wind speeds at approximately 1.5m above concerned levels, to the mean wind speed at a reference height were obtained. The data was then combined with meteorological records obtained from Toronto Pearson International Airport to determine the wind speeds and frequencies in the simulated areas.



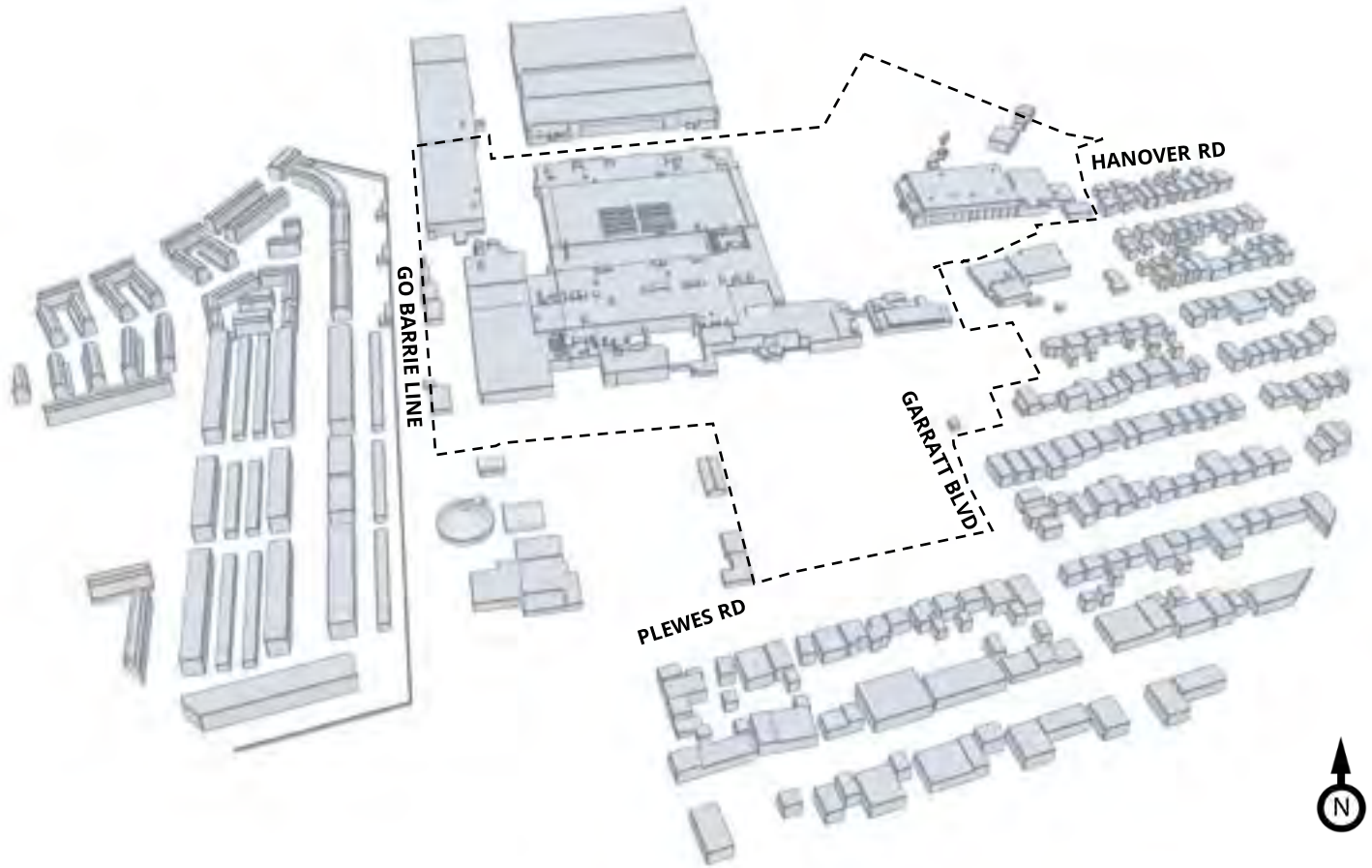

PLEWES RD VIEW




HANOVER RD VIEW

**Image 4: Computer model of the proposed project**

# 2. METHODOLOGY




**Subject Area Boundary**

**Image 5: Computer model of the existing site and extended surroundings**

# 2. METHODOLOGY

## 2.4 Meteorological Data

Long-term wind data recorded at Toronto Pearson International Airport between 1990 and 2020, inclusive, were analyzed for the summer (May to October) and winter (November to April) months. This airport is the closest airport with current and long-term wind data of reliable quality. Image 6 graphically depicts the directional distributions of wind frequencies and speeds for these periods.

In the summer and winter, winds from southwest through north directions are predominant, with secondary frequent wind components from the southwest quadrant in the summer and from the east direction in the winter.

Strong winds of a mean speed greater than 30 km/h measured at the airport (at an anemometer height of 10m) are more frequent in the winter (red and yellow bands in Image 6). These winds potentially could be the source of uncomfortable or severe wind conditions, depending on the site exposure and development design.

Wind statistics were combined with the simulated data to predict the wind conditions at the project site and assessed against the wind criteria for pedestrian comfort.

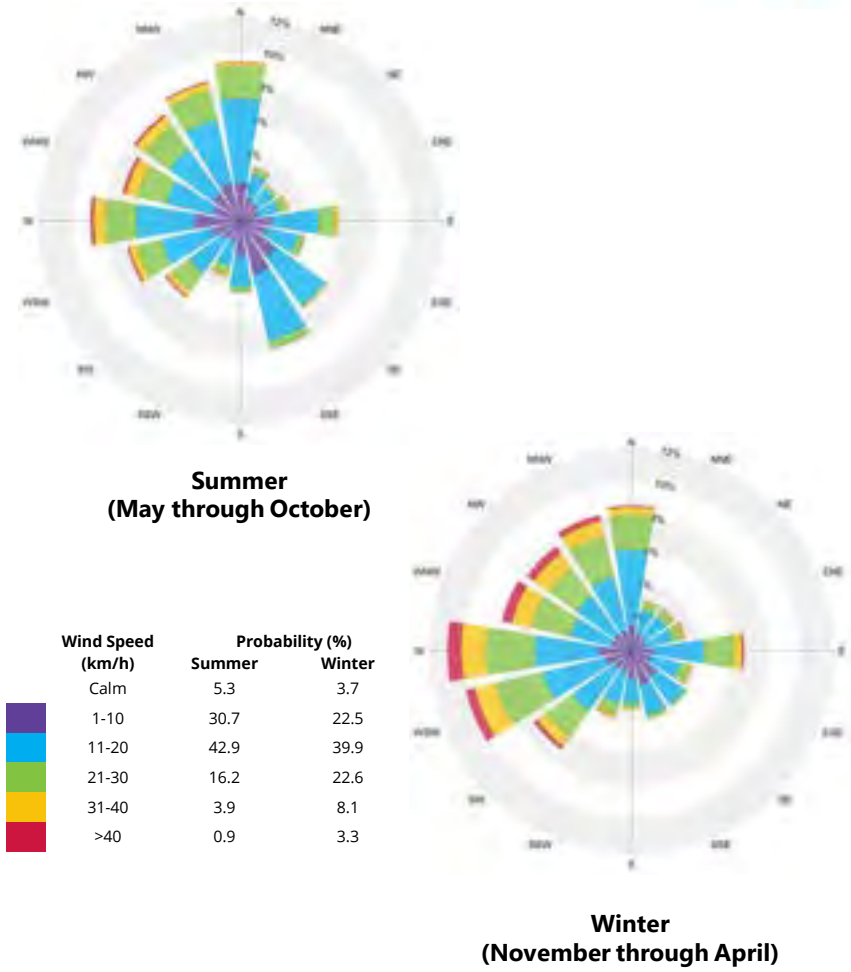



**Image 6: Directional distribution of wind approaching Toronto Pearson International Airport (1990 to 2020)**

# 3. WIND CRITERIA

The RWDI pedestrian wind criteria are used in the current study. These criteria have been developed by RWDI through research and consulting practice since 1974. They have also been widely accepted by municipal authorities, building designers and the city planning community, including the City of Toronto. The criteria are as follows:

## 3.1 Pedestrian Safety Criterion

Pedestrian safety is associated with excessive gust that can adversely affect a pedestrian's balance and footing. If strong winds that can affect a person's balance (**90km/h**) occur more than **0.1%** of the time or 9 hours per year, the wind conditions are considered severe.

## 3.2 Pedestrian Comfort Criteria

Wind comfort is expressed in terms of typical pedestrian activities that the speeds would be conducive to:

**Sitting (≤ 10 km/h)**: Calm or light breezes desired for outdoor seating areas where one can read a paper without having it blown away.
**Standing (≤ 14 km/h)**: Gentle breezes suitable for main building entrances and bus stops.
**Strolling (≤ 17 km/h)**: Moderate winds that would be appropriate for window shopping and strolling along a downtown street, plaza or park.
**Walking (≤ 20 km/h)**: Relatively high speeds that can be tolerated if one's objective is to walk, run or cycle without lingering.
**Uncomfortable**: The comfort category for walking is not met.

Wind conditions are considered suitable for sitting, standing, strolling or walking if the associated mean wind speeds are expected for at least four out of five days (**80% of the time**). Wind control measures are typically required at locations where winds are rated as uncomfortable or they exceed the wind safety criterion.

Note that these wind speeds are assessed at the pedestrian height (i.e., 1.5m above grade or the concerned floor level), typically lower than those recorded in the airport (10m height and open terrain).

These criteria for wind forces represent average wind tolerance. They are sometimes subjective and regional differences in wind climate and thermal conditions as well as variations in age, health, clothing, etc. can also affect people's perception of the wind climate.

For the current development, wind speeds comfortable for walking or strolling are appropriate for sidewalks and walkways where pedestrians are likely to be active and moving intentionally. Lower wind speeds comfortable for standing are required for building entrances and areas where people are expected to be engaged in passive activities. Calm wind speeds suitable for sitting are desired in areas where prolonged periods of passive activities are anticipated, such as outdoor amenity areas, seating areas etc., especially during the summer when these areas are typically in use.

# 4. RESULTS AND DISCUSSION

## 4.1 Wind Flow Around the Project

Wind generally tends to flow over buildings of uniform height, without disruption. Buildings that are taller than their surroundings tend to intercept and redirect winds around them. The mechanism in which winds are directed down the height of a building is called *Downwashing*. These flows subsequently move around exposed building corners, causing a localized increase in wind activity due to *Corner Acceleration*. Moreover, when two buildings are situated side by side, wind flow tends to accelerate through the space between the buildings due to *Channeling Effect* caused by the narrow gap. Stepped massing, low roofs and canopies diffuse downwash and reduce the potential wind impact on the ground level. These flow patterns are illustrated in Image 7.

The multi-building project will be taller than the buildings that exist in the surrounding area. The project is expected to redirect winds around it; however, potential wind impacts would be moderated as result of the low to moderate building heights and fairly sparse arrangement of the buildings across the site .

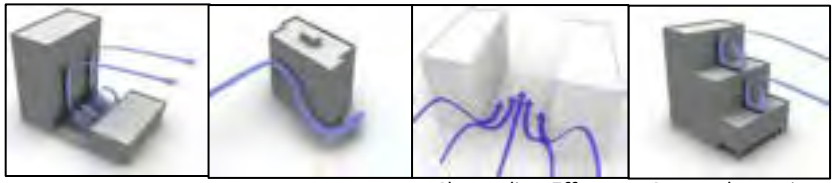



**Image 7: General wind flow patterns**

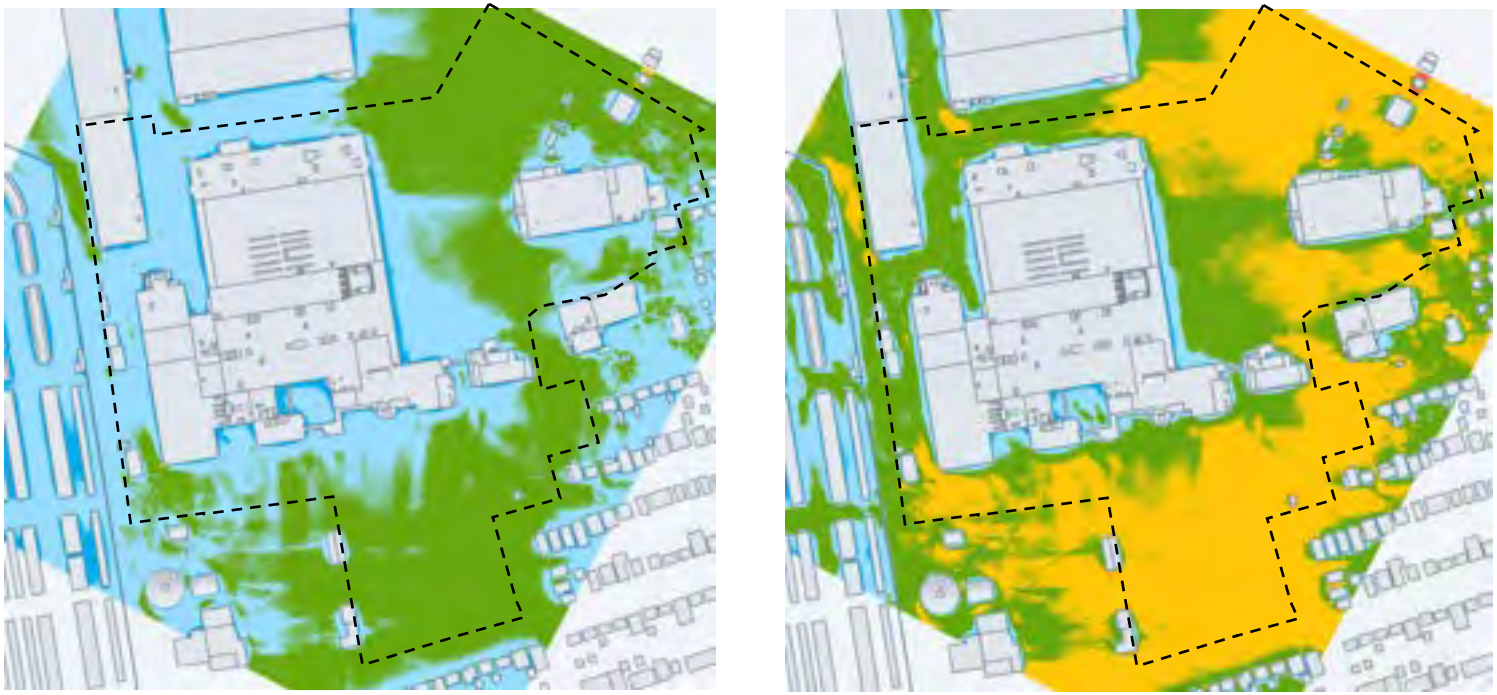
## 4.2 Simulation Results

The predicted wind comfort conditions for the existing and proposed configurations are presented in Images 8 and 9 for the summer and winter seasons. The results are presented as colour contours of wind speeds calculated based on the wind criteria (Section 3.2). The contours represent wind speeds at a horizontal plane approximately 1.5 m above the concerned level.

The assessment against the safety criterion (Section 3.1) was conducted, based on the predicted wind conditions and our wind tunnel experience with similar development. Wind conditions at all the grade level areas and the pedestrian bridge areas assessed are expected to meet the safety criterion.

A detailed discussion of the expected wind conditions with respect to the prescribed criteria and applicability of the results follows in Sections 4.3 through 4.5. The discussion includes recommendations for wind control to reduce the potential for high wind speeds.

# 4. RESULTS AND DISCUSSION



**(a) EXISTING SCENARIO – SUMMER**

**(b) EXISTING SCENARIO – WINTER**

**COMFORT:** SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

N

**Subject Area Boundary**

**SAFETY:** **The criterion is expected to be met at all areas.**

**Image 8: Predicted wind conditions – GROUND LEVEL – Existing Scenario**

# 4. RESULTS AND DISCUSSION




(a) PROPOSED SCENARIO – SUMMER




(b) PROPOSED SCENARIO – WINTER

COMFORT: SITTING | STANDING | STROLLING | WALKING | UNCOMFORTABLE

N

Proposed Parks
POPS
Private Open Space
Subject Area Boundary

SAFETY: The criterion is expected to be met at all areas at grade level

**Image 9: Predicted wind conditions – GROUND LEVEL – Proposed Scenario**

## 4.3 Existing Scenario

The existing site consists of low-rise buildings and open lots. There are no tall buildings to redirect winds to create any notable impact. Wind conditions at most areas around the existing project site are considered comfortable for standing or strolling in the summer (blue and green regions in Image 8a) and strolling or walking in the winter (green and yellow regions in Image 8b).

Wind conditions at all areas on and around the project site are expected to meet the safety criterion.

## 4.4 Proposed Scenario: Safety

The introduction of the proposed project will disrupt the otherwise unimpeded wind flow through the Subject Area and, as a result, create an apparent reduction in wind speeds over most of the constructed area, relative to the existing conditions (Images 9a and 9b). Localized increases in wind speeds are expected at the western facades and corners of the buildings due to the downwashing, corner acceleration and channeling effect at grade level. However, owing to the moderate heights of the proposed buildings, the gusts created at grade are not predicted to be severe.

Wind conditions around the proposed project at all grade level areas assessed are predicted to meet the safety criterion.

Wind tunnel tests are recommended at a later design stage to quantify these wind conditions and, if necessary, to develop wind control solutions.

## 4.5 Proposed Scenario: Comfort

### 4.5.1 Sidewalks and Neighbouring Properties

Although the introduction of mid-rise buildings in a low-rise context will result in an increase in wind speeds. The impact of the project will be limited to the Subject Area and the project is not expected to worsen wind conditions on neighbouring properties. Actually, the wind conditions on the downwind side adjacent to the proposed Subject Area to the east and south side are expected to improve from the existing scenario.

The resulting wind speeds at most sidewalks and areas outside the property are expected to continue to be comfortable for standing or strolling in the summer and strolling or walking in the winter season (Images 9a and 9b). These conditions are appropriate for sidewalk use.

During the winter months, higher wind speeds that are comfortable for walking and marginally uncomfortable for pedestrian use are expected occasionally at the northwest corners of Block-J and Block-F buildings (see yellow and dark orange-red regions in Image 9b). These conditions are expected near pedestrian walkways and attributed to localized flow accelerations limited to the corner area. Therefore, wind control measures should be considered around the corners. Tower setbacks and corner articulations should be considered. Clusters of screens, sculptures or coniferous trees and shrubs like in the examples displayed in Image 10 can be placed in the area to diffuse the intensity of winds accelerating near the building corner. Note that street trees generally will lower wind speeds around them. Coniferous trees afford wind control benefits in the winter months as well. The existing noise barrier (approx. 3 m high) on the south side of Block J buildings will slightly improve conditions locally closer to the barrier wall.

### 4.5.2 Proposed Park, POPS, Private Open Spaces, and pedestrian bridge

Wind conditions in the proposed park areas are comfortable for standing or strolling throughout the year which is suitable for the intended usage of the area (Images 9a and 9b).

The POPS and the Private spaces are predicted to be comfortable for sitting or standing during the summer season when these areas are expected to be used more frequently, which is appropriate. Slightly higher wind speeds during the winter season comfortable for standing or strolling are predicted in the POPS and Private open spaces, which is acceptable as the area will likely not be frequently used during colder winter months (Images 9a and 9b).

The proposed pedestrian bridge to the north of the Subject Area is expected to be comfortable for strolling or walking during both the summer and winter months, which is appropriate for the active pedestrian usage of the bridge area (Image 9a and 9b).

# 4. RESULTS AND DISCUSSION



Coniferous trees at building corner



Coniferous/Marcescent trees at sidewalk areas



Coniferous/Marcescent trees at sidewalk areas




Stepped Massing





Wind screens near building corner



Street Art near building corner

**Image 10: Design strategies for wind control on sidewalks**

### 4.5.3 Main Entrances

At the current stage of master planning for the ZBA submission, no entrance location or design details are specified. As a general guideline for wind control, main entrances should be placed away from windy areas such as building corners, gaps between buildings and exposed west and north building facades, where possible. Recessing entrances from building façades is often used to create a localized sheltered area. Other wind control measures for entrances may include entrance canopies, wind screens, and planters (see photos in Image 11 for reference), which can be considered at more detailed design stages.

Given the predicted conditions for the wind assessment, building entrances are recommended to be planned within close vicinity of the areas with sitting or standing conditions anticipated throughout the year (blue and light blue regions in Images 9a and 9b).




**Image 11: Wind control examples for building entrances**

# 5. SUMMARY

RWDI was retained to provide an assessment of the potential pedestrian level wind impact of the proposed project at Taxiway West – South Sub-District in Toronto, Ontario. Our assessment was based on the local wind climate, the current design of the proposed development, the existing surrounding buildings, and computational modelling and simulation of wind conditions. Our findings are summarized as follows:

- The proposed buildings are taller than surroundings, and therefore will redirect wind to ground level. However, the impact will be limited to the Subject Area owing to their moderate heights and arrangement. The project is not expected to have a notable adverse influence on wind conditions on other properties. As compared to the existing conditions, reduced wind conditions are expected on the east and south side of the Subject Area, therefore improving wind conditions in these areas.
- Wind conditions at ground level areas assessed, including the sidewalk areas, proposed parks, pedestrian bridge, POPS, and private open spaces are expected to be appropriate for the intended usage.
- Potentially uncomfortable wind speeds are expected at the northwest corners of Block-J and Block-F near the building corners in the winter. Wind control measures have been suggested to reduce wind impacts.

At a later stage, physical scale-model tests in a boundary-layer wind tunnel or more detailed transient computational modeling would be required to address any further design changes.

# 6. APPLICABILITY OF RESULTS

The assessment presented in this report is for the proposed project at Taxiway West – South Sub-District, based on the information provided by design team up to those dated May 5, 2022. In the event of any significant changes to the design, construction or operation of the building or addition of surroundings in the future, RWDI could provide an assessment of their impact on the pedestrian wind conditions discussed in this report. It is the responsibility of others to contact RWDI to initiate this process.

| File Name | File Type | Date Received (mm/dd/yyyy) |
|---|---|---|
| 220204 South Subdistrict Site Plan.3dm | Rhinoceros | 02/04/2022 |
| 220330 South Subdistrict_Massing Model_Sketchup.skp | SketchUp | 04/05/2022 |
| Design Freeze 3 Presentation_SUMMARY OF CHANGES.pdf | Adobe PDF | 04/05/2022 |

# 7. REFERENCES


1. H. Wu, C.J. Williams, H.A. Baker and W.F. Waechter (2004), "Knowledge-based Desk-Top Analysis of Pedestrian Wind Conditions", *ASCE Structure Congress 2004,* Nashville, Tennessee.

2. H. Wu and F. Kriksic (2012). "Designing for Pedestrian Comfort in Response to Local Climate", *Journal of Wind Engineering and Industrial Aerodynamics*, vol.104-106, pp.397-407.

3. C.J. Williams, H. Wu, W.F. Waechter and H.A. Baker (1999), "Experience with Remedial Solutions to Control Pedestrian Wind Problems", *10th International Conference on Wind Engineering*, Copenhagen, Denmark.

# 13. Project Data Sheet

TORONTO

# Project Data Sheet

## Project Data

Note: More detailed statistics may be requested during review of the application.

| | |
|---|---|
| Existing Use: Industrial | Proposed Use: Mixed Use |
| Existing Generalized Land Use: Industrial | Proposed Generalized Land Use: Mixed Use - Residential/Non-Residential |

Total lot area: 224,402.00 m² | Lot frontage: Varies. Please refer to architectural drawings m | Lot depth: Varies. Please refer to architectural drawings m

Date of construction for existing building (if known): varied from 1952-1982

| | Existing | Retained | Proposed | Total |
|---|---|---|---|---|
| Number of buildings | 4 | 2 | | 2 |
| Ground Floor Area | 72,073.00 m² | 57,859.00 m² | 49,980.00 m² | 107,839.0 m² |
| Residential GFA | m² | m² | 207,406.0( m² | 207,406.( m² |
| Non-residential GFA | m² | m² | 160,959.0( m² | 160,959.( m² |
| Landscaped Open Space | m² | m² | 25,954.00 m² | 25,954.0( m² |
| Paved Surface Area | m² | m² | 90,609.00 m² | 90,609.0( m² |
| Height of Building(s) | 1-3 Storeys ___ m | 1-3 Storeys ___ m | Up to 14 Storeys ___ m | Up to 14 Storeys ___ m |

**Minimum Setbacks** Setbacks vary for each block. Please refer to architectural drawings and other supporting materials

| | | Existing | Retained | Proposed |
|---|---|---|---|---|
| Front Lot Line | Select One: | m | m | m |
| Side Lot Line | Select One: | m | m | m |
| Side Lot Line | Select One: | m | m | m |
| Rear Lot Line | Select One: | m | m | m |

**Residential Units - Tenure and Quantity** Tenure TBD. A total of 2,850 residential units are proposed.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Existing | ☐ Rental* | ___ Units | ☐ Freehold | ___ Units | ☐ Condo | ___ Units | ☐ Other | | ___ Units |
| Retained | ☐ Rental* | ___ Units | ☐ Freehold | ___ Units | ☐ Condo | ___ Units | ☐ Other | | ___ Units |
| Proposed | ☐ Rental | ___ Units | ☐ Freehold | ___ Units | ☐ Condo | ___ Units | ☐ Other | | ___ Units |
| Total | ☐ Rental | 0 Units | ☐ Freehold | ___ Units | ☐ Condo | ___ Units | ☐ Other | | ___ Units |

*If Rental Units are selected for Existing and Retained conditions, a "**Rental Housing Demolition and Conversion Screening and Declaration**" form is required to be submitted with this Application.

## Breakdown of Project Components - Part 1 of 2

Total GFA of project: 368,365

Lot coverage ratio (ground floor area÷lot area): 0.48

Floor space ratio (gross floor area÷lot area): 1.64

| Type of use | Residential | Retail | Office | Industrial | Institutional/Other |
|---|---|---|---|---|---|
| Total GFA (m²) | 207,406.0( m² | 27,862.0( m² | 98,654.0( m² | 34,002.00 m² | 441.00 m² |
| Percentage of Project (%) | 56.30 % | 7.56 % | 26.78 % | 9.23 % | 0.12 % |
| Below Grade GFA (m²) | m² | m² | m² | m² | m² |

Total non-res: 160,959 m2

| Breakdown of Residential Component | Rooms | Bachelor | 1-Bedroom | 2-Bedroom | 3 or more Bedrooms |
|---|---|---|---|---|---|
| Number of Units | | 135 | 1,411 | 983 | 321 |
| Typical Unit Size | APT Units m² | 35.60 m² | 53.88 m² | 74.30 m² | 100.30 m² |
| | TH Units | | 54.3 | 75.7 | 100.3 |

**This section for Office Use Only**

File No(s): _____ Date Received: _____

## Breakdown of Project Components - Part 2 of 2

**Parking and Loading Data:** Number of parking places provided in project 3,044

**Breakdown of parking space allocation:**

for residential use 1,135 for residential visitors 28 for retail use 54

for office use 1,479 for industrial use 340 for institutional/other use 8

**Location and number of parking spaces:**

☐Open surface spaces ____ ☐Attached garage ____ ☐Detached garage ____ ☐Cash payment in lieu ____

☐Above grade parking deck 910 ☐Below grade parking structure 2,134 ☐Off-site lease ____

Number of loading spaces provided in project ____ Type of loading spaces provided (if applicable) ____

**Access and Services:**

Road access ☐Provincial Highway ☒Municipal Street ☐Private right-of-way

Servicing: ☒All of below

| Municipal Water | Municipal Sanitary Sewers | Municipal Storm Sewers | Other (septic) |
|---|---|---|---|
| ☒available ☐connected | ☒available ☐connected | ☒available ☐connected | |

# 14. Rail Study Response Memo

ARUP

By email

July 7, 2023

121 Bloor Street East Suite 900
Toronto ON M4W 3M5
Canada

t +1 416 515 0915

arup.com

Jinny Tran, Senior Development Manager
Northcrest Developments
161 Bay St., Suite 1305
Toronto, ON M5J 2S1

t 647-228-9086
e jtran@northcrestdev.ca

Dear Jinny,

## The Hangar District (formerly Taxiway West South Sub-District)
## Rail Safety and Risk Mitigation Report for the Proposed Redevelopment of 123 Garratt

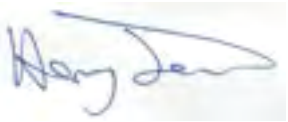
Arup has been retained by Northcrest Developments ("Northcrest") to prepare the Rail Safety and Risk Mitigation (RSRM) report for the Hanger District in support of the resubmission of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS"). A RSRM report was dated May 2022 was issued to the city of Toronto. This letter along and its attachments are being provided in lieu of an updated report.

Comments have been received from Metrolinx and the City of Toronto including comments from Metrolinx's peer reviewer Aecom and the City's peer reviewer Entuitive. Responses to all comments are included with this resubmission. In addition the following supporting information is included with this letter in support of the responses to comments:

- Attachment 1 – Response to the City of Toronto peer review comments on the Downsview Lands OPA RSRM report.
- Attachment 2 – Communication from CN confirming the frequency of freight along the rail corridor.
- Attachment 3 – Rail Safety Justification Memo – Dated May 16th 2023.

If there are any questions, please contact me on the details provided. We look forward to continuing our ongoing discussion with the City of Toronto and Metrolinx.

Yours sincerely,



Henry Jeens, P.Eng.
Associate Principal

d +1-647-260-3482
e henry.jeens@arup.com

cc Alexandra Suchon, alexandra.suchon@arup.com; Joshua Battiston, Joshua.Battiston@arup.com

# Attachment 1 - Responses to OPA Peer Review Comments

| | |
|---|---|
| **Project:** | **Downsview OPA** |
| **Company:** | **Northcrest Developments/ Canada Lands Corporation** |
| Application #: | 21 225717 NNY 06 OZ |
| **City Contact:** | Sarah Phipps |
| **Email:** | Sarah.Phipps@toronto.ca |
| **Phone Number:** | |

| Commenting Division | Submission # | Plan/Report Reference | Date of comment | Comment section | Comment | City Comment | Consultant formal response |
|---|---|---|---|---|---|---|---|
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 2.1.3 | E1 | "It is understood that this is a very rare occurrence". Is there any background or reference from the rail authorities to support this statement? | ARUP has worked on other studies on this corridor and confirmed with Metrolinx that freight trains are extremely rare. |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 2.2 | E2 | Figures 5 to 9 are illegible. Provide higher resolution images. | Acknowledged. Revisions will be made to the original drawings in the resubmission as per comment. |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 2.5 | E3 | Is there any background or reference from the rail authorities stating that the existing spur will be decommissioned or not used. | The Applicants will provide documentation/confirmation that the rail spur is no longer needed. |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 5.1 | E4 | Freight trains have running rights on this corridor. Provide communication or statement from rail authority stating there will be limited or no freight presence. | The Applicants will coordinate with Metrolinx to confirm their current and historical freight train frequencies. |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 5.1 | E5 | "The future expansion plans and changes in this corridor are known." Provide communication from Metrolinx to explain this. | The Applicants have shared previously and will provide Metrolinx's double tracking plans, as well as DRAFT design basis report/sketches for the crossings with Metrolinx feedback. |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 5.3.3 | E6 | It is understood that the freight train speed would be much lower than a passenger train speed. However, the presence of freight trains would increase the risk of incidents such as a dangerous goods leak. Provide clarity on how infrequent freight trains are within the corridor. | Noted. See comment response above. |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 5.4.2 | E7 | Revise document referencing the Metrolinx enhanced anti-trespassing fence requirements. (2.4m high anti-trespassing anti-tamper) | Acknowledged. Will complete for next darwing shared drawing set. |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: General | E0 | It is noted that this report will set out potential approaches to rail safety and risk mitigation. Specific mitigation measures will be developed as part of the district planning approvals. | Agreed. Information only |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Rail Safety and Risk Mitigation Report: Section 5.5 | E8 | It is noted that a site-specific rail safety report will be provided for proposed developments within a 30m setback from the rail corridor | Agreed. Information only |
| Entuitive - Peer Review | 1 | Rail Safety Risk Mitigation Report | 9/26/2022 | Taxiway West South Sub-District: | E9 | A formal peer review will be needed for this sub-district of the Subject Area. It is understood that this report will be read in conjunction with the "Rail Safety and Risk Mitigation Report for the Proposed Redevelopment of Downsview Lands". | Agreed. Information only |

Attachment 2 - Communication with CN

## Ben White

**From:** Rail Data Requests <RailDataRequests@metrolinx.com>
**Sent:** May 25, 2020 2:29 PM
**To:** Ben White
**Cc:** Steve Titus; Alexandra Davidson
**Subject:** RE: Traffic Data Request for Metrolinx Line in Toronto - CN Newmarket Subdivision North of Wilson Ave

Good Day Ben,

Further to your request dated May 7th, 2020 the subject property (North of Wilson Avenue) is located immediately adjacent to the Metrolinx's Newmarket Subdivision which carries Barrie GO Train services, and CN spur.

It's anticipated that GO service on this lines will be comprised of electric trains within (at least) a 10-year time horizon. The preliminary midterm weekday train volume forecast at this location, including both revenue and equipment trips is in the order of 178 electric trains – 143 day, 35 night). Trains will be comprised of a single locomotive and up to 12 passenger cars.

The maximum track design speed at this location on this corridor is 75 mph (121 km/h).

*There are no anti-whistling by-laws in place around the subject property.*

With respect to future electrified rail service, Metrolinx is committed to finding the most sustainable solution for electrifying the GO and UP Express rail network and we are currently working towards the next phase. Metrolinx has not made a final decision regarding the electric train technology or technologies to be deployed. We can, however, provide the following interim information which may be helpful;

1. At lower speeds, train noise is dominated by the powertrain. At higher speeds, train noise is dominated by the wheel- track interaction. Hence, at higher speeds, the noise level and spectrum of electric trains is expected to be very similar, if not identical, to those of equivalent diesel trains.

2. Along with electrification, Metrolinx will intensify service levels along all of its corridors to deliver the promised GO Expansion service. Everything else being equal, this will likely result in an overall increase in train noise emissions.

Given the above considerations, it would be prudent, for the purposes of acoustical analyses, to assume that the acoustical characteristics of electrified and diesel trains are equivalent. In light of the aforementioned information, acoustical models should employ diesel train parameters as the basis for analyses. We anticipate that additional information regarding specific operational parameters for electrified trains will become available in the future.

Operational information is subject to change and may be influenced by, among other factors, service planning priorities, operational considerations, funding availability, and passenger demand.

It should be noted that this information is only as it pertains to Metrolinx trains. It would be prudent to contact other rail operators in the area directly for their rail traffic information.

I trust this information is useful. Should you have any questions or concerns, please do not hesitate to contact me.

Best Regards,
**Terri Cowan**
Third Party Projects Officer
Third Party Projects Review| Capital Projects Group
Metrolinx | 20 Bay Street, Suite 600 |Toronto, Ontario|M5J 2W3
T: 416-202-3903 C: 416-358-1595

**Date:** 2020/07/10 Project Number: NMT– 9.12–Wilson Avenue, Toronto

Dear Iwona:

**Re: Train Traffic Data – CN Newmarket Subdivision near Wilson Avenue in Newmarket, ON**

The following is provided in response to Iwona's 2020/05/07 request for information regarding rail traffic in the vicinity of Wilson Avenue, Toronto at approximately Mile 9.12 on CN's Newmarket Subdivision.

Typical daily traffic volumes are recorded below. However, traffic volumes may fluctuate due to overall economic conditions, varying traffic demands, weather conditions, track maintenance programs, statutory holidays and traffic detours that when required may be heavy although temporary. For the purpose of noise and vibration reports, train volumes must be escalated by 2.5% per annum for a 10-year period.

Typical daily traffic volumes at this site location are as follows:

*Maximum train speed is given in Miles per Hour

| | 0700-2300 | | | |
|---|---|---|---|---|
| Type of Train | Volumes | Max.Consist | Max. Speed | Max. Power |
| Freight | 0 | 140 | 40 | 4 |
| Way Freight | 1 | 25 | 40 | 4 |
| Passenger | 1 | 10 | 50 | 2 |

| | 2300-0700 | | | |
|---|---|---|---|---|
| Type of Train | Volumes | Max.Consist | Max. Speed | Max. Power |
| Freight | 0 | 140 | 40 | 4 |
| Way Freight | 2 | 25 | 40 | 4 |
| Passenger | 0 | 10 | 50 | 2 |

The volumes recorded reflect northbound and southbound freight and passenger operations on CN's Newmarket Subdivision.

Except where anti-whistling bylaws are in effect, engine-warning whistles and bells are normally sounded at all at-grade crossings. There are two (2) at-grade crossings in the immediate vicinity of the study area at Mile 10.01 (Private Gated Crossing) and Mile 10.5 (Carl Hall Rd.). Anti-whistling bylaws are not in effect at these crossings. Please note that engine-warning whistles may be sounded in cases of emergency, as a safety and or warning precaution at station locations and pedestrian crossings and occasionally for operating requirements.

With respect to equipment restrictions, the gross weight of the heaviest permissible car is 286,000 lbs.

The single mainline track is considered to be continuously welded rail throughout the study area.
The Canadian National Railway continues to be strongly opposed to locating developments near railway facilities and rights-of-way due to potential safety and environmental conflicts. Development adjacent to the Railway Right-of-Way is not appropriate without sound impact mitigation measures to reduce the incompatibility. For confirmation of the applicable rail noise, vibration and safety standards, Adjacent Development, Canadian National Railway Properties at Proximity@cn.ca should be contacted directly.

I trust the above information will satisfy your current request.

Sincerely,

Michael Vallins P.Eng
Manager, Public Works- Eastern canada
Permits.gld@cn.ca

ARUP

# Memorandum

| | |
|---|---|
| **To** | AECOM |
| **Date** | May 16, 2023 |
| **Copies** | Northcrest, City of Toronto, Metrolinx |
| **Reference number** | 260341 |
| **From** | Henry Jeens |
| **File reference** | Reference City of Toronto Application No.: 22 148540 NNY 06 OZ, 22 148583 NNY 06 SB<br>Reference Metrolinx PN#: NMT-22-039 |
| **Subject** | Rail Safety and Risk Mitigation for 123 Garratt Blvd - Additional Technical Justification in response to AECOM Peer Review Comments |

## 1. Introduction

Northcrest Developments ("Northcrest") has submitted a plan to redevelop a district (known as Taxiway West South Sub-District) within the wider Downsview Masterplan. Their development proposals are described in a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") made to the city of Toronto in May 2022. This district is adjacent to the Metrolinx GO Barrie Rail corridor at approximately Mile 10.

As part of this submission a Rail Safety and Risk Mitigation Report dated 5th May 2022 (Rail Safety Report) was submitted to the City of Toronto and has been reviewed by the City of Toronto, Metrolinx and their respective peer reviewers. Comments were provided by Metrolinx, and a call held with them and their peer reviewers to discuss key comments on 27th February 2023.

The district has a number of proposed and existing building that are beyond 30m from the rail corridor but less than 40m. The report proposes that given the specific site context no additional mitigation measures (such as a structural wall or berm) are required. Metrolinx guidance notes that *Safety berms are required for lands within up to 120 metres from the railway corridor, with the required barrier height diminishing with distance and determined through calculation (5.1.2.1).*

The purposed of this memo is to provide further information on the proposed approach including supporting calculations, analysis and the specific site context to demonstrate that the proposed draft plan of subdivision is appropriate.

## 2. Context and Development Proposals

The proposed development can be seen in Figure 1 below. This is taken from Figure 4 of the Rail Safety Report with the two buildings being considered and subject to this memo as outlined in red.

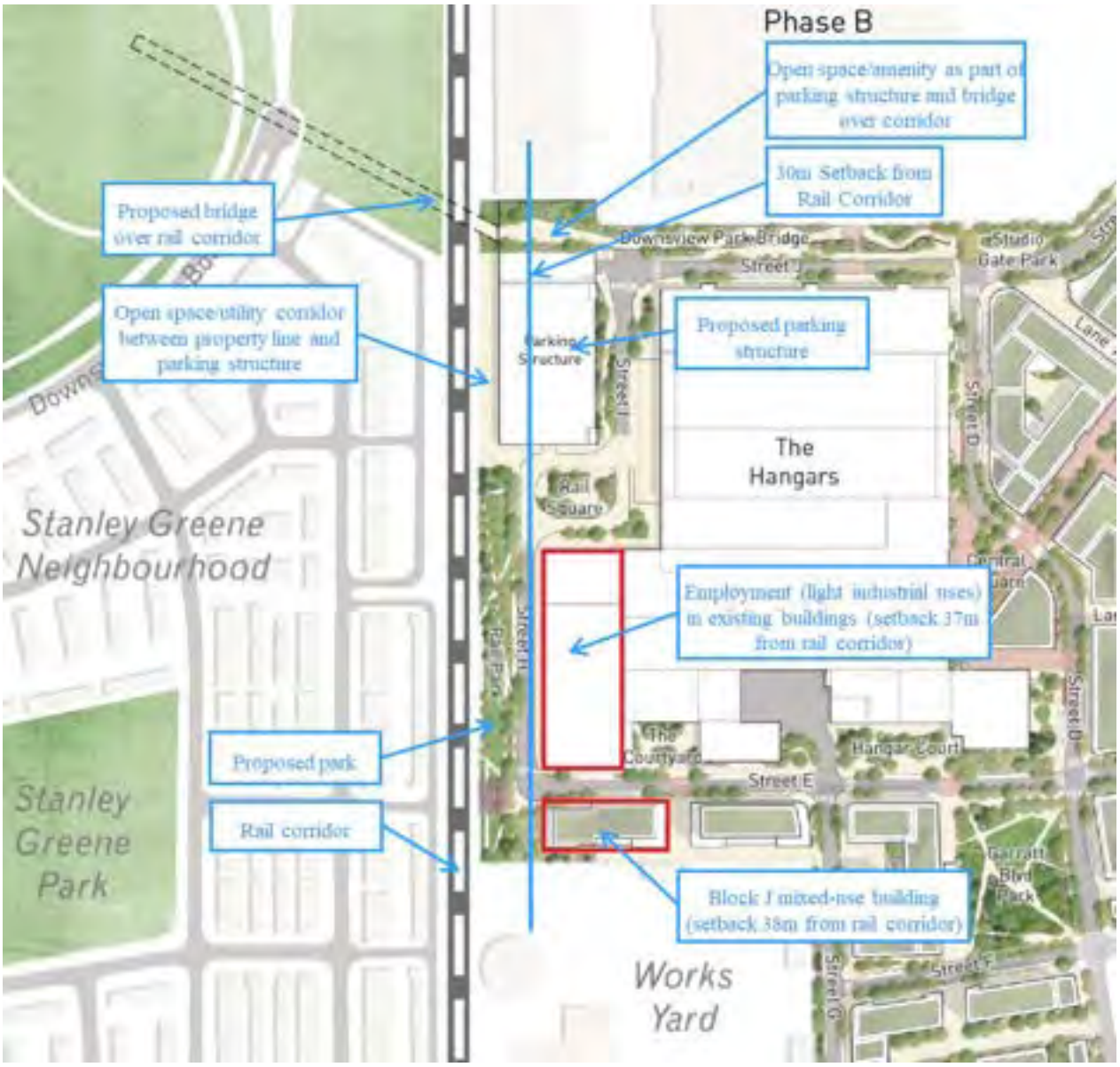



**Figure 1: Proposed Development Land Uses Adjacent to Rail Corridor**

Measurements in the figure show the distance between the property line and building. The existing rail centreline is between 7.5 and 8m from the property line. Metrolinx's proposed expansion plans within the corridor proposed keeping the current track in its existing location and adding a second track to the west. This means the total setback of the two buildings from the rail centreline is a minimum of 37m+7.5m which is 44.5m.

## 2.1 Existing Employment (Superstore) Building

The northern side of the two buildings is an existing building known as the superstore building and is part of Bombardier's current aeroplane manufacturing activities. The existing superstore building is a single-storey (with mezzanine level) building currently dedicated to shipping & receiving, warehouse and storage uses. The aerial view and interior view of the building is shown in Figure 2 and Figure 3.

Regarding the structure of the superstore building, Jablonsky, Ast and Partners, Structural engineers who have reviewed the existing buildings have confirmed, *"the existing Super Store structure is structurally independent from the existing Hangar structures, separated by an expansion joint and double column line. In the case of a derailment and impact to the West side of the building, a progressive collapse of subsequent existing structures are [sic] unlikely to occur due to the presence of the aforementioned expansion joint between existing buildings."*

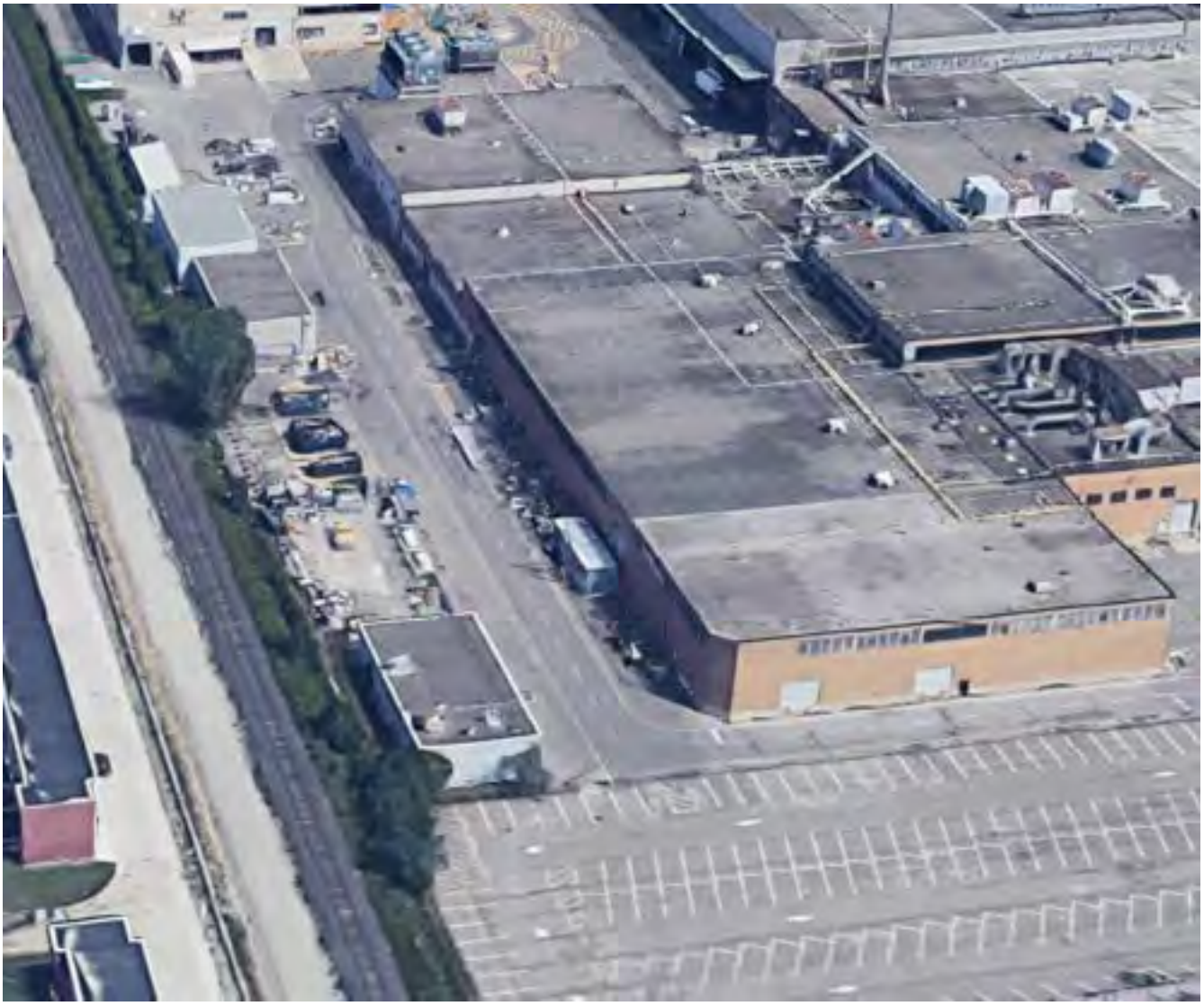


**Figure 2: Aerial View of the Existing Superstore Building, Looking Northeast**

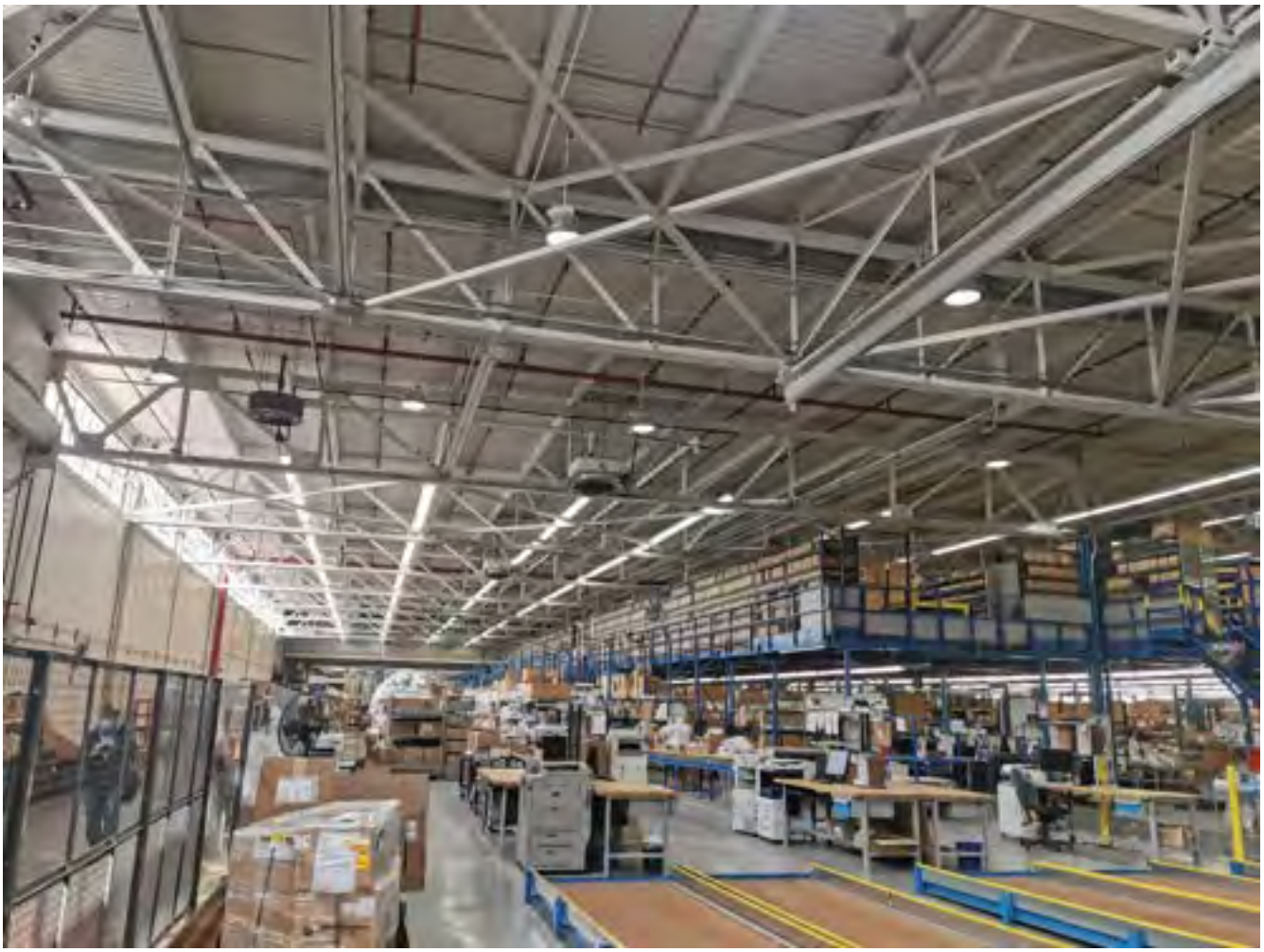


**Figure 3: Interior View of the Existing Superstore Building**

With Bombardier's departure from the site, a new tenant will need to be found. Northcrest has confirmed that they do not have a fixed tenant in mind for this space in the future, however, it is anticipated that this space will continue to be used for light industrial / warehousing / advanced manufacturing uses.

In addition, there are no plans at this time to convert the use to high-occupancy use, therefore, it could be foreseen that the occupancy level of the building will remain low-occupancy.

## 2.2 Block J

The proposed mixed use Block J is expected to contain higher occupancy uses including residential. It is noted that discussions with City planning are underway to potentially convert the proposed use of Block J from residential to employment. The design of this building will not be progressed until later stages. Regardless of the development use, the recommendations in the report and this memo will persist, including the horizontal setback distance requirement of 30m, and the unnecessity for physical rail safety risk mitigation measures such as a crash wall, given the fulfillment of setback distance and the unlikeliness of train impacting the building in case of derailment. However, opportunities might be

sought for structural reinforcement on the ground floor if required (to be identified as part of a future site plan process).

### 2.3 Updates to the Plan

In response to the feedback from the City of Toronto and the development of the design, there are some revisions to the development proposal, which are shown in Figure 4.




**Figure 4: Revision to Development Proposal**

The main change relates to the space between the buildings and the railway corridor, which was previously adopted as a park and roads. The design now has Proposed Street H located immediately adjacent to the rail corridor, as highlighted in blue in Figure 4. Parts of the existing building are proposed to be service docks to allow loading/unloading activities to support the future building tenants. These uses are considered non-sensitive and low-occupancy and are in line with the land use as assessed in the Rail Safety Report.

## 3. Design Rationale

When considering the appropriate measures two key factors have been considered

1. The likelihood/expectation of if a derailed train will reach the buildings
2. The relative feasibility of introducing physical rail safety measure

### 3.1 Derailment Scenarios:

The likelihood of a derailed train reaching the building was assessed in the Rail Safety Report, which was summarized in Section 3.2 with detailed calculations shown in Appendix 2. These analyses are summarized again below, followed by some additional scenarios to test the resiliency of the proposed site layout.

Based on the method set out in AECOM's Development of Crash Wall Design Loads from Theoretical Train Impact (2014), typical derailment scenarios include glancing blow (Case 1 and Case 3) and single train car rotation (Case 2 and Case 4), with freight trains and passenger trains calculated separately.

For these typical scenarios, the following input parameters are required to calculate the design load perpendicular to the wall:

- Grade of the groundline in the direction of travel relative to the centerline of track
- Angle of impacting the wall, which is taken as 3.5 degrees for tangent track in the glancing blow scenarios
- Track speed
- Distance from the crash wall to the centreline of track

The input parameters for the proposed development are tabulated in Table 1:

**Table 1: Input Parameters for Rail Derailment Analysis – Typical Scenarios**

| Input Parameter | Value | Note |
|---|---|---|
| Grade ($G$) | 0 | Railway and proposed development are at the same grade |
| Angle of Impact ($\theta_G$) | 3.5° | The corridor and building edge are parallel |
| Track Speed ($v_0$) | 75mph (passenger trains)/ 60mph (freight trains) | Section 2.1.2 of the OPA Rail Report attached in Appendix 1 of the Rail Safety Report |
| Distance from the crash wall (location of possible impact) to the centreline of track ($d_{Cl}$) | >30m | The distance from the closest high-sensitive (high-occupancy) area to the mutual property line is farther than 30m, as shown in Figure 4 of the Rail Safety Report and Figure 1 of this Memo |

With the distance from the location of possible impact to the centreline of track ($d_{Cl}$) larger than 30m, an impact speed ($v_G$) will return an imaginary number for both glancing blow scenarios (Case 1 and Case 3) which indicates that the train will come to a stop before impacting the structure 30m away from the centre of the track. For single train rotation scenarios (Case 2 and Case 4), as $d_{Cl}$ is larger than 8.5m and 13.5m respectively, both load cases need not be considered as specified in AECOM's guidelines.

In light of these, a more precise calculation is adopted in the Rail Safety Report concerning the distance a train required to come to a stop in case of derailment, based on the parameters in Table 1 and two variation of impact angle, 5 degrees and 7 degrees. These calculations are shown in Appendix 2 of the Rail Safety Report. The results indicating even with the angle of impact changing from 3.5 degrees to 7 degrees, the distance a train will travel before impact is 29m, which is still less than the 30m compared to $d_{Cl}$.

Given that neither of these typical scenarios result in a train impacting the proposed developments or the existing buildings, a more conservative approach – a series of "what-if" scenarios – were considered to further verify the likelihood of a derailed train reaching the buildings.

In order to achieve this, the input parameters for these "what-if" scenarios are further magnified, as tabulated below: As calculations of travel distance do not involve the mass of the train, scenarios for freight trains and passengers will return the same result. Therefore, only one value of $d_{Cl}$ in each "What-if' scenario is obtained. Detailed calculations can be found in Appendix 1 of this report.

The results in the "What-if" analysis indicated that with extreme conditions in glancing blow, the travel distance of a train before impact or coming to a stop is 23.2m and 41m respectively under Scenario 1 and Scenario 3.

When considering the rotated car scenarios, the AECOM guidance assumes that the rotation is around the centroid/centre of the car, with 13m being the largest value obtained in their calculations. Therefore, in this what if scenario, it has been assumed that the full length of the car rotated around its end is used, which is 26m for passenger trains. This crash result is less like as it is a result of moment around one fixed point, which relies on one end of the train carriage being fixed somehow.

Considering the land use plan in Figure 1, it is noted that both the existing employment-use building and mix-used building Block J have a minimum distance of approximately 37m from the rail corridor, and 44.5m from the track centreline.

**Table 2: "What if" Scenario Summary**

| "What if" Scenario | Magnified Input Parameter | Derailment Scenarios Applied | Values | Description | Maximum distance of impact to the centreline of track ($d_{Cl}$) |
|---|---|---|---|---|---|
| Scenario 1 | speed increased to MP40 locomotive maximum speed ($v_0$) | Glancing blow (Case 1 and Case 3) | 93mph (passenger trains) | The maximum track speed of 75mph for passenger trains in the typical scenarios will be increased to 93mph | 23.2m |

| "What if" Scenario | Magnified Input Parameter | Derailment Scenarios Applied | Values | Description | Maximum distance of impact to the centreline of track ($d_{Cl}$) |
|---|---|---|---|---|---|
| Scenario 2 | Rotation of car ($\theta_f$) around end rather than centre 90 degrees | Single train car rotation (Case 2 and Case 4) | 90 degrees around end (worse case) | the longest train car (as passenger car) rotating about its end 90 degrees resulting in the end of the car being a full car length from the track | one train car length - 26m |
| Scenario 3 | 10degrees angle of impact ($\theta_G$) | Glancing blow (Case 1 and Case 3) | 10degrees | The angle of impact, which is assumed to be 3.5degrees in the typical scenarios, will be increased to 10degrees in the analysis | 41m |

## 3.2 Rail Safety Measures

The analysis in the previous section shows that in none of the 'what if' scenarios a train is expected to impact either the existing 'supermarket' building or the proposed block J. Considering this the provision of physical rail safety measures is not expected to materially reduce the risk associated with a derailed train and are therefore not required. The physical setback of these buildings is considered sufficient without the need of any physical rail safety measures such as berms or crash walls.

Notwithstanding this, consideration was given to if physical measures could be provided.

### Between the Property and Buildings

The proposed road, open space and servicing/access means that berms, or other landscape-based systems cannot be provided without significantly affecting the operation or functionality of the development as there is limited space in that area. While it may be technically possible to provide a crash wall along the edge of the development, this approach is high in embodied carbon and is considered a disproportionate safety measure given the unlikeliness of train impact to the development as illustrated in the previous section.

### Existing Superstore Building

The existing building currently contains a low occupancy use and there are no proposed changes to the use. This alone, in accordance with the guidance, means that rail safety measures are not required. Additionally works to enhance the structure to withstand the loading from a derailed train would be significantly impactful on the existing building and would be a disproportionate safety measure given the results of the "what if" analysis.

### Proposed Mixed-use Block J

Despite the ongoing discussions with City planning for the potential conversion of the proposed use of Block J from residential to employment, the use of this building is yet to be confirmed. In addition, the design of this building will be actioned in later stages. It is noted that no matter residential or employment, the recommendations in the report and this memo, including the setback distance requirement and the unnecessity for physical rail safety risk mitigation measures such as a crash wall,

would not be affected. However, opportunities might be sought for structural reinforcement on the ground floor if required (to be identified as part of site plan process).

The structural design approach for this building will depend on what the final uses are and location of these uses within the building. Significant structural measures such as a crash wall along the western edge would be impactful to the building structure and may limit the uses in the building. The eventual designer may however consider approaches that create structural independence or redundancy in the design or other alternatives such as structural reinforcements on the ground floor west wall.

From this review it is apparent that the provision of physical rail safety measures would be disproportionate safety measures or impact on the development considering the limited role they would play as set out in the "what-if" analysis in Section 3.1.

## 4. Conclusion and Recommendation

The analysis in the section above shows that a train, even considering 'what if' and less likely scenarios is not expected to impact the buildings. Therefore, it is the conclusion of this justification memo that no additional mitigation measures are required.



## Appendix 1: Train Travel Distance Calculation Sheet for “What-if” Scenarios

**Distance Travelled**

**Common parameters**

| | | |
|---|---|---|
| G | 0 | G is the grade in decimal unit of the groundline in the direction of travel defined by the angle of impact relative to the centerline of track; calculated as $\frac{\text{Groundline at wall} - \text{Base of Rail}}{d_{CL}/\sin\theta_G}$. |

**Variables**

| | | | |
|---|---|---|---|
| $\theta_G$ | 3.5 | ° | *impact angle/3.5 for tangent track* |
| speed | 93 | mph | *track speed (freight and passenger train should be calculated separately)* |

**Intermediate variables**

| | | | |
|---|---|---|---|
| a | -2.45 | m/s2 | |
| $v_0$ | 41.57 | m/s | *track speed (freight and passenger train should be calculated separately)* |
| $v_G$ | 0 | | *speed of derailed train impacting the wall* |

**Output**

| | | | |
|---|---|---|---|
| $d_{cl}$ | 23.16 | m | *distance from crash wall to the centreline of track in m* |

For the glancing blow load cases, the speed of derailed equipment impacting the wall is reduced from the track speed, $v_0$, to

$$v_G = \sqrt{v_0^2 + 2a\left(\frac{d_{CL} - 1.625}{\sin\theta_G}\right)} \text{ [m/s]} \quad [3]$$

Where $d_{CL}$ is the distance from the crash wall to the centerline of track in m

$v_0$ is the track speed in m/s

$\theta_G$ is the angle of impact

$a$ is the acceleration in m/s, calculated as $-9.8(.25 + G)$

G is the grade in decimal unit of the groundline in the direction of travel defined by the angle of impact relative to the centerline of track; calculated as $\frac{\text{Groundline at wall} - \text{Base of Rail}}{d_{CL}/\sin\theta_G}$.

$$d_{CL} = 1.625 + sin\theta_G \times \frac{(v_G^2 - v_0^2)}{2a}$$

**Distance Travelled**

**Common parameters**

| | | |
|---|---|---|
| G | 0 | G is the grade in decimal unit of the groundline in the direction of travel defined by the angle of impact relative to the centerline of track; calculated as $\frac{\text{Groundline at wall} - \text{Base of Rail}}{d_{CL}/\sin\theta_G}$. |

**Variables**

| | | | |
|---|---|---|---|
| $\theta_G$ | 10 | ° | *impact angle/3.5 for tangent track* |
| speed | - | mph | *track speed (freight and passenger train should be calculated separately)* |

**Intermediate variables**

| | | | |
|---|---|---|---|
| a | -2.45 | m/s2 | |
| $v_0$ | 33.33 | m/s | *track speed (freight and passenger train should be calculated separately)* |
| $v_G$ | 0 | | *speed of derailed train impacting the wall* |

**Output**

| | | | |
|---|---|---|---|
| $d_{cl}$ | 41.00 | m | *distance from crash wall to the centreline of track in m* |

For the glancing blow load cases, the speed of derailed equipment impacting the wall is reduced from the track speed, $v_0$, to

$$v_G = \sqrt{v_0^2 + 2a\left(\frac{d_{CL} - 1.625}{\sin\theta_G}\right)} \text{ [m/s]} \quad [3]$$

Where $d_{CL}$ is the distance from the crash wall to the centerline of track in m

$v_0$ is the track speed in m/s

$\theta_G$ is the angle of impact

$a$ is the acceleration in m/s, calculated as $-9.8(.25 + G)$

G is the grade in decimal unit of the groundline in the direction of travel defined by the angle of impact relative to the centerline of track; calculated as $\frac{\text{Groundline at wall} - \text{Base of Rail}}{d_{CL}/\sin\theta_G}$.

$$d_{CL} = 1.625 + sin\theta_G \times \frac{(v_G^2 - v_0^2)}{2a}$$

## Appendix 2: Appendix 2 - Letter from Jablonsky Confirming Structural Independence

**JABLONSKY, AST AND PARTNERS**
Consulting Engineers

**400 - 3 Concorde Gate**
**Toronto, ON M3C 3N7**
**Telephone (416) 447-7405**
**www.astint.on.ca**
**Email jap@astint.on.ca**

April 3, 2023

Northcrest
161 Bay St., Suite 1305
Toronto, ON M5J 2S1

Attn: Ms. Jinny Tran
Senior Development Manager

Re: Downsview Hangar District
Rail Safety Mitigation
Our Project No. 21041

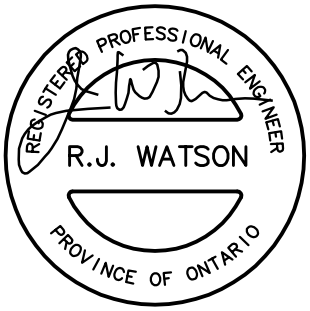
Dear Ms. Tran,

Please be advised that the existing Super Store structure is structurally independent from the existing Hangar structures, separated by an expansion joint and double column line. In the case of a derailment and impact to the West side of the building, a progressive collapse of subsequent existing structures are unlikely to occur due to the presence of the aforementioned expansion joint between existing buildings.

We hope this satisfies you requirements at this time. Should you have any questions or require additional information, please do not hesitate to contact this office.

Yours very truly,

JABLONSKY, AST AND PARTNERS
CONSULTING ENGINEERS




Jeff Watson, P. Eng.

cc: Kevin Deonaraine, JAP

# 15. Resubmission Cover Letter

Northcrest

July 7, 2023

Perry Korouyenis, Senior Planner
Community Planning – North York District
North York Civic Centre
5100 Yonge Street
North York, Ontario M2N 5V7

Dear Mr. Korouyenis:

**Re: Taxiway West South Sub-District ("The Hangar District")**
**Resubmission of Zoning By-law Amendment & Draft Plan of Subdivision Applications**
**City File Nos.: 22 148540 NNY 06 OZ & 22 148583 NNY 06 SB**
**123 Garratt Boulevard, North York, ON M3K 1Y5**

On behalf of Northcrest Developments ("**Northcrest**") we are pleased to provide the enclosed resubmission package for the Zoning By-law Amendment and Draft Plan of Subdivision applications for the Hangar District municipally known as 123 Garratt Boulevard ("the **Subject Area**") within the City of Toronto. An initial application was submitted on May 16, 2022 and deemed complete on June 1, 2022.

The Subject Area is owned by PSPIB Downsview Investments Inc. ("**PSP**") and is comprised of 22.4 hectares (55.5 acres) of land consisting of the existing Bombardier hangars, offices and ancillary structures, surface parking lots, and a portion of the Downsview Airport taxiway. Northcrest Developments is a wholly owned subsidiary of PSP, established to manage the redevelopment of the Downsview Airport lands, and is the authorized agent/applicant on behalf of the owner.

Since the initial submission, a comprehensive set of comments were received in late 2022 / early 2023 including comments from City departments, external agencies and peer reviewers. Over the past year, a series of meetings and workshops were held with City Planning, Engineering, Transportation, Heritage, Parks and Urban Design Staff as well as with commenting agencies and utility providers to address comments associated with the proposed district plan. In particular, this included a full-day on-site workshop with City Staff held on April 28, 2023 where key issues and preliminary alternatives were assessed. We also held subsequent in-person and virtual community engagement events with the local and broader community to go over the application materials and seek input and comments on various elements of the proposal.

We are pleased to present the updated concept site plan for the district, as illustrated in **Figure 1**, which reflects input from community members and interested parties, and addresses key technical comments from the City.




**Figure 1. The Hangar District - Concept Site Plan**

**Overview of District Plan Changes**

The following section provides a summary of key changes. Please note the naming of blocks throughout the Subject Area have changed as a result of the updates to the plan. Where applicable, both the previous block names and their updated names have been referenced together.

Street Network

Key updates to the proposed street network are illustrated in **Figure 2** and outlined below.




**Figure 2. Key Changes to District Street Network**

1. *Realignment of Powell Road extension and conversion to public ROW (Streets M and N)*

   The extension of Powell Road has been revised to propose a more direct and linear connection through the Subject Area as requested by the City, with an increased right-of-way width from 11m to 18.5m in accordance with typical City municipal street standards (Streets M and N). A pedestrian mid-block connection will continue to be proposed to provide a visual and physical pedestrian connection through to Central Square and Street D.

2. *Conversion of private lanes to public ROW within the Village (Streets K and L)*

   Certain private laneways have been re-oriented and converted into public streets (Streets K and L), to create a direct public connection from Hanover Road to the Taxiway Street, through the District's 'Village'. The proposed 11m shared street will promote a pedestrian-first environment and discourage through traffic while ensuring necessary access for servicing to the adjacent development blocks. We look forward to continuing to work with City Staff on the design, operation, and implementation of this ROW.

3. *Modified alignment of private streets west of the hangars (Streets H, I and J)*

   As agreed to by City Transportation Staff, the streets west of the hangars will remain as private streets, and have been realigned to better support loading functions for future employment uses. A public access easement will be provided on these streets to ensure a continuous, seamless, and publicly accessible street network.

4. *Provision of a reserve block for future Murray Road extension*

   As requested by City Staff, a 20-metre reserve block has been incorporated in the Draft Plan of Subdivision and the District design to protect for a future extension of Murray Road to connect to proposed public Street E.

<u>Parks & Open Spaces</u>

Key updates to the proposed parks and open spaces are illustrated in **Figure 3** and outlined below.




**Figure 3. Key Changes to Parks and Open Spaces**

5. *Adjustments to Central Square, Rail Park, Rail Square, and Garratt Blvd Park*

   Based on the collective feedback received from Staff, there was a desire to create a larger park space in the centre of the District. The updated plan features the removal of the former Block B office building and Lane F to expand Central Square, resulting in a park space that is nearly four times in size. The larger park supports direct visual connections from key streets, reinforcing the relationship between the hangars, Bay 12 and the Taxiway Street.

   This change is accompanied by the removal of Rail Park and Rail Square which allows for the realignment of the private streets H, I and J to support loading functions of future employment use. We have also expanded the size of Garratt Blvd Park to provide greater flexibility in programming and design of this local neighbourhood park.

6. *Revisions to Village Park, now Robert Leek Park Expansion*

   Village Park, now referred to as Robert Leek Park Expansion, has been revised per City's suggestion to be located at the north end of the parcel in order achieve a direct visual connection from Hanover Road and from the Taxiway Street. The southern portion of Block G (previously Block I) is proposed as a mixed-use residential block.

7. *Downsview Park Bridge & Parking Structure*

   The Downsview Park Bridge continues to remain a priority feature of the District and will significantly improve connectivity for cyclists and pedestrians across the rail to and from Downsview Park while creating a unique, landmark public open space. While the design approach largely remains the same, in response to City's comments, we are proposing to convert the space into a privately owned publicly accessible space ("**POPS**") to allow for the continued integration of the parking garage and greater variety of programming and landscaping opportunities. We will continue to work with the City to explore different options to implement the park bridge.

**Table 1** below outlines the updated parks and open space statistics. The revised district plan continues to feature 6 acres (2.4 ha) of parks and open space, of which 2.9 acres (1.2 ha) is public parkland, exceeding requirements for parkland dedication. Furthermore the proposed POPS will contribute to the 100 acres (40 hectares) of new open space in the wider Downsview Lands, as identified in the draft Downsview Secondary Plan.

*Table 1: Proposed Parks and Open Space Statistics*

| **Open Space Type** | **Area ($m^2$)** | **Area (hectares)** | **Area (acres)** |
|---|---|---|---|
| Public Parkland | 11,923 | 1.2 | 2.9 |
| POPS | 10,225 | 1.02 | 2.53 |
| Other Open Space | 2,141 | 0.21 | 0.53 |
| **TOTAL** | **24,289** | **2.43** | **6.0** |

Land Use

**Figure 4** illustrates the conceptual site and block plan for the District and identifies the two blocks proposed to change in use. These changes are further described below.




**Figure 4. Concept Site and Block Plan**

8. *Revisions to Block J (now Block H)*

   Block J (now Block H) has been converted from mixed-use to employment in order to align with the City's request to expand the General Employment designation to this block to create a continuous employment area with the City Works Yard to the south. Northcrest maintains the ability to redesignate Block J (now Block H) to Mixed Use in the future should the City Works Yard be redeveloped.

9. *Revisions to Block F (now Block D)*

   To maintain the overall balance of residential and non-residential uses, Block F (now Block D) has been converted into a residential mixed-use block.

*10. Overall GFA updates*

The overall gross floor area (GFA) proposed in the Subject Area has remained the same as the initial submission at approximately 368,365 $m^2$, with 132,656 $m^2$ of employment GFA, 28,862 $m^2$ of retail, services and community uses, and 207,406 $m^2$ of residential GFA. The number of proposed residential units also remains unchanged at 2,850. The overall density has remained the same at 1.64 FSI for the Subject Area and 1.2 FSI for the broader Taxiway West District which also includes the Film Studio Campus. The Site and Area Specific Policy 596 requirement for a 1:1 ratio of employment to non-employment uses continues to be met for the overall Taxiway West District, as demonstrated through **Table 2** below.

*Table 2: Taxiway West District Breakdown of Non-Residential and Residential Use*

| **Use** | | **GFA ($m^2$)** | **% of Total** |
|---|---|---|---|
| Non-Residential Use (Employment, Retail/ Services, Community) | Film Studio Campus* | 113,070 | - |
| | The Hangar District | 160,960 | - |
| | **Non-residential TOTAL** | **274,029** | **57%** |
| Residential Use | The Hangar District | 207,406 | - |
| | **Residential TOTAL** | **204,406** | **43%** |
| | **Taxiway West District TOTAL** | **481,435** | **100%** |

* Film Studio Campus GFA is based on the as-submitted site plan application and existing facilities.

Built Form & Massing

The proposed built form has continued to evolve in response to City comments and related discussions, including the revisions to the street network, parks and open spaces and land use noted above. Modifications to building massing and heights have been made, as illustrated in **Figure 5.**

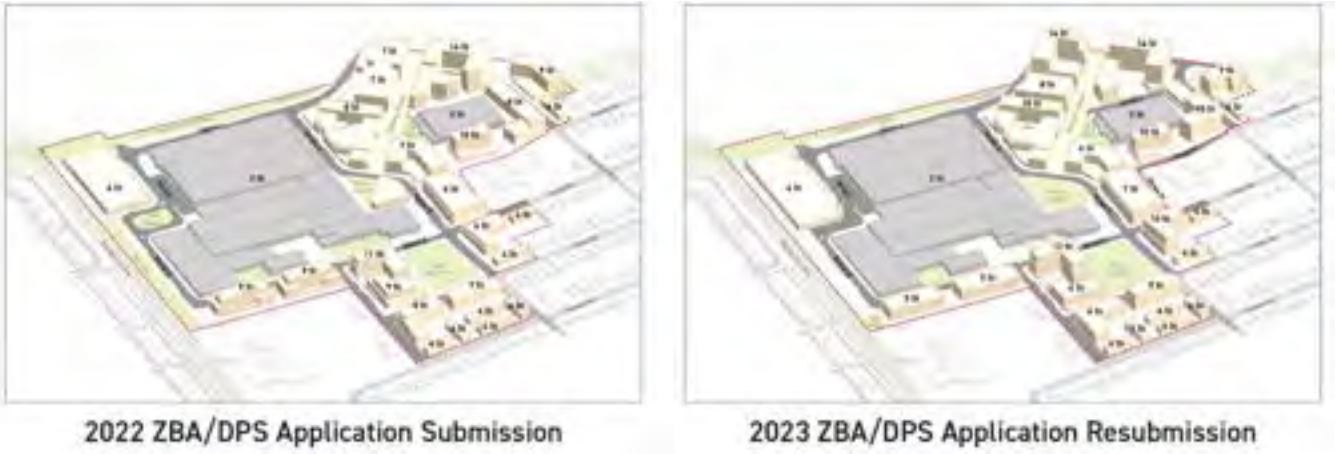



**Figure 5. Massing Comparison**

These changes include higher building heights in strategic locations to the northeast towards the future Taxiway East District and reductions in height in response to changes in land use and desire to create variety in built form and support a desirable public realm. The updated massing has been reviewed to assess any changes in microclimate conditions, a Sun/Shadow Study addendum prepared by Urban Strategies Inc. and Pedestrian Level Wind Study addendum letter prepared by RWDI are enclosed with this resubmission. Both studies reconfirm the original conclusions that the proposed development, including recent massing modifications, can achieve appropriate microclimate conditions for pedestrian comfort year-round.

Overall, the revised proposal continues to uphold the design objectives and intent of the massing strategy as outlined in the District Plan and Urban Design Guidelines provided with the initial submission. This includes:

- Keeping building heights through the centre of the District relatively low in response to policy direction;
- Maintaining a mid-scale built form character throughout the District with a maximum building height of 14 storeys;
- Retaining and adaptively reusing the hangars and Bay 12 buildings, as well as massing new buildings to create a positive built form relationship with these heritage structures, including generally maintaining a 1:1 ratio of hangar building height and the streetwall of new buildings along Street D;
- Ensuring a sensitive built form transition by maintaining a 4-storey built form for buildings directly adjacent to the Ancaster Neighbourhood, as well as providing setbacks and stepbacks for mid-scaled buildings; and
- Ensuring that the proposed built form supports a desirable public realm including comfortable microclimate conditions.

**Submission Materials**

In coordination with City Planning, a scoped resubmission has been prepared for this technical resubmission. Please note that certain reports have not been updated e.g. District Plan report as the vision, plan elements, and design strategy has not changed. This technical resubmission aims to focus on confirming the foundational elements of the District Plan including streets and blocks.

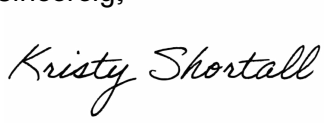
Please find enclosed a digital copy of the following resubmission materials in support of the ZBA and DPS resubmission:

- Application Resubmission Form;
- Project Data Sheet;
- Resubmission Cover Letter, dated July 7, 2023;
- Comment Response Table, dated July 7, 2023;
- Draft Plan of Subdivision, prepared by WSP, dated June 28 2023;
- Architectural Drawings Package, prepared by Perkins Eastman, dated July 2023;
- 3D Massing Model;
- Simplified Report Graphics, dated July 2023;
- Landscape Plan and Cross Sections, prepared by DTAH, dated July 2023;

- Civil Drawings Package, prepared by Arup, dated July 2023;
- Sun/Shadow Study Addendum, prepared by Urban Strategies Inc., dated July 2023;
- Functional Servicing Report Addendum, prepared by Arup, dated July 2023;
- Stormwater Management Report Addendum, prepared by Arup, dated July 2023;
- Transportation Impact Study Addendum, prepared by WSP, dated July 2023;
- Rail Study Response Memo prepared by Arup, dated July 2023;
- Green Development Standards Checklist (TGS Checklist), dated July 2023;
- Land Use Compatibility Study Addendum, prepared by SLR, dated June 26, 2023;
- Noise Study Addendum Letter, prepared by Aercoustics, dated July 2023;
- Pedestrian Level Wind Study Addendum Letter, prepared by RWDI, dated July 2023; and,
- Housing Issues Report Addendum Letter, prepared by NBLC, dated June 23, 2023.

Northcrest and the project team appreciates the feedback and collaboration with the City in advancing the proposed changes outlined above. We are confident that this iteration maintains the vision and objectives of the original District Plan. We look forward to further refining the details of the District Plan with the City following this resubmission. Please do not hesitate to get in touch should you have any questions.

Sincerely,



Kristy Shortall, Senior Vice President, Development
**Northcrest Developments**

# 16. Simplified Report Graphics

# Figure 1: Site Plan

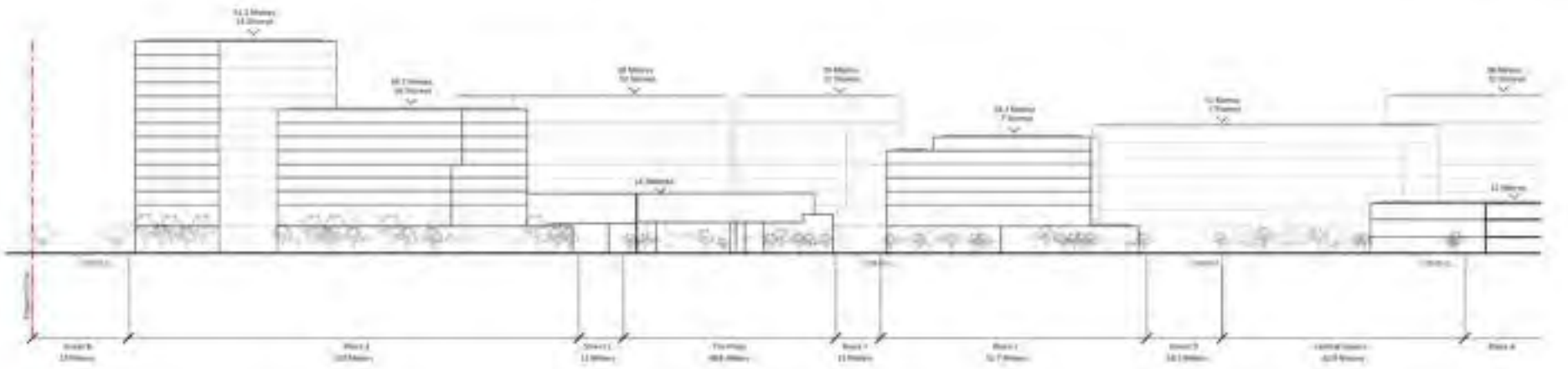



Simplified Report Graphics

# Figure 2.1: Sample Elevation Drawing

(Taxiway Street looking South-East)



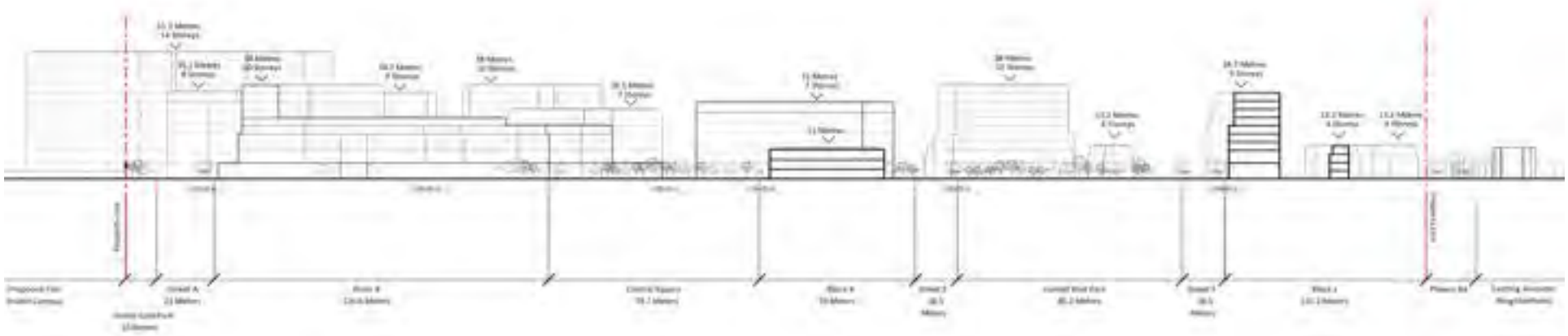


(elevations not to scale)

# Figure 2.2: Sample Elevation Drawing

(Street D looking East)

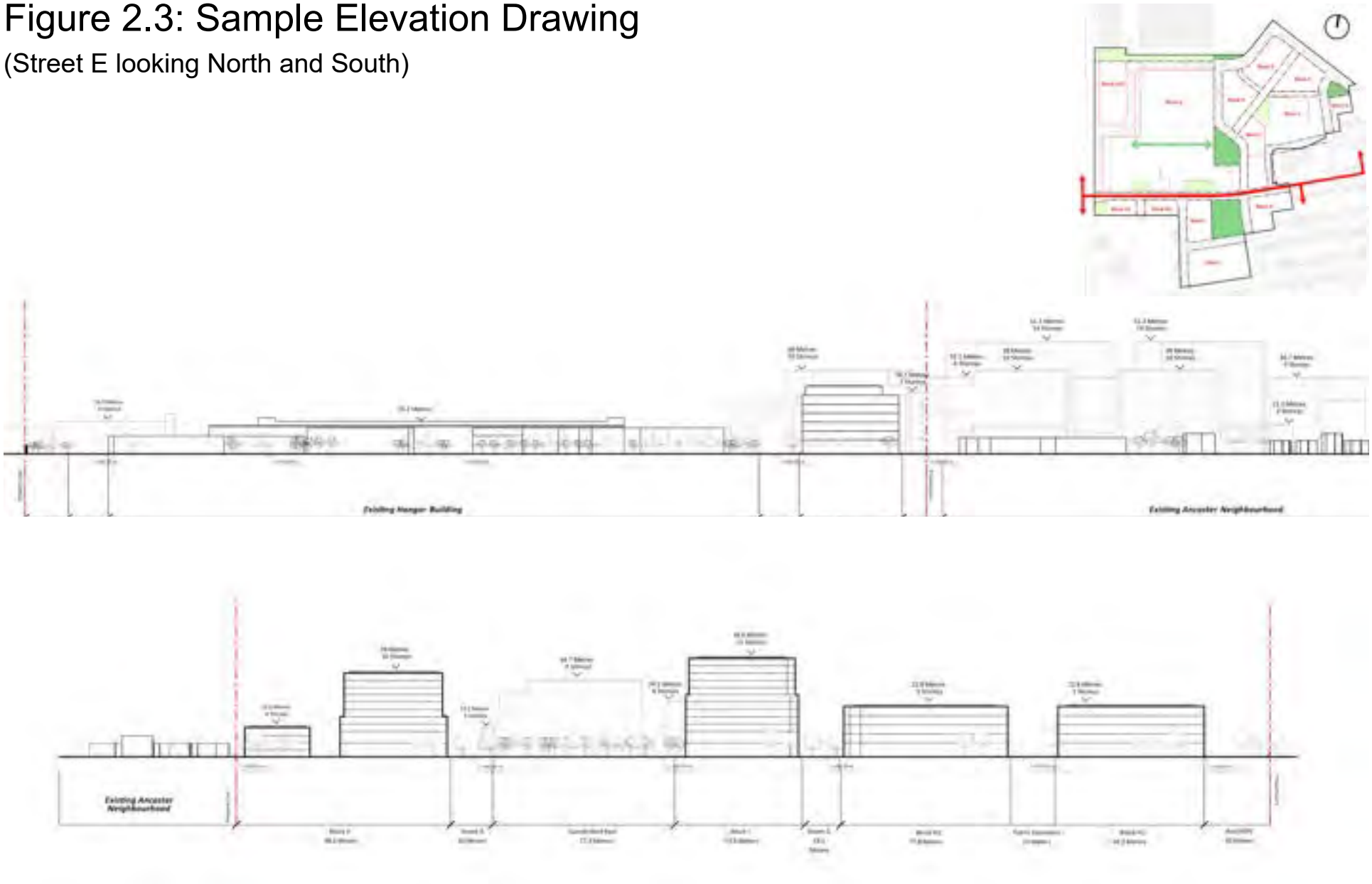




(elevations not to scale)

# Figure 2.3: Sample Elevation Drawing

(Street E looking North and South)




(elevations not to scale)

# Figure 3.1: 3D Model

(Looking North-West)




Legend

- Proposed massing
- Existing massing within The Hangar District
- Existing massing outside The Hangar District

# Figure 3.2: 3D Model

(Looking South-East)




Legend

- Proposed massing
- Existing massing within The Hangar District
- Existing massing outside The Hangar District

# 17. Sun Shadow Study Addendum

URBAN STRATEGIES INC

197 Spadina Avenue, Suite 600
Toronto, ON Canada M5T 2C8
www.urbanstrategies.com

tel 416 340 9004 x 255
lhaeinan@urbanstrategies.com
Toronto • Hamilton • Vancouver

| | |
|---|---|
| Date | July, 2023 |
| Project | Downsview Hangar District |
| To | Northcrest Developments |
| From | Urban Strategies Inc. |
| Subject | Sun/Shadow Study Addendum for the Proposed Redevelopment of 123 Garratt Boulevard |

---

Urban Strategies Inc. has been retained by Northcrest Developments ("Northcrest") to prepare this Sun/Shadow Study addendum letter in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application resubmission for the Hangar District (previously known as the Taxiway West South Sub-District) at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto.

The Subject Area is comprised of 22.4 hectares (55.5 acres) of land consisting of the existing Bombardier hangars, offices and ancillary structures, surface parking lots, and a portion of the Downsview Airport taxiway. The Subject Area is located south of a proposed Film Studio Campus.

In May 2022, Northcrest filed a combined ZBA and DPS application ("the initial submission"). Since the initial submission, a number of refinements have been made in an effort to align with comments from various City departments and commenting agencies; discussions with staff through various meetings and an in-person workshop; feedback received through community engagement; as well as with policy directions emerging out of the City's draft Update Downsview Secondary Plan ("the revised proposal").

In particular, a number of revisions have been made to the proposed parks and open spaces and the built form/massing:

- **Public Parks:** Central Square has been expanded nearly four times its original size, from 1,046 $m^2$ (0.26 acres) to 4,001 $m^2$ (0.99 acres). Garratt Blvd Park has been expanded from 5,214 $m^2$ (1.29 acres) to 6,040 $m^2$ (1.49 acres). Rail Park has been removed in response to staff comments, and to support loading functions for the employment uses in the hangars. The location of Village Park (now referred to as Robert Leek Park Expansion) has been moved to the north end of Block G (previously Block J) for a more contiguous expansion of the existing Robert Leek Park.

- **Privately Owned Publicly-accessible Spaces (POPS) and private open space:** The Downsview Park Bridge has been converted from a public park to a POPS. Similarly to Rail Park, Rail Square (previously proposed as a private open space) has been removed in response to staff comments.
- **Built form/Massing:** Some shifts in the distribution of heights and density have taken place, generally resulting in higher building heights in the northeast portion of the Subject Area towards the future Taxiway East District, while the heights through the centre of the Subject Area have been kept relatively low, consistent with the massing strategy in the initial submission. The maximum building height of 14 storeys throughout the Subject Area has been maintained, as well as the 4-storey height along the edges that are directly adjacent to the Ancaster Neighbourhood.

Please refer to the Cover Letter submitted with this application resubmission for the fulsome description of key changes to the proposed District design. It is also noted that as a result of some of these refinements, the naming of blocks throughout the Subject Area has changed.

An updated Sun/Shadow Study has been prepared for the revised proposal and appended to this addendum letter. The updated Sun/Shadow Study demonstrates that overall, the incremental shadows created by the proposed development are considered to be appropriate.

As elaborated below, the revised proposal maintains sunlight access across the network of public spaces, is in keeping with the role of shadows in complementing sunlight to support a comfortable microclimate, creates minimal impacts to the Ancaster Neighbourhood to the east, and meets the policy directions for the adequately limiting shadow impacts while enabling intensification and supporting the creation of a complete community.

**Summary of Sun/Shadow Impacts**

**March and September 21st:**

In March and September, the majority of Garratt Blvd Park is in full sun throughout the day until late afternoon (5:18 onwards), when the sun is low and shadows are longer. Central Square, due to being adjacent to the existing hangars, is free of net new shadows from 11:18 for the rest of the day, with most of the park area being in full sun between 10:18 and 16:18.

The Downsview Park Bridge and Studio Gate Park are almost entirely in sunlight throughout the day, with shadows moving off at 10:18 and onwards. The Plaza, the Rail POPS, and the Courtyard are largely free from shadowing between 11:18 and 16:18, and Hangar Court offers a mix of both sunlight and shadow conditions throughout most of the day.

Robert Leek Park Expansion is in shadow primarily between 11:18 and 13:18 due to its new location to the north of a development block. During this time however, the existing portion of Robert Leek Park to the east is in full sun, offering a balance of areas in sun and shadow throughout the day.

The Taxiway Street's 45-degree orientation offers varying shadow conditions throughout the day, with segments in sun and shadow throughout the morning hours, and access to full sun in the key afternoon hours between 13:18 to 15:18. North-south streets are generally in sunlight from 11:18 to 14:18. The north sidewalk of east-west streets also receive sunlight for several hours as shadows move throughout the day.

**June 21st:**

In June, all proposed parks and POPS are significantly or completely in sunlight for most of the day. Some net new shadows are limited to portions of Rail POPS before 13:18, Garratt Blvd Park after 13:18, and the Plaza and Robert Leek Park Expansion after 16:18. For these spaces, the majority of the areas remain in sunlight up to 17:18.

Along the Taxiway Street, shadows move throughout the day, with portions of the street in full sun in the morning hours, and most of the street in full sun between 12:18 and 15:18. North-south streets are generally in sunlight from 11:18 to 15:18. East-west streets generally receive sun access for most of the day, with the north sidewalks in sunlight throughout the day and shadowing moving off the south sidewalks after 15:18.

**December 21st:**

In December, while shadows are generally longer, sunlight access is maintained across the open space network throughout the daylight hours. Various parks have partial exposure to sunlight, such as Garratt Blvd Park from 9:18 to 14:18, Central Square from 10:18 to 15:18, and Studio Gate Park from 11:18 to 15:18.

POPS also provide public spaces with partial sunlight, including the Plaza from 10:18 to 12:18, the Rail POPS and Downsview Park Bridge from 9:18 to 15:18, the Courtyard from 10:18 to 13:18, and Hangar Court from 9:18 to 14:18.

The Taxiway Street has partial sunlight access up to 15:18, with most of the Taxiway Street in sunlight from 13:18 to 14:18. North-south streets are generally in sunlight from 10:18 to 12:18.

**Ancaster Neighbourhood:**

Due to its location generally north of the Ancaster neighbourhood, the Proposed Development has very limited shadow impacts on the existing neighbourhood. A limited amount of net new shadows are cast on Robert Leek Park throughout the year with no significant shadow impact until late afternoon hours of 13:18 – 16:18 in March and September, 17:18 – 18:18 in June, and 13:18 in December. There are also limited shadow impacts on residential properties surrounding the Subject Area, after 16:18 in March, June, and September, and 13:18 onwards in December. No net new shadows fall onto Ancaster Park at any time throughout the year.

**Summary:**

The Official Plan calls for minimizing shadow impacts on parks and open spaces to preserve their utility (Policy 3.2.3.3). Outdoor amenity spaces should also provide daylight and where possible, direct sunlight, have comfortable shadow conditions, and promote use in all seasons (Policy 3.1.3.13). Where development includes or is adjacent to a park, buildings should be designed to provide good transition in scale for sunlight

access (Policy 3.1.3.8). New buildings are directed to provide accessible open space where possible and prioritize the provision of these spaces on blocks that have access to direct sunlight and daylight (Policy 3.1.3.2).

In Mixed Use Areas, buildings are to be located and massed to adequately limit shadow impacts on adjacent Neighbourhoods, particularly during the Spring and Fall equinoxes (Policy 4.5.2). New buildings will be located and massed to frame the edges of streets and parks with good proportion and maintain sunlight and comfortable wind conditions for pedestrians on adjacent streets, parks and open spaces, to preserve their utility and intended use, including sitting and standing (Policy 3.1.3.1 and 4.5.2).

Overall, the shadows created by the revised proposal are considered to be acceptable and appropriate. By the nature of the Application proposing predominantly mid-scale buildings, some net new shadows are anticipated in the area. The revisions to building massing in the revised proposal have carefully considered shadows to minimize the introduction of net new shadows compared to the initial submission, and where possible, improve shadow conditions onto parks and open spaces.

Within the Subject Area, key parks, open spaces and sidewalks experience a balance of access to sunlight and shadow throughout the day and seasons of the year. Shadows move over elements of the public realm over the course of the day, offering ever-changing conditions and experiences, such that most sidewalks and all parks and open spaces have access to sun at some point in the day all year round. Where there is shadow, this can play a role in setting thermal comfort and contributing to a desirable microclimate to meet the diverse needs of all users. This is especially the case in the summer and more broadly throughout the year given a warming climate and the anticipated increase in extreme heat events over the long term.

Shadow impacts on parks and residential neighbourhoods are generally limited to early or late hours of the day when shadows are the longest. Open spaces, particularly larger parks such as Garratt Blvd Park and Central Square, typically have sun exposure to all or most of the park area with moving shadows, allowing users to follow their preferences and move into sunlight or shadow within the same space. As well, the varying sizes and distribution of public parks and POPS throughout the Subject Area allow for a variety of other accessible and nearby options.

The new shadows are also deemed to be acceptable given the broader benefits to the community that accompany the Application, including a high quality public realm which adds diverse new parks and open spaces, and a new street network. This application proposes to redevelop the Subject Area into a complete and mixed-use community, kickstarting the implementation of a vision for a thriving community in the broader Downsview Lands.

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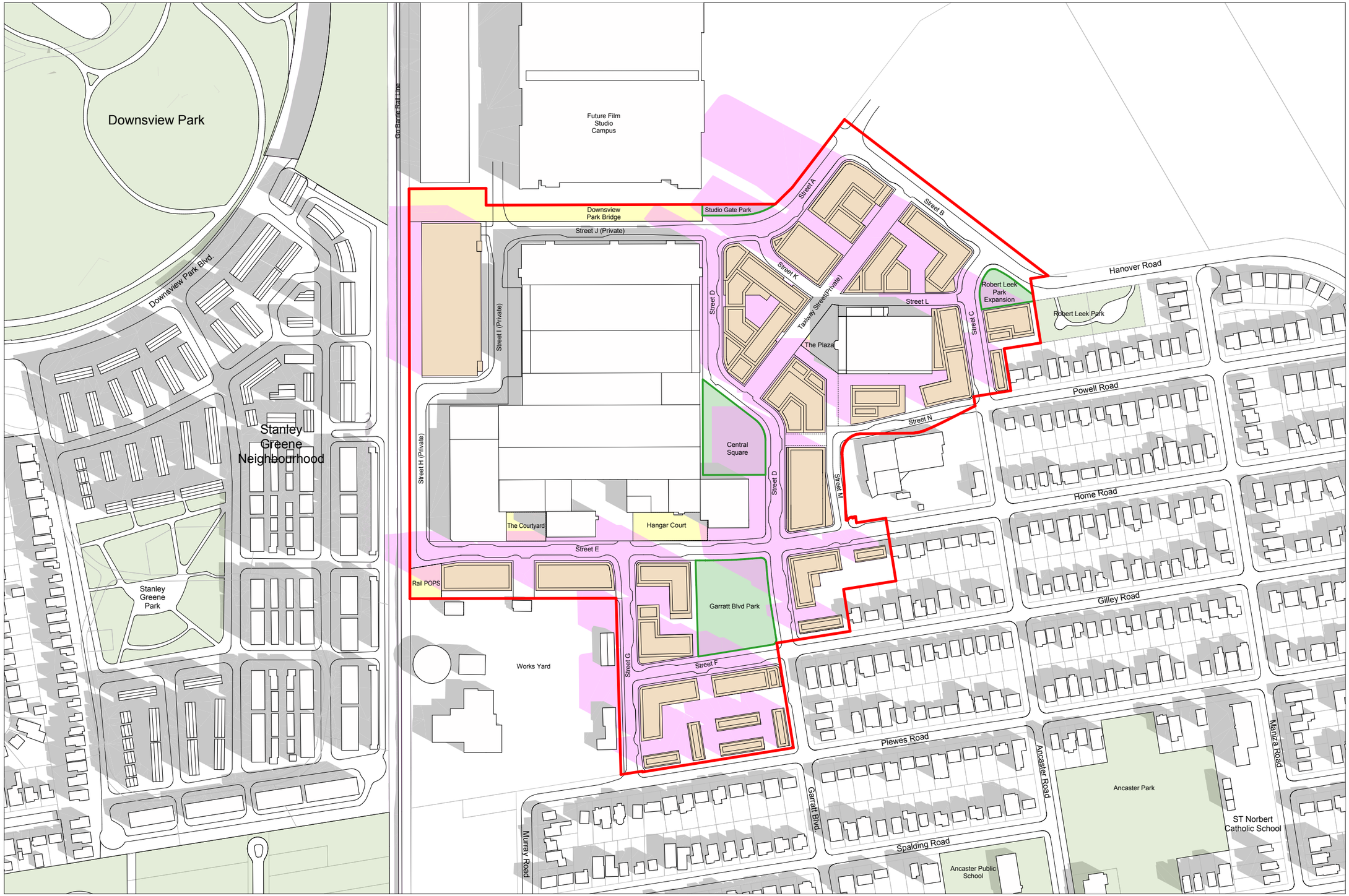
# **The Hangar District** (Formerly Taxiway West South Sub-District)

## Sun/Shadow Study Addendum for the Proposed Redevelopment of 123 Garratt Boulevard Prepared for Northcrest Developments

July 2023

# Hangar District

Shadow Study | March 21 9:18




- Subject Area
- Existing Public Parks
- Proposed Public Parks
- Privately Owned Public Spaces
- Existing Buildings
- Existing Shadows
- Subject Area New Buildings
- Subject Area New Shadows

N

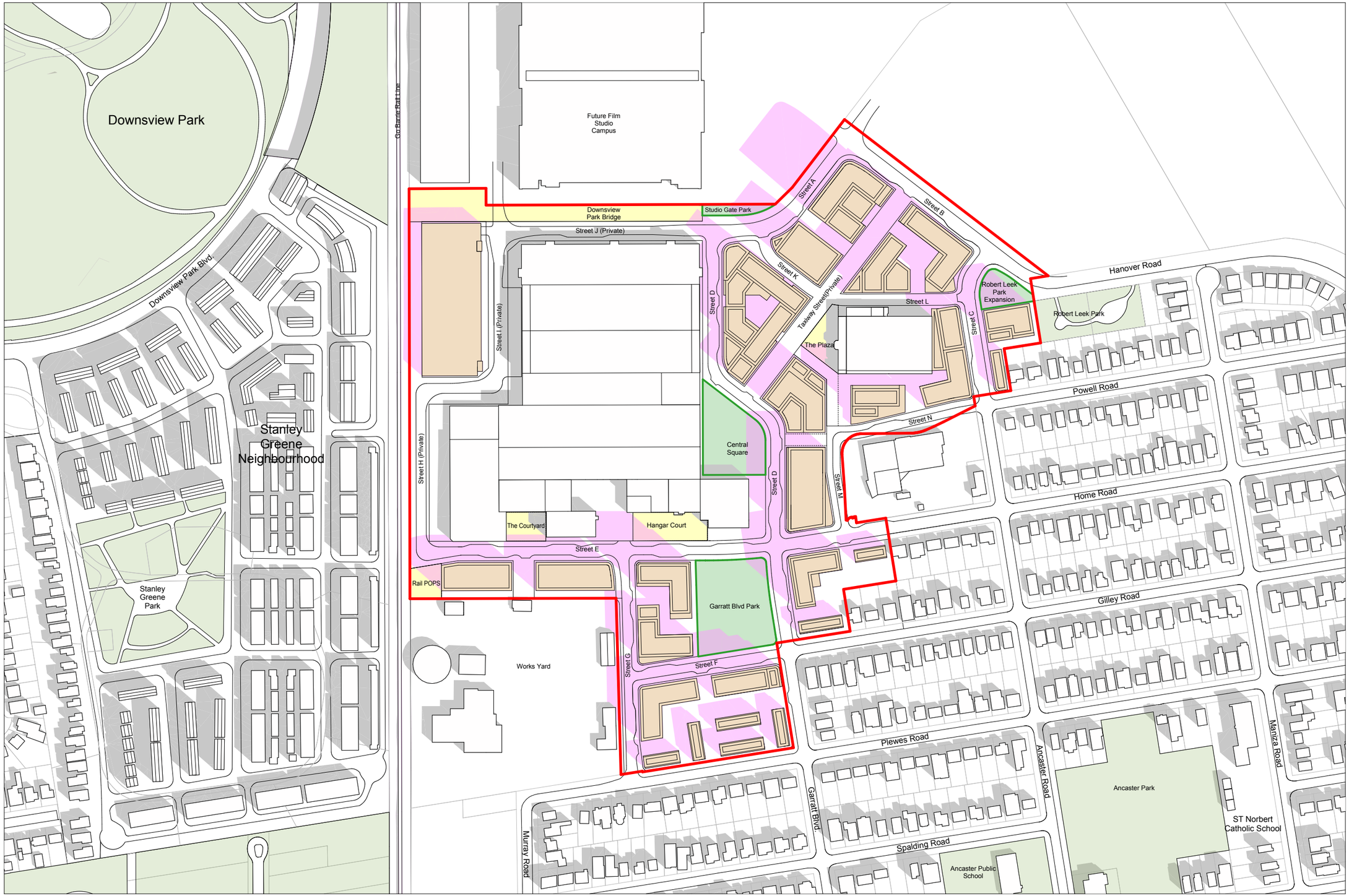
URBAN STRATEGIES INC



*Prepared July, 2023*

# Hangar District

Shadow Study | March 21 10:18




- Subject Area
- Existing Public Parks
- Proposed Public Parks
- Privately Owned Public Spaces
- Existing Buildings
- Existing Shadows
- Subject Area New Buildings
- Subject Area New Shadows

N

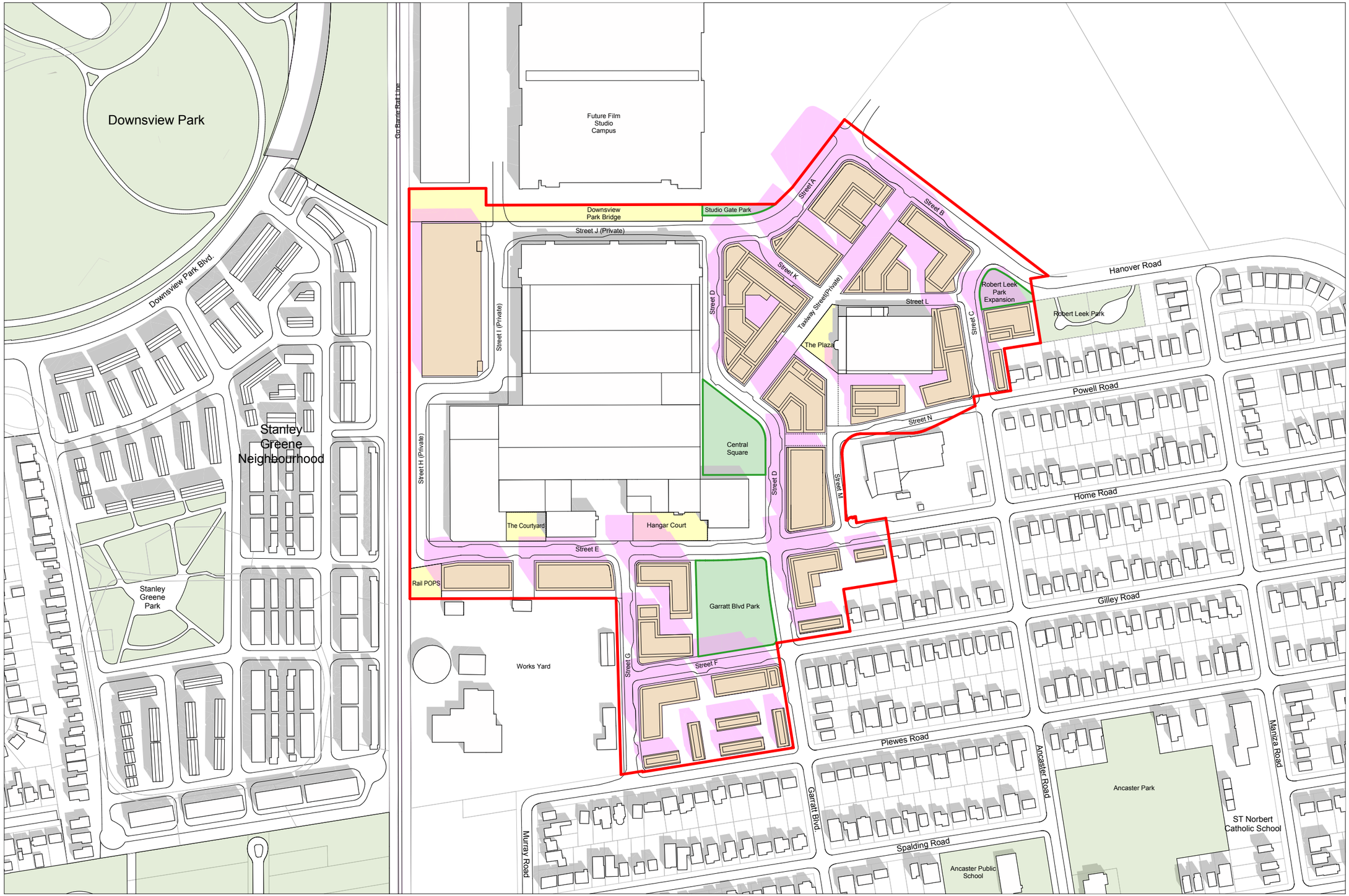
URBAN STRATEGIES INC



*Prepared July, 2023*

# Hangar District

Shadow Study | March 21 11:18




- Subject Area
- Existing Public Parks
- Proposed Public Parks
- Privately Owned Public Spaces
- Existing Buildings
- Existing Shadows
- Subject Area New Buildings
- Subject Area New Shadows

N

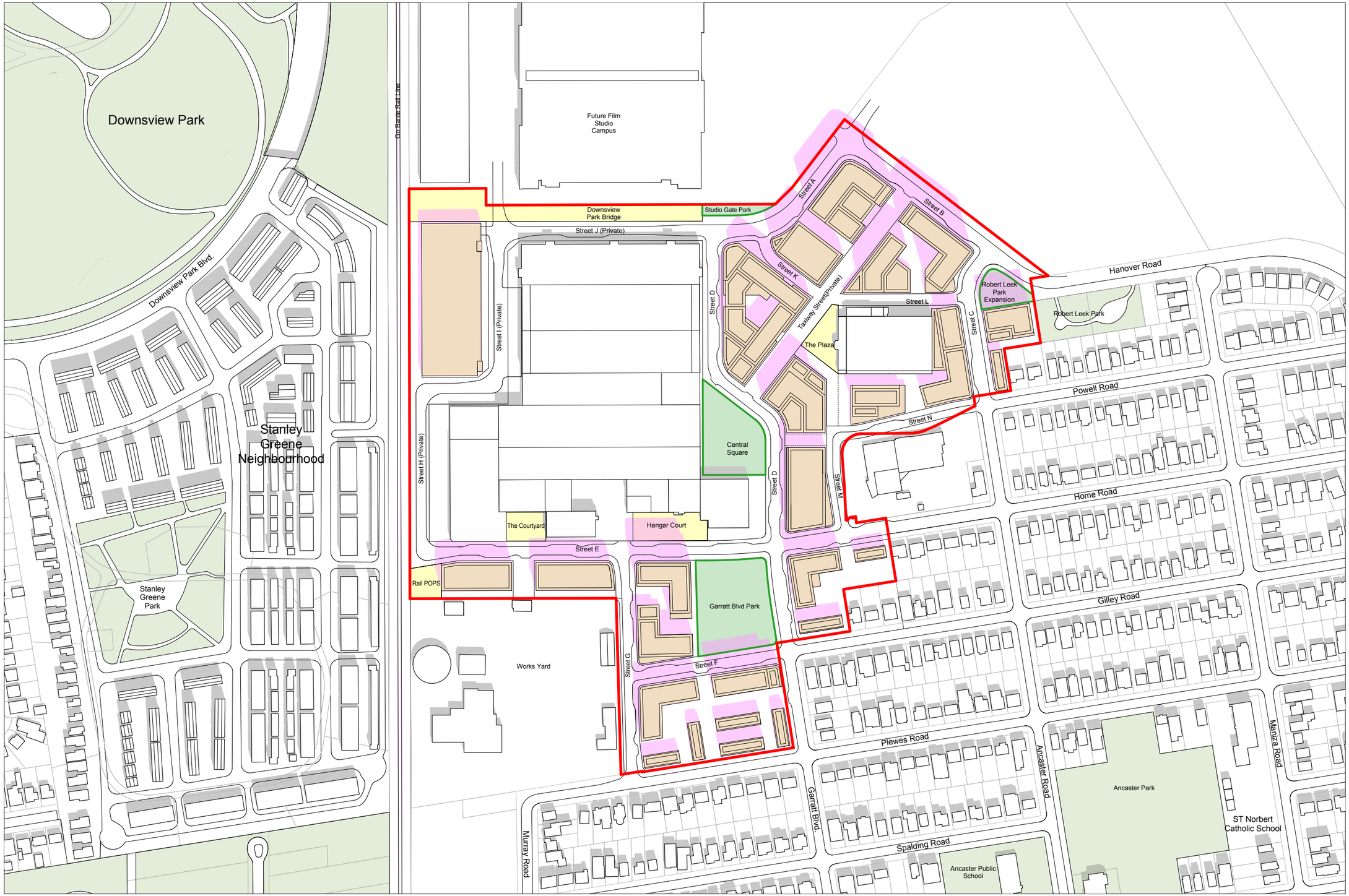
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*Prepared July, 2023*

# Hangar District

Shadow Study | March 21 12:18




- Subject Area
- Existing Public Parks
- Proposed Public Parks
- Privately Owned Public Spaces
- Existing Buildings
- Existing Shadows
- Subject Area New Buildings
- Subject Area New Shadows

N

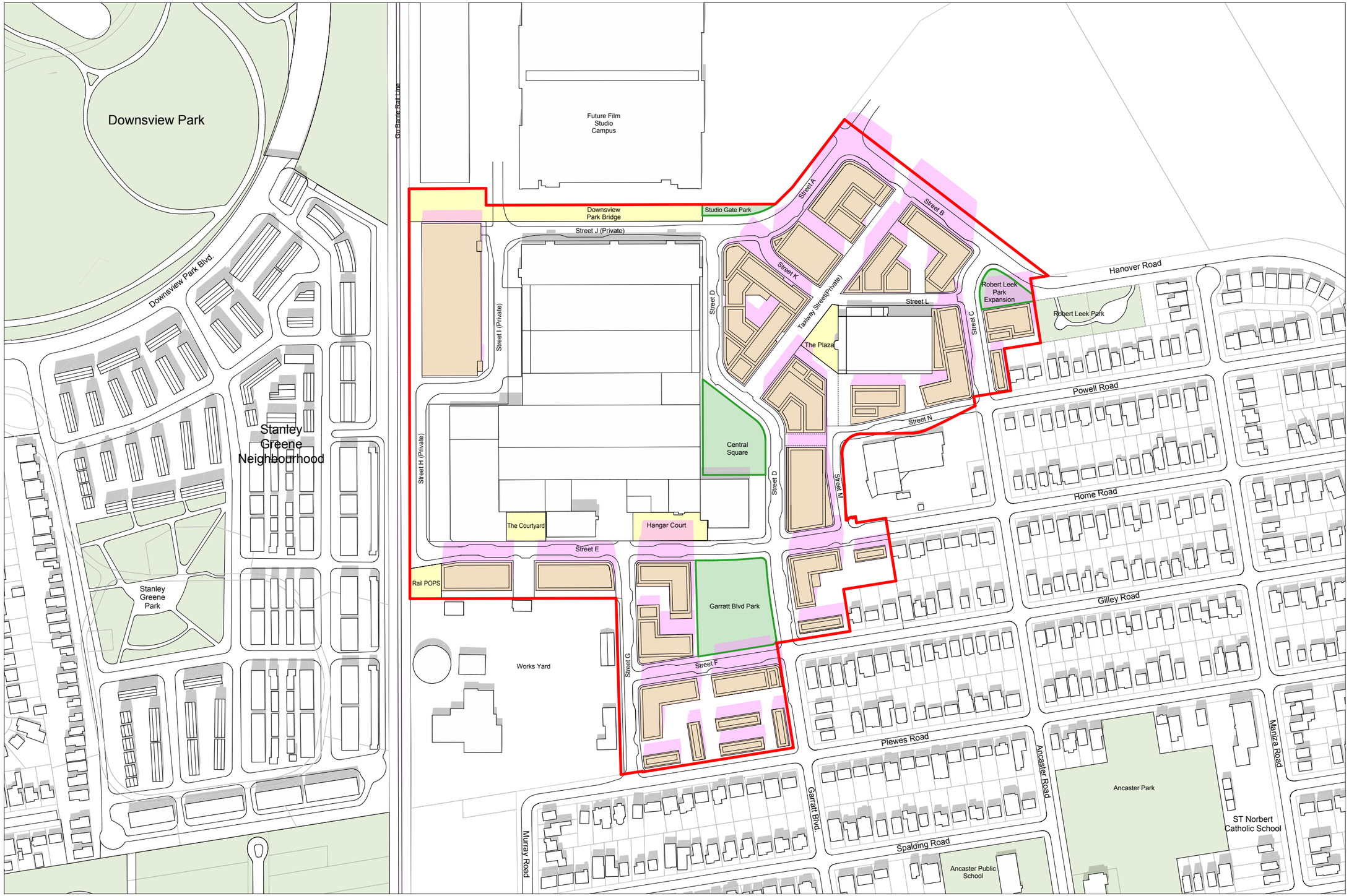
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*Prepared July, 2023*

# Hangar District

Shadow Study | March 21 13:18




- Subject Area
- Existing Public Parks
- Proposed Public Parks
- Privately Owned Public Spaces
- Existing Buildings
- Existing Shadows
- Subject Area New Buildings
- Subject Area New Shadows

N

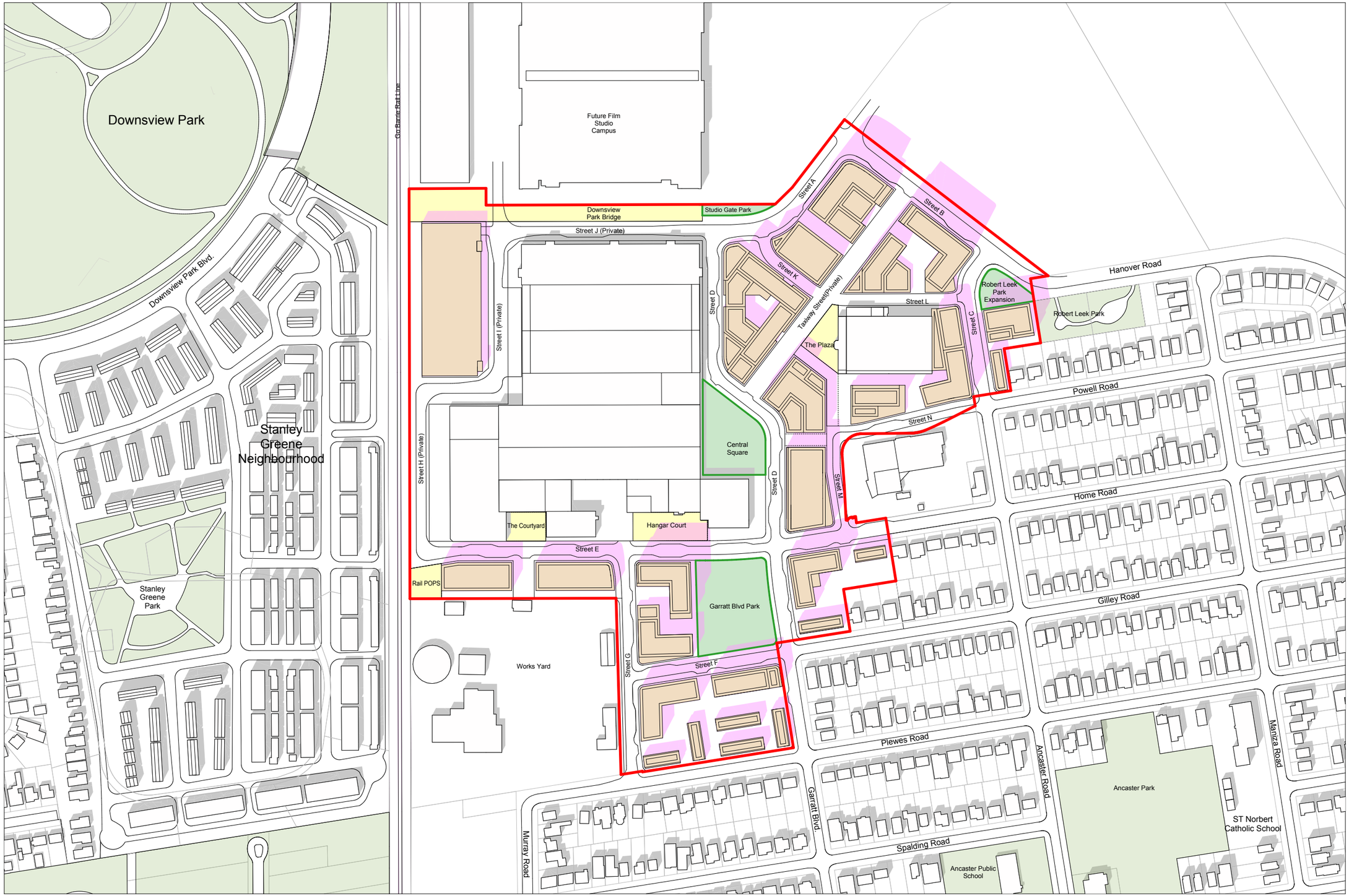
URBAN STRATEGIES INC



*Prepared July, 2023*

# Hangar District

Shadow Study | March 21 14:18




- Subject Area
- Existing Public Parks
- Proposed Public Parks
- Privately Owned Public Spaces
- Existing Buildings
- Existing Shadows
- Subject Area New Buildings
- Subject Area New Shadows

N

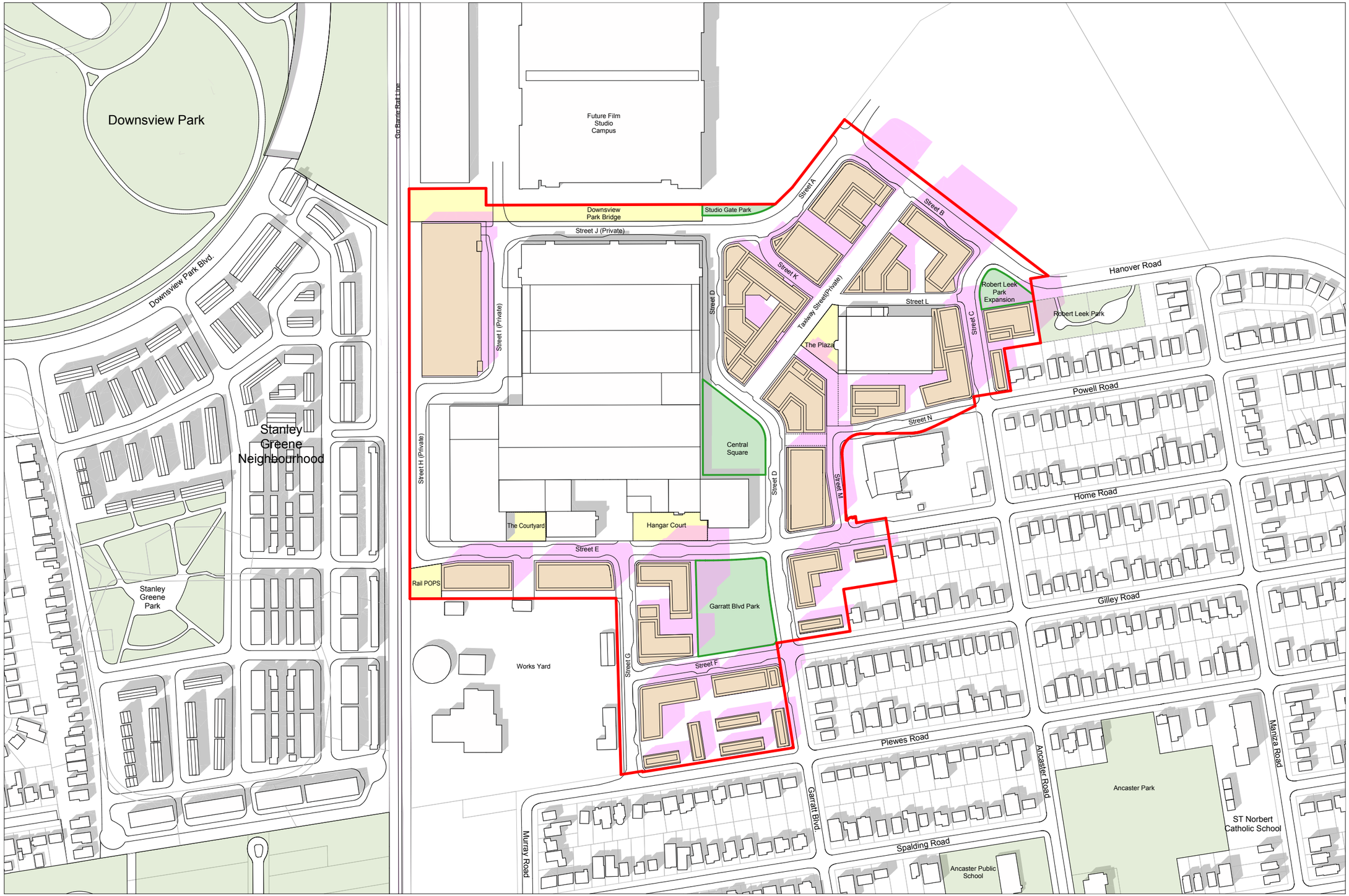
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*Prepared July, 2023*

# Hangar District

Shadow Study | March 21 15:18




Subject Area

Existing Public Parks

Proposed Public Parks

Privately Owned Public Spaces

Existing Buildings

Existing Shadows

Subject Area New Buildings

Subject Area New Shadows

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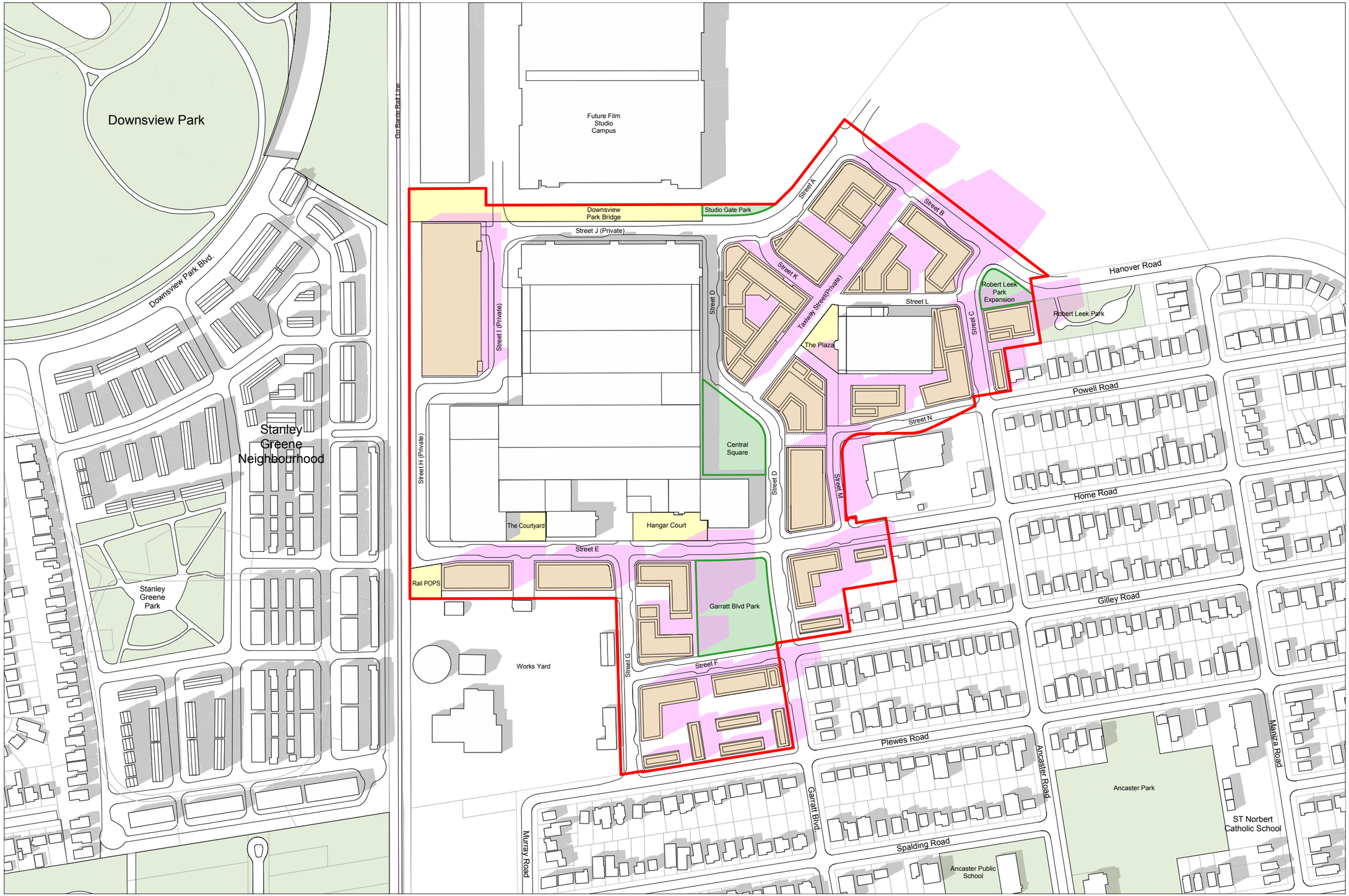
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*Prepared July, 2023*

# Hangar District

Shadow Study | March 21 16:18




- Subject Area
- Existing Public Parks
- Proposed Public Parks
- Privately Owned Public Spaces
- Existing Buildings
- Existing Shadows
- Subject Area New Buildings
- Subject Area New Shadows

N

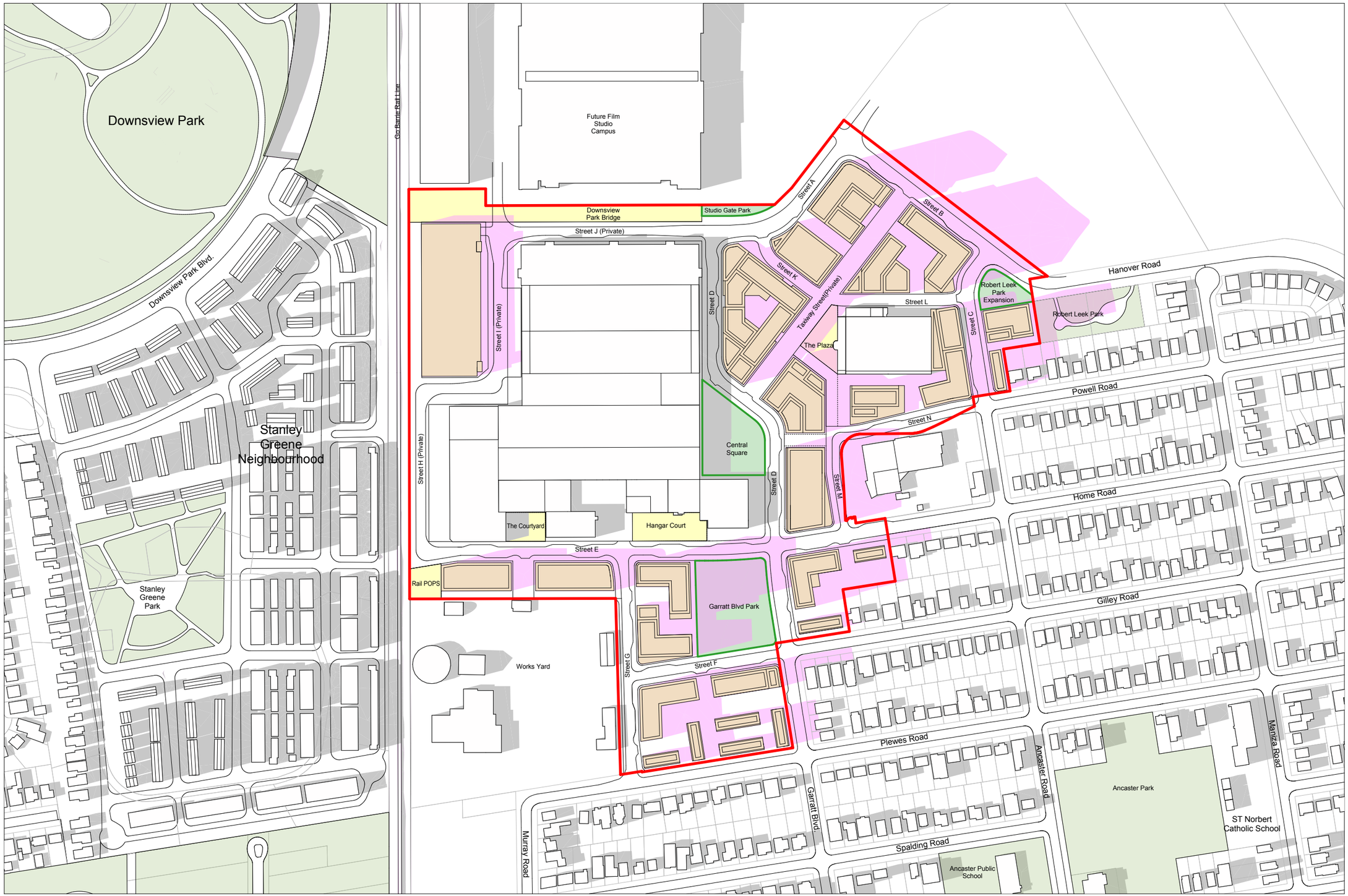
URBAN STRATEGIES INC



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# Hangar District

Shadow Study | March 21 17:18




- Subject Area
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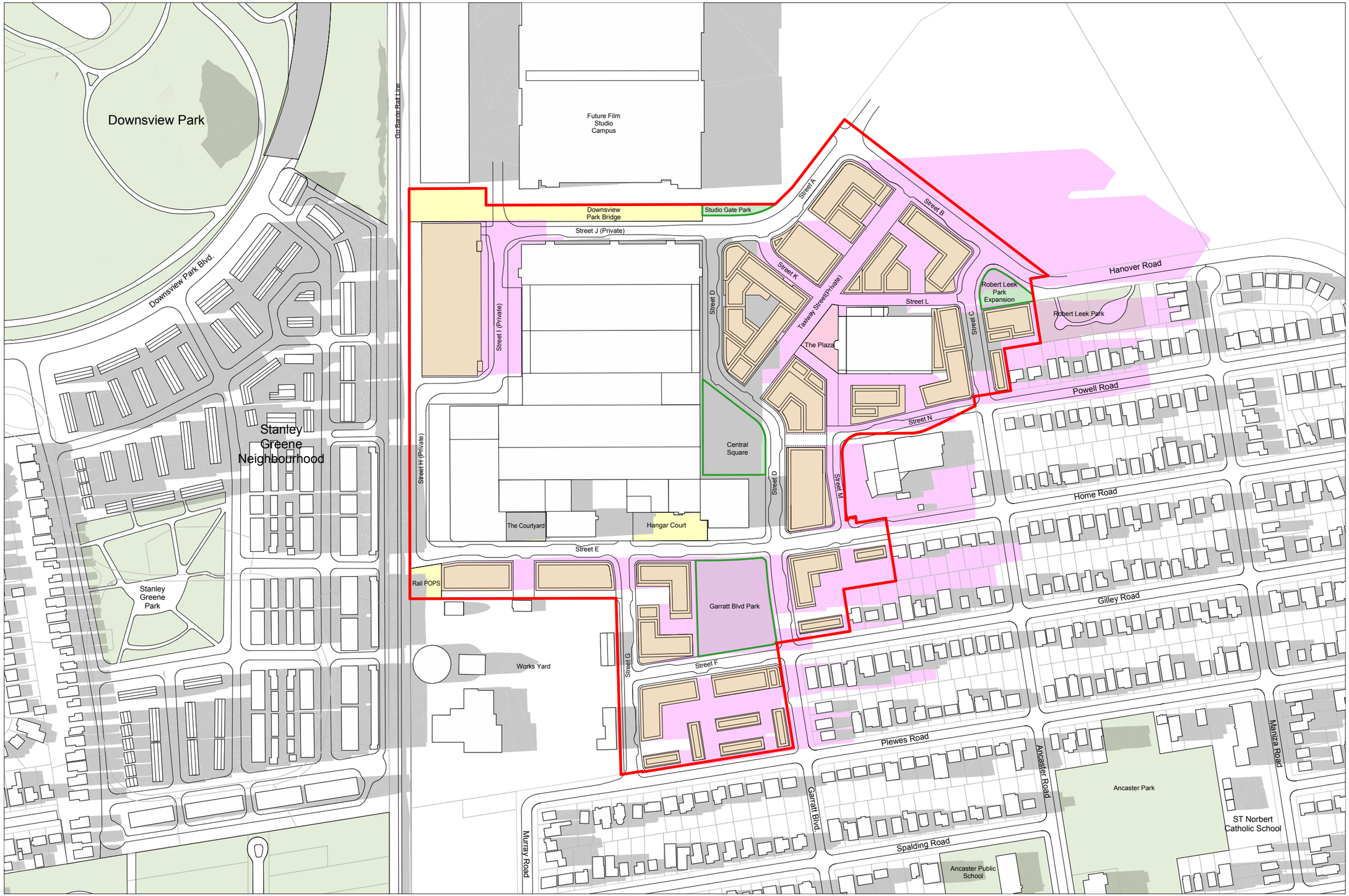
URBAN STRATEGIES INC



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# Hangar District

Shadow Study | March 21 18:18




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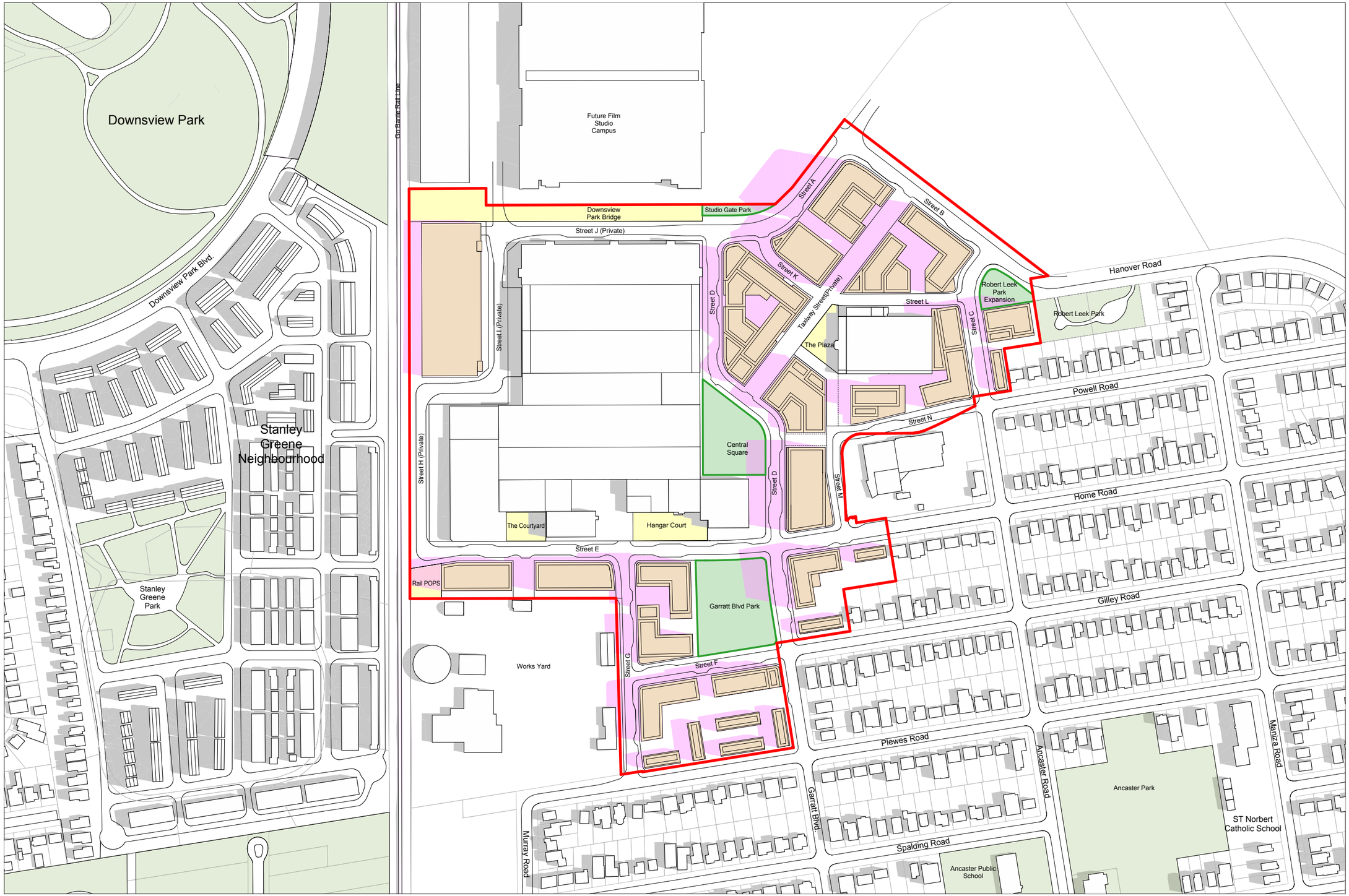
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# Hangar District

Shadow Study | June 21 9:18




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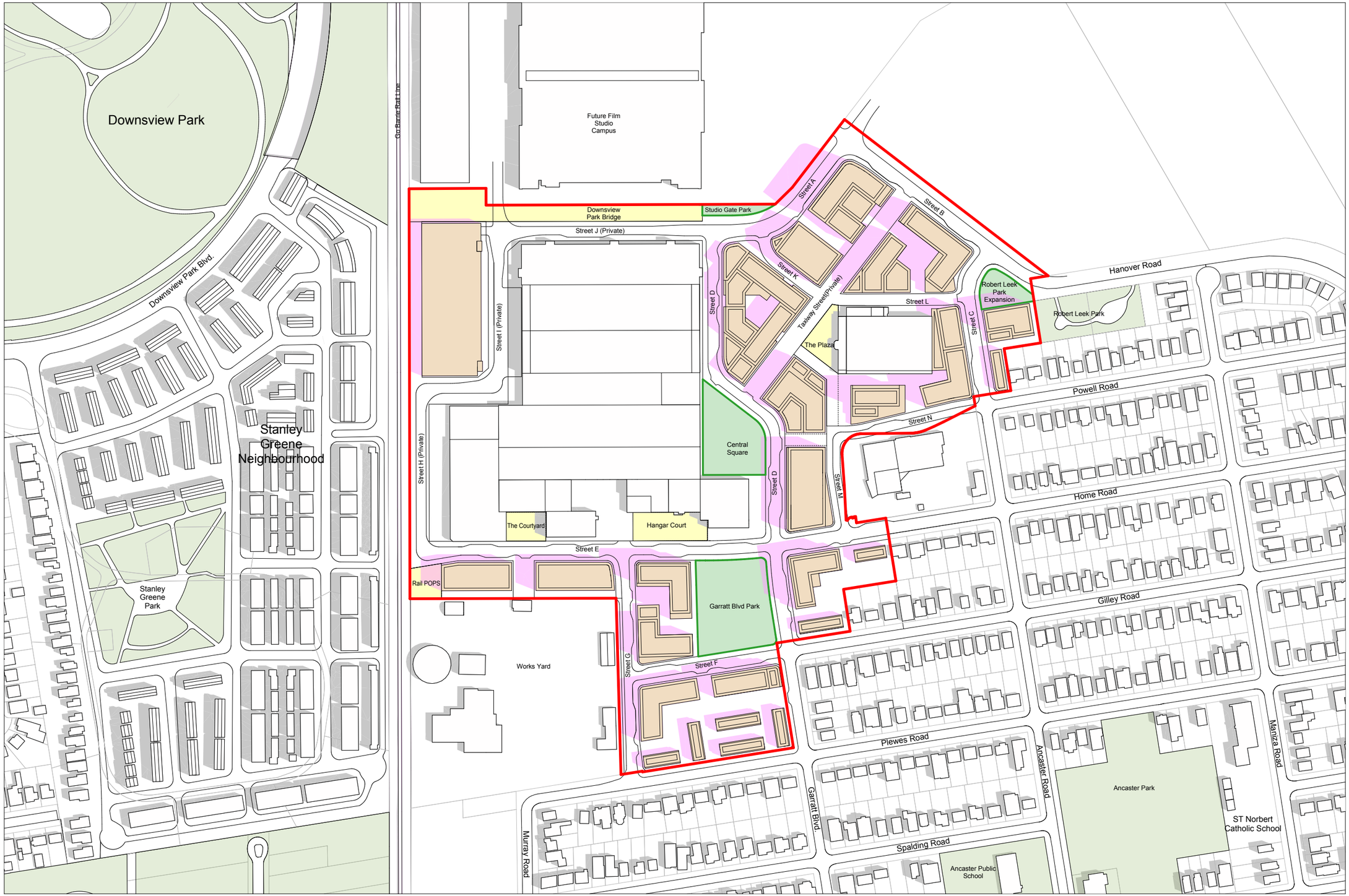
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# Hangar District

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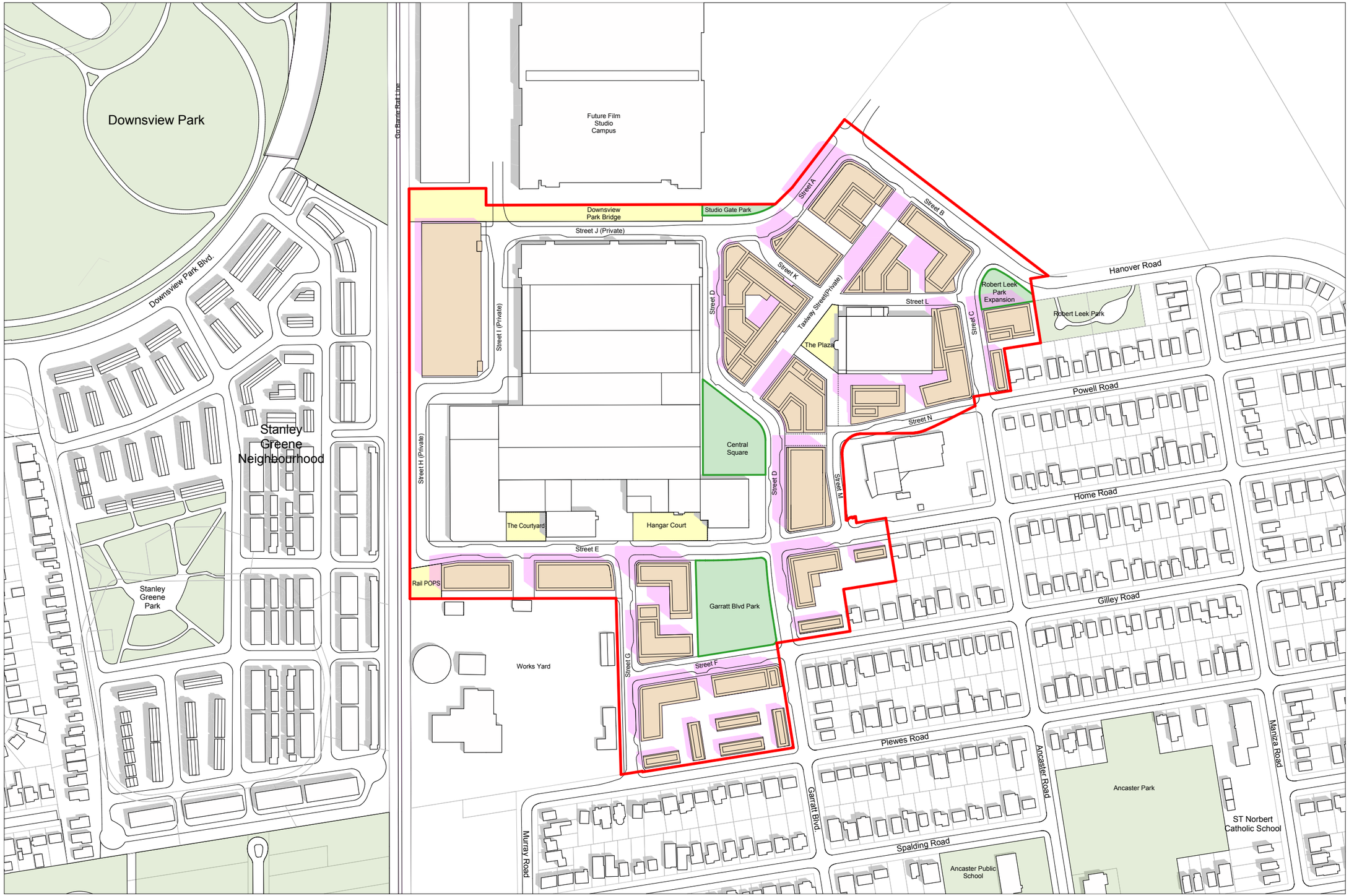
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# Hangar District

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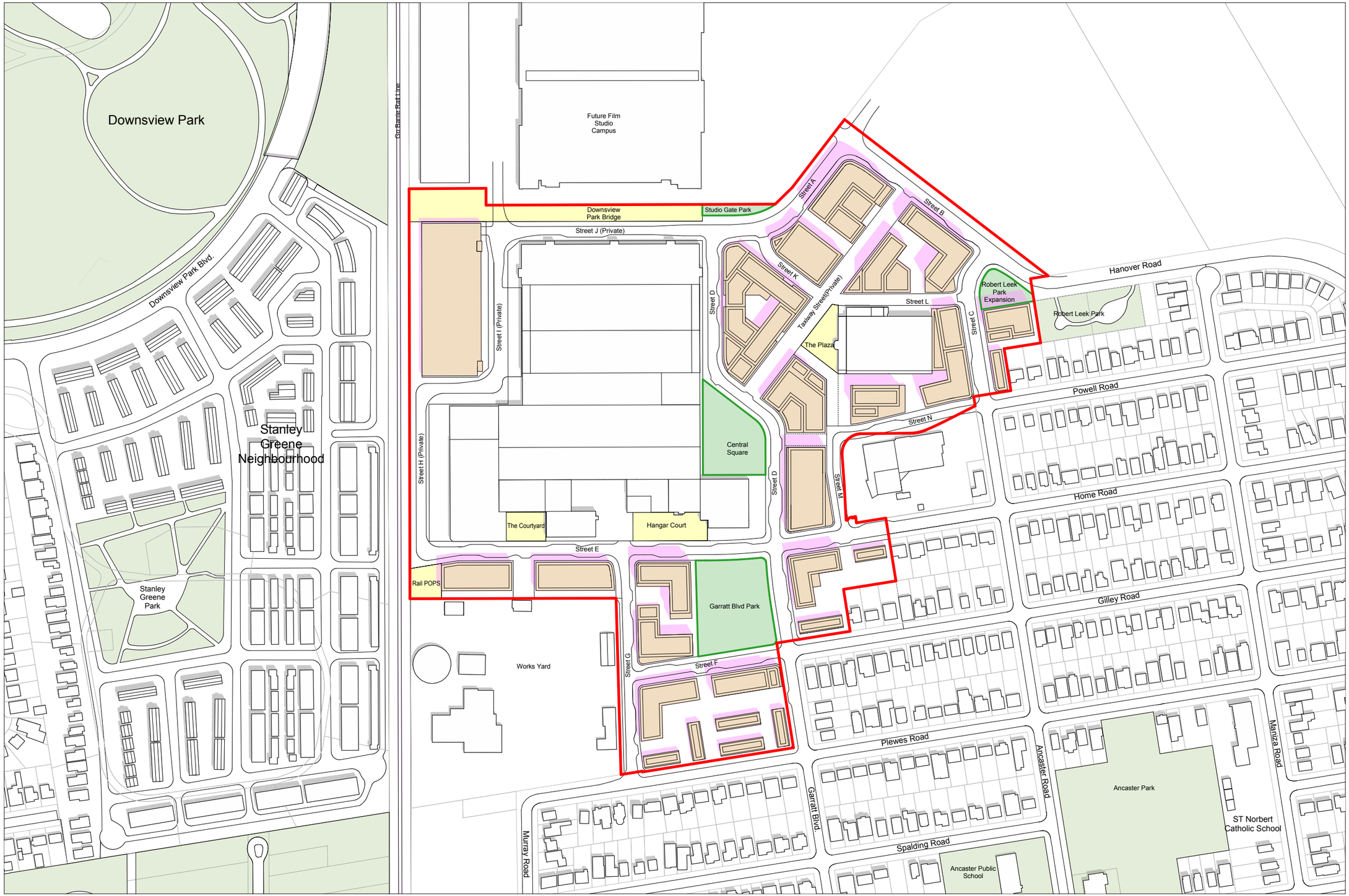
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# Hangar District

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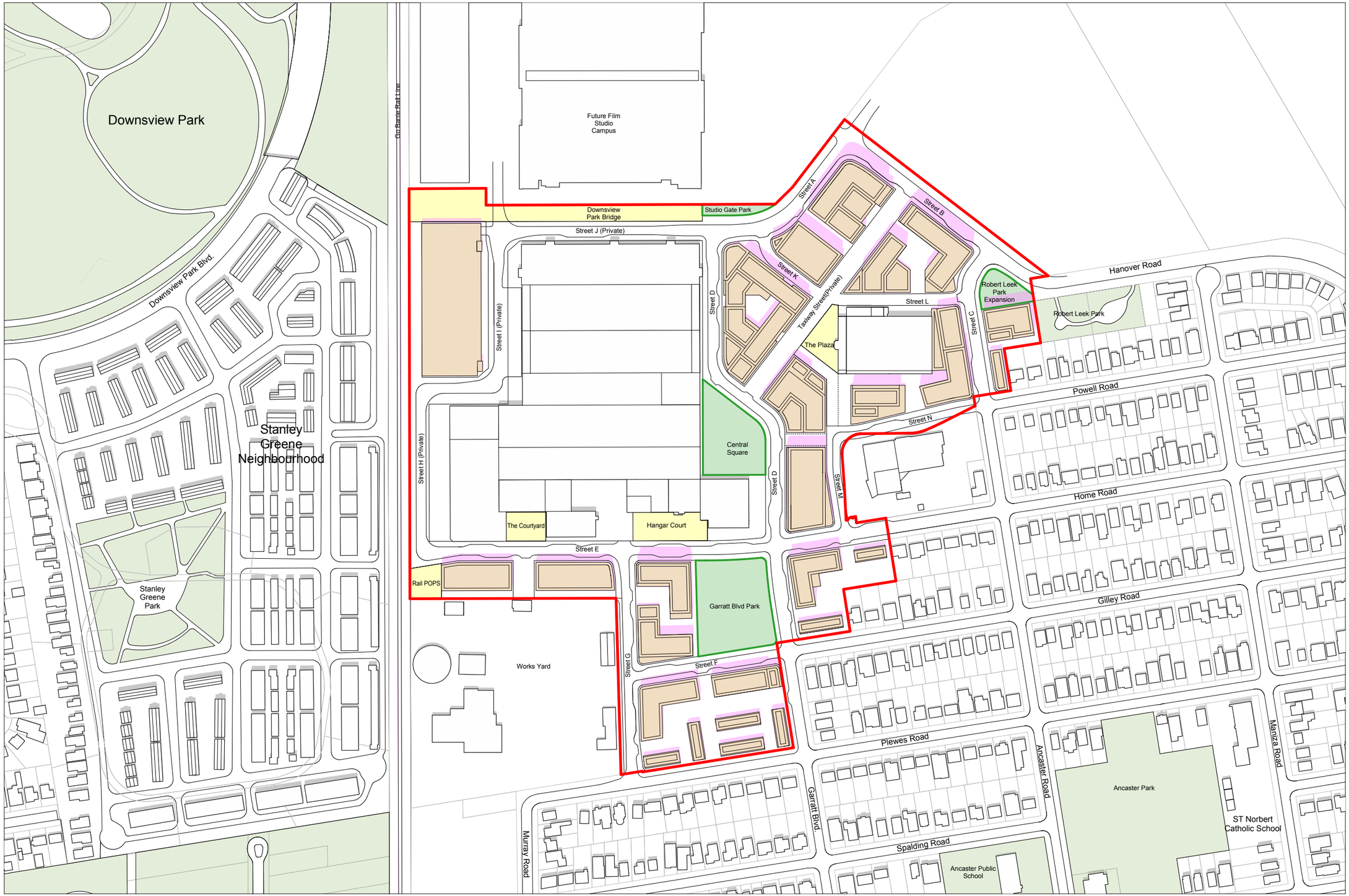
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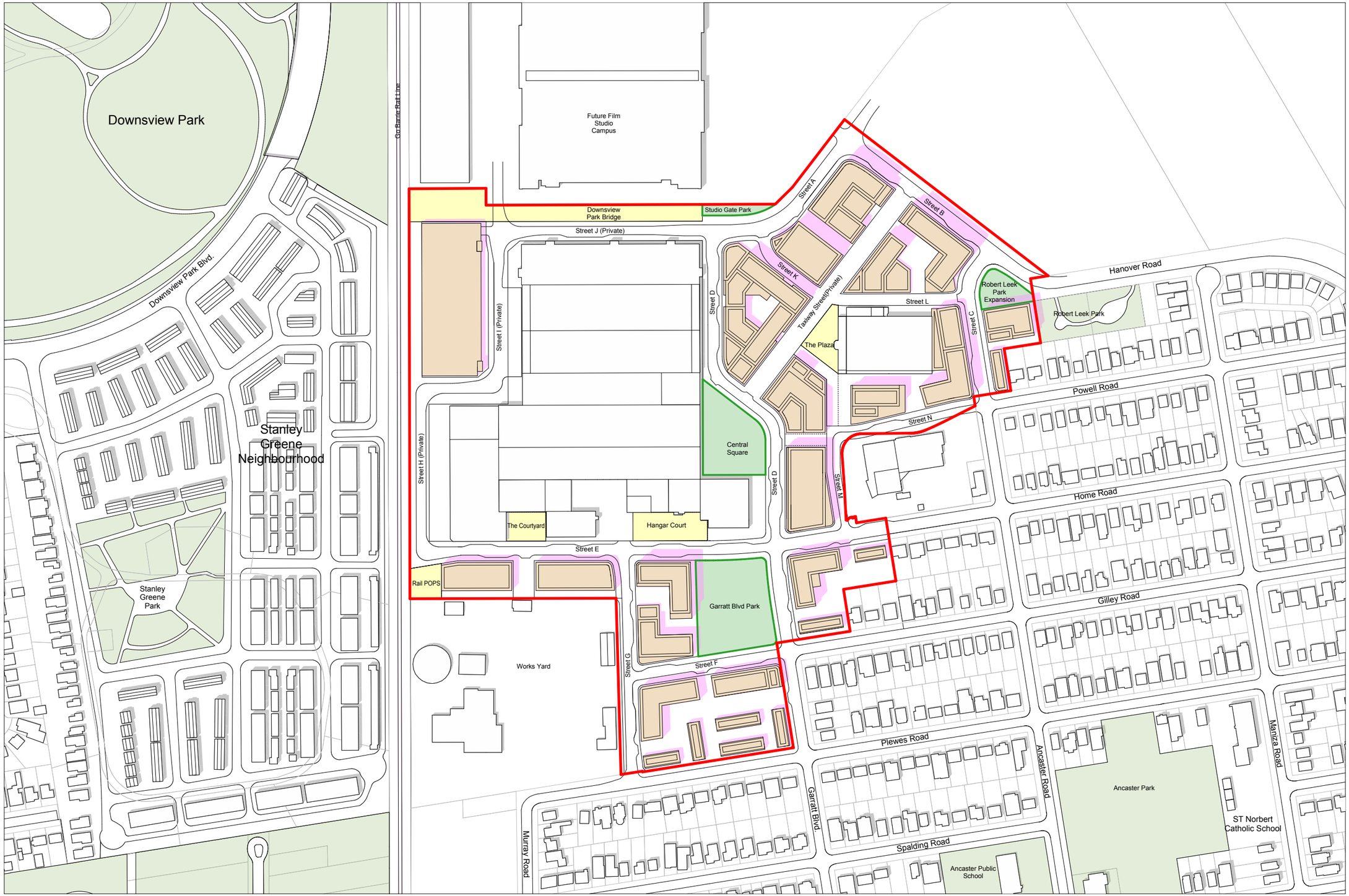
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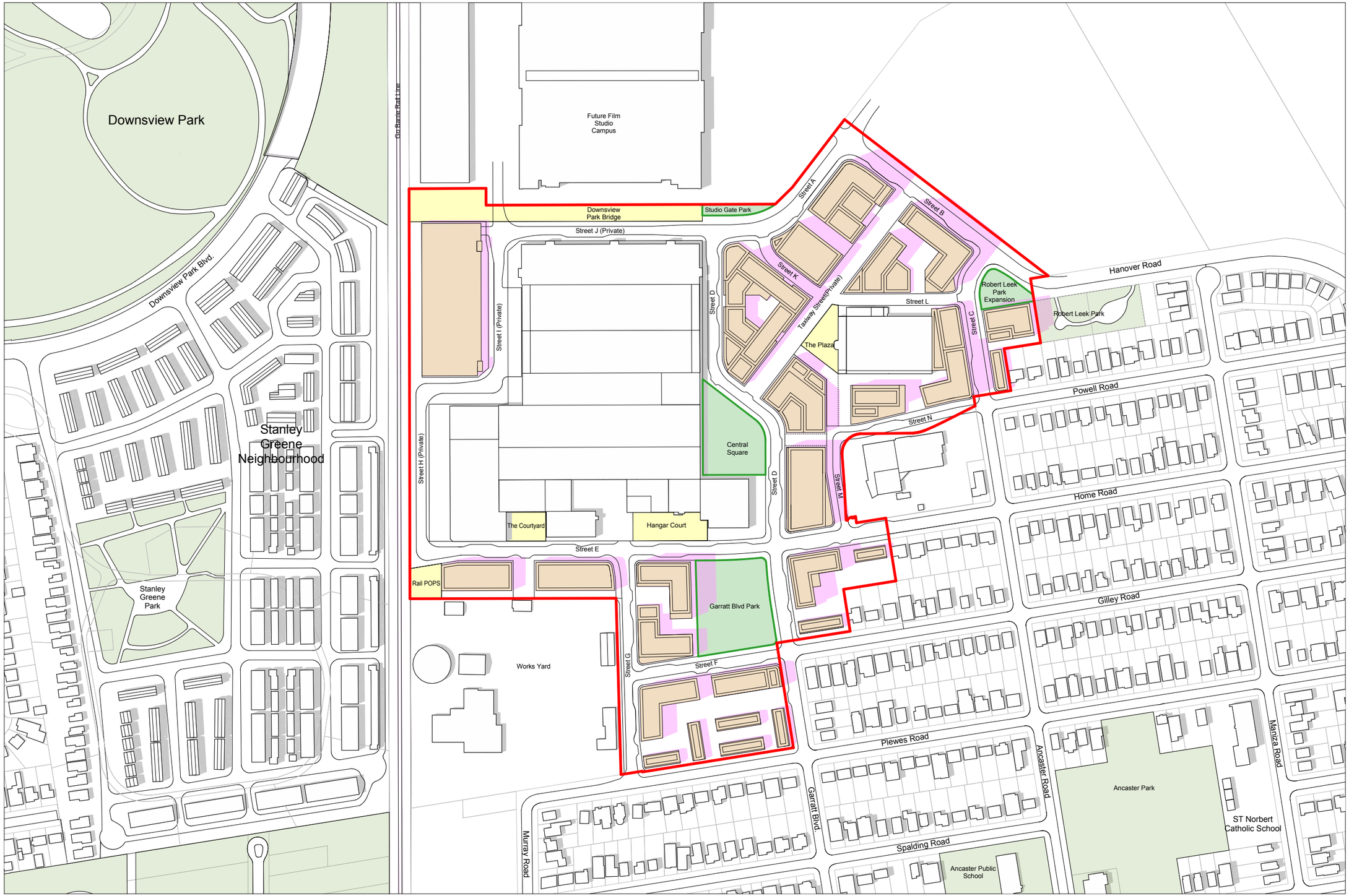
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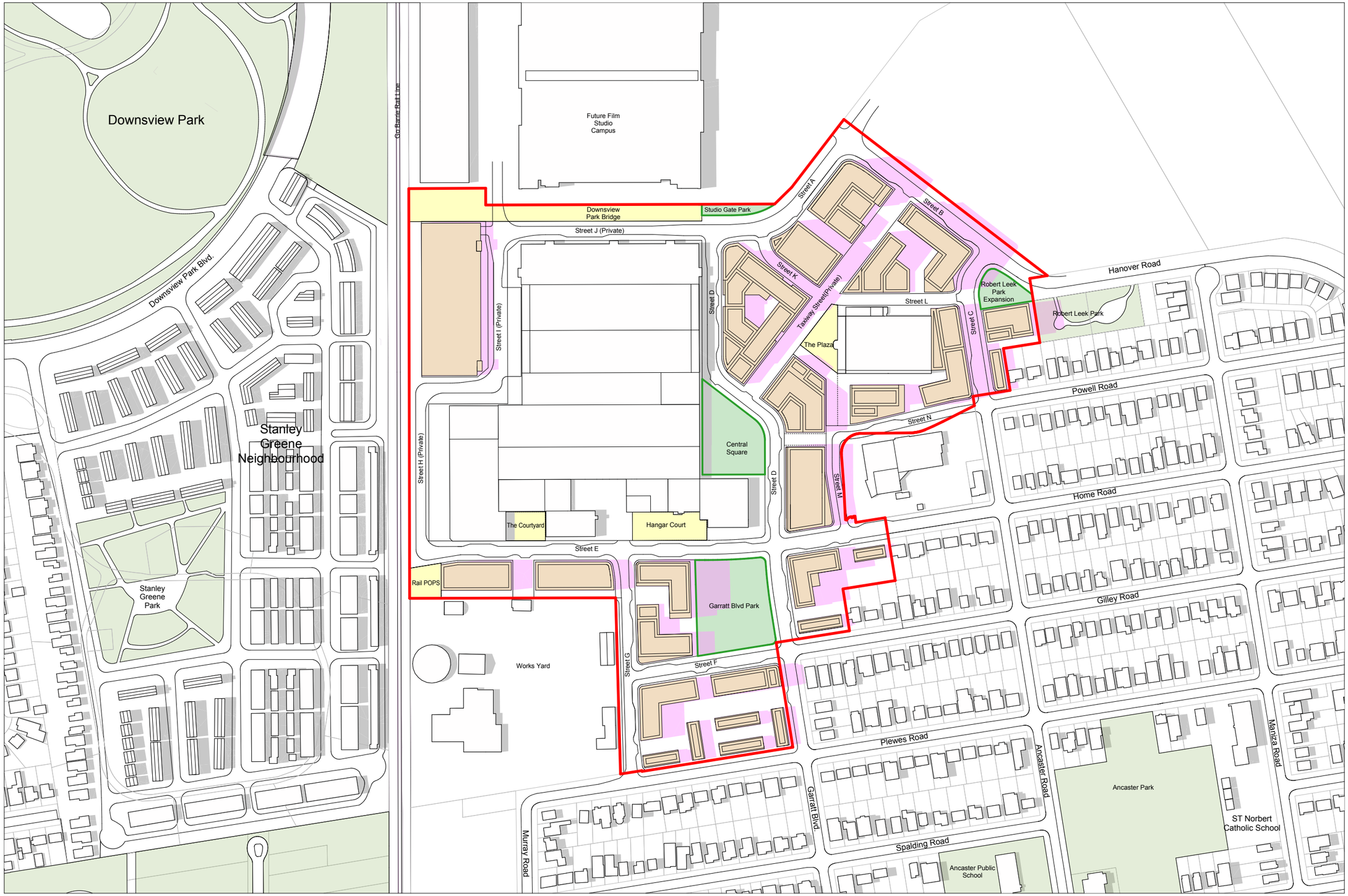
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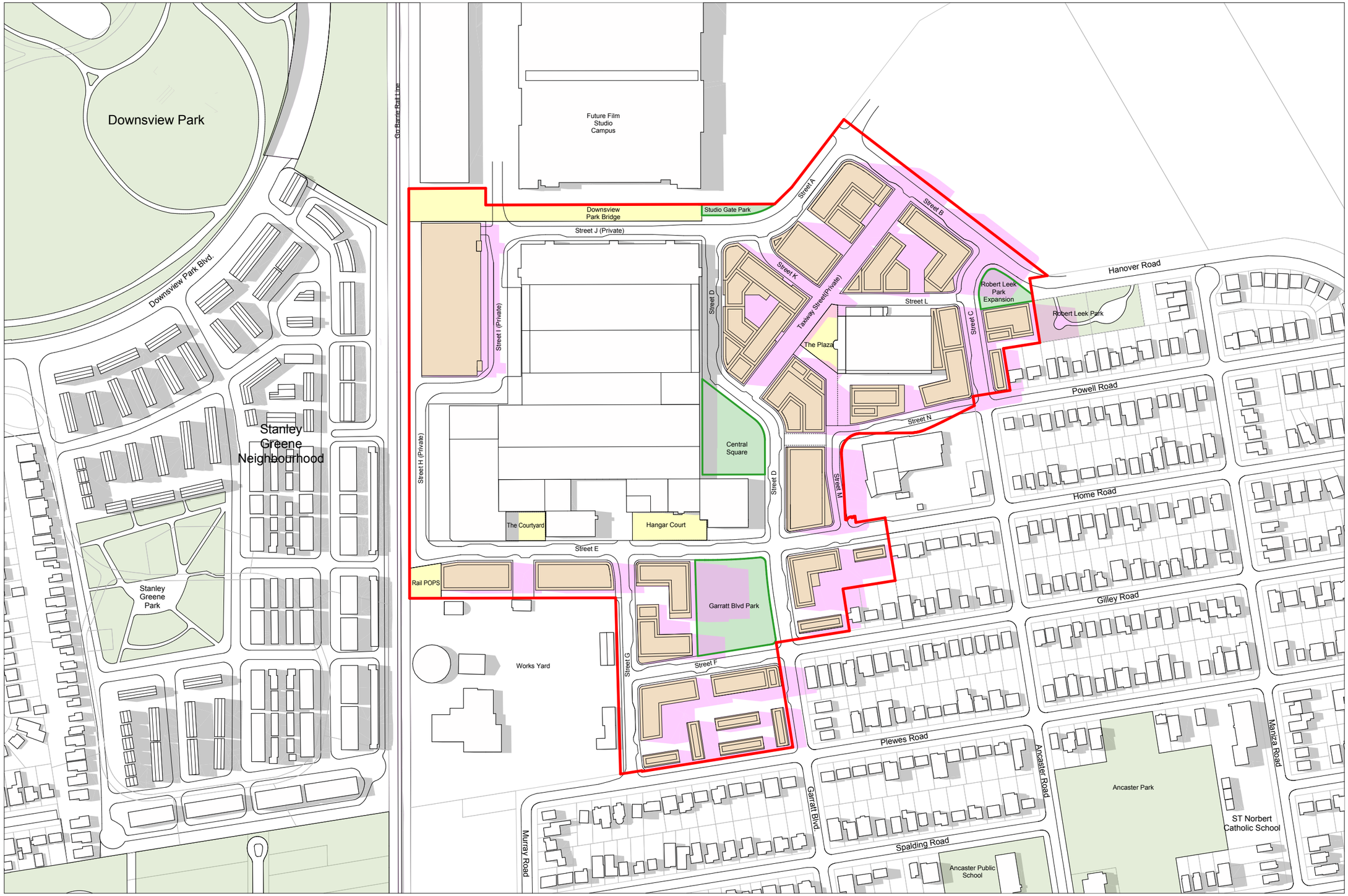
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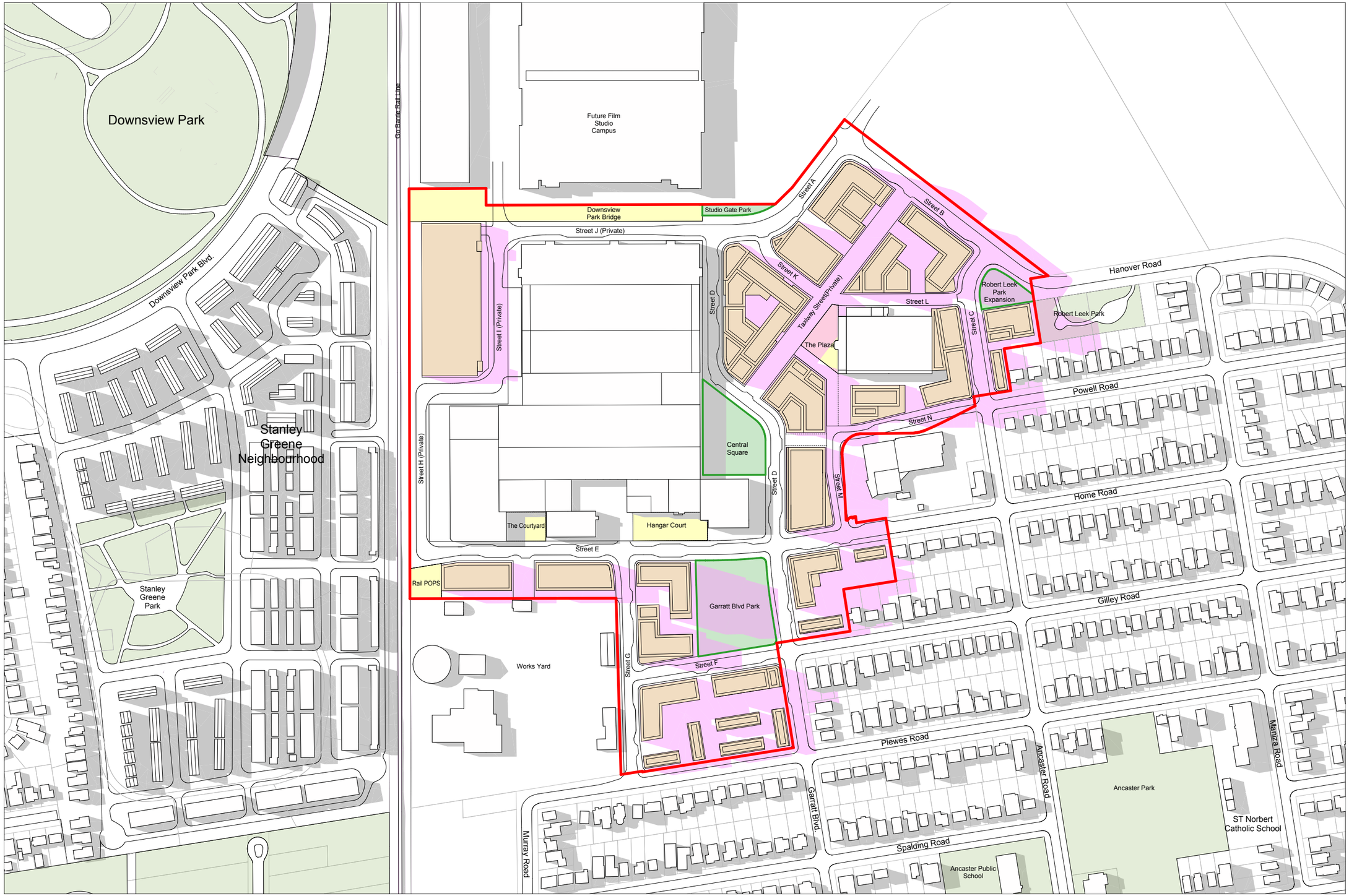



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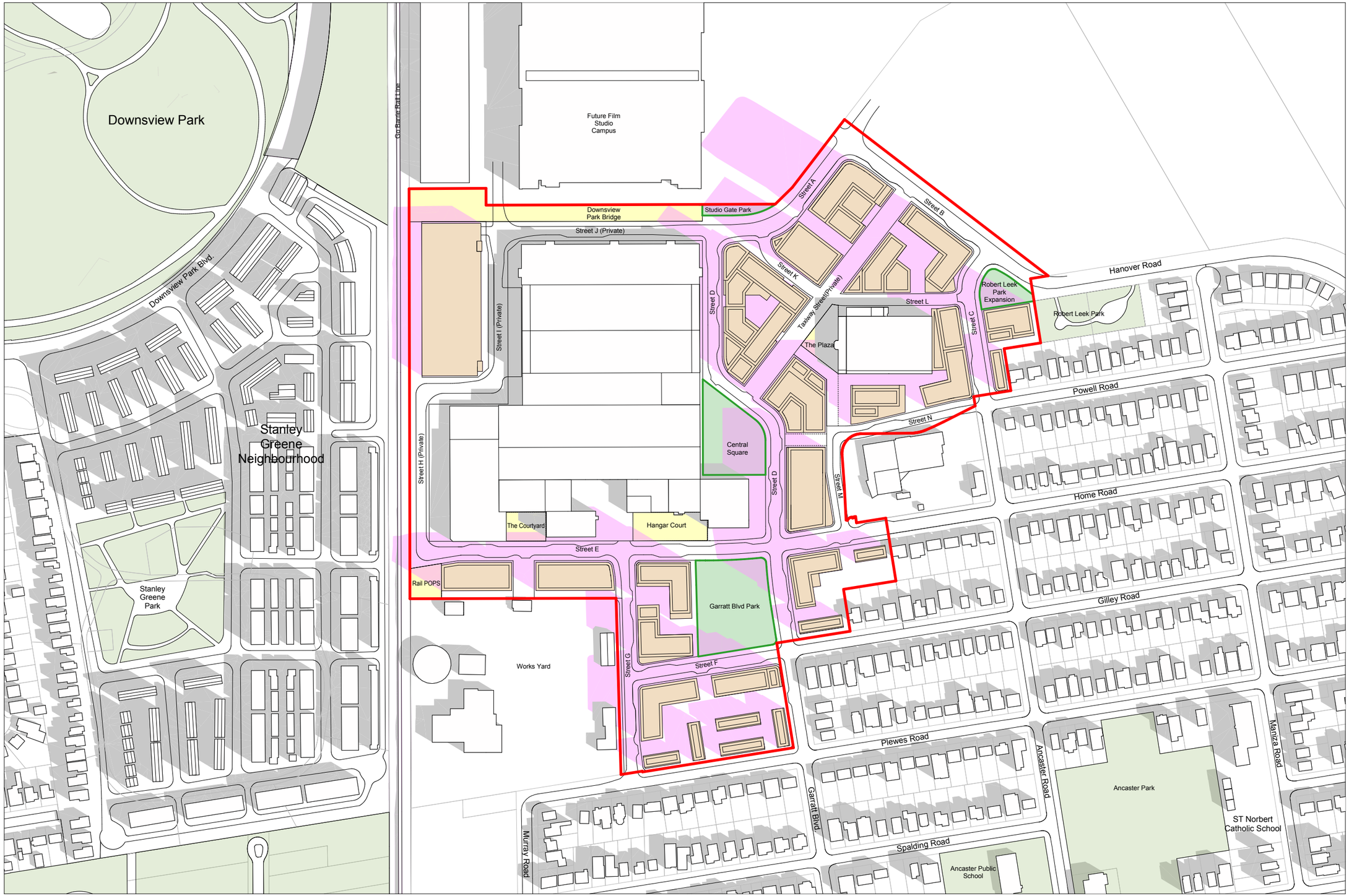
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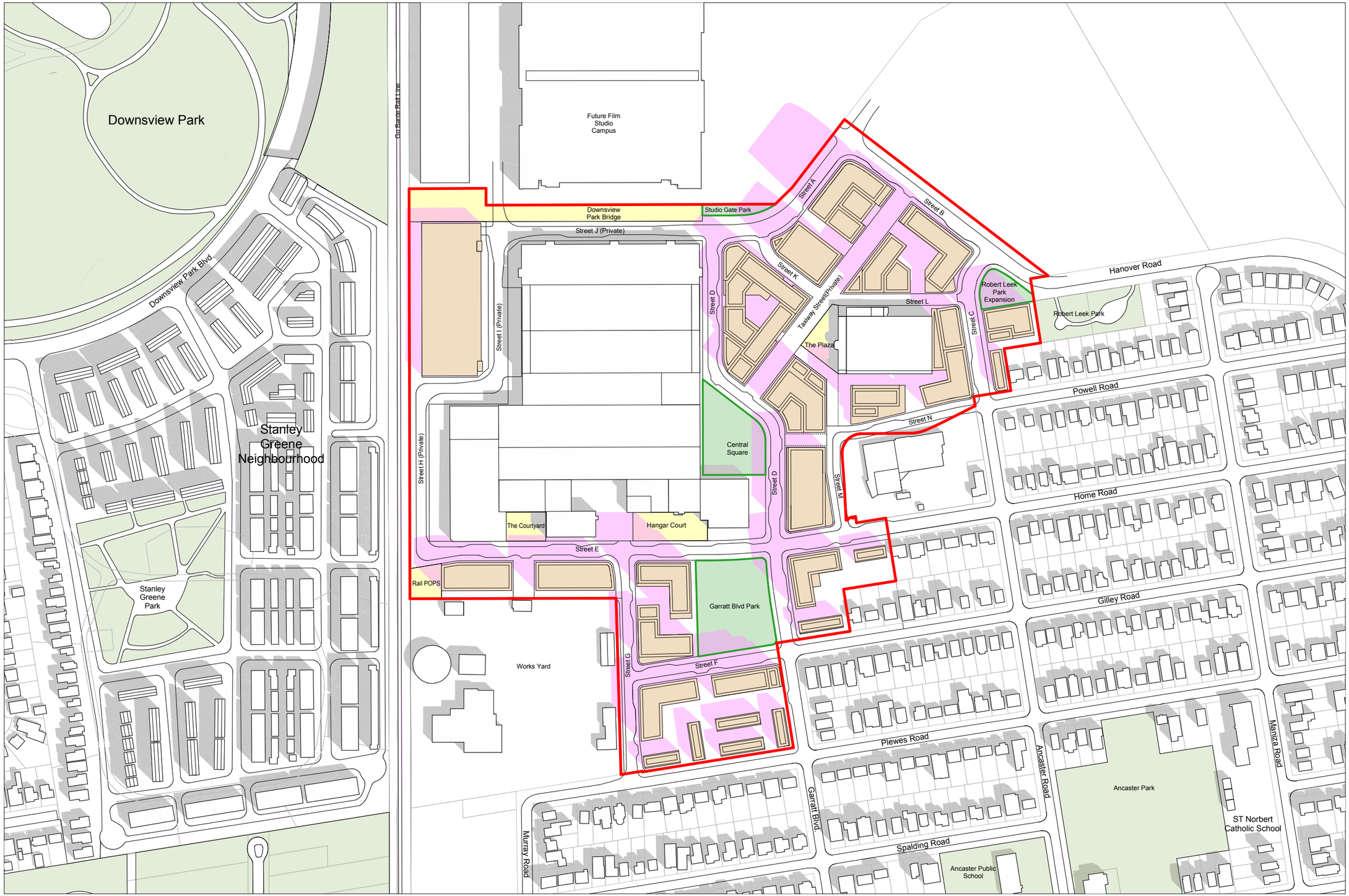
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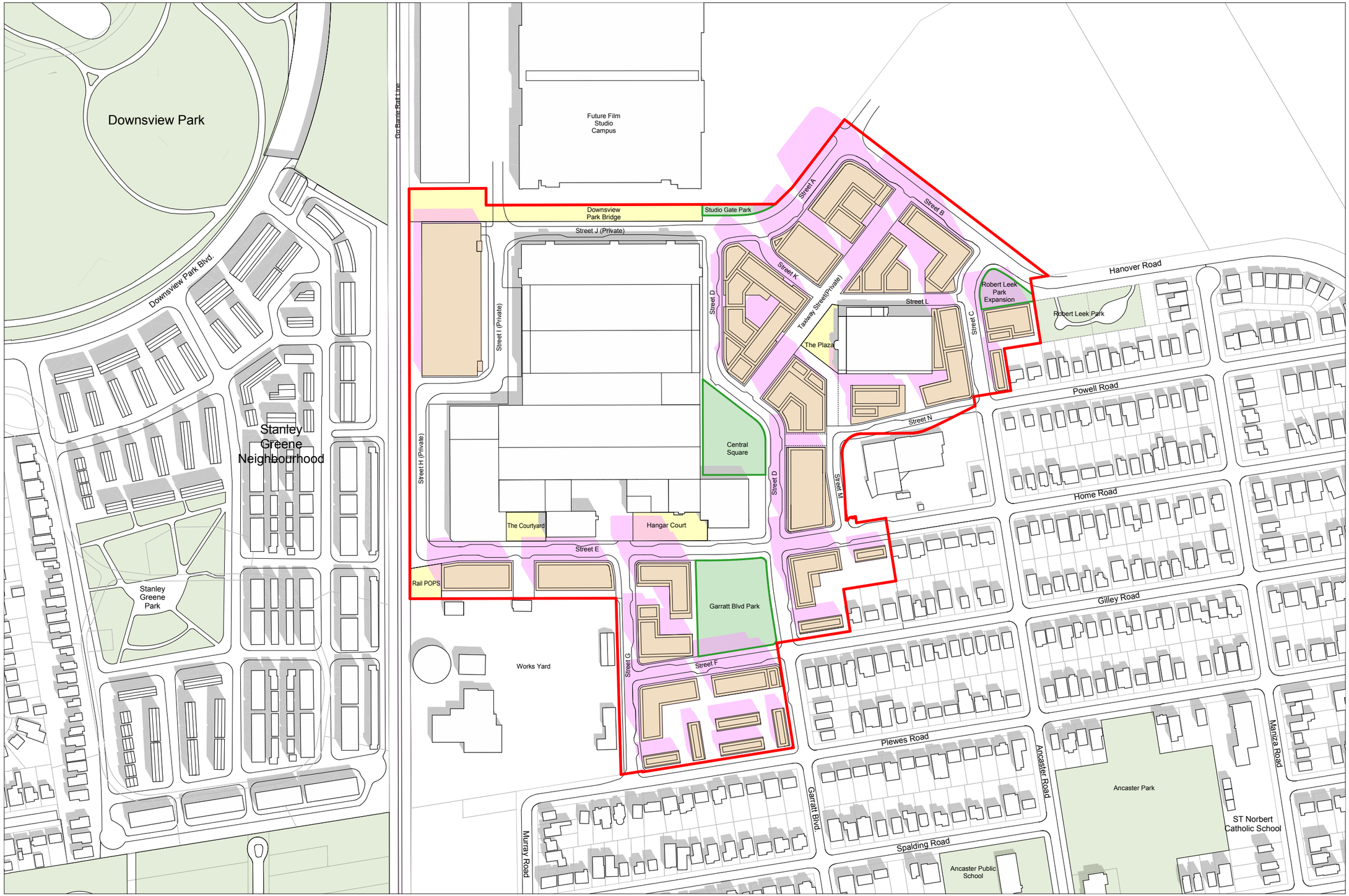
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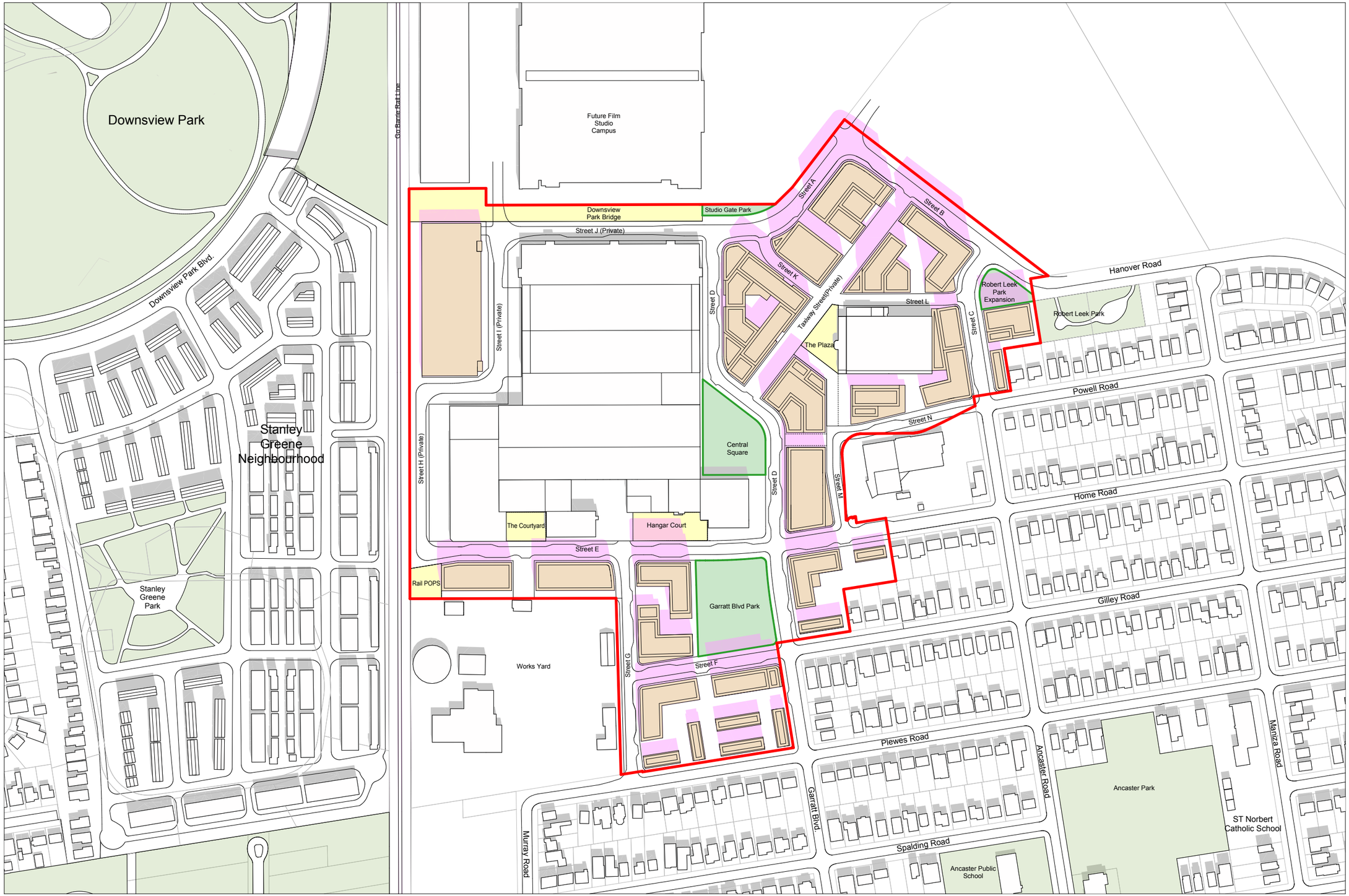
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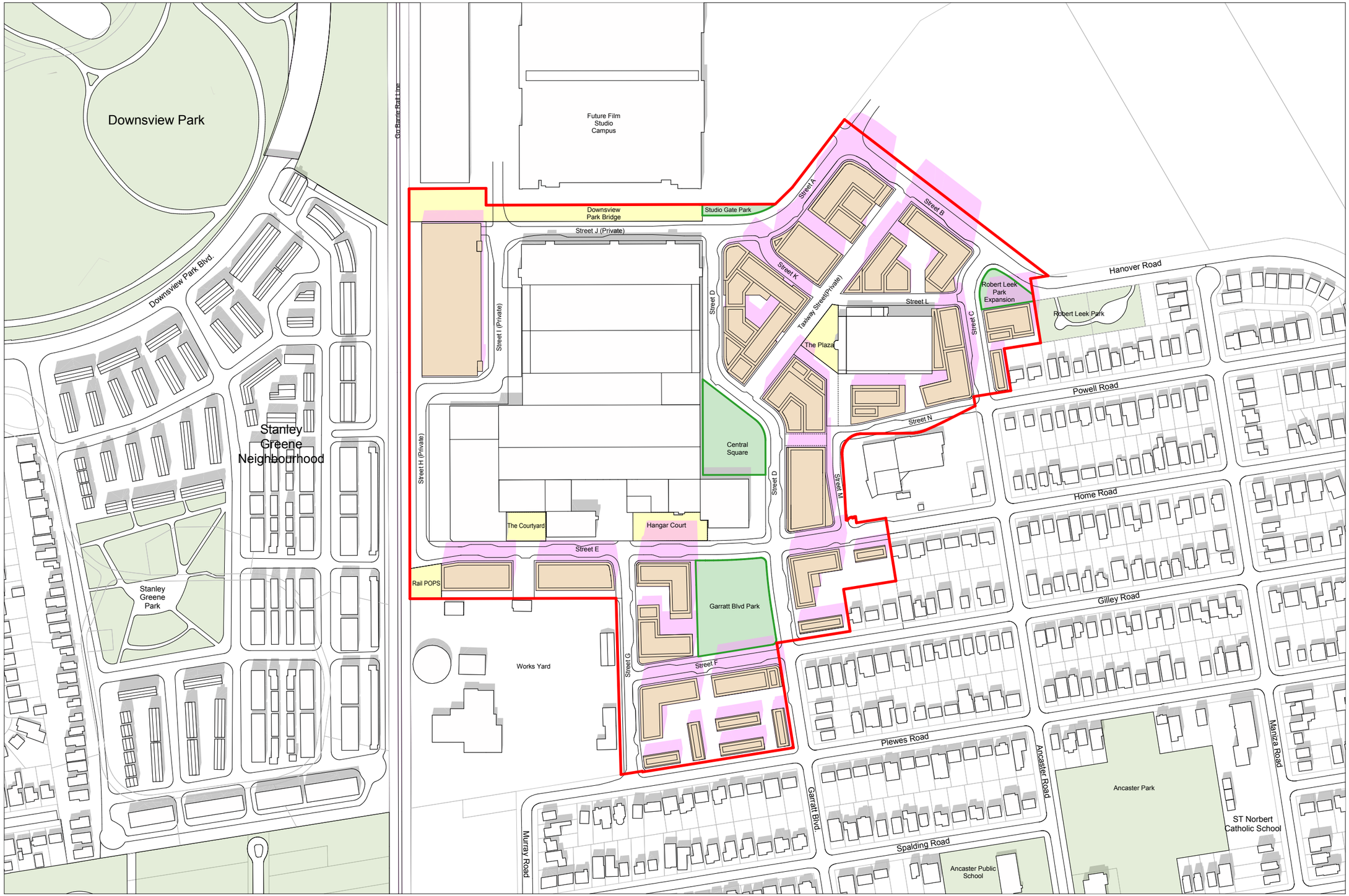
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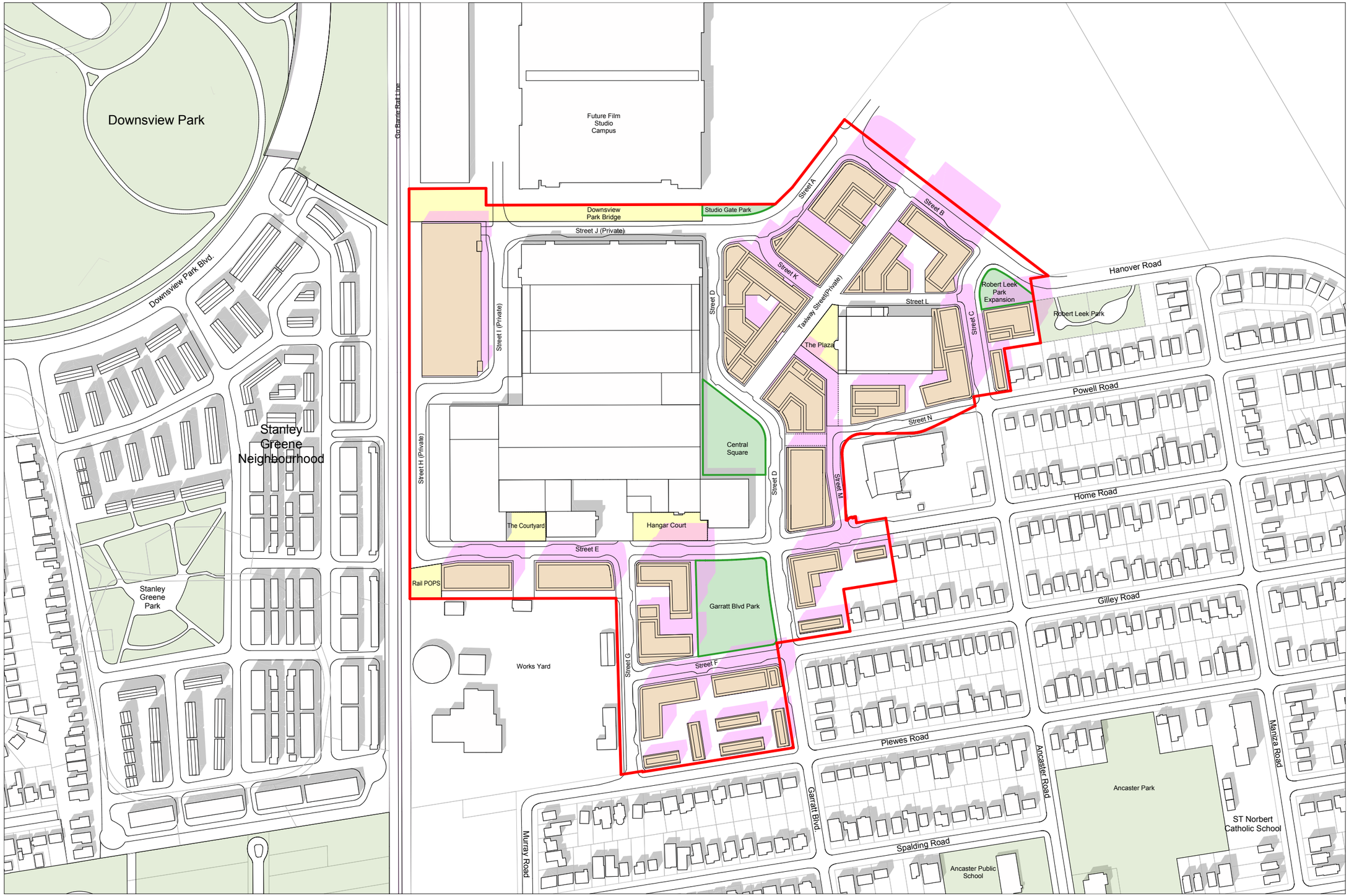



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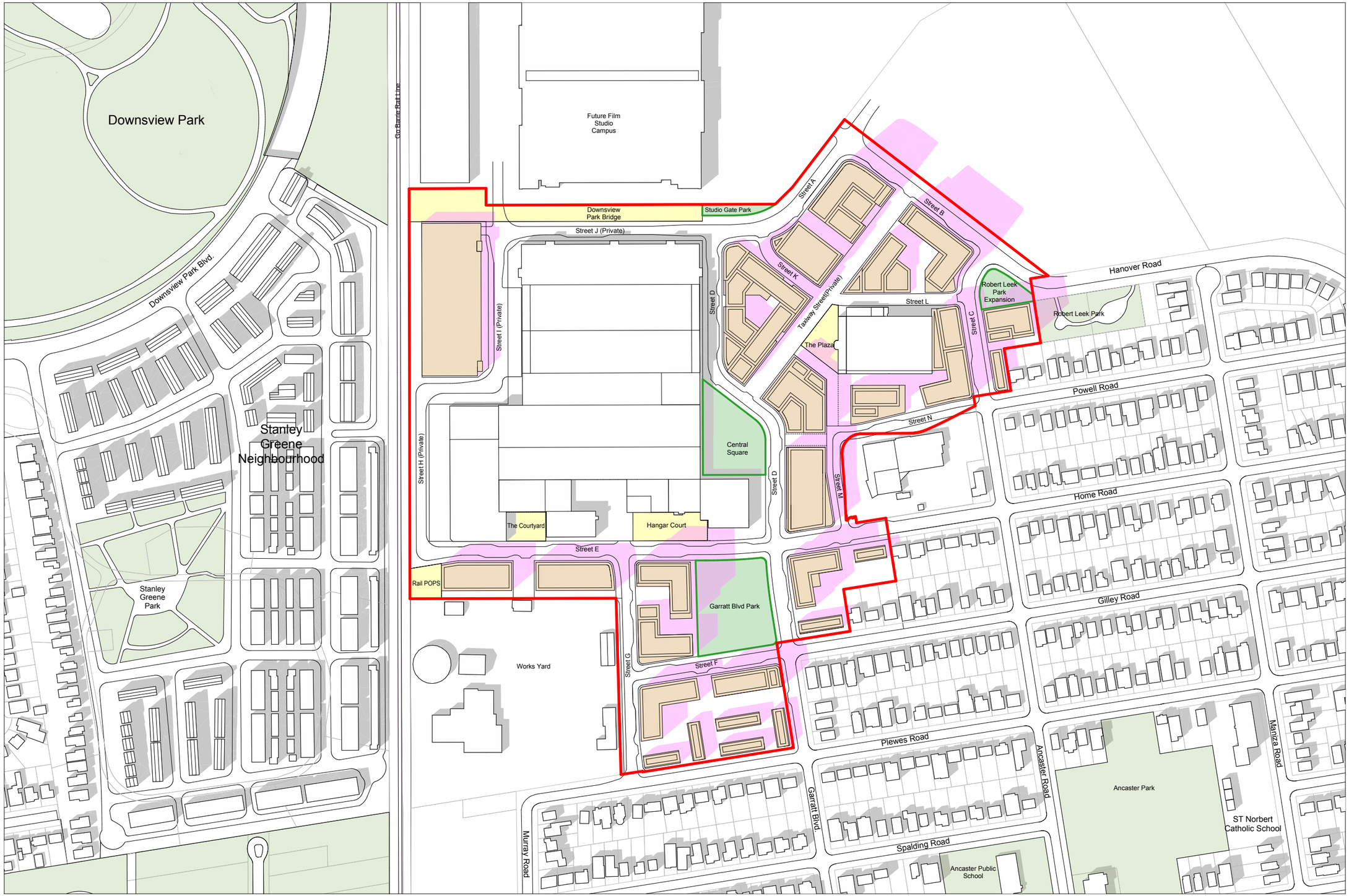
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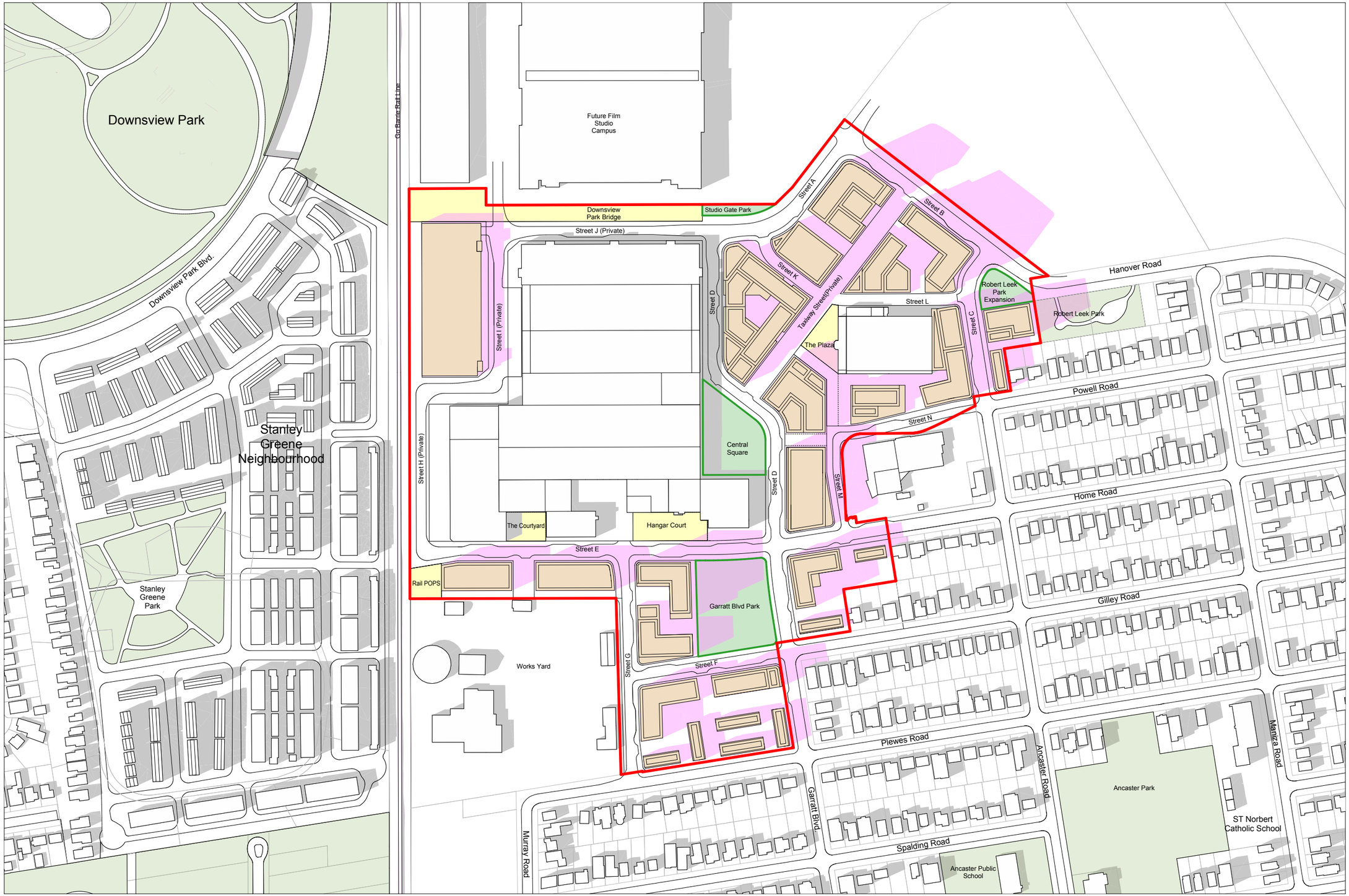



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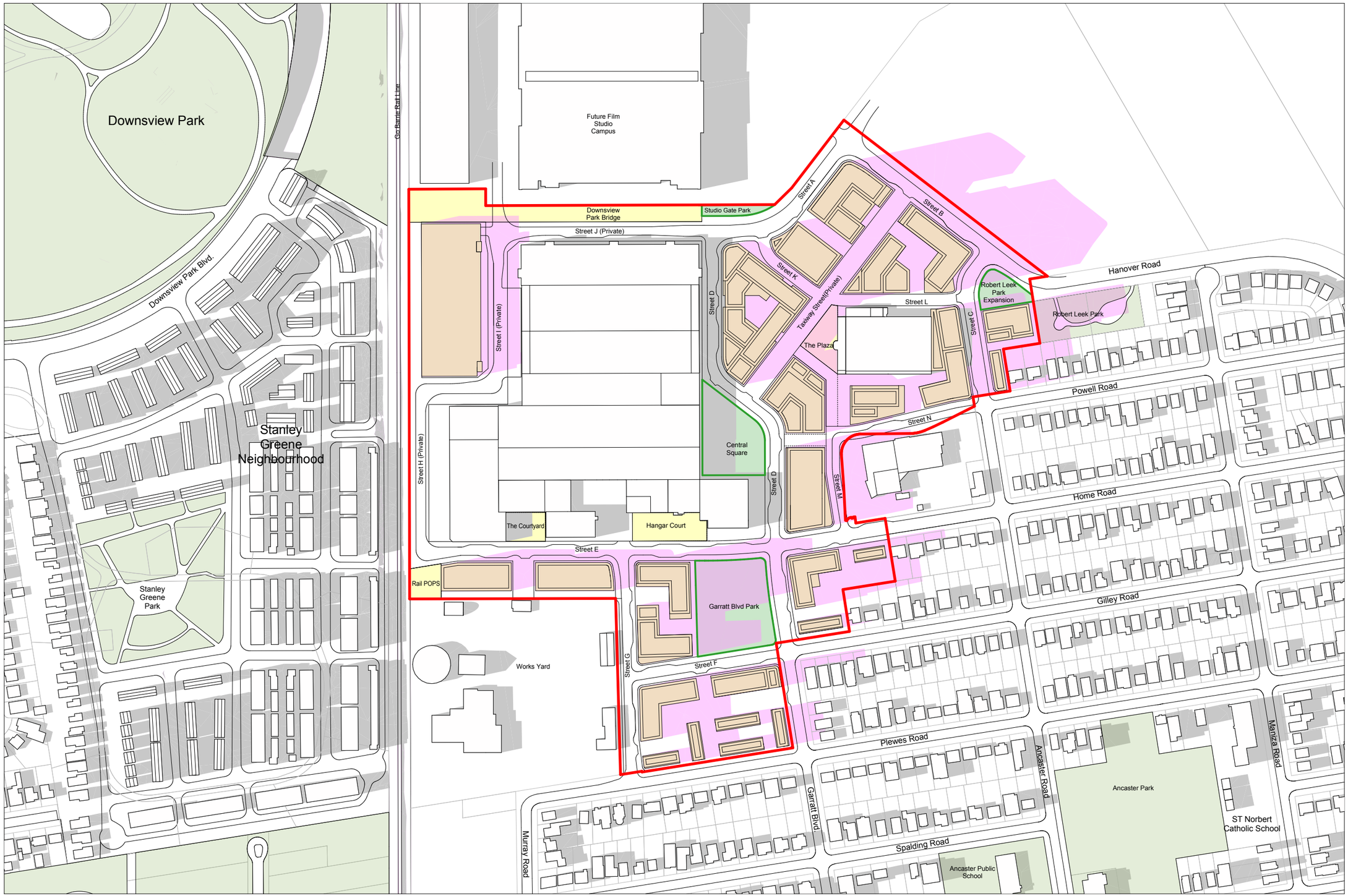
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# Hangar District

Shadow Study | September 21 18:18

Downsview Park
Go Barrie Rail Line
Future Film Studio Campus
Downsview Park Bridge
Studio Gate Park
Street A
Street B
Street J (Private)
Street K
Street L
Street C
Street D
Street I (Private)
Taxiway Street(Private)
The Plaza
Robert Leek Park Expansion
Robert Leek Park
Hanover Road
Powell Road
Street N
Street M
Central Square
Street H (Private)
The Courtyard
Hangar Court
Street E
Home Road
Rail POPS
Garratt Blvd Park
Gilley Road
Stanley Greene Neighbourhood
Stanley Greene Park
Works Yard
Street G
Street F
Plewes Road
Ancaster Road
Manza Road
Ancaster Park
ST Norbert Catholic School
Garratt Blvd.
Murray Road
Spalding Road
Ancaster Public School
Downsview Park Blvd.

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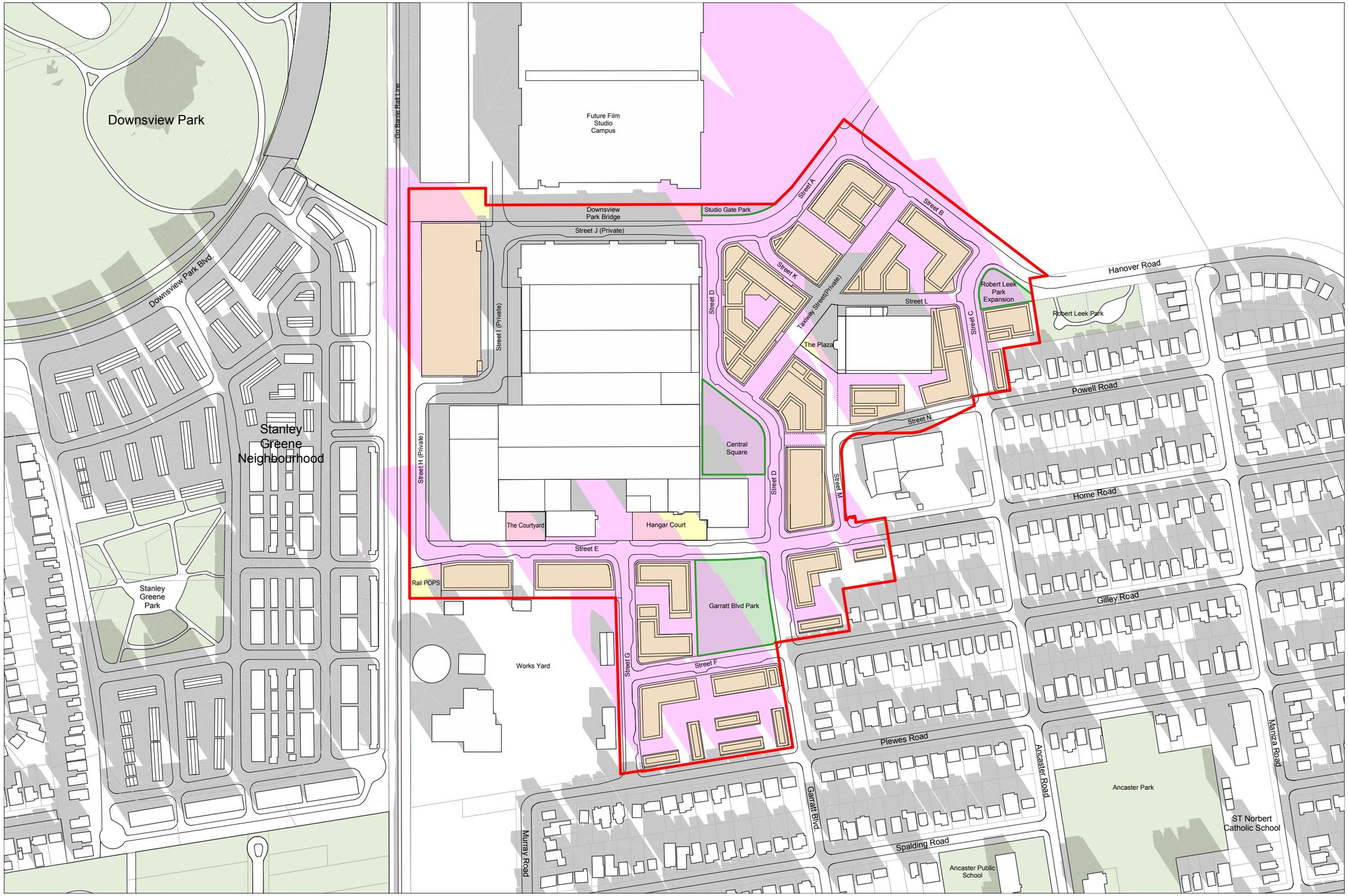
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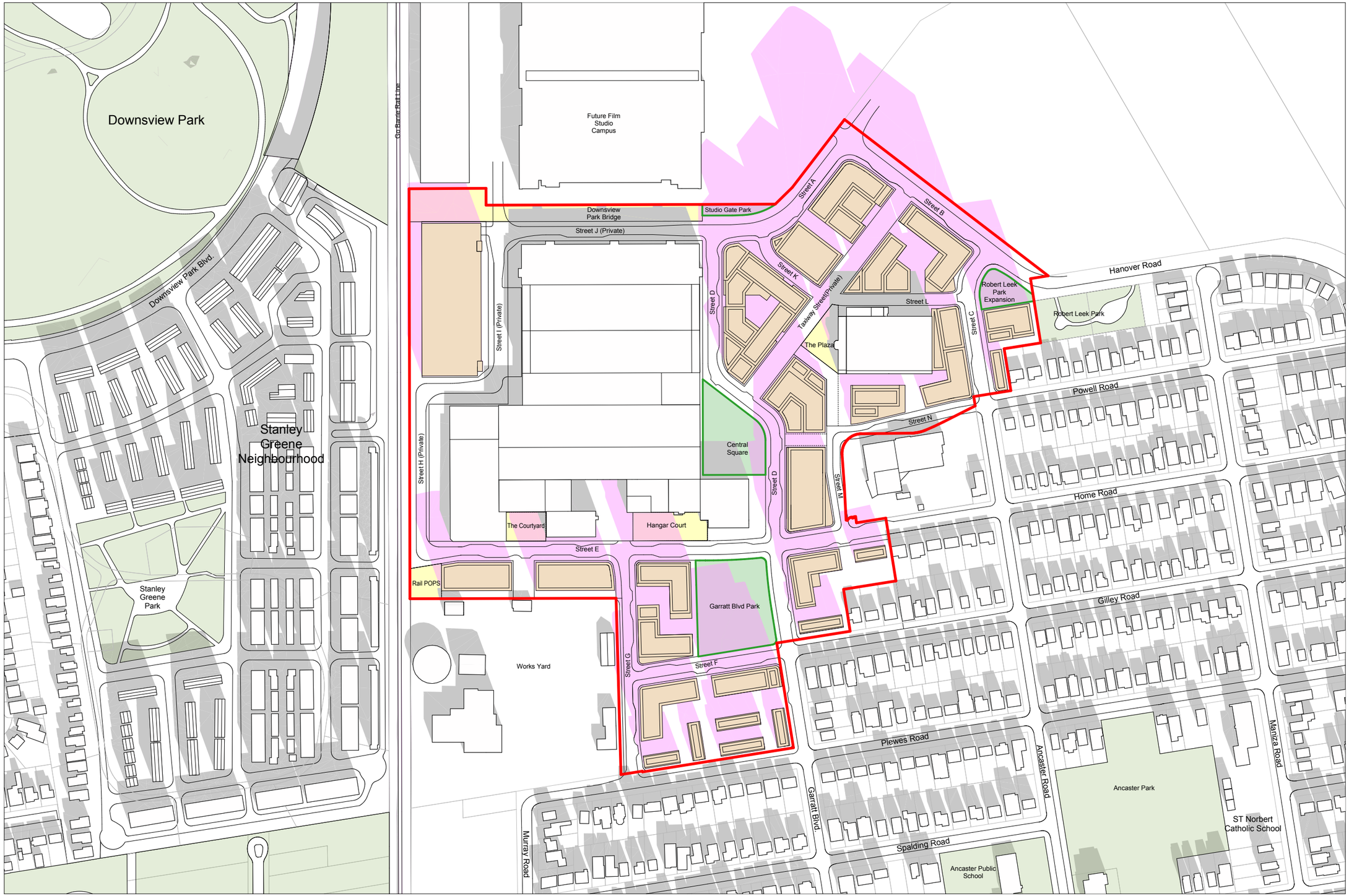
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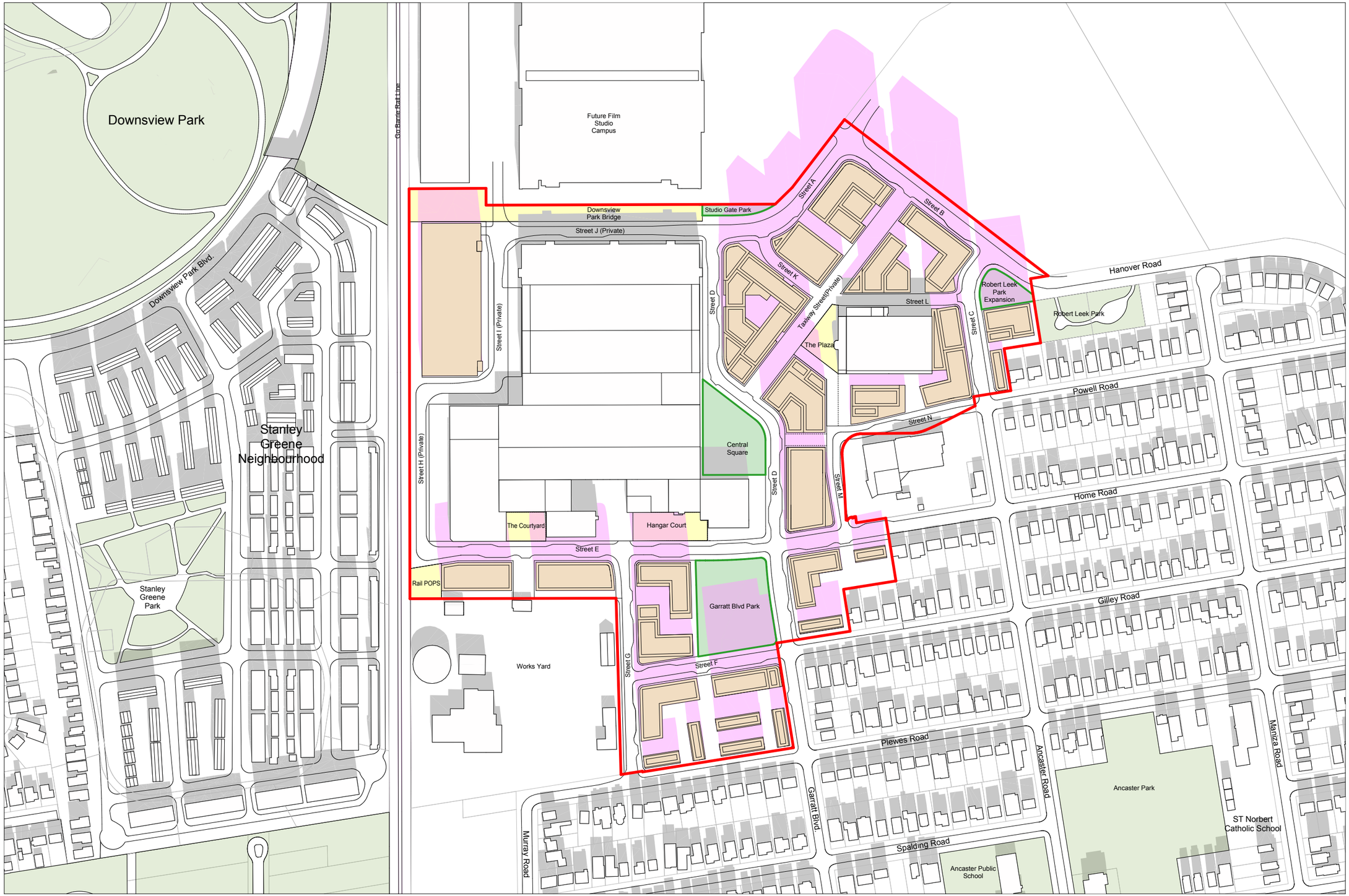
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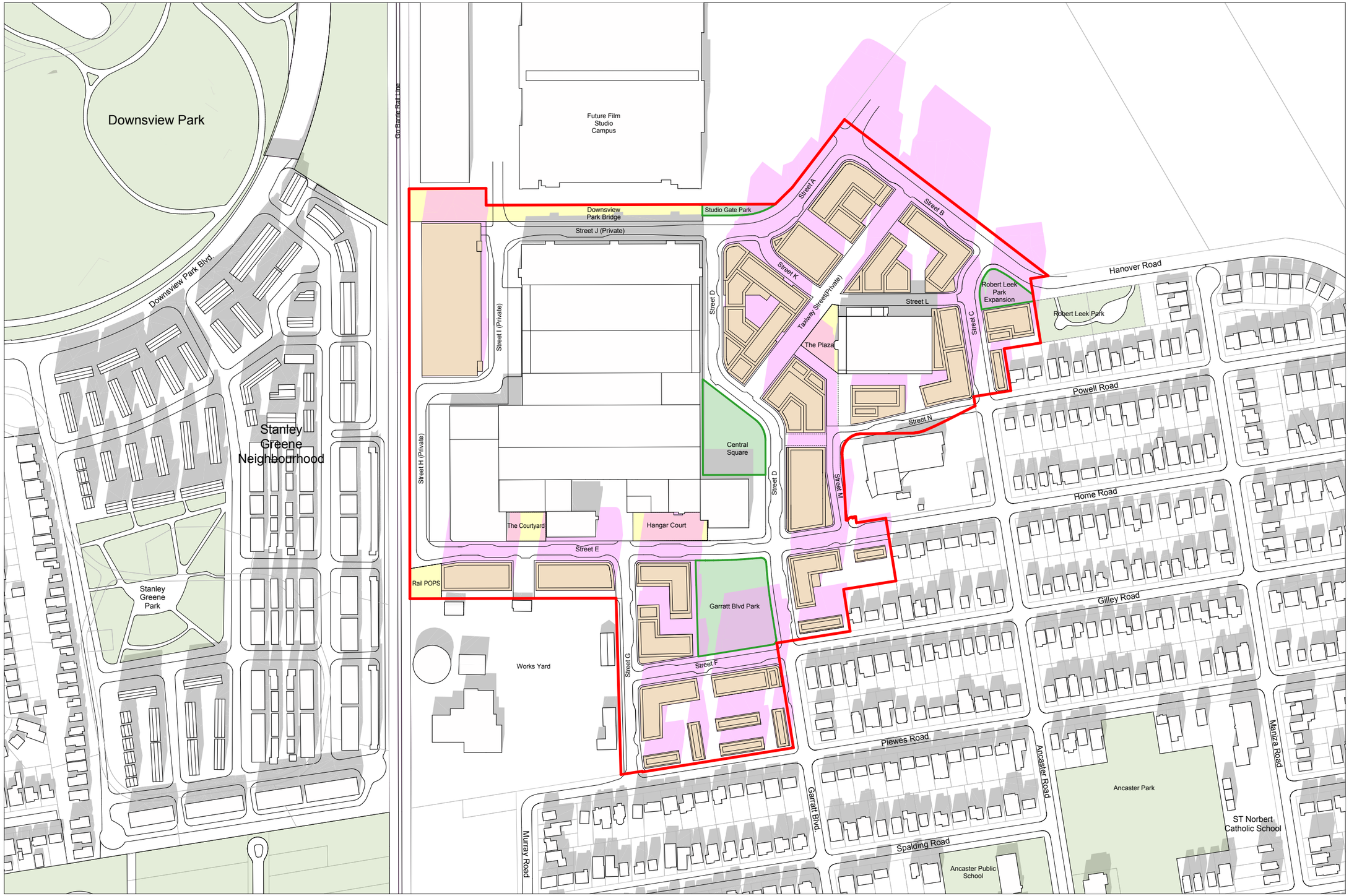
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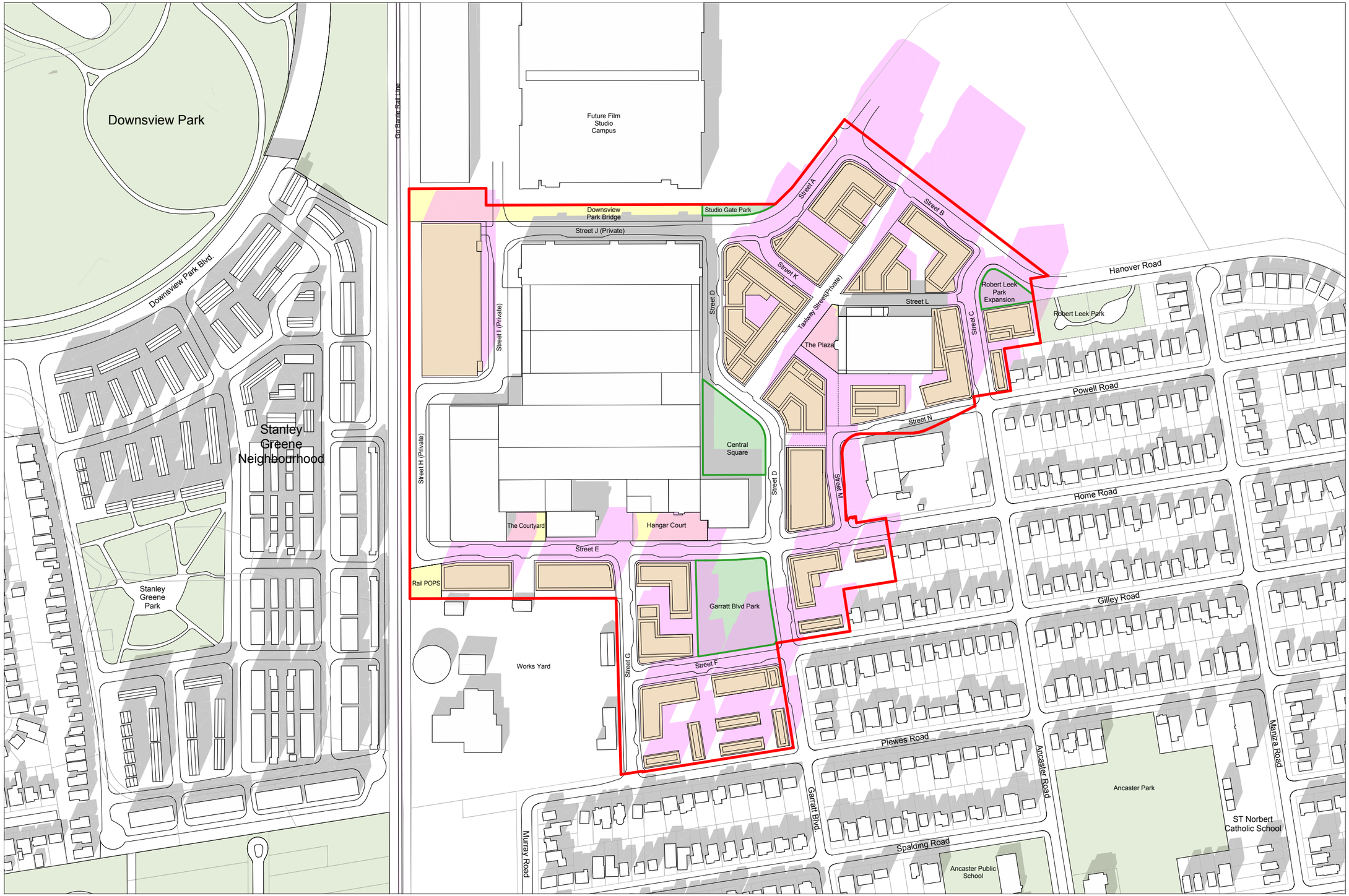
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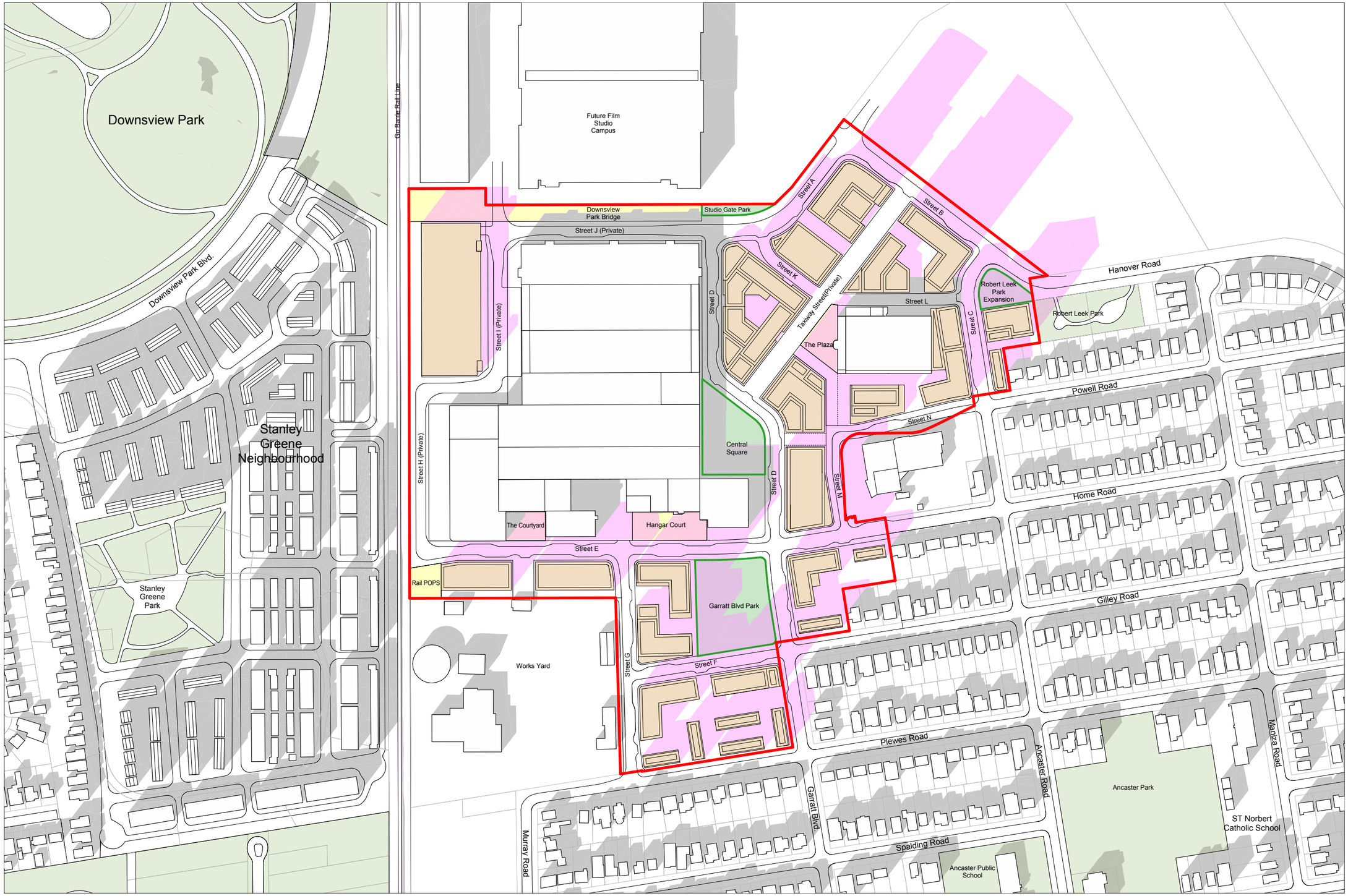
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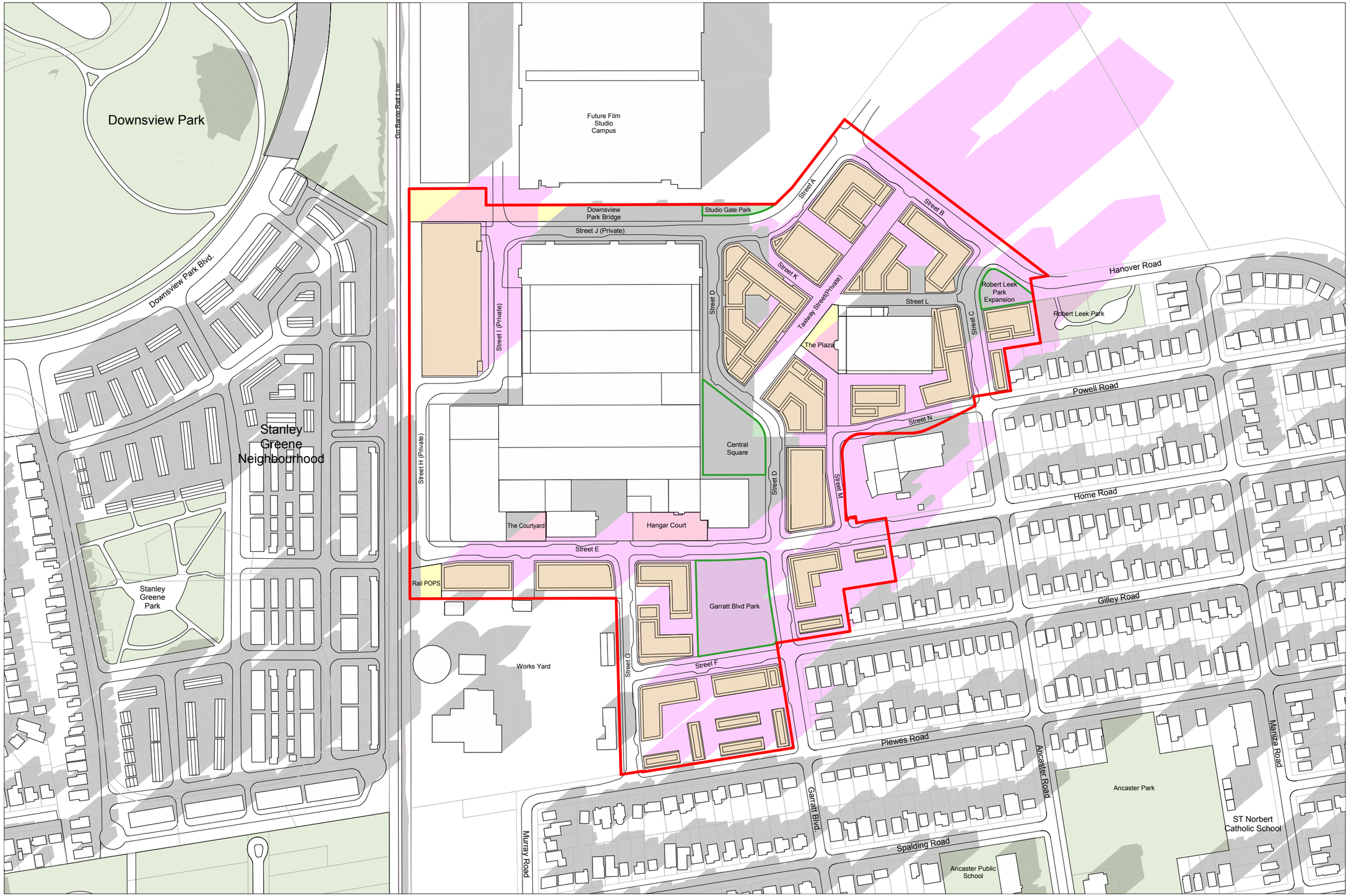
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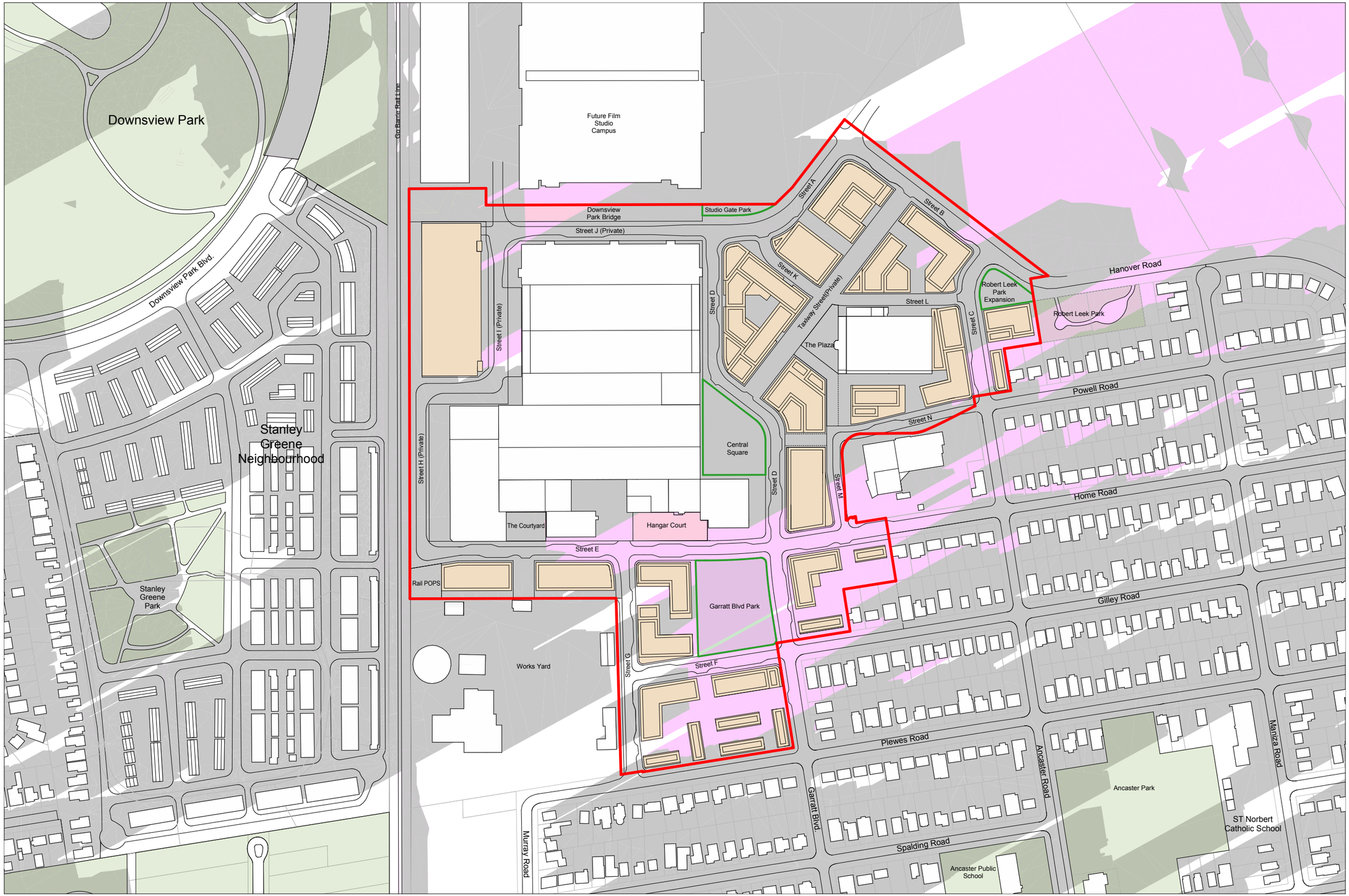
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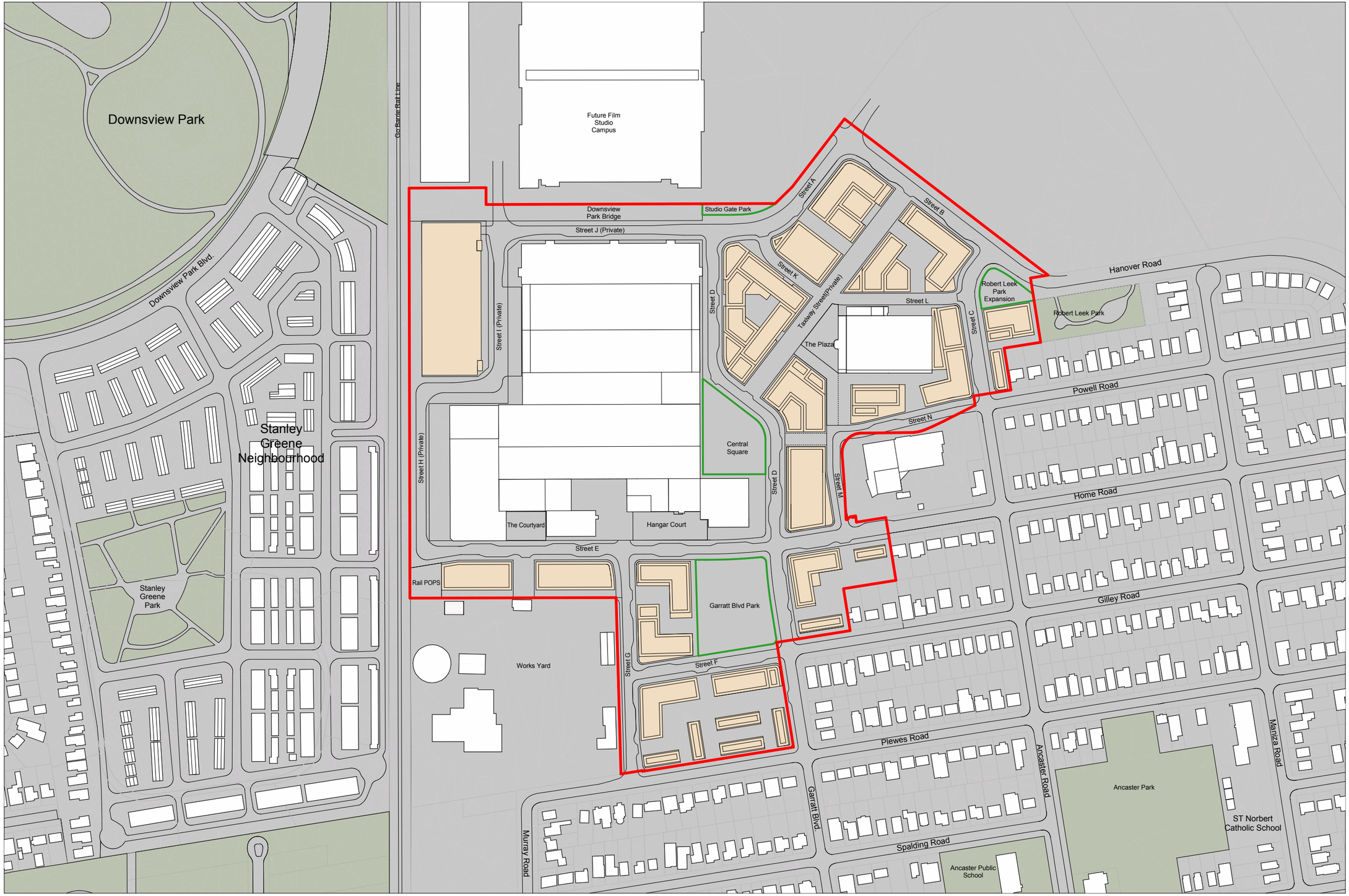
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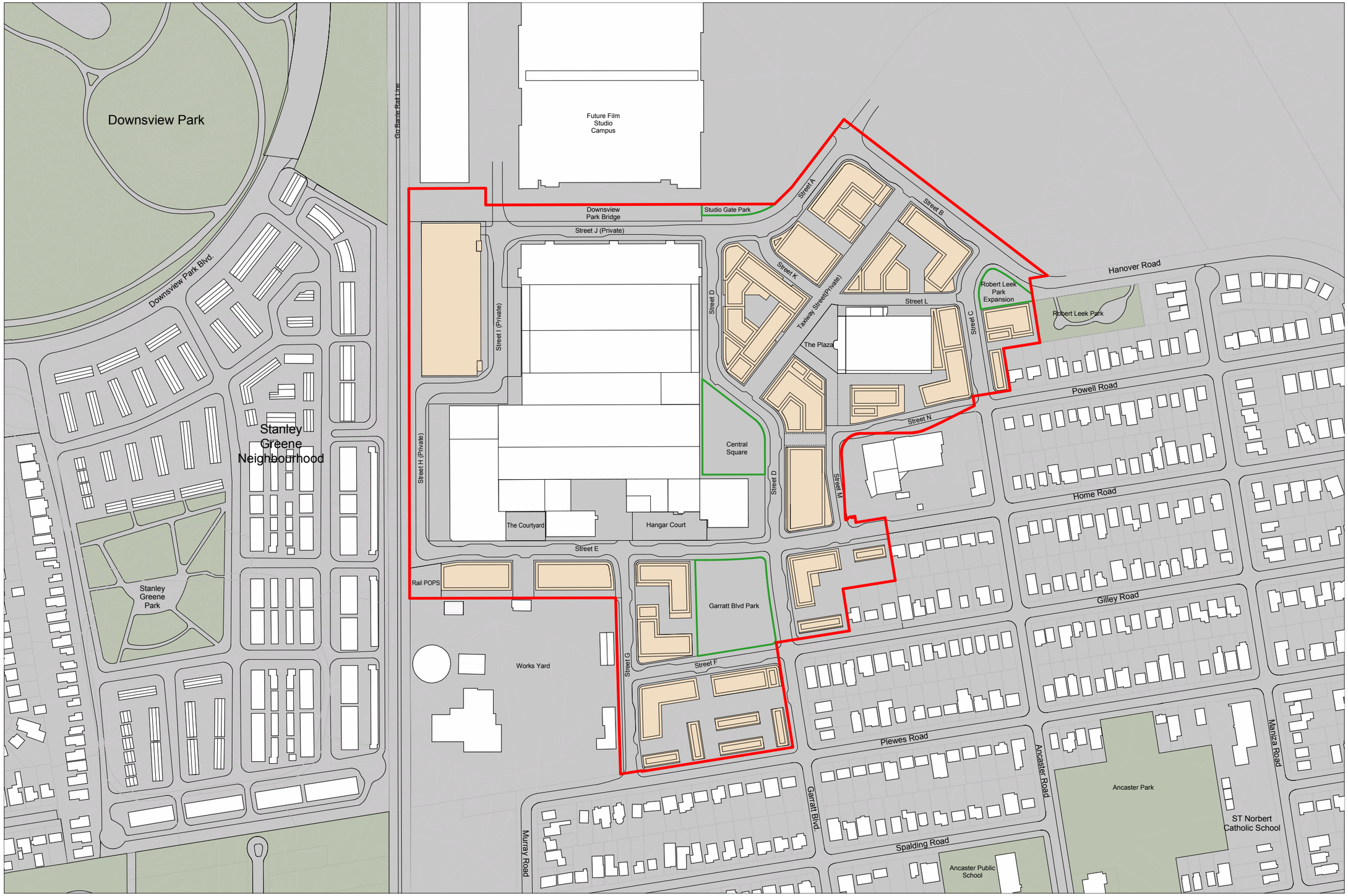
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# 18. TGS Checklist

# TGS Version 4.0 Checklist: Mid to High Rise Residential and all New Non-Residential Development

**Complete in conjunction with the full Toronto Green Standard Version 4.0 (TGS V4.0) and Specifications.**

**Tier 1** performance measures are required by the City and must be included as part of your approved development application.
**Tier 2** and **3** higher performance levels are voluntary and associated with financial incentives. To determine eligibility for incentives go to www.toronto.ca/greendevelopment.

**Performance Level:** ☐ Tier 1 (Required) ☑ Tier 2 ☐ Tier 3

**Application Information:** ☐ Site Plan Control ☑ Zoning Bylaw Amendment ☑ Draft Plan of Subdivision

Application Number: 22 148540 NNY 06 OZ & 22 148583 NNY 06 SB

Date Received (yyyy-mm-dd): 2023-07-07

Community Planner (First, Last Name): Perry Korouyenis

Is this checklist revised from an earlier submission? ☑ Yes ☐ No

Gross Floor Area ($m^2$): 368,365

Number of Storeys: 4-14

Number of Units: 2850

Non Residential Gross Floor Area (m2): 160,959

Proposal Description: (Include a narrative of your project highlighting green attributes or performances measures):

The Hangar District is a 55.5 ac site that is proposed to be transformed into an employment-oriented, mixed-use district featuring a range of employment, residential, retail and community uses. The public and private realm will be designed to reflect the principles of City-Nature, integrating natural landscapes within the built environment that will contribute to biodiversity, healthy ecosystems, stormwater management and community well-being.

**Property and Applicant Information:**

Address of Subject Land (Street Number and Name):

123 Garratt Boulevard

Project Name:

The Hangar District (formerly the Taxiway West South Sub-District)

**Applicant/Agent**

Name(First, Last Name): Downsview Metro Devco Inc.

Business Telephone Number: (647) 220 - 8976

Business Email: kshortall@northcrestdev.ca

Registered Owner (First, Last Name): PSPIB Downsview Investments Inc.

# TGS Version 4.0 Checklist: Mid to High Rise Residential and all New Non-Residential Development

TGS Documentation includes the submission of the completed Tier 1 TGS Checklist and the Statistics Template updated with each planning submission. All sections must be completed for SPA. The TGS Statistics Template is provided on the Project Statistics Plan with each submission in addition to the TGS Checklist. For projects pursuing Tier 2 or 3, a separate TGS High Performance checklist must be submitted prior to NOAC.

## Tier 1: Air Quality

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| ***AQ 1.1** | Single-Occupant Vehicle Trips | Reduce single occupancy vehicles trips by 25% | ☑ Transportation Impact Study (TIS) includes TDM analysis (if applicable) | Plan Numbers: See TIS prepared by WSP, dated July 2023 |
| ***AQ 1.2** | Electric Vehicle Infrastructure | Parking spaces equipped with an Energized Outlet in accordance with Zoning Bylaw 569-2013 as amended | ☑ TGS V4.0 Statistics Template<br>☑ Project parking statistics include number and location of EV spaces<br>☐ Notations indicate location of EV spaces, performance level and EVEMS on Parking | Plan Numbers: A-002a & A-002b (*) |
| ***AQ 2.1** | Bicycle Parking Rates | Bicycle parking rates in accordance with Zoning Bylaw 569-2013 | ☑ TGS V4.0 Statistics Template<br>☑ Project statistics include rates, number and type (long-term/short-term) of bicycle parking spaces<br>☐ Summary table includes number, type and % of net floor area occupied by bicycle parking for each parking floor or at-grade | Plan Numbers: A-002a & A-002b (*) |
| ***AQ 2.2** | Long-term Bicycle Parking Location | Long-term bicycle parking, secure controlled-access in accordance with Zoning Bylaw 569-2013: | ☐ Notations on Parking Plans to indicate the number of long-term parking spaces in each secure bicycle parking area | Plan Numbers: To be provided (*) |

* Note from Applicant: Detailed floor plans including parking plans will be provided via subsequent SPA process.

# TGS Version 4.0 Checklist: Mid to High Rise Residential and all New Non-Residential Development

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| ***AQ 2.3** | Short-term Bicycle Parking Location | Short-term bicycle parking, highly visible and publicly accessible location in accordance with Zoning Bylaw 569-2013 | ☐ Notations on Parking Plans or Site Plan indicate location and the number of short-term spaces in each bicycle parking area | Plan Numbers: To be provided (*) |
| ***AQ 2.4** | Electric Bike Infrastructure | 15% of parking spaces equipped with Energized Outlet (120 V) | ☐ Notations on Parking Plan includes location and performance level on parking plans | Plan Numbers: To be provided (*) |
| ***AQ 2.5** | Shower & Change Facilities | Shower and change facilities in accordance with Zoning Bylaw 569-2013 | ☐ Notations indicate location and number of shower and change facilities | Plan Numbers: To be provided (*) |
| ***AQ 2.6** | Publically Accessible Bike Parking | At least 10 additional publicly accessible, short-term bicycle parking spaces, at-grade on the site or within the public boulevard | ☐ Notations on Plans include location and number of spaces | Plan Numbers: To be provided (*) |
| AQ 3.1 | Connectivity | Pedestrian walkways | ☐ Notations on Site Plan, Landscape Plans and Details | Plan Numbers: N/A - SPA Requirement |
| AQ 3.2 | Sidewalk Space | Minimum 2.1 meter pedestrian clearway | ☐ Notations on Plans and Details | Plan Numbers: N/A - SPA Requirement |

* Note from Applicant: Detailed floor plans including parking plans will be provided via subsequent SPA process.

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| AQ 3.3 | Weather Protection | Covered outdoor waiting areas | ☐ Notations on Plans and Details | Plan Numbers: N/A - SPA Requirement |
| AQ 3.4 | Pedestrian Lighting | Pedestrian-scale lighting | ☐ Notations on Plans and Details<br>☐ Lighting Plan | Plan Numbers: N/A - SPA Requirement |

## Tier 1: Buildings Energy, Emissions and Resilience

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| GHG 1.1 | Greenhouse Gas Emissions Limits | Demonstrate an annual Greenhouse Gas Intensity (GHGI) that meets the TGS performance limits | ☐ Energy (Modelling) Report and Energy Workbook prior to NOAC | Plan Numbers: N/A - SPA Requirement |
| GHG 1.2 | Building Energy Performance | Design the building to achieve the TEUI and TEDI targets by building type OR 25% improvement above OBC, SB-10, Division 3 (2017) | ☐ Energy (Modelling) Report and Energy Workbook prior to NOAC | Plan Numbers: N/A - SPA Requirement |

## Tier 1: Water Quality and Efficiency

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| ***WQ 1.1** | Water Balance, Quality Control & Quantity Control | Design the site to achieve all Water Balance, Water Quality and Water Quantity control targets required by the Wet Weather Flow Management Guidelines | ☑ Stormwater Management Report<br>☐ Notations on Plans (Landscape, Grading, Roof and Details) indicate green infrastructure features and locations consistent with Stormwater Report | Plan Numbers:<br>See SWM Report prepared by Arup (*) |
| ***WQ 1.2** | Green Streets | Capture and control stormwater runoff from new streets in accordance with the City's green infrastructure standards and specifications for the Right-of-Way | ☑ Stormwater Management Report<br>☐ Landscape and Planting Plan, Public Utilities Plan consistent with Stormwater Report<br>☐ Notations indicate locations, feature type, location, dimensions and details | Plan Numbers:<br>See SWM Report prepared by Arup (*) |
| WQ 1.3 | On-site Green Infrastructure | Landscaped site area includes at least <u>one</u> of the following features:<br>☐ Enhanced Green Roof<br>☐ Enhanced landscape using pollinator plants<br>☐ Bioretention facility<br>☐ Reforested Area | ☐ Notations on the Roof Plan, Landscape and Planting Plans to indicate features size, type, location and plant lists<br>☐ Plan list identifies pollinator species if applicable<br>☐ Green Infrastructure Statistics Template<br>☐ Green Roof Statistics Template<br>☐ Stormwater Management Report references | Plan Numbers:<br>N/A - SPA Requirement |

* Note from Applicant: Additional landscape, planting and grading details related to the public realm will be provided at a later date.

## Tier 1: Ecology and Biodiversity

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| ***EC 1.1** | Tree Planting Areas and Soil Volume | Total volume of soil for tree planting areas = 40% of the site area divided by 66 $m^2$ x 30 $m^3$<br><br>Each tree planting area has access to 30$m^3$ of soil | ☑ TGS V4.0 Statistics Template<br>☐ Soil Volume Template<br>☐ Notations indicate soil volume (depth and area,) species and quantity for each planting area<br>☐ Soil Volume Plan | Plan Numbers:<br>A-002b |
| ***EC 1.2** | Trees Along Street Frontages | Trees planted along street frontages with access to 30 $m^3$ of soil/tree | ☐ Notations indicate soil volume (soil depth and area) species and quantity for each planting area<br>☐ Planting details, Soil Volume Plan<br>☐ Public Utilities Plan | Plan Numbers:<br>To be provided (*) |
| EC 1.3 | Parking Lots | 1 shade tree planted parking lots area for every 5 parking spaces | ☐ Notations indicate soil volume (depth and area), species and quantity on the Planting Plan/Soil Volume Plan for parking areas | Plan Numbers:<br>N/A - SPA Requirement |
| EC 1.4 | Watering Program | Four-year Watering program for private trees | ☐ Notations on the Planting Plan include watering program methods and watering schedule | Plan Numbers:<br>N/A - SPA Requirement |
| EC 2.1 | Green & Cool Paving | Treat 75% of non-roof hardscape to reduce the urban heat island | ☐ TGS V4.0 Statistics Template<br>☐ Materials list includes SRI of high albedo paving<br>☐ Notations indicate location of treated hardscape and soft landscaping | Plan Numbers:<br>N/A - SPA Requirement |

*Note from Applicant: Additional landscape and planting details related to the public realm will provided at a later date (subsequent resubmissions), this will include a tree planting areas and soil volume plan.

**TGS Version 4.0 Checklist: Mid to High Rise Residential and all New Non-Residential Development**

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| EC 2.2 | On-site Landscaping, Native and Plants | Landscape includes 50% native plants and native flowering species | ☐ TGS V4.0 Statistics Template<br>☐ Plant list includes common name, scientific name, size, quantity, stock type, native or non-native and flowering species<br>☐ Notations indicate potable or non-potable irrigation system on Landscape Plan | Plan Numbers:<br>N/A - SPA Requirement |
| EC 2.3 | Green & Cool Roofs | At least <u>one</u> or a combination of the following:<br>☐ Green Roof required under the Green Roof By-Law or,<br>☐ Green Roof Bylaw does not apply, provide 100% of Available Roof Space with one or a combination - Green Roof<br>☐ Solar PV<br>☐ Cool Roof | ☐ TGS V4.0 Statistics Template<br>☐ Green Roof Statistics Template on roof plan.<br>☐ Notations include green roof locations identified on elevations and roof plans<br>☐ Notations include SRI of cool roof on roof plan and location of solar panels | Plan Numbers:<br>N/A - SPA Requirement |
| ***EC 3.1** | Ravine & Natural Feature Protected Area: Stewardship | Stewardship Plan implemented for setbacks | ☐ Stewardship Plan (if applicable)<br>☐ Notations indicate Stewardship Plan area | Plan Numbers:<br>Not applicable to the development |
| ***EC 3.2** | Ravine & Natural Feature Protected Area: NHS | Natural Heritage System and the Ravine Protected Area planted with 100% native plants | ☐ TGS V4.0 Statistics Template<br>☐ Plant list identifies native or non-native species and plants from regionally appropriate seed source | Plan Numbers:<br>Not applicable to the development |

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| EC 5.1 | Bird-Friendly Glazing | 85% of all exterior glazing within the first 16m treated including fly-through and High Hazard Areas, to reduce bird collisions | ☐ TGS V4.0 Statistics Template<br>☐ Bird Friendly Statistics Template<br>☐ Notations on Elevation Plans include treatment area, and material legend showing type, density and colour of visual markers, and High Hazard Areas | Plan Numbers:<br>N/A-SPA Requirement |
| EC 5.2 | Rooftop Vegetation | Glazing 4 m above rooftop vegetation is treated to reduce bird collisions | ☐ Notations include required treated area, type of treatment, surface, density and colour of visual markers | Plan Numbers:<br>N/A-SPA Requirement |
| EC 5.3 | Grate Porosity | Maximum porosity of ventilation grates is 20mm X 20mm or 10mm x50mm | ☐ Notations indicate location and porosity of ground level grates | Plan Numbers:<br>N/A-SPA Requirement |
| EC 5.4 | Exterior Lighting | Dark Sky compliant fixtures | ☐ Notations indicate Dark Sky compliant fixtures<br>☐ Lighting Plan | Plan Numbers:<br>N/A-SPA Requirement |

## Tier 1: Waste and Circular Economy

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| ***SW 1.1** | Waste Collection | Waste sorting system for garbage, recycling and organics | ☐ TGS V4.0 Statistics Template<br>☐ Notations on Floor Plans indicate type and location of waste sorting system | Plan Numbers:<br>To be provided (*) |
| ***SW 1.2** | Waste Storage Space | Waste storage rooms | ☐ Notations on Floor Plans or Parking Plans indicate area and location of waste storage rooms | Plan Numbers:<br>To be provided (*) |

* Note from Applicant: Detailed floor plans including parking plans will be provided via subsequent SPA process.

# TGS Version 4.0 Checklist: Mid to High Rise Residential and all New Non-Residential Development

| Section | Development Feature | Tier 1 Performance Measure (See full standards and specifications for details and definitions) | Documentation Required for Site Plan Approval (Sections marked with an asterisk* are required for Rezoning or Subdivision applications) | Plans and Drawings |
|---|---|---|---|---|
| SW 1.3 | Bulky Waste | Provide 10m2 for bulky and special collection items (Residential) | ☐ Notations on Plans indicate area and location for bulky items collection | Plan Numbers: N/A-SPA Requirement |
| SW 1.4 | Compaction | Waste storage room with space for containers and the compactor unit (Residential) | ☐ Notations on Plans indicate area and location of waste storage rooms and compactor unit | Plan Numbers: N/A-SPA Requirement |
| SW 4.1 | Construction Waste Management | Manage construction and demolition waste in accordance with O. Reg. 103/94 | ☐ Documentation in accordance with O. Reg. 103/94 | Plan Numbers: N/A-SPA Requirement |

# 19. Transportation Impact Study Addendum

# THE HANGAR DISTRICT (FORMERLY THE TAXIWAY WEST SOUTH SUB-DISTRICT)

## TRANSPORTATION IMPACT STUDY ADDENDUM FOR THE PROPOSED REDEVELOPMENT OF 123 GARRATT BOULEVARD

Prepared for Northcrest Development

JULY 2023



July 2023

Northcrest Developments

Subject: Transportation Impact Study Addendum In Support of
The Hangar District ZBA/DPS Application Resubmission

WSP Canada Inc. (WSP) is pleased to present the findings of our Transportation Impact Study (TIS) Addendum in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application resubmission for the Hangar District (previously known as The Hangar District) at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto.

In May 2022, Northcrest filed a combined ZBA and DPS application ("the initial submission"). Since the initial submission, a number of refinements have been made in an effort to align with comments from various City departments and commenting agencies; discussions with staff through various meetings and an in-person workshop; feedback received through community engagement; as well as with policy directions emerging out of the City's draft Update Downsview Secondary Plan and Master Environmental Servicing Plan (MESP). The project team has worked closely with the City through a full day workshop and several follow up meetings to develop a revised site plan. The purpose of this TIS Addendum is to document the transportation evaluation of the changes made from a traffic, parking, street network and TDM perspective.

We thank you for the opportunity to undertake this study. Please do not hesitate to contact us if you have any questions or comments.

Sincerely,

WSP Canada Inc.



Peter Yu, P. Eng., PMP
Project Manager

WSP ref.: 211-04376-00 T01

100 COMMERCE VALLEY DRIVE WEST
THORNHILL, ON, CANADA L3T 0A1

wsp.com

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# 1 INTRODUCTION

WSP Canada Inc. has been retained by Northcrest Developments ("Northcrest") to prepare this Transportation Impact Study (TIS) Addendum in support of a combined Zoning By-law Amendment ("ZBA") and Draft Plan of Subdivision ("DPS") application resubmission for the Hangar District (previously known as the Taxiway West South Sub-District) at 123 Garratt Boulevard ("the Subject Area") within the City of Toronto. The subject area in context is shown in **Figure 1-1.**

The Subject Area is comprised of 22.4 hectares (55.5 acres) of land consisting of the existing Bombardier hangars, offices and ancillary structures, surface parking lots, and a portion of the Downsview Airport taxiway. The Subject Area is located south of a proposed Film Studio Campus.

In May 2022, Northcrest filed a combined ZBA and DPS application ("the initial submission"). Since the initial submission, a number of refinements have been made in an effort to align with comments from various City departments and commenting agencies; discussions with staff through various meetings and an in-person workshop; feedback received through community engagement; as well as with policy directions emerging out of the City's draft Update Downsview Secondary Plan.

Please refer to the Cover Letter submitted with this application resubmission for the description of key changes to the proposed District design. It is also noted that as a result of some of these refinements, the naming of blocks throughout the Subject Area has changed.

The refined proposal maintains the vision for the Hangar District introduced in the initial application to create a vibrant, thriving employment hub that is home to technology and creative industries, bringing new jobs and opportunities while creating a unique place to live, work, shop and enjoy life. The Hangar District design continues to reflect the objective to create a highly walkable, accessible and inclusive place, featuring a variety of parks and open spaces.

The Subject Area is located in Downsview, City of Toronto (formerly within the district of North York). It is 22.4 hectares (55.5 acres) in size, and is located south of the proposed Film Studio Campus, west of the re-imagined Runway, east of the Barrie GO rail line (also known as the GO Transit Newmarket Subdivision line), and north of the Ancaster neighbourhood. It is in the southwestern portion of the Downsview Framework Plan Area.

Overall, the site statistics and suite of land uses remain very similar to the May 2022 Transportation Study. **Table 1-1** summarizes the site statistics proposed and evaluated within this submission broken down by the three sub areas as shown in the map of the subject area shown in **Figure 1-2**. The simplified site plan is shown in **Figure 1-3**.

**Table 1-2** compares the updated site statistics with those previously evaluated in the May 2022 Transportation Study. TH

**Table 1-1: Site Statistics Proposed**

| Land Use | The Hangars | The Villages | Ancaster West | Total |
|---|---|---|---|---|
| **Residential (units)** | - | 1,891 | 959 | **2,850** |
| **Retail (sq.m.)** | 4,645 | 6,708 | 706 | **12,059** |
| **Office (sq.m.)** | 47,288 | 33,803 | 17,563 | **98,654** |
| **Light Industrial (sq.m.)** | 34003 | - | - | **34,003** |
| **Institutional (sq.m.)** | 1,858 | 6,001 | - | **7,859** |
| **Hotel (suites / sq.m.)** | - | 136 / 8,384 | - | **136 / 8,384** |

**Table 1-2: Comparison Between Current and May 2022 Site Statistics**

| Land Use | May 2022 Submission | Current Submission |
|---|---|---|
| **Residential (units)** | 2,850 | 2,850 |
| **Retail (sq.m.)** | 14,447 | 12,059 |
| **Office (sq.m.)** | 97,154 | 98,654 |
| **Light Industrial (sq.m.)** | 34,002 | 34,003 |
| **Institutional (sq.m.)** | 6,796 | 7,859 |
| **Hotel (suites/sq.m.)** | 275 / 8,561 | 136 / 8,384 |

It should be noted that sections of the original May 2022 Transportation Study that were not commented upon by the City nor impacted by the refinements to the district plan (i.e., existing conditions, future background conditions, multi-modal evaluation and other context discussions) are not repeated in this TIS Addendum. With respect to City comments received regarding the May 2022 Transportation Study, a comment response matrix has been provided in the resubmission material.




FIGURE 1-1 - SUBJECT AREA IN CONTEXT

- Taxiway West District
- Subject Area
- Update Downsview Secondary Plan
- Downsview Framework Plan
- Downsview Framework Plan Districts




FIGURE 1-2 - SUBJECT AREA

Taxiway West District

Subject Area

Downsview Framework Plan

The Hangar District Character Areas

# FIGURE 1-3 -
# SIMPLIFIED SITE PLAN



# 2 STREET NETWORK

The street network within The Hangar District has been refined based on City comments with particular emphasis on investigating opportunities to convert previous private lane/streets to public streets. **Table 2-1** summarizes the 15 street segments (11 public and 4 private). Private streets that have been converted to a public street in this resubmission are ***bolded and italicized.*** The rationale and context are provided in the subsequent section. The overall functional plan of the district street network is shown in **Figure 2-1.** Unless otherwise noted, the lane widths, cross-sections of the ROW for the public streets remain the same as the May 2022 Transportation Study (provided in **Appendix A** for reference) since design considerations already reflect minimized lane widths and accommodate TTC bus movements where appropriate.

**Figure 2-2** illustrates the streets classified by public/private context. As with most developments, there will be some private driveways to service the development blocks which will be identified and evaluated through the site plan application process.

**Table 2-1: Street Network Summary**

| Street | Classification | ROW | Change from May 2022 | Additional Remarks |
|---|---|---|---|---|
| **A** | Public | 23m | -- | -- |
| **B** | Public | 23m | -- | Extension of Hanover Street |
| **C** | Public | 20m | -- | Extension of Ancaster Road |
| **D** | Public | 18.5m | -- | Extension of Garratt Boulevard |
| **E** | Public | 18.5m | -- | Extension of Home Road |
| **F** | Public | 18.5m | -- | Extension of Gilley Road |
| **G** | Public | 18.5m | -- | -- |
| **H** | Private | N/A | Refinements to road layout based on the adjustments related to the removal of the rail park and rail square in order to improve truck access for the future employment uses | Remains private due to the loading operational needs stemming from the preservation of the existing Hangar building & agreed upon with City staff through the workshop |
| **I** | Private | N/A | | |
| **J** | Private | N/A | | |
| **K** | ***Public*** | 11m | Change from a private lane to public street as per discussions with City staff and with adjustment to alignment. The width of the ROW has been maintained from the 11m wide private lane | Designed as an intimate shared street concept modelled after precedence from North America. Exceptions required to permit localized truck reverses due to the preservation of existing building in Block F |
| **L** | ***Public*** | 11m | | |
| **M**<br>**N** | ***Public*** | 18.5m | Change from a 11m wide private lane to 18.5m ROW public street as per discussions with City staff | Requires property from Flight Safety property. Interim conditions to be designed where an interim access road with sidewalk on one side may be in service |
| **Taxiway Street** | Private | 18.5m in width | -- | Special need to operate a unique character street through the Village that requires a high degree of maintenance, shared-street and enhanced streetscape that are well beyond the typical public local street function. This street will be one-way only (southbound) and is not intended to serve a substantial level of vehicular traffic |




C:\Users\nima.farid\Desktop\Projects\221-12626-00 Hangar Taxiway\2023-07-04\XREF

**Scale:** 1:1000

wsp

Figure 2-1
Functional Design
Taxiway West South
Sub-District

HangarDist-DraftPlan-230628.dwg_Landscape 11x17 (flip)

Modified: 6/27/2023 10:16 PM By: nima.farid Plot Date: 2023/07/04




FIGURE 2-2 PROPOSED STREET NETWORK

- Taxiway West District
- Subject Area
- Downsview Framework Plan
- Proposed Public Streets
- Proposed Private Streets
- Potential Future Public Street Extension

URBAN STRATEGIES INC. PERKINS EASTMAN dtah ARUP WSP

## 2.1 PUBLIC STREETS

New public streets have been introduced to The Hangar District:

**Streets K & L**: Formerly two private lanes that were off-set intentionally when intersecting with Taxiway Street to discourage through traffic cutting through the Taxiway and gaining higher speeds. Since discussions with the City, the team has aligned the two lanes and converted it to a public designation with a 11m ROW. The alignment also serves as a view corridor for incoming traffic and active transportation modes from Hanover Road.

The 11m ROW has been designed thoughtfully with the following aspects in mind:

- The street will operate as a curbless street that is intended to be shared among all road users and allow pedestrians to spillover into the street for special events and higher pedestrian peak periods. Vehicular traffic accessing K and L are intended to be limited to those accessing the parking ramps or servicing areas of the adjacent blocks. Design features such as differentiated surface treatment and bollards can be introduced if desired to ensure accessibility and the presence of a pedestrian protected zone;
- As agreed upon during the workshop held with City staff, portions of the underground garage – specifically the accesses connecting the different garages is permitted under the ROW of Streets K & L. This is to ensure there is economical efficiency to the layout of the underground garage.
- Due to the design vision, programming and operational functions to create a flexible pedestrian environment for this short segment, no landscaping or street furniture is proposed within the ROW. Instead alternative design to lighting and landscaping is recommended, to be integrated with the adjacent private development to create an enhanced, high quality laneway experience.
- Streets K & L will operate as a two-way road that features a 6m wide segment available for motorists. The 6m is the City's lane width minimum to accommodate the City's waste collection vehicle. Therefore, converting Streets K & L to a one-way street would not change the design of the portion accessible by motorists;
- Streets K & L would be eligible for City snow clearance;
- The majority of new build uses along Streets K & L will have loading arrangement internalized to preclude the need for garbage and delivery trucks having to reverse onto the public street (based on preliminary AuoTURN loading review). The exception sought is for Block F which includes the existing Bay 12 building contemplated for entertainment uses as well as new build residential uses. For example, to preserve the non-residential uses in Bay 12, large WB-20 truck movements are required to reverse out onto Streets K & L; and
- There will be no major municipal sewers contemplated along Streets K & L, but minor utilities and/or water may be required to support the street functions.

**Streets M & N**: The former private lanes that extends west of the existing Powell Road terminus and wrapping around the Flight Safety property has been converted to a 18.5m ROW public road. the public road would connect between Ancaster Road to Home Road. The Powell Road extension is based on the road centreline of the existing approach of Powell Road to the east of Ancaster Road.

**Murray Road reserve block**: As discussed with City staff, a 20m wide reserve block has been proposed between Blocks H1 and H2 to allow for the future extension of Murray Road from where it terminates today at Plewes Road should this be required as confirmed by future City studies for the Works Yard and Murray Road.

## 2.2 PRIVATE STREETS

Two groups of private streets form part of the street network within the subject site as described below.

- **Streets H, I & J**: These streets largely follow the existing alignment of the private service driveways that serve the Hangar building. Similar to operations today, there will be a series of large loading bays that front onto these streets. Efforts have been made to consolidate these loading needs to these private streets in order to eliminate loading onto Street D or E. Due to the preservation nature of the Hangar complex, it is not feasible to design loading arrangements that would preclude the need for trucks to reverse onto these private streets.
- **Taxiway Street:** This street will be a key year-round active transportation link for residents, employees, and patrons to The Hangar District. It will be lined within enhanced landscaping and streetscaping and will have retail/restaurant uses fronting onto the street. In addition, Taxiway Street will function as a one-way vehicular street support the convenience of pick-up/drop-off trips related to the retail/restaurant uses within the Village and wide enough (6m) to function as an emergency access road. The supply of pick-up/drop-off opportunities along the Taxiway Street is a curbside management strategy that minimizes the need for motorists to perform pick-up/drop-off along the boundary public streets (Streets A, B, C and D) where the emphasis is on keeping all modes of transportation including transit and cyclists flowing without blockage. The Taxiway Street will be a shared street concept with no curbs to permit pedestrians to spill out onto the street if desired. In addition, the alignment of the Taxiway Street will include curvatures to discourage higher motorist speeds. It is important to note that the Taxiway Street is not required from a traffic capacity perspective. Important considerations of why Taxiway Street needs to be private are to:
    - Permit regular road closure to vehicular traffic during special evens within the Village that require the street to be car-free and only for active transportation.
    - Ensure the street has a high level of service as it relates to maintenance and snow removal. Typically based on the City's snow clearance standards, local roads would be served when 8 cm of snow has accumulated before a snow plow is deployed to ensure the road is safe and passable. However, given the importance of the Taxiway Street in the district as a year round facility, a higher target of maintenance and snow plowing is required. There is also a high degree of design flexibility and maintenance of enhanced landscaping features that the City would typically not entertain for public ROWs – particularly local roads.

## 2.3 CYCLING NEEDS AND DESIGN

From a cycling perspective, City staff commented on the following components of the proposed street network. Responses to each of these along with future endeavours are identified.

1) Connections south to Wilson Avenue using Ancaster Road and Garratt Boulevard must also consider continuing the cycling infrastructure. The emerging direction from the MESP would provide further direction and function of the public street network. We will need to determine the feasibility and the function to the existing network.

   **WSP response**: Cycling facility on Ancaster Road and Garratt Boulevard beyond the limits of the subject district are beyond the scope of the development application and at the City's discretion. The cycling designs proposed along the public streets allow the City to extend along existing streets in the future, which are typically done when there is a need for road resurfacing, servicing upgrades, etc. Notwithstanding, the district proposal already includes some offsite improvements (i.e., along active transportation and right-of-way improvements along existing segments of Home Road and Ancaster Road beyond the district boundary) to improve connectively immediately adjacent to the district. The eventual expansion of the cycling network in the broader study area connecting to Wilson and other major transit stations is aligned with the multi-modal objective of this development.

2) The function and design of Hanover Road and Beffort Road should be reviewed with an active transportation lens in anticipation of Dufferin Street extension.

   **WSP response**: This work is being advanced at the MESP level, tied to the delivery of Dufferin extension. The design of the district does not preclude the advancement of this effort at the MESP level, and the district initiatives will support the objective to improve active transportation connections.

3) The function and design of Murray Road and Plewes Road should be reviewed in context of the Caledonia Road extension (i.e. one of the preferred solutions in the adopted Yorkdale Transportation Master Plan).

   **WSP response**: The Draft Plan has been revised to identify a reserve block to protect for a potential future extension of Murray Rd. The reserve block is 20m in width, consistent with the ROW of the existing Murray Road. The subject district does not contribute significant E-W multi-modal demand to Plewes Road.

4) Please refer to the City's Cycling Network Plan for the existing, planned near-term implementation programs, and City-wide cycling routes in the area.

   **WSP response**: The proposed cycling facilities in and around The Hangar District do not preclude the City’s ability to expand cycling facilities along existing streets based on separate studies or re-prioritization exercises. The team also notes that the City is working with the applicant as co-proponents at the MESP level, where surrounding cycling infrastructure is being advanced.

5) Internal and external pedestrian/cycling accesses and connections, especially connections to existing/planned cycling facilities, should be reviewed and properly designed. Please review the City's Complete Street Guidelines, Bikeway design Guideline (On-going) and Multi-use trail design guidelines.

   **WSP response**: Noted, the emphasis of this resubmission has been to confirm the classification and alignment of various streets in the district. Refinements required to the cycling facility design will be completed in the next submission. It is anticipated that the changes will be to the allocation of the ROW rather than substantial changes to the street ROW widths.

6) The design, type, and location of the proposed cycling facilities in this District should be planned and designed to fit into the City's broader cycling network. Transportation Services staff to provide further comment on design requirements and preferences for this district, general directions include but not limited to:

   a. For new facilities, elevated and separated unidirectional cycle tracks are preferred over bi-directional multi-use paths/trails. Unidirectional cycle tracks make for more intuitive intersections.
   b. At controlled intersections, there should be raised crossings or raised intersections. Especially if there is bi-directional cycle tracks or trails through them. Please refer to the City's Raised Crosswalk Guidelines.
   c. Appropriate buffer should be provided between cycling facilities and sidewalk.

   **WSP response**: Noted, the emphasis of this resubmission has been to confirm the classification and alignment of various streets in the district. Refinements required to the cycling facility design will be completed in the next submission. Although we believe the proposed cycling infrastructure in the district provides an adequate means for cyclists to ride in a separated condition along the boundary public roads, we are open to working with the City on potential reallocation within the proposed ROW should refinements be required on the configuration of the cycling facility.

7) Proposed "Designated Cycling Facilities" in the District Plan - Street D should also have proposed designated cycling facility to complete the network in this district.

   **WSP response**: The proposed cycling plan is shown in **Figure 2-3**. As shown in the diagram, the outer ring road along Streets A, B, C, existing segment of Garratt Boulevard and the segment of Street E between Garratt Boulevard and Home Ancaster Road are proposed to feature dedicated cycling facilities that separate cyclists from motorists (cycle track or multi-use path). The rationale is that higher speed cyclists should be arriving at/departing the district via these ring roads and that once cyclists have arrived within the gateways (i.e., Street E/D where a mobility hub is proposed for enhanced dedicated bicycle parking) that they would be either parking or riding in a shared street environment since they're at or close to their destination.

   It is important to consider that once motorists have entered the district, slower vehicle operating speeds will be induced through the short link distance of Street D along with the all-way stop control at Streets A and E. As shown in Figure 4-2 in Section 4, the weekday peak hour volume on Street D is in the order of 140. When projected over an entire day, this would be approximately 1,500 vehicular trips along Street D. The speed and volume of motorized traffic are key factors influencing the context sensitive design of cycling facilities. The City's Complete Street Guideline references the guidance from OTM Book 18 (excerpt below). Based on the low operating speeds of vehicles and the low daily vehicular volumes, a shared roadway is appropriate.




8) Consider connections to Wilson via Ancaster and Garratt continuing cycling infrastructure.

   **WSP response**: The suggested improvement is beyond the district boundary and study /project scope. The designs completed within the district allows the City to expand further to Wilson in the future when the timing is appropriate (i.e., scheduled road resurfacing/improvements).




FIGURE 2-3 PROPOSED ACTIVE MOBILITY NETWORK

- Taxiway West District
- Subject Area
- Downsview Framework Plan
- Proposed Designated Cycling Facilities
- Proposed Shared Active Transportation Routes
- Conceptual Mid-block Connections
- Framework Plan Proposed Cycling Facilities
- Context Cycling Facilities/Shared Access
- Proposed Rail Crossing
- Framework Plan Proposed Rail Crossing
- Context Proposed Rail Crossing
- Potential Future Public Street Extension
- Proposed Public Realm (pedestrian network and streets)
- Parks and Open Spaces
- Potential Future Hub

# 3 PARKING ASSESSMENT

## 3.1 MOTOR VEHICLE PARKING

The vehicular parking requirements outlined in By-laws 125-2022 and 89-2022, which remove the minimum parking requirements for most uses have been referenced as a baseline in this study. The City of Toronto adopted By-law 125-2022 on February 17, 2022, with respect to correcting the mapping errors contained in By-law 89-2022, which was adopted on February 3, 2022 to amend By-law 569-2013, the Zoning By-law. An appeal to By-laws 125-2022 and 89-2022 was received and has been resolved through an order issued by the Ontario Land Tribunal (OLT), and the decision was made under OLT-22-002960.

**Table 3-1** summarizes the minimum and maximum parking rates for each of the uses proposed in the site. The as-of-right zoning as per By-law 89-2022 is "all other areas of the City" as shown in the excerpt below. Notwithstanding, Parking Zone B rates are proposed to be applied to The Hangar District to align it with the target modal split by not encouraging excessive auto ownership. Parking Zone B is suitable for sites with modest to frequent surface transit facilities that connect to higher order transit. Given The Hangar District will be one of the further sites from higher order transit in the entire Downsview development lands and requiring some intermediate connection through surface transit, Parking Zone B rates are appropriate for the subject district. The vehicular parking of The Hangar District is modelled after the minimum and maximum parking allowances from Parking Zone B of By-law 89-2022.



**Table 3-1 Required Parking per Zoning By-law 89-2022**

| Land Use (Magnitude) | | Parking Rates | | Parking Spaces | |
|---|---|---|---|---|---|
| | | Parking Zone B | Proposed | Parking Zone B | Proposed |
| Residential *(spaces per unit)* | Studio *(135 units)* | 0.7 | 0.40 | 94 | 1,140 |
| | 1-Bedroom *(1,353 units)* | 0.8 | | 1,082 | |
| | 2-Bedroom *(947 units)* | 0.9 | | 852 | |
| | 3-Bedroom *(271 units)* | 1.1 | | 297 | |
| | Townhouse *(145 units)* | N/A | | N/A | |
| | Visitor *(2,850 units)* | **Minimum**: 2 + 0.05/unit **Maximum**: 1.0 per unit for the first 5 dwelling units; and 0.1 per unit for the sixth and subsequent units | 0.10 | **Minimum**: 144 **Maximum**: 289 | 285 |
| **Residential & Visitor Sub-total** | | | | **Minimum: 144 Maximum: 2,614** | **1,425** |
| Non-Residential Uses *(spaces per 100 sq.m.)* | Office *(98,654 sq.m.)* | 1.0 | 1.0* plus 0.5 (transitional) | 986 | 1,479 |
| | Retail *(13,917 sq.m.)* | 4.0 | 1.50 | 556 | 208 |
| | Industrial *(34,003 sq.m.)* | 4.0 | 1.00 | 1,360 | 340 |
| | Institutional *(6,002 sq.m.)* | 1.0 | 0.50 | 60 | 30 |
| | Hotel *(8,384 sq.m.)* | 1.0 | 0.20 | 83 | 16 |
| **Non-residential Sub-total** | | | | **3,045** | **2,073** |
| ***The Hangar District Total*** | | | | **Minimum: 137 Maximum: 5,645** | **3,498** |

** Transitional parking for office uses above the PZB maximum parking space rate will be required subject to securing the necessary agreements with the City of Toronto, which will be reflected in the site specific by-law.*

As shown above, the minimum and maximum parking requirements associated with Parking Zone B of By-law 89-2022 is 137 and 5,645 spaces, respectively. Based on the individual proposed parking rates for each of the land uses, the absolute supply would be 3,498 spaces, which is well within the minimum and maximum allowances from the Zoning By-law. However, given the mixed-use nature of the development and the intent of a complete community, share parking is proposed amongst the non-residential uses along with the visitor parking component as permitted based on the Zoning By-law as shown below.

| Use | Shared Parking Allowance Morning | Shared Parking Allowance Afternoon | Shared Parking Allowance Evening |
|---|---|---|---|
| Residential Units | 100% | 100% | 100% |
| Residential Visitor | 10% | 35% | 100% |
| Office | 100% | 60% | 0% |
| Retail | 100% | 100% | 20% |
| Industrial (Manufacturing Uses) | 100% | 100% | 100% |
| Institutional | 25% | 100% | 100% |
| Hotel | 80% | 75% | 100% |

Based on the consideration of the above shared parking allowances, the **proposed parking supply is 3,044 spaces (1,425 residential spaces and 1,629 pooled non-residential and visitor parking spaces). This parking supply is well within the minimum and maximum parking allowances from By-law 89-2022 for Parking Zone B.**

Almost all of the proposed parking supply rates comply with the minimum and maximum requirements from Parking Zone B. The only exception is for office use. Where based on marketing studies completed for the prospective tenants of office use within The Hangar District along with records of current office tenant parking demand, office uses require a higher parking rate in the near term horizon (before higher density and a complete community environment is achieved in the Downsview lands and before broader surface transit and active transportation facilities are built) than Parking Zone B permit. This interim supply for office use is critical for attracting a wide range of office and employment tenants to the site. There are two important considerations on why this interim transitional arrangement is adequate:

- Shared parking is embedded in the proposed district. Rather than having dedicated parking for specific non-residential uses, a pool of 1,629 spaces is proposed, which is well within the 3,334 maximum non-residential and visitor spaces permitted (Table 3-1). Therefore, while higher office parking is supplied in the interim, **the office parking will be used in the off-peak periods for other land uses while still respecting the maximum allowances from the City By-law**.

- In the interim phases of building out The Hangar District, parking for non-residential uses will be supplied in part through temporary surface parking (on parcels that are developed during a later phase) and the parking parkade proposed at the north-west corner of the site near the Hangar buildings. As the underground parking are gradually built to serve various uses, the surface parking will be scaled back. As discussed with the City, there are opportunities in the future to convert the parkade from vehicular parking to other non-auto uses in the future (i.e., mobility hub, enhanced bicycle parking, scooter or other micro-mobility).

## 3.2 AUTO PARKING SUMMARY

**Overall, the proposed parking supply of 3,044 spaces based on the approximate land use proposed is 46% lower than the maximum allowances of Parking Zones B from By-law 89-2022.** This is aligned with the TGS Version 4 target of reducing single occupant vehicle trips by at least 25% and the emphasis to reduce reliance on vehicular modes of transportation. The proposed parking supply features dedicated residential spaces along with a pool of shared non-residential and visitor parking spaces. With consideration of the transitional parking component of the office use, the future overall parking supply may be even lower than the maximum City allowances to achieve higher sustainability. The accessible parking needs will be established and evaluated during the SPA stage when more details on each block and parking area are available. The final quantity of parking supplied in the district will be refined through the design and approval process once specific uses and tenants are established, but at no point with the quantity of parking exceed the Zoning By-law requirements.

# 3.3 BICYCLE PARKING

The bicycle parking requirements for the proposed development are based on the harmonized By-law 569-2013 and the Toronto Green Standard requirements. The proposed development is located in Bicycle Zone 2. **Table 3-2** summarizes the bicycle parking requirements for the district.

**Table 3-2: Bicycle Parking Standards according to By-law 569-2013 (Bicycle Zone 2)**

| Land Use | | | Short-Term | | Long-Term | | Total |
|---|---|---|---|---|---|---|---|
| | | | Rate | Required spaces | Rate | Required spaces | |
| Residential Apartments & Townhouses | | 2,850 units | 0.07 | 200 | 0.68 | 1,938 | 2,138 |
| Non-Residential | Retail | 12,059 $m^2$ | 0.25 (+3) | 38 | 0.13 | 19 | 57 |
| | Office | 98,654 $m^2$ | 0.15 (+3) | 151 | 0.13 | 129 | 280 |
| | Industrial (manufacturing) | 34,003 $m^2$ | 0.08 (+3) | 31 | 0.07 | 24 | 55 |
| | Hotel | 8, 384 $m^2$ | 0.15 (+3) | 16 | 0.13 | 11 | 27 |
| | Institutional | 7,859 $m^2$ | 0.15 (+3) | 13 | 0.13 | 8 | 21 |
| | Total | | -- | 249 | -- | 191 | 440 |
| ***The Hangar District Total*** | | | - | ***449*** | - | ***2,129*** | ***2,578*** |

The total required bicycle parking supply is 2,578 spaces (including 449 short-term and 2,129 long-term). The Hangar District proposes to meet these requirements. In addition, as per TGS Version 4 Tier 2 requirements, at least 15% of the long-term bicycle parking spaces will include an Energized Outlet adjacent to the bicycle rack or parking space. During the SPA stage of each of the development blocks, the exact bicycle parking requirement will be established for each building along with the review of the bicycle parking location and specification relative to the City's requirements.

It should also be noted that in addition to the above-noted bicycle parking commitments, the applicant is exploring to provide non-residential short-term and long-term parking spaces in centralized bicycle parking facilities located at strategic locations in The Hangar District. In addition, permission is being requested through the resubmission to permit short-term and long-term residential and non-residential bike parking to be provided within the same lot or within 300 m thereof.

# 4 TRAFFIC OPERATIONS

The existing and future background evaluations presented in the May 2022 Transportation Study remain applicable for this resubmission. The following highlights key updates to the future total conditions.

- The sites statistics of the non-residential uses have been changed slightly as summarized in Section 1, but the overall land uses and residential density remain unchanged.
- At the time of the original May 2022 Transportation Study, the City had not yet completed its own Emme model for the Downsview lands. As a result, a conservative first principle approach using person trips from proxy surveys and applying non-auto modal targets was used to forecast the site-generated traffic. Through the broader transportation modelling work at the MESP level, it has been understood that the first principles approach overestimates the total amount of trip generation and auto trips. To remain consistent with the MESP findings, a GTAModel adjustment factor of 37.6% was applied to the first principles approach in this report. WSP looks forward to working with City Staff to further fine-tune the trip generation adjustment to the to properly align with the City's GTAModel v4 for the 2031 horizon.
- In the May 2022 Transportation Study, two temporary/interim private roadways were evaluated to support the traffic volumes of the entire Taxiway West District including The Hangar District and the North Sub-District (film studio campus). The access roads include an interim east-west road connecting to Allen Road via a traffic signal, along with a temporary north-south road that connects to Carl Hall Road. The temporary north-south road was proposed as part of the SPA process of the North Sub-District (Film Studio). At this time, based on the GTAModel adjustment factor and the future total traffic findings, the temporary north-south access is not required to support the entire Taxiway West District from a phasing perspective. Notwithstanding, details related to the north-south temporary road will be covered under a separate process as part of the Taxiway North Sub-District. Similarly, it should be noted that the Applicant and the City, working as co-proponents at the MESP, have identified a temporary east-west road to support The Hangar District instead of the interim condition of the Downsview Park Boulevard extension as proposed originally. This has been reflected below in **Figure 4-1**. This report will continue to be updated to align with the MESP findings at the next resubmission as well.

**Figure 4-1: Temporary Access Road Connecting the Taxiway West District to Allen Road**



## 4.1 TRIP GENERATION

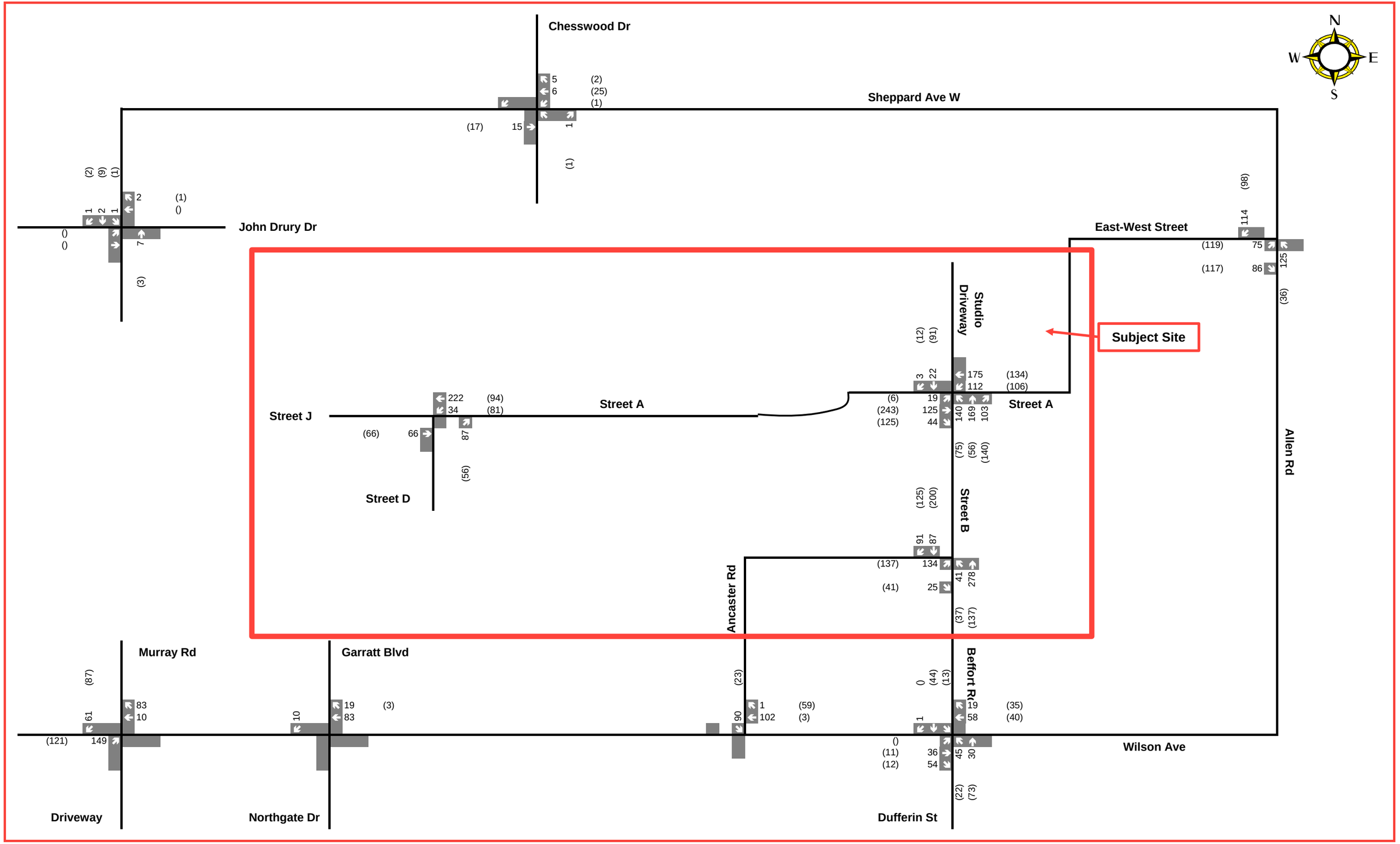
As noted earlier, and based on lessons learned from working with the GTAModel V4 at the MESP, it has been noted that the conservative first principles approach yields significantly higher trip generation than those in the City's model. To better align this work with that of the City's modeling, this report proposes an adjustment factor of 37.6%. WSP would welcome further coordination and collaboration with the City to properly align with the City's GTAModel v4 for the 2031 horizon.

Consistent with the May 2022 Transportation Study, the existing traffic associated with the existing Bombardier uses have been removed to derive the net site-generated volumes. The auto trip generation summary is provided in **Table 4-1**. It is important to note that the trip generation was first completed for each of the 3 sub-areas (The Hangars, The Village and Ancaster West) and rounded up conservatively based on the rates outlined in Table 4-1. As a result, the sub-total for all three sub-areas will be slightly higher than the direct application of the trip generation rates to the overall statistics. In essence, the trip generation evaluated is slightly higher due to rounding, which is conservative.

**Table 4-1 Net Auto Trip Generation of the Taxiway West District**

| Land Use (Magnitude) | | A.M. Peak Hour | | | P.M. Peak Hour | | |
|---|---|---|---|---|---|---|---|
| | | Inbound | Outbound | Total | Outbound | Inbound | Total |
| Film Studio (107, 329 $m^2$) | Trip Rate (per 100 $m^2$) | 0.44 | 0.07 | 0.51 | 0.15 | 0.29 | 0.44 |
| | *Sub-Total* | *473* | *76* | *549* | *161* | *312* | *473* |
| ***North Sub-District (Film Studio) Total*** | | ***473*** | ***76*** | ***549*** | ***161*** | ***312*** | ***473*** |
| Residential *(2,850 units)* | Trip Rate (per unit) | 0.04 | 0.14 | 0.18 | 0.13 | 0.05 | 0.18 |
| | *Sub-Total* | *119* | *404* | *523* | *374* | *147* | *521* |
| Retail *(12,049.52 $m^2$)* | Trip Rate (per 100 $m^2$) | 0.62 | 0.63 | 1.25 | 1.88 | 1.87 | 3.75 |
| | *Sub-Total* | *77* | *79* | *156* | *230* | *228* | *458* |
| Office / Commercial *(98,653.70 $m^2$)* | Trip Rate (per 100 $m^2$) | 0.66 | 0.09 | 0.75 | 0.09 | 0.61 | 0.70 |
| | *Sub-Total* | *654* | *91* | *745* | *91* | *605* | *696* |
| Institutional *(7859.59 $m^2$)* | Trip Rate (per 100 $m^2$) | 0.30 | 0.30 | 0.60 | 0.88 | 0.87 | 1.75 |
| | *Sub-Total* | *31* | *31* | *62* | *88* | *88* | *176* |
| Hotel *(136 suites)* | Trip Rate (per suite) | 0.15 | 0.15 | 0.30 | 0.15 | 0.15 | 0.30 |
| | *Sub-Total* | *21* | *21* | *42* | *21* | *21* | *42* |
| Light Industrial *(34,002.50 $m^2$)* | Trip Rate (per 100 $m^2$) | 0.33 | 0.12 | 0.45 | 0.12 | 0.33 | 0.45 |
| | *Sub-Total* | *113* | *41* | *154* | *41* | *113* | *154* |
| ***The Hangar District Total*** | | ***1015*** | ***667*** | ***1682*** | ***845*** | ***1202*** | ***2047*** |
| Existing Traffic Removal | | -600 | -200 | -800 | -300 | -850 | -1150 |
| *Sub-Total* | | *888* | *543* | *1,431* | *706* | *664* | *1,370* |
| GTAModel adjustment factor (37.6%) | | -334 | -203 | -537 | -266 | -250 | -516 |
| ***Net Total*** | | ***554*** | ***340*** | ***894*** | ***440*** | ***414*** | ***854*** |

Overall, the entire Taxiway West District are forecast to generate a net total of 894 and 854 auto trips during the morning and afternoon peak hours, respectively. Consistent with the May 2022 Transportation Study, the net site-generated volumes were then assigned dynamically through Visum based on the future 2028 road network to arrive at the site-generated traffic assignment shown in **Figure 4-1**. The Visum output used for deriving the site traffic assignment are provided in **Appendix B**.




Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

# Figure 4-1 Net Site-Generated Volumes
# Taxiway West District

## 4.2 FUTURE TOTAL ASSESSMENT

Visum was used to develop the 2028 future total volumes considering the dynamic assignment of the site-generated volumes along with the routing changes of the volumes associated with the existing community that will gain additional access to Allen Road via the temporary east-west road. The Visum output used for deriving the site traffic assignment are provided in **Appendix B**. Consistent with the original May 2022 Transportation Study, three key internal intersections have been evaluated in this study. The future total volumes at these three intersections were developed by applying the 37.6% GTAModel adjustment factor related to the overestimation of auto trips to the previous set of future total volumes at these three internal intersections (Figure 4.7 of the May 2022 Transportation Study).

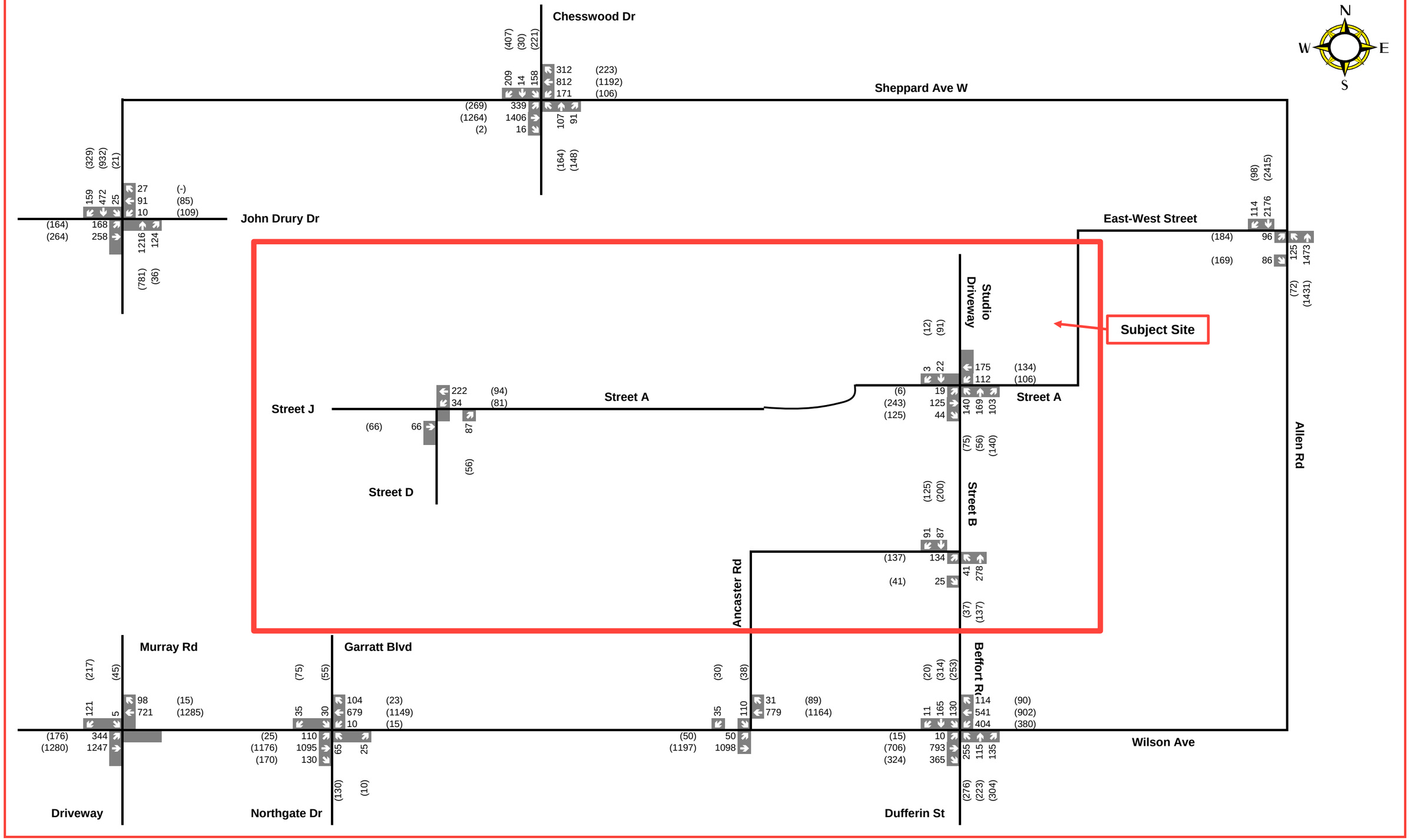
The resulting 2028 future total traffic volumes are shown in **Figure 4-2**. Based on these volumes, the future total intersection operations have been evaluated and are documented in **Table 4-2**. Detailed Synchro worksheets are provided in **Appendix C**.

The future total assessment maintains the cycle lengths and splits as analyzed in the May 2022 Transportation Study, with the exception of the p.m. peak hour period at the intersection of Chesswood Drive and Sheppard Avenue West where minor green time split reallocation was applied (one second was reallocated from the exclusive southbound-left / southbound-through phases to the eastbound through and westbound through phases).

**Table 4-2 2028 Future Total Intersection Operations**

| Intersection | Weekday A.M. Peak Hour | | Weekday P.M. Peak Hour | |
|---|---|---|---|---|
| | LOS (Delay in Seconds) [Overall intersection V/C Ratio] | Critical Movements (Volume/ Capacity Ratio) | LOS (Delay in Seconds) [Overall intersection V/C Ratio] | Critical Movements (Volume/ Capacity Ratio) |
| ***Signalized Intersections*** | | | | |
| Sheppard Ave W & John Drury Dr | B (19.5) [0.71] | - | B (18.4) [0.64] | - |
| Sheppard Ave W & Chesswood Dr | D (40.2) [0.96] | EB-TR (0.91)<br>WB-TR (0.93)<br>SB-L (0.91) | D (41.7) [0.92] | EB-L (0.93)<br>WB-TR (0.99)<br>SB-L (0.95) |
| Wilson Ave & Murray Rd / Residential Driveway | A (8.3) [0.68] | - | B (15.7) [0.84] | -- |
| Wilson Ave & Garratt Blvd / Northgate Dr | A (9.7) [0.44] | - | B (11.7) [0.47] | - |
| Wilson Rd & Ancaster Rd | A (6.1) [0.45] | - | A (5.9) [0.44] | - |
| Wilson Ave & Dufferin St | D (44.6) [0.90] | EB-T (0.91)<br>WB-L (0.98) | C (32.1) [0.77] | WB-L (0.96) |
| Allen Rd & New East/West Road | B (14.2) [0.72] | - | B (19.0) [0.79] | - |
| Street A & Street B / Studio Driveway | B (13.4) [0.31] | - | B (11.5) [0.35] | - |
| ***All-way Stop Intersections*** | | | | |
| Street C & Street B / Hanover Rd | B (10.2) [0.32] | -- | B (10.3) [0.41] | -- |
| Street D & Street A / Street J | A (8.8) [0.32] | -- | A (8.0) [0.26] | -- |

*Note 1: For signalized intersections, the level of service is based on the overall delay of the intersection. Critical v/c ratios are only listed for movements with values over 0.90.*
*Note 2: For all-way stop-controlled intersections, the LOS is based on the delay associated with the overall intersection.*




Legend

xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

# Figure 4-2
# 2028 Future Total Traffic Volumes

The future total conditions above may be summarized as follows:

- All of the study intersections continue to operate at acceptable LOS 'D' or better;
- All of the study movements and intersections continue to operate within capacity;
- The results indicate that the proposed intersection control at the three key internal intersections are appropriate;
- Relative to the future total conditions presented in the May 2022 Transportation Study (excerpt below), the intersection overall v/c ratios are very similar. The average change in overall v/c ratio for all of the study intersections is minimal.

TABLE 27 SIGNALIZED INTERSECTION ANALYSIS

| Intersection | Existing | Future Total (2028) |
|---|---|---|
| Sheppard Avenue West / John Drury Drive | 0.47 (0.53) | 0.72 (0.69) |
| Sheppard Avenue West / Chesswood Drive | 0.93 (0.83) | 0.86 (0.92) |
| Allen Road / New East-West Street | -- (--) | 0.79 (0.89) |
| Wilson Avenue / Murray Road / Private Driveway | 0.53 (0.55) | 0.55 (0.88) |
| Wilson Avenue / Garratt Boulevard / Northgate Drive | 0.44 (0.49) | 0.43 (0.46) |
| Wilson Avenue / Ancaster Road | 0.39 (0.43) | 0.40 (0.45) |
| Wilson Avenue / Dufferin Street | 0.80 (0.77) | 0.92 (0.79) |
| Street A / Street B | -- (--) | 0.55 (0.57) |

Notes:
1 xx (xx) – AM Peak Hour (PM Peak Hour)

- From a lane configuration perspective, almost all of the newly formed intersections feature a basic one lane in each approach configuration to minimize the overdesign of an intersection for vehicular modes particularly when the LOS is adequate. Consistent with the May 2022 Transportation Study, the only auxiliary turn lanes proposed in The Hangar District are as follow:
  - At Street A / B / Studio Driveway – auxiliary northbound left and westbound left-turn lanes are proposed.
  - At Street B / C / Hanover Road – auxiliary northbound left-turn lane is proposed.

  In general, these left-turn auxiliary turn lanes are intended to better serve bus movements that may circulate the street network around the Village in circumstances where the left-turn volume represent a high proportion of the approach volume. While larger vehicles are waiting for gaps to perform the left-turns, the trailing mixture of left, through and right-turn volumes may inadvertently be blocking the crosswalk or active transportation facility. Therefore, providing these auxiliary turn lanes is a reasonable design measure.

**Conclusion**: The future total results confirm that the vehicular traffic generated by the entire Taxiway West District can be readily accommodated by the study road network. No geometric improvements are required at the existing surrounding study intersections beyond signal timing split adjustments. The addition of the site-generated traffic does not result in excessive delays or capacity constraints for the existing community looking to access/egress onto Wilson Avenue. In fact, the availability of the east-west access road to Allen Road via a signalized intersection provides additional routing options for the existing neighbourhood.

# 5 TRANSPORTATION DEMAND MANAGEMENT

TDM is a critical component of The Hangar District that will be designed through both hard and soft TDM measures. In the original May 2022 Transportation Study, a series of TDM measures were identified that are classified into the following major categories:

1) Transit & first-/last-mile
2) Operational TDM measures and management
3) Vehicle parking – reduced overall parking relative to the By-law maximums (as outlined in Section 3.1)
4) Bicycle parking – as noted in Section 3.2, the proposed bicycle parking supply will satisfy the City's requirements. In addition, consistent with the May 2022 submission, a portion of the short-term bicycle parking will be provided in purpose-built structures at the different gateways to The Hangar District along with secured/access controlled, maintenance and repair stations and the potential for long-term automation and expansion.
5) Loading and servicing – the proposed loading supply and design dimension will comply with the City of Toronto By-law 569-2013 to ensure loading occurs off-street and do not impede active transportation or transit users. In general, each residential building will feature 1 Type 'G' loading bay and where the unit count exceeds 400 units, a Type 'C' loading bay will also be provided. Where notable retail or non-residential uses are proposed, an additional Type A or B loading bay will be provided. The loading needs of each of the development blocks will be confirmed and evaluated in greater detail during the SPA submission stage. As noted earlier, almost all of the loading operations will be designed so that trucks do not need to reverse onto a public street, with the only exceptions where there are existing buildings being preserved.

The combination of these TDM measures will allow The Hangar District to achieve the target auto modal share target of 45-50% (as per the 2031 framework plan and consistent with the May 2022 Transportation Study), which fulfills the Toronto Green Standard Tier 2 version 4 single occupant modal split reduction of 25% since the current auto modal split is 65-70%. Further details and updates on parts 1 and 2 of the TDM pillars are outlined in the following section. The vehicular and bicycle parking provisions remain consistent with the May 2022 submission and are already discussed in Sections 3.1 and 3.2.

## 5.1 TRANSIT & FIRST-/LAST MILE

As outlined in the May 2022 transportation study, The Hangar District is located 2km to 5km from various higher-order transit stations. This presents the interim need for a reliable and convenient mean of connecting to the higher order subway and GO stations. The following four mitigating measures are proposed to bridge the interim gap (before the broader active transportation facilities and regular local bus services are introduced in the longer term):

1) Ensuring the proposed streets within The Hangar District are designed with active transportation as a priority and provisions for the circulation needs of surface transit. As noted earlier in Section 2, the street network has been updated since the original May 2022 Transportation Study based on feedback received from City staff through formal comments and several meetings. In addition, The Hangar District continues to feature a diverse suite of land uses that allow a complete community where residents can live, work, entertain and complete retail needs within a walkable community rather than having to drive externally.

2) Providing interim transit shuttle service that may be complimentary to the existing TTC surface transit services. The mechanism of the shuttle service is being advanced to understand operational requirements and feasibility, and will require coordination with the City and TTC. Given the changes internal to the District and the removal of the temporary north-south road connecting to Carl Hall Road, further development/update of the previous shuttle bus routing (as shown in **Figure 5-1**) will be completed as part of the next submission. The project team is looking to enter into dialogues with TTC and the City on the planning of the shuttle bus program. What remains a priority is the goal of providing the shuttle service from Day 1 of the development occupancy to ensure residents, visitors and employees develop the habit of using transit rather than driving. As shown in Figure 5-1, the private shuttle bus network will largely by-pass the existing neighbourhood to minimize overlap with TTC services and truck volumes. However, this does not preclude the opportunity for to eventually expand the shuttle service to serve existing residents in the surrounding community. Further work on defining the routing, funding and frequency parameters of this important TDM measure leading up to the next submission with coordination required from the City to enter into discussions with TTC.

**Figure 5-1 Interim Shuttle Bus Concept**



3) Providing bicycle facilities and programs that support cycling as a means of travel to/from transit stations. This includes providing sufficient bicycle parking that fulfill TGS requirements, some of which will be centralized at key gateway locations to the South Sub-district to form mobility hubs. At the granular level, each of the future development buildings will need to have bicycle repair stations along with bicycle parking that meets the City's minimum dimension requirements.

4) Providing and protecting for future micro-mobility options within The Hangar District. While Toronto currently do not permit e-Scooters on public right-of-ways. E-scooters are growing in popularity as a sustainable means of commuting short-to modest distances, which would be great for accessing/egressing the surrounding higher-order transit stations. This is an area that will continue to be explored in the future applications stages.

## 5.2 OPERATIONAL TDM MEASURES

Operational TDM measures are comprised of programs, incentives and measures that are implemented pos-occupancy of the site to reduce reliance on single occupant mode of transportation. However, unlike typical development applications, the scale and variety of uses of The Hangar District presents a challenge to commit to exact Operational TDM measures to apply for each building and land use. As part of the SPA application for each of the separate buildings/blocks, the TDM measures catered for the respective uses would be defined and secured through funding mechanisms. Notwithstanding, WSP has defined the package of TDM measures that are likely suitable for The Hangar District as outlined in **Table 5-1**.

**TABLE 5-1 – Proposed TDM Strategy – The Hangar District**

| Action / Measure | Estimated Cost | |
|---|---|---|
| | Unit | Total |
| Design the parking structure serving the Hangar employment uses to permit transition to non-vehicular parking uses as the active transportation, transit infrastructure and complete community concept matures in the broader Downsview lands. For example, the garage could be converted to enhanced micro mobility facilities. | Included in construction costs | |
| Reduced vehicular parking supply (relative to Parking Zone B By-law maximum allowances) | Included in construction costs | |
| Unbundle the rental of vehicular parking from office/industrial leases along with residential unit sales/rental. This allows residents and employees to save on the cost of auto ownership and reinvesting the funds towards other modes of transportation. | Marketing strategy | |
| Charging market price for vehicular parking without subsidy | Marketing strategy | |
| TDM monitoring – a regular travel demand survey may be conducted once the building is reasonably occupied to collect feedback on the effectiveness of TDM measures along with travel mode data. This will be important input to the optimization of a tailored set of TDM measures for the Hangar buildings. This TDM measure will be defined at the MESP level. | TBD | |
| Providing an easily accessible bicycle repair/maintenance station within easy reach of each building. | $1,500/station | TBD |
| Investment into bike share station. There are currently no bike share station in the community. Typically either a lump sum contribution is made or provision is made to provide a bike share station within the subject site. During the SPA stage, the team is | $25,000 to $50,000 investment | |

| Action / Measure | Estimated Cost | |
|---|---|---|
| | Unit | Total |
| open to discussing with TPA opportunities for strategic bike share station(s) within The Hangar District. | | |
| PRESTO card and bike share/car share incentive distribution to the first set of building residents | $150/unit x 2,850 units | $427,500 |
| Offering carpool parking spaces in convenient locations of the parking structure so that those carpooling to work are rewarded. | Included in construction and marketing costs | |
| Information Session on Active Transportation and public transit and shuttle service when the building is at a meaningful occupancy (i.e. 85%). Session could be held at the site complex with handouts printed of the available non-auto modes of transportation available. | $500/session (disbursements) | TBD |
| TDM Display Screen to be displayed in building common area displaying transit, and active transportation details. | $2,000/screen | TBD |
| Providing a high level of service for maintenance for active transportation modes (i.e., snow removal, repairs, signage and lighting which are all important components of the user experience for someone walking, cycling or taking transit). | Ongoing operational costs | |

# 6 CONCLUSIONS

This TIS Addendum has evaluated the updated plan for The Hangar District in the City of Toronto. The site statistics and land uses are very similar to those evaluate in the May 2022 Transportation Study. The update of the district street network is based on the consideration of comments received from the City, along with extensive follow up meetings and a whole day workshop.

The entire Taxiway West District (including The Hangar and the North Sub-District) is forecast to generate a net total of 894 and 854 auto trips during the morning and afternoon peak hours, respectively. This is with consideration of the removal of the Bombardier-related traffic, latest set of statistics and a GTAModel adjustment factor to better reflect the trip generation/modal split from the City's Emme outputs as identified in the MESP transportation evaluation.

The future total conditions confirm that all of the study intersections will continue to operate adequately with no movements operating over capacity. No geometric improvement is required at the external boundary intersections. The results indicate that the traffic generated by the entire Taxiway West District can be accommodated by the proposed east-west temporary access road to Allen Road. The existing and future background conditions remain the same as the May 2022 Transportation Study.

While the site is currently designated "all other areas of the City", the project team believes Parking Zone B rates are more fitting for The Hangar District due to its location within the Downsview lands. Therefore, the proposed target parking supply rates comply with the City of Toronto By-law 89-2022 Parking Zone B minimum and maximum rates. The proposed parking supply of 3,044 spaces is 46% lower than the maximum allowances of Parking Zones B. The proposed parking supply features dedicated residential spaces along with a pool of shared non-residential and visitor parking spaces. With consideration of the transitional parking component of the office use, the future overall parking supply may be even lower than the maximum City allowances to achieve higher sustainability. Interim parking during the phased development will take place both interim surface parking and the proposed parkade.

The proposed bicycle parking supply will conform with the City of Toronto By-law 569-2013 Bicycle Zone 2 requirements.

A robust package of TDM measures is proposed within the tool kit to apply to The Hangar district that accounts for different land uses. Given the scale of the development and the stage at which each development building/block is at, it is not feasible to secure an agreement on the exact details of the TDM measures.

# APPENDX A
# CROSS-SECTIONS

# APPENDIX

The cross-sections for the proposed public streets largely remain the same as the May 2022 submission. For reference, the typical cross-sections and their location relative to the updated street network plan has been provided in this appendix. Streets M/N and K/L have been reconfigured to public streets. The preliminary cross-section of Streets M/N are presented while the cross-section of Streets K/L is being refined further based on additional discussions with the City. As noted in the report, the street network is comprised of the following public streets.

| Street | Classification | ROW | Change from May 2022 | Additional Remarks |
|---|---|---|---|---|
| **A** | Public | 23m | -- | -- |
| **B** | Public | 23m | -- | Extension of Hanover Street |
| **C** | Public | 20m | -- | Extension of Ancaster Road |
| **D** | Public | 18.5m | -- | Extension of Garratt Boulevard |
| **E** | Public | 18.5m | -- | Extension of Home Road |
| **F** | Public | 18.5m | -- | Extension of Gilley Road |
| **G** | Public | 18.5m | -- | -- |
| **K** | ***Public*** | 11m | Change from a private lane to public street as per discussions with City staff and with adjustment to alignment. The width of the ROW has been maintained from the 11m wide private lane. | Designed as an intimate shared street concept modelled after precedence from North America. Exceptions required to permit localized truck reverses due to the preservation of existing building in Block F |
| **L** | ***Public*** | 11m | | |
| **M**<br>**N** | ***Public*** | 18.5m | Change from a 11m wide private lane to 18.5m ROW public street as per discussions with City staff | Requires property from Flight Safety property. Interim conditions to be designed where an interim access road with sidewalk on one side may be in service |




Key Map for Public Street Cross-sections presented

- Taxiway West District
- Subject Area
- Downsview Framework Plan
- Proposed Public Streets
- Proposed Private Streets
- Potential Future Public Street Extension

URBAN STRATEGIES INC. | PERKINS EASTMAN | dtah | ARUP | WSP

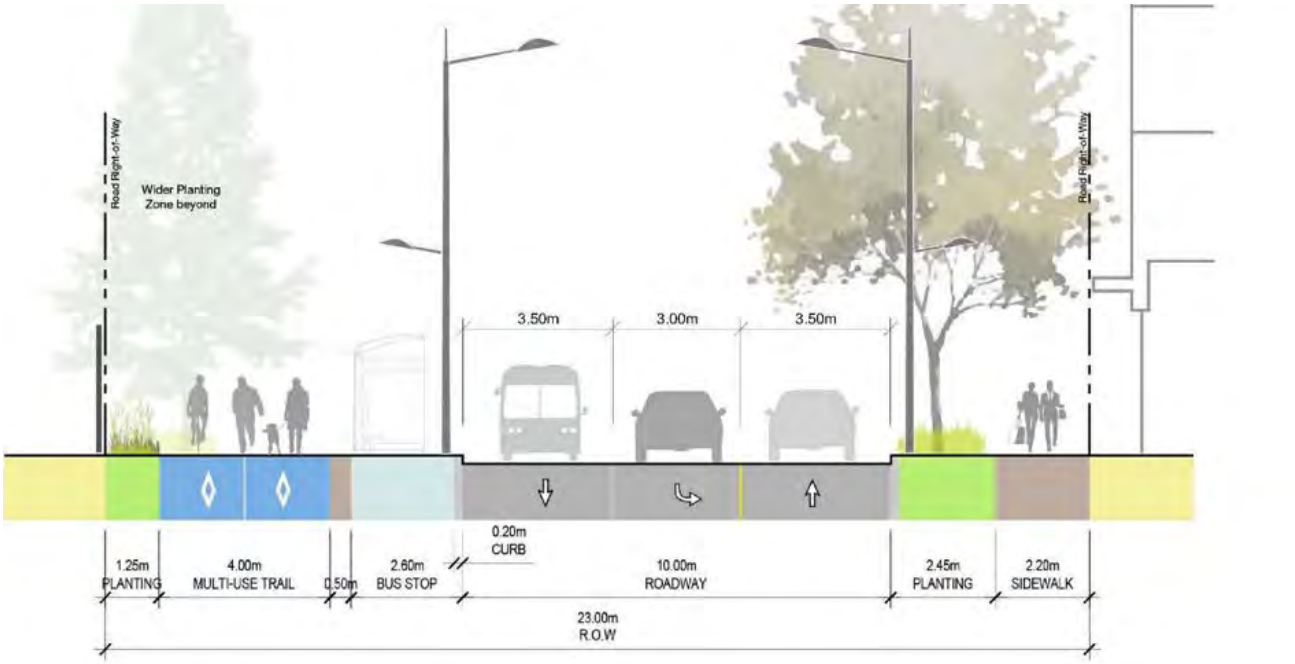
**Street A**

Street A is an important east-west local street bordering the North Sub-District and framing the north edge of the Hangar District. In addition to its role as an active transportation corridor that connects to the rail crossing, it will serve as a bus route and one of the primary street for trucks using the industrial hangar space and North Sub-District (Film Studio Campus). It is also a direct route to the proposed parking garage adjacent to the rail line. Street A will connect to the extension of the Framework Plan collector roads, leading to the interim East-west connection to the Allen Road.

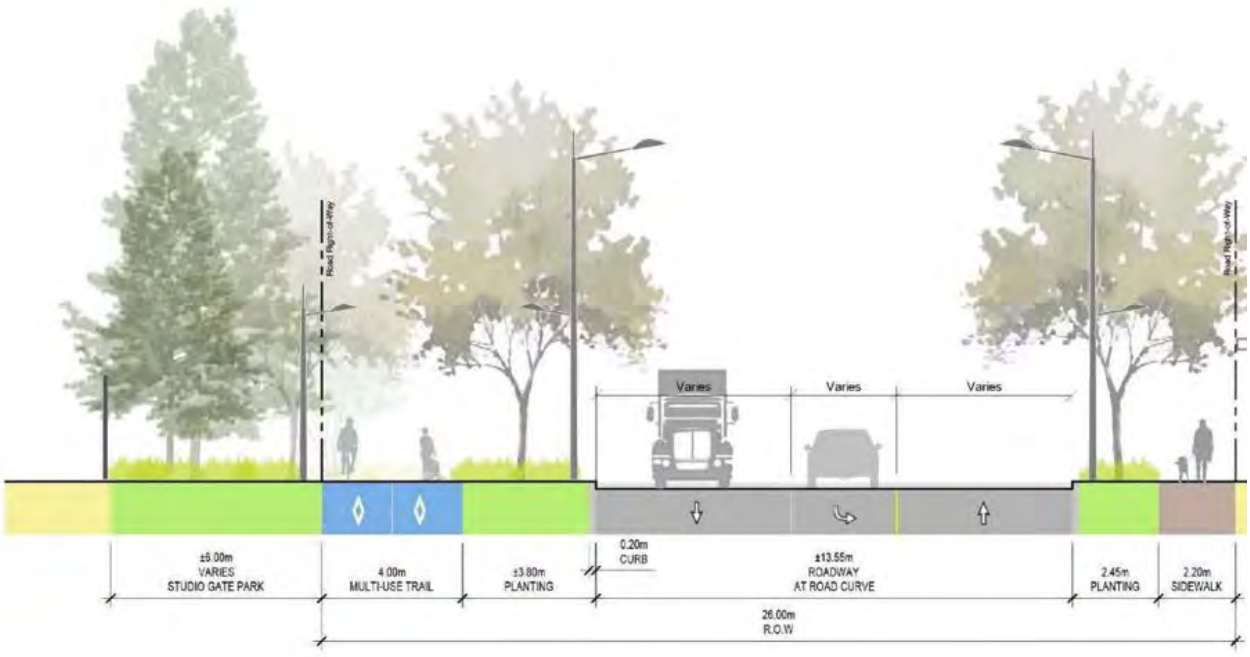
Transportation elements of the cross section include:

- A basic 23m Right of Way
- A 4.00m multi-use trail on the north side and 2.20m sidewalk on the south side
- Two (2) 3.50m thru lanes with a 3.00m left turn lanes between Street D and Street B
- Space for a bus stop on the north side near Street B.

## PROPOSED STREET A CROSS-SECTION (A1)




## PROPOSED STREET A CROSS-SECTION (A2)



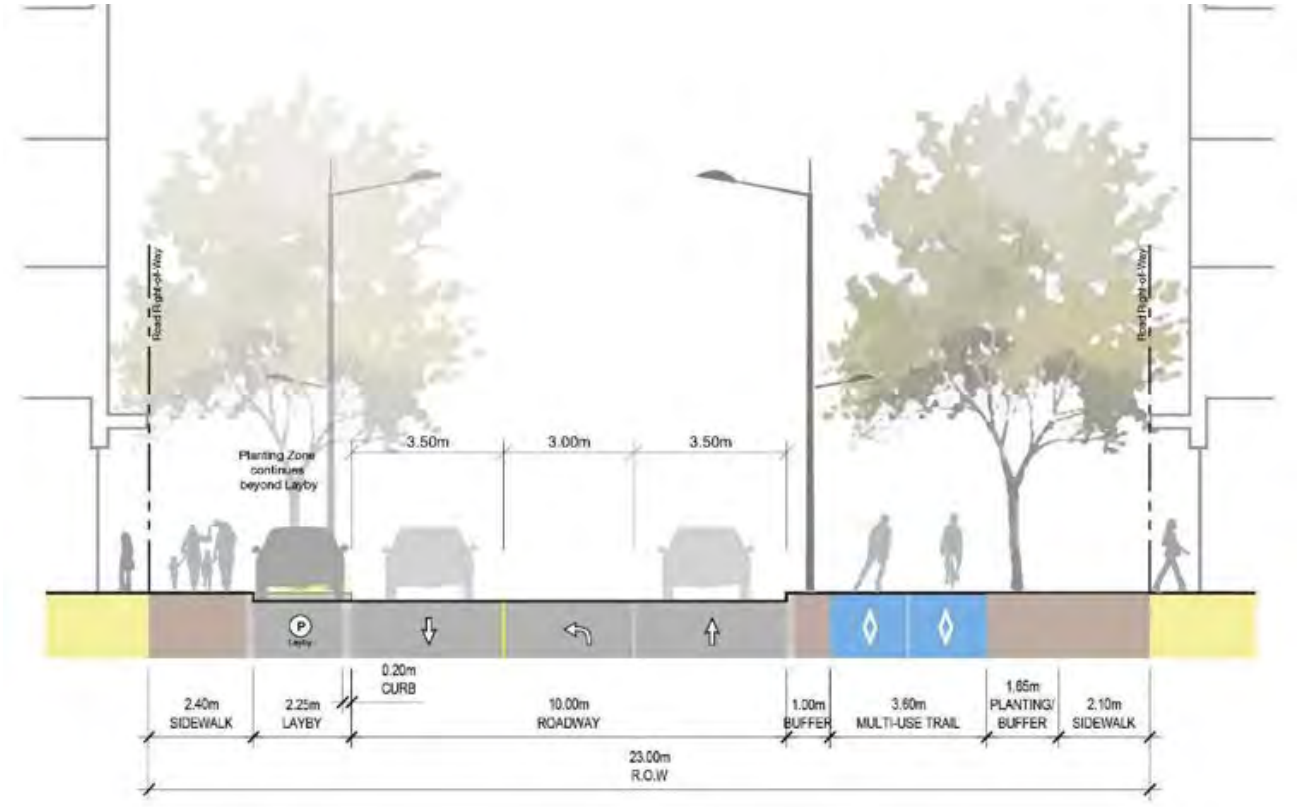
**Street B**

Street B is a collector street as identified in the Downsview Framework Plan. It frames the north-eastern edge of the Hangar District, forming an extension of the existing Hanover Road in the near term. As such, it will provide an effective route to Wilson Avenue. One of the prominent features of the street is the multi-use trail (MUT) along the northeast side of the street that is also part of the Framework Plan active transportation network and connecting to the MUT on Street 'A'. It will also act as a bus route and one of the primary streets for trucks.

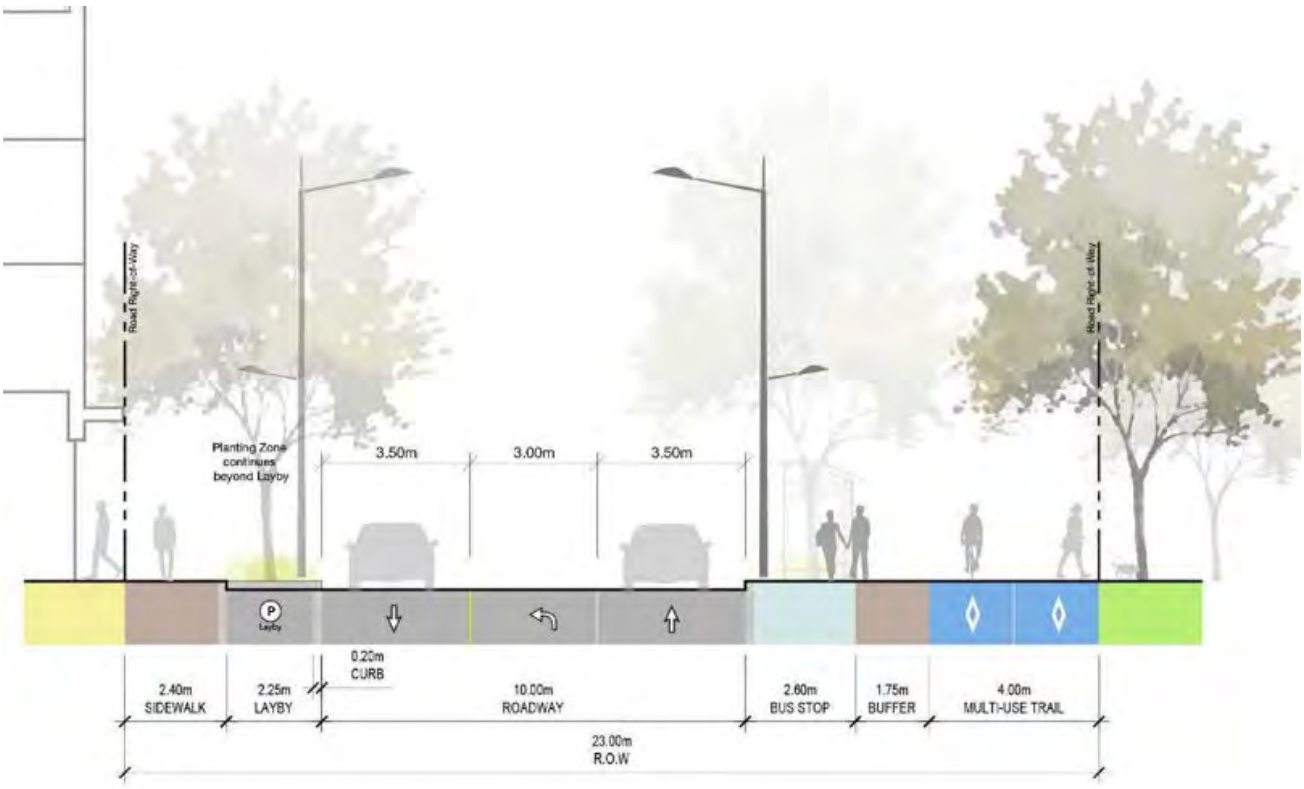
Transportation elements of the cross section include:

- A basic 23m Right of Way
- A 3.60m multi-use trail on the east side and 2.40m sidewalk on the west side
- Two (2) 3.50m thru lanes with a 3.00m left turn lanes
- Space for a bus stop on the east side, near Street C
- Provide separate on-street parking on the south side of the street

## PROPOSED STREET B CROSS-SECTION (B1)




## PROPOSED STREET B CROSS-SECTION (B2)



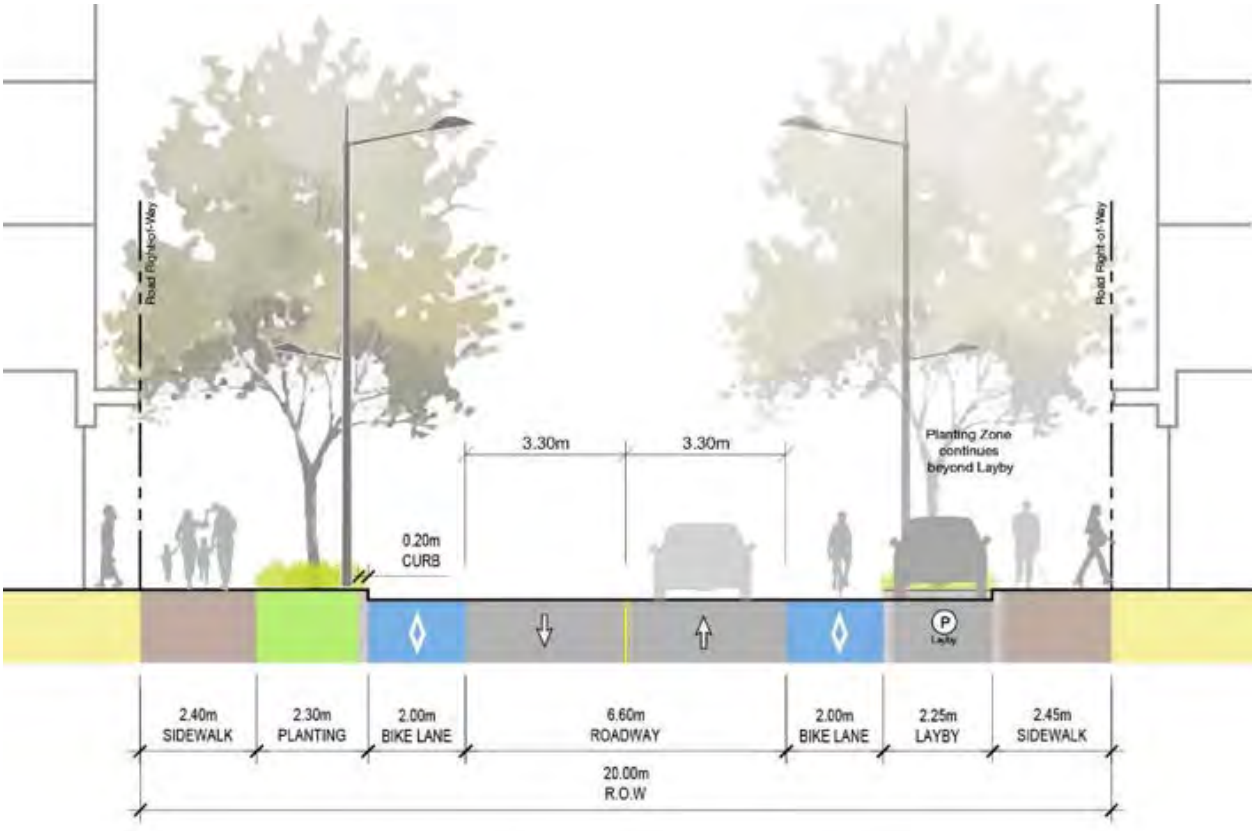
**Street C**

Street C is a local street extension of Ancaster Road to the south. In addition to connecting the existing Ancaster neighbourhood, one of its primary roles is a cycling route connecting the Framework Plan to the City's planned cycling route through Ancaster. Street C will also be part of the bus loop around the Hangar District.

Transportation elements of the cross section include:

- A basic 20m Right of Way, matching the existing Ancaster Road ROW
- 2.0m on-street uni-directional bicycle lanes
- 2.4m sidewalks on both sides of the street
- Two (2) 3.30m thru lanes
- Space for a bus stop on the east side, north of Powell Road.
- Provision for separate on-street parking on either side of the street.

**PROPOSED STREET C CROSS-SECTION (C1)**



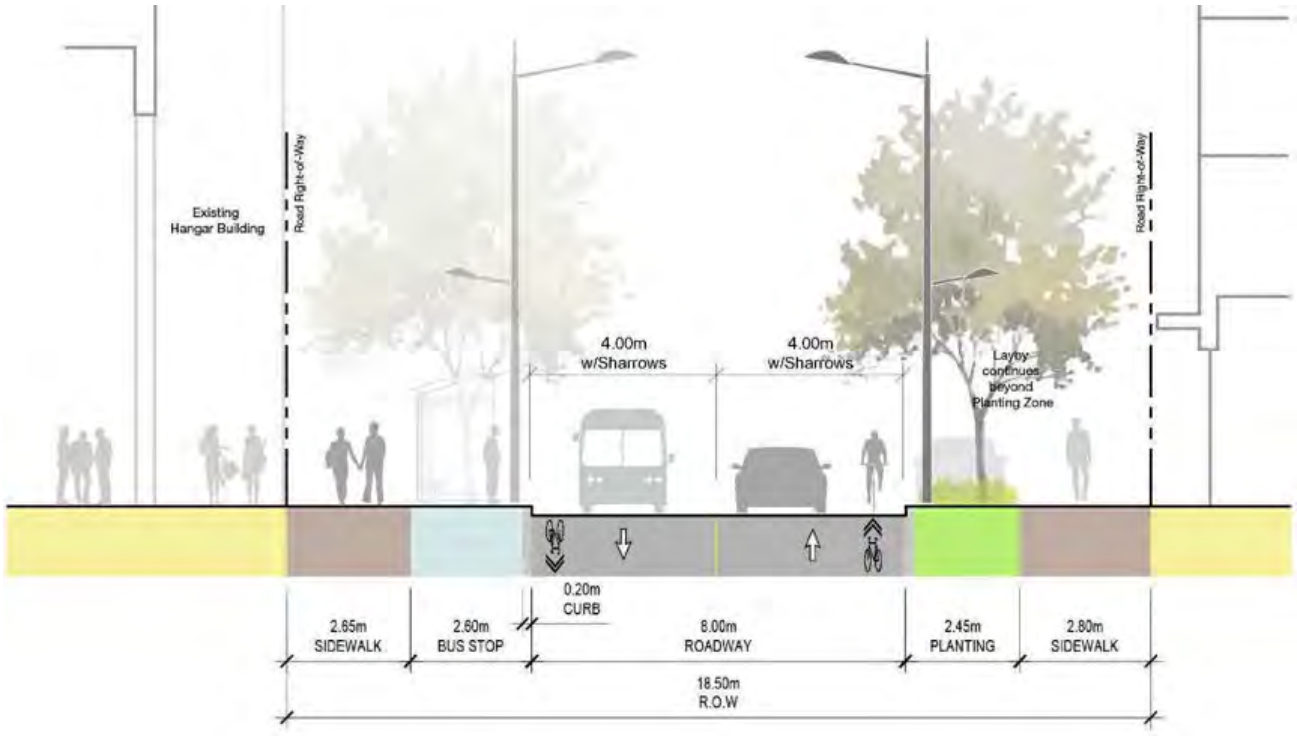
**Street D**

Street D is a de facto extension of Garratt Boulevard, but it will have two different characters: one from its existing terminus to Street E/Home Road and one from Street E/Home Road to Street A. South of street E, it has a similar cross section as Street B and is part of the on-street bicycle system, with dedicated on-street cycle lanes. North of Street E, the street changes nature to reflect the built form and urban design elements of the plan. As it travels through the pedestrian focused portion of the Hangar District, the design of the street is a shared travel way for cars and cyclists. It is also part of the transit loop with two bus stops planned north and south of the Taxiway Street.

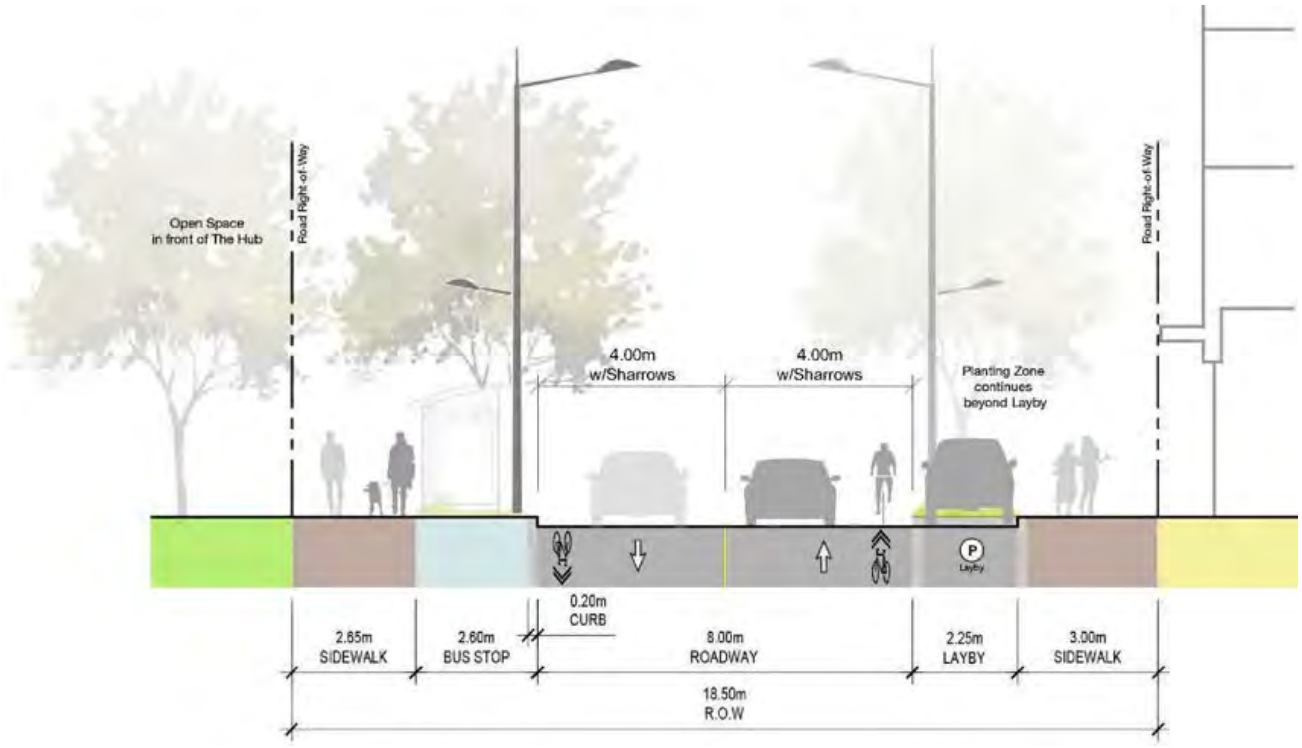
Transportation elements of the cross section include:

- 18.5m Right of Way
- 2.65 – 2.80m sidewalks on both sides of the street
- Two (2) 4.00m thru lanes with sharrows for the cycle route
- Space for a bus stops on the west side.
- Provision for separate on-street parking on either side of the street.

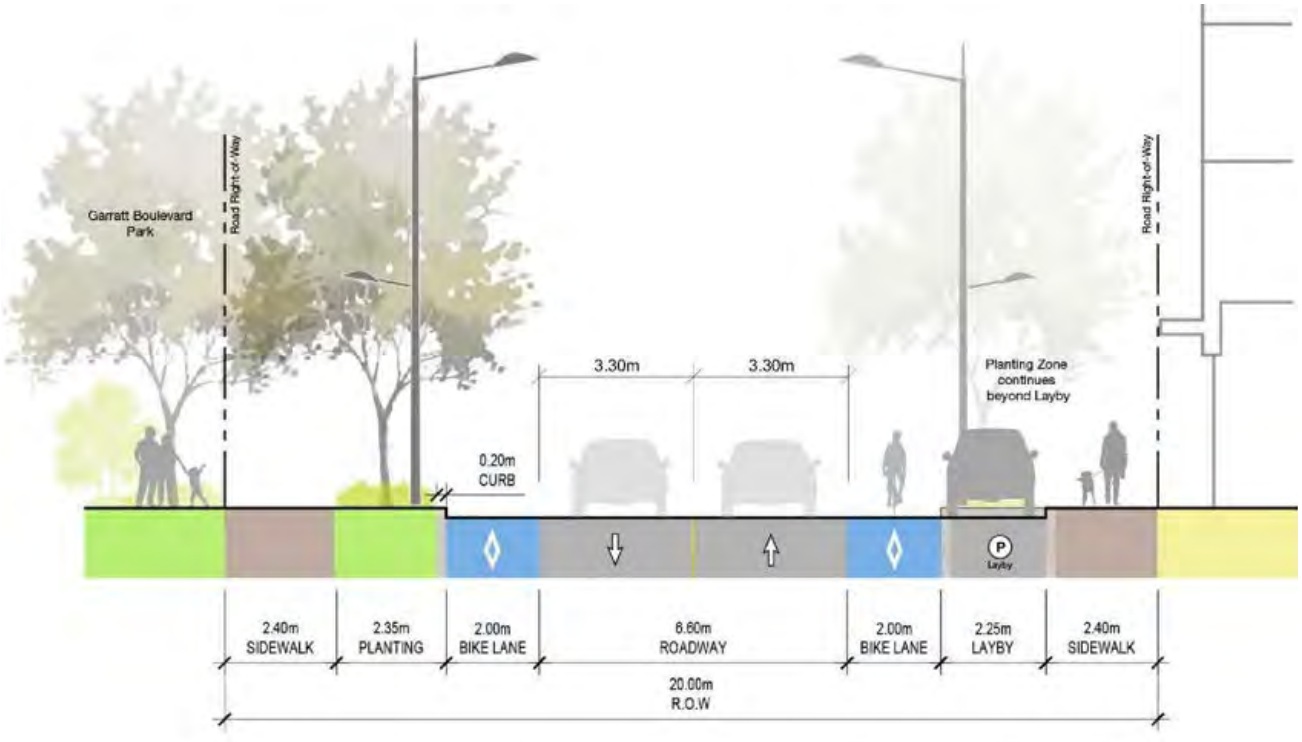
**PROPOSED STREET D CROSS-SECTION (D1)**



## PROPOSED STREET D CROSS-SECTION (D2)




## PROPOSED STREET D CROSS-SECTION (D3)



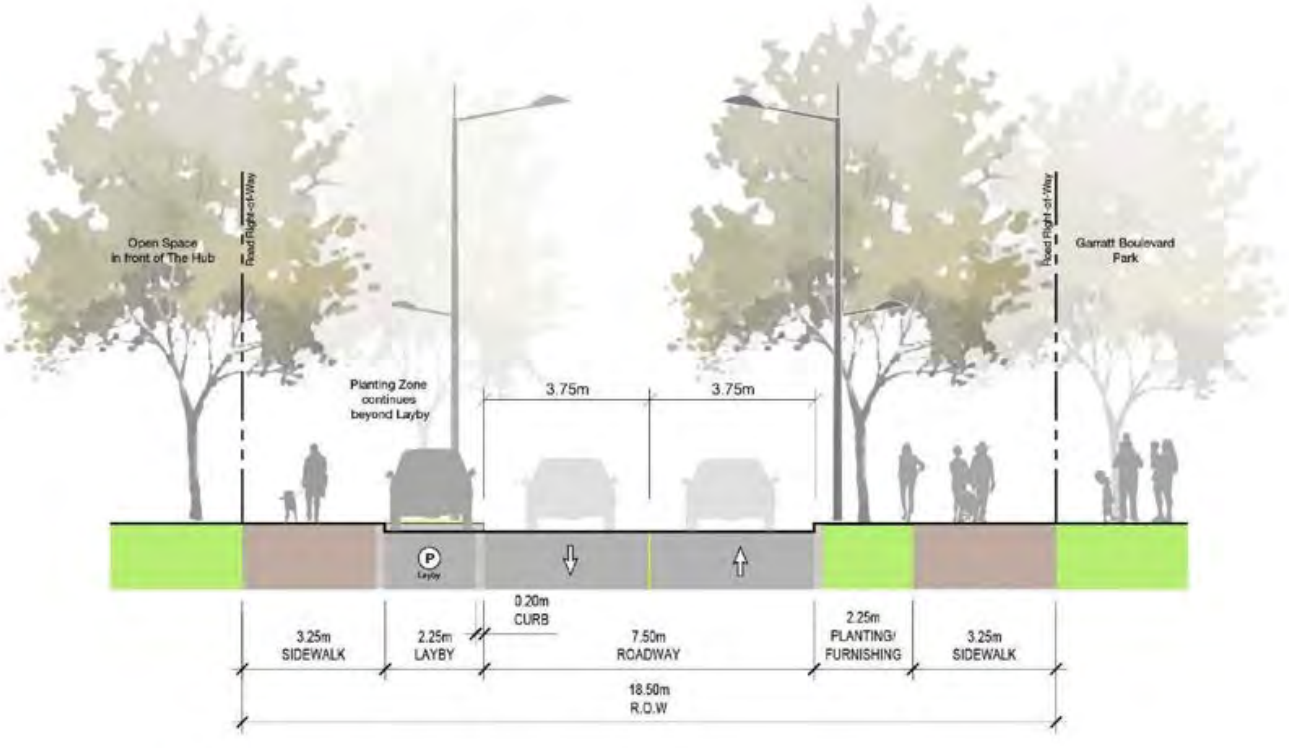
**Street E**

Street E is a local street that will also have two different characters: one as a continuation of Home Road from it's existing terminus to Street D and one from Street D to the westerly limits of the site. The extension of Home Road is a similar cross section as Street B and is part of the on-street bicycle system, with dedicated on-street bicycle lanes and a portion of the proposed bus loop. The westerly portion of Street E has a smaller right of way to reflect the built form and urban design elements of the plan in this area.

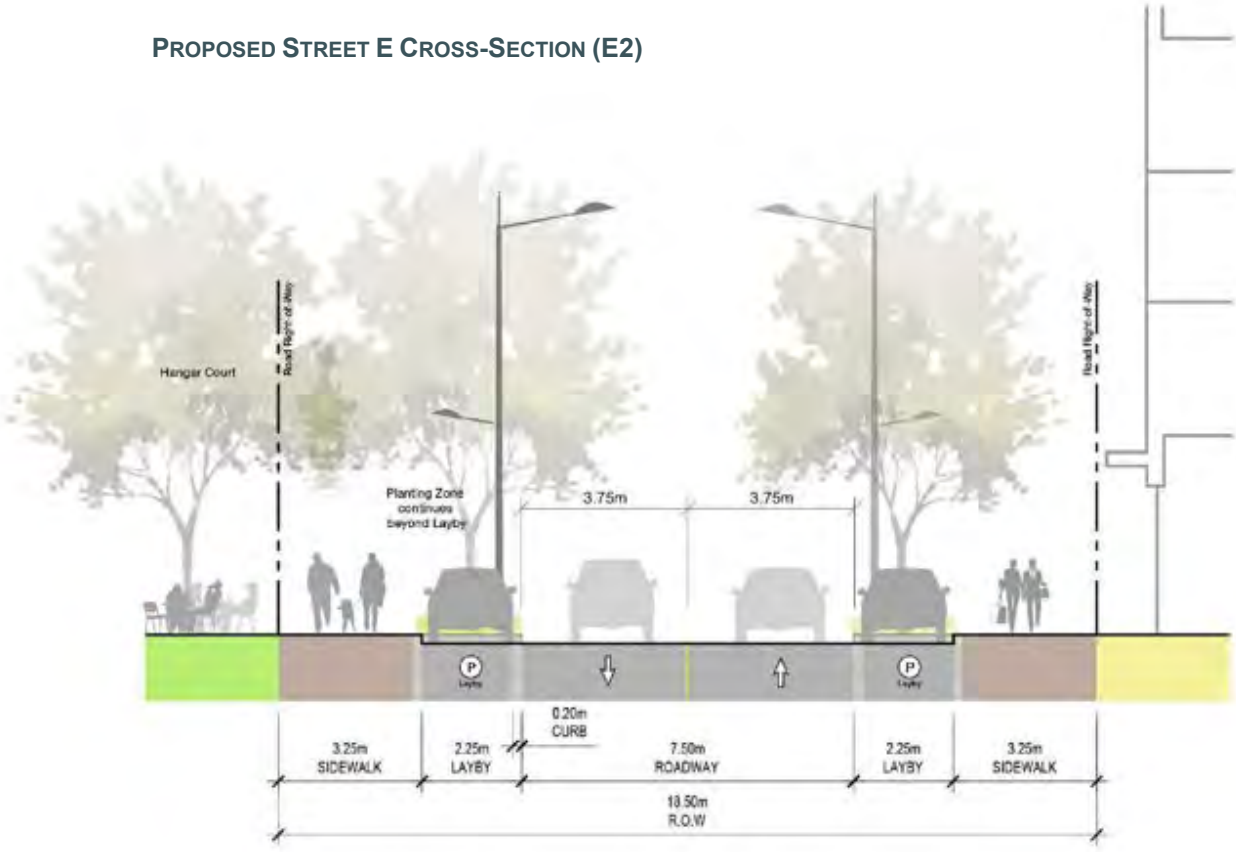
Transportation elements of the cross section include:

- 18.5m Right of Way
- 3.25-3.7m sidewalks on both sides of the street
- Two (2) 3.75m vehicle travel lanes; informally shared with bicycle.
- Provision for separate on-street parking on either side of the street.

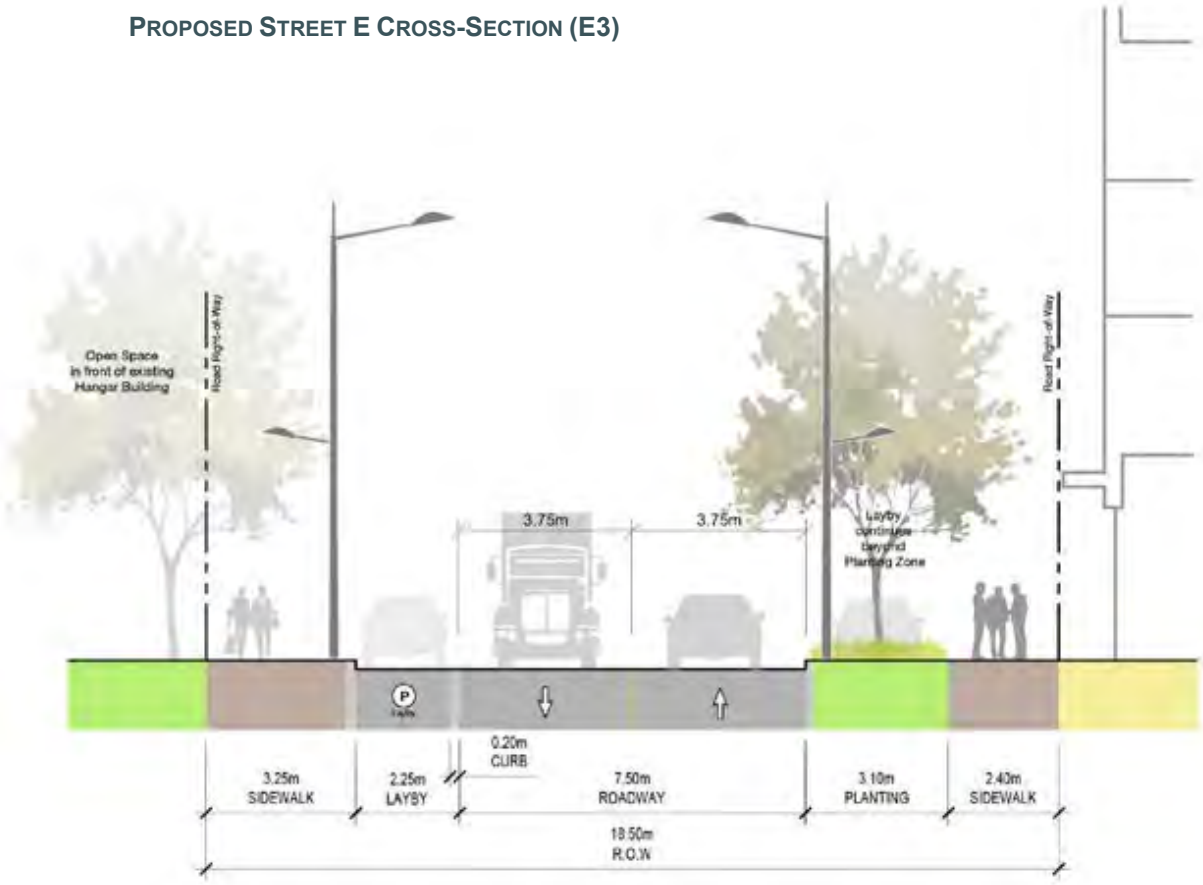
**PROPOSED STREET E CROSS-SECTION (E1)**



## PROPOSED STREET E CROSS-SECTION (E2)




## PROPOSED STREET E CROSS-SECTION (E3)



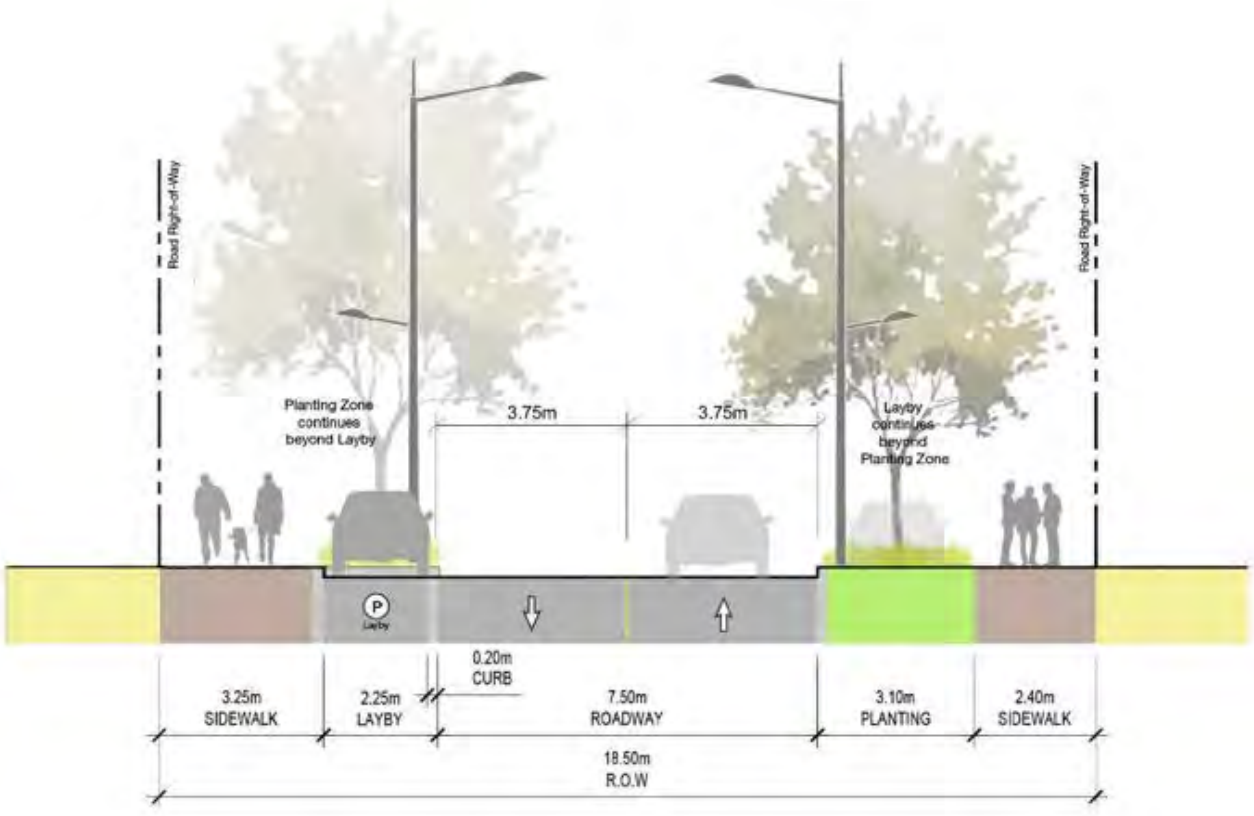
**Street F**

Streets F is a local street that connects to Garratt Boulevard opposite Gilley Road at its east end and to Street G at its west end.

Transportation elements of the cross section include:

- 18.5m Right of Way
- 3.25-3.7m sidewalks on both sides of the street
- Two (2) 3.75m vehicle travel lanes; informally shared with bicycle.
- Provision for separate on-street parking on either side of the street.

**PROPOSED STREET F CROSS-SECTION (F1)**



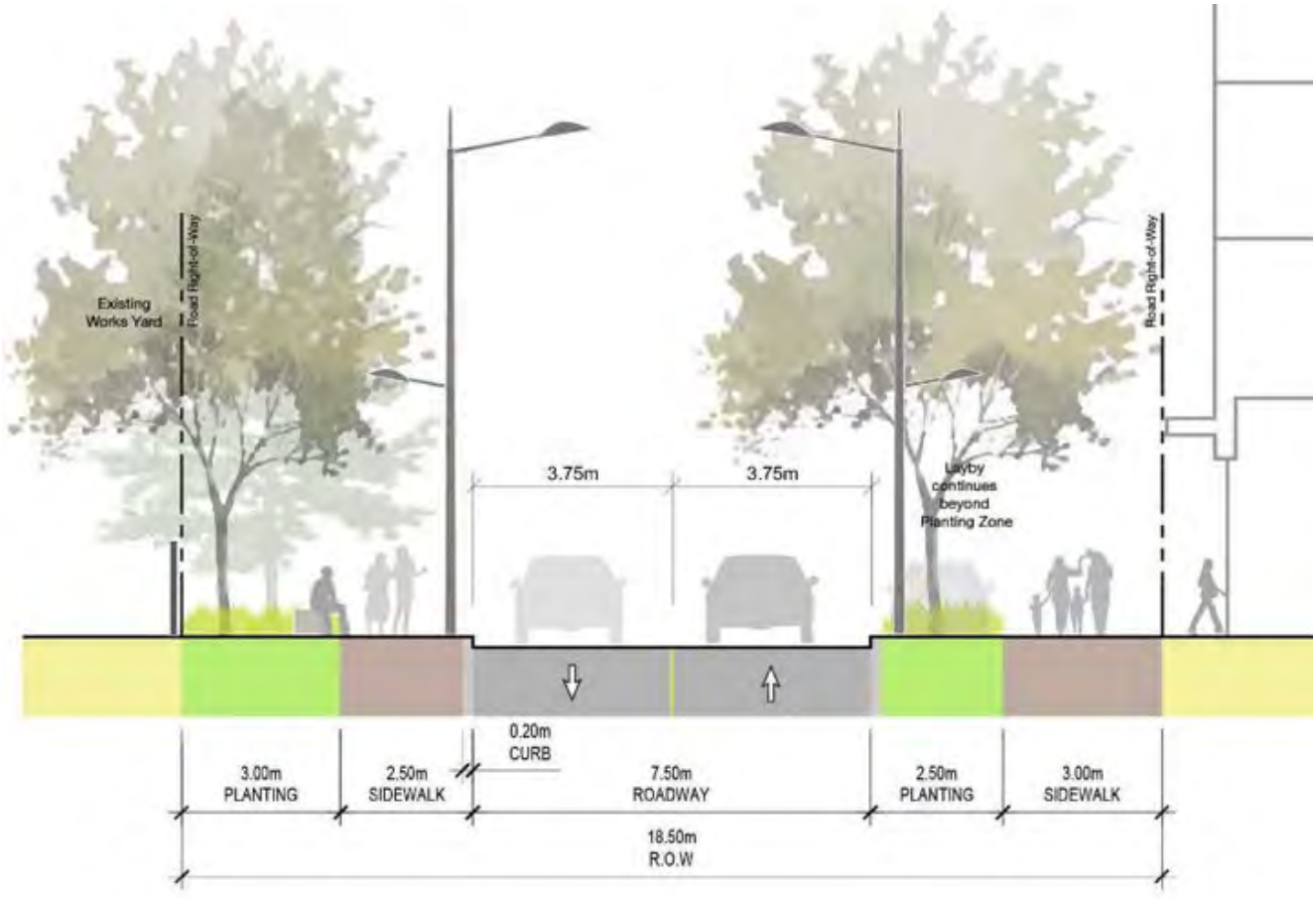
**Street G**

Streets G is a local north-south street that connects to Plewes Road at its southern terminus. It borders the existing City of Toronto works yard on the west and the Hangar District residential area on the east. This road is also planned to accommodate some truck traffic from the west via Murray street.

Transportation elements of the cross section include:

- 18.5m Right of Way
- 3.00-3.20m sidewalks on both sides of the street
- Two (2) 3.75m vehicle travel lanes; informally shared with bicycle.
- Provision for separate on-street parking on one side of the street.

**PROPOSED STREET G CROSS-SECTION (G1)**



**Street M & N**

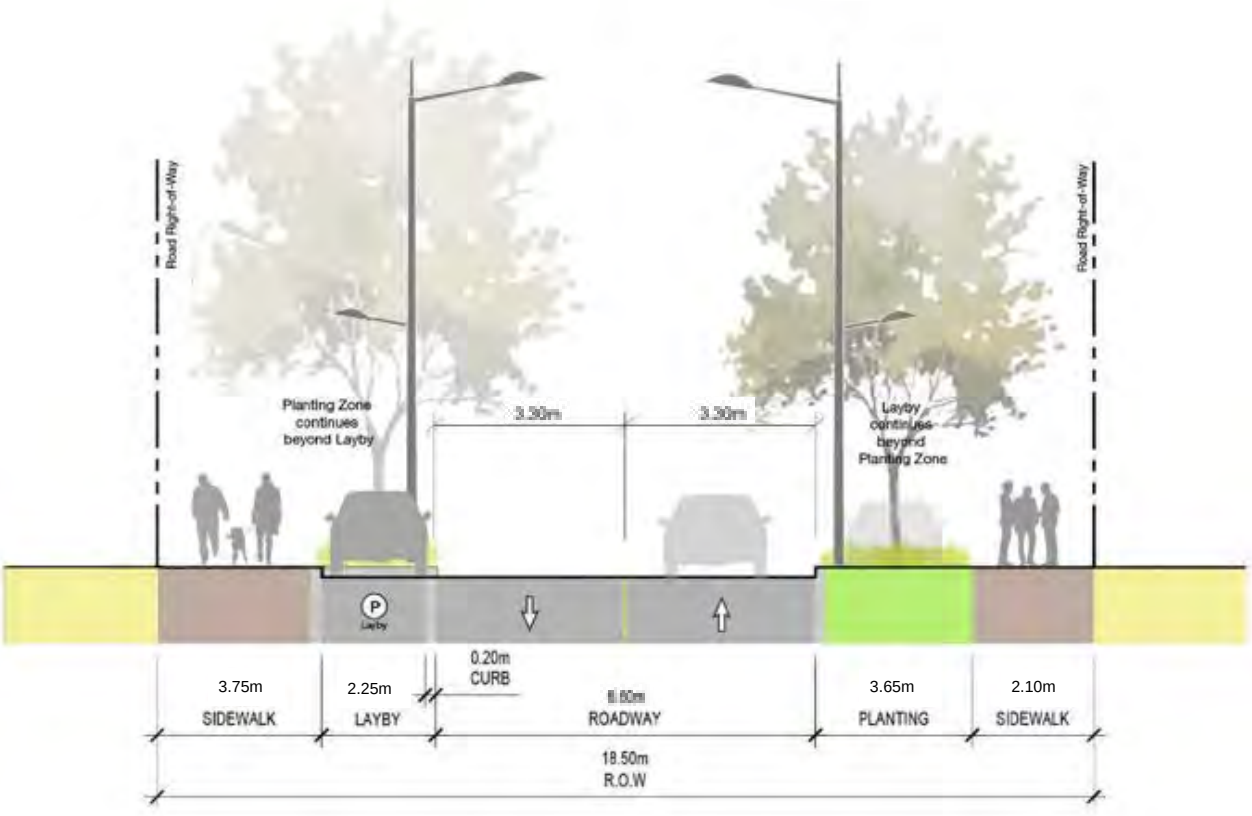
Streets M & N are local streets that form the extension of Powell Road while connecting to Street E and Home Road.

Transportation elements of the cross section include:

- 18.5m Right of Way
- 3.25-3.7m sidewalks on both sides of the street
- Two (2) 3.3m vehicle travel lanes.

- Provision for separate on-street parking on the north side.

**PROPOSED STREET N CROSS-SECTION (N1)**



# APPENDX B
# VISUM OUTPUT

SITE TRAFFIC
AM PEAK HOUR



SITE TRAFFIC
PM PEAK HOUR



# FUTURE TOTAL TRAFFIC
# AM PEAK HOUR

Link Bars
Volume PrT [veh] (AP)

# FUTURE TOTAL TRAFFIC
# PM PEAK HOUR



# APPENDX C FUTURE TOTAL TRAFFIC OPERATIONS

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 168 | 258 | 0 | 10 | 90 | 27 | 0 | 1216 | 123 | 24 | 471 | 159 |
| Future Volume (vph) | 168 | 258 | 0 | 10 | 90 | 27 | 0 | 1216 | 123 | 24 | 471 | 159 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 0.0 | | 30.0 | 80.0 | | 0.0 | 65.0 | | 25.0 | 60.0 | | 25.0 |
| Storage Lanes | 0 | | 1 | 1 | | 0 | 1 | | 1 | 1 | | 1 |
| Taper Length (m) | 7.5 | | | 40.0 | | | 15.0 | | | 55.0 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Ped Bike Factor | | 1.00 | | 1.00 | 1.00 | | | | 0.97 | 1.00 | | 0.98 |
| Frt | | | | | 0.966 | | | | 0.850 | | | 0.850 |
| Flt Protected | | 0.981 | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 0 | 1843 | 1773 | 1652 | 1793 | 0 | 1773 | 3433 | 1349 | 1546 | 3245 | 1363 |
| Flt Permitted | | 0.819 | | 0.274 | | | | | | 0.149 | | |
| Satd. Flow (perm) | 0 | 1538 | 1773 | 476 | 1793 | 0 | 1773 | 3433 | 1310 | 242 | 3245 | 1329 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | 14 | | | | 65 | | | 161 |
| Link Speed (k/h) | | 30 | | | 30 | | | 50 | | | 50 | |
| Link Distance (m) | | 114.6 | | | 186.3 | | | 252.0 | | | 1259.5 | |
| Travel Time (s) | | 13.8 | | | 22.4 | | | 18.1 | | | 90.7 | |
| Confl. Peds. (#/hr) | 1 | | 2 | 2 | | 1 | 2 | | 4 | 4 | | 2 |
| Peak Hour Factor | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 2% | 0% | 4% | 0% | 4% | 1% | 9% | 10% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 24 |
| Adj. Flow (vph) | 170 | 261 | 0 | 10 | 91 | 27 | 0 | 1228 | 124 | 24 | 476 | 161 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 431 | 0 | 10 | 118 | 0 | 0 | 1228 | 124 | 24 | 476 | 161 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.24 | 1.09 | 1.01 | 1.24 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 |
| Detector Template | Left | | Right | Left | | | Left | | Right | Left | | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Turn Type | Perm | NA | Perm | Perm | NA | | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | 6 |



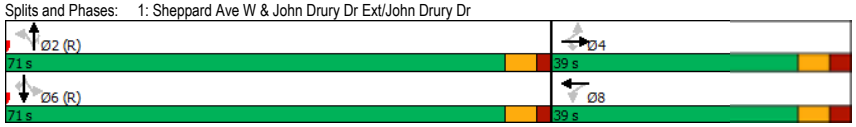


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector Phase | 4 | 4 | 4 | 8 | 8 | | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Minimum Split (s) | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| Total Split (s) | 39.0 | 39.0 | 39.0 | 39.0 | 39.0 | | 71.0 | 71.0 | 71.0 | 71.0 | 71.0 | 71.0 |
| Total Split (%) | 35.5% | 35.5% | 35.5% | 35.5% | 35.5% | | 64.5% | 64.5% | 64.5% | 64.5% | 64.5% | 64.5% |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | | -1.0 | -1.0 | -1.0 | -1.0 | | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | None | None | None | Min | Min | | C-Min | C-Min | C-Min | C-Min | C-Min | C-Min |
| v/c Ratio | | 0.84 | | 0.06 | 0.19 | | | 0.63 | 0.16 | 0.18 | 0.26 | 0.20 |
| Control Delay | | 49.5 | | 25.3 | 23.1 | | | 18.4 | 6.7 | 8.7 | 5.1 | 1.9 |
| Queue Delay | | 0.0 | | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | | 49.5 | | 25.3 | 23.1 | | | 18.4 | 6.7 | 8.7 | 5.1 | 1.9 |
| Queue Length 50th (m) | | 86.5 | | 1.5 | 16.0 | | | 98.4 | 6.0 | 0.6 | 6.0 | 0.0 |
| Queue Length 95th (m) | | #142.8 | | 5.8 | 30.5 | | | 117.0 | 14.8 | m3.7 | m33.4 | m9.5 |
| Internal Link Dist (m) | | 90.6 | | | 162.3 | | | 228.0 | | | 1235.5 | |
| Turn Bay Length (m) | | | | 80.0 | | | | | 25.0 | 60.0 | | 25.0 |
| Base Capacity (vph) | | 520 | | 160 | 616 | | | 2075 | 818 | 146 | 1962 | 867 |
| Starvation Cap Reductn | | 0 | | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | | 0 | | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | | 0 | | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | | 0.83 | | 0.06 | 0.19 | | | 0.59 | 0.15 | 0.16 | 0.24 | 0.19 |

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Sheppard Ave W & John Drury Dr Ext/John Drury Dr



## HCM Signalized Intersection Capacity Analysis
## 1: Sheppard Ave W & John Drury Dr Ext/John Drury Dr

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 168 | 258 | 0 | 10 | 90 | 27 | 0 | 1216 | 123 | 24 | 471 | 159 |
| Future Volume (vph) | 168 | 258 | 0 | 10 | 90 | 27 | 0 | 1216 | 123 | 24 | 471 | 159 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | | 6.0 | | 6.0 | 6.0 | | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | | 1.00 | | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 0.97 | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | | 1.00 | 0.97 | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.98 | | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1842 | | 1650 | 1793 | | | 3433 | 1310 | 1544 | 3245 | 1329 |
| Flt Permitted | | 0.82 | | 0.27 | 1.00 | | | 1.00 | 1.00 | 0.15 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1539 | | 475 | 1793 | | | 3433 | 1310 | 242 | 3245 | 1329 |
| Peak-hour factor, PHF | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 | 0.99 |
| Adj. Flow (vph) | 170 | 261 | 0 | 10 | 91 | 27 | 0 | 1228 | 124 | 24 | 476 | 161 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 0 | 28 | 0 | 0 | 70 |
| Lane Group Flow (vph) | 0 | 431 | 0 | 10 | 109 | 0 | 0 | 1228 | 96 | 24 | 476 | 91 |
| Confl. Peds. (#/hr) | 1 | | 2 | 2 | | 1 | 2 | | 4 | 4 | | 2 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 2% | 0% | 4% | 0% | 4% | 1% | 9% | 10% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 24 | 0 | 0 | 24 |
| Turn Type | Perm | NA | Perm | Perm | NA | | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | 6 |
| Actuated Green, G (s) | | 35.7 | | 35.7 | 35.7 | | | 61.3 | 61.3 | 61.3 | 61.3 | 61.3 |
| Effective Green, g (s) | | 36.7 | | 36.7 | 36.7 | | | 62.3 | 62.3 | 62.3 | 62.3 | 62.3 |
| Actuated g/C Ratio | | 0.33 | | 0.33 | 0.33 | | | 0.57 | 0.57 | 0.57 | 0.57 | 0.57 |
| Clearance Time (s) | | 7.0 | | 7.0 | 7.0 | | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Vehicle Extension (s) | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 513 | | 158 | 598 | | | 1944 | 741 | 137 | 1837 | 752 |
| v/s Ratio Prot | | | | | 0.06 | | | c0.36 | | | 0.15 | |
| v/s Ratio Perm | | c0.28 | | 0.02 | | | | | 0.07 | 0.10 | | 0.07 |
| v/c Ratio | | 0.84 | | 0.06 | 0.18 | | | 0.63 | 0.13 | 0.18 | 0.26 | 0.12 |
| Uniform Delay, d1 | | 33.9 | | 24.9 | 26.0 | | | 16.1 | 11.2 | 11.5 | 12.1 | 11.1 |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.52 | 0.39 | 0.83 |
| Incremental Delay, d2 | | 11.8 | | 0.2 | 0.1 | | | 1.6 | 0.4 | 1.5 | 0.2 | 0.2 |
| Delay (s) | | 45.7 | | 25.1 | 26.1 | | | 17.7 | 11.5 | 7.5 | 4.9 | 9.4 |
| Level of Service | | D | | C | C | | | B | B | A | A | A |
| Approach Delay (s) | | 45.7 | | | 26.1 | | | 17.1 | | | 6.1 | |
| Approach LOS | | D | | | C | | | B | | | A | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 19.5 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.71 | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 76.4% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group



## Lanes, Volumes, Timings
## 2: Chesswood Dr & Sheppard Ave W

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 339 | 1405 | 15 | 170 | 812 | 311 | 0 | 106 | 91 | 158 | 14 | 209 |
| Future Volume (vph) | 339 | 1405 | 15 | 170 | 812 | 311 | 0 | 106 | 91 | 158 | 14 | 209 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 55.0 | | 0.0 | 95.0 | | 0.0 | 15.0 | | 0.0 | 35.0 | | 0.0 |
| Storage Lanes | 1 | | 0 | 1 | | 0 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 25.0 | | | 30.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | 1.00 | 1.00 | | 1.00 | 0.99 | | | 0.98 | | 0.98 | 0.97 | |
| Frt | | 0.998 | | | 0.958 | | | 0.931 | | | 0.859 | |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 1636 | 3392 | 0 | 1668 | 3142 | 0 | 1773 | 1615 | 0 | 1491 | 1480 | 0 |
| Flt Permitted | 0.085 | | | 0.091 | | | | | | 0.323 | | |
| Satd. Flow (perm) | 146 | 3392 | 0 | 159 | 3142 | 0 | 1773 | 1615 | 0 | 495 | 1480 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 1 | | | 58 | | | 36 | | | 222 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 30 | | | 50 | |
| Link Distance (m) | | 1259.5 | | | 260.7 | | | 108.8 | | | 208.8 | |
| Travel Time (s) | | 90.7 | | | 18.8 | | | 13.1 | | | 15.0 | |
| Confl. Peds. (#/hr) | 19 | | 32 | 32 | | 19 | 15 | | 28 | 28 | | 15 |
| Peak Hour Factor | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Heavy Vehicles (%) | 3% | 5% | 0% | 1% | 8% | 6% | 0% | 3% | 9% | 13% | 1% | 6% |
| Bus Blockages (#/hr) | 0 | 0 | 31 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adj. Flow (vph) | 361 | 1495 | 16 | 181 | 864 | 331 | 0 | 113 | 97 | 168 | 15 | 222 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 361 | 1511 | 0 | 181 | 1195 | 0 | 0 | 210 | 0 | 168 | 237 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 1 | | 1 | 1 | | 1 | 1 | | 1 | 1 | |
| Detector Template | Left | | | Left | | | Left | | | Left | | |
| Leading Detector (m) | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Turn Type | pm+pt | NA | | pm+pt | NA | | Perm | NA | | pm+pt | NA | |
| Protected Phases | 5 | 2 | | 1 | 6 | | | 4 | | 3 | 8 | |
| Permitted Phases | 2 | | | 6 | | | 4 | | | 8 | | |

## Lanes, Volumes, Timings
## 2: Chesswood Dr & Sheppard Ave W

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector Phase | 5 | 2 | | 1 | 6 | | 4 | 4 | | 3 | 8 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 7.0 | 38.0 | | 7.0 | 38.0 | | 7.0 | 7.0 | | 5.0 | 7.0 | |
| Minimum Split (s) | 11.0 | 45.0 | | 11.0 | 45.0 | | 30.0 | 30.0 | | 11.0 | 30.0 | |
| Total Split (s) | 22.0 | 56.0 | | 13.0 | 47.0 | | 30.0 | 30.0 | | 11.0 | 41.0 | |
| Total Split (%) | 20.0% | 50.9% | | 11.8% | 42.7% | | 27.3% | 27.3% | | 10.0% | 37.3% | |
| Yellow Time (s) | 3.0 | 4.0 | | 3.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| All-Red Time (s) | 1.0 | 3.0 | | 1.0 | 3.0 | | 3.0 | 3.0 | | 2.0 | 3.0 | |
| Lost Time Adjust (s) | -3.0 | -1.0 | | -1.0 | -1.0 | | -1.0 | -1.0 | | -1.0 | -1.0 | |
| Total Lost Time (s) | 1.0 | 6.0 | | 3.0 | 6.0 | | 6.0 | 6.0 | | 5.0 | 6.0 | |
| Lead/Lag | Lead | Lag | | Lead | Lag | | Lag | Lag | | Lead | | |
| Lead-Lag Optimize? | Yes | Yes | | Yes | Yes | | Yes | Yes | | Yes | | |
| Recall Mode | None | C-Min | | None | C-Min | | None | None | | None | None | |
| v/c Ratio | 0.85 | 0.90 | | 0.73 | 0.93 | | | 0.71 | | 0.89 | 0.43 | |
| Control Delay | 41.6 | 34.7 | | 42.9 | 44.5 | | | 49.0 | | 77.4 | 7.3 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 41.6 | 34.7 | | 42.9 | 44.5 | | | 49.0 | | 77.4 | 7.3 | |
| Queue Length 50th (m) | 48.4 | 182.3 | | 22.8 | 134.5 | | | 37.6 | | 31.1 | 2.5 | |
| Queue Length 95th (m) | m#121.1 | #229.0 | | #64.8 | #185.6 | | | 60.0 | | #60.0 | 20.5 | |
| Internal Link Dist (m) | | 1235.5 | | | 236.7 | | | 84.8 | | | 184.8 | |
| Turn Bay Length (m) | 55.0 | | | 95.0 | | | | | | 35.0 | | |
| Base Capacity (vph) | 425 | 1670 | | 249 | 1286 | | | 380 | | 189 | 622 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.85 | 0.90 | | 0.73 | 0.93 | | | 0.55 | | 0.89 | 0.38 | |

**Intersection Summary**

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: Chesswood Dr & Sheppard Ave W






## HCM Signalized Intersection Capacity Analysis
## 2: Chesswood Dr & Sheppard Ave W

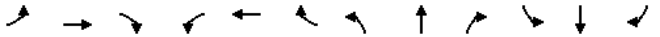
07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 339 | 1405 | 15 | 170 | 812 | 311 | 0 | 106 | 91 | 158 | 14 | 209 |
| Future Volume (vph) | 339 | 1405 | 15 | 170 | 812 | 311 | 0 | 106 | 91 | 158 | 14 | 209 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 1.0 | 6.0 | | 3.0 | 6.0 | | | 6.0 | | 5.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 0.99 | | | 0.98 | | 1.00 | 0.97 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 0.96 | | | 0.93 | | 1.00 | 0.86 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1635 | 3394 | | 1668 | 3143 | | | 1614 | | 1481 | 1481 | |
| Flt Permitted | 0.09 | 1.00 | | 0.09 | 1.00 | | | 1.00 | | 0.32 | 1.00 | |
| Satd. Flow (perm) | 147 | 3394 | | 160 | 3143 | | | 1614 | | 503 | 1481 | |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 361 | 1495 | 16 | 181 | 864 | 331 | 0 | 113 | 97 | 168 | 15 | 222 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 35 | 0 | 0 | 30 | 0 | 0 | 163 | 0 |
| Lane Group Flow (vph) | 361 | 1510 | 0 | 181 | 1160 | 0 | 0 | 180 | 0 | 168 | 74 | 0 |
| Confl. Peds. (#/hr) | 19 | | 32 | 32 | | 19 | 15 | | 28 | 28 | | 15 |
| Heavy Vehicles (%) | 3% | 5% | 0% | 1% | 8% | 6% | 0% | 3% | 9% | 13% | 1% | 6% |
| Bus Blockages (#/hr) | 0 | 0 | 31 | 0 | 0 | 37 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | pm+pt | NA | | pm+pt | NA | | Perm | NA | | pm+pt | NA | |
| Protected Phases | 5 | 2 | | 1 | 6 | | | 4 | | 3 | 8 | |
| Permitted Phases | 2 | | | 6 | | | 4 | | | 8 | | |
| Actuated Green, G (s) | 68.0 | 53.1 | | 53.7 | 42.8 | | | 17.0 | | 28.0 | 28.0 | |
| Effective Green, g (s) | 71.0 | 54.1 | | 55.7 | 43.8 | | | 18.0 | | 29.0 | 29.0 | |
| Actuated g/C Ratio | 0.65 | 0.49 | | 0.51 | 0.40 | | | 0.16 | | 0.26 | 0.26 | |
| Clearance Time (s) | 4.0 | 7.0 | | 4.0 | 7.0 | | | 7.0 | | 6.0 | 7.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 422 | 1669 | | 244 | 1251 | | | 264 | | 185 | 390 | |
| v/s Ratio Prot | c0.19 | c0.45 | | 0.08 | 0.37 | | | 0.11 | | c0.05 | 0.05 | |
| v/s Ratio Perm | 0.36 | | | 0.29 | | | | | | c0.19 | | |
| v/c Ratio | 0.86 | 0.91 | | 0.74 | 0.93 | | | 0.68 | | 0.91 | 0.19 | |
| Uniform Delay, d1 | 31.0 | 25.6 | | 23.7 | 31.6 | | | 43.3 | | 38.9 | 31.4 | |
| Progression Factor | 0.81 | 0.98 | | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 14.2 | 7.8 | | 11.5 | 13.1 | | | 7.1 | | 40.7 | 0.2 | |
| Delay (s) | 39.3 | 33.0 | | 35.2 | 44.7 | | | 50.4 | | 79.6 | 31.6 | |
| Level of Service | D | C | | D | D | | | D | | E | C | |
| Approach Delay (s) | | 34.2 | | | 43.4 | | | 50.4 | | | 51.5 | |
| Approach LOS | | C | | | D | | | D | | | D | |

**Intersection Summary**

| | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 40.2 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.96 | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 20.0 |
| Intersection Capacity Utilization | 94.4% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

c Critical Lane Group



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 343 | 1246 | 0 | 0 | 721 | 97 | 0 | 0 | 0 | 5 | 0 | 121 |
| Future Volume (vph) | 343 | 1246 | 0 | 0 | 721 | 97 | 0 | 0 | 0 | 5 | 0 | 121 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 10.0 | | 0.0 | 25.0 | | 25.0 | 0.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 1 | | 0 | 1 | | 1 | 0 | | 0 | 0 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | 0.98 | | | | | 0.93 | | | | | 0.98 | |
| Frt | | | | | | 0.850 | | | | | 0.870 | |
| Flt Protected | 0.950 | | | | | | | | | | 0.998 | |
| Satd. Flow (prot) | 1574 | 3077 | 0 | 1773 | 3000 | 925 | 0 | 1879 | 0 | 0 | 1325 | 0 |
| Flt Permitted | 0.365 | | | | | | | | | | 0.988 | |
| Satd. Flow (perm) | 596 | 3077 | 0 | 1773 | 3000 | 860 | 0 | 1879 | 0 | 0 | 1310 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | | 97 | | | | | 125 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 50 | | | 40 | |
| Link Distance (m) | | 260.0 | | | 292.0 | | | 79.9 | | | 194.0 | |
| Travel Time (s) | | 18.7 | | | 21.0 | | | 5.8 | | | 17.5 | |
| Confl. Peds. (#/hr) | 17 | | | | | 17 | 3 | | 20 | 20 | | 3 |
| Confl. Bikes (#/hr) | | | | | | | | | 5 | | | 2 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Heavy Vehicles (%) | 7% | 16% | 0% | 0% | 19% | 46% | 0% | 0% | 0% | 67% | 0% | 19% |
| Bus Blockages (#/hr) | 0 | 0 | 26 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adj. Flow (vph) | 354 | 1285 | 0 | 0 | 743 | 100 | 0 | 0 | 0 | 5 | 0 | 125 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 354 | 1285 | 0 | 0 | 743 | 100 | 0 | 0 | 0 | 0 | 130 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 0.0 | | | 0.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.25 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Thru | | Left | Thru | Right | Left | Thru | | Left | Thru | |
| Leading Detector (m) | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 0.6 | | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | | 2.0 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |



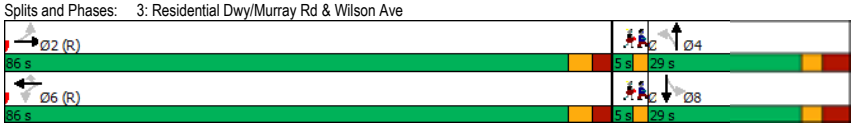


| Lane Group | Ø3 | Ø7 |
|---|---|---|
| Lane Configurations | | |
| Traffic Volume (vph) | | |
| Future Volume (vph) | | |
| Ideal Flow (vphpl) | | |
| Lane Width (m) | | |
| Storage Length (m) | | |
| Storage Lanes | | |
| Taper Length (m) | | |
| Lane Util. Factor | | |
| Ped Bike Factor | | |
| Frt | | |
| Flt Protected | | |
| Satd. Flow (prot) | | |
| Flt Permitted | | |
| Satd. Flow (perm) | | |
| Right Turn on Red | | |
| Satd. Flow (RTOR) | | |
| Link Speed (k/h) | | |
| Link Distance (m) | | |
| Travel Time (s) | | |
| Confl. Peds. (#/hr) | | |
| Confl. Bikes (#/hr) | | |
| Peak Hour Factor | | |
| Heavy Vehicles (%) | | |
| Bus Blockages (#/hr) | | |
| Adj. Flow (vph) | | |
| Shared Lane Traffic (%) | | |
| Lane Group Flow (vph) | | |
| Enter Blocked Intersection | | |
| Lane Alignment | | |
| Median Width(m) | | |
| Link Offset(m) | | |
| Crosswalk Width(m) | | |
| Two way Left Turn Lane | | |
| Headway Factor | | |
| Turning Speed (k/h) | | |
| Number of Detectors | | |
| Detector Template | | |
| Leading Detector (m) | | |
| Trailing Detector (m) | | |
| Detector 1 Position(m) | | |
| Detector 1 Size(m) | | |
| Detector 1 Type | | |
| Detector 1 Channel | | |
| Detector 1 Extend (s) | | |
| Detector 1 Queue (s) | | |
| Detector 1 Delay (s) | | |
| Detector 2 Position(m) | | |
| Detector 2 Size(m) | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | | Perm | NA | Perm | | | | Perm | NA | |
| Protected Phases | | 2 | | | 6 | | | 4 | | | 8 | |
| Permitted Phases | 2 | | | 6 | | 6 | 4 | | | 8 | | |
| Detector Phase | 2 | 2 | | 6 | 6 | 6 | 4 | 4 | | 8 | 8 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 20.0 | 20.0 | | 20.0 | 20.0 | 20.0 | 7.0 | 7.0 | | 7.0 | 7.0 | |
| Minimum Split (s) | 27.0 | 27.0 | | 27.0 | 27.0 | 27.0 | 29.0 | 29.0 | | 29.0 | 29.0 | |
| Total Split (s) | 86.0 | 86.0 | | 86.0 | 86.0 | 86.0 | 29.0 | 29.0 | | 29.0 | 29.0 | |
| Total Split (%) | 71.7% | 71.7% | | 71.7% | 71.7% | 71.7% | 24.2% | 24.2% | | 24.2% | 24.2% | |
| Yellow Time (s) | 3.3 | 3.3 | | 3.3 | 3.3 | 3.3 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 2.8 | 2.8 | | 2.8 | 2.8 | 2.8 | 4.1 | 4.1 | | 4.1 | 4.1 | |
| Lost Time Adjust (s) | -1.0 | -1.0 | | -1.0 | -1.0 | -1.0 | | -1.0 | | | -1.0 | |
| Total Lost Time (s) | 5.1 | 5.1 | | 5.1 | 5.1 | 5.1 | | 6.1 | | | 6.1 | |
| Lead/Lag | | | | | | | Lag | Lag | | Lag | Lag | |
| Lead-Lag Optimize? | | | | | | | Yes | Yes | | Yes | Yes | |
| Recall Mode | C-Max | C-Max | | C-Max | C-Max | C-Max | Min | Min | | Min | Min | |
| v/c Ratio | 0.73 | 0.51 | | | 0.30 | 0.14 | | | | | 0.55 | |
| Control Delay | 18.3 | 5.1 | | | 5.7 | 2.8 | | | | | 18.0 | |
| Queue Delay | 0.0 | 0.0 | | | 0.0 | 0.0 | | | | | 0.0 | |
| Total Delay | 18.3 | 5.1 | | | 5.7 | 2.8 | | | | | 18.0 | |
| Queue Length 50th (m) | 25.7 | 34.2 | | | 14.5 | 0.0 | | | | | 1.2 | |
| Queue Length 95th (m) | #132.3 | 86.8 | | | 97.1 | 19.6 | | | | | 18.7 | |
| Internal Link Dist (m) | | 236.0 | | | 268.0 | | | 55.9 | | | 170.0 | |
| Turn Bay Length (m) | 10.0 | | | | | 25.0 | | | | | | |
| Base Capacity (vph) | 484 | 2501 | | | 2439 | 716 | | | | | 351 | |
| Starvation Cap Reductn | 0 | 0 | | | 0 | 0 | | | | | 0 | |
| Spillback Cap Reductn | 0 | 0 | | | 0 | 0 | | | | | 0 | |
| Storage Cap Reductn | 0 | 0 | | | 0 | 0 | | | | | 0 | |
| Reduced v/c Ratio | 0.73 | 0.51 | | | 0.30 | 0.14 | | | | | 0.37 | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Cycle Length: 120 | |
| Actuated Cycle Length: 120 | |
| Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green | |
| Natural Cycle: 100 | |
| Control Type: Actuated-Coordinated | |
| # 95th percentile volume exceeds capacity, queue may be longer. | |
| Queue shown is maximum after two cycles. | |

Splits and Phases: 3: Residential Dwy/Murray Rd & Wilson Ave








| Lane Group | Ø3 | Ø7 |
|---|---|---|
| Detector 2 Type | | |
| Detector 2 Channel | | |
| Detector 2 Extend (s) | | |
| Turn Type | | |
| Protected Phases | 3 | 7 |
| Permitted Phases | | |
| Detector Phase | | |
| Switch Phase | | |
| Minimum Initial (s) | 3.0 | 3.0 |
| Minimum Split (s) | 5.0 | 5.0 |
| Total Split (s) | 5.0 | 5.0 |
| Total Split (%) | 4% | 4% |
| Yellow Time (s) | 2.0 | 2.0 |
| All-Red Time (s) | 0.0 | 0.0 |
| Lost Time Adjust (s) | | |
| Total Lost Time (s) | | |
| Lead/Lag | Lead | Lead |
| Lead-Lag Optimize? | Yes | Yes |
| Recall Mode | None | None |
| v/c Ratio | | |
| Control Delay | | |
| Queue Delay | | |
| Total Delay | | |
| Queue Length 50th (m) | | |
| Queue Length 95th (m) | | |
| Internal Link Dist (m) | | |
| Turn Bay Length (m) | | |
| Base Capacity (vph) | | |
| Starvation Cap Reductn | | |
| Spillback Cap Reductn | | |
| Storage Cap Reductn | | |
| Reduced v/c Ratio | | |

| Intersection Summary |
|---|

## HCM Signalized Intersection Capacity Analysis
## 3: Residential Dwy/Murray Rd & Wilson Ave

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 343 | 1246 | 0 | 0 | 721 | 97 | 0 | 0 | 0 | 5 | 0 | 121 |
| Future Volume (vph) | 343 | 1246 | 0 | 0 | 721 | 97 | 0 | 0 | 0 | 5 | 0 | 121 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 5.1 | 5.1 | | | 5.1 | 5.1 | | | | | 6.1 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 0.93 | | | | | 0.98 | |
| Flpb, ped/bikes | 0.98 | 1.00 | | | 1.00 | 1.00 | | | | | 1.00 | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | | 0.87 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | | 1.00 | |
| Satd. Flow (prot) | 1547 | 3077 | | | 3000 | 860 | | | | | 1320 | |
| Flt Permitted | 0.37 | 1.00 | | | 1.00 | 1.00 | | | | | 0.99 | |
| Satd. Flow (perm) | 595 | 3077 | | | 3000 | 860 | | | | | 1307 | |
| Peak-hour factor, PHF | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Adj. Flow (vph) | 354 | 1285 | 0 | 0 | 743 | 100 | 0 | 0 | 0 | 5 | 0 | 125 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 113 | 0 |
| Lane Group Flow (vph) | 354 | 1285 | 0 | 0 | 743 | 82 | 0 | 0 | 0 | 0 | 17 | 0 |
| Confl. Peds. (#/hr) | 17 | | | | | 17 | 3 | | 20 | 20 | | 3 |
| Confl. Bikes (#/hr) | | | | | | | | | 5 | | | 2 |
| Heavy Vehicles (%) | 7% | 16% | 0% | 0% | 19% | 46% | 0% | 0% | 0% | 67% | 0% | 19% |
| Bus Blockages (#/hr) | 0 | 0 | 26 | 0 | 0 | 26 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | | | | Perm | NA | |
| Protected Phases | | 2 | | | 6 | | | 4 | | | 8 | |
| Permitted Phases | 2 | | | 6 | | 6 | 4 | | | 8 | | |
| Actuated Green, G (s) | 96.6 | 96.6 | | | 96.6 | 96.6 | | | | | 10.2 | |
| Effective Green, g (s) | 97.6 | 97.6 | | | 97.6 | 97.6 | | | | | 11.2 | |
| Actuated g/C Ratio | 0.81 | 0.81 | | | 0.81 | 0.81 | | | | | 0.09 | |
| Clearance Time (s) | 6.1 | 6.1 | | | 6.1 | 6.1 | | | | | 7.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | | | | | 3.0 | |
| Lane Grp Cap (vph) | 483 | 2502 | | | 2440 | 699 | | | | | 121 | |
| v/s Ratio Prot | | 0.42 | | | 0.25 | | | | | | | |
| v/s Ratio Perm | c0.60 | | | | | 0.10 | | | | | c0.01 | |
| v/c Ratio | 0.73 | 0.51 | | | 0.30 | 0.12 | | | | | 0.14 | |
| Uniform Delay, d1 | 5.2 | 3.6 | | | 2.8 | 2.3 | | | | | 50.0 | |
| Progression Factor | 1.00 | 1.00 | | | 1.64 | 2.71 | | | | | 1.00 | |
| Incremental Delay, d2 | 9.5 | 0.8 | | | 0.3 | 0.3 | | | | | 0.5 | |
| Delay (s) | 14.7 | 4.3 | | | 4.9 | 6.6 | | | | | 50.5 | |
| Level of Service | B | A | | | A | A | | | | | D | |
| Approach Delay (s) | | 6.6 | | | 5.1 | | | 0.0 | | | 50.5 | |
| Approach LOS | | A | | | A | | | A | | | D | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| HCM 2000 Control Delay | 8.3 | HCM 2000 Level of Service | A | |
| HCM 2000 Volume to Capacity ratio | 0.68 | | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 13.2 | |
| Intersection Capacity Utilization | 76.2% | ICU Level of Service | D | |
| Analysis Period (min) | 15 | | | |
| c Critical Lane Group | | | | |



## Lanes, Volumes, Timings
## 4: Northgate Dr/Garratt Blvd & Wilson Ave

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 110 | 1094 | 130 | 10 | 679 | 104 | 65 | 0 | 25 | 30 | 0 | 34 |
| Future Volume (vph) | 110 | 1094 | 130 | 10 | 679 | 104 | 65 | 0 | 25 | 30 | 0 | 34 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 20.0 | | 20.0 | 20.0 | | 20.0 | 0.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 0 | 1 | | 1 |
| Taper Length (m) | 10.0 | | | 10.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | 0.98 | | 0.89 | 0.99 | | 0.93 | | 0.96 | | 0.97 | | 0.95 |
| Frt | | | 0.850 | | | 0.850 | | 0.962 | | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.965 | | 0.950 | | |
| Satd. Flow (prot) | 1685 | 3336 | 1299 | 1685 | 3336 | 1303 | 0 | 1700 | 0 | 1404 | 0 | 1092 |
| Flt Permitted | 0.366 | | | 0.218 | | | | 0.965 | | 0.711 | | |
| Satd. Flow (perm) | 638 | 3336 | 1151 | 382 | 3336 | 1209 | 0 | 1654 | 0 | 1017 | 0 | 1038 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 77 | | | 99 | | 27 | | | | 37 |
| Link Speed (k/h) | | 50 | | | 50 | | | 40 | | | 40 | |
| Link Distance (m) | | 292.0 | | | 221.4 | | | 192.5 | | | 371.3 | |
| Travel Time (s) | | 21.0 | | | 15.9 | | | 17.3 | | | 33.4 | |
| Confl. Peds. (#/hr) | 17 | | 30 | 30 | | 17 | 26 | | 28 | 28 | | 26 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 1 | | | 1 |
| Peak Hour Factor | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Heavy Vehicles (%) | 0% | 7% | 4% | 0% | 7% | 5% | 0% | 0% | 4% | 20% | 0% | 38% |
| Bus Blockages (#/hr) | 0 | 0 | 26 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adj. Flow (vph) | 118 | 1176 | 140 | 11 | 730 | 112 | 70 | 0 | 27 | 32 | 0 | 37 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 118 | 1176 | 140 | 11 | 730 | 112 | 0 | 97 | 0 | 32 | 0 | 37 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.25 | 1.09 | 1.01 | 1.23 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | | 1 | | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | | Left | | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | | 2.0 | | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | | |

## Lanes, Volumes, Timings
## 4: Northgate Dr/Garratt Blvd & Wilson Ave

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | | Perm |
| Protected Phases | | 2 | | | 6 | | | 4 | | | | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 4 | | | 8 | | 8 |
| Detector Phase | 2 | 2 | 2 | 6 | 6 | 6 | 4 | 4 | | 8 | | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 | 7.0 | 7.0 | | 7.0 | | 7.0 |
| Minimum Split (s) | 26.0 | 26.0 | 26.0 | 26.0 | 26.0 | 26.0 | 31.0 | 31.0 | | 31.0 | | 31.0 |
| Total Split (s) | 88.0 | 88.0 | 88.0 | 88.0 | 88.0 | 88.0 | 32.0 | 32.0 | | 32.0 | | 32.0 |
| Total Split (%) | 73.3% | 73.3% | 73.3% | 73.3% | 73.3% | 73.3% | 26.7% | 26.7% | | 26.7% | | 26.7% |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 3.0 | | 3.0 | | 3.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | | 3.0 | | 3.0 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | | -1.0 | | -1.0 | | -1.0 |
| Total Lost Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | | 5.0 | | 5.0 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | C-Min | C-Min | C-Min | C-Min | C-Min | C-Min | None | None | | None | | None |
| v/c Ratio | 0.24 | 0.45 | 0.15 | 0.04 | 0.28 | 0.12 | | 0.39 | | 0.23 | | 0.22 |
| Control Delay | 6.9 | 6.6 | 3.2 | 12.8 | 10.7 | 7.7 | | 36.1 | | 46.5 | | 14.9 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 | | 0.0 |
| Total Delay | 6.9 | 6.6 | 3.2 | 12.8 | 10.7 | 7.7 | | 36.1 | | 46.5 | | 14.9 |
| Queue Length 50th (m) | 5.0 | 33.1 | 2.4 | 0.5 | 19.1 | 0.0 | | 16.7 | | 7.5 | | 0.0 |
| Queue Length 95th (m) | 21.7 | 91.6 | 13.9 | m6.2 | 95.8 | 27.0 | | 30.0 | | 15.8 | | 9.4 |
| Internal Link Dist (m) | | 268.0 | | | 197.4 | | | 168.5 | | | 347.3 | |
| Turn Bay Length (m) | 20.0 | | 20.0 | 20.0 | | 20.0 | | | | | | |
| Base Capacity (vph) | 498 | 2607 | 916 | 298 | 2607 | 966 | | 393 | | 228 | | 262 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 |
| Reduced v/c Ratio | 0.24 | 0.45 | 0.15 | 0.04 | 0.28 | 0.12 | | 0.25 | | 0.14 | | 0.14 |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Cycle Length: 120 | |
| Actuated Cycle Length: 120 | |
| Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green | |
| Natural Cycle: 60 | |
| Control Type: Actuated-Coordinated | |

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Northgate Dr/Garratt Blvd & Wilson Ave






## HCM Signalized Intersection Capacity Analysis
## 4: Northgate Dr/Garratt Blvd & Wilson Ave

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 110 | 1094 | 130 | 10 | 679 | 104 | 65 | 0 | 25 | 30 | 0 | 34 |
| Future Volume (vph) | 110 | 1094 | 130 | 10 | 679 | 104 | 65 | 0 | 25 | 30 | 0 | 34 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | | 5.0 | | 5.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.89 | 1.00 | 1.00 | 0.93 | | 0.99 | | 1.00 | | 0.95 |
| Flpb, ped/bikes | 0.98 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | | 0.97 | | 0.97 | | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 0.96 | | 1.00 | | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.97 | | 0.95 | | 1.00 |
| Satd. Flow (prot) | 1654 | 3336 | 1152 | 1661 | 3336 | 1209 | | 1655 | | 1360 | | 1037 |
| Flt Permitted | 0.37 | 1.00 | 1.00 | 0.22 | 1.00 | 1.00 | | 0.97 | | 0.71 | | 1.00 |
| Satd. Flow (perm) | 637 | 3336 | 1152 | 381 | 3336 | 1209 | | 1655 | | 1018 | | 1037 |
| Peak-hour factor, PHF | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 | 0.93 |
| Adj. Flow (vph) | 118 | 1176 | 140 | 11 | 730 | 112 | 70 | 0 | 27 | 32 | 0 | 37 |
| RTOR Reduction (vph) | 0 | 0 | 17 | 0 | 0 | 22 | 0 | 23 | 0 | 0 | 0 | 32 |
| Lane Group Flow (vph) | 118 | 1176 | 123 | 11 | 730 | 90 | 0 | 74 | 0 | 32 | 0 | 5 |
| Confl. Peds. (#/hr) | 17 | | 30 | 30 | | 17 | 26 | | 28 | 28 | | 26 |
| Confl. Bikes (#/hr) | | | 1 | | | | | | 1 | | | 1 |
| Heavy Vehicles (%) | 0% | 7% | 4% | 0% | 7% | 5% | 0% | 0% | 4% | 20% | 0% | 38% |
| Bus Blockages (#/hr) | 0 | 0 | 26 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | | Perm |
| Protected Phases | | 2 | | | 6 | | | 4 | | | | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 4 | | | 8 | | 8 |
| Actuated Green, G (s) | 92.8 | 92.8 | 92.8 | 92.8 | 92.8 | 92.8 | | 15.2 | | 15.2 | | 15.2 |
| Effective Green, g (s) | 93.8 | 93.8 | 93.8 | 93.8 | 93.8 | 93.8 | | 16.2 | | 16.2 | | 16.2 |
| Actuated g/C Ratio | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 | | 0.13 | | 0.13 | | 0.13 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | | 6.0 | | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | | 3.0 |
| Lane Grp Cap (vph) | 497 | 2607 | 900 | 297 | 2607 | 945 | | 223 | | 137 | | 139 |
| v/s Ratio Prot | | c0.35 | | | 0.22 | | | | | | | |
| v/s Ratio Perm | 0.19 | | 0.11 | 0.03 | | 0.07 | | 0.04 | | 0.03 | | 0.00 |
| v/c Ratio | 0.24 | 0.45 | 0.14 | 0.04 | 0.28 | 0.10 | | 0.33 | | 0.23 | | 0.04 |
| Uniform Delay, d1 | 3.5 | 4.4 | 3.2 | 2.9 | 3.7 | 3.1 | | 47.0 | | 46.4 | | 45.1 |
| Progression Factor | 1.14 | 1.11 | 1.23 | 2.45 | 2.30 | 5.39 | | 1.00 | | 1.00 | | 1.00 |
| Incremental Delay, d2 | 1.0 | 0.5 | 0.3 | 0.2 | 0.3 | 0.2 | | 0.9 | | 0.9 | | 0.1 |
| Delay (s) | 5.0 | 5.4 | 4.2 | 7.4 | 8.7 | 16.9 | | 47.9 | | 47.2 | | 45.2 |
| Level of Service | A | A | A | A | A | B | | D | | D | | D |
| Approach Delay (s) | | 5.3 | | | 9.7 | | | 47.9 | | | 46.2 | |
| Approach LOS | | A | | | A | | | D | | | D | |

| Intersection Summary | | | | | |
|---|---|---|---|---|---|
| HCM 2000 Control Delay | 9.7 | HCM 2000 Level of Service | A | | |
| HCM 2000 Volume to Capacity ratio | 0.44 | | | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 11.0 | | |
| Intersection Capacity Utilization | 76.1% | ICU Level of Service | D | | |
| Analysis Period (min) | 15 | | | | |

c Critical Lane Group

| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 50 | 1097 | 778 | 31 | 110 | 35 |
| Future Volume (vph) | 50 | 1097 | 778 | 31 | 110 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.5 | 3.0 | 3.0 | 3.0 |
| Storage Length (m) | 25.0 | | | 0.0 | 40.0 | 0.0 |
| Storage Lanes | 1 | | | 0 | 1 | 1 |
| Taper Length (m) | 15.0 | | | | 15.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 |
| Ped Bike Factor | 1.00 | | 1.00 | | 0.95 | 0.98 |
| Frt | | | 0.994 | | | 0.850 |
| Flt Protected | 0.950 | | | | 0.950 | |
| Satd. Flow (prot) | 1532 | 3336 | 3278 | 0 | 1685 | 1396 |
| Flt Permitted | 0.319 | | | | 0.950 | |
| Satd. Flow (perm) | 512 | 3336 | 3278 | 0 | 1595 | 1373 |
| Right Turn on Red | | | | Yes | | Yes |
| Satd. Flow (RTOR) | | | 8 | | | 37 |
| Link Speed (k/h) | | 50 | 50 | | 40 | |
| Link Distance (m) | | 221.4 | 542.1 | | 831.3 | |
| Travel Time (s) | | 15.9 | 39.0 | | 74.8 | |
| Confl. Peds. (#/hr) | 6 | | | 6 | 34 | 3 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles (%) | 10% | 7% | 8% | 10% | 0% | 8% |
| Adj. Flow (vph) | 53 | 1155 | 819 | 33 | 116 | 37 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 53 | 1155 | 852 | 0 | 116 | 37 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Left | Right | Left | Right |
| Median Width(m) | | 3.0 | 3.0 | | 3.0 | |
| Link Offset(m) | | 0.0 | 0.0 | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | 4.8 | | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.01 | 1.09 | 1.09 | 1.09 |
| Turning Speed (k/h) | 25 | | | 15 | 25 | 15 |
| Number of Detectors | 1 | 2 | 2 | | 1 | 1 |
| Detector Template | Left | Thru | Thru | | Left | Right |
| Leading Detector (m) | 2.0 | 10.0 | 10.0 | | 2.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 0.6 | | 2.0 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | 9.4 | | | |
| Detector 2 Size(m) | | 0.6 | 0.6 | | | |
| Detector 2 Type | | Cl+Ex | Cl+Ex | | | |
| Detector 2 Channel | | | | | | |





| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Detector 2 Extend (s) | | 0.0 | 0.0 | | | |
| Turn Type | Perm | NA | NA | | Prot | Perm |
| Protected Phases | | 2 | 6 | | 8 | |
| Permitted Phases | 2 | | | | | 8 |
| Detector Phase | 2 | 2 | 6 | | 8 | 8 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 19.0 | 19.0 | 19.0 | | 7.0 | 7.0 |
| Minimum Split (s) | 25.0 | 25.0 | 25.0 | | 28.0 | 28.0 |
| Total Split (s) | 91.0 | 91.0 | 91.0 | | 29.0 | 29.0 |
| Total Split (%) | 75.8% | 75.8% | 75.8% | | 24.2% | 24.2% |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | | 3.0 | 3.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | | -1.0 | -1.0 |
| Total Lost Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | 4.0 |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | C-Min | C-Min | C-Max | | None | None |
| v/c Ratio | 0.13 | 0.44 | 0.33 | | 0.49 | 0.17 |
| Control Delay | 3.2 | 3.1 | 4.0 | | 53.1 | 14.0 |
| Queue Delay | 0.0 | 0.1 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 3.2 | 3.1 | 4.0 | | 53.1 | 14.0 |
| Queue Length 50th (m) | 0.5 | 5.9 | 18.2 | | 27.5 | 0.0 |
| Queue Length 95th (m) | 4.3 | 28.5 | 32.5 | | 43.3 | 9.5 |
| Internal Link Dist (m) | | 197.4 | 518.1 | | 807.3 | |
| Turn Bay Length (m) | 25.0 | | | | 40.0 | |
| Base Capacity (vph) | 401 | 2617 | 2573 | | 351 | 315 |
| Starvation Cap Reductn | 0 | 300 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.13 | 0.50 | 0.33 | | 0.33 | 0.12 |

**Intersection Summary**

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 29 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 5: Wilson Ave & Ancaster Rd



## HCM Signalized Intersection Capacity Analysis
## 5: Wilson Ave & Ancaster Rd

07-02-2023

| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 50 | 1097 | 778 | 31 | 110 | 35 |
| Future Volume (vph) | 50 | 1097 | 778 | 31 | 110 | 35 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.5 | 3.0 | 3.0 | 3.0 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | 1.00 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.99 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1523 | 3336 | 3279 | | 1685 | 1373 |
| Flt Permitted | 0.32 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 512 | 3336 | 3279 | | 1685 | 1373 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 53 | 1155 | 819 | 33 | 116 | 37 |
| RTOR Reduction (vph) | 0 | 0 | 2 | 0 | 0 | 32 |
| Lane Group Flow (vph) | 53 | 1155 | 850 | 0 | 116 | 5 |
| Confl. Peds. (#/hr) | 6 | | | 6 | 34 | 3 |
| Heavy Vehicles (%) | 10% | 7% | 8% | 10% | 0% | 8% |
| Turn Type | Perm | NA | NA | | Prot | Perm |
| Protected Phases | | 2 | 6 | | 8 | |
| Permitted Phases | 2 | | | | | 8 |
| Actuated Green, G (s) | 93.2 | 93.2 | 93.2 | | 15.8 | 15.8 |
| Effective Green, g (s) | 94.2 | 94.2 | 94.2 | | 16.8 | 16.8 |
| Actuated g/C Ratio | 0.79 | 0.79 | 0.79 | | 0.14 | 0.14 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | | 5.0 | 5.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 401 | 2618 | 2574 | | 235 | 192 |
| v/s Ratio Prot | | c0.35 | 0.26 | | c0.07 | |
| v/s Ratio Perm | 0.10 | | | | | 0.00 |
| v/c Ratio | 0.13 | 0.44 | 0.33 | | 0.49 | 0.03 |
| Uniform Delay, d1 | 3.1 | 4.2 | 3.7 | | 47.7 | 44.5 |
| Progression Factor | 0.58 | 0.52 | 0.85 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 0.6 | 0.5 | 0.3 | | 1.6 | 0.1 |
| Delay (s) | 2.4 | 2.7 | 3.5 | | 49.3 | 44.6 |
| Level of Service | A | A | A | | D | D |
| Approach Delay (s) | | 2.7 | 3.5 | | 48.2 | |
| Approach LOS | | A | A | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 6.1 | HCM 2000 Level of Service | A |
| HCM 2000 Volume to Capacity ratio | 0.45 | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 56.4% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |



## Lanes, Volumes, Timings
## 6: Dufferin St & Wilson Ave

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 793 | 364 | 403 | 541 | 113 | 254 | 115 | 134 | 130 | 165 | 10 |
| Future Volume (vph) | 10 | 793 | 364 | 403 | 541 | 113 | 254 | 115 | 134 | 130 | 165 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 35.0 | | 55.0 | 245.0 | | 0.0 | 45.0 | | 0.0 | 30.0 | | 0.0 |
| Storage Lanes | 1 | | 1 | 1 | | 0 | 1 | | 1 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 10.0 | | | 7.5 | | | 15.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | 0.99 | | 0.95 | 0.99 | 0.99 | | 0.95 | | 0.97 | 0.98 | 1.00 | |
| Frt | | | 0.850 | | 0.974 | | | | 0.850 | | 0.992 | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 1685 | 3305 | 1223 | 1574 | 3153 | 0 | 1604 | 1860 | 1288 | 1636 | 1771 | 0 |
| Flt Permitted | 0.395 | | | 0.112 | | | 0.569 | | | 0.681 | | |
| Satd. Flow (perm) | 692 | 3305 | 1165 | 184 | 3153 | 0 | 908 | 1860 | 1250 | 1155 | 1771 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 209 | | 31 | | | | 118 | | 2 | |
| Link Speed (k/h) | | 50 | | | 60 | | | 50 | | | 40 | |
| Link Distance (m) | | 542.1 | | | 151.6 | | | 245.7 | | | 259.2 | |
| Travel Time (s) | | 39.0 | | | 9.1 | | | 17.7 | | | 23.3 | |
| Confl. Peds. (#/hr) | 16 | | 30 | 30 | | 16 | 66 | | 16 | 16 | | 66 |
| Confl. Bikes (#/hr) | | | | | | 2 | | | | | | 3 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Heavy Vehicles (%) | 0% | 8% | 7% | 7% | 11% | 1% | 5% | 1% | 10% | 3% | 5% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 |
| Adj. Flow (vph) | 10 | 818 | 375 | 415 | 558 | 116 | 262 | 119 | 138 | 134 | 170 | 10 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 10 | 818 | 375 | 415 | 674 | 0 | 262 | 119 | 138 | 134 | 180 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.30 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.18 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | |
| Detector Template | Left | Thru | Right | Left | Thru | | Left | Thru | Right | Left | Thru | |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |

## Lanes, Volumes, Timings
## 6: Dufferin St & Wilson Ave

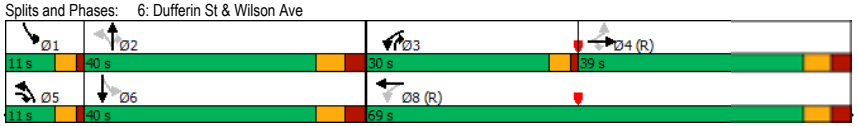
07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | pm+ov | pm+pt | NA | | pm+pt | NA | pm+ov | pm+pt | NA | |
| Protected Phases | | 4 | 5 | 3 | 8 | | 5 | 2 | 3 | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | |
| Detector Phase | 4 | 4 | 5 | 3 | 8 | | 5 | 2 | 3 | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 6.0 | 6.0 | 30.0 | | 6.0 | 32.0 | 6.0 | 6.0 | 32.0 | |
| Minimum Split (s) | 37.0 | 37.0 | 10.0 | 10.0 | 37.0 | | 10.0 | 39.0 | 10.0 | 10.0 | 39.0 | |
| Total Split (s) | 39.0 | 39.0 | 11.0 | 30.0 | 69.0 | | 11.0 | 40.0 | 30.0 | 11.0 | 40.0 | |
| Total Split (%) | 32.5% | 32.5% | 9.2% | 25.0% | 57.5% | | 9.2% | 33.3% | 25.0% | 9.2% | 33.3% | |
| Yellow Time (s) | 4.0 | 4.0 | 3.0 | 3.0 | 4.0 | | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 1.0 | 1.0 | 3.0 | | 1.0 | 3.0 | 1.0 | 1.0 | 3.0 | |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 6.0 | 6.0 | 3.0 | 3.0 | 6.0 | | 3.0 | 6.0 | 3.0 | 3.0 | 6.0 | |
| Lead/Lag | Lag | Lag | Lead | Lead | | | Lead | Lag | Lead | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes | Yes | Yes | |
| Recall Mode | C-Min | C-Min | None | None | C-Min | | None | Min | None | None | Min | |
| v/c Ratio | 0.05 | 0.91 | 0.67 | 0.97 | 0.40 | | 0.68 | 0.23 | 0.19 | 0.29 | 0.37 | |
| Control Delay | 37.2 | 63.2 | 23.4 | 71.3 | 16.7 | | 39.2 | 35.1 | 3.8 | 26.4 | 37.4 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 37.2 | 63.2 | 23.4 | 71.3 | 16.7 | | 39.2 | 35.1 | 3.8 | 26.4 | 37.4 | |
| Queue Length 50th (m) | 2.2 | 114.3 | 31.0 | 86.1 | 47.5 | | 46.7 | 22.9 | 2.1 | 21.8 | 35.6 | |
| Queue Length 95th (m) | m4.4 | #143.9 | 85.6 | #152.9 | 61.7 | | 70.9 | 39.2 | 11.6 | 36.7 | 57.2 | |
| Internal Link Dist (m) | | 518.1 | | | 127.6 | | | 221.7 | | | 235.2 | |
| Turn Bay Length (m) | 35.0 | | 55.0 | 245.0 | | | 45.0 | | | 30.0 | | |
| Base Capacity (vph) | 190 | 908 | 563 | 426 | 1691 | | 386 | 528 | 732 | 457 | 503 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.05 | 0.90 | 0.67 | 0.97 | 0.40 | | 0.68 | 0.23 | 0.19 | 0.29 | 0.36 | |

**Intersection Summary**

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Dufferin St & Wilson Ave






## HCM Signalized Intersection Capacity Analysis
## 6: Dufferin St & Wilson Ave

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 10 | 793 | 364 | 403 | 541 | 113 | 254 | 115 | 134 | 130 | 165 | 10 |
| Future Volume (vph) | 10 | 793 | 364 | 403 | 541 | 113 | 254 | 115 | 134 | 130 | 165 | 10 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 6.0 | 6.0 | 3.0 | 3.0 | 6.0 | | 3.0 | 6.0 | 3.0 | 3.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.96 | 1.00 | 0.99 | | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | |
| Flpb, ped/bikes | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | | 0.97 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.97 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1664 | 3305 | 1177 | 1574 | 3154 | | 1557 | 1860 | 1267 | 1619 | 1771 | |
| Flt Permitted | 0.40 | 1.00 | 1.00 | 0.11 | 1.00 | | 0.57 | 1.00 | 1.00 | 0.68 | 1.00 | |
| Satd. Flow (perm) | 692 | 3305 | 1177 | 186 | 3154 | | 932 | 1860 | 1267 | 1160 | 1771 | |
| Peak-hour factor, PHF | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Adj. Flow (vph) | 10 | 818 | 375 | 415 | 558 | 116 | 262 | 119 | 138 | 134 | 170 | 10 |
| RTOR Reduction (vph) | 0 | 0 | 138 | 0 | 15 | 0 | 0 | 0 | 58 | 0 | 1 | 0 |
| Lane Group Flow (vph) | 10 | 818 | 237 | 415 | 659 | 0 | 262 | 119 | 80 | 134 | 179 | 0 |
| Confl. Peds. (#/hr) | 16 | | 30 | 30 | | 16 | 66 | | 16 | 16 | | 66 |
| Confl. Bikes (#/hr) | | | | | | 2 | | | | | | 3 |
| Heavy Vehicles (%) | 0% | 8% | 7% | 7% | 11% | 1% | 5% | 1% | 10% | 3% | 5% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 33 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 |
| Turn Type | Perm | NA | pm+ov | pm+pt | NA | | pm+pt | NA | pm+ov | pm+pt | NA | |
| Protected Phases | | 4 | 5 | 3 | 8 | | 5 | 2 | 3 | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 31.6 | 31.6 | 39.0 | 62.6 | 62.6 | | 39.6 | 32.2 | 59.2 | 39.2 | 32.0 | |
| Effective Green, g (s) | 32.6 | 32.6 | 41.0 | 63.6 | 63.6 | | 41.6 | 33.2 | 61.2 | 41.2 | 33.0 | |
| Actuated g/C Ratio | 0.27 | 0.27 | 0.34 | 0.53 | 0.53 | | 0.35 | 0.28 | 0.51 | 0.34 | 0.28 | |
| Clearance Time (s) | 7.0 | 7.0 | 4.0 | 4.0 | 7.0 | | 4.0 | 7.0 | 4.0 | 4.0 | 7.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 187 | 897 | 402 | 422 | 1671 | | 366 | 514 | 646 | 429 | 487 | |
| v/s Ratio Prot | | 0.25 | 0.04 | c0.23 | 0.21 | | c0.05 | 0.06 | 0.03 | 0.02 | 0.10 | |
| v/s Ratio Perm | 0.01 | | 0.16 | c0.29 | | | c0.20 | | 0.03 | 0.09 | | |
| v/c Ratio | 0.05 | 0.91 | 0.59 | 0.98 | 0.39 | | 0.72 | 0.23 | 0.12 | 0.31 | 0.37 | |
| Uniform Delay, d1 | 32.3 | 42.3 | 32.6 | 35.6 | 16.8 | | 33.2 | 33.5 | 15.4 | 28.2 | 35.1 | |
| Progression Factor | 1.12 | 1.16 | 1.38 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.5 | 14.1 | 2.1 | 39.2 | 0.7 | | 6.5 | 0.2 | 0.1 | 0.4 | 0.5 | |
| Delay (s) | 36.7 | 63.1 | 46.9 | 74.8 | 17.5 | | 39.7 | 33.8 | 15.5 | 28.6 | 35.5 | |
| Level of Service | D | E | D | E | B | | D | C | B | C | D | |
| Approach Delay (s) | | 57.9 | | | 39.3 | | | 31.9 | | | 32.6 | |
| Approach LOS | | E | | | D | | | C | | | C | |

**Intersection Summary**

| | | | | |
|---|---|---|---|---|
| HCM 2000 Control Delay | 44.6 | HCM 2000 Level of Service | D | |
| HCM 2000 Volume to Capacity ratio | 0.90 | | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 18.0 | |
| Intersection Capacity Utilization | 109.1% | ICU Level of Service | H | |
| Analysis Period (min) | 15 | | | |

c Critical Lane Group

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 95 | 86 | 124 | 1473 | 2176 | 113 |
| Future Volume (vph) | 95 | 86 | 124 | 1473 | 2176 | 113 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 | 3.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.91 | 0.91 |
| Frt | | 0.850 | | | 0.993 | |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1652 | 1478 | 1652 | 3500 | 4994 | 0 |
| Flt Permitted | 0.950 | | 0.043 | | | |
| Satd. Flow (perm) | 1652 | 1478 | 75 | 3500 | 4994 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | | 1 | | | 8 | |
| Link Speed (k/h) | 40 | | | 60 | 60 | |
| Link Distance (m) | 451.9 | | | 263.9 | 203.5 | |
| Travel Time (s) | 40.7 | | | 15.8 | 12.2 | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 106 | 96 | 138 | 1637 | 2418 | 126 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 106 | 96 | 138 | 1637 | 2544 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Left | Left | Right |
| Median Width(m) | 3.0 | | | 3.0 | 3.0 | |
| Link Offset(m) | 0.0 | | | 0.0 | 0.0 | |
| Crosswalk Width(m) | 4.8 | | | 4.8 | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.09 | 1.09 | 1.09 | 1.01 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | 15 | 25 | | | 15 |
| Number of Detectors | 1 | 1 | 1 | 2 | 2 | |
| Detector Template | Left | Right | Left | Thru | Thru | |
| Leading Detector (m) | 2.0 | 2.0 | 2.0 | 10.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 2.0 | 2.0 | 0.6 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 2 Position(m) | | | | 9.4 | 9.4 | |
| Detector 2 Size(m) | | | | 0.6 | 0.6 | |
| Detector 2 Type | | | | Cl+Ex | Cl+Ex | |
| Detector 2 Channel | | | | | | |
| Detector 2 Extend (s) | | | | 0.0 | 0.0 | |
| Turn Type | Prot | pm+ov | pm+pt | NA | NA | |
| Protected Phases | 4 | 5 | 5 | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Detector Phase | 4 | 5 | 5 | 2 | 6 | |
| Switch Phase | | | | | | |





| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Minimum Initial (s) | 7.0 | 6.0 | 6.0 | 19.0 | 19.0 | |
| Minimum Split (s) | 39.0 | 10.0 | 10.0 | 26.0 | 26.0 | |
| Total Split (s) | 39.0 | 23.0 | 23.0 | 91.0 | 68.0 | |
| Total Split (%) | 30.0% | 17.7% | 17.7% | 70.0% | 52.3% | |
| Yellow Time (s) | 4.0 | 3.0 | 3.0 | 5.0 | 5.0 | |
| All-Red Time (s) | 3.0 | 1.0 | 1.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 6.0 | 3.0 | 3.0 | 6.0 | 6.0 | |
| Lead/Lag | | Lead | Lead | | Lag | |
| Lead-Lag Optimize? | | Yes | Yes | | Yes | |
| Recall Mode | None | None | None | C-Min | C-Min | |
| v/c Ratio | 0.57 | 0.26 | 0.70 | 0.59 | 0.74 | |
| Control Delay | 65.8 | 38.7 | 46.8 | 6.6 | 16.2 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 65.8 | 38.7 | 46.8 | 6.6 | 16.2 | |
| Queue Length 50th (m) | 27.5 | 20.9 | 20.6 | 74.5 | 144.3 | |
| Queue Length 95th (m) | 45.5 | 32.5 | 42.8 | 111.7 | 219.2 | |
| Internal Link Dist (m) | 427.9 | | | 239.9 | 179.5 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 419 | 463 | 303 | 2781 | 3421 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.25 | 0.21 | 0.46 | 0.59 | 0.74 | |

**Intersection Summary**

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 101: Allen Rd & E-W Road



## HCM Signalized Intersection Capacity Analysis
## 101: Allen Rd & E-W Road

07-02-2023

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 95 | 86 | 124 | 1473 | 2176 | 113 |
| Future Volume (vph) | 95 | 86 | 124 | 1473 | 2176 | 113 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 | 3.0 |
| Total Lost time (s) | 6.0 | 3.0 | 3.0 | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.91 | |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1652 | 1478 | 1652 | 3500 | 4991 | |
| Flt Permitted | 0.95 | 1.00 | 0.04 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1652 | 1478 | 76 | 3500 | 4991 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 106 | 96 | 138 | 1637 | 2418 | 126 |
| RTOR Reduction (vph) | 0 | 1 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 106 | 95 | 138 | 1637 | 2541 | 0 |
| Turn Type | Prot | pm+ov | pm+pt | NA | NA | |
| Protected Phases | 4 | 5 | 5 | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Actuated Green, G (s) | 13.7 | 24.0 | 102.3 | 102.3 | 88.0 | |
| Effective Green, g (s) | 14.7 | 26.0 | 103.3 | 103.3 | 89.0 | |
| Actuated g/C Ratio | 0.11 | 0.20 | 0.79 | 0.79 | 0.68 | |
| Clearance Time (s) | 7.0 | 4.0 | 4.0 | 7.0 | 7.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 186 | 295 | 197 | 2781 | 3416 | |
| v/s Ratio Prot | c0.06 | 0.03 | c0.06 | 0.47 | c0.51 | |
| v/s Ratio Perm | | 0.04 | 0.50 | | | |
| v/c Ratio | 0.57 | 0.32 | 0.70 | 0.59 | 0.74 | |
| Uniform Delay, d1 | 54.7 | 44.5 | 35.6 | 5.2 | 13.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 4.0 | 0.6 | 10.7 | 0.9 | 1.5 | |
| Delay (s) | 58.6 | 45.1 | 46.3 | 6.1 | 14.7 | |
| Level of Service | E | D | D | A | B | |
| Approach Delay (s) | 52.2 | | | 9.2 | 14.7 | |
| Approach LOS | D | | | A | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 14.2 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.72 | | |
| Actuated Cycle Length (s) | 130.0 | Sum of lost time (s) | 15.0 |
| Intersection Capacity Utilization | 70.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |



## Lanes, Volumes, Timings
## 102: Street B/Studio Dwy & Street A

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 18 | 124 | 43 | 112 | 174 | 0 | 140 | 168 | 102 | 0 | 21 | 3 |
| Future Volume (vph) | 18 | 124 | 43 | 112 | 174 | 0 | 140 | 168 | 102 | 0 | 21 | 3 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 0.0 | | 0.0 | 90.0 | | 0.0 | 50.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 0 | | 0 | 1 | | 0 | 1 | | 0 | 0 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.969 | | | | | | 0.943 | | | 0.984 | |
| Flt Protected | | 0.995 | | 0.950 | | | 0.950 | | | | | |
| Satd. Flow (prot) | 0 | 1776 | 0 | 1652 | 1842 | 0 | 1652 | 1737 | 0 | 0 | 1813 | 0 |
| Flt Permitted | | 0.968 | | 0.629 | | | 0.740 | | | | | |
| Satd. Flow (perm) | 0 | 1728 | 0 | 1094 | 1842 | 0 | 1287 | 1737 | 0 | 0 | 1813 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 30 | | | | | | 64 | | | 3 | |
| Link Speed (k/h) | | 40 | | | 40 | | | 40 | | | 30 | |
| Link Distance (m) | | 107.0 | | | 385.5 | | | 165.4 | | | 70.3 | |
| Travel Time (s) | | 9.6 | | | 34.7 | | | 14.9 | | | 8.4 | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 20 | 138 | 48 | 124 | 193 | 0 | 156 | 187 | 113 | 0 | 23 | 3 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 206 | 0 | 124 | 193 | 0 | 156 | 300 | 0 | 0 | 26 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | |
| Leading Detector (m) | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 0.6 | | 2.0 | 0.6 | | 2.0 | 0.6 | | 2.0 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | | NA | |
| Protected Phases | | 2 | | | 6 | | | 8 | | | 4 | |

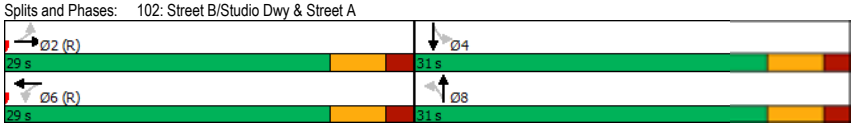
## Lanes, Volumes, Timings
## 102: Street B/Studio Dwy & Street A

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Detector Phase | 2 | 2 | | 6 | 6 | | 8 | 8 | | 4 | 4 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Minimum Split (s) | 24.0 | 24.0 | | 24.0 | 24.0 | | 24.0 | 24.0 | | 24.0 | 24.0 | |
| Total Split (s) | 29.0 | 29.0 | | 29.0 | 29.0 | | 31.0 | 31.0 | | 31.0 | 31.0 | |
| Total Split (%) | 48.3% | 48.3% | | 48.3% | 48.3% | | 51.7% | 51.7% | | 51.7% | 51.7% | |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lost Time Adjust (s) | | -1.0 | | -1.0 | -1.0 | | -1.0 | -1.0 | | | -1.0 | |
| Total Lost Time (s) | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | | 5.0 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | C-Max | C-Max | | C-Max | C-Max | | None | None | | None | None | |
| v/c Ratio | | 0.20 | | 0.19 | 0.18 | | 0.49 | 0.62 | | | 0.06 | |
| Control Delay | | 6.8 | | 8.5 | 7.7 | | 23.2 | 20.6 | | | 13.6 | |
| Queue Delay | | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | |
| Total Delay | | 6.8 | | 8.5 | 7.7 | | 23.2 | 20.6 | | | 13.6 | |
| Queue Length 50th (m) | | 8.2 | | 5.9 | 9.0 | | 15.5 | 23.9 | | | 2.0 | |
| Queue Length 95th (m) | | 22.4 | | 17.5 | 23.1 | | 26.2 | 38.8 | | | 6.0 | |
| Internal Link Dist (m) | | 83.0 | | | 361.5 | | | 141.4 | | | 46.3 | |
| Turn Bay Length (m) | | | | 90.0 | | | 50.0 | | | | | |
| Base Capacity (vph) | | 1021 | | 638 | 1075 | | 557 | 788 | | | 787 | |
| Starvation Cap Reductn | | 0 | | 0 | 0 | | 0 | 0 | | | 0 | |
| Spillback Cap Reductn | | 0 | | 0 | 0 | | 0 | 0 | | | 0 | |
| Storage Cap Reductn | | 0 | | 0 | 0 | | 0 | 0 | | | 0 | |
| Reduced v/c Ratio | | 0.20 | | 0.19 | 0.18 | | 0.28 | 0.38 | | | 0.03 | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Cycle Length: 60 | |
| Actuated Cycle Length: 60 | |
| Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green | |
| Natural Cycle: 50 | |
| Control Type: Actuated-Coordinated | |

Splits and Phases: 102: Street B/Studio Dwy & Street A






## HCM Signalized Intersection Capacity Analysis
## 102: Street B/Studio Dwy & Street A

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 18 | 124 | 43 | 112 | 174 | 0 | 140 | 168 | 102 | 0 | 21 | 3 |
| Future Volume (vph) | 18 | 124 | 43 | 112 | 174 | 0 | 140 | 168 | 102 | 0 | 21 | 3 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | |
| Frt | | 0.97 | | 1.00 | 1.00 | | 1.00 | 0.94 | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 1775 | | 1652 | 1842 | | 1652 | 1738 | | | 1813 | |
| Flt Permitted | | 0.97 | | 0.63 | 1.00 | | 0.74 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | | 1727 | | 1093 | 1842 | | 1287 | 1738 | | | 1813 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 20 | 138 | 48 | 124 | 193 | 0 | 156 | 187 | 113 | 0 | 23 | 3 |
| RTOR Reduction (vph) | 0 | 13 | 0 | 0 | 0 | 0 | 0 | 48 | 0 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 0 | 194 | 0 | 124 | 193 | 0 | 156 | 252 | 0 | 0 | 24 | 0 |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | | NA | |
| Protected Phases | | 2 | | | 6 | | | 8 | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | | 34.0 | | 34.0 | 34.0 | | 14.0 | 14.0 | | | 14.0 | |
| Effective Green, g (s) | | 35.0 | | 35.0 | 35.0 | | 15.0 | 15.0 | | | 15.0 | |
| Actuated g/C Ratio | | 0.58 | | 0.58 | 0.58 | | 0.25 | 0.25 | | | 0.25 | |
| Clearance Time (s) | | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | | | 6.0 | |
| Vehicle Extension (s) | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1007 | | 637 | 1074 | | 321 | 434 | | | 453 | |
| v/s Ratio Prot | | | | | 0.10 | | | c0.14 | | | 0.01 | |
| v/s Ratio Perm | | 0.11 | | c0.11 | | | 0.12 | | | | | |
| v/c Ratio | | 0.19 | | 0.19 | 0.18 | | 0.49 | 0.58 | | | 0.05 | |
| Uniform Delay, d1 | | 5.9 | | 5.9 | 5.8 | | 19.2 | 19.7 | | | 17.1 | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.4 | | 0.7 | 0.4 | | 1.2 | 2.0 | | | 0.0 | |
| Delay (s) | | 6.3 | | 6.6 | 6.2 | | 20.4 | 21.7 | | | 17.1 | |
| Level of Service | | A | | A | A | | C | C | | | B | |
| Approach Delay (s) | | 6.3 | | | 6.3 | | | 21.3 | | | 17.1 | |
| Approach LOS | | A | | | A | | | C | | | B | |

| Intersection Summary | | | | | |
|---|---|---|---|---|---|
| HCM 2000 Control Delay | 13.4 | HCM 2000 Level of Service | | B | |
| HCM 2000 Volume to Capacity ratio | 0.31 | | | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | | 10.0 | |
| Intersection Capacity Utilization | 46.9% | ICU Level of Service | | A | |
| Analysis Period (min) | 15 | | | | |
| c Critical Lane Group | | | | | |

## Lanes, Volumes, Timings
## 103: Hanover Rd/Street B & Street C

07-02-2023



| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 134 | 24 | 40 | 277 | 87 | 90 |
| Future Volume (vph) | 134 | 24 | 40 | 277 | 87 | 90 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 | 3.0 |
| Storage Length (m) | 0.0 | 0.0 | 40.0 | | | 0.0 |
| Storage Lanes | 1 | 0 | 1 | | | 0 |
| Taper Length (m) | 7.5 | | 7.5 | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.979 | | | | 0.931 | |
| Flt Protected | 0.959 | | 0.950 | | | |
| Satd. Flow (prot) | 1632 | 0 | 1652 | 1842 | 1715 | 0 |
| Flt Permitted | 0.959 | | 0.950 | | | |
| Satd. Flow (perm) | 1632 | 0 | 1652 | 1842 | 1715 | 0 |
| Link Speed (k/h) | 40 | | | 40 | 40 | |
| Link Distance (m) | 35.3 | | | 60.4 | 165.4 | |
| Travel Time (s) | 3.2 | | | 5.4 | 14.9 | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 149 | 27 | 44 | 308 | 97 | 100 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 176 | 0 | 44 | 308 | 197 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Left | Left | Right |
| Median Width(m) | 3.0 | | | 3.0 | 3.0 | |
| Link Offset(m) | 0.0 | | | 0.0 | 0.0 | |
| Crosswalk Width(m) | 4.8 | | | 4.8 | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.09 | 1.09 | 1.09 | 1.01 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | 15 | 25 | | | 15 |
| Sign Control | Stop | | | Stop | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |

Control Type: Unsignalized



## HCM Unsignalized Intersection Capacity Analysis
## 103: Hanover Rd/Street B & Street C

07-02-2023



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Traffic Volume (vph) | 134 | 24 | 40 | 277 | 87 | 90 |
| Future Volume (vph) | 134 | 24 | 40 | 277 | 87 | 90 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 149 | 27 | 44 | 308 | 97 | 100 |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 |
|---|---|---|---|---|
| Volume Total (vph) | 176 | 44 | 308 | 197 |
| Volume Left (vph) | 149 | 44 | 0 | 0 |
| Volume Right (vph) | 27 | 0 | 0 | 100 |
| Hadj (s) | 0.11 | 0.53 | 0.03 | -0.27 |
| Departure Headway (s) | 5.3 | 5.7 | 5.2 | 4.7 |
| Degree Utilization, x | 0.26 | 0.07 | 0.45 | 0.26 |
| Capacity (veh/h) | 625 | 609 | 668 | 730 |
| Control Delay (s) | 10.2 | 8.0 | 11.2 | 9.3 |
| Approach Delay (s) | 10.2 | 10.8 | | 9.3 |
| Approach LOS | B | B | | A |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Delay | | 10.2 | | |
| Level of Service | | B | | |
| Intersection Capacity Utilization | | 32.3% | ICU Level of Service | A |
| Analysis Period (min) | | 15 | | |

## Lanes, Volumes, Timings
## 104: Street D & Street J/Street A

07-02-2023

| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 65 | 0 | 34 | 221 | 0 | 87 |
| Future Volume (vph) | 65 | 0 | 34 | 221 | 0 | 87 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | | | 0.865 | |
| Flt Protected | | | | 0.993 | | |
| Satd. Flow (prot) | 1842 | 0 | 0 | 1829 | 1504 | 0 |
| Flt Permitted | | | | 0.993 | | |
| Satd. Flow (perm) | 1842 | 0 | 0 | 1829 | 1504 | 0 |
| Link Speed (k/h) | 40 | | | 40 | 40 | |
| Link Distance (m) | 103.1 | | | 63.7 | 68.9 | |
| Travel Time (s) | 9.3 | | | 5.7 | 6.2 | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Adj. Flow (vph) | 72 | 0 | 38 | 246 | 0 | 97 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 72 | 0 | 0 | 284 | 97 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Left | Left | Right |
| Median Width(m) | 0.0 | | | 0.0 | 3.0 | |
| Link Offset(m) | 0.0 | | | 0.0 | 0.0 | |
| Crosswalk Width(m) | 4.8 | | | 4.8 | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 |
| Turning Speed (k/h) | | 15 | 25 | | 25 | 15 |
| Sign Control | Stop | | | Stop | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Control Type: Unsignalized | |



## HCM Unsignalized Intersection Capacity Analysis
## 104: Street D & Street J/Street A

07-02-2023

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Traffic Volume (vph) | 65 | 0 | 34 | 221 | 0 | 87 |
| Future Volume (vph) | 65 | 0 | 34 | 221 | 0 | 87 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 72 | 0 | 38 | 246 | 0 | 97 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total (vph) | 72 | 284 | 97 |
| Volume Left (vph) | 0 | 38 | 0 |
| Volume Right (vph) | 0 | 0 | 97 |
| Hadj (s) | 0.03 | 0.06 | -0.57 |
| Departure Headway (s) | 4.4 | 4.3 | 4.1 |
| Degree Utilization, x | 0.09 | 0.34 | 0.11 |
| Capacity (veh/h) | 779 | 819 | 804 |
| Control Delay (s) | 7.9 | 9.4 | 7.6 |
| Approach Delay (s) | 7.9 | 9.4 | 7.6 |
| Approach LOS | A | A | A |

| Intersection Summary | | | |
|---|---|---|---|
| Delay | 8.8 | | |
| Level of Service | A | | |
| Intersection Capacity Utilization | 32.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 164 | 263 | 0 | 109 | 84 | 0 | 0 | 780 | 36 | 20 | 931 | 328 |
| Future Volume (vph) | 164 | 263 | 0 | 109 | 84 | 0 | 0 | 780 | 36 | 20 | 931 | 328 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 0.0 | | 30.0 | 80.0 | | 0.0 | 65.0 | | 25.0 | 60.0 | | 25.0 |
| Storage Lanes | 0 | | 1 | 1 | | 0 | 1 | | 1 | 1 | | 1 |
| Taper Length (m) | 0.0 | | | 40.0 | | | 15.0 | | | 55.0 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Ped Bike Factor | | 1.00 | | 1.00 | | | | | 0.97 | 1.00 | | 0.96 |
| Frt | | | | | | | | | 0.850 | | | 0.850 |
| Flt Protected | | 0.981 | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 0 | 1843 | 1773 | 1652 | 1879 | 0 | 1773 | 3433 | 1385 | 1416 | 3400 | 1399 |
| Flt Permitted | | 0.836 | | 0.364 | | | | | | 0.241 | | |
| Satd. Flow (perm) | 0 | 1569 | 1773 | 631 | 1879 | 0 | 1773 | 3433 | 1339 | 358 | 3400 | 1349 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | | | | | 40 | | | 226 |
| Link Speed (k/h) | | 30 | | | 30 | | | 50 | | | 50 | |
| Link Distance (m) | | 237.9 | | | 186.3 | | | 273.1 | | | 1257.9 | |
| Travel Time (s) | | 28.5 | | | 22.4 | | | 19.7 | | | 90.6 | |
| Confl. Peds. (#/hr) | 3 | | 7 | 7 | | 3 | 7 | | 6 | 6 | | 7 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 2% | 0% | 2% | 0% | 4% | 1% | 19% | 5% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 18 |
| Adj. Flow (vph) | 173 | 277 | 0 | 115 | 88 | 0 | 0 | 821 | 38 | 21 | 980 | 345 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 450 | 0 | 115 | 88 | 0 | 0 | 821 | 38 | 21 | 980 | 345 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.20 | 1.09 | 1.01 | 1.20 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 1 | 1 | 1 | 1 | | 1 | 1 | 1 | 1 | 1 | 1 |
| Detector Template | Left | | Right | Left | | | Left | | Right | Left | | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Turn Type | Perm | NA | Perm | Perm | NA | | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | 6 |



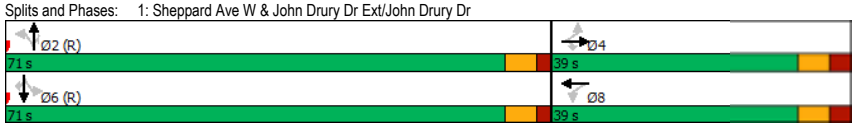


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector Phase | 4 | 4 | 4 | 8 | 8 | | 2 | 2 | 2 | 6 | 6 | 6 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| Minimum Split (s) | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| Total Split (s) | 39.0 | 39.0 | 39.0 | 39.0 | 39.0 | | 71.0 | 71.0 | 71.0 | 71.0 | 71.0 | 71.0 |
| Total Split (%) | 35.5% | 35.5% | 35.5% | 35.5% | 35.5% | | 64.5% | 64.5% | 64.5% | 64.5% | 64.5% | 64.5% |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| All-Red Time (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Lost Time Adjust (s) | | -1.0 | -1.0 | -1.0 | -1.0 | | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 |
| Total Lost Time (s) | | 6.0 | 6.0 | 6.0 | 6.0 | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | None | None | None | Min | Min | | C-Min | C-Min | C-Min | C-Min | C-Min | C-Min |
| v/c Ratio | | 0.63 | | 0.40 | 0.10 | | | 0.54 | 0.06 | 0.13 | 0.65 | 0.48 |
| Control Delay | | 28.4 | | 26.3 | 18.5 | | | 23.7 | 4.9 | 10.3 | 14.6 | 3.5 |
| Queue Delay | | 0.0 | | 0.0 | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | | 28.4 | | 26.3 | 18.5 | | | 23.7 | 4.9 | 10.3 | 14.6 | 3.5 |
| Queue Length 50th (m) | | 75.9 | | 16.9 | 11.1 | | | 69.2 | 0.0 | 1.4 | 68.4 | 9.0 |
| Queue Length 95th (m) | | 122.8 | | 36.9 | 22.7 | | | 80.1 | 5.3 | m2.0 | m91.1 | m19.3 |
| Internal Link Dist (m) | | 213.9 | | | 162.3 | | | 249.1 | | | 1233.9 | |
| Turn Bay Length (m) | | | | 80.0 | | | | | 25.0 | 60.0 | | 25.0 |
| Base Capacity (vph) | | 717 | | 288 | 858 | | | 2059 | 819 | 214 | 2040 | 899 |
| Starvation Cap Reductn | | 0 | | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | | 0 | | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | | 0 | | 0 | 0 | | | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | | 0.63 | | 0.40 | 0.10 | | | 0.40 | 0.05 | 0.10 | 0.48 | 0.38 |

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green
Natural Cycle: 70
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: Sheppard Ave W & John Drury Dr Ext/John Drury Dr



## HCM Signalized Intersection Capacity Analysis
## 1: Sheppard Ave W & John Drury Dr Ext/John Drury Dr

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 164 | 263 | 0 | 109 | 84 | 0 | 0 | 780 | 36 | 20 | 931 | 328 |
| Future Volume (vph) | 164 | 263 | 0 | 109 | 84 | 0 | 0 | 780 | 36 | 20 | 931 | 328 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | | 6.0 | | 6.0 | 6.0 | | | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Lane Util. Factor | | 1.00 | | 1.00 | 1.00 | | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 0.97 | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.98 | | 0.95 | 1.00 | | | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1841 | | 1647 | 1879 | | | 3433 | 1339 | 1411 | 3400 | 1349 |
| Flt Permitted | | 0.84 | | 0.36 | 1.00 | | | 1.00 | 1.00 | 0.24 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1569 | | 631 | 1879 | | | 3433 | 1339 | 358 | 3400 | 1349 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 173 | 277 | 0 | 115 | 88 | 0 | 0 | 821 | 38 | 21 | 980 | 345 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21 | 0 | 0 | 126 |
| Lane Group Flow (vph) | 0 | 450 | 0 | 115 | 88 | 0 | 0 | 821 | 17 | 21 | 980 | 219 |
| Confl. Peds. (#/hr) | 3 | | 7 | 7 | | 3 | 7 | | 6 | 6 | | 7 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 2% | 0% | 2% | 0% | 4% | 1% | 19% | 5% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 18 | 0 | 0 | 18 |
| Turn Type | Perm | NA | Perm | Perm | NA | | Perm | NA | Perm | Perm | NA | Perm |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | 6 |
| Actuated Green, G (s) | | 49.3 | | 49.3 | 49.3 | | | 47.7 | 47.7 | 47.7 | 47.7 | 47.7 |
| Effective Green, g (s) | | 50.3 | | 50.3 | 50.3 | | | 48.7 | 48.7 | 48.7 | 48.7 | 48.7 |
| Actuated g/C Ratio | | 0.46 | | 0.46 | 0.46 | | | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 |
| Clearance Time (s) | | 7.0 | | 7.0 | 7.0 | | | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| Vehicle Extension (s) | | 3.0 | | 3.0 | 3.0 | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 717 | | 288 | 859 | | | 1519 | 592 | 158 | 1505 | 597 |
| v/s Ratio Prot | | | | | 0.05 | | | 0.24 | | | c0.29 | |
| v/s Ratio Perm | | c0.29 | | 0.18 | | | | | 0.01 | 0.06 | | 0.16 |
| v/c Ratio | | 0.63 | | 0.40 | 0.10 | | | 0.54 | 0.03 | 0.13 | 0.65 | 0.37 |
| Uniform Delay, d1 | | 22.7 | | 19.8 | 17.0 | | | 22.5 | 17.3 | 18.1 | 24.0 | 20.4 |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | | 1.00 | 1.00 | 0.55 | 0.58 | 0.40 |
| Incremental Delay, d2 | | 1.7 | | 0.9 | 0.1 | | | 1.4 | 0.1 | 0.6 | 0.8 | 0.6 |
| Delay (s) | | 24.4 | | 20.7 | 17.0 | | | 23.8 | 17.4 | 10.6 | 14.7 | 8.8 |
| Level of Service | | C | | C | B | | | C | B | B | B | A |
| Approach Delay (s) | | 24.4 | | | 19.1 | | | 23.6 | | | 13.1 | |
| Approach LOS | | C | | | B | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 18.4 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.64 | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 11.0 |
| Intersection Capacity Utilization | 76.9% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |

c Critical Lane Group



## Lanes, Volumes, Timings
## 2: Chesswood Dr & Sheppard Ave W

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 268 | 1263 | 2 | 105 | 1192 | 222 | 0 | 164 | 147 | 220 | 30 | 407 |
| Future Volume (vph) | 268 | 1263 | 2 | 105 | 1192 | 222 | 0 | 164 | 147 | 220 | 30 | 407 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 55.0 | | 0.0 | 95.0 | | 0.0 | 15.0 | | 0.0 | 35.0 | | 0.0 |
| Storage Lanes | 1 | | 0 | 1 | | 0 | 1 | | 0 | 1 | | 0 |
| Taper Length (m) | 25.0 | | | 30.0 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | | 1.00 | | 1.00 | 0.99 | | | 0.99 | | 0.99 | 0.91 | |
| Frt | | | | | 0.976 | | | 0.929 | | | 0.860 | |
| Flt Protected | 0.950 | | | 0.950 | | | | | | 0.950 | | |
| Satd. Flow (prot) | 1636 | 3466 | 0 | 1652 | 3281 | 0 | 1773 | 1685 | 0 | 1636 | 1417 | 0 |
| Flt Permitted | 0.078 | | | 0.181 | | | | | | 0.230 | | |
| Satd. Flow (perm) | 134 | 3466 | 0 | 314 | 3281 | 0 | 1773 | 1685 | 0 | 394 | 1417 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | 25 | | | 38 | | | 207 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 30 | | | 50 | |
| Link Distance (m) | | 1257.9 | | | 278.3 | | | 108.8 | | | 208.8 | |
| Travel Time (s) | | 90.6 | | | 20.0 | | | 13.1 | | | 15.0 | |
| Confl. Peds. (#/hr) | 50 | | 11 | 11 | | 50 | 59 | | 9 | 9 | | 59 |
| Peak Hour Factor | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Heavy Vehicles (%) | 3% | 3% | 0% | 2% | 5% | 3% | 0% | 0% | 5% | 3% | 3% | 4% |
| Bus Blockages (#/hr) | 0 | 0 | 25 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adj. Flow (vph) | 276 | 1302 | 2 | 108 | 1229 | 229 | 0 | 169 | 152 | 227 | 31 | 420 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 276 | 1304 | 0 | 108 | 1458 | 0 | 0 | 321 | 0 | 227 | 451 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 1 | | 1 | 1 | | 1 | 1 | | 1 | 1 | |
| Detector Template | Left | | | Left | | | Left | | | Left | | |
| Leading Detector (m) | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Turn Type | pm+pt | NA | | Perm | NA | | Perm | NA | | pm+pt | NA | |
| Protected Phases | 5 | 2 | | | 6 | | | 4 | | 3 | 8 | |
| Permitted Phases | 2 | | | 6 | | | 4 | | | 8 | | |

## Lanes, Volumes, Timings
## 2: Chesswood Dr & Sheppard Ave W

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector Phase | 5 | 2 | | 6 | 6 | | 4 | 4 | | 3 | 8 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 7.0 | 38.0 | | 38.0 | 38.0 | | 7.0 | 7.0 | | 7.0 | 7.0 | |
| Minimum Split (s) | 11.0 | 45.0 | | 45.0 | 45.0 | | 30.0 | 30.0 | | 11.0 | 30.0 | |
| Total Split (s) | 14.0 | 68.0 | | 54.0 | 54.0 | | 30.0 | 30.0 | | 12.0 | 42.0 | |
| Total Split (%) | 12.7% | 61.8% | | 49.1% | 49.1% | | 27.3% | 27.3% | | 10.9% | 38.2% | |
| Yellow Time (s) | 3.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 3.0 | 4.0 | |
| All-Red Time (s) | 1.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 1.0 | 3.0 | |
| Lost Time Adjust (s) | -4.0 | -1.0 | | -1.0 | -2.0 | | -1.0 | -1.0 | | -2.0 | -1.0 | |
| Total Lost Time (s) | 0.0 | 6.0 | | 6.0 | 5.0 | | 6.0 | 6.0 | | 2.0 | 6.0 | |
| Lead/Lag | Lead | | | Lag | Lag | | Lag | Lag | | Lead | | |
| Lead-Lag Optimize? | Yes | | | Yes | Yes | | Yes | Yes | | Yes | | |
| Recall Mode | None | C-Min | | C-Min | C-Min | | None | None | | None | None | |
| v/c Ratio | 0.92 | 0.65 | | 0.79 | 0.99 | | | 0.86 | | 0.91 | 0.77 | |
| Control Delay | 58.8 | 16.9 | | 66.6 | 51.2 | | | 60.0 | | 67.7 | 27.7 | |
| Queue Delay | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | | 0.0 | 0.0 | |
| Total Delay | 58.8 | 16.9 | | 66.6 | 51.2 | | | 60.0 | | 67.7 | 27.7 | |
| Queue Length 50th (m) | ~47.6 | 125.4 | | 20.5 | 165.5 | | | 61.6 | | 37.5 | 50.0 | |
| Queue Length 95th (m) | #99.9 | 151.1 | | #54.9 | #221.5 | | | #107.3 | | #69.8 | 93.0 | |
| Internal Link Dist (m) | | 1233.9 | | | 254.3 | | | 84.8 | | | 184.8 | |
| Turn Bay Length (m) | 55.0 | | | 95.0 | | | | | | 35.0 | | |
| Base Capacity (vph) | 299 | 2006 | | 137 | 1475 | | | 397 | | 250 | 603 | |
| Starvation Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | | 0 | 0 | | | 0 | | 0 | 0 | |
| Reduced v/c Ratio | 0.92 | 0.65 | | 0.79 | 0.99 | | | 0.81 | | 0.91 | 0.75 | |

**Intersection Summary**

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Chesswood Dr & Sheppard Ave W






## HCM Signalized Intersection Capacity Analysis
## 2: Chesswood Dr & Sheppard Ave W

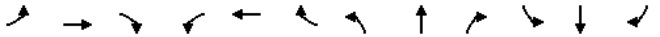
07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 268 | 1263 | 2 | 105 | 1192 | 222 | 0 | 164 | 147 | 220 | 30 | 407 |
| Future Volume (vph) | 268 | 1263 | 2 | 105 | 1192 | 222 | 0 | 164 | 147 | 220 | 30 | 407 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 0.0 | 6.0 | | 6.0 | 5.0 | | | 6.0 | | 2.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 0.99 | | | 0.99 | | 1.00 | 0.91 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | | 1.00 | 0.98 | | | 0.93 | | 1.00 | 0.86 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1636 | 3465 | | 1648 | 3282 | | | 1685 | | 1634 | 1418 | |
| Flt Permitted | 0.08 | 1.00 | | 0.18 | 1.00 | | | 1.00 | | 0.23 | 1.00 | |
| Satd. Flow (perm) | 135 | 3465 | | 314 | 3282 | | | 1685 | | 395 | 1418 | |
| Peak-hour factor, PHF | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Adj. Flow (vph) | 276 | 1302 | 2 | 108 | 1229 | 229 | 0 | 169 | 152 | 227 | 31 | 420 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 30 | 0 | 0 | 142 | 0 |
| Lane Group Flow (vph) | 276 | 1304 | 0 | 108 | 1444 | 0 | 0 | 291 | 0 | 227 | 309 | 0 |
| Confl. Peds. (#/hr) | 50 | | 11 | 11 | | 50 | 59 | | 9 | 9 | | 59 |
| Heavy Vehicles (%) | 3% | 3% | 0% | 2% | 5% | 3% | 0% | 0% | 5% | 3% | 3% | 4% |
| Bus Blockages (#/hr) | 0 | 0 | 25 | 0 | 0 | 31 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | pm+pt | NA | | Perm | NA | | Perm | NA | | pm+pt | NA | |
| Protected Phases | 5 | 2 | | | 6 | | | 4 | | 3 | 8 | |
| Permitted Phases | 2 | | | 6 | | | 4 | | | 8 | | |
| Actuated Green, G (s) | 62.7 | 62.7 | | 47.0 | 47.0 | | | 21.3 | | 33.3 | 33.3 | |
| Effective Green, g (s) | 66.7 | 63.7 | | 48.0 | 49.0 | | | 22.3 | | 35.3 | 34.3 | |
| Actuated g/C Ratio | 0.61 | 0.58 | | 0.44 | 0.45 | | | 0.20 | | 0.32 | 0.31 | |
| Clearance Time (s) | 4.0 | 7.0 | | 7.0 | 7.0 | | | 7.0 | | 4.0 | 7.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 296 | 2006 | | 137 | 1461 | | | 341 | | 239 | 442 | |
| v/s Ratio Prot | c0.13 | 0.38 | | | c0.44 | | | c0.17 | | c0.09 | 0.22 | |
| v/s Ratio Perm | 0.43 | | | 0.34 | | | | | | 0.22 | | |
| v/c Ratio | 0.93 | 0.65 | | 0.79 | 0.99 | | | 0.85 | | 0.95 | 0.70 | |
| Uniform Delay, d1 | 33.8 | 15.6 | | 26.6 | 30.2 | | | 42.3 | | 33.2 | 33.3 | |
| Progression Factor | 0.70 | 0.94 | | 1.00 | 1.00 | | | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 34.2 | 1.6 | | 35.6 | 21.0 | | | 18.2 | | 43.8 | 4.8 | |
| Delay (s) | 57.9 | 16.3 | | 62.2 | 51.2 | | | 60.5 | | 77.0 | 38.1 | |
| Level of Service | E | B | | E | D | | | E | | E | D | |
| Approach Delay (s) | | 23.6 | | | 51.9 | | | 60.5 | | | 51.1 | |
| Approach LOS | | C | | | D | | | E | | | D | |

**Intersection Summary**

| | | | | |
|---|---|---|---|---|
| HCM 2000 Control Delay | 41.7 | HCM 2000 Level of Service | D | |
| HCM 2000 Volume to Capacity ratio | 0.92 | | | |
| Actuated Cycle Length (s) | 110.0 | Sum of lost time (s) | 14.0 | |
| Intersection Capacity Utilization | 123.3% | ICU Level of Service | H | |
| Analysis Period (min) | 15 | | | |

c Critical Lane Group



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 175 | 1279 | 0 | 0 | 1285 | 15 | 0 | 0 | 0 | 45 | 0 | 216 |
| Future Volume (vph) | 175 | 1279 | 0 | 0 | 1285 | 15 | 0 | 0 | 0 | 45 | 0 | 216 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 10.0 | | 0.0 | 25.0 | | 25.0 | 0.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 1 | | 0 | 1 | | 1 | 0 | | 0 | 0 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 0.0 | | | 0.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | 1.00 | | | | | 0.95 | | | | | 0.99 | |
| Frt | | | | | | 0.850 | | | | | 0.888 | |
| Flt Protected | 0.950 | | | | | | | | | | 0.991 | |
| Satd. Flow (prot) | 1518 | 3159 | 0 | 1773 | 3159 | 966 | 0 | 1879 | 0 | 0 | 1570 | 0 |
| Flt Permitted | 0.177 | | | | | | | | | | 0.939 | |
| Satd. Flow (perm) | 282 | 3159 | 0 | 1773 | 3159 | 915 | 0 | 1879 | 0 | 0 | 1466 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | | | | 55 | | | | | 115 | |
| Link Speed (k/h) | | 50 | | | 50 | | | 30 | | | 40 | |
| Link Distance (m) | | 360.3 | | | 292.0 | | | 79.9 | | | 169.7 | |
| Travel Time (s) | | 25.9 | | | 21.0 | | | 9.6 | | | 15.3 | |
| Confl. Peds. (#/hr) | 11 | | | | | 11 | | | 48 | 48 | | |
| Confl. Bikes (#/hr) | | | | | | | | | 1 | | | |
| Peak Hour Factor | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Heavy Vehicles (%) | 11% | 13% | 0% | 0% | 13% | 43% | 0% | 0% | 0% | 7% | 0% | 5% |
| Bus Blockages (#/hr) | 0 | 0 | 21 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adj. Flow (vph) | 179 | 1305 | 0 | 0 | 1311 | 15 | 0 | 0 | 0 | 46 | 0 | 220 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 179 | 1305 | 0 | 0 | 1311 | 15 | 0 | 0 | 0 | 0 | 266 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 0.0 | | | 0.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.22 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Thru | | Left | Thru | Right | Left | Thru | | Left | Thru | |
| Leading Detector (m) | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 0.6 | | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | | 2.0 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |





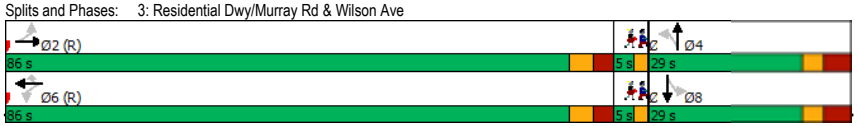
| Lane Group | Ø3 | Ø7 |
|---|---|---|
| Lane Configurations | | |
| Traffic Volume (vph) | | |
| Future Volume (vph) | | |
| Ideal Flow (vphpl) | | |
| Lane Width (m) | | |
| Storage Length (m) | | |
| Storage Lanes | | |
| Taper Length (m) | | |
| Lane Util. Factor | | |
| Ped Bike Factor | | |
| Frt | | |
| Flt Protected | | |
| Satd. Flow (prot) | | |
| Flt Permitted | | |
| Satd. Flow (perm) | | |
| Right Turn on Red | | |
| Satd. Flow (RTOR) | | |
| Link Speed (k/h) | | |
| Link Distance (m) | | |
| Travel Time (s) | | |
| Confl. Peds. (#/hr) | | |
| Confl. Bikes (#/hr) | | |
| Peak Hour Factor | | |
| Heavy Vehicles (%) | | |
| Bus Blockages (#/hr) | | |
| Adj. Flow (vph) | | |
| Shared Lane Traffic (%) | | |
| Lane Group Flow (vph) | | |
| Enter Blocked Intersection | | |
| Lane Alignment | | |
| Median Width(m) | | |
| Link Offset(m) | | |
| Crosswalk Width(m) | | |
| Two way Left Turn Lane | | |
| Headway Factor | | |
| Turning Speed (k/h) | | |
| Number of Detectors | | |
| Detector Template | | |
| Leading Detector (m) | | |
| Trailing Detector (m) | | |
| Detector 1 Position(m) | | |
| Detector 1 Size(m) | | |
| Detector 1 Type | | |
| Detector 1 Channel | | |
| Detector 1 Extend (s) | | |
| Detector 1 Queue (s) | | |
| Detector 1 Delay (s) | | |
| Detector 2 Position(m) | | |
| Detector 2 Size(m) | | |

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | | Perm | NA | Perm | | | | Perm | NA | |
| Protected Phases | | 2 | | | 6 | | | 4 | | | 8 | |
| Permitted Phases | 2 | | | 6 | | 6 | 4 | | | 8 | | |
| Detector Phase | 2 | 2 | | 6 | 6 | 6 | 4 | 4 | | 8 | 8 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 20.0 | 20.0 | | 20.0 | 20.0 | 20.0 | 7.0 | 7.0 | | 7.0 | 7.0 | |
| Minimum Split (s) | 26.1 | 26.1 | | 26.1 | 26.1 | 26.1 | 28.1 | 28.1 | | 28.1 | 28.1 | |
| Total Split (s) | 86.0 | 86.0 | | 86.0 | 86.0 | 86.0 | 29.0 | 29.0 | | 29.0 | 29.0 | |
| Total Split (%) | 71.7% | 71.7% | | 71.7% | 71.7% | 71.7% | 24.2% | 24.2% | | 24.2% | 24.2% | |
| Yellow Time (s) | 3.3 | 3.3 | | 3.3 | 3.3 | 3.3 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| All-Red Time (s) | 2.8 | 2.8 | | 2.8 | 2.8 | 2.8 | 4.1 | 4.1 | | 4.1 | 4.1 | |
| Lost Time Adjust (s) | -1.0 | -1.0 | | -1.0 | -1.0 | -1.0 | | -1.0 | | | -1.0 | |
| Total Lost Time (s) | 5.1 | 5.1 | | 5.1 | 5.1 | 5.1 | | 6.1 | | | 6.1 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | C-Min | C-Min | | C-Min | C-Min | C-Min | None | None | | None | None | |
| v/c Ratio | 0.85 | 0.55 | | | 0.56 | 0.02 | | | | | 0.80 | |
| Control Delay | 51.5 | 8.6 | | | 13.3 | 1.1 | | | | | 44.2 | |
| Queue Delay | 0.0 | 0.0 | | | 0.0 | 0.0 | | | | | 0.0 | |
| Total Delay | 51.5 | 8.6 | | | 13.3 | 1.1 | | | | | 44.2 | |
| Queue Length 50th (m) | 27.2 | 64.7 | | | 127.9 | 0.0 | | | | | 36.8 | |
| Queue Length 95th (m) | #90.2 | 106.3 | | | 123.3 | m0.6 | | | | | 63.9 | |
| Internal Link Dist (m) | | 336.3 | | | 268.0 | | | 55.9 | | | 145.7 | |
| Turn Bay Length (m) | 10.0 | | | | | 25.0 | | | | | | |
| Base Capacity (vph) | 210 | 2354 | | | 2354 | 696 | | | | | 385 | |
| Starvation Cap Reductn | 0 | 0 | | | 0 | 0 | | | | | 0 | |
| Spillback Cap Reductn | 0 | 0 | | | 0 | 0 | | | | | 0 | |
| Storage Cap Reductn | 0 | 0 | | | 0 | 0 | | | | | 0 | |
| Reduced v/c Ratio | 0.85 | 0.55 | | | 0.56 | 0.02 | | | | | 0.69 | |

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 34 (28%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 120
Control Type: Actuated-Coordinated
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: Residential Dwy/Murray Rd & Wilson Ave








| Lane Group | Ø3 | Ø7 |
|---|---|---|
| Detector 2 Type | | |
| Detector 2 Channel | | |
| Detector 2 Extend (s) | | |
| Turn Type | | |
| Protected Phases | 3 | 7 |
| Permitted Phases | | |
| Detector Phase | | |
| Switch Phase | | |
| Minimum Initial (s) | 3.0 | 3.0 |
| Minimum Split (s) | 5.0 | 5.0 |
| Total Split (s) | 5.0 | 5.0 |
| Total Split (%) | 4% | 4% |
| Yellow Time (s) | 2.0 | 2.0 |
| All-Red Time (s) | 0.0 | 0.0 |
| Lost Time Adjust (s) | | |
| Total Lost Time (s) | | |
| Lead/Lag | | |
| Lead-Lag Optimize? | | |
| Recall Mode | None | None |
| v/c Ratio | | |
| Control Delay | | |
| Queue Delay | | |
| Total Delay | | |
| Queue Length 50th (m) | | |
| Queue Length 95th (m) | | |
| Internal Link Dist (m) | | |
| Turn Bay Length (m) | | |
| Base Capacity (vph) | | |
| Starvation Cap Reductn | | |
| Spillback Cap Reductn | | |
| Storage Cap Reductn | | |
| Reduced v/c Ratio | | |

Intersection Summary

## HCM Signalized Intersection Capacity Analysis
### 3: Residential Dwy/Murray Rd & Wilson Ave

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 175 | 1279 | 0 | 0 | 1285 | 15 | 0 | 0 | 0 | 45 | 0 | 216 |
| Future Volume (vph) | 175 | 1279 | 0 | 0 | 1285 | 15 | 0 | 0 | 0 | 45 | 0 | 216 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 5.1 | 5.1 | | | 5.1 | 5.1 | | | | | 6.1 | |
| Lane Util. Factor | 1.00 | 0.95 | | | 0.95 | 1.00 | | | | | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 0.95 | | | | | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | | 1.00 | 1.00 | | | | | 0.99 | |
| Frt | 1.00 | 1.00 | | | 1.00 | 0.85 | | | | | 0.89 | |
| Flt Protected | 0.95 | 1.00 | | | 1.00 | 1.00 | | | | | 0.99 | |
| Satd. Flow (prot) | 1512 | 3159 | | | 3159 | 915 | | | | | 1548 | |
| Flt Permitted | 0.18 | 1.00 | | | 1.00 | 1.00 | | | | | 0.94 | |
| Satd. Flow (perm) | 282 | 3159 | | | 3159 | 915 | | | | | 1466 | |
| Peak-hour factor, PHF | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 | 0.98 |
| Adj. Flow (vph) | 179 | 1305 | 0 | 0 | 1311 | 15 | 0 | 0 | 0 | 46 | 0 | 220 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 97 | 0 |
| Lane Group Flow (vph) | 179 | 1305 | 0 | 0 | 1311 | 11 | 0 | 0 | 0 | 0 | 169 | 0 |
| Confl. Peds. (#/hr) | 11 | | | | | 11 | | | 48 | 48 | | |
| Confl. Bikes (#/hr) | | | | | | | | | 1 | | | |
| Heavy Vehicles (%) | 11% | 13% | 0% | 0% | 13% | 43% | 0% | 0% | 0% | 7% | 0% | 5% |
| Bus Blockages (#/hr) | 0 | 0 | 21 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | Perm | NA | | Perm | NA | Perm | | | | Perm | NA | |
| Protected Phases | | 2 | | | 6 | | | 4 | | | 8 | |
| Permitted Phases | 2 | | | 6 | | 6 | 4 | | | 8 | | |
| Actuated Green, G (s) | 88.5 | 88.5 | | | 88.5 | 88.5 | | | | | 18.3 | |
| Effective Green, g (s) | 89.5 | 89.5 | | | 89.5 | 89.5 | | | | | 19.3 | |
| Actuated g/C Ratio | 0.75 | 0.75 | | | 0.75 | 0.75 | | | | | 0.16 | |
| Clearance Time (s) | 6.1 | 6.1 | | | 6.1 | 6.1 | | | | | 7.1 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | | 3.0 | 3.0 | | | | | 3.0 | |
| Lane Grp Cap (vph) | 210 | 2356 | | | 2356 | 682 | | | | | 235 | |
| v/s Ratio Prot | | 0.41 | | | 0.41 | | | | | | | |
| v/s Ratio Perm | c0.63 | | | | | 0.01 | | | | | c0.12 | |
| v/c Ratio | 0.85 | 0.55 | | | 0.56 | 0.02 | | | | | 0.72 | |
| Uniform Delay, d1 | 10.6 | 6.6 | | | 6.6 | 3.9 | | | | | 47.8 | |
| Progression Factor | 1.00 | 1.00 | | | 1.62 | 1.00 | | | | | 1.00 | |
| Incremental Delay, d2 | 33.0 | 0.9 | | | 0.9 | 0.0 | | | | | 10.4 | |
| Delay (s) | 43.7 | 7.5 | | | 11.6 | 4.0 | | | | | 58.2 | |
| Level of Service | D | A | | | B | A | | | | | E | |
| Approach Delay (s) | | 11.9 | | | 11.5 | | | 0.0 | | | 58.2 | |
| Approach LOS | | B | | | B | | | A | | | E | |

| Intersection Summary | | | | |
|---|---|---|---|---|
| HCM 2000 Control Delay | 15.7 | HCM 2000 Level of Service | B | |
| HCM 2000 Volume to Capacity ratio | 0.84 | | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 13.2 | |
| Intersection Capacity Utilization | 82.0% | ICU Level of Service | E | |
| Analysis Period (min) | 15 | | | |
| c Critical Lane Group | | | | |



## Lanes, Volumes, Timings
### 4: Northgate Dr/Garratt Blvd & Wilson Ave

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 25 | 1176 | 170 | 15 | 1149 | 23 | 130 | 0 | 10 | 55 | 0 | 75 |
| Future Volume (vph) | 25 | 1176 | 170 | 15 | 1149 | 23 | 130 | 0 | 10 | 55 | 0 | 75 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 20.0 | | 20.0 | 20.0 | | 20.0 | 0.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 1 | | 1 | 1 | | 1 | 0 | | 0 | 1 | | 1 |
| Taper Length (m) | 10.0 | | | 10.0 | | | 0.0 | | | 0.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | 0.98 | | 0.90 | 0.99 | | 0.82 | | 0.93 | | 0.97 | | 0.91 |
| Frt | | | 0.850 | | | 0.850 | | 0.991 | | | | 0.850 |
| Flt Protected | 0.950 | | | 0.950 | | | | 0.956 | | 0.950 | | |
| Satd. Flow (prot) | 1574 | 3500 | 1367 | 1685 | 3466 | 1399 | 0 | 1773 | 0 | 1604 | 0 | 1449 |
| Flt Permitted | 0.206 | | | 0.199 | | | | 0.956 | | 0.779 | | |
| Satd. Flow (perm) | 335 | 3500 | 1225 | 350 | 3466 | 1146 | 0 | 1647 | 0 | 1272 | 0 | 1321 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 93 | | | 27 | | 27 | | | | 78 |
| Link Speed (k/h) | | 50 | | | 50 | | | 40 | | | 40 | |
| Link Distance (m) | | 292.0 | | | 221.4 | | | 192.5 | | | 360.0 | |
| Travel Time (s) | | 21.0 | | | 15.9 | | | 17.3 | | | 32.4 | |
| Confl. Peds. (#/hr) | 52 | | 27 | 27 | | 52 | 53 | | 33 | 33 | | 53 |
| Confl. Bikes (#/hr) | | | | | | | | | | | | 2 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Heavy Vehicles (%) | 7% | 2% | 1% | 0% | 3% | 0% | 0% | 0% | 0% | 5% | 0% | 4% |
| Bus Blockages (#/hr) | 0 | 0 | 21 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| Adj. Flow (vph) | 26 | 1225 | 177 | 16 | 1197 | 24 | 135 | 0 | 10 | 57 | 0 | 78 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 26 | 1225 | 177 | 16 | 1197 | 24 | 0 | 145 | 0 | 57 | 0 | 78 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.22 | 1.09 | 1.01 | 1.20 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | | 1 | | 1 |
| Detector Template | Left | Thru | Right | Left | Thru | Right | Left | Thru | | Left | | Right |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | | 2.0 | | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | | Cl+Ex |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | | |

## Lanes, Volumes, Timings
## 4: Northgate Dr/Garratt Blvd & Wilson Ave

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | | |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | | Perm |
| Protected Phases | | 2 | | | 6 | | | 4 | | | | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 4 | | | 8 | | 8 |
| Detector Phase | 2 | 2 | 2 | 6 | 6 | 6 | 4 | 4 | | 8 | | 8 |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 | 19.0 | 7.0 | 7.0 | | 7.0 | | 7.0 |
| Minimum Split (s) | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 31.0 | 31.0 | | 31.0 | | 31.0 |
| Total Split (s) | 88.0 | 88.0 | 88.0 | 88.0 | 88.0 | 88.0 | 32.0 | 32.0 | | 32.0 | | 32.0 |
| Total Split (%) | 73.3% | 73.3% | 73.3% | 73.3% | 73.3% | 73.3% | 26.7% | 26.7% | | 26.7% | | 26.7% |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 3.0 | 3.0 | | 3.0 | | 3.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | | 3.0 | | 3.0 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | | -1.0 | | -1.0 | | -1.0 |
| Total Lost Time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | | 5.0 | | 5.0 |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | C-Min | C-Min | C-Min | C-Min | C-Min | C-Min | None | None | | None | | None |
| v/c Ratio | 0.10 | 0.47 | 0.19 | 0.06 | 0.46 | 0.03 | | 0.49 | | 0.27 | | 0.28 |
| Control Delay | 10.7 | 11.2 | 6.2 | 5.5 | 7.5 | 2.1 | | 40.8 | | 44.1 | | 11.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | | 0.0 | | 0.0 |
| Total Delay | 10.7 | 11.2 | 6.2 | 5.5 | 7.6 | 2.1 | | 40.8 | | 44.1 | | 11.0 |
| Queue Length 50th (m) | 2.2 | 77.9 | 8.4 | 1.1 | 94.5 | 0.6 | | 24.9 | | 11.7 | | 0.0 |
| Queue Length 95th (m) | m5.9 | 125.0 | m25.9 | m2.0 | 42.6 | m1.2 | | 45.2 | | 24.2 | | 13.2 |
| Internal Link Dist (m) | | 268.0 | | | 197.4 | | | 168.5 | | | 336.0 | |
| Turn Bay Length (m) | 20.0 | | 20.0 | 20.0 | | 20.0 | | | | | | |
| Base Capacity (vph) | 251 | 2629 | 943 | 263 | 2603 | 867 | | 391 | | 286 | | 357 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 172 | 0 | | 0 | | 0 | | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | | 0 | | 0 |
| Reduced v/c Ratio | 0.10 | 0.47 | 0.19 | 0.06 | 0.49 | 0.03 | | 0.37 | | 0.20 | | 0.22 |

**Intersection Summary**

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 32 (27%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: Northgate Dr/Garratt Blvd & Wilson Ave






## HCM Signalized Intersection Capacity Analysis
## 4: Northgate Dr/Garratt Blvd & Wilson Ave

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 25 | 1176 | 170 | 15 | 1149 | 23 | 130 | 0 | 10 | 55 | 0 | 75 |
| Future Volume (vph) | 25 | 1176 | 170 | 15 | 1149 | 23 | 130 | 0 | 10 | 55 | 0 | 75 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | | 5.0 | | 5.0 | | 5.0 |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 1.00 | | 1.00 | | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.90 | 1.00 | 1.00 | 0.82 | | 1.00 | | 1.00 | | 0.91 |
| Flpb, ped/bikes | 0.98 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | | 0.93 | | 0.97 | | 1.00 |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | | 0.99 | | 1.00 | | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | | 0.96 | | 0.95 | | 1.00 |
| Satd. Flow (prot) | 1540 | 3500 | 1225 | 1667 | 3466 | 1146 | | 1646 | | 1553 | | 1320 |
| Flt Permitted | 0.21 | 1.00 | 1.00 | 0.20 | 1.00 | 1.00 | | 0.96 | | 0.78 | | 1.00 |
| Satd. Flow (perm) | 335 | 3500 | 1225 | 349 | 3466 | 1146 | | 1646 | | 1273 | | 1320 |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 26 | 1225 | 177 | 16 | 1197 | 24 | 135 | 0 | 10 | 57 | 0 | 78 |
| RTOR Reduction (vph) | 0 | 0 | 23 | 0 | 0 | 6 | 0 | 23 | 0 | 0 | 0 | 65 |
| Lane Group Flow (vph) | 26 | 1225 | 154 | 16 | 1197 | 18 | 0 | 122 | 0 | 57 | 0 | 13 |
| Confl. Peds. (#/hr) | 52 | | 27 | 27 | | 52 | 53 | | 33 | 33 | | 53 |
| Confl. Bikes (#/hr) | | | | | | | | | | | | 2 |
| Heavy Vehicles (%) | 7% | 2% | 1% | 0% | 3% | 0% | 0% | 0% | 0% | 5% | 0% | 4% |
| Bus Blockages (#/hr) | 0 | 0 | 21 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | | Perm |
| Protected Phases | | 2 | | | 6 | | | 4 | | | | |
| Permitted Phases | 2 | | 2 | 6 | | 6 | 4 | | | 8 | | 8 |
| Actuated Green, G (s) | 89.1 | 89.1 | 89.1 | 89.1 | 89.1 | 89.1 | | 18.9 | | 18.9 | | 18.9 |
| Effective Green, g (s) | 90.1 | 90.1 | 90.1 | 90.1 | 90.1 | 90.1 | | 19.9 | | 19.9 | | 19.9 |
| Actuated g/C Ratio | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | 0.75 | | 0.17 | | 0.17 | | 0.17 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | | 6.0 | | 6.0 | | 6.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | | 3.0 | | 3.0 |
| Lane Grp Cap (vph) | 251 | 2627 | 919 | 262 | 2602 | 860 | | 272 | | 211 | | 218 |
| v/s Ratio Prot | | c0.35 | | | 0.35 | | | | | | | |
| v/s Ratio Perm | 0.08 | | 0.13 | 0.05 | | 0.02 | | 0.07 | | 0.04 | | 0.01 |
| v/c Ratio | 0.10 | 0.47 | 0.17 | 0.06 | 0.46 | 0.02 | | 0.45 | | 0.27 | | 0.06 |
| Uniform Delay, d1 | 4.0 | 5.7 | 4.3 | 3.9 | 5.7 | 3.8 | | 45.1 | | 43.7 | | 42.2 |
| Progression Factor | 1.66 | 1.61 | 2.10 | 0.88 | 1.06 | 1.14 | | 1.00 | | 1.00 | | 1.00 |
| Incremental Delay, d2 | 0.7 | 0.5 | 0.3 | 0.4 | 0.5 | 0.0 | | 1.2 | | 0.7 | | 0.1 |
| Delay (s) | 7.4 | 9.7 | 9.3 | 3.8 | 6.5 | 4.4 | | 46.3 | | 44.4 | | 42.3 |
| Level of Service | A | A | A | A | A | A | | D | | D | | D |
| Approach Delay (s) | | 9.6 | | | 6.5 | | | 46.3 | | | 43.2 | |
| Approach LOS | | A | | | A | | | D | | | D | |

**Intersection Summary**

| | | | | |
|---|---|---|---|---|
| HCM 2000 Control Delay | 11.7 | HCM 2000 Level of Service | B | |
| HCM 2000 Volume to Capacity ratio | 0.47 | | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 11.0 | |
| Intersection Capacity Utilization | 79.6% | ICU Level of Service | D | |
| Analysis Period (min) | 15 | | | |

c Critical Lane Group

| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 50 | 1196 | 1163 | 88 | 37 | 30 |
| Future Volume (vph) | 50 | 1196 | 1163 | 88 | 37 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.5 | 3.0 | 3.0 | 3.0 |
| Storage Length (m) | 25.0 | | | 0.0 | 40.0 | 0.0 |
| Storage Lanes | 1 | | | 0 | 1 | 1 |
| Taper Length (m) | 15.0 | | | | 15.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | 0.95 | 1.00 | 1.00 |
| Ped Bike Factor | 0.99 | | 0.99 | | 0.95 | 0.98 |
| Frt | | | 0.989 | | | 0.850 |
| Flt Protected | 0.950 | | | | 0.950 | |
| Satd. Flow (prot) | 1685 | 3466 | 3415 | 0 | 1685 | 1463 |
| Flt Permitted | 0.190 | | | | 0.950 | |
| Satd. Flow (perm) | 335 | 3466 | 3415 | 0 | 1595 | 1439 |
| Right Turn on Red | | | | Yes | | Yes |
| Satd. Flow (RTOR) | | | 16 | | | 32 |
| Link Speed (k/h) | | 50 | 50 | | 40 | |
| Link Distance (m) | | 221.4 | 542.1 | | 831.3 | |
| Travel Time (s) | | 15.9 | 39.0 | | 74.8 | |
| Confl. Peds. (#/hr) | 20 | | | 20 | 34 | 3 |
| Peak Hour Factor | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Heavy Vehicles (%) | 0% | 3% | 3% | 0% | 0% | 3% |
| Adj. Flow (vph) | 53 | 1259 | 1224 | 93 | 39 | 32 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 53 | 1259 | 1317 | 0 | 39 | 32 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Left | Right | Left | Right |
| Median Width(m) | | 3.0 | 3.0 | | 3.0 | |
| Link Offset(m) | | 0.0 | 0.0 | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | 4.8 | | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.01 | 1.09 | 1.09 | 1.09 |
| Turning Speed (k/h) | 25 | | | 15 | 25 | 15 |
| Number of Detectors | 1 | 2 | 2 | | 1 | 1 |
| Detector Template | Left | Thru | Thru | | Left | Right |
| Leading Detector (m) | 2.0 | 10.0 | 10.0 | | 2.0 | 2.0 |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Size(m) | 2.0 | 0.6 | 0.6 | | 2.0 | 2.0 |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Detector 2 Position(m) | | 9.4 | 9.4 | | | |
| Detector 2 Size(m) | | 0.6 | 0.6 | | | |
| Detector 2 Type | | Cl+Ex | Cl+Ex | | | |
| Detector 2 Channel | | | | | | |





| Lane Group | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Detector 2 Extend (s) | | 0.0 | 0.0 | | | |
| Turn Type | Perm | NA | NA | | Prot | Perm |
| Protected Phases | | 2 | 6 | | 8 | |
| Permitted Phases | 2 | | | | | 8 |
| Detector Phase | 2 | 2 | 6 | | 8 | 8 |
| Switch Phase | | | | | | |
| Minimum Initial (s) | 19.0 | 19.0 | 19.0 | | 7.0 | 7.0 |
| Minimum Split (s) | 25.0 | 25.0 | 25.0 | | 28.0 | 28.0 |
| Total Split (s) | 91.0 | 91.0 | 91.0 | | 29.0 | 29.0 |
| Total Split (%) | 75.8% | 75.8% | 75.8% | | 24.2% | 24.2% |
| Yellow Time (s) | 4.0 | 4.0 | 4.0 | | 3.0 | 3.0 |
| All-Red Time (s) | 2.0 | 2.0 | 2.0 | | 2.0 | 2.0 |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | | -1.0 | -1.0 |
| Total Lost Time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | 4.0 |
| Lead/Lag | | | | | | |
| Lead-Lag Optimize? | | | | | | |
| Recall Mode | C-Min | C-Min | C-Min | | None | None |
| v/c Ratio | 0.19 | 0.44 | 0.46 | | 0.19 | 0.16 |
| Control Delay | 6.6 | 4.8 | 7.4 | | 45.9 | 14.8 |
| Queue Delay | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 |
| Total Delay | 6.6 | 4.8 | 7.4 | | 45.9 | 14.8 |
| Queue Length 50th (m) | 0.7 | 25.2 | 74.4 | | 9.3 | 0.0 |
| Queue Length 95th (m) | 9.3 | 65.5 | 64.0 | | 18.1 | 8.9 |
| Internal Link Dist (m) | | 197.4 | 518.1 | | 807.3 | |
| Turn Bay Length (m) | 25.0 | | | | 40.0 | |
| Base Capacity (vph) | 278 | 2881 | 2841 | | 351 | 325 |
| Starvation Cap Reductn | 0 | 31 | 0 | | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.19 | 0.44 | 0.46 | | 0.11 | 0.10 |

**Intersection Summary**

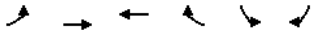
Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 29 (24%), Referenced to phase 2:EBTL and 6:WBT, Start of Green
Natural Cycle: 60
Control Type: Actuated-Coordinated

Splits and Phases: 5: Wilson Ave & Ancaster Rd



## HCM Signalized Intersection Capacity Analysis
## 5: Wilson Ave & Ancaster Rd

07-02-2023



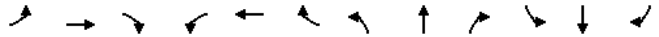
| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 50 | 1196 | 1163 | 88 | 37 | 30 |
| Future Volume (vph) | 50 | 1196 | 1163 | 88 | 37 | 30 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.5 | 3.0 | 3.0 | 3.0 |
| Total Lost time (s) | 5.0 | 5.0 | 5.0 | | 4.0 | 4.0 |
| Lane Util. Factor | 1.00 | 0.95 | 0.95 | | 1.00 | 1.00 |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.99 | | 1.00 | 0.98 |
| Flpb, ped/bikes | 0.99 | 1.00 | 1.00 | | 1.00 | 1.00 |
| Frt | 1.00 | 1.00 | 0.99 | | 1.00 | 0.85 |
| Flt Protected | 0.95 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (prot) | 1672 | 3466 | 3416 | | 1685 | 1439 |
| Flt Permitted | 0.19 | 1.00 | 1.00 | | 0.95 | 1.00 |
| Satd. Flow (perm) | 334 | 3466 | 3416 | | 1685 | 1439 |
| Peak-hour factor, PHF | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 | 0.95 |
| Adj. Flow (vph) | 53 | 1259 | 1224 | 93 | 39 | 32 |
| RTOR Reduction (vph) | 0 | 0 | 3 | 0 | 0 | 28 |
| Lane Group Flow (vph) | 53 | 1259 | 1314 | 0 | 39 | 4 |
| Confl. Peds. (#/hr) | 20 | | | 20 | 34 | 3 |
| Heavy Vehicles (%) | 0% | 3% | 3% | 0% | 0% | 3% |
| Turn Type | Perm | NA | NA | | Prot | Perm |
| Protected Phases | | 2 | 6 | | 8 | |
| Permitted Phases | 2 | | | | | 8 |
| Actuated Green, G (s) | 96.8 | 96.8 | 96.8 | | 12.2 | 12.2 |
| Effective Green, g (s) | 97.8 | 97.8 | 97.8 | | 13.2 | 13.2 |
| Actuated g/C Ratio | 0.81 | 0.81 | 0.81 | | 0.11 | 0.11 |
| Clearance Time (s) | 6.0 | 6.0 | 6.0 | | 5.0 | 5.0 |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 |
| Lane Grp Cap (vph) | 272 | 2824 | 2784 | | 185 | 158 |
| v/s Ratio Prot | | 0.36 | c0.38 | | c0.02 | |
| v/s Ratio Perm | 0.16 | | | | | 0.00 |
| v/c Ratio | 0.19 | 0.45 | 0.47 | | 0.21 | 0.02 |
| Uniform Delay, d1 | 2.4 | 3.2 | 3.3 | | 48.7 | 47.6 |
| Progression Factor | 1.12 | 1.01 | 1.59 | | 1.00 | 1.00 |
| Incremental Delay, d2 | 1.5 | 0.5 | 0.5 | | 0.6 | 0.1 |
| Delay (s) | 4.2 | 3.7 | 5.8 | | 49.2 | 47.7 |
| Level of Service | A | A | A | | D | D |
| Approach Delay (s) | | 3.7 | 5.8 | | 48.5 | |
| Approach LOS | | A | A | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 5.9 | HCM 2000 Level of Service | A |
| HCM 2000 Volume to Capacity ratio | 0.44 | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 9.0 |
| Intersection Capacity Utilization | 56.2% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |



## Lanes, Volumes, Timings
## 6: Dufferin St & Wilson Ave

07-02-2023



| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 15 | 705 | 324 | 380 | 902 | 90 | 276 | 222 | 303 | 253 | 314 | 20 |
| Future Volume (vph) | 15 | 705 | 324 | 380 | 902 | 90 | 276 | 222 | 303 | 253 | 314 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 35.0 | | 55.0 | 245.0 | | 0.0 | 45.0 | | 0.0 | 30.0 | | 0.0 |
| Storage Lanes | 1 | | 1 | 1 | | 0 | 1 | | 1 | 1 | | 0 |
| Taper Length (m) | 7.5 | | | 10.0 | | | 7.5 | | | 15.0 | | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 0.95 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Ped Bike Factor | 0.98 | | 0.90 | 0.98 | 0.99 | | 0.96 | | 0.96 | 0.98 | 0.99 | |
| Frt | | | 0.850 | | 0.986 | | | | 0.850 | | 0.991 | |
| Flt Protected | 0.950 | | | 0.950 | | | 0.950 | | | 0.950 | | |
| Satd. Flow (prot) | 1465 | 3433 | 1305 | 1589 | 3283 | 0 | 1604 | 1807 | 1321 | 1685 | 1834 | 0 |
| Flt Permitted | 0.277 | | | 0.186 | | | 0.326 | | | 0.502 | | |
| Satd. Flow (perm) | 419 | 3433 | 1176 | 304 | 3283 | 0 | 528 | 1807 | 1266 | 873 | 1834 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | | 127 | | 13 | | | | 79 | | 3 | |
| Link Speed (k/h) | | 50 | | | 60 | | | 50 | | | 40 | |
| Link Distance (m) | | 542.1 | | | 151.6 | | | 245.7 | | | 259.2 | |
| Travel Time (s) | | 39.0 | | | 9.1 | | | 17.7 | | | 23.3 | |
| Confl. Peds. (#/hr) | 40 | | 74 | 74 | | 40 | 75 | | 27 | 27 | | 75 |
| Confl. Bikes (#/hr) | | | | | | | | | | | | 1 |
| Peak Hour Factor | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Heavy Vehicles (%) | 15% | 4% | 3% | 6% | 6% | 9% | 5% | 4% | 5% | 0% | 1% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 |
| Adj. Flow (vph) | 16 | 734 | 338 | 396 | 940 | 94 | 288 | 231 | 316 | 264 | 327 | 21 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 16 | 734 | 338 | 396 | 1034 | 0 | 288 | 231 | 316 | 264 | 348 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.26 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.21 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | 1 | 1 | 2 | | 1 | 2 | 1 | 1 | 2 | |
| Detector Template | Left | Thru | Right | Left | Thru | | Left | Thru | Right | Left | Thru | |
| Leading Detector (m) | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | | 2.0 | 10.0 | 2.0 | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | | 2.0 | 0.6 | 2.0 | 2.0 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |

## Lanes, Volumes, Timings
## 6: Dufferin St & Wilson Ave

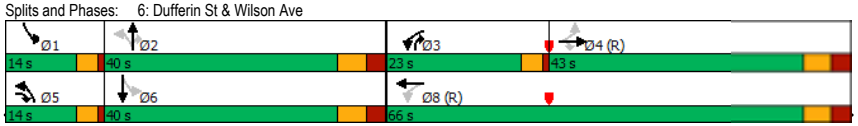
07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | pm+ov | pm+pt | NA | | pm+pt | NA | pm+ov | pm+pt | NA | |
| Protected Phases | | 4 | 5 | 3 | 8 | | 5 | 2 | 3 | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | |
| Detector Phase | 4 | 4 | 5 | 3 | 8 | | 5 | 2 | 3 | 1 | 6 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 30.0 | 30.0 | 6.0 | 6.0 | 30.0 | | 6.0 | 32.0 | 6.0 | 6.0 | 32.0 | |
| Minimum Split (s) | 37.0 | 37.0 | 10.0 | 10.0 | 37.0 | | 10.0 | 39.0 | 10.0 | 10.0 | 39.0 | |
| Total Split (s) | 43.0 | 43.0 | 14.0 | 23.0 | 66.0 | | 14.0 | 40.0 | 23.0 | 14.0 | 40.0 | |
| Total Split (%) | 35.8% | 35.8% | 11.7% | 19.2% | 55.0% | | 11.7% | 33.3% | 19.2% | 11.7% | 33.3% | |
| Yellow Time (s) | 4.0 | 4.0 | 3.0 | 3.0 | 4.0 | | 3.0 | 4.0 | 3.0 | 3.0 | 4.0 | |
| All-Red Time (s) | 3.0 | 3.0 | 1.0 | 1.0 | 3.0 | | 1.0 | 3.0 | 1.0 | 1.0 | 3.0 | |
| Lost Time Adjust (s) | -1.0 | -2.0 | -1.0 | -4.0 | -1.0 | | -4.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 6.0 | 5.0 | 3.0 | 0.0 | 6.0 | | 0.0 | 6.0 | 3.0 | 3.0 | 6.0 | |
| Lead/Lag | Lag | Lag | Lead | Lead | | | Lead | Lag | Lead | Lead | Lag | |
| Lead-Lag Optimize? | Yes | Yes | Yes | Yes | | | Yes | Yes | Yes | Yes | Yes | |
| Recall Mode | C-Min | C-Min | None | None | C-Min | | None | Min | None | None | Min | |
| v/c Ratio | 0.14 | 0.74 | 0.58 | 0.95 | 0.65 | | 0.72 | 0.45 | 0.48 | 0.58 | 0.68 | |
| Control Delay | 27.5 | 32.8 | 9.9 | 59.5 | 25.6 | | 33.3 | 39.1 | 17.0 | 29.1 | 46.3 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 27.5 | 32.8 | 9.9 | 59.5 | 25.6 | | 33.3 | 39.1 | 17.0 | 29.1 | 46.3 | |
| Queue Length 50th (m) | 2.2 | 52.6 | 24.5 | 70.8 | 99.9 | | 44.1 | 47.7 | 36.1 | 41.4 | 76.6 | |
| Queue Length 95th (m) | m3.8 | 77.7 | 0.2 | #132.4 | 116.8 | | #81.3 | 72.1 | 60.5 | 66.1 | 109.7 | |
| Internal Link Dist (m) | | 518.1 | | | 127.6 | | | 221.7 | | | 235.2 | |
| Turn Bay Length (m) | 35.0 | | 55.0 | 245.0 | | | 45.0 | | | 30.0 | | |
| Base Capacity (vph) | 129 | 1087 | 586 | 417 | 1648 | | 402 | 514 | 660 | 455 | 521 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.12 | 0.68 | 0.58 | 0.95 | 0.63 | | 0.72 | 0.45 | 0.48 | 0.58 | 0.67 | |

**Intersection Summary**

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 24 (20%), Referenced to phase 4:EBTL and 8:WBTL, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Dufferin St & Wilson Ave






## HCM Signalized Intersection Capacity Analysis
## 6: Dufferin St & Wilson Ave

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 15 | 705 | 324 | 380 | 902 | 90 | 276 | 222 | 303 | 253 | 314 | 20 |
| Future Volume (vph) | 15 | 705 | 324 | 380 | 902 | 90 | 276 | 222 | 303 | 253 | 314 | 20 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | 6.0 | 5.0 | 3.0 | 0.0 | 6.0 | | 0.0 | 6.0 | 3.0 | 3.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.93 | 1.00 | 0.99 | | 1.00 | 1.00 | 0.97 | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.98 | 1.00 | 1.00 | 1.00 | 1.00 | | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | | 1.00 | 1.00 | 0.85 | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1437 | 3433 | 1215 | 1584 | 3284 | | 1586 | 1807 | 1287 | 1669 | 1834 | |
| Flt Permitted | 0.28 | 1.00 | 1.00 | 0.19 | 1.00 | | 0.33 | 1.00 | 1.00 | 0.50 | 1.00 | |
| Satd. Flow (perm) | 419 | 3433 | 1215 | 310 | 3284 | | 545 | 1807 | 1287 | 881 | 1834 | |
| Peak-hour factor, PHF | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 | 0.96 |
| Adj. Flow (vph) | 16 | 734 | 338 | 396 | 940 | 94 | 288 | 231 | 316 | 264 | 327 | 21 |
| RTOR Reduction (vph) | 0 | 0 | 76 | 0 | 7 | 0 | 0 | 0 | 43 | 0 | 2 | 0 |
| Lane Group Flow (vph) | 16 | 734 | 262 | 396 | 1027 | 0 | 288 | 231 | 273 | 264 | 346 | 0 |
| Confl. Peds. (#/hr) | 40 | | 74 | 74 | | 40 | 75 | | 27 | 27 | | 75 |
| Confl. Bikes (#/hr) | | | | | | | | | | | | 1 |
| Heavy Vehicles (%) | 15% | 4% | 3% | 6% | 6% | 9% | 5% | 4% | 5% | 0% | 1% | 0% |
| Bus Blockages (#/hr) | 0 | 0 | 27 | 0 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 |
| Turn Type | Perm | NA | pm+ov | pm+pt | NA | | pm+pt | NA | pm+ov | pm+pt | NA | |
| Protected Phases | | 4 | 5 | 3 | 8 | | 5 | 2 | 3 | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | | 2 | | 2 | 6 | | |
| Actuated Green, G (s) | 32.6 | 32.6 | 45.8 | 56.6 | 56.6 | | 46.0 | 32.8 | 52.8 | 44.8 | 32.2 | |
| Effective Green, g (s) | 33.6 | 34.6 | 47.8 | 60.6 | 57.6 | | 53.4 | 33.8 | 54.8 | 46.8 | 33.2 | |
| Actuated g/C Ratio | 0.28 | 0.29 | 0.40 | 0.51 | 0.48 | | 0.44 | 0.28 | 0.46 | 0.39 | 0.28 | |
| Clearance Time (s) | 7.0 | 7.0 | 4.0 | 4.0 | 7.0 | | 4.0 | 7.0 | 4.0 | 4.0 | 7.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 117 | 989 | 483 | 411 | 1576 | | 391 | 508 | 587 | 432 | 507 | |
| v/s Ratio Prot | | c0.21 | 0.06 | c0.19 | 0.31 | | c0.11 | 0.13 | 0.08 | 0.07 | c0.19 | |
| v/s Ratio Perm | 0.04 | | 0.15 | 0.29 | | | 0.22 | | 0.13 | 0.17 | | |
| v/c Ratio | 0.14 | 0.74 | 0.54 | 0.96 | 0.65 | | 0.74 | 0.45 | 0.47 | 0.61 | 0.68 | |
| Uniform Delay, d1 | 32.3 | 38.7 | 27.7 | 28.3 | 23.6 | | 23.9 | 35.5 | 22.5 | 26.8 | 38.7 | |
| Progression Factor | 0.78 | 0.73 | 0.41 | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.2 | 4.6 | 1.1 | 34.7 | 2.1 | | 7.1 | 0.6 | 0.6 | 2.6 | 3.8 | |
| Delay (s) | 27.5 | 32.8 | 12.5 | 63.1 | 25.7 | | 31.0 | 36.2 | 23.1 | 29.3 | 42.5 | |
| Level of Service | C | C | B | E | C | | C | D | C | C | D | |
| Approach Delay (s) | | 26.4 | | | 36.1 | | | 29.4 | | | 36.8 | |
| Approach LOS | | C | | | D | | | C | | | D | |

**Intersection Summary**

| | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 32.1 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.77 | | |
| Actuated Cycle Length (s) | 120.0 | Sum of lost time (s) | 17.0 |
| Intersection Capacity Utilization | 112.6% | ICU Level of Service | H |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 183 | 169 | 71 | 1431 | 2415 | 98 |
| Future Volume (vph) | 183 | 169 | 71 | 1431 | 2415 | 98 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 | 3.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.91 | 0.91 |
| Frt | | 0.850 | | | 0.994 | |
| Flt Protected | 0.950 | | 0.950 | | | |
| Satd. Flow (prot) | 1652 | 1478 | 1652 | 3500 | 4999 | 0 |
| Flt Permitted | 0.950 | | 0.046 | | | |
| Satd. Flow (perm) | 1652 | 1478 | 80 | 3500 | 4999 | 0 |
| Right Turn on Red | | Yes | | | | Yes |
| Satd. Flow (RTOR) | | 2 | | | 8 | |
| Link Speed (k/h) | 40 | | | 60 | 60 | |
| Link Distance (m) | 451.9 | | | 308.9 | 199.8 | |
| Travel Time (s) | 40.7 | | | 18.5 | 12.0 | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.95 | 0.95 | 0.90 |
| Adj. Flow (vph) | 203 | 188 | 79 | 1506 | 2542 | 109 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 203 | 188 | 79 | 1506 | 2651 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Left | Left | Right |
| Median Width(m) | 3.0 | | | 3.0 | 3.0 | |
| Link Offset(m) | 0.0 | | | 0.0 | 0.0 | |
| Crosswalk Width(m) | 4.8 | | | 4.8 | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.09 | 1.09 | 1.09 | 1.01 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | 15 | 25 | | | 15 |
| Number of Detectors | 1 | 1 | 1 | 2 | 2 | |
| Detector Template | Left | Right | Left | Thru | Thru | |
| Leading Detector (m) | 2.0 | 2.0 | 2.0 | 10.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 2.0 | 2.0 | 0.6 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Detector 2 Position(m) | | | | 9.4 | 9.4 | |
| Detector 2 Size(m) | | | | 0.6 | 0.6 | |
| Detector 2 Type | | | | Cl+Ex | Cl+Ex | |
| Detector 2 Channel | | | | | | |
| Detector 2 Extend (s) | | | | 0.0 | 0.0 | |
| Turn Type | Prot | pm+ov | pm+pt | NA | NA | |
| Protected Phases | 4 | 5 | 5 | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Detector Phase | 4 | 5 | 5 | 2 | 6 | |
| Switch Phase | | | | | | |





| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Minimum Initial (s) | 7.0 | 6.0 | 6.0 | 19.0 | 19.0 | |
| Minimum Split (s) | 39.0 | 10.0 | 10.0 | 26.0 | 26.0 | |
| Total Split (s) | 39.0 | 14.0 | 14.0 | 91.0 | 77.0 | |
| Total Split (%) | 30.0% | 10.8% | 10.8% | 70.0% | 59.2% | |
| Yellow Time (s) | 4.0 | 3.0 | 3.0 | 5.0 | 5.0 | |
| All-Red Time (s) | 3.0 | 1.0 | 1.0 | 2.0 | 2.0 | |
| Lost Time Adjust (s) | -1.0 | -1.0 | -1.0 | -1.0 | -1.0 | |
| Total Lost Time (s) | 6.0 | 3.0 | 3.0 | 6.0 | 6.0 | |
| Lead/Lag | | Lead | Lead | | Lag | |
| Lead-Lag Optimize? | | Yes | Yes | | Yes | |
| Recall Mode | None | None | None | C-Min | C-Min | |
| v/c Ratio | 0.72 | 0.45 | 0.47 | 0.58 | 0.82 | |
| Control Delay | 64.7 | 39.7 | 24.9 | 9.7 | 21.4 | |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| Total Delay | 64.7 | 39.7 | 24.9 | 9.7 | 21.4 | |
| Queue Length 50th (m) | 52.3 | 41.5 | 4.7 | 87.6 | 180.0 | |
| Queue Length 95th (m) | 74.7 | 56.8 | 22.6 | 131.2 | 260.8 | |
| Internal Link Dist (m) | 427.9 | | | 284.9 | 175.8 | |
| Turn Bay Length (m) | | | | | | |
| Base Capacity (vph) | 419 | 450 | 197 | 2578 | 3230 | |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | |
| Reduced v/c Ratio | 0.48 | 0.42 | 0.40 | 0.58 | 0.82 | |

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBT, Start of Green
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 101: Allen Rd & E-W Road



HCM Signalized Intersection Capacity Analysis
101: Allen Rd & E-W Road

07-02-2023

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 183 | 169 | 71 | 1431 | 2415 | 98 |
| Future Volume (vph) | 183 | 169 | 71 | 1431 | 2415 | 98 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 | 3.0 |
| Total Lost time (s) | 6.0 | 3.0 | 3.0 | 6.0 | 6.0 | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 0.95 | 0.91 | |
| Frt | 1.00 | 0.85 | 1.00 | 1.00 | 0.99 | |
| Flt Protected | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | |
| Satd. Flow (prot) | 1652 | 1478 | 1652 | 3500 | 4998 | |
| Flt Permitted | 0.95 | 1.00 | 0.05 | 1.00 | 1.00 | |
| Satd. Flow (perm) | 1652 | 1478 | 80 | 3500 | 4998 | |
| Peak-hour factor, PHF | 0.90 | 0.90 | 0.90 | 0.95 | 0.95 | 0.90 |
| Adj. Flow (vph) | 203 | 188 | 79 | 1506 | 2542 | 109 |
| RTOR Reduction (vph) | 0 | 2 | 0 | 0 | 3 | 0 |
| Lane Group Flow (vph) | 203 | 186 | 79 | 1506 | 2648 | 0 |
| Turn Type | Prot | pm+ov | pm+pt | NA | NA | |
| Protected Phases | 4 | 5 | 5 | 2 | 6 | |
| Permitted Phases | | 4 | 2 | | | |
| Actuated Green, G (s) | 21.2 | 29.0 | 94.8 | 94.8 | 83.0 | |
| Effective Green, g (s) | 22.2 | 31.0 | 95.8 | 95.8 | 84.0 | |
| Actuated g/C Ratio | 0.17 | 0.24 | 0.74 | 0.74 | 0.65 | |
| Clearance Time (s) | 7.0 | 4.0 | 4.0 | 7.0 | 7.0 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 282 | 352 | 165 | 2579 | 3229 | |
| v/s Ratio Prot | c0.12 | 0.04 | 0.03 | c0.43 | c0.53 | |
| v/s Ratio Perm | | 0.09 | 0.32 | | | |
| v/c Ratio | 0.72 | 0.53 | 0.48 | 0.58 | 0.82 | |
| Uniform Delay, d1 | 51.0 | 43.1 | 21.6 | 7.9 | 17.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| Incremental Delay, d2 | 8.5 | 1.4 | 2.2 | 1.0 | 2.5 | |
| Delay (s) | 59.5 | 44.6 | 23.8 | 8.9 | 19.8 | |
| Level of Service | E | D | C | A | B | |
| Approach Delay (s) | 52.3 | | | 9.6 | 19.8 | |
| Approach LOS | D | | | A | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 19.0 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 130.0 | Sum of lost time (s) | 15.0 |
| Intersection Capacity Utilization | 77.3% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |



Lanes, Volumes, Timings
102: Street B/Studio Dwy & Street A

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 6 | 243 | 124 | 106 | 134 | 0 | 74 | 56 | 140 | 0 | 90 | 12 |
| Future Volume (vph) | 6 | 243 | 124 | 106 | 134 | 0 | 74 | 56 | 140 | 0 | 90 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Storage Length (m) | 0.0 | | 0.0 | 90.0 | | 0.0 | 50.0 | | 0.0 | 0.0 | | 0.0 |
| Storage Lanes | 0 | | 0 | 1 | | 0 | 1 | | 0 | 0 | | 0 |
| Taper Length (m) | 7.5 | | | 7.5 | | | 7.5 | | | 7.5 | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 0.954 | | | | | | 0.891 | | | 0.984 | |
| Flt Protected | | 0.999 | | 0.950 | | | 0.950 | | | | | |
| Satd. Flow (prot) | 0 | 1756 | 0 | 1652 | 1842 | 0 | 1652 | 1641 | 0 | 0 | 1813 | 0 |
| Flt Permitted | | 0.996 | | 0.553 | | | 0.687 | | | | | |
| Satd. Flow (perm) | 0 | 1750 | 0 | 961 | 1842 | 0 | 1194 | 1641 | 0 | 0 | 1813 | 0 |
| Right Turn on Red | | | Yes | | | Yes | | | Yes | | | Yes |
| Satd. Flow (RTOR) | | 52 | | | | | | 156 | | | 13 | |
| Link Speed (k/h) | | 40 | | | 40 | | | 40 | | | 30 | |
| Link Distance (m) | | 107.0 | | | 385.5 | | | 165.4 | | | 70.3 | |
| Travel Time (s) | | 9.6 | | | 34.7 | | | 14.9 | | | 8.4 | |
| Peak Hour Factor | 0.90 | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 |
| Adj. Flow (vph) | 7 | 256 | 138 | 118 | 141 | 0 | 82 | 59 | 156 | 0 | 95 | 13 |
| Shared Lane Traffic (%) | | | | | | | | | | | | |
| Lane Group Flow (vph) | 0 | 401 | 0 | 118 | 141 | 0 | 82 | 215 | 0 | 0 | 108 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No | No | No | No | No | No | No |
| Lane Alignment | Left | Left | Right | Left | Left | Right | Left | Left | Right | Left | Left | Right |
| Median Width(m) | | 3.0 | | | 3.0 | | | 3.0 | | | 3.0 | |
| Link Offset(m) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Crosswalk Width(m) | | 4.8 | | | 4.8 | | | 4.8 | | | 4.8 | |
| Two way Left Turn Lane | | | | | | | | | | | | |
| Headway Factor | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | | 15 | 25 | | 15 | 25 | | 15 | 25 | | 15 |
| Number of Detectors | 1 | 2 | | 1 | 2 | | 1 | 2 | | 1 | 2 | |
| Detector Template | Left | Thru | | Left | Thru | | Left | Thru | | Left | Thru | |
| Leading Detector (m) | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | | 2.0 | 10.0 | |
| Trailing Detector (m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Position(m) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Size(m) | 2.0 | 0.6 | | 2.0 | 0.6 | | 2.0 | 0.6 | | 2.0 | 0.6 | |
| Detector 1 Type | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | | Cl+Ex | Cl+Ex | |
| Detector 1 Channel | | | | | | | | | | | | |
| Detector 1 Extend (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Queue (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 1 Delay (s) | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | |
| Detector 2 Position(m) | | 9.4 | | | 9.4 | | | 9.4 | | | 9.4 | |
| Detector 2 Size(m) | | 0.6 | | | 0.6 | | | 0.6 | | | 0.6 | |
| Detector 2 Type | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | | | Cl+Ex | |
| Detector 2 Channel | | | | | | | | | | | | |
| Detector 2 Extend (s) | | 0.0 | | | 0.0 | | | 0.0 | | | 0.0 | |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | | NA | |
| Protected Phases | | 2 | | | 6 | | | 8 | | | 4 | |

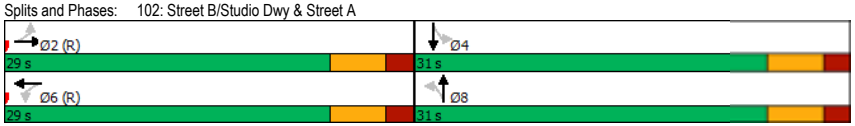
## Lanes, Volumes, Timings
## 102: Street B/Studio Dwy & Street A

07-02-2023

| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Detector Phase | 2 | 2 | | 6 | 6 | | 8 | 8 | | 4 | 4 | |
| Switch Phase | | | | | | | | | | | | |
| Minimum Initial (s) | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | |
| Minimum Split (s) | 24.0 | 24.0 | | 24.0 | 24.0 | | 24.0 | 24.0 | | 24.0 | 24.0 | |
| Total Split (s) | 29.0 | 29.0 | | 29.0 | 29.0 | | 31.0 | 31.0 | | 31.0 | 31.0 | |
| Total Split (%) | 48.3% | 48.3% | | 48.3% | 48.3% | | 51.7% | 51.7% | | 51.7% | 51.7% | |
| Yellow Time (s) | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | | 4.0 | 4.0 | |
| All-Red Time (s) | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | | 2.0 | 2.0 | |
| Lost Time Adjust (s) | | -1.0 | | -1.0 | -1.0 | | -1.0 | -1.0 | | | -1.0 | |
| Total Lost Time (s) | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | | 5.0 | |
| Lead/Lag | | | | | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | | | | | |
| Recall Mode | C-Max | C-Max | | C-Max | C-Max | | None | None | | None | None | |
| v/c Ratio | | 0.34 | | 0.19 | 0.12 | | 0.39 | 0.52 | | | 0.33 | |
| Control Delay | | 5.5 | | 5.8 | 4.9 | | 26.2 | 11.7 | | | 20.8 | |
| Queue Delay | | 0.0 | | 0.0 | 0.0 | | 0.0 | 0.0 | | | 0.0 | |
| Total Delay | | 5.5 | | 5.8 | 4.9 | | 26.2 | 11.7 | | | 20.8 | |
| Queue Length 50th (m) | | 14.1 | | 4.4 | 4.9 | | 8.5 | 5.9 | | | 9.7 | |
| Queue Length 95th (m) | | 33.2 | | 12.8 | 13.0 | | 18.0 | 20.5 | | | 19.8 | |
| Internal Link Dist (m) | | 83.0 | | | 361.5 | | | 141.4 | | | 46.3 | |
| Turn Bay Length (m) | | | | 90.0 | | | 50.0 | | | | | |
| Base Capacity (vph) | | 1167 | | 631 | 1210 | | 517 | 799 | | | 793 | |
| Starvation Cap Reductn | | 0 | | 0 | 0 | | 0 | 0 | | | 0 | |
| Spillback Cap Reductn | | 0 | | 0 | 0 | | 0 | 0 | | | 0 | |
| Storage Cap Reductn | | 0 | | 0 | 0 | | 0 | 0 | | | 0 | |
| Reduced v/c Ratio | | 0.34 | | 0.19 | 0.12 | | 0.16 | 0.27 | | | 0.14 | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Cycle Length: 60 | |
| Actuated Cycle Length: 60 | |
| Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green | |
| Natural Cycle: 50 | |
| Control Type: Actuated-Coordinated | |

Splits and Phases: 102: Street B/Studio Dwy & Street A






## HCM Signalized Intersection Capacity Analysis
## 102: Street B/Studio Dwy & Street A

07-02-2023

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 6 | 243 | 124 | 106 | 134 | 0 | 74 | 56 | 140 | 0 | 90 | 12 |
| Future Volume (vph) | 6 | 243 | 124 | 106 | 134 | 0 | 74 | 56 | 140 | 0 | 90 | 12 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 |
| Total Lost time (s) | | 5.0 | | 5.0 | 5.0 | | 5.0 | 5.0 | | | 5.0 | |
| Lane Util. Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | |
| Frt | | 0.95 | | 1.00 | 1.00 | | 1.00 | 0.89 | | | 0.98 | |
| Flt Protected | | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | | 1.00 | |
| Satd. Flow (prot) | | 1755 | | 1652 | 1842 | | 1652 | 1642 | | | 1812 | |
| Flt Permitted | | 1.00 | | 0.55 | 1.00 | | 0.69 | 1.00 | | | 1.00 | |
| Satd. Flow (perm) | | 1750 | | 962 | 1842 | | 1195 | 1642 | | | 1812 | |
| Peak-hour factor, PHF | 0.90 | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 |
| Adj. Flow (vph) | 7 | 256 | 138 | 118 | 141 | 0 | 82 | 59 | 156 | 0 | 95 | 13 |
| RTOR Reduction (vph) | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 128 | 0 | 0 | 11 | 0 |
| Lane Group Flow (vph) | 0 | 383 | 0 | 118 | 141 | 0 | 82 | 87 | 0 | 0 | 97 | 0 |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | | NA | |
| Protected Phases | | 2 | | | 6 | | | 8 | | | 4 | |
| Permitted Phases | 2 | | | 6 | | | 8 | | | 4 | | |
| Actuated Green, G (s) | | 38.4 | | 38.4 | 38.4 | | 9.6 | 9.6 | | | 9.6 | |
| Effective Green, g (s) | | 39.4 | | 39.4 | 39.4 | | 10.6 | 10.6 | | | 10.6 | |
| Actuated g/C Ratio | | 0.66 | | 0.66 | 0.66 | | 0.18 | 0.18 | | | 0.18 | |
| Clearance Time (s) | | 6.0 | | 6.0 | 6.0 | | 6.0 | 6.0 | | | 6.0 | |
| Vehicle Extension (s) | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | | 3.0 | |
| Lane Grp Cap (vph) | | 1149 | | 631 | 1209 | | 211 | 290 | | | 320 | |
| v/s Ratio Prot | | | | | 0.08 | | | 0.05 | | | 0.05 | |
| v/s Ratio Perm | | c0.22 | | 0.12 | | | c0.07 | | | | | |
| v/c Ratio | | 0.33 | | 0.19 | 0.12 | | 0.39 | 0.30 | | | 0.30 | |
| Uniform Delay, d1 | | 4.5 | | 4.0 | 3.8 | | 21.8 | 21.5 | | | 21.5 | |
| Progression Factor | | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | | 1.00 | |
| Incremental Delay, d2 | | 0.8 | | 0.7 | 0.2 | | 1.2 | 0.6 | | | 0.5 | |
| Delay (s) | | 5.3 | | 4.7 | 4.0 | | 23.0 | 22.0 | | | 22.0 | |
| Level of Service | | A | | A | A | | C | C | | | C | |
| Approach Delay (s) | | 5.3 | | | 4.3 | | | 22.3 | | | 22.0 | |
| Approach LOS | | A | | | A | | | C | | | C | |

| Intersection Summary | | | | | |
|---|---|---|---|---|---|
| HCM 2000 Control Delay | 11.5 | HCM 2000 Level of Service | | B | |
| HCM 2000 Volume to Capacity ratio | 0.35 | | | | |
| Actuated Cycle Length (s) | 60.0 | Sum of lost time (s) | | 10.0 | |
| Intersection Capacity Utilization | 51.8% | ICU Level of Service | | A | |
| Analysis Period (min) | 15 | | | | |
| c Critical Lane Group | | | | | |

## Lanes, Volumes, Timings
## 103: Hanover Rd/Street B & Street C

07-02-2023

| Lane Group | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 137 | 40 | 37 | 137 | 199 | 124 |
| Future Volume (vph) | 137 | 40 | 37 | 137 | 199 | 124 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 | 3.0 |
| Storage Length (m) | 0.0 | 0.0 | 40.0 | | | 0.0 |
| Storage Lanes | 1 | 0 | 1 | | | 0 |
| Taper Length (m) | 7.5 | | 7.5 | | | |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | 0.970 | | | | 0.946 | |
| Flt Protected | 0.963 | | 0.950 | | | |
| Satd. Flow (prot) | 1624 | 0 | 1652 | 1842 | 1743 | 0 |
| Flt Permitted | 0.963 | | 0.950 | | | |
| Satd. Flow (perm) | 1624 | 0 | 1652 | 1842 | 1743 | 0 |
| Link Speed (k/h) | 40 | | | 40 | 40 | |
| Link Distance (m) | 35.3 | | | 60.4 | 165.4 | |
| Travel Time (s) | 3.2 | | | 5.4 | 14.9 | |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.95 | 0.95 | 0.90 |
| Adj. Flow (vph) | 152 | 44 | 41 | 144 | 209 | 138 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 196 | 0 | 41 | 144 | 347 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Left | Left | Right |
| Median Width(m) | 3.0 | | | 3.0 | 3.0 | |
| Link Offset(m) | 0.0 | | | 0.0 | 0.0 | |
| Crosswalk Width(m) | 4.8 | | | 4.8 | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.09 | 1.09 | 1.09 | 1.01 | 1.01 | 1.09 |
| Turning Speed (k/h) | 25 | 15 | 25 | | | 15 |
| Sign Control | Stop | | | Stop | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |

Control Type: Unsignalized



## HCM Unsignalized Intersection Capacity Analysis
## 103: Hanover Rd/Street B & Street C

07-02-2023

| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Traffic Volume (vph) | 137 | 40 | 37 | 137 | 199 | 124 |
| Future Volume (vph) | 137 | 40 | 37 | 137 | 199 | 124 |
| Peak Hour Factor | 0.90 | 0.90 | 0.90 | 0.95 | 0.95 | 0.90 |
| Hourly flow rate (vph) | 152 | 44 | 41 | 144 | 209 | 138 |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 |
|---|---|---|---|---|
| Volume Total (vph) | 196 | 41 | 144 | 347 |
| Volume Left (vph) | 152 | 41 | 0 | 0 |
| Volume Right (vph) | 44 | 0 | 0 | 138 |
| Hadj (s) | 0.05 | 0.53 | 0.03 | -0.20 |
| Departure Headway (s) | 5.2 | 5.9 | 5.4 | 4.6 |
| Degree Utilization, x | 0.28 | 0.07 | 0.22 | 0.44 |
| Capacity (veh/h) | 637 | 580 | 633 | 751 |
| Control Delay (s) | 10.3 | 8.1 | 8.7 | 11.2 |
| Approach Delay (s) | 10.3 | 8.6 | | 11.2 |
| Approach LOS | B | A | | B |

| Intersection Summary | | | |
|---|---|---|---|
| Delay | 10.3 | | |
| Level of Service | B | | |
| Intersection Capacity Utilization | 41.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

## Lanes, Volumes, Timings
## 104: Street D & Street J/Street A

07-02-2023

| Lane Group | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Traffic Volume (vph) | 65 | 0 | 81 | 93 | 0 | 56 |
| Future Volume (vph) | 65 | 0 | 81 | 93 | 0 | 56 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Lane Width (m) | 3.5 | 3.0 | 3.0 | 3.5 | 3.0 | 3.0 |
| Lane Util. Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | | | 0.865 | |
| Flt Protected | | | | 0.977 | | |
| Satd. Flow (prot) | 1842 | 0 | 0 | 1800 | 1504 | 0 |
| Flt Permitted | | | | 0.977 | | |
| Satd. Flow (perm) | 1842 | 0 | 0 | 1800 | 1504 | 0 |
| Link Speed (k/h) | 40 | | | 40 | 40 | |
| Link Distance (m) | 103.1 | | | 63.7 | 112.1 | |
| Travel Time (s) | 9.3 | | | 5.7 | 10.1 | |
| Peak Hour Factor | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 | 0.90 |
| Adj. Flow (vph) | 68 | 0 | 90 | 98 | 0 | 62 |
| Shared Lane Traffic (%) | | | | | | |
| Lane Group Flow (vph) | 68 | 0 | 0 | 188 | 62 | 0 |
| Enter Blocked Intersection | No | No | No | No | No | No |
| Lane Alignment | Left | Right | Left | Left | Left | Right |
| Median Width(m) | 0.0 | | | 0.0 | 3.0 | |
| Link Offset(m) | 0.0 | | | 0.0 | 0.0 | |
| Crosswalk Width(m) | 4.8 | | | 4.8 | 4.8 | |
| Two way Left Turn Lane | | | | | | |
| Headway Factor | 1.01 | 1.09 | 1.09 | 1.01 | 1.09 | 1.09 |
| Turning Speed (k/h) | | 15 | 25 | | 25 | 15 |
| Sign Control | Stop | | | Stop | Stop | |

| Intersection Summary | |
|---|---|
| Area Type: | Other |
| Control Type: Unsignalized | |



## HCM Unsignalized Intersection Capacity Analysis
## 104: Street D & Street J/Street A

07-02-2023

| Movement | EBT | EBR | WBL | WBT | NBL | NBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Sign Control | Stop | | | Stop | Stop | |
| Traffic Volume (vph) | 65 | 0 | 81 | 93 | 0 | 56 |
| Future Volume (vph) | 65 | 0 | 81 | 93 | 0 | 56 |
| Peak Hour Factor | 0.95 | 0.90 | 0.90 | 0.95 | 0.90 | 0.90 |
| Hourly flow rate (vph) | 68 | 0 | 90 | 98 | 0 | 62 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 |
|---|---|---|---|
| Volume Total (vph) | 68 | 188 | 62 |
| Volume Left (vph) | 0 | 90 | 0 |
| Volume Right (vph) | 0 | 0 | 62 |
| Hadj (s) | 0.03 | 0.13 | -0.57 |
| Departure Headway (s) | 4.3 | 4.2 | 3.9 |
| Degree Utilization, x | 0.08 | 0.22 | 0.07 |
| Capacity (veh/h) | 823 | 836 | 862 |
| Control Delay (s) | 7.6 | 8.4 | 7.2 |
| Approach Delay (s) | 7.6 | 8.4 | 7.2 |
| Approach LOS | A | A | A |

| Intersection Summary | | | |
|---|---|---|---|
| Delay | 8.0 | | |
| Level of Service | A | | |
| Intersection Capacity Utilization | 26.2% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |