



CITY OF IQALUIT

# **Astro Hill Infrastructure Upgrades Preliminary Design Study: Options Analysis – Desktop Review Report**

May 31, 2022



Colliers Project Leaders  
2720 Iris Street  
Ottawa, Ontario  
K2C 1E6

Attention: Jared Wright, B.Eng.  
LEED Green Associate

***Astro Hill Infrastructure Upgrades Preliminary Design Study: Options  
Analysis – Desktop Review Report***

Dear Mr. Wright:

Dillon Consulting Limited (Dillon) is pleased to submit this Options Analysis – Desktop Review Report for the Astro Hill Infrastructure Upgrades Preliminary Design Study.

We trust the foregoing meets your present needs. However, if you have any questions, please feel free to contact Steven at (709) 754-2374 at your convenience.

Yours sincerely,

**DILLON CONSULTING LIMITED**

  
Steven Greeley, P.Eng.  
Project Manager, Associate

SJG:lmk  
Attachment

Our file: 21-2987

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# Table of Contents

<b>1.0</b>	<b>Introduction</b>	<b>3</b>
1.1	Intent of this Document.....	3
1.2	Background Information .....	4
<b>2.0</b>	<b>Option #1 – Existing North/South Corridor Replacement</b>	<b>5</b>
2.1	Technical Suitability/Complexity/Constructability .....	5
2.2	Impact on Existing Services to Existing Buildings.....	6
2.3	Future Development in the Area .....	8
2.4	Challenges Related to Easements.....	9
2.5	Impacts on Downstream Infrastructure .....	9
2.5.1	Sanitary Sewer .....	9
2.5.2	Potable Water .....	10
2.6	Opinion of Probable Cost .....	10
<b>3.0</b>	<b>Option # 2 – Palaugaa Road</b>	<b>11</b>
3.1	Technical Suitability/Complexity/Constructability .....	11
3.2	Impact on Existing Services to Existing Buildings.....	12
3.3	Future Development in the Area .....	13
3.4	Challenges Related to Easements.....	14
3.5	Impacts on Downstream Infrastructure .....	14
3.5.1	Sanitary Sewer .....	14
3.5.2	Potable Water .....	14
3.6	Opinion of Probable Cost .....	14
<b>4.0</b>	<b>Conclusion and Recommendations</b>	<b>15</b>
4.1	General Recommendations .....	15
4.2	Suggested Timeline .....	15
4.3	Future Water Demand, Population Projection and Water Modeling.....	16

## Figures

Figure 1: Preferred Option from Stantec Report (2021) .....	3
Figure 2: Option #1 – North/South Corridor (Green) and Option #2 – Palaugaa Road (Blue) .....	4
Figure 3 - Existing Building Numbers .....	7
Figure 4 - Nunastar Proposed Development Overview – Option #1 .....	8
Figure 5 - EXP Drawing - Uivvaq Loop Ultimate Water Circulation Pattern. Note the South to North Flow. ....	11
Figure 6 - Conceptual Future Servicing Plan – Option #2 .....	13

## Appendices

A	Creekside Village Water Main Replacement Drawings (2015 EXP). 2015 Creekside Village Water Main Replacement Drawings (EXP)
B	Site Photographs
C	Nunastar Developments – Astro Hill Master Plan
D	City of Iqaluit Sewer Network Capacities 2020
E	Opinion of Probable Costs

## 1.0 Introduction

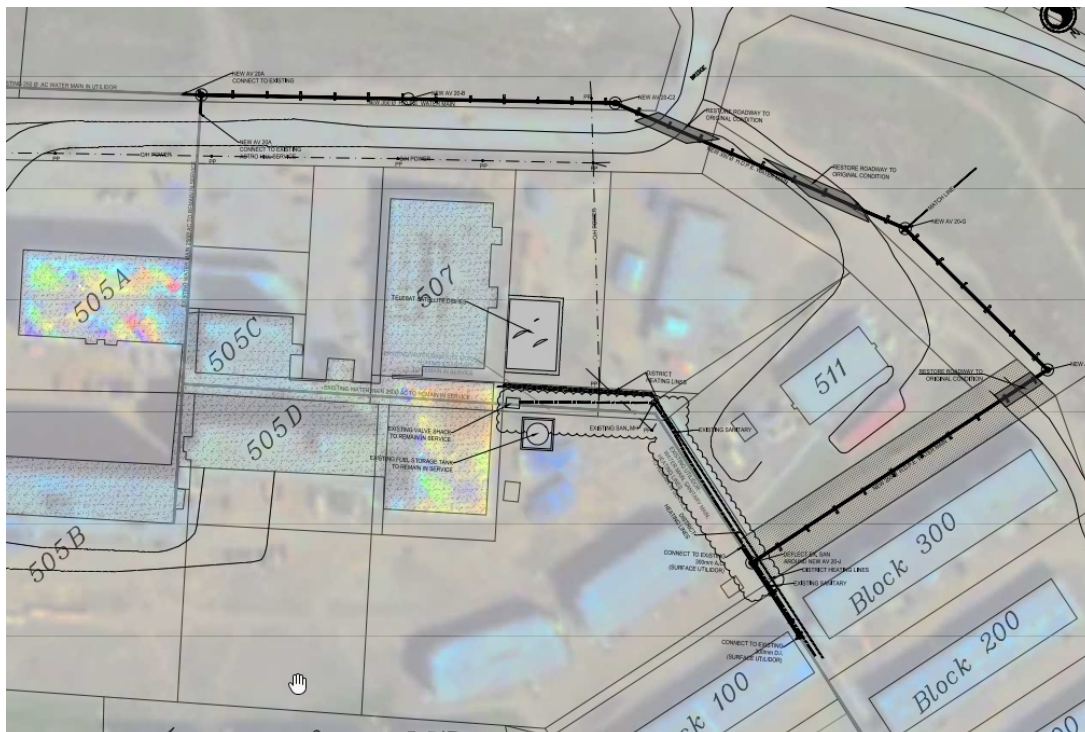
### 1.1 Intent of this Document

Currently, the distribution main servicing Astro Hill, Creekside Village and Lower Iqaluit runs directly under private property on the Astro Hill Complex. Because of this, access by the City of Iqaluit can be limited. In the event of an emergency, repair or replacement of the distribution main must be made underneath the existing building in the crawl space, making for a difficult and slow process.

It has been determined by the City of Iqaluit that the distribution main should be re-routed around the Astro Hill Complex and ultimately connect to existing infrastructure on Queen Elizabeth Way.

In January 2021, Stantec Architecture Ltd. completed a study titled, “*Astro Hill Water Main Replacement – Final Feasibility Report*”. In coordination with the City, it was determined that the preferred route for a new water main would be to bypass the Astro Hill Complex to the east and head south through the “L-Shaped lot”, north of Block 300 as shown below in Figure 1.

**Figure 1: Preferred Option from Stantec Report (2021)**

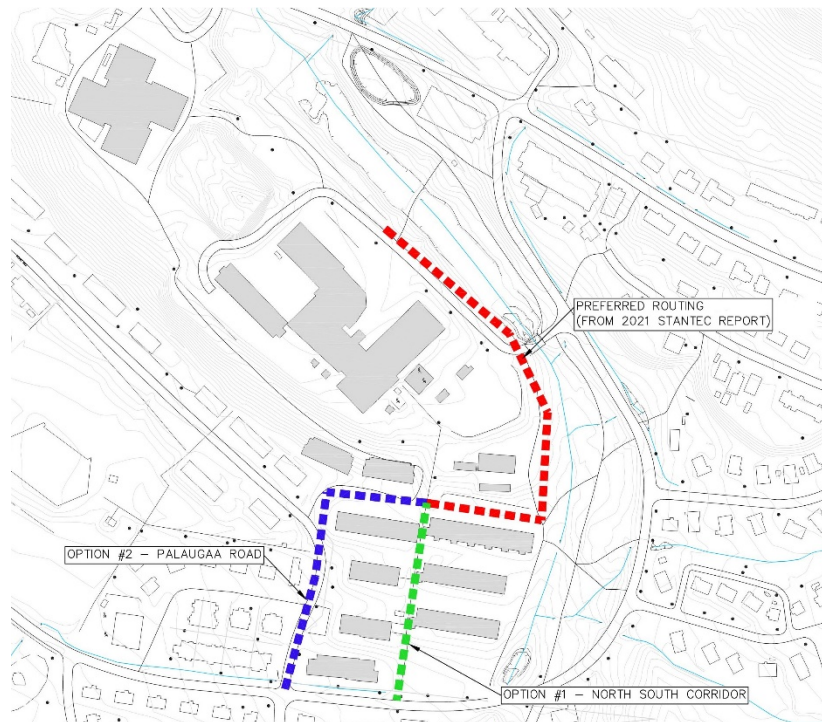


The scope of this report will be to further expand on the study completed in January 2021.

Two (2) options will be considered to re-route the water and sewer utilidor through the remainder of the Astro Hill Complex and Creekside Village and connect to the existing infrastructure on Queen Elizabeth Way.

1. Option #1 – Replace the Existing North/South Corridor (Green); and
2. Option #2 – Palaugaa Road (Blue).

**Figure 2: Option #1 – North/South Corridor (Green) and Option #2 – Palaugaa Road (Blue)**



Cost Estimates for both Option #1 and Option #2 will include the work required to re-route the water distribution main around the Astro Hill Complex (shown in red).

## 1.2 Background Information

The following is a list of background information provided by the City of Iqaluit:

1. Creekside Village Water Main Replacement Drawings (2015 EXP);
2. Water Main Repair Plan – AV9A – MH8 (Front of CBC – 2020 EXP);
3. Desktop Geotechnical Evaluation – Creekside Village 900 Block (Tetra Tech-2015);
4. Utilidor Water Distribution Upgrades – Phase 1 (EXP 2021);
5. Astro Hill Master Plan – Nunastar Properties Inc.;

6. Astro Hill Overall Site Plan (Nunastar 2022);
7. Astro Hill Water Main Replacement – Final Feasibility Report (Stantec 2021);
8. City of Iqaluit Sewer Network Capacities 2020 (EXP 2020);
9. City of Iqaluit Piped Sewer & Water System 2018 (Northern Futures Planning 2018); and
10. City of Iqaluit Capital Works and Operational Support Plan – Lower Iqaluit Loop (EXP 2019).
11. UIVVAQ Water Distribution Loop Design Drawings and Design Memorandum (EXP 2020)
12. Utilidor Water Distribution Upgrades – Phase 1 Report (EXP 2021)

## 2.0 Option #1 – Existing North/South Corridor Replacement

### 2.1 Technical Suitability/Complexity/Constructability

From the City of Iqaluit Municipal Design Guidelines, A.3.4.1 states “Water mains shall have a minimum depth of cover of 2.5 m measured from finished grade to the top of the pipe”.

Similarly, B.3.4.1 states, “The sanitary sewer main shall have a minimum depth of cover to ensure the mains are in permafrost. No main shall be installed with less than 3.0 m of cover measured from finished grade to the top of the pipe.

In the existing conditions, the water main and sanitary sewer in the north/south corridor are either above ground or contained in a shallow, insulated box. See **Appendix A** - Creekside Village Water Main Replacement Drawings (2015 EXP).

The technical suitability, complexity, and constructability of Option #1 will be analyzed assuming that the shallow utilities will be replaced with a buried utilidor.

With the above stated assumption, there are a number of constructability concerns for Option #1. They include:

1. There is a significant amount of existing infrastructure, both private and public, that will have to be maintained during construction or removed and re-instated entirely;
2. Space for heavy equipment such as dump trucks and excavators will be limited. Access to the north/south easement will be through private property on all sides. Arrangements will have to be made with the land owners;
3. The existing privately owned glycol heating system (Lots 189-192, 9-1 & 9-2) is directly adjacent to the publicly owned water and sewer mains. The heating system will likely have to be removed

during construction of the underground utility and re-instated upon completion of the works. Temporary heating accommodations will be required. This may be a significant construction challenge;

4. There are overhead wires in the immediate vicinity of the work that may be of concern;
5. There are three (3) existing electrical building annexes (Lots 189,190 & 191) that are located within the boundaries of the existing north/south easement. Temporary support of the buildings will be required. There will be a risk of damage to these building annexes. They will be very close to the trench excavation;
6. At the south end of the north/south corridor, there is an existing water re-circulation building. This building is directly on top of the existing shallow bury water main and will need to be removed, including the internal works, to install the new underground utilidor;
7. At the south end of the north/south corridor, there are existing retaining walls, decorative fences and hand rails that will need to be removed and re-instated after construction; and
8. In 2015, much of the existing water main in the north/south corridor was replaced. A decision was made at the time to not install deep bury water mains, but to simply replace the shallow bury water mains. One can speculate that the reason for this was the various construction concerns noted above.

See **Appendix B** for Site Photographs. The photographs have been chosen to help visualize the constructability issues noted above.

## 2.2 Impact on Existing Services to Existing Buildings

Currently, the water and sanitary sewer services for Buildings 352-357 are all connected to the existing north/south corridor.

Buildings 350 (CBC) and 351 are connected to the infrastructure on Queen Elizabeth Way.

See Figure 3 below for existing building numbers.



**Figure 3 - Existing Building Numbers**

As stated above, the existing utilidor is shallow, meaning that all service connections are shallow as well. Upon replacement of the existing sanitary sewer and water main with a new, buried utilidor, all building service connections will have to be reconnected to the new underground utilidor.

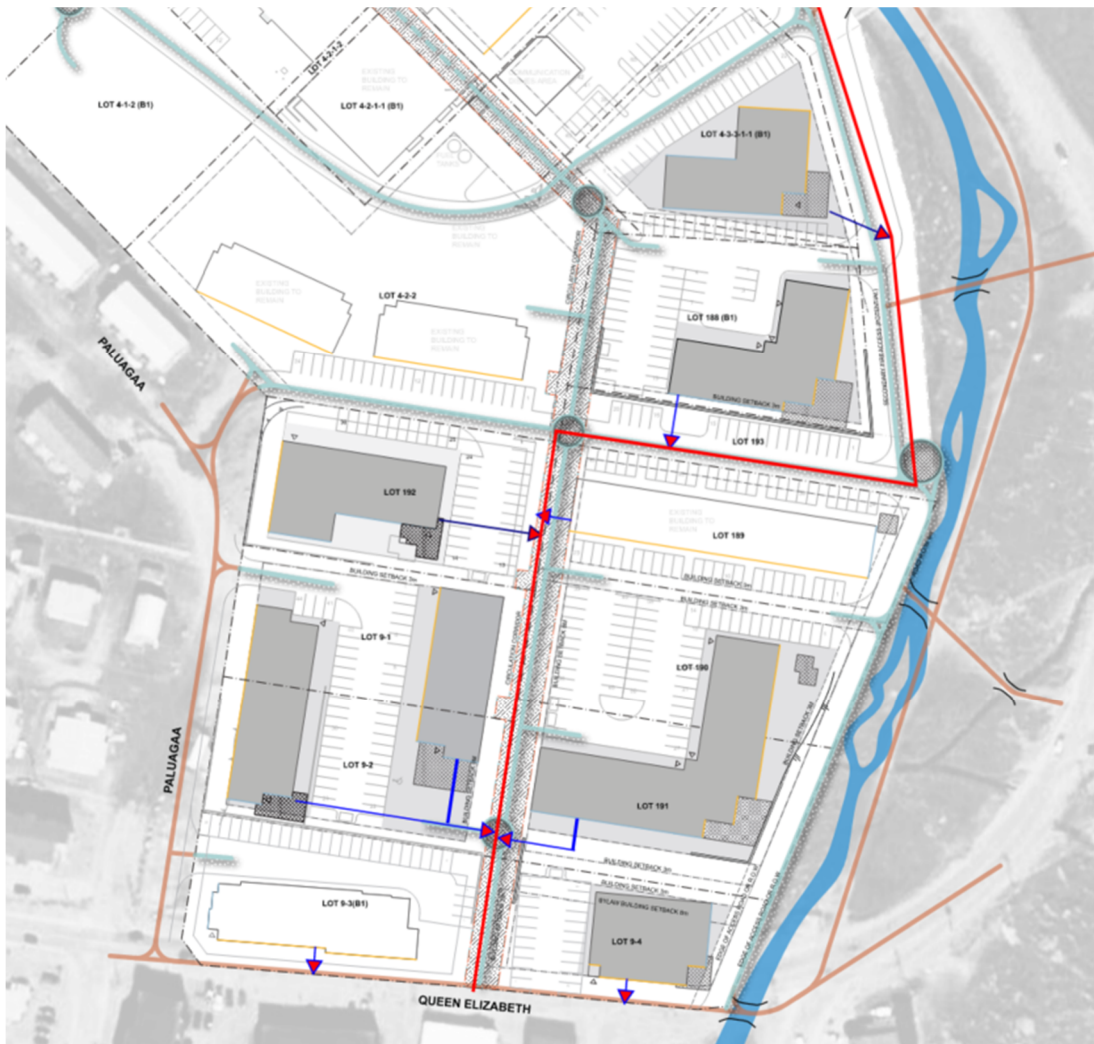
Buildings 352-357 will be impacted during construction and will experience some level of service outage. The length of service outage can be minimized with a well thought out and executed construction plan. Interior building plumbing work will be minimal.

In general, for Option #1, the impact on existing services to existing buildings will be minimal.

## 2.3 Future Development in the Area

For Option #1, the north/south corridor runs directly through Lands leased by Nunastar Properties Inc.

As depicted in the Nunastar Properties Inc. Astro Hill Master Plan, (See **Appendix C for Full report**) there is significant densification proposed for the area. Figure 4 provides an overview of the proposed development scheme. The Red line represents the Potential Option #1 routing and the blue arrows represent conceptual locations for sanitary and water services for each building/lot.



**Figure 4 - Nunastar Proposed Development Overview – Option #1**

Maintaining the north/south corridor will be convenient for new building services as development progresses. Each new building will require short water and sewer service connections. The approximate development timeline is outlined in Table 1 Below.

Building No.	Lot No.	Approx. Re-Development TimeLine
350 (CBC)	9-3	Not scheduled for Re-development
351	9-4	2022 (Ongoing)
352	9-2	3-5 Years
353	191	10 years
354	9-1	3-5 Years
355	190	10 years
356	192	10+ Years
357	189	Not scheduled for Re-development

Table 1 – Development Timelines

For both Option #1 and Option #2, water and sewer pipe sizes within the new utilidor will be designed to meet future demands. Future demands will be address later in this report.

## 2.4 Challenges Related to Easements

With respect to easements, Option #1 is the simplest option.

There is currently a +/- 8.8 m wide service corridor and easement covering the existing North/South corridor. All new infrastructure will be contained within the existing easement.

It is understood at this time that an easement will not be required along the “L Shaped Lot” nor in the area north of Astro Hill.

Additional easements are not anticipated at this time. As the preliminary design progresses, the need for additional easements may arise. Should this be the case, this report will be revised.

## 2.5 Impacts on Downstream Infrastructure

### 2.5.1 Sanitary Sewer

It is understood that the City of Iqaluit has no concerns with sanitary sewer capacity immediately downstream of the subject area. From existing MH9 to existing MH7, there is more than 5 L/s capacity available.

Further downstream, from MH6 to Lift Station #1, there are known sanitary sewer capacity issues.

At the direction of the City, and for the purposes of this investigation, downstream sewer capacity issues will not be considered as a limiting factor. These issues will be dealt with under separate City projects.

For information, the City of Iqaluit Sewer Network Capacities 2020, by EXP Services Inc. is included in **Appendix D**.

### 2.5.2 Potable Water

The Existing north/south corridor is the main distribution line feeding Astro Hill, Creak Side Village and Lower Iqaluit. If this infrastructure is to be replaced, it will result in disruptions to water service to Lower Iqaluit. This will be a concern during design and an ongoing challenge during construction.

Careful consideration will have to be given to construction phasing. There may be a need for temporary, above-ground water piping to be installed to minimize disruptions downstream.

Upon completion of the preliminary design, the new water regime will be analyzed in the City's water model. Any downstream hydrological issues will be apparent at that time.

## 2.6 Opinion of Probable Cost

A Class D Opinion of Probable Cost (**Appendix E**) has been completed for Option #1.

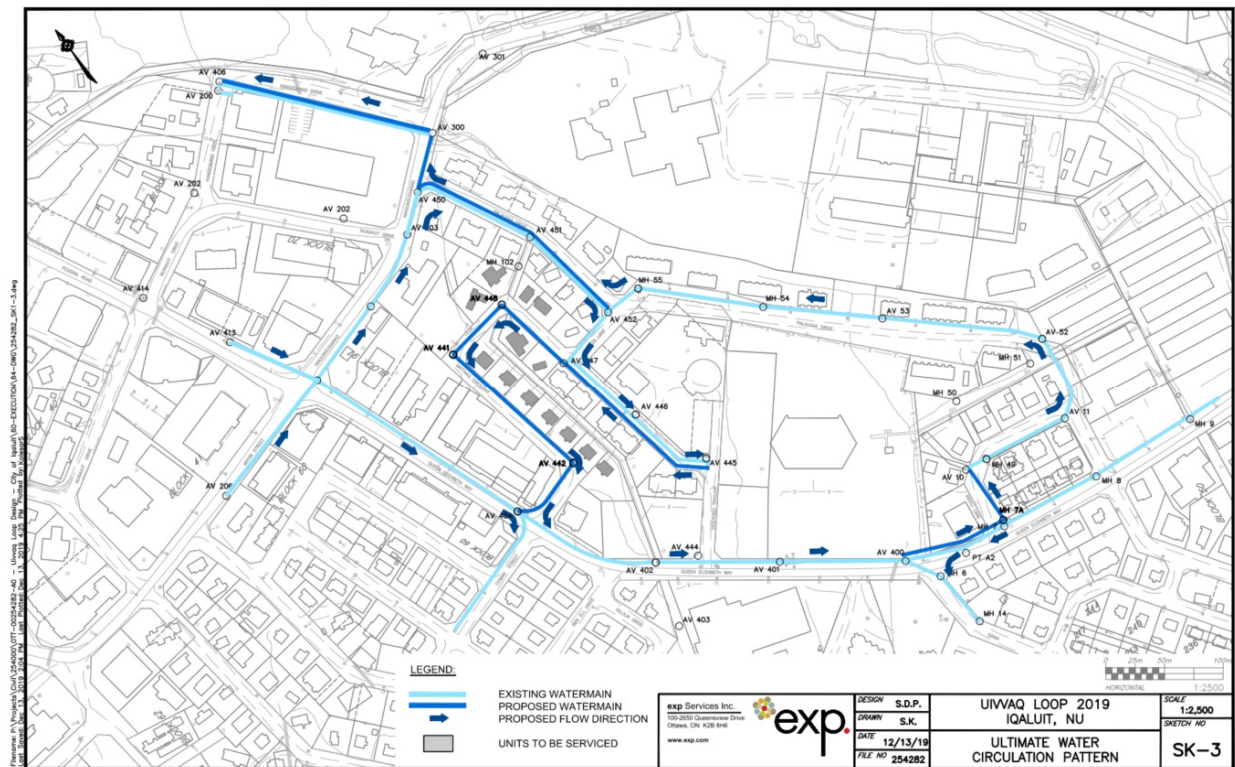
It is estimated that the cost will be \$5.35M.

## 3.0 Option # 2 – Palaugaa Road

### 3.1 Technical Suitability/Complexity/Constructability

The constructability of Option #2 will be much more straightforward. The following items should be considered by the City:

1. This option is **NOT** a connection to the Uivvaq Loop. Potable water will flow in a North to South direction, from Astro Hill to feed Lower Iqaluit. The ultimate water circulation pattern in the Uivvaq Loop will be South to North, as is depicted in the drawing prepared by EXP Services, 2019 (See Figure 5 below). Option #2 is simply an alternative routing to avoid much of the constructability constraints observed in Option #1.



**Figure 5 - EXP Drawing - Uivvaq Loop Ultimate Water Circulation Pattern. Note the South to North Flow.**

2. The construction cannot end at AV52 as was indicated in the Request for Proposals. To service Lower Iqaluit, the work will have to extend to Queen Elizabeth Way and tie into the existing water main in the street;

3. A portion of the work will have to occur in the parking lot on the north side of Building 365 (Lot 192). Arrangements will have to be made with the landowner. The majority of the work will occur in the road ROW on Palaugaa Road;
4. The timeline for the installation of Option #2 will be driven by the development of Buildings 352 and 354 (Lots 9-2 and 9-1), which are currently slated for re-development in 3-5 years. Until that time, the existing north/south utilidor will remain active and in use to service buildings 352-357 (Lots 189-192, 9-1 & 9-2);
5. As each lot is re-developed, new service connections will be made to the new infrastructure installed as Option #2. Once each lot has been re-developed, the existing infrastructure in the North/South corridor will no longer be required and can be de-commissioned.
6. As more units are taken off the existing north/south corridor, the potable water demand will drop. This may result in the existing water main becoming more susceptible to freezing. At the detailed design phase, this must be taken into consideration.
7. The new utilidor can be constructed and tested within the road right-of-way before connection to the existing regime. Service interruption should be minimal. There will be a service interruption should be when the contractor makes the final connections to the live system;

### 3.2 Impact on Existing Services to Existing Buildings

A conceptual future servicing arrangement has been prepared and is shown below in Figure 6. The Red line represents the proposed Option #2 water and sewer routing and the blue arrows represent conceptual locations for sanitary and water services for each future building or lot.

The impact on each individual building service has been summarized in Table 2 below.

Building No.	Lot No.	Impact on Existing Services
350 (CBC)	9-3	No Impact. Servicing on QEW.
351	9-4	No Impact. Servicing on QEW.
352	9-2	New Service Required at time of Construction of Option #2. Phase 1 of Re-Development. 3-5yrs
353	191	Remain on existing N/S utilidor. Install new services at time of re-development. Phase 2 of Development 10+yrs years
354	9-1	New Service Required at time of Construction of Option #2. Phase 1 of Development. 3-5 yrs
355	190	Remain on existing N/S utilidor. Install new services at time of re-development. Phase 2 of Development 10+yrs years
356	192	Remain on existing N/S utilidor. Install new services at time of re-development. Phase 2 of Development 10+yrs years

357	189	New Service Required at time of Construction of Option #2. Phase 1 of Development. 3-5 yrs
-----	-----	--

Table 2 – Impact on Existing Services – Option #2

The existing north/south utilidor will remain active and in use to service Lots 189-192, 9-1 & 9-2.

3.3 Future Development in the Area

A conceptual servicing arrangement has been prepared and is shown below in Figure 6. The Red line represents the Proposed Option #2 water and sewer routing and the blue arrows represent conceptual locations for sanitary and water services for each future building or lot.

The most suitable locations for water services, sanitary services, hydrant locations, etc. will be determined at the detailed design stage for each separate development.



Figure 6 - Conceptual Future Servicing Plan – Option #2

### 3.4 Challenges Related to Easements

For Option #2, the City should consider the following:

1. A new 8.0 m wide easement will be required through the parking lot on the north side of Building 356 (Lot 192); and
2. The existing easement over the North/South Corridor will remain in place until the entire area has been developed and all infrastructure within the easement has been removed.
3. It is understood at this time that an easement will not be required along the “L Shaped Lot” nor in the area north of Astro Hill.
4. Additional easements are not anticipated at this time. As the preliminary design progresses, the need for additional easements may arise. Should this be the case, this report will be revised.

### 3.5 Impacts on Downstream Infrastructure

#### 3.5.1 Sanitary Sewer

It is understood that the City of Iqaluit has no concerns with sanitary sewer capacity immediately downstream of the subject area. From existing MH9 to existing MH7, there is more than 5 L/s capacity available.

Further downstream, from MH6 to Lift Station #1, there are known sanitary sewer capacity issues.

At the direction of the City, and for the purposes of this investigation, downstream sewer capacity issues will not be considered as a limiting factor. These issues will be dealt with under separate City projects. For information, the City of Iqaluit Sewer Network Capacities 2020, by EXP Services Inc. is included in **Appendix D**.

#### 3.5.2 Potable Water

During construction of Option #2, it is less likely that Lower Iqaluit will be affected by water service interruptions. Construction Phasing will be less of a challenge. Temporary water services should not be required. There will be a water service disruption during connection of the new water main to the existing water main.

Upon completion of the preliminary design, the new water regime will be analyzed in the City’s water model. Any downstream hydrological issues will be apparent at that time.

### 3.6 Opinion of Probable Cost

A Class D Opinion of Probable Cost (**Appendix E**) has been completed for Option #2. It is estimated that the cost will be \$5.31M.

## 4.0 Conclusion and Recommendations

### 4.1 General Recommendations

At this time, with the information available, we recommend the City choose Option #2 – Palaugaa Road. Please consider the following:

1. The Class D cost estimates for Option #1 (\$5.35M) and Option #2 (\$5.31M) are very similar. While Option #1 is the shorter route, it provides more construction risks and challenges. This uncertainty may lead to higher bids at Tender. Option #2 is the longer route, but is more straightforward. Option #2 will likely be less expensive;
2. For Option #1, the entirety of the work will be adjacent to existing buildings and existing infrastructure, including water mains, sanitary sewers, building heating systems, and overhead electrical wires. There is more space to construct Option #2 within the road ROW. Option #2 is less complex and poses less risk to the City; and
3. Option #2 will result in less water service disruption during construction.

### 4.2 Suggested Timeline

At this time, it is understood that the City of Iqaluit is not experiencing capacity issues with the existing North/South Corridor infrastructure. Therefore, the work outlined in this report is not of an urgent nature. The timeline will be driven by the development of the Creekside Village by Nunastar Developments.

It is expected that development will begin in the 3-5 year range. Therefore, it is suggested that this work be completed during the construction season of 2025. To achieve this goal, we suggest the following timeline.

<u>Task</u>	<u>Date</u>
RFP Detailed Design	June 2024
RFP Award	July 2024
Detailed Design	July-November 2024
Tender Period	November 2024
Tender Award	November 2024
Construction	June-October 2025
Construction Completion	October 2025

## 4.3

## Future Water Demand, Population Projection and Water Modeling

For the purposes of this report, we have made the assumption that the new water distribution main will be a 350mm HDPE DR11 pipe. There are a number of items that should be considered.

- The High Annual Population Growth Rate of 3.38% (from the consolidated general plan of 2015) will be used for all population projections. This results in a 145% increase in population from 2022 to 2042. This is likely a conservative estimate and will cover any future developments in Lower Iqaluit or Astro Hill.

Year	Population
2016 (Statics Canada)	7082
2022	8937
2042	17376

- The City of Iqaluit's water distribution system is complex and highly interconnected. The Lower Base, Lower Iqaluit, and Airport Loops are all interconnected. Changes to one loop will affect the other loops. The exact water main size required will be determined after consultation with the City water model.
- Population growth estimates for the Astro Hill RE-Development are included in the Astro Hill Master Plan, attached as Appendix C.
- Firefighting flows will be considered in the City Water Model and may be the determining factor in sizing the water main.
- Fire Hydrant Coverage will be confirmed at the detailed design stage.

## Appendix A

***Creekside Village Water Main Replacement Drawings (2015 EXP). 2015 Creekside Village Water Main Replacement Drawings (EXP)***

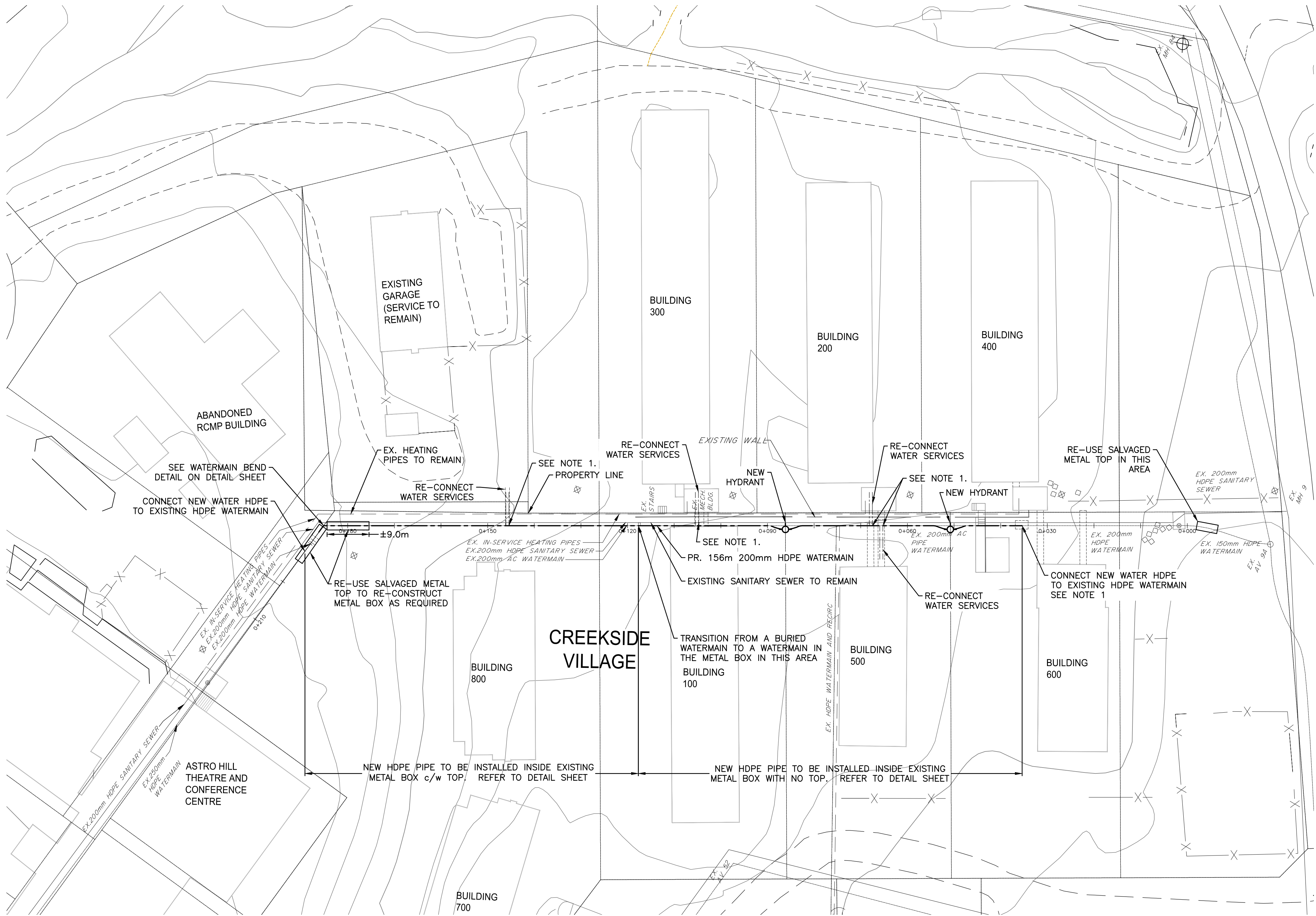
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May 2022 – 21-2987



\\nares\proj\2015\07\01\Projects\Civil\Engineering Services\225000\01T-00225312-40 - Creekside Village Water Main Replacement Design\2-drawings\225312-SP.dwg  
User: kellym  
Printed: Aug 13, 2015 9:37 AM  
Plotted by: kellym  
References:



LEGEND

- EXISTING WATERMAIN
- EXISTING SANITARY SEWER
- EXISTING IN-SERVICE ABOVE GROUND HEATING PIPES
- EXISTING FENCE LINE
- EXISTING STONE BOULDERS
- EXISTING DITCH LINE
- EXISTING BOX CONTAINING WATER AND SANITARY SERVICES
- EXISTING HYDRO POLE LOCATION
- PROPOSED NEW WATERMAIN

NOTE:

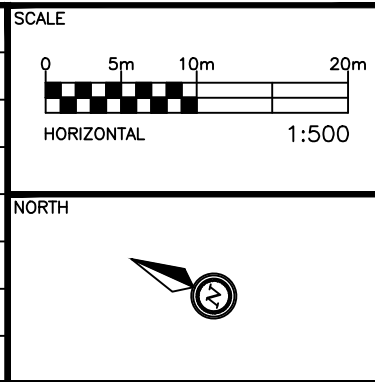
- CONTRACTOR TO TAKE APART PLYWOOD BOXES OVER EXISTING SERVICE CONNECTIONS PROVIDE A NEW SERVICE CONNECTION TO NEW WATERMAIN AND RE-INSTALL PLYWOOD BOX.

NOTES  
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMANS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

ISSUED  
FOR TENDER

PROJECT KEYPLAN

REV	REVISION DESCRIPTION	DATE	BY	APP
2	ISSUED FOR TENDER	18/08/15	MCK	SLB
1	ISSUED FOR REVIEW	31/07/15	SAB	SLB



DESIGNED BY

REVIEWED BY

CLIENT

CITY OF IQALUIT  
DEPARTMENT OF ENGINEERING AND SUSTAINABILITY



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BASEPLAN

exp  
DESIGN SLB  
CHECKED SLB  
CAD IPC  
PROJECT MANAGER SLB  
APPROVED SLB

CREEKSIDE VILLAGE WATERMAIN  
REPLACEMENT DESIGN

SITE PLAN

PROJECT No.  
OTT-00225312-AG  
SURVEY exp  
DATE JUL 13 2015  
DRAWING No.  
SP1

## Appendix B

### *Site Photographs*

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May 2022 – 21-2987





**Photo 1: Option #1 - Existing Heating System above Shallow Utilidor. Notice Building Annex with Easement and O/H Wires.**



**Photo 2: Option #1 - Existing Fence and Infrastructure above Shallow Utilidor.**



**Photo 3: Existing Water Re-Circulation Building, Handrail and Retaining Wall above Shallow Utilidor.  
South Extents of North/South Corridor.**



**Photo 4: Option #2 - Parking Lot North of Lot 192.**

## Appendix C

### *Nunastar Developments – Astro Hill Master Plan*

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*Astro Hill Infrastructure Upgrades Preliminary  
Design Study: Options Analysis – Desktop Review  
Report*

May 2022 – 21-2987





# ASTRO HILL MASTER PLAN

IQALUIT, NUNAVUT



May 2018

# Contents

INTRODUCTION .....	1
Master Plan Purpose .....	1
Vision Statement .....	1
Mission Statement .....	1
Planning Principles .....	2
Location and Overview .....	3
THE SITE + OPPORTUNITIES .....	5
Site Analysis Key Findings .....	5
HIGHLIGHTS OF THE PLAN .....	15
Key Successes of the Plan .....	15
Masterplan Process .....	17
Masterplan .....	19
By the Numbers .....	21
Lot-by-Lot Analysis .....	23
Placemaking Elements .....	27
Illustrative Vision Plan .....	29



## President's message

## Acknowledgements

Ogee Consulting Ltd. thanks Nunastar Properties Inc. for the opportunity to work on this project. In particular we would like to thank Ed Romanowski, Doug Cox, Merv Weiss and Warren Brown for their support and input during this process.

We would also like to thank Ian Evans of the architecture firm Hodgson Schilf Evans Architects Inc. for his input and professional opinion.

luliana Morar played a significant role in preparing this document; her research and creativity were helpful throughout the project. Julie Harris, Historian, from Contentworks, provided background knowledge and information about Iqaluit and its history. Thanks to Alexia Caron-Roy and Jackson Brandt for their creative input.

Sincerely,

George Harris, Ogee Consulting Ltd.

# INTRODUCTION

1

## Master Plan Purpose

The Astro Hill Master Plan is intended as a dynamic, long-term planning document that will guide future growth and development on the Astro Hill neighborhood, a modern residential, commercial and entertainment development in the Core Area of Iqaluit. The plan builds stronger connections between the buildings, social realm, and the environment of Iqaluit. The Astro Hill Master Plan is a working document that will require updating as the development proceeds and external factors affect the plan’s vision and details.

The plan has been guided by considerable discussion and input from the Nunastar team at each stage in the plan’s formulation. This internal discussion and communication provided valuable insights into opportunities and challenges in addressing the site’s development and community potential.

Input from the City, the public and other interested parties will be sought at appropriate points in the development process.

## Vision Statement

The Astro Hill Master Plan presents a vision for a mixed-use development project that encompasses a significant portion of Iqaluit’s Core Area. It outlines strategies for improvements to the site in the context of its current urban fabric and a vision to the future. The Master Plan seeks to present sensitive and place-specific design recommendations that relate closely to existing conditions, and aims to promote healthy growth and continued reinvestment in the area in the spirit of community sustainability.

## Mission Statement

Our mission is to develop Astro Hill into the most desirable mixed-use development in Canada’s Arctic to live, work and enjoy life. We take pride in all the many facets of Astro Hill and seek to bring added value to the community in its care, development and management.



## Planning Principles

The following principles guided the planning process:

- To respect Inuit Qaujimajatuqangit (the knowledge and practice of Inuit ways) in design and development choices.
- To respect, protect and rehabilitate the beauty and function of the city's natural landscape, including tundra and winter conditions.
- To strengthen a sense of community in Astro Hill and in the City's Core Area.
- To create attractive and sustainable buildings that are well-suited to their cultural, social, climatic and environmental contexts.
- To create outdoor spaces and circulation routes that will enable people to connect with each other and nature.
- To respect the natural environment and build a beautiful community. To develop the property in a sustainable way that accounts for the environmental, economic and social conditions of Iqaluit.
- To build a healthy community that actively supports and promotes personal wellbeing and allow Iqalumiut to enjoy life, develop their gifts and abilities, have constructive relationships, and contribute to family and society.
- To keep the economic well-being of residents, employees and the community as a whole front and centre.



# Location and Overview

The Astro Hill site is 6.3 Ha in size. It is located in Iqaluit, Nunavut, a city located in Canada’s Arctic on Baffin Island. It has a population of about 8,000 people that is growing quickly (15.5% between 2011 and 2016). The city has a polar climate and is connected to other places in Nunavut and Canada by air and sea. About 50% of the population is Inuit.

The Astro Hill site is located in the City’s designated Core Area, adjacent to Queen Elizabeth Road. The road is an extension of the City’s major thoroughfare network that connects the airport with major administrative buildings, the hospital, Astro Hill, the Arctic College, and suburban neighbourhoods.



Iqaluit Location Map in Arctic and World



Iqaluit Regional Location Map



Astro Hill in Iqaluit Location Map



Iqaluit Core Area Map

# THE SITE + OPPORTUNITIES

2

## Site Analysis Key Findings

### The Land

The Astro Hill site is a special location where many natural features converge in one place. A cross section through the site identifies the special natural features that provide a rich base for reaching the site development’s full potential.

- Geraldine Lake is enjoyed as a place outside the urban environment.
- The Creek leading from the lake to the Astro Hill site is an important opportunity to connect people through a linear trail network to the landscape beyond the City. The Creek is ‘nature in the City’ that is an important resource.
- Astro Hill offers spectacular views to Frobisher Bay and the Arctic landscape in all directions. Its height and location in the physical centre of the urban landscape also places it in a privileged and highly visible location.
- The Creek passing by Astro Hill can connect people to the Inlet – the ice and water that is the lifeblood of the community.
- The Beach is the edge that marks where the ice and water begin. It has the opportunity to be the capital’s promenade.



Iqaluit Land and Water Map



Iqaluit Downtown Area Photo

Topography

The site features topographic variety. The lower portion sits on a moderate slope of 4-10%. Development in this area will require retaining walls or stabilization of slopes to sustain flat areas for parking and buildings. Most retaining walls will likely be kept below 1.0 m. In the middle portion of the site (Lots 4-3-3-1-1 and 188), the slopes increase up to 20%. These areas will require even more retaining walls to maximize the useable areas. The upper bench of the site where the Frobisher Hotel is located is relatively flat with a steep bank to the southwest. This bank has a slope of over 33% (3:1 ratio) and would be prohibitively expensive to develop.



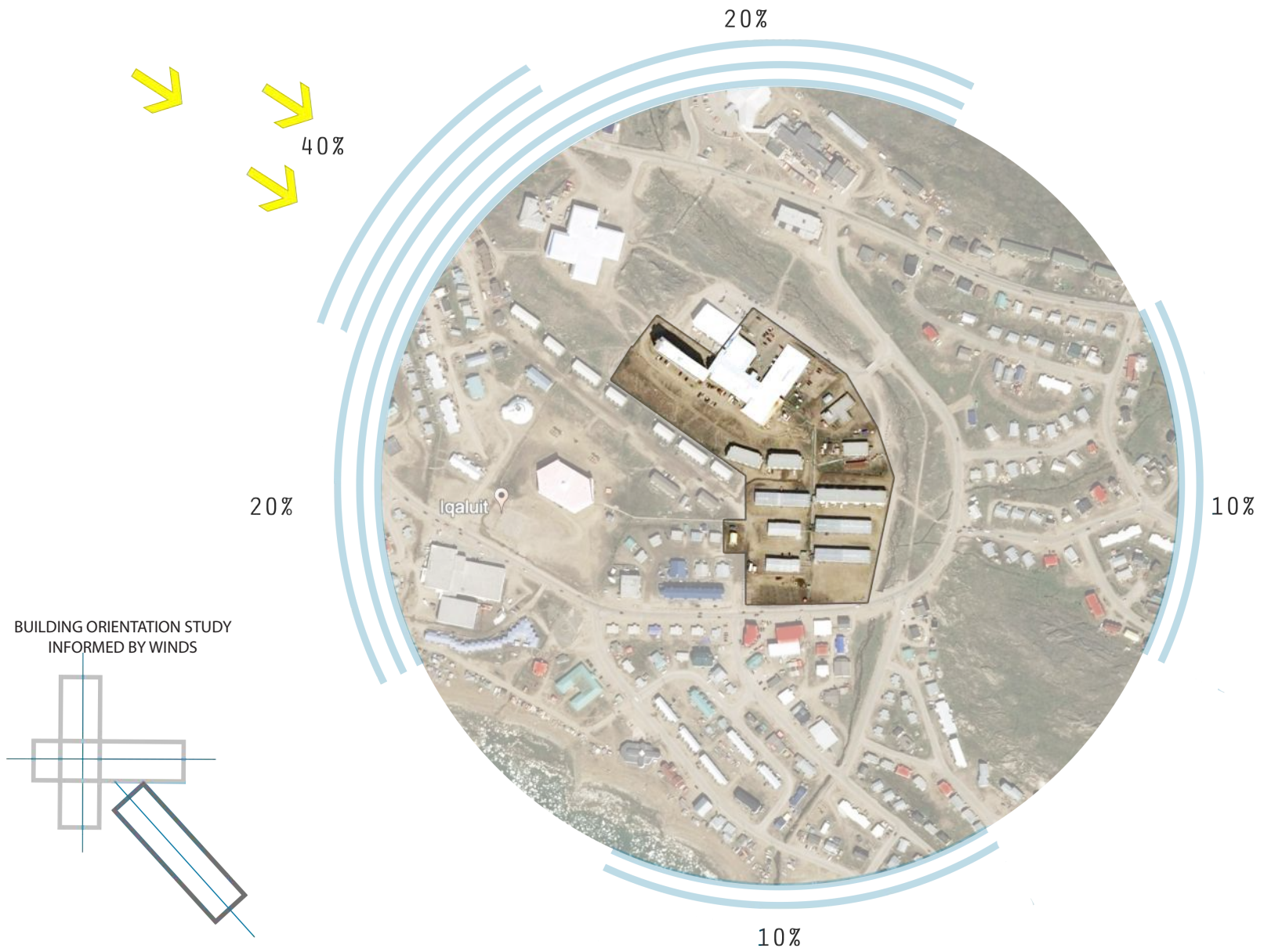
Iqaluit Topographic Overview Map



Slope Analysis on Section A-A

Wind and Snow Drifting

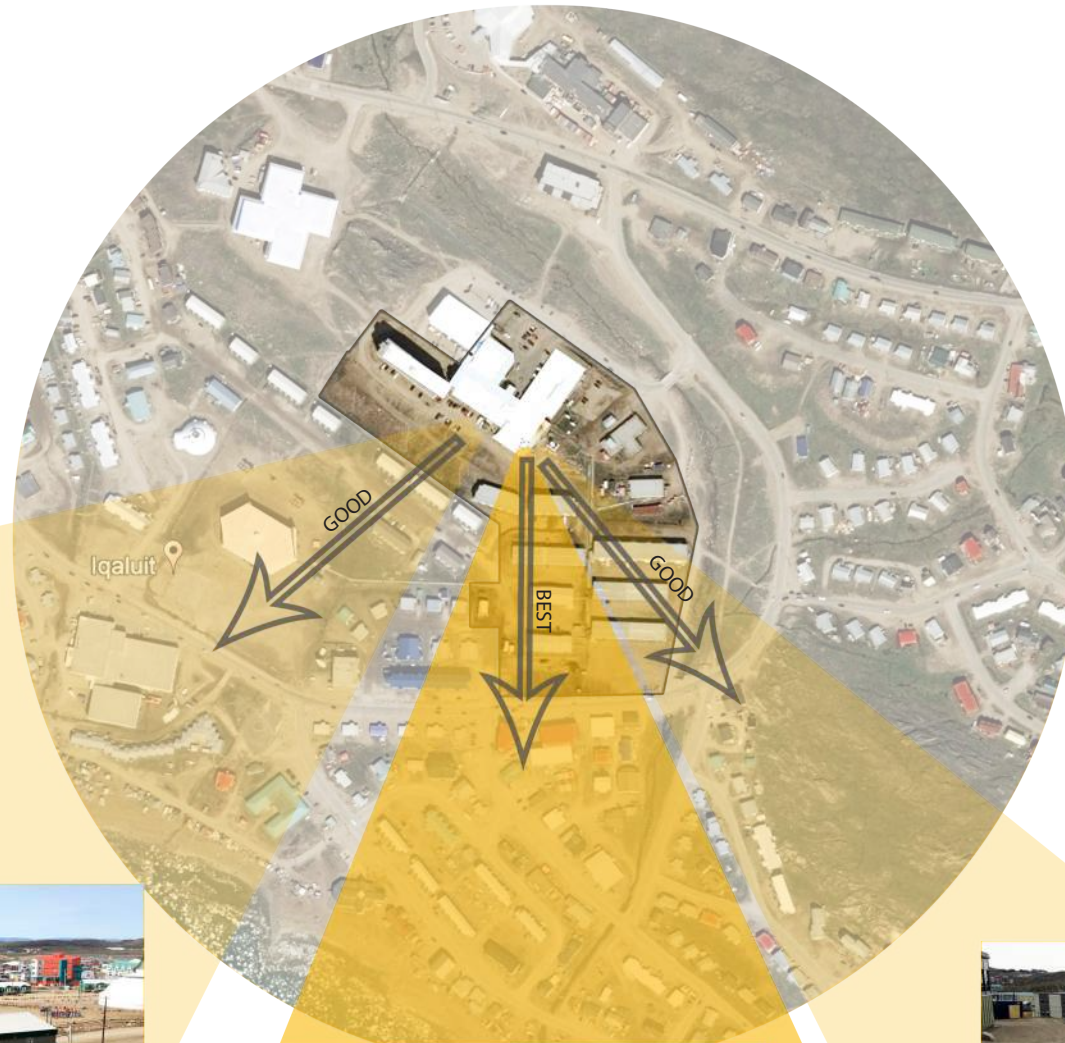
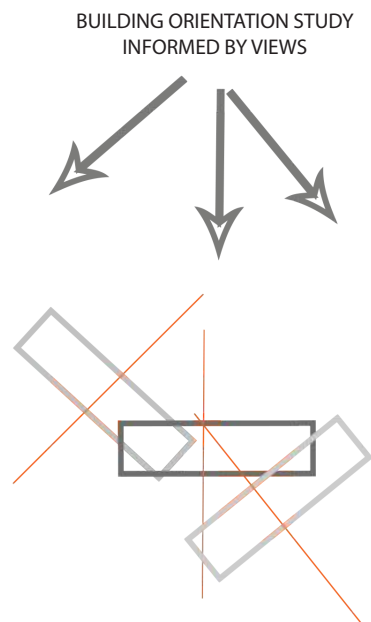
Wind is of critical importance in this environment. Protection from the wind can make all the difference between the weather being pleasant or unbearable. On a sunny day with no wind a temperature of -30 can feel fresh and uplifting. The majority of the winter wind is from the northwest. As a result, the leeward side of a structure is on the south and east side of that object. The best views from the site are also to the south and east. Snow drifts form on the southeast side of structures. It appears that the north faces of buildings typically get wind scoured and do not have drifting problems. On the south side of buildings snow accumulates as it flows over roofs. Drifting issues can be reduced by orienting buildings in line with the predominant wind direction.



Winds Diagram and Map

## Views and Vistas

The site offers remarkable views of the Inlet directly south, as well as good, open views in almost all other directions, including towards the creek. The least attractive view looks towards the west.



**Open Space**

The enhancement and effective handling of open space in Iqaluit is challenging. In Iqaluit the differentiation between public and private space is blurred for cultural, practical and environmental reasons. Spatial definition in the Arctic environment requires a different framework that places emphasis on the relationships between buildings and spaces. Functionally and visually, an open space can only be discerned by the presence of buildings and a clearly understood relationship between the spaces and the buildings; otherwise, it is simply extra space or unused space that belongs to the greater landscape.

In Iqaluit, the steep slopes of the hill and the land adjacent to the creek are the perceived open spaces that cross cultures. This open space although not continuous provides an opportunity to connect places and bring nature into the City.



Open Space Map



Geraldine Creek in Summer



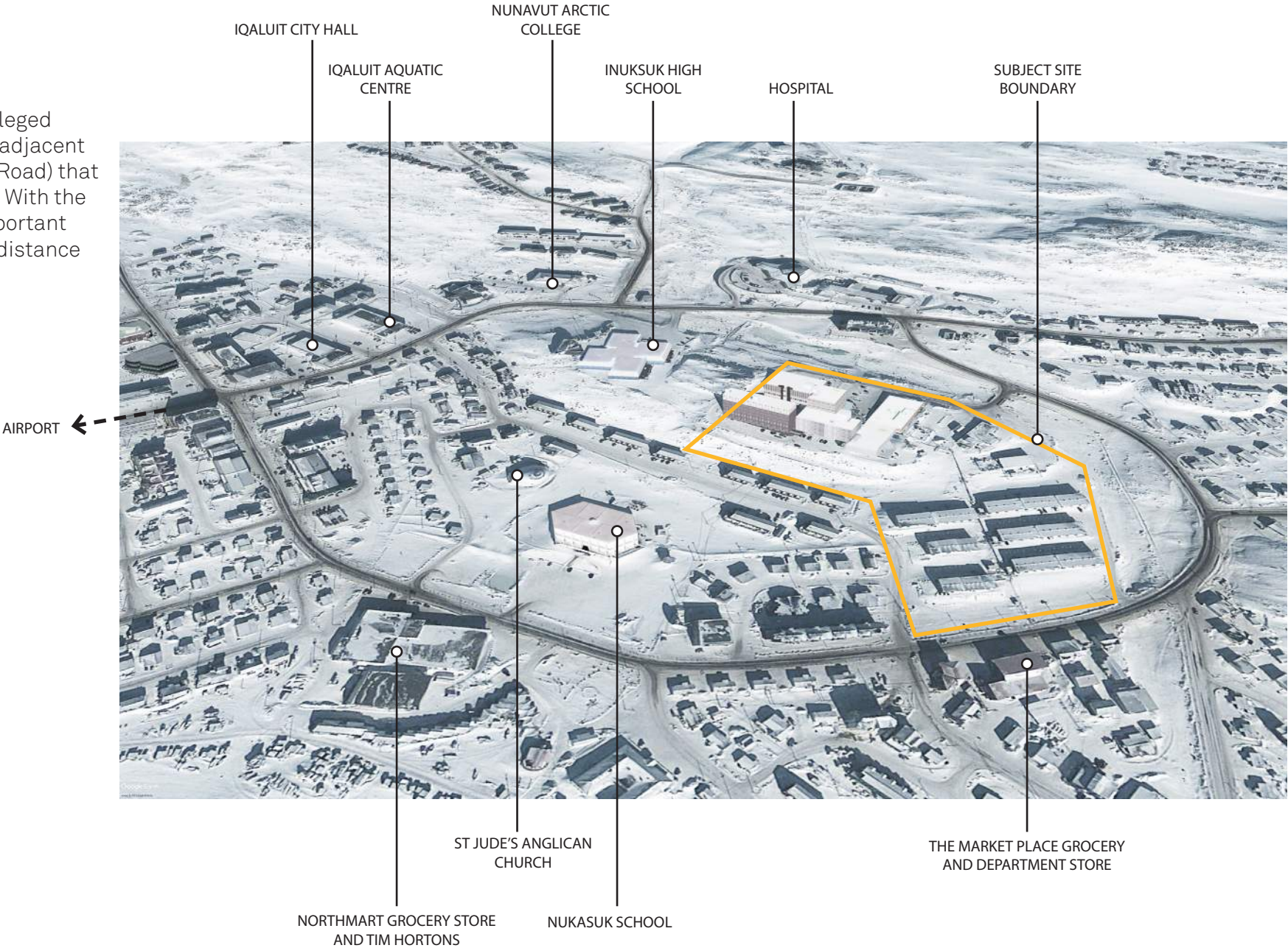
View of Astro Hill from Above



Geraldine Creek in Winter

**Site Context and Landmarks**

The site is located in the Downtown Core in a privileged location that overlooks the city centre. The site is adjacent to Queen Elizabeth and Niarqunngusariaq (Apex Road) that are two of the most heavily used roads in the City. With the exception of the Iqaluit Airport, all of the most important facilities and spaces in Iqaluit are within walking distance of Astro Hill.



## Density of the Urban Fabric

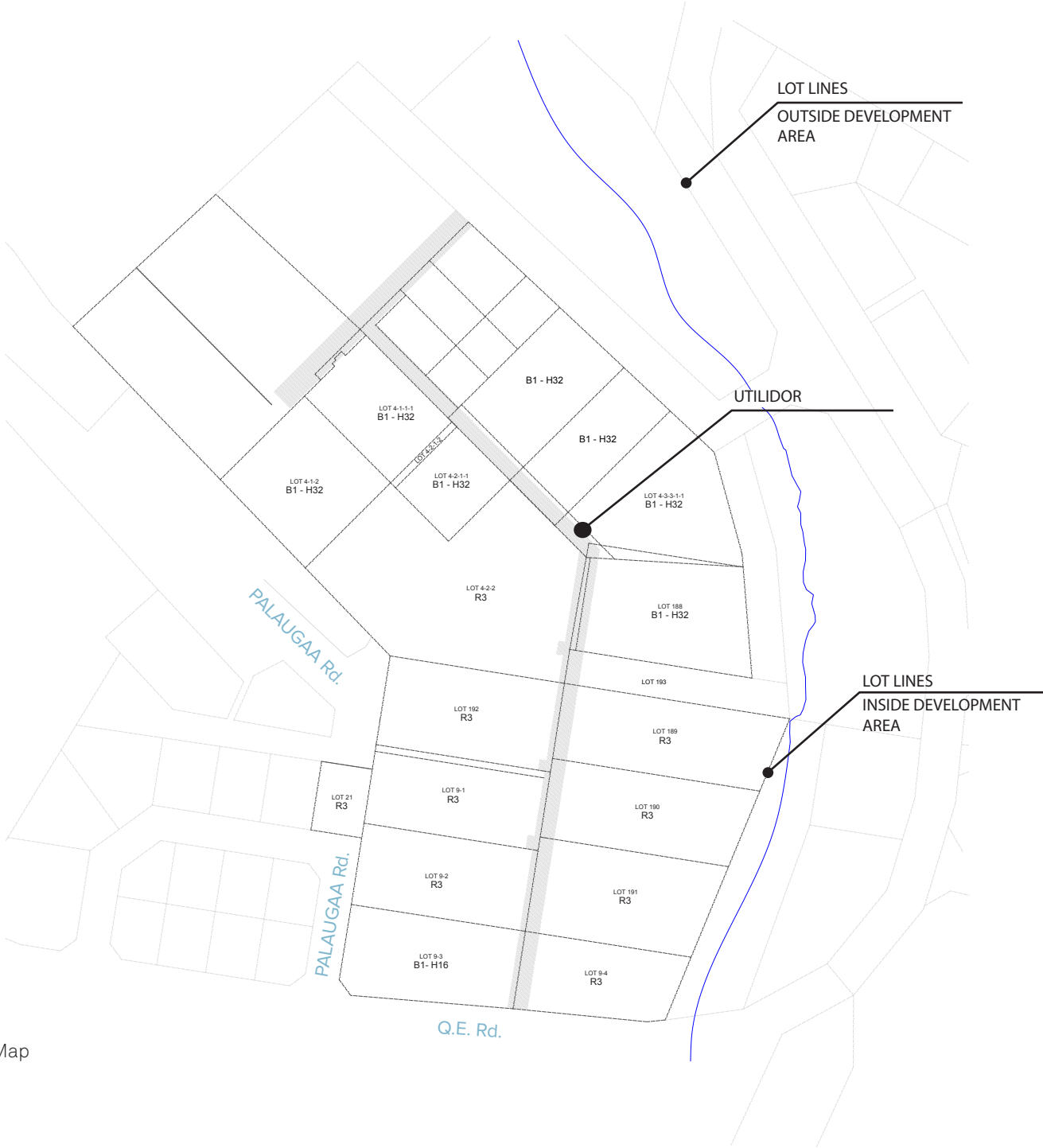
The density of built structures in Iqaluit is low and does not well define the public rooms or spaces between them that is so important for urban life. In an environment like Iqaluit where methods of spatial differentiation are limited buildings are essential for this purpose. The need for density must be balanced with the effects of snow drifting to create an urban form that fits this environment.



Iqaluit Figure Ground Map

**Zoning**

The site is roughly zoned half R3 and half B1. R3 zoning is High Density Residential. In this zone buildings can be up to 4 storeys in height. The portion of the site located at the higher elevations are zoned as B1(H32). This zone is the Central Business Zone and buildings can be up to 8 storeys in height. One site located on Queen Elizabeth is zoned B1(H16) with a maximum allowable height of 4 storeys. Lot 21, zoned R3 that is adjacent to the west R3 sites was purchased so that Palaugaa Road can be rerouted from where it presently impedes on one of the developable sites in the lower area.



Subject Site Parcel Map

**Pedestrian Circulation**

During the winter in Iqaluit pedestrians typically stay to maintained pathways, sidewalks or share the road with vehicles. Snow drifting and snow piling create barriers to pedestrian movements. Main streets often have snow piled adjacent to them that creates a desirable barrier between pedestrians and traffic. Apart from wind blown open landscapes, pathways that are maintained are more conducive to walking because of the snow drifting that occurs. Maintained pedestrian routes need to be direct and properly constructed to allow for snow clearing.

Due to the open nature of the landscape pedestrian circulation is diverse in the summer months. The creek acts as a barrier to pedestrians in the summer with only a few designated and developed crossings. There are some primary circulation routes (desire lines) that can be identified in vegetated areas.



Pedestrian Circulation Map

## Vehicular Circulation

Vehicular circulation on and off site is a considerable issue for development at Astro Hill. Vehicle use is on the increase and the existing road infrastructure is not sufficient to keep up with demand. The majority of people travel by car especially during the winter months. Snow drifting and accumulation are critical considerations for the design of roads and parking.

Fire access to the upper Hotel portion of the site has been identified as being insufficient. Future development needs to address access for fire and emergency vehicles in the layout of the site and placement of buildings.



Vehicular Circulation Map

# HIGHLIGHTS OF THE PLAN



## Key Successes of the Plan



### Urban Centre

Astro Hill is a community within a community. The proposed Master Plan builds upon the prestigious and strategic location of the hotel complex at the apex of a hill overlooking the City. The hotel complex acts as a commercial centre with higher density, walkable, residential development supporting it. The site's location within the downtown also supports the City's commercial centre.



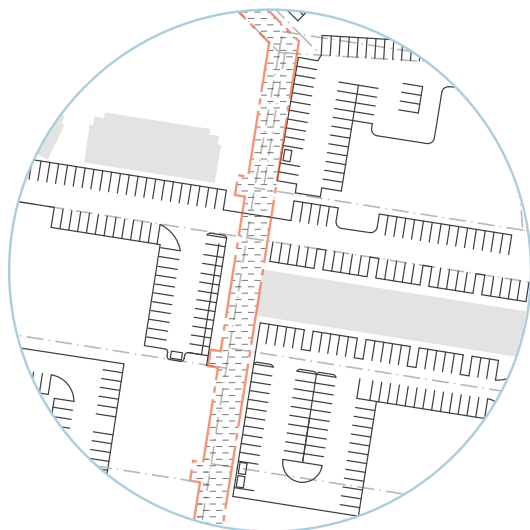
### Urban Density

The proposed Master Plan has met the allowable density of development identified by the current City Bylaws. The master plan has shown that sufficient surface parking can be provided in most lots to also meet the requirements.



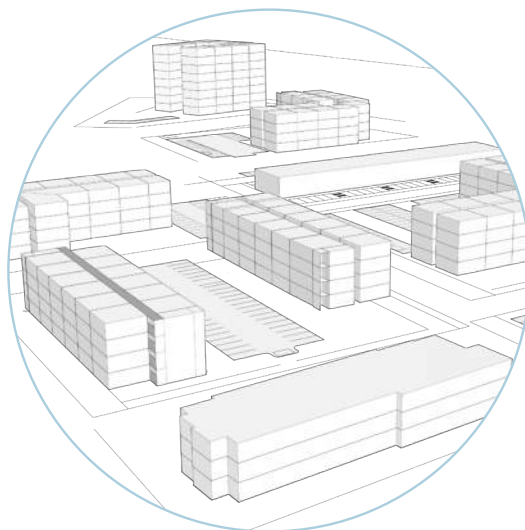
### Walkability

The proposed Master Plan has considered and addressed the importance of walkability in the plan. Major and minor pedestrian routes were considered fundamentally in the planning process. The plan has achieved a hierarchy of social spaces where formal or informal social interactions can occur.



### Vehicle Access and Parking

Fire access around the hotel complex and to other development sites has been identified in the Master Plan. A strategy for accessing landlocked land parcels was developed. No landlocked parcels are necessary because of the plan. Private roadways are intended to be multimodal with shared access by pedestrians and vehicles. Where appropriate or desirable additional pedestrian routes are provided. The plan identifies sufficient parking to meet the requirements of 1 stall per 2 units identified for residential development in the Bylaws. It is difficult to predict the commercial parking requirements but there appears to be sufficient area for parking.



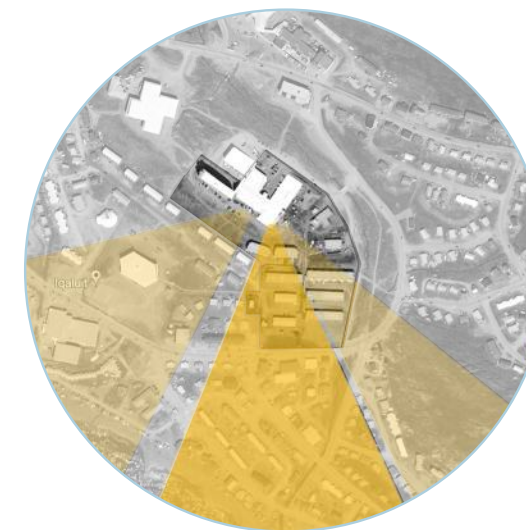
### Building Massing and Public Space

The proposed arrangement of buildings creates interesting public and private spaces around them. Spaces seem to flow continuously and are well defined. Semi private social spaces are located mostly on the south and east sides of buildings protected from the wind with great views.



### Street Oriented Design

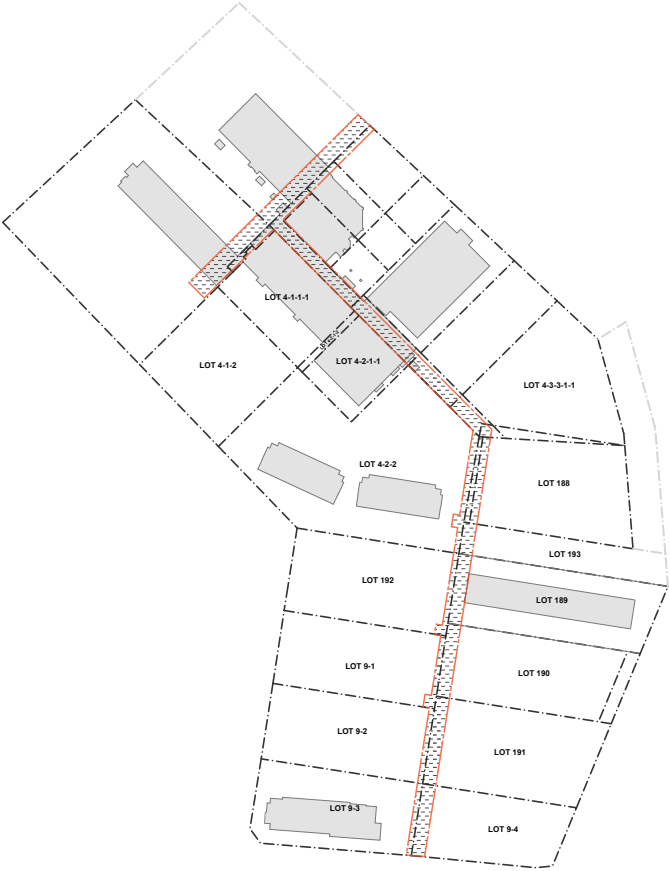
The layout of building masses not only defines the outdoor social spaces within the private sites, but they also better define the streets that they are adjacent to. The plan locates parking in the back of lots close to buildings. Parking is in close proximity to building entrances for easy access. Buildings oriented to the streets also allow for “eyes on the street” that creates safer outdoor spaces. By orienting the buildings toward the creek more value is given to this natural resource.



### Views and Topography

The proposed Master Plan has been developed to take advantage of the topography and great vistas. Buildings step up the hill and increase in height to maximize the views of the Bay and creek. Maximizing these views has been a key principle throughout the design. Views of the Bay and the creek have been paramount in the plan’s organization. Placing taller buildings at the top of the slope also emphasizes the scale of the development.

# Masterplan Process

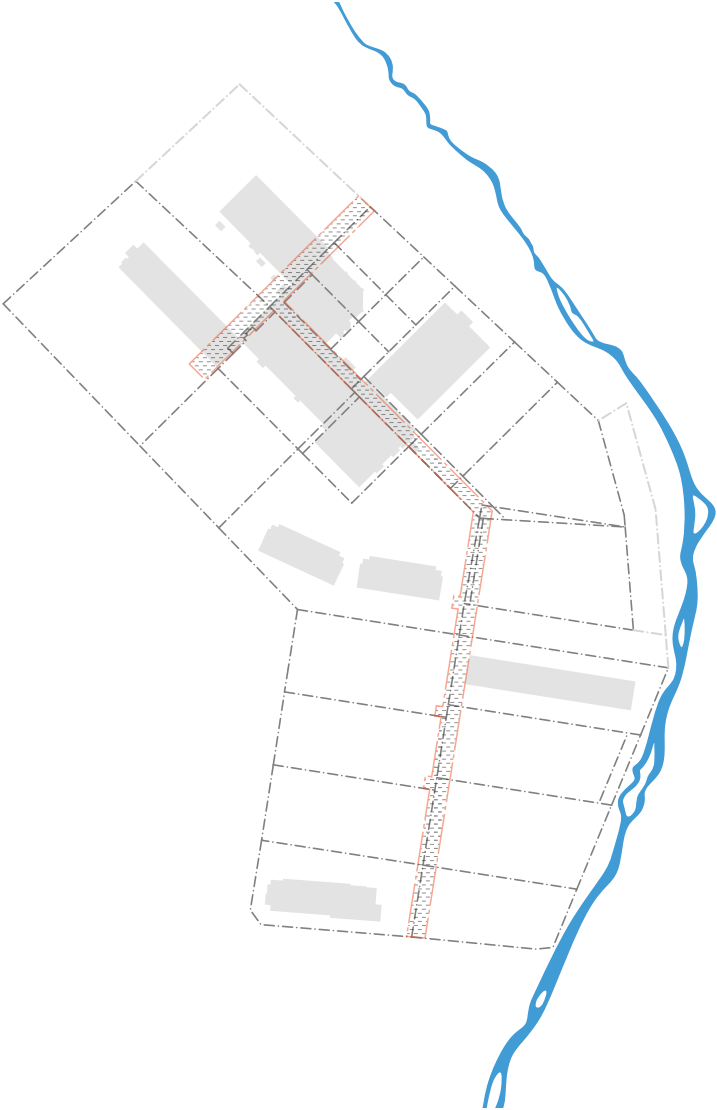


## The Site Conditions

The project site is made up of a number of lots that have been subdivided over time. The hotel complex and 13 lots below it are the focus for this study. The combined area of the study area is 6.3 Ha.

The hotel complex consists of a number of attached buildings (including the Territory Administration building) that were not anticipated to have major changes to the spatial footprint of the complex. The existing former CBC building is anticipated to be redeveloped largely on the existing structure with the same footprint. Some development may occur on the existing portion of the conference centre building. Existing buildings on lots 4-2-2, 189, and 9-3(B1) were not anticipated to change during the lifetime of this Master Plan.

A major element of the site is the utilidor which subdivides the site. Along with facilitating the utilities for the various sites this corridor is also presently and has historically been used for pedestrian circulation. As the utilidor becomes redundant as new buildings are made self sufficient (not requiring the use of Utilidor), the corridor will evolve more into an open space.



## Geraldine Creek

The full value of Geraldine Creek has not been appreciated historically in the development of Iqaluit. The Master Plan takes advantage of the sites situation along this unique and beautiful natural feature. Buildings are orientated towards the creek to benefit from this physical and visual amenity. The creek is a central organizing element in the Master Plan as access points and circulation routes branch off from here. As a primary circulation route from the top of the site to the bottom, the creek edge will be used by both pedestrians and vehicles.



## Pedestrian Circulation

The Astro Hill Master Plan has created a walkable development that achieves one of the primary principles for the project. Pedestrian circulation on and off site were developed based on functional and practical aspects of the site. The routes are as short as possible from one place to another but they have also avoided snow pile locations and locations of regular drifts. The utilidor and the creek are two significant organizing features of the site circulation.



## Parking

Parking is a significant impact on site planning in Iqaluit. City requirements of 1 stall for each two units and rental agreements with third parties for 1 stall for each unit were important considerations in the planning. The plan has anticipated the critical spatial requirements of surface parking. The area required for parking and the left over space for buildings were balanced during planning. The environmental considerations of wind and snow drifting were considered when parking was being located. The environmental aspects were balanced with the social aspects of where parking is located in relation to the street and the residences.



## Buildable Areas

Identifying the most appropriate location and the size of the areas where buildings can occur were fundamental to the Master Plan. The size of the building did not come at the expense of parking nor did the location impact the circulation or ignore the Creek as an important amenity.



## Social Spaces and Buildings

Identifying opportunities for outdoor social interaction is important in Iqaluit. These spaces were located to take advantage of amazing views and the sun. Protection from the wind was of primary importance. Buildings can be designed to accommodate the development of successful outdoor social spaces. The buildings need to be simple, functional and conform practically to their use. The height of the buildings is driven by the need for economic sustainability where density helps not only at the private land owner scale but at the civic scale as well, in providing much needed housing and commercial services.

Master Plan

The proposed Master Plan for the Astro Hill site was developed in a iterative process of looking at each individual lot as well as the entire neighborhood. The result is a cohesive plan that achieves maximum benefits for individual lots, the neighborhood as a whole and for the City.

Astro Hill Master Plan

Scale 1:2500

LEGEND

▷ Building entrance

Primary building orientation

Secondary building orientation

Pedestrian Circulation network

Pedestrian circulation indoor

Off-site pedestrian circulation

Major social space

Social space

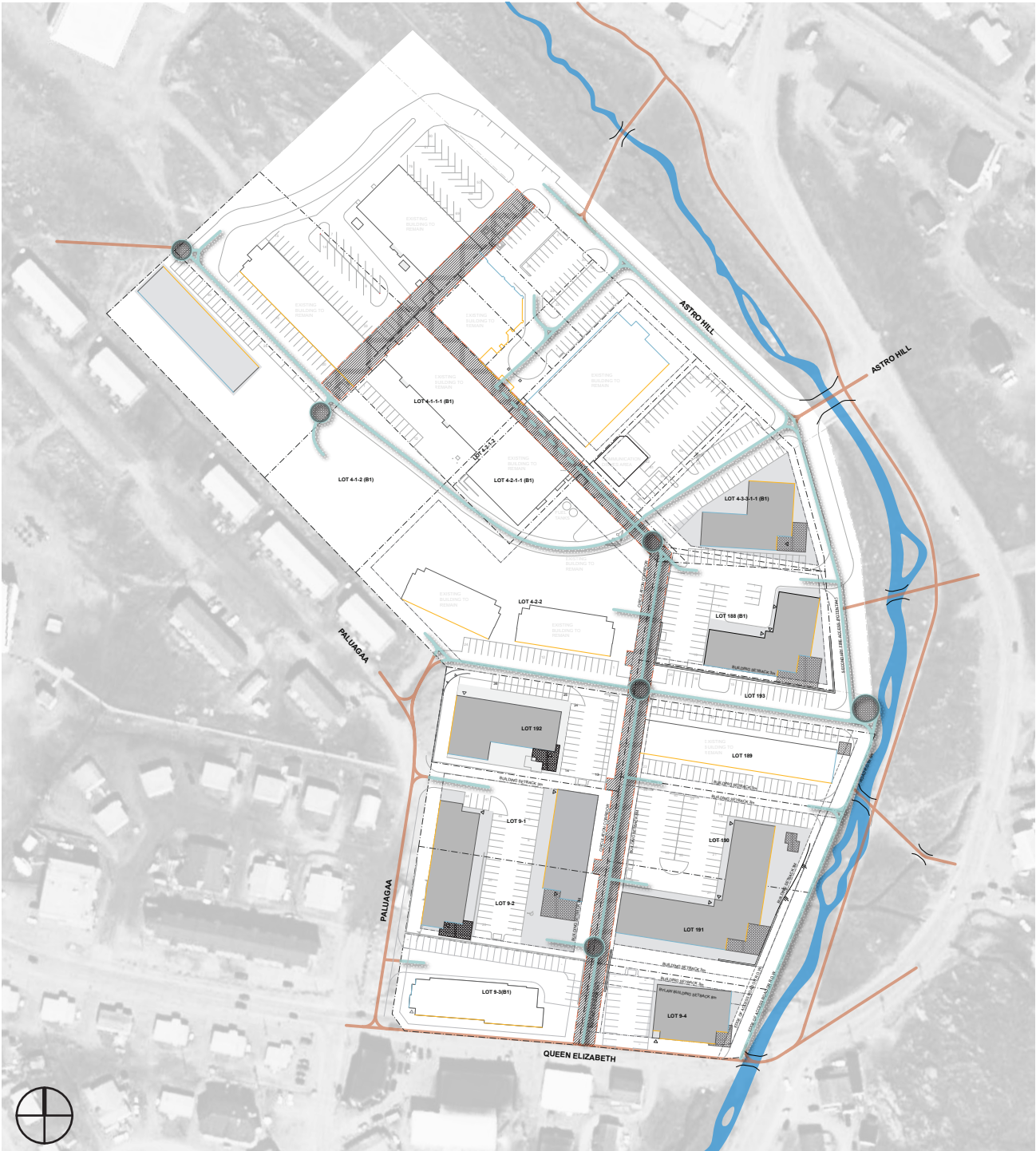
Private outdoor social space

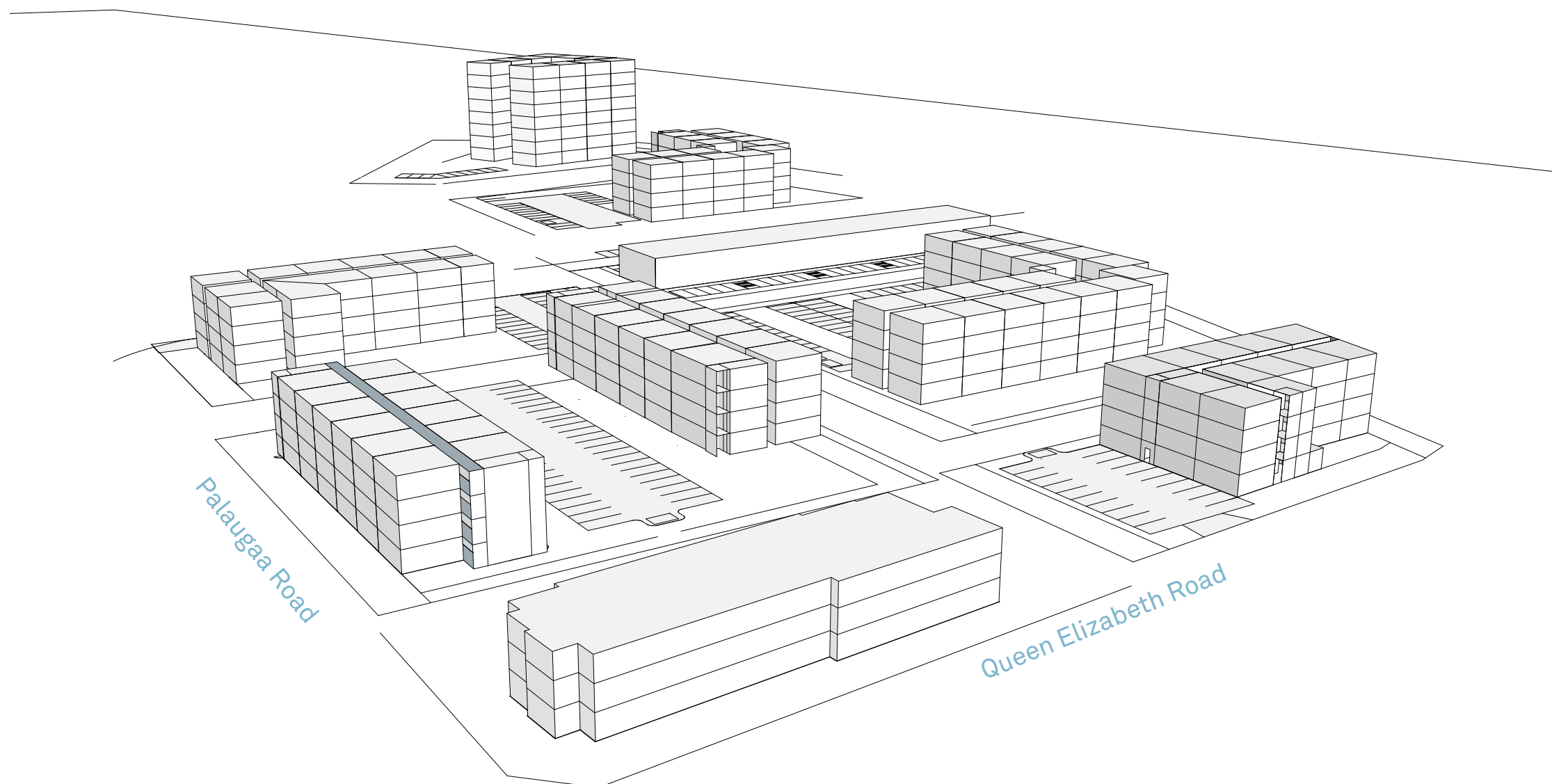
Retaining wall (potential)

Garbage enclosure (potential)

Proposed building layout

Buildable area





Master Plan Massing Model

By the Numbers



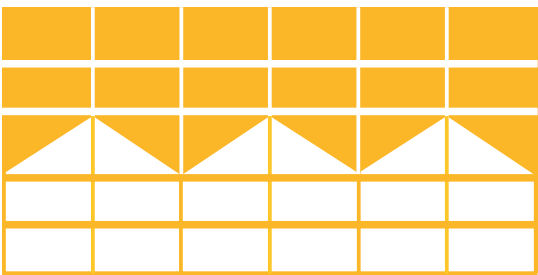
**Mix of Uses**

20% Commercial  
80% Residential



**Walkable Development**

A network of pedestrian trails creates a walkable environment and connects to the existing trail system.



**Development Density**

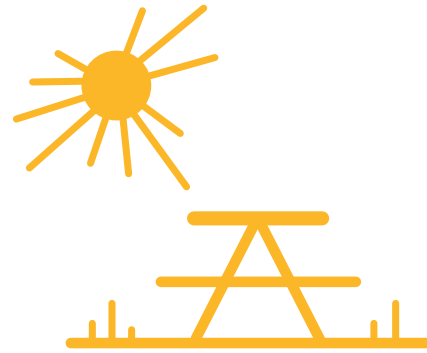
Following the redevelopment of the Astro Hill neighborhood, the number of units will increase from the existing 360 to approximately 590 to 650 units, achieving a density of 93 units/ha.



### **Parking**

Approximately 594 proposed parking stalls, creating a ratio of:

1 parking stall for 1.2 units



### **Social Spaces**

6 outdoor public social spaces proposed

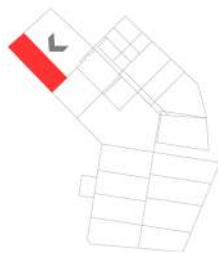


### **Creekside Development**

300m of Creekside redevelopment

Lot-by-Lot Analysis

LOT Test site ()  
Upgrade



Gross lot area  
1970.14 m²

Buildable area  
1000 m²



Max. building height allowed  
n/a

Proposed building - height  
2-storeys

Maximum allowed units: n/a

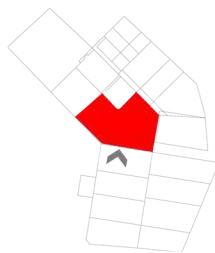
Number of proposed units: tbd

Parking stalls req'd (visitor)  
tbd

Parking stalls proposed  
17

Parking stalls w/power

LOT 4-2-2(R3)  
Upgrade



Gross lot area  
7251.27 m²

Existing building area  
2362.53 m²



Max. building height allowed  
4-storeys

Existing building - height  
2-storeys

Number of existing units:

Number of units allowed:

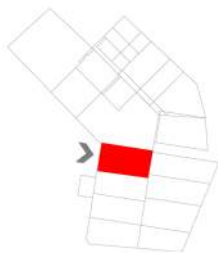
Parking stalls req'd (visitor)

Parking stalls proposed  
24

Parking stalls w/power

Allowed uses: fourplex dwelling, row dwelling, six-plex, stacked row dwelling, apartment dwelling, day care centre, home based business, residential care facility

LOT 192(R3)



Gross lot area  
3129.31 m²

Net buildable area  
1458.69 m²



Maximum units allowed: 47

Units proposed: 52

Max. building height allowed  
15m, 4-storeys

Building height proposed  
15m, 4-storeys

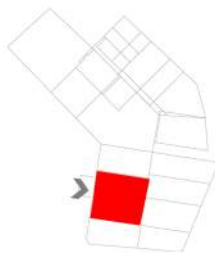
Parking stalls req'd (visitor)  
27+(2)=29

Parking stalls proposed  
33+(3)=36

Parking stalls w/power

Allowed uses: fourplex dwelling, row dwelling, six-plex, stacked row dwelling, apartment dwelling, day care centre, home based business, residential care facility

LOT 9-1+9-2(R3)



Gross lot area  
5613.06 m<sup>2</sup>

Net buildable area  
2726.20 m<sup>2</sup>



Maximum units allowed: 85

Units proposed: 88

Max. building height allowed  
15m, 4-storeys

Building height proposed  
15m, 4-storeys



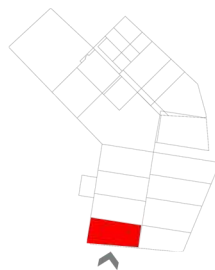
Parking stalls req'd (visitor)  
46+(4)=50

Parking stalls proposed  
41+(3)=44

Parking stalls w/power

Allowed uses: fourplex dwelling, row dwelling, six-plex, stacked row dwelling, apartment dwelling, day care centre, home based business, residential care facility

LOT 9-3(BI)



Gross lot area  
2924.37 m<sup>2</sup>

Existing building area  
850.50 m<sup>2</sup>



Max. building height allowed  
4-storeys

Existing building - height  
2-storeys



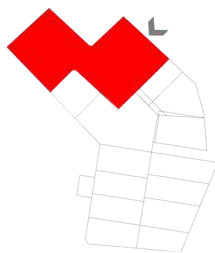
Parking stalls req'd (visitor)  
17+(1) = 18

Parking stalls proposed  
29

Parking stalls w/power

Allowed uses: Automotive gas bar, bank, business services, community centre, custom workshop (ancillary to a permitted use), day care centre, eating or drinking establishment, educational facility, emergency and protective services, home-based business, hotel, office, parking lot, personal service establishment, place of assembly, research and development centre, retail store, shelter, studio, undertaker's establishment.

LOT Hotel (BI/h32)



Gross lot area  
tbd m<sup>2</sup>

Existing building area  
tbd m<sup>2</sup>



Max. building height allowed  
8-storeys

Existing building - height  
5-storeys

Number of existing units: 95

Number of proposed units: +32



Parking stalls req'd (visitor)  
n/a

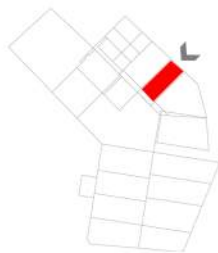
Parking stalls proposed  
156

Parking stalls w/power

Allowed uses: Automotive gas bar, bank, business services, community centre, custom workshop (ancillary to a permitted use), day care centre, eating or drinking establishment, educational facility, emergency and protective services, home-based business, hotel, office, parking lot, personal service establishment, place of assembly, research and development centre, retail store, shelter, studio, undertaker's establishment.

Lot-by-Lot Analysis

LOT Theatre(BIh32)  
Upgrade



Gross lot area  
2457.91 m²

Existing building area  
1517.60 m²



Max. building height allowed  
8-storeys

Parking stalls req'd (visitor)  
n/a

Existing building - height  
2-storeys

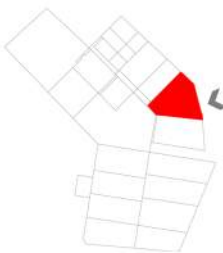
Parking stalls proposed  
43

Number of existing units: 0

Parking stalls w/power

Number of proposed units: +32

LOT 4-3-3-I-I (BI/h32)



Gross lot area  
3097 m²

Net buildable area  
1512.50 m²



Maximum units allowed: n/a

Parking stalls req'd (visitor)  
n/a

Units proposed: 80

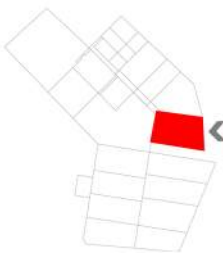
Max. building height allowed  
32m, 8-storeys

Parking stalls proposed  
40

Building height proposed  
32m, 8-storeys

Parking stalls w/power

LOT 188(BI/h32)



Gross lot area  
3637.17 m²

Net buildable area  
1336.98 m²



Maximum units allowed: n/a

Parking stalls req'd (visitor)  
n/a

Units proposed: 75

Max. building height allowed  
32m, 8-storeys

Parking stalls proposed  
31

Building height proposed  
32m, 8-storeys

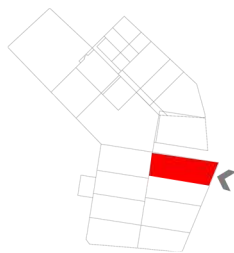
Parking stalls w/power

Allowed uses: Automotive gas bar; bank; business services; community centre; custom workshop (ancillary to a permitted use); day care centre; eating or drinking establishment; educational facility; emergency and protective services; home-based business; hotel; office; parking lot; personal service establishment; place of assembly; research and development centre; retail store; shelter; studio; undertaker's establishment.

Allowed uses: Automotive gas bar; bank; business services; community centre; custom workshop (ancillary to a permitted use); day care centre; eating or drinking establishment; educational facility; emergency and protective services; home-based business; hotel; office; parking lot; personal service establishment; place of assembly; research and development centre; retail store; shelter; studio; undertaker's establishment.

Allowed uses: Automotive gas bar; bank; business services; community centre; custom workshop (ancillary to a permitted use); day care centre; eating or drinking establishment; educational facility; emergency and protective services; home-based business; hotel; office; parking lot; personal service establishment; place of assembly; research and development centre; retail store; shelter; studio; undertaker's establishment.

**LOT 189**(R3)  
Upgrade



Gross lot area  
3288.23 m<sup>2</sup>

Existing building area  
1128.07 m<sup>2</sup>



Max. building height allowed  
4-storeys

Parking stalls req'd (visitor)  
12+(1) = 14

Existing building - height  
2-storeys )

Parking stalls proposed  
49

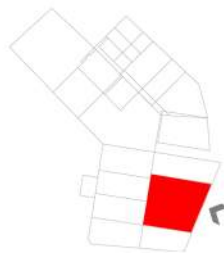
Number of existing units: 24

Parking stalls w/power

Number of units allowed: 49

Allowed uses: fourplex dwelling, row dwelling, six-plex, stacked row dwelling,  
apartment dwelling, day care centre, home based business, residential care facility

**LOT 190+191**(R3)



Gross lot area  
6516.30 m<sup>2</sup>

Net buildable area  
2983.93 m<sup>2</sup>



Maximum units allowed: 98

Parking stalls req'd (visitor)  
42+(6)=48

Units proposed: 84

Parking stalls proposed  
53+(6)=59

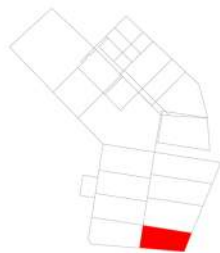
Max. building height allowed  
15m, 4-storeys

Parking stalls w/power

Building height proposed  
15m, 4-storeys

Allowed uses: fourplex dwelling, row dwelling, six-plex, stacked row dwelling,  
apartment dwelling, day care centre, home based business, residential care facility

**LOT 9-4** (R3)



Gross lot area  
2317.40 m<sup>2</sup>

Gross buildable area  
1459.50 m<sup>2</sup>



Maximum units allowed: 35

Parking stalls req'd (visitor)  
17+(3)=20

Units proposed: 32

Parking stalls proposed  
19+(3)=22

Max. building height allowed  
15m, 4-storeys

Parking stalls w/power

Building height proposed  
15m, 4-storeys

Allowed uses: fourplex dwelling, row dwelling, six-plex, stacked row dwelling,  
apartment dwelling, day care centre, home based business, residential care facility

## Placemaking Elements

Nunastar has an opportunity to shape the brand of not only Astro Hill but also Iqaluit. Creating a menu of site features that are regularly used within the development will help differentiate Astro Hill from others. Selecting materials and techniques that support the Astro Hill brand is a great opportunity. Because the City has not yet undertaken this exercise this leaves an opportunity to set the stage for the neighborhood, the City and other developments. The following are potential features and the qualities that should be considered.



### Furnishings

The look and quality of the site furnishings provided for public use on a site can have an incredible effect on how that place is perceived. In Iqaluit public features need to be robust and secure and should give a sense of being inviting and warm. Natural materials like stone and wood will fit with the landscape while bright primary colours will provide a contrast that is fresh, but reflective of the Inuit art tradition.

### Spatial Markers

Spatial markers are a valuable tool to define space in an environment like Iqaluit that does not support the growth of trees or shrubs. These markers can define the edges of roads, a pathway, parking stalls or trail heads. They must be robust and able to withstand impacts from vehicles and snow being blown off roads. Metal and stone are appropriate materials.



source: architect.com



source: pinterest.com



source: pinterest.com



source: gardenista.com



source: pinterest.com

## Retaining Walls

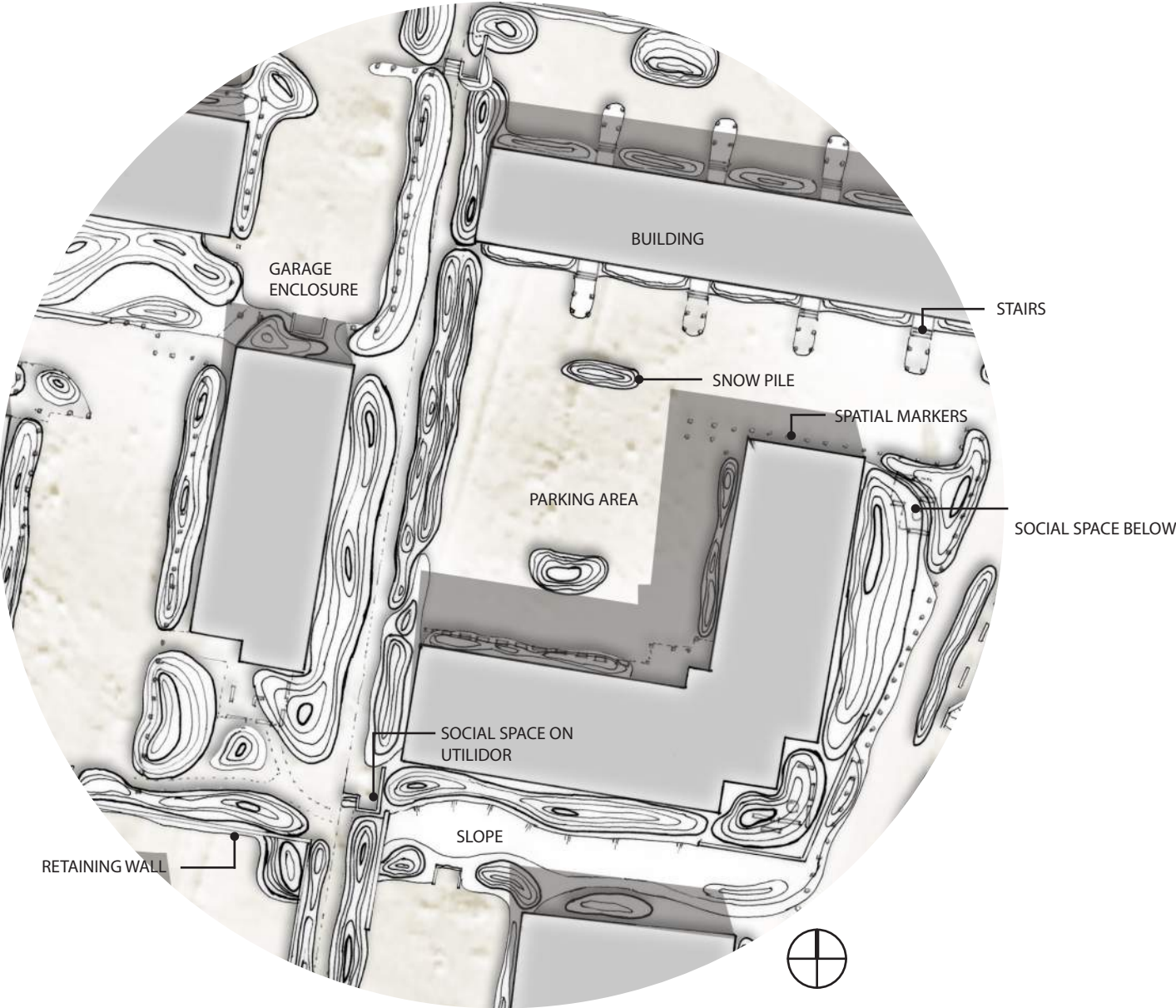
Retaining walls play an important part in defining space in the north. Retaining walls need to be able to facilitate hydrostatic pressure caused by the significant amount of ground water found near the surface. Concrete products are economically unfeasible and timber is also difficult to source. While gabion baskets filled with local stone have been used in Iqaluit they have not been well executed. Angular retaining walls made from a variety of materials like Corten steel or cast-in-place concrete could evoke the angles found in the ice and rocks of the landscape.

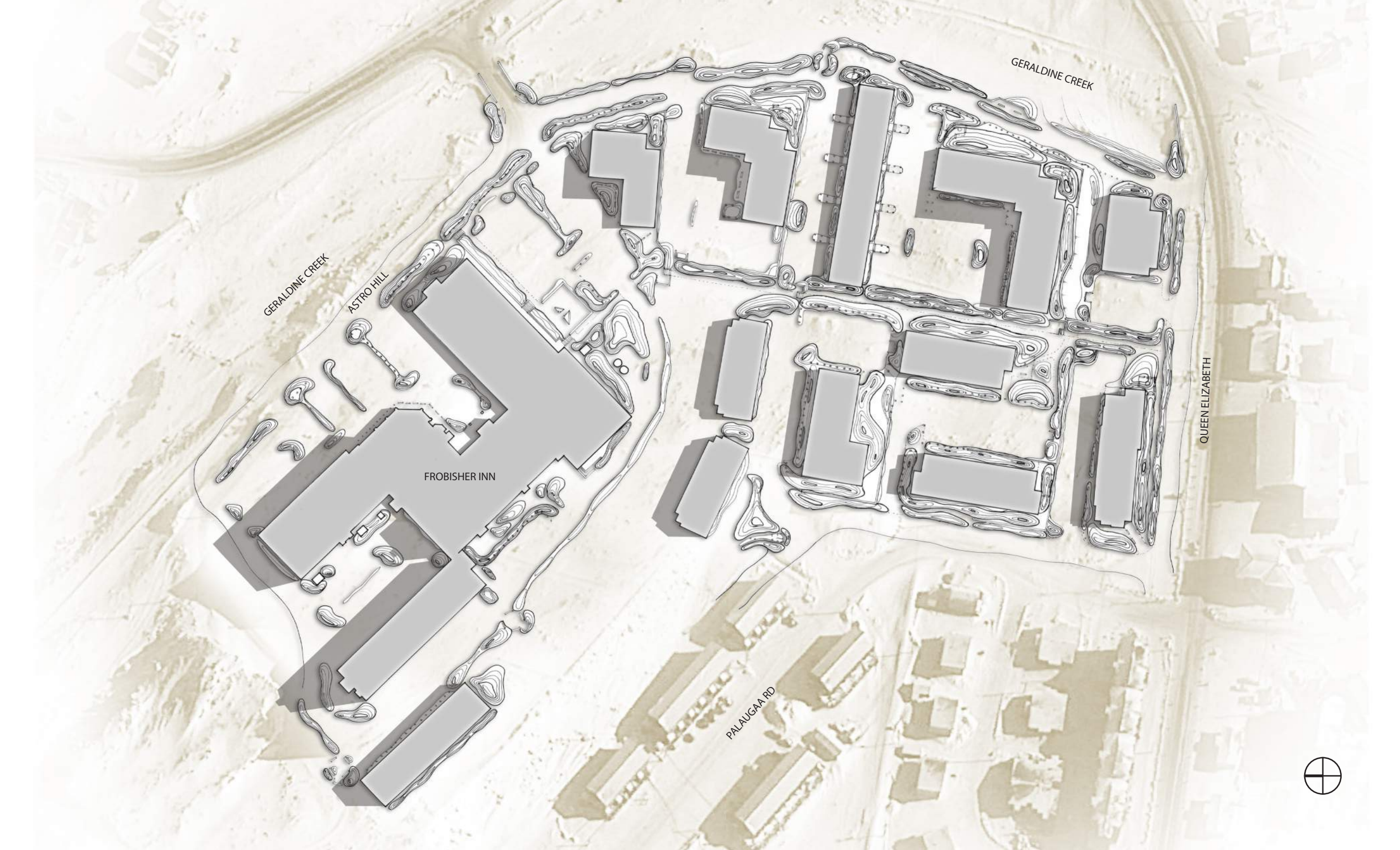
## Surface Treatments

In an open landscape with environmental conditions like Iqaluit using surface treatments to define space is very valuable. Like a rug in a room the texture on the ground can change behavior and identify where one use ends and another begins. Given the difficulty of re-establishing natural vegetation like tundra using stone products can be very useful. Different textures and colours of stone can be used.

# Illustrative Vision Plan

The Illustrative Plan is a graphical depiction of the Master Plan for the physical environment. It is the accumulation of all the various physical aspects of the neighborhood, including but not limited to circulation, open space, buildings, etc. The illustrative plan is the comprehensive look at all the components in a total environment.





GERALDINE CREEK

ASTRO HILL

FROBISHER INN

GERALDINE CREEK

QUEEN ELIZABETH

PALAUGA RD





Source: <http://discovery.cathaypacific.com/en/epic-trip-to-svalbard/>



Conceptual Visualization of the Public Realm Concept



## Appendix D

### *City of Iqaluit Sewer Network Capacities 2020*

CITY OF IQALUIT

*Astro Hill Infrastructure Upgrades Preliminary  
Design Study: Options Analysis – Desktop Review  
Report*

May 2022 – 21-2987





## Appendix E


### *Opinion of Probable Costs*

CITY OF IQALUIT


*Astro Hill Infrastructure Upgrades Preliminary  
Design Study: Options Analysis – Desktop Review  
Report*

May 2022 – 21-2987



<div>OPINION OF PROBABLE COST</div> <div>CLASS D</div> <div>Astro Hill Utilidor Replacement -Option #1</div> <div>Replacement of Existing North/South Corridor</div>				<div>PREPARED FOR:</div> <div>City of Iqaluit</div>		<div></div> <div>Estimate By: Lawrence Meaney</div> <div>Checked By: Steven Greeley</div> <div>Project No: 21-2987</div> <div>Date: May 31, 2022</div>	
ITEM	DESCRIPTION	QUANTITY		UNIT COST	TOTAL	EXTENDED TOTALS	
		NUMBER	UNIT				
	Utilidor Replacement Services						
1	Mobilization	1	L.S.	\$160,000.00	\$160,000.00		
2	Demobilization	1	L.S.	\$160,000.00	\$160,000.00		
3	Pre-Fab Steel Access Vaults						
	.1 Supply and Delivery	8	ea	\$158,000.00	\$1,264,000.00		
	.2 Installation	8	ea	\$26,000.00	\$208,000.00		
	.3 Install New Bollards	32	ea	\$2,600.00	\$83,200.00		
4	Sanitary Sewer						
	.1 Supply & Install New HDPE DR 11 Sanitary Sewer	160	m	\$1,000.00	\$160,000.00		
5	Water Main						
	.1 Supply & Install New HDPE DR 11 Water Main	530	m	\$1,200.00	\$636,000.00		
6	Services						
	.1 Reconnect Water Service Connections to Existing Dwellings	6	each	\$16,000.00	\$96,000.00		
7	Trenching						
	.1 Mains						
	.1 Single Pipe	375	m	\$1,200.00	\$450,000.00		
	.2 Double Pipe	155	m	\$1,000.00	\$155,000.00		
	.2 Services						
	.1 Single Pipe	0	m	\$700.00	\$0.00		
	.2 Double Pipe	60	m	\$800.00	\$48,000.00		
8	Roadway/Driveway Reinstatement						
	.1 Granular 'A'	240	m <sup>3</sup>	\$185.00	\$44,400.00		
	.2 Ditch Reinstatement	0	m	\$10.00	\$0.00		
	General						
9	Allowance for Watermain Work required underneath Astro Hill Complex	1	L.S.	\$200,000.00	\$200,000.00		
10	Temporary Utilities/Bypass	1	L.S.	\$200,000.00	\$200,000.00		
11	Removal of fences/stairs/ retaining walls along North South Corridor	1	L.S.	\$25,000.00	\$25,000.00		
12	Reinstatement of fences/stairs/retaining walls along North South Corridor	1	L.S.	\$150,000.00	\$150,000.00		
13	Pole Relocation, Shoring, and Bracing	1	L.S.	\$75,000.00	\$75,000.00		
14	Shoring of Electrical Annex Buildings	1	L.S.	\$100,000.00	\$100,000.00		
15	Removal and Reinstatement of Water Re-Circulation Building	1	L.S.	\$250,000.00	\$250,000.00		
	SUBTOTAL (Construction Cost)					\$4,464,600.00	
	CONTINGENCY 20%					\$892,920.00	
	ENGINEERING 12%					\$535,752.00	
	OPINION OF PROBABLE COST (Including Contingency)					\$5,357,520.00	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES, MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF DILLON CONSULTING LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.

<div>OPINION OF PROBABLE COST</div> <div>CLASS D</div> <div>Astro Hill Utilidor Replacement -Option #2</div> <div>Palaugaa Road</div>				<div>PREPARED FOR:</div> <div>City of Iqaluit</div>		<div></div> <div>Estimate By: Lawrence Meaney</div> <div>Checked By: Steven Greeley</div> <div>Project No: 21-2987</div> <div>Date: May 31, 2022</div>	
ITEM	DESCRIPTION	QUANTITY		UNIT COST	TOTAL	EXTENDED TOTALS	
		NUMBER	UNIT				
	Utilidor Replacement Services						
1	Mobilization	1	L.S.	\$160,000.00	\$160,000.00		
2	Demobilization	1	L.S.	\$160,000.00	\$160,000.00		
3	Pre-Fab Steel Access Vaults						
	.1 Supply and Delivery	10	ea	\$158,000.00	\$1,580,000.00		
	.2 Installation	10	ea	\$26,000.00	\$260,000.00		
	.3 Install New Bollards	40	ea	\$2,600.00	\$104,000.00		
4	Sanitary Sewer						
	.1 Supply & Install New HDPE DR 11 Sanitary Sewer	250	m	\$1,000.00	\$250,000.00		
5	Water Main						
	.1 Supply & Install New Insulated HDPE DR 11 Water Main	620	m	\$1,200.00	\$744,000.00		
6	Services						
	.1 Water Service Connections to Existing Dwellings	3	each	\$16,000.00	\$48,000.00		
7	Trenching						
	.1 Mains						
	.1 Single Pipe	370	m	\$850.00	\$314,500.00	pl	
	.2 Double Pipe	250	m	\$1,000.00	\$250,000.00		
	.3 Triple Pipe	0	m	\$1,100.00	\$0.00		
	.2 Services						
	.1 Single Pipe	0	m	\$700.00	\$0.00		
	.2 Double Pipe	100	m	\$800.00	\$80,000.00		
8	Roadway/Parking Area Repair						
	.1 Granular 'A'	400	m <sup>3</sup>	\$185.00	\$74,000.00		
	General						
9	Temporary Utilities/Bypass	0	L.S.	\$200,000.00	\$0.00		
10	Removal of fences/stairs/ retaining walls along North South Corridor	0	L.S.	\$25,000.00	\$0.00		
11	Reinstatement of fences/stairs/retaining walls along North South Corridor	0	L.S.	\$100,000.00	\$0.00		
12	Pole Relocation, Shoring, and Bracing	0	L.S.	\$100,000.00	\$0.00		
13	Shoring of Electrical Annex Buildings	0	L.S.	\$150,000.00	\$0.00		
14	Removal & Reinstatement of Water Re-Circulation Building (N/S CORID	0	L.S.	\$250,000.00	\$0.00		
	SUBTOTAL (Construction Cost)					\$4,024,500.00	
	CONTINGENCY		20%	\$804,900.00			
	ENGINEERING		12%	\$482,940.00			
	OPINION OF PROBABLE COST (Including Contingency)					\$5,312,340.00	

THIS OPINION OF PROBABLE COSTS IS PRESENTED ON THE BASIS OF EXPERIENCE, QUALIFICATIONS, AND BEST JUDGEMENT. IT HAS BEEN PREPARED IN ACCORDANCE WITH ACCEPTABLE PRINCIPLES AND PRACTICES, MARKET TRENDS, NON-COMPETITIVE BIDDING SITUATIONS, UNFORSEEN LABOUR AND MATERIAL ADJUSTMENTS AND THE LIKE ARE BEYOND THE CONTROL OF DILLON CONSULTING LIMITED. AS SUCH WE CANNOT WARRANT OR GUARANTEE THAT ACTUAL COSTS WILL NOT VARY FROM THE OPINION PROVIDED.