

SHADOW STUDY:

1345 Lakeshore Road East, Mississauga

VANDYK Group of Companies

May 2018



Job Number - 1823

1.0 INTRODUCTION

The following information prepared by Bousfields Inc. is to be read in conjunction with the accompanying shadow drawings as well as the architectural drawing set prepared by Kohn Partnership Architects Inc.

Site Latitude and Longitude

The information taken from OpenStreetMap regarding the site of 1345 Lakeshore Road East, Mississauga, Ontario, L4X 1S9 is located at:

Latitude: 43°58'4332"N

Longitude: 79°55'1223"W

Astronomic north was determined by geolocating the 3D model in SketchUp based on OpenStreetMap. The origin of the base plan is from City of Mississauga CAD files, Google Earth satellite imagery, and architectural drawings prepared by Kohn Partnership Architects Inc.

Software Used to Prepare Shadow Analysis

SketchUp Pro was used for 3D work, calculations were done using AutoCad, final composite images were done in Photoshop.

Description of Areas

Residential private outdoor amenity spaces are determined as private rear yards, decks, patios and pools of surrounding residential dwellings (See fig. 1).

Communal outdoor amenity areas are determined as public amenity areas and common outdoor amenity areas that are part of proposed or existing development

Public realm is determined as sidewalks, open spaces, parks and plazas. (See fig. 2).

Turf and flower gardens in public parks within the public realm have not been identified.

Building faces have been identified to allow for possibility of using solar energy (See fig. 4).

The findings of the study are summarized as follows:

RESIDENTIAL PRIVATE OUTDOOR AMENITY SPACES (SECTION 3.1)

Section 3.1 of the Mississauga Urban Design Terms of Reference - Standards for Shadow Studies requires the identification of private outdoor amenity spaces within the vicinity of the proposed development. Areas outlined in teal were identified as private outdoor amenity spaces, including rear yards, decks, patios and pools within 7.5m of the rear wall or other appropriate exterior building wall, known as the line of impact assessment or "no impact zone".

Testing times include June 21st and September 21st to maximize the use of these spaces.

The criteria is met if there is shadow impact for no more than two consecutive hourly test times within the space between the exterior wall of the dwelling that abuts the amenity space and the line of impact assessment.

The shadow analysis demonstrates that Area I located west of the subject site receives shadowing from 7:07 am to 10:15 am, a little over three consecutive hourly test times. Therefore, criteria 3.1 is not met, however it should be noted that Appledale Park is located to the immediate east of Area I and is surrounded by heavy tree planting that cast significant shadow throughout the day (the shadow impact from the existing tree canopy is not accounted for in the 3D context model). Also, it should be noted that while the rear yards of townhouse units are shadowed by the existing tree canopy and by the proposed development, residents also have access to the communal outdoor amenity areas of the complex, which have access to sunlight.

Figure 1 - Residential private outdoor amenity spaces key map identifies all areas in the vicinity.

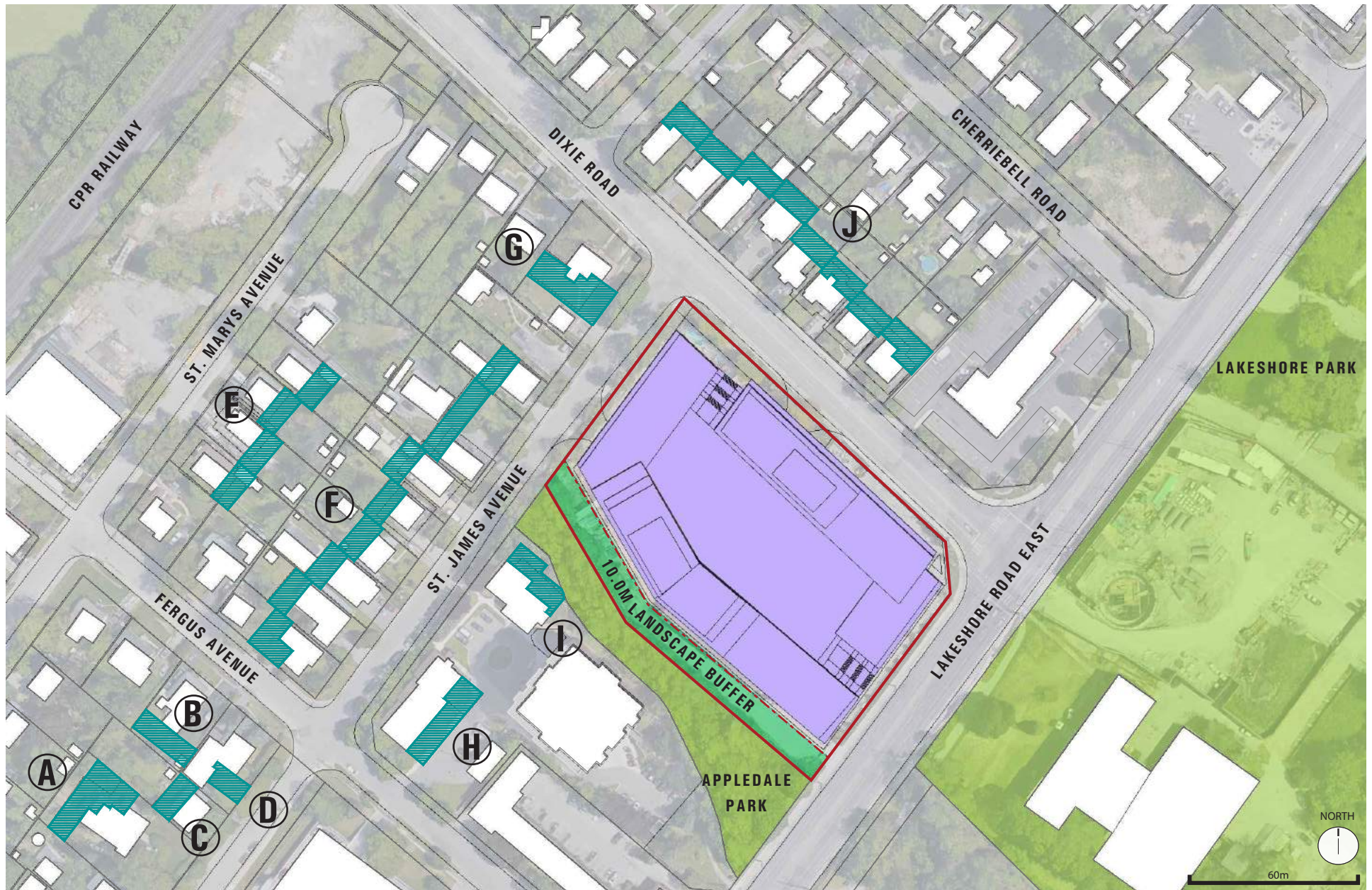
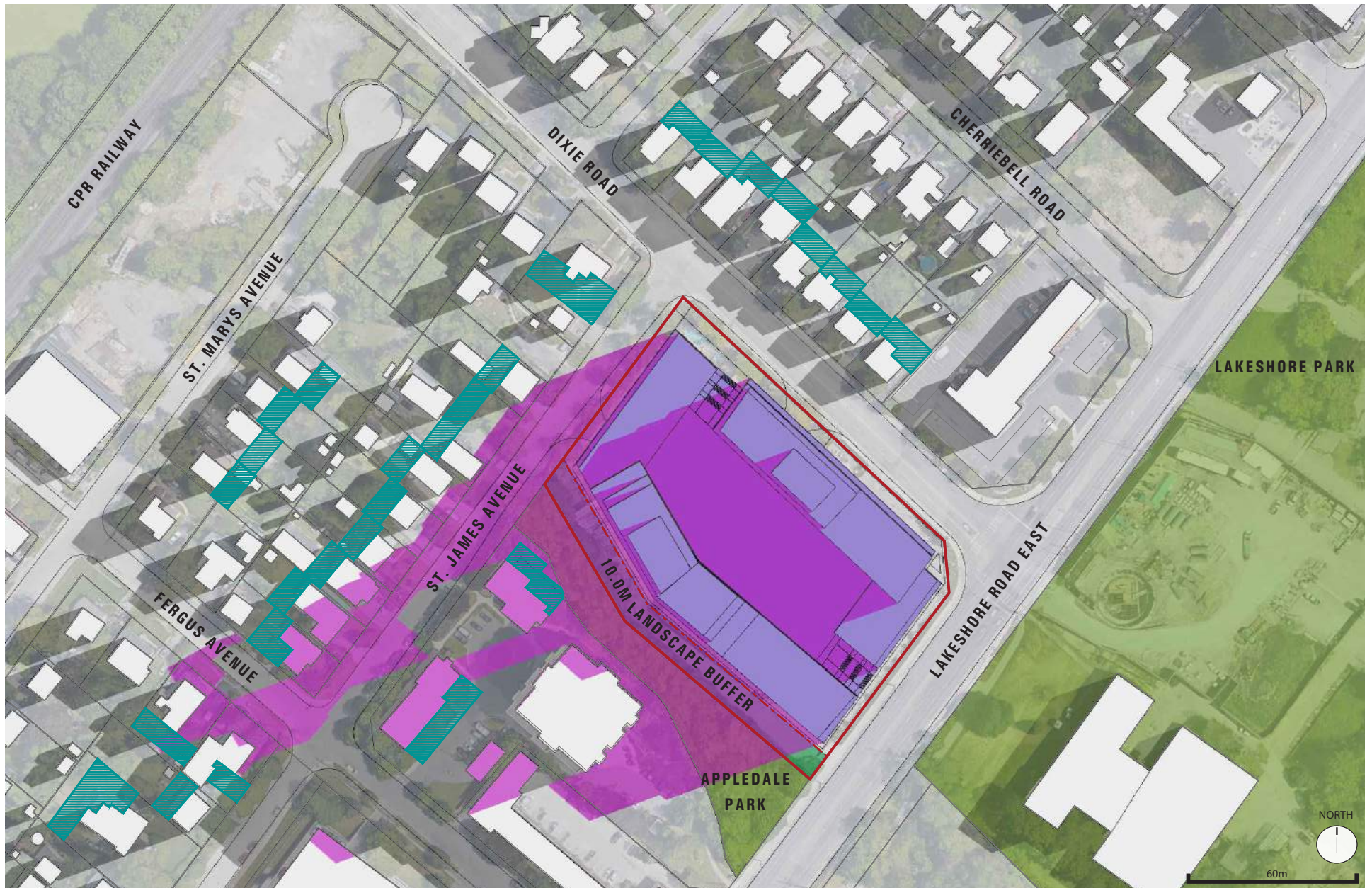


Figure 1 - Residential private outdoor amenity spaces key map

JUNE 21ST

June 21st - 7:07 am



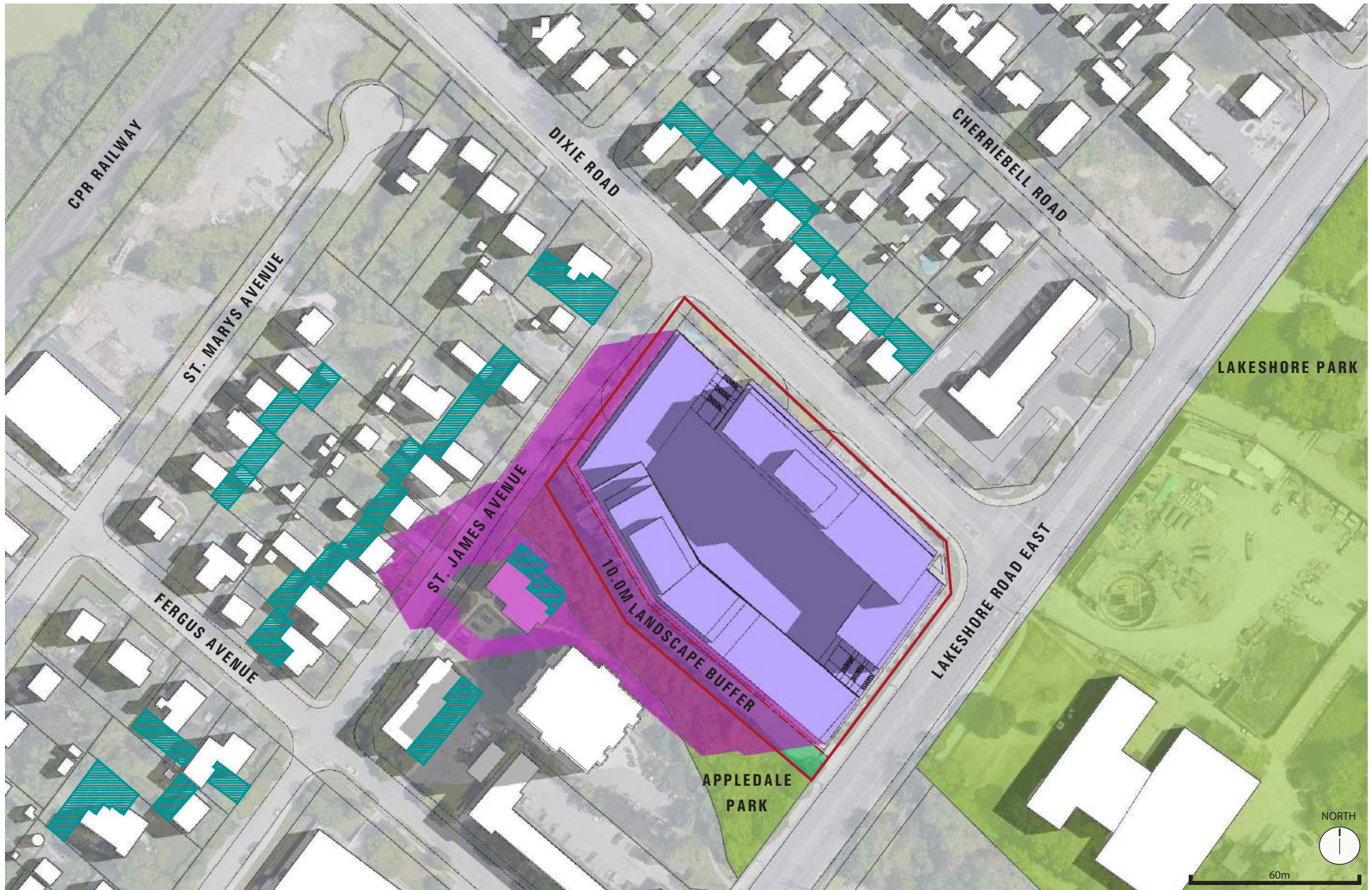
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Residential Private Outdoor Amenity Areas - 7.5m from rear wall

June 21st - 7:20 am



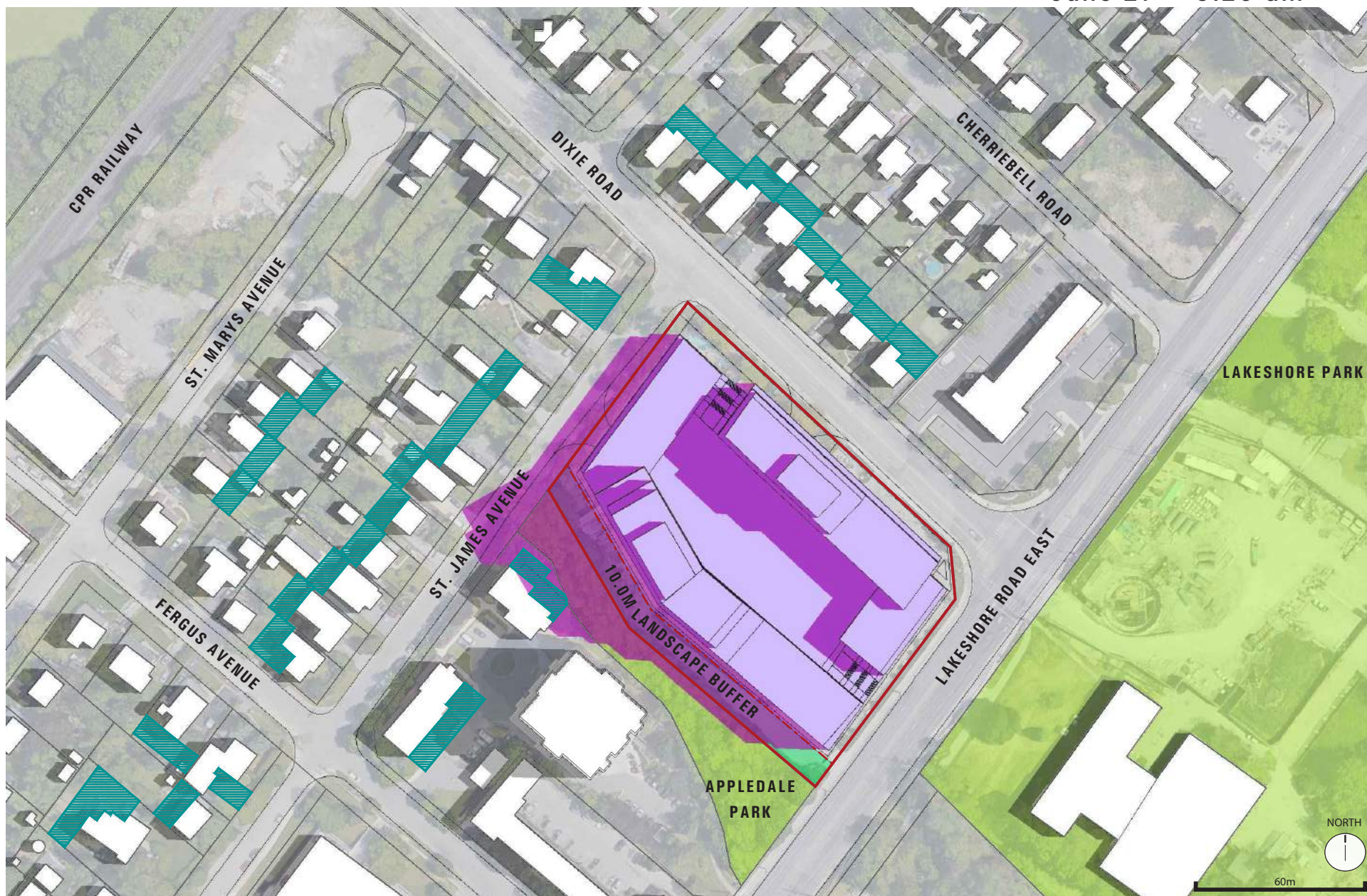
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June 21st - 8:20 am



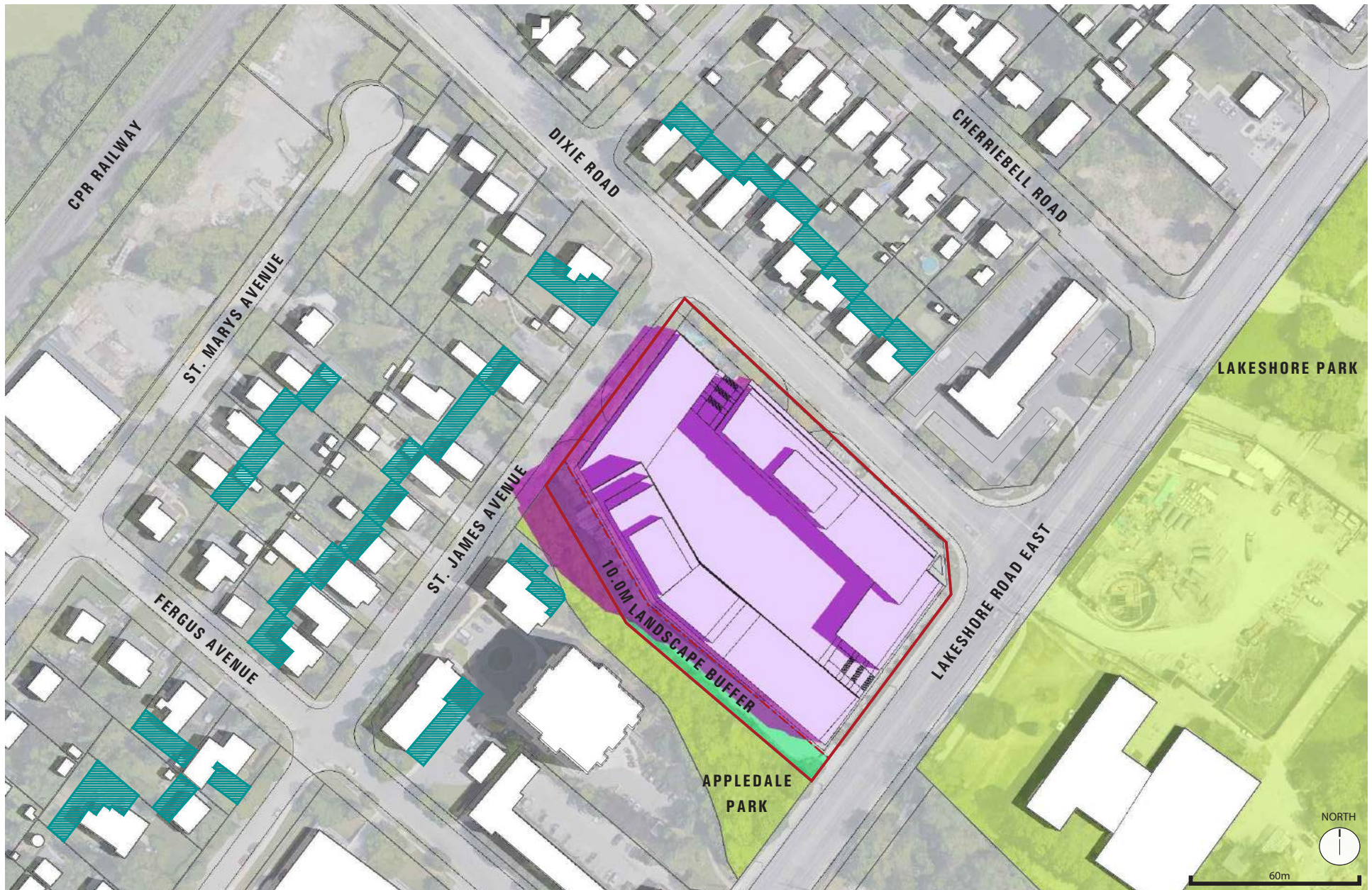
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June 21st - 9:20 am



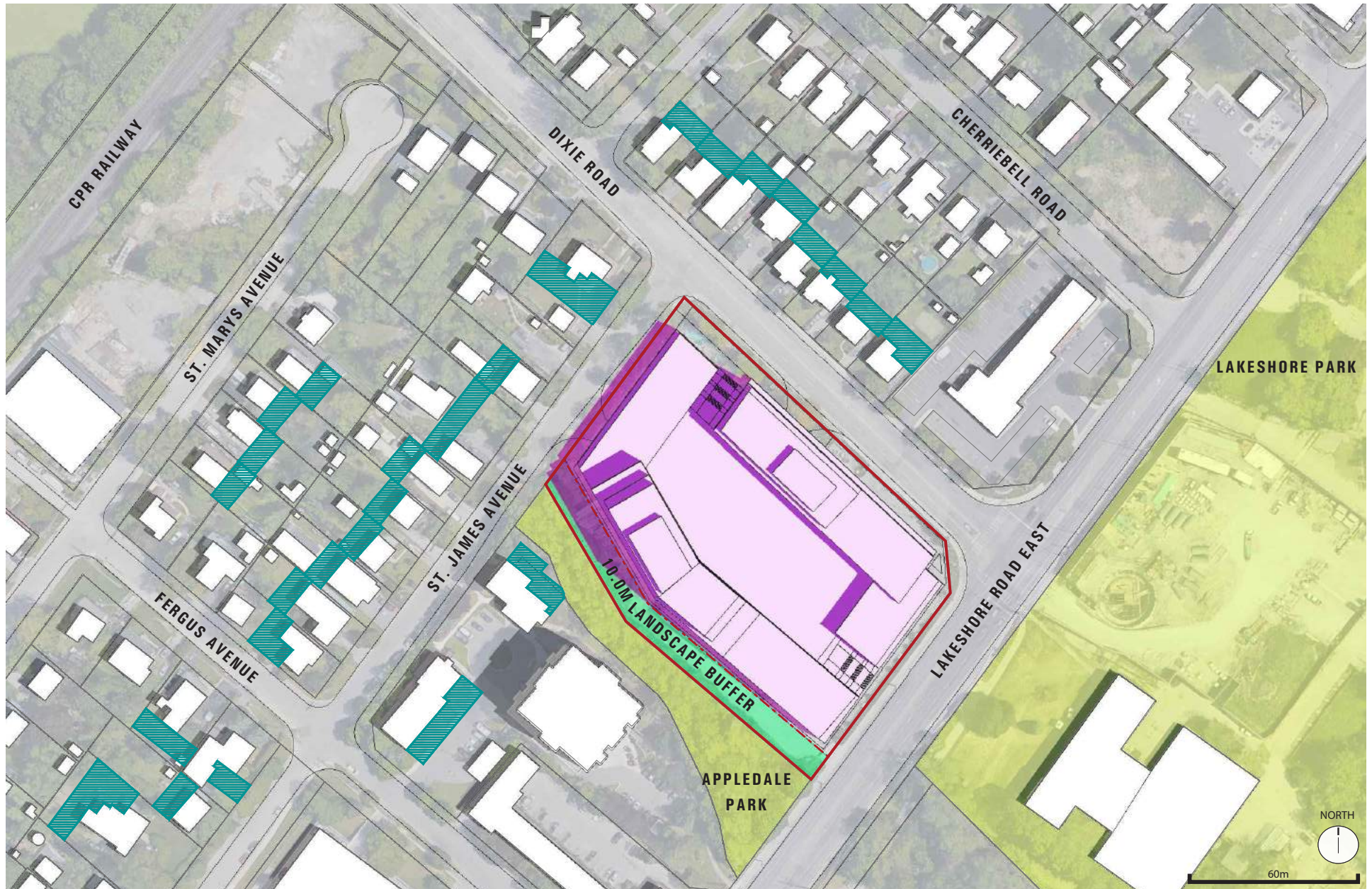
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June 21st - 10:20 am



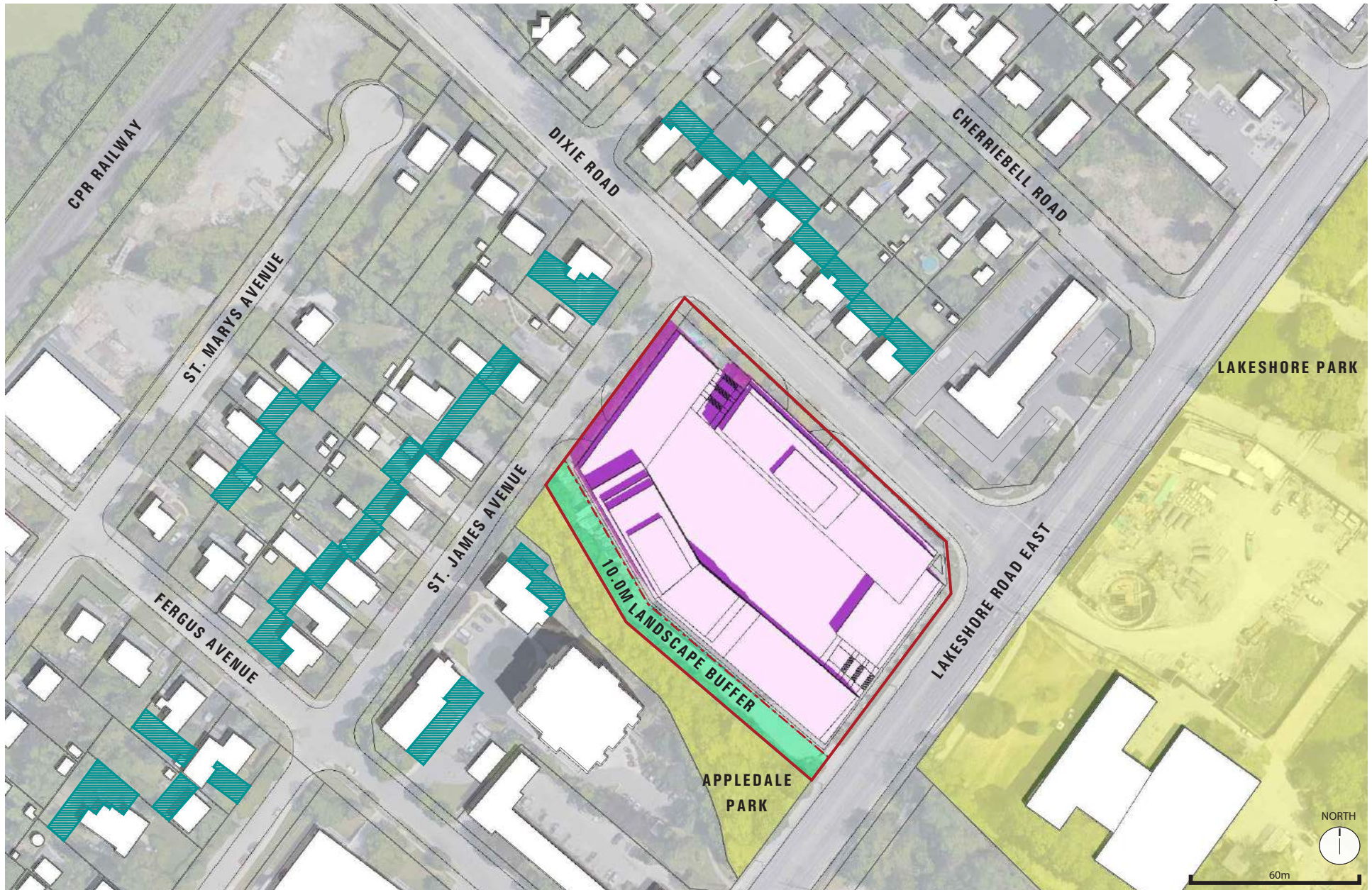
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June 21st - 11:20 am



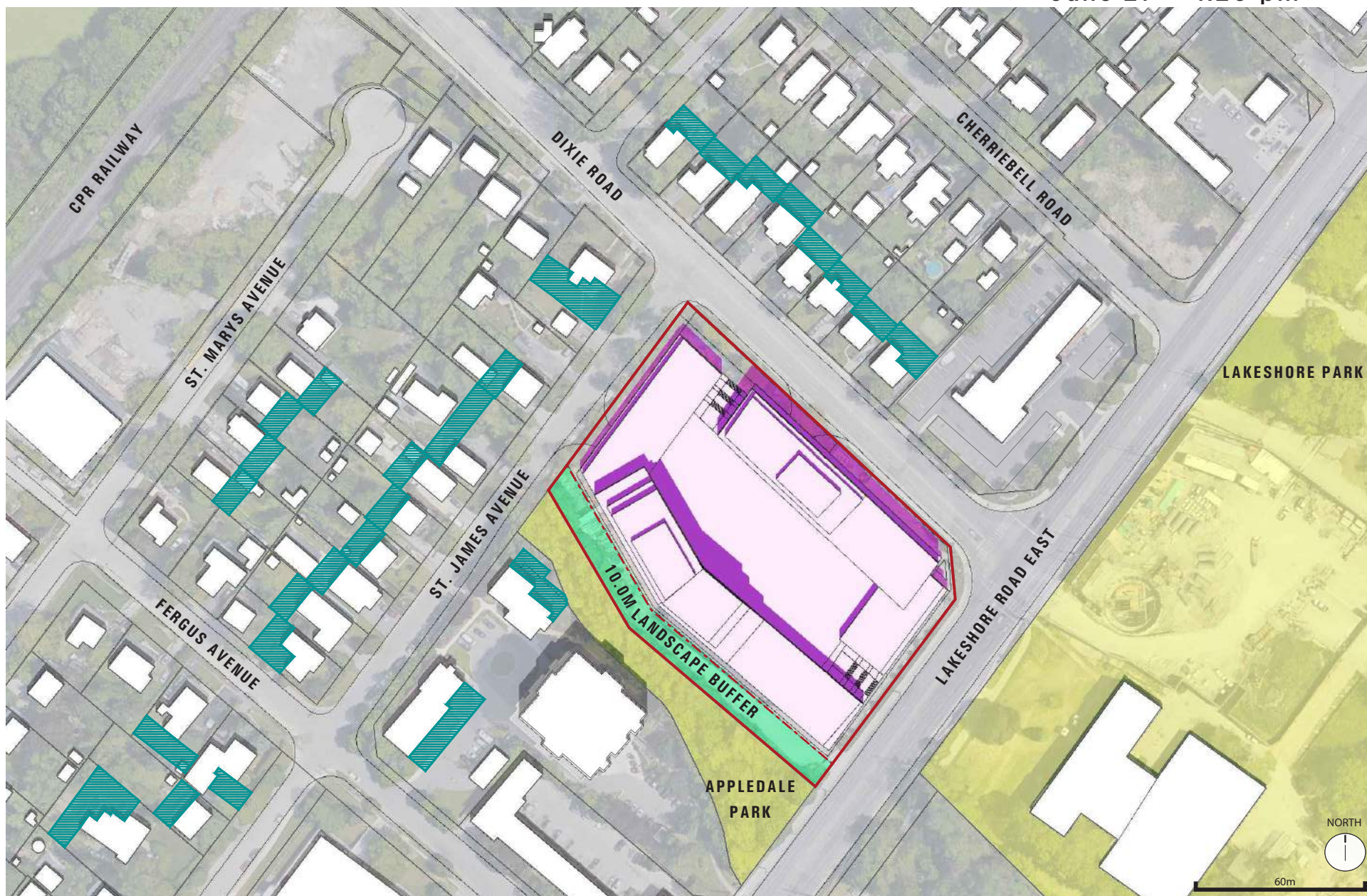
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June 21st - 12:20 pm



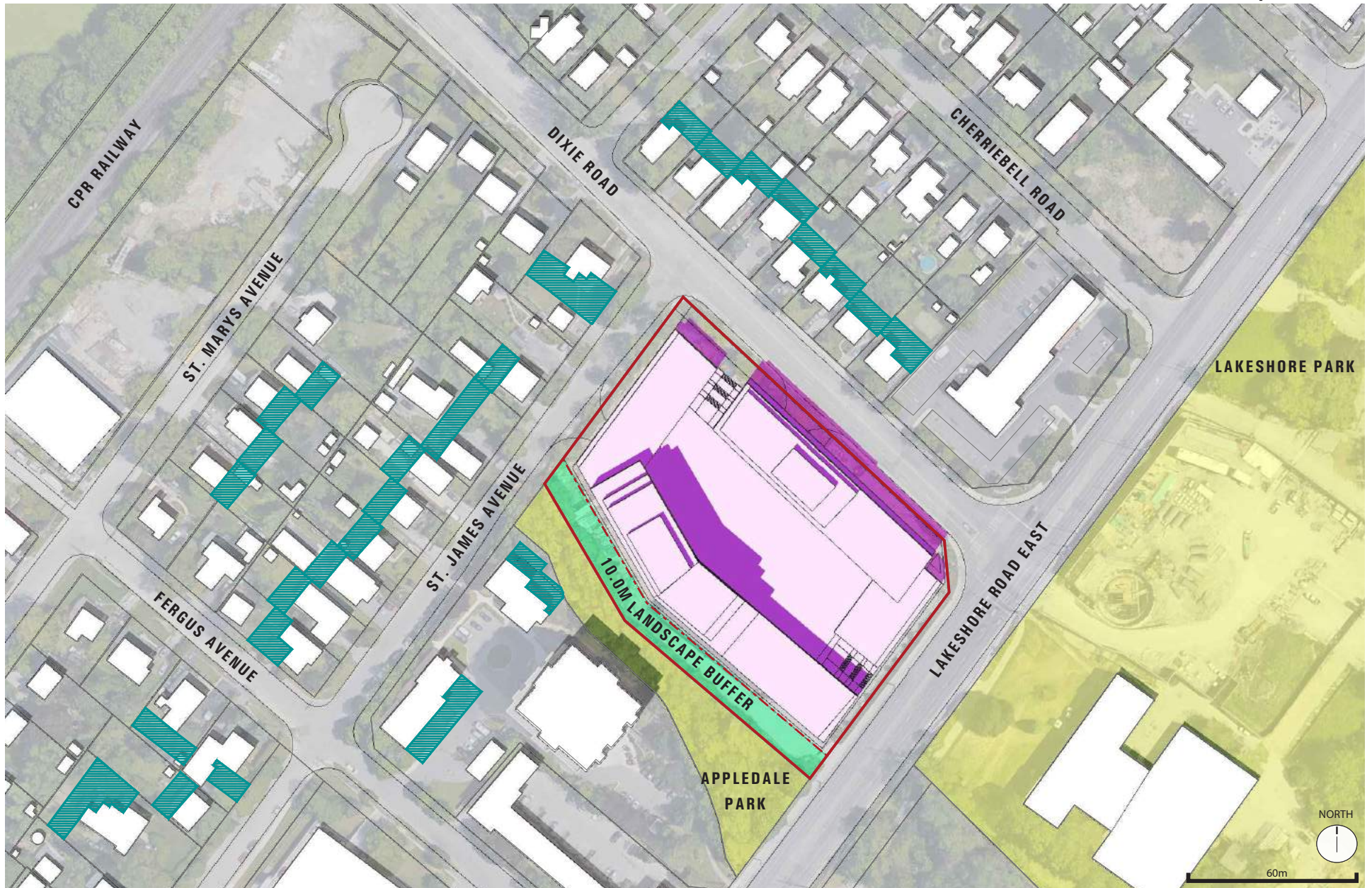
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June 21st - 1:20 pm



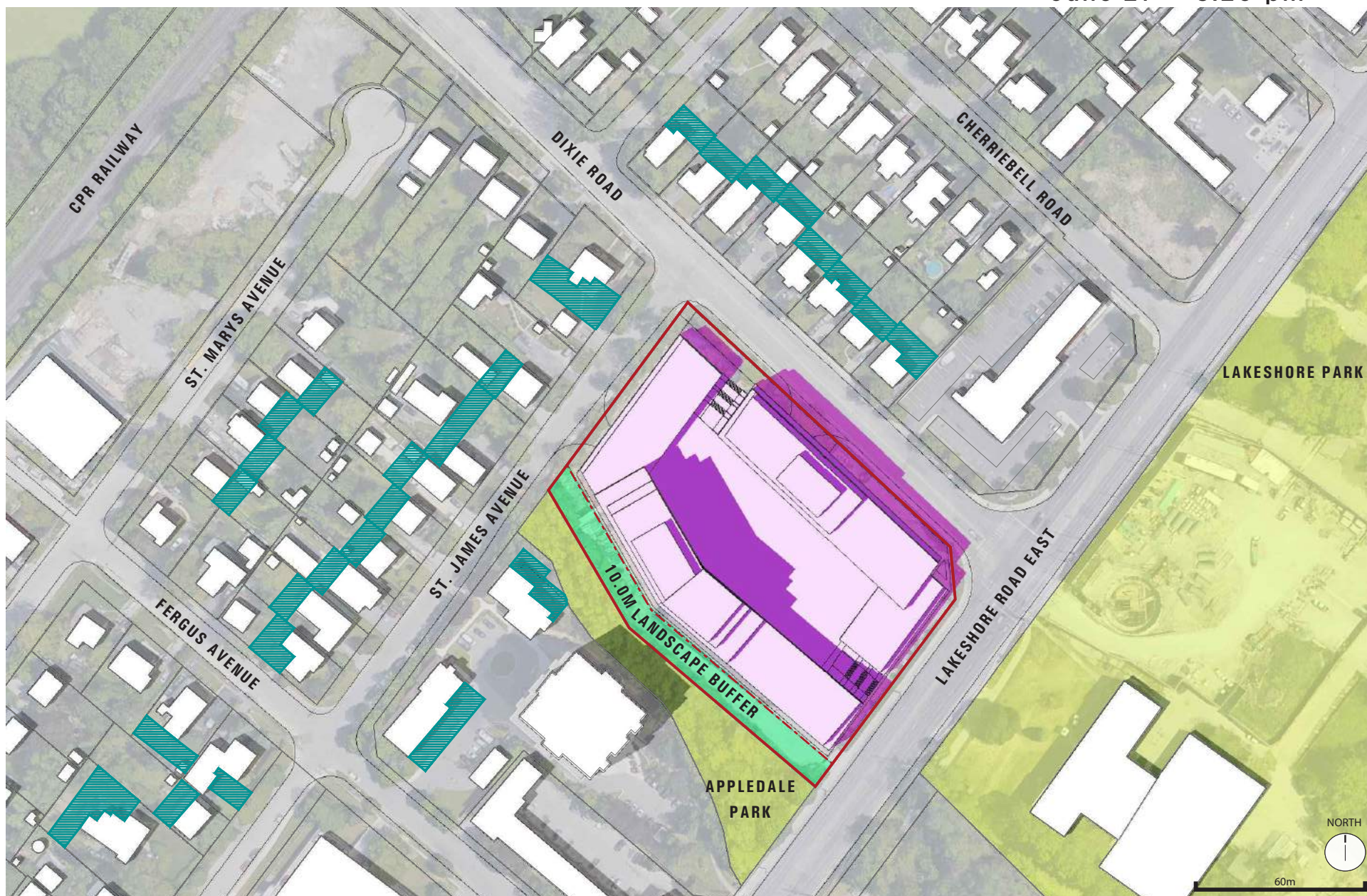
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June 21st - 2:20 pm



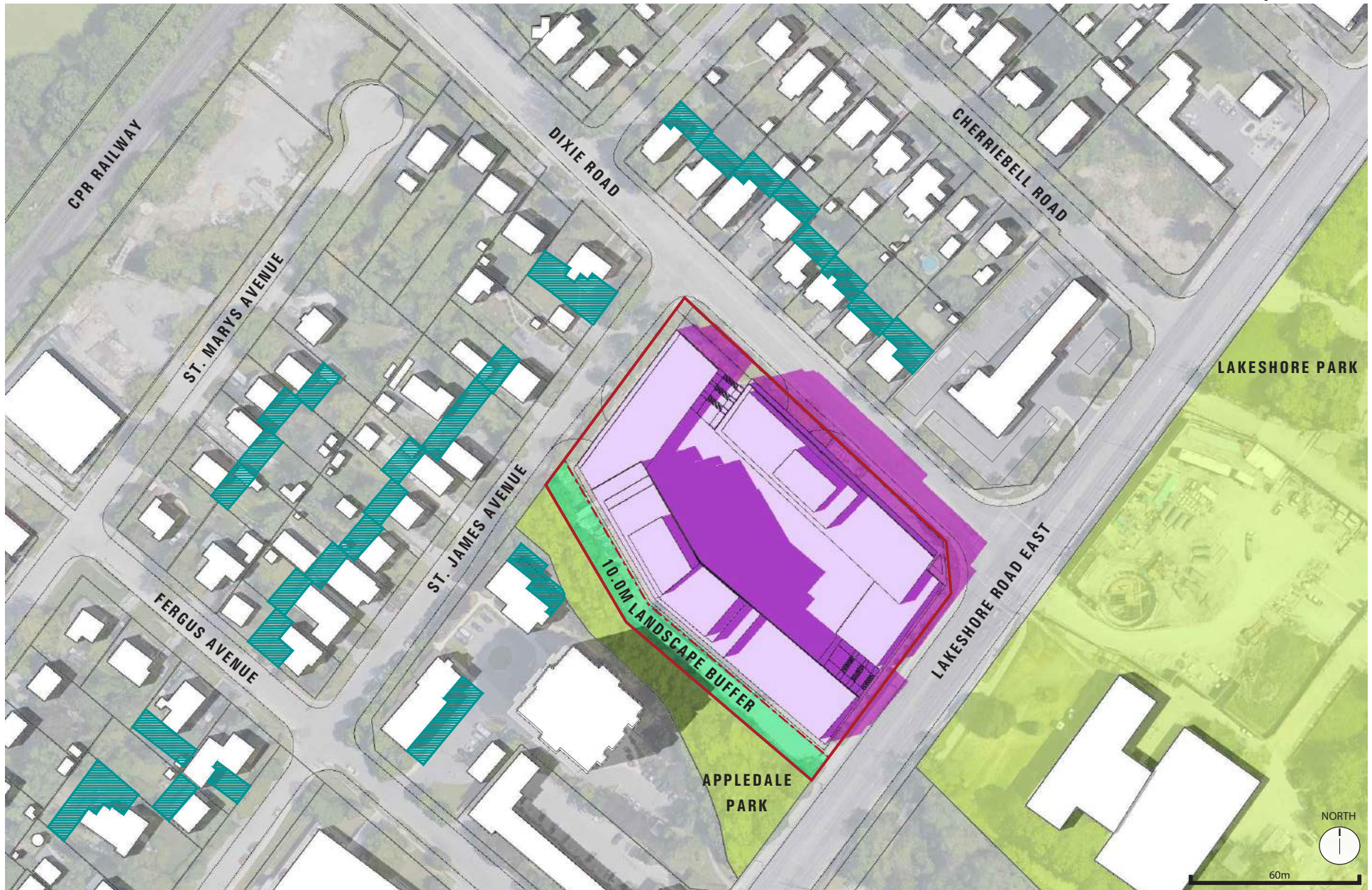
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June 21st - 3:20 pm



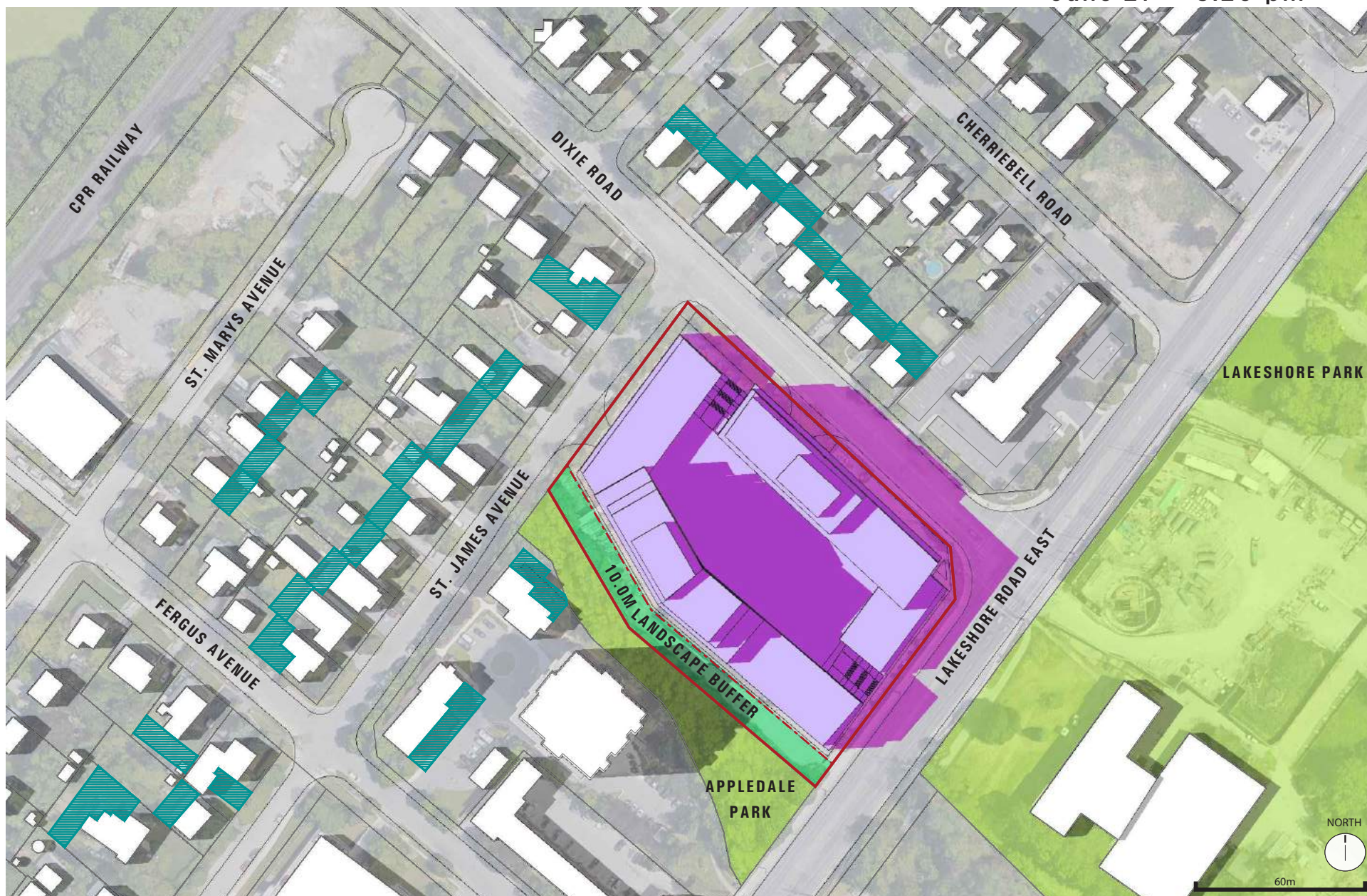
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June 21st - 4:20 pm



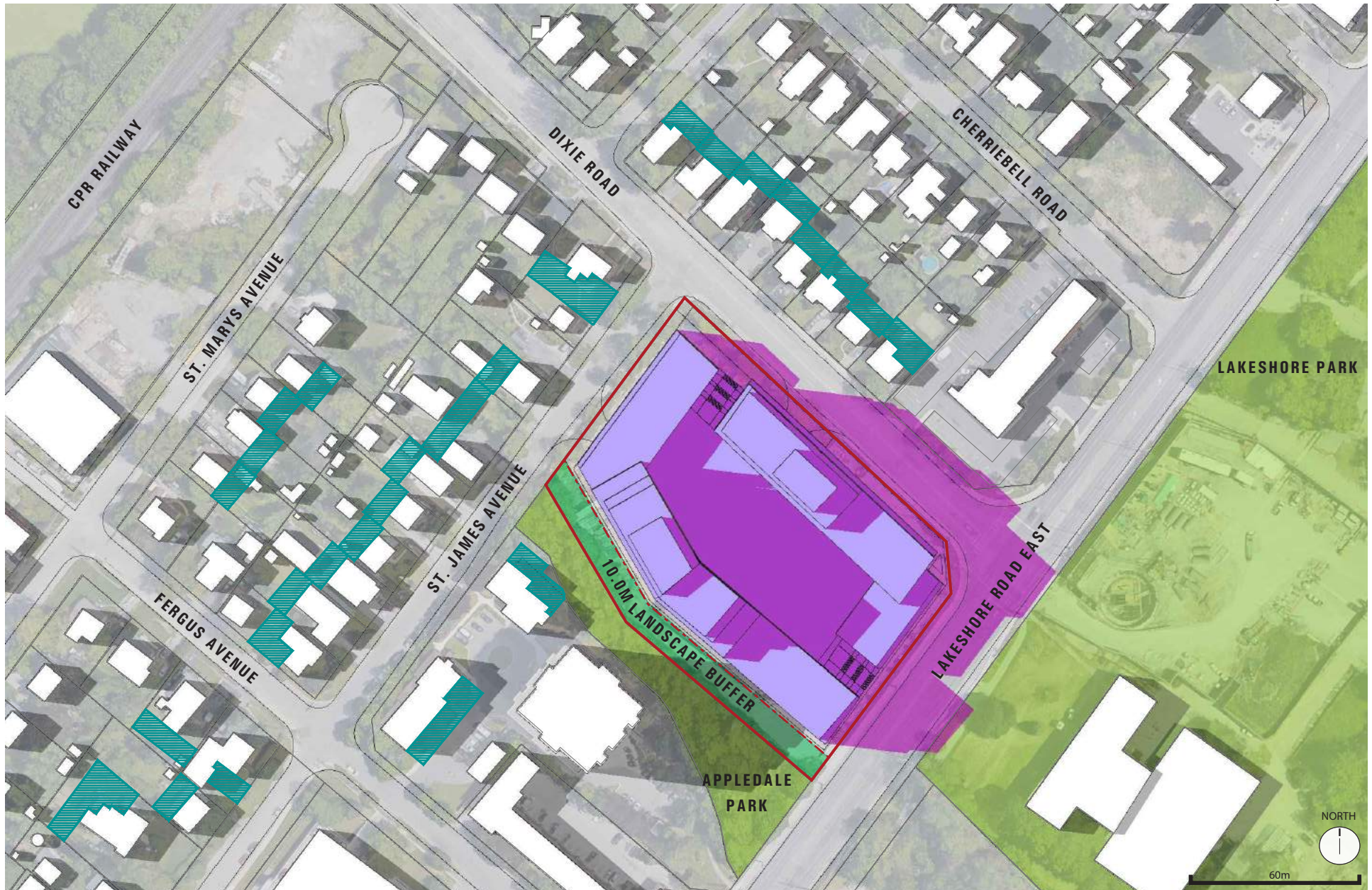
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June 21st - 5:20 pm



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June 21st - 6:20 pm



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June 21st - 7:20 pm

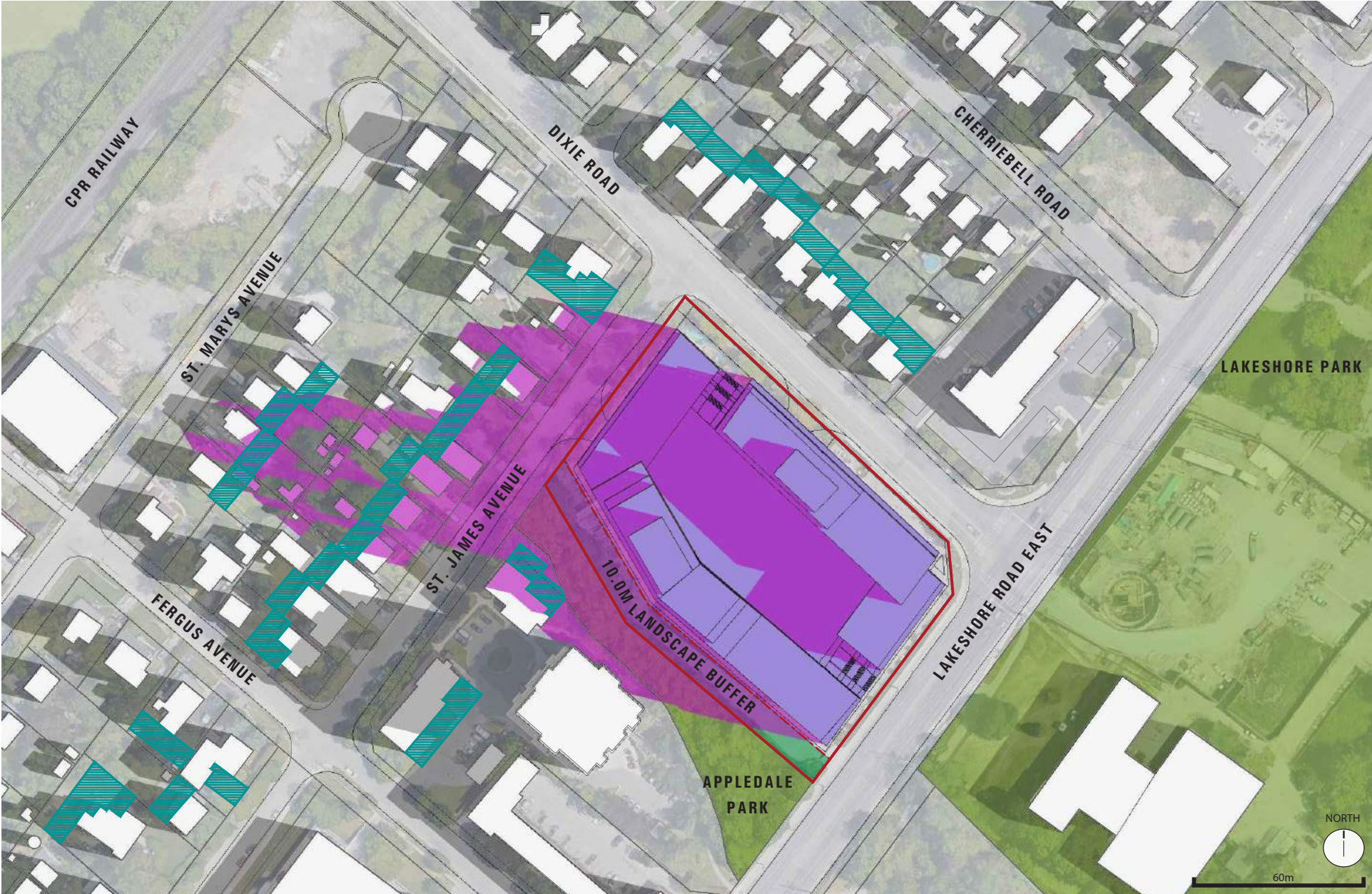


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June 21st - 7:33 pm

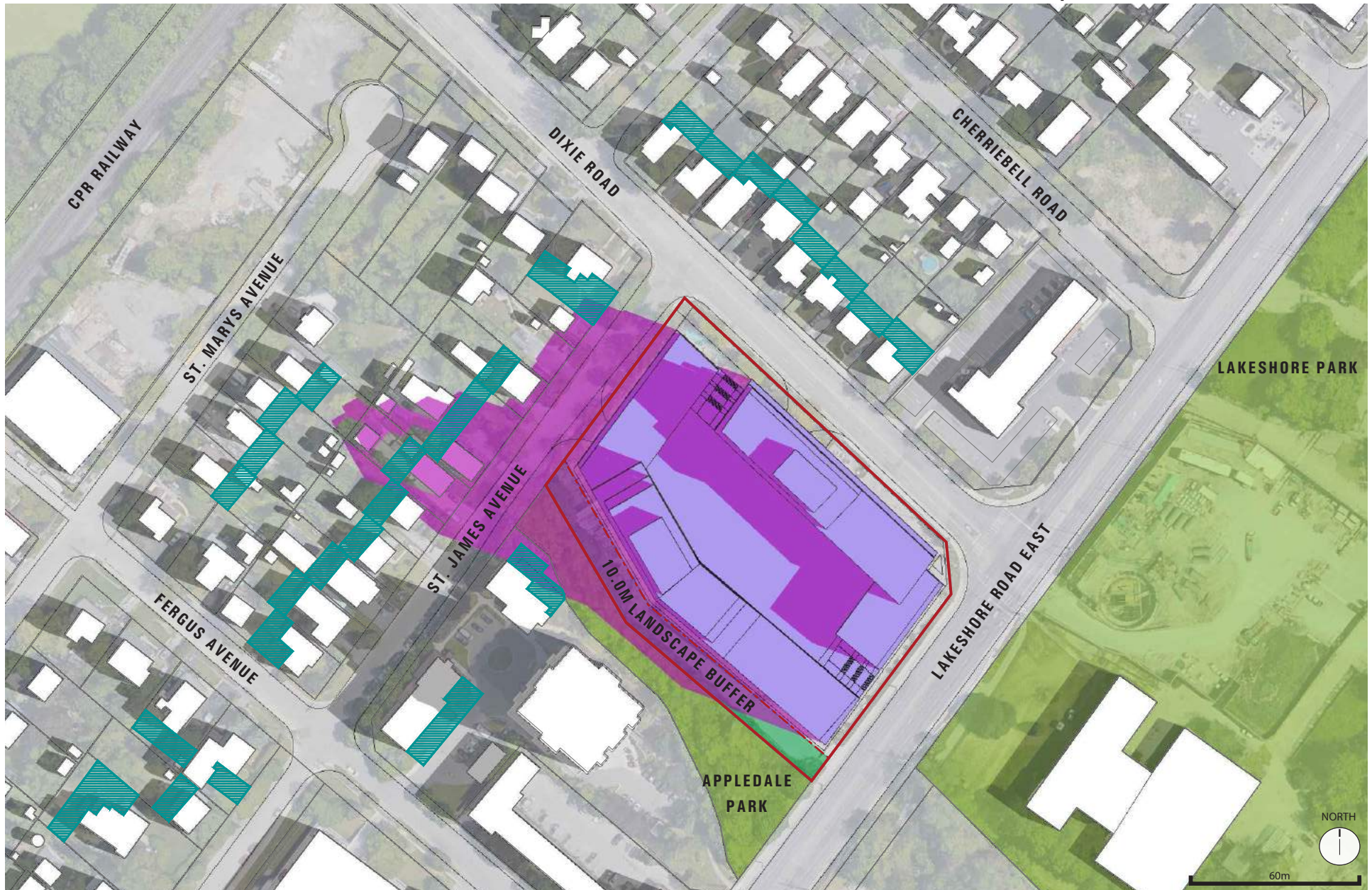


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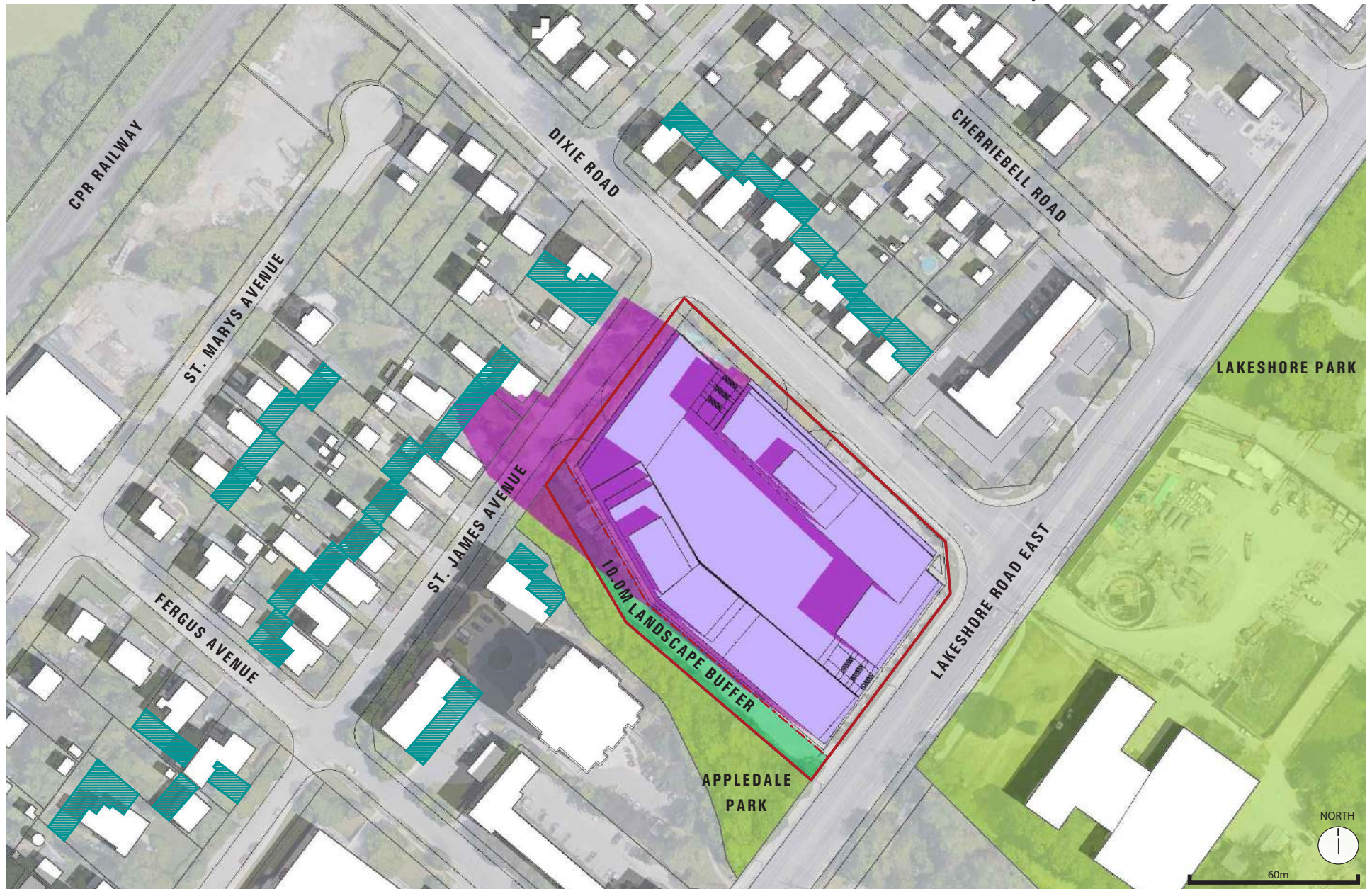
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September 21st - 9:12 am



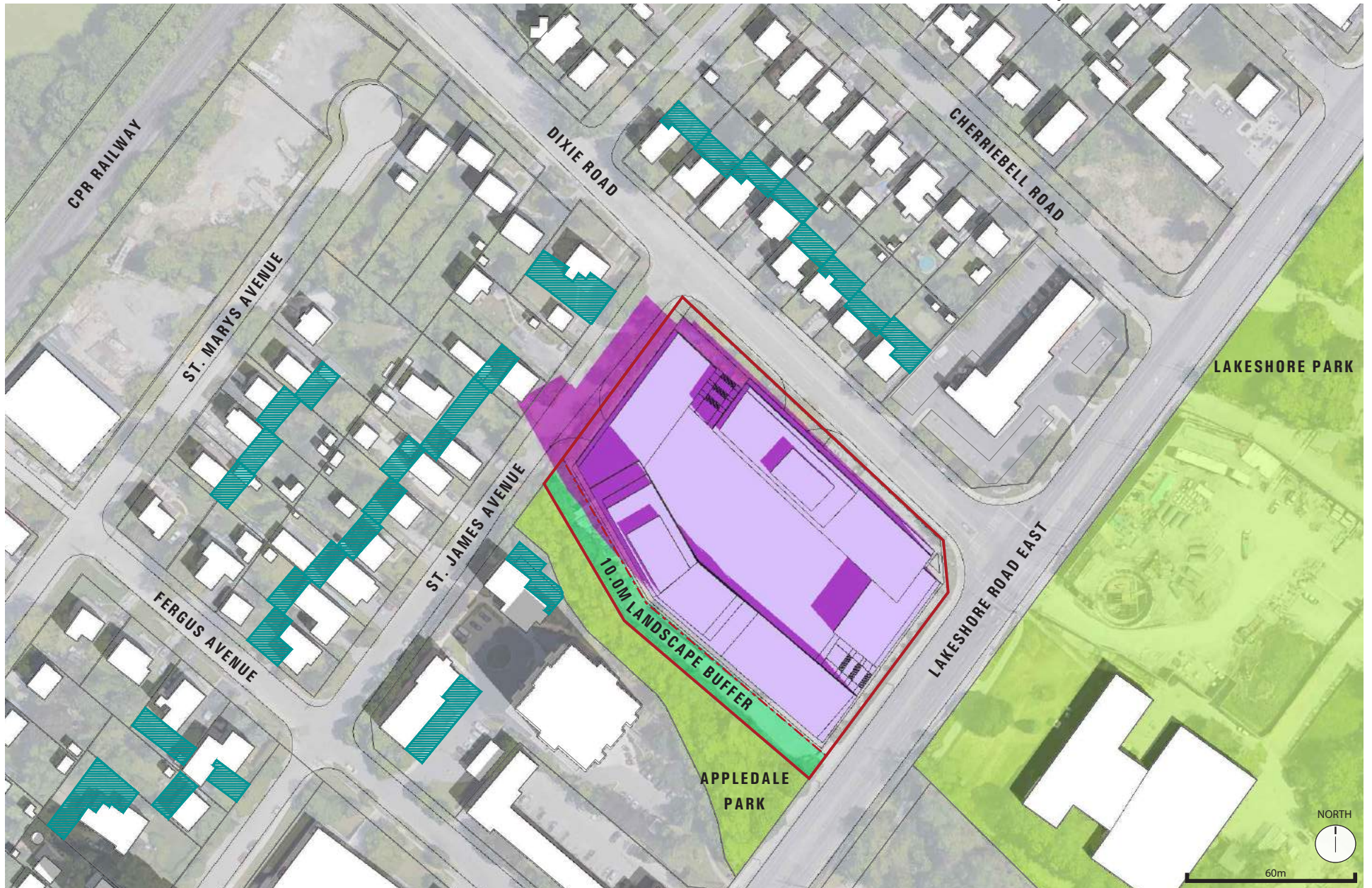
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September 21st - 10:12 am



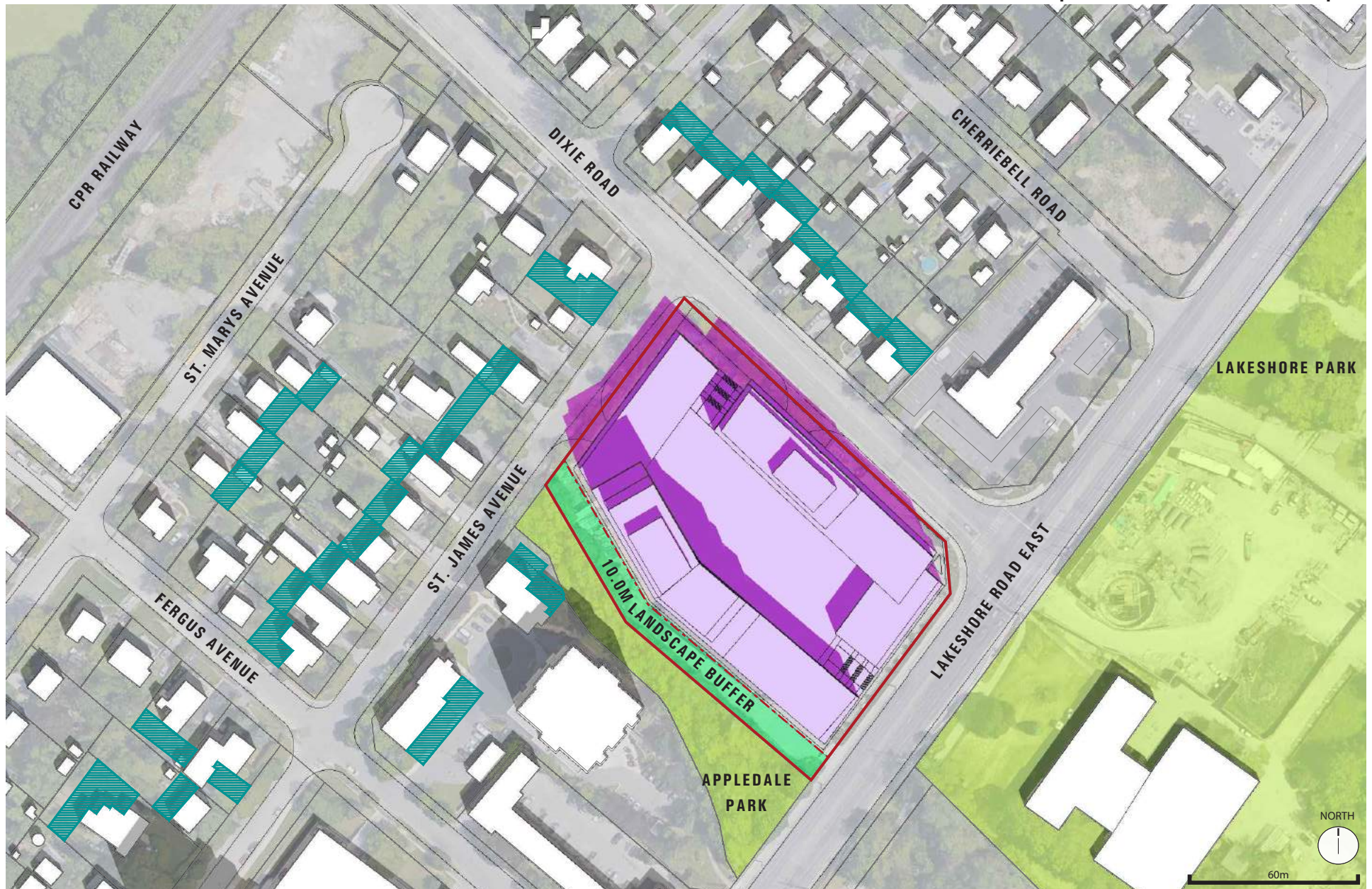
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September 21st - 11:12 am



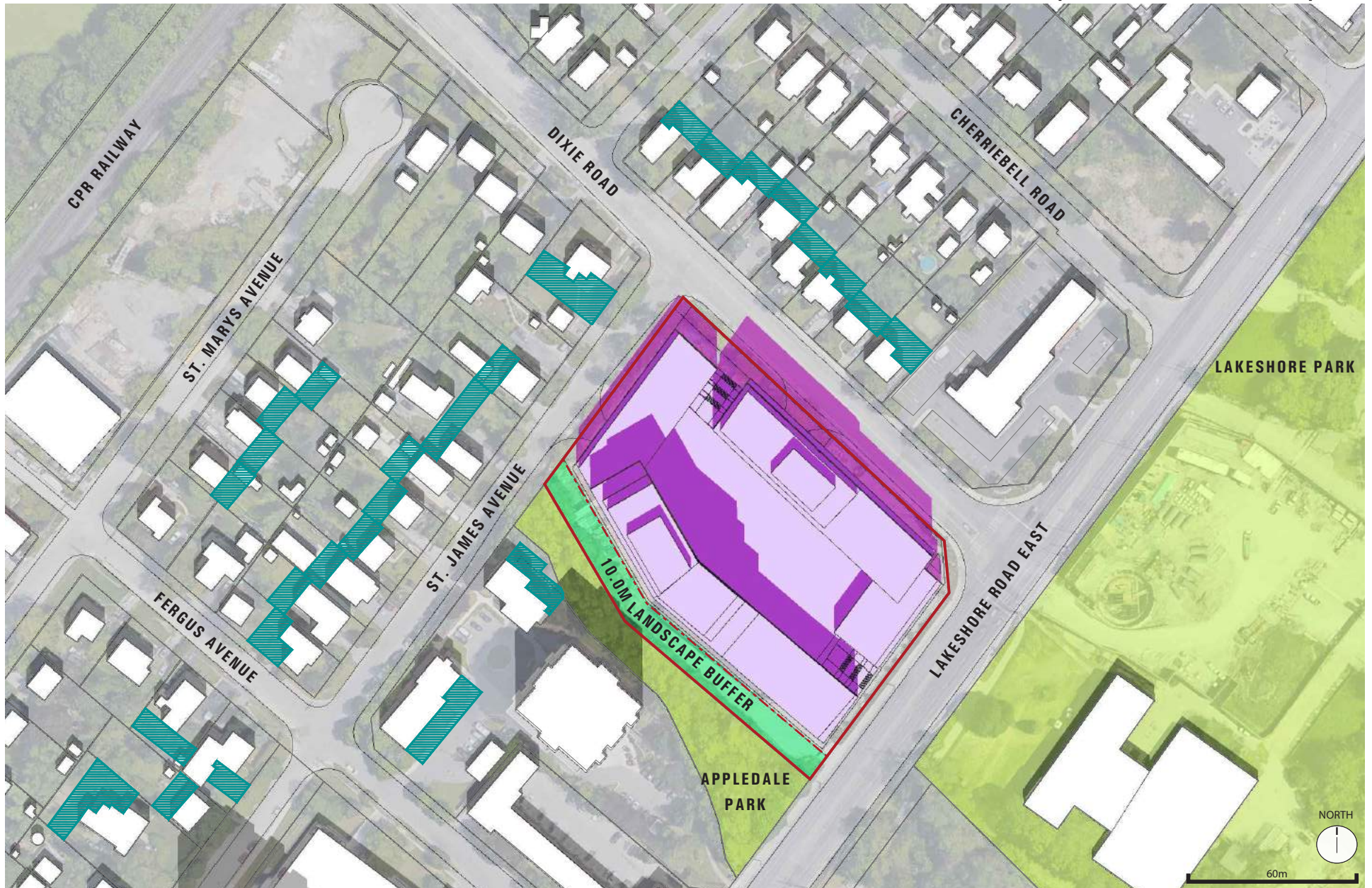
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September 21st - 12:12 pm



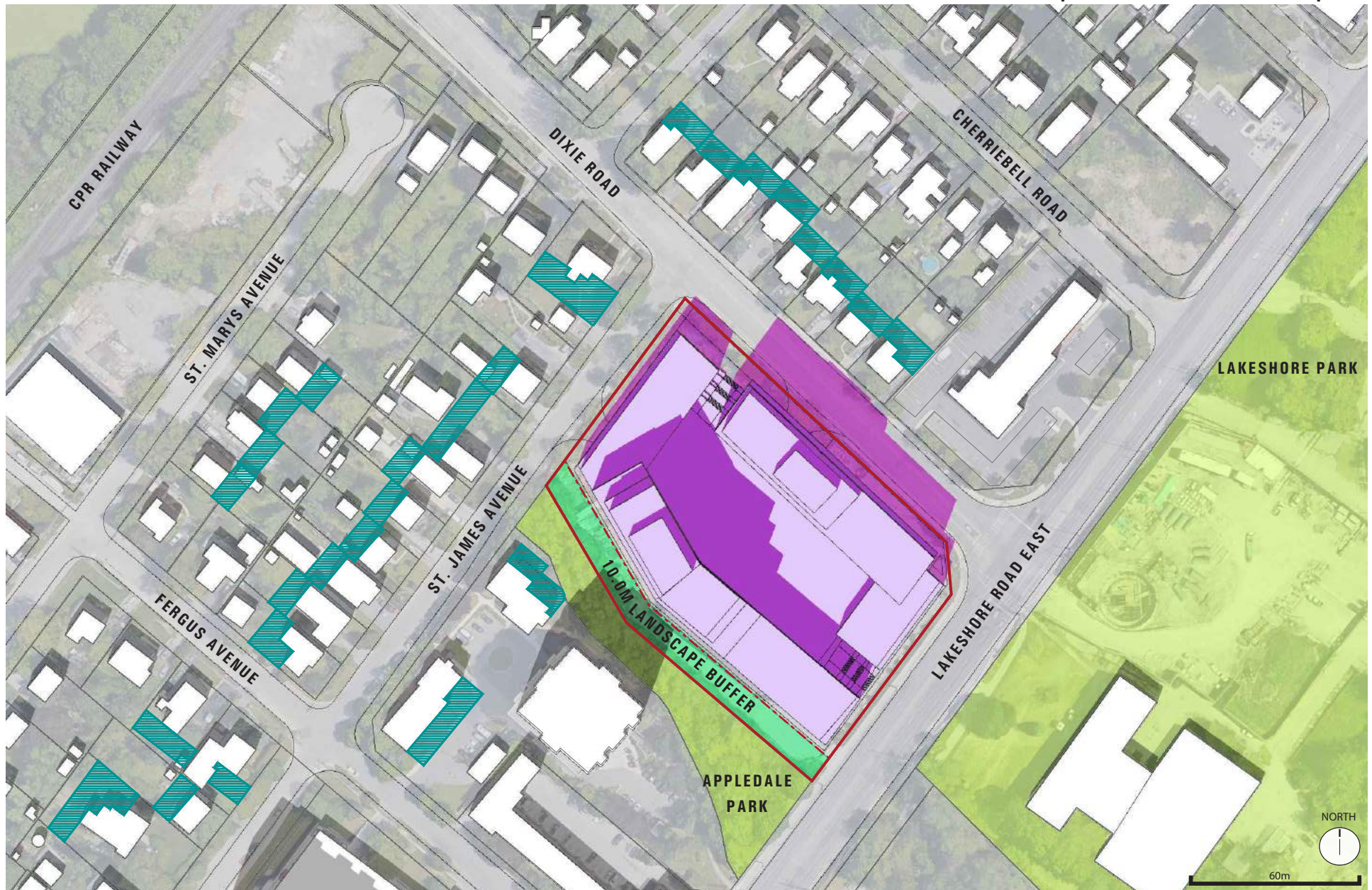
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September 21st - 1:12 pm



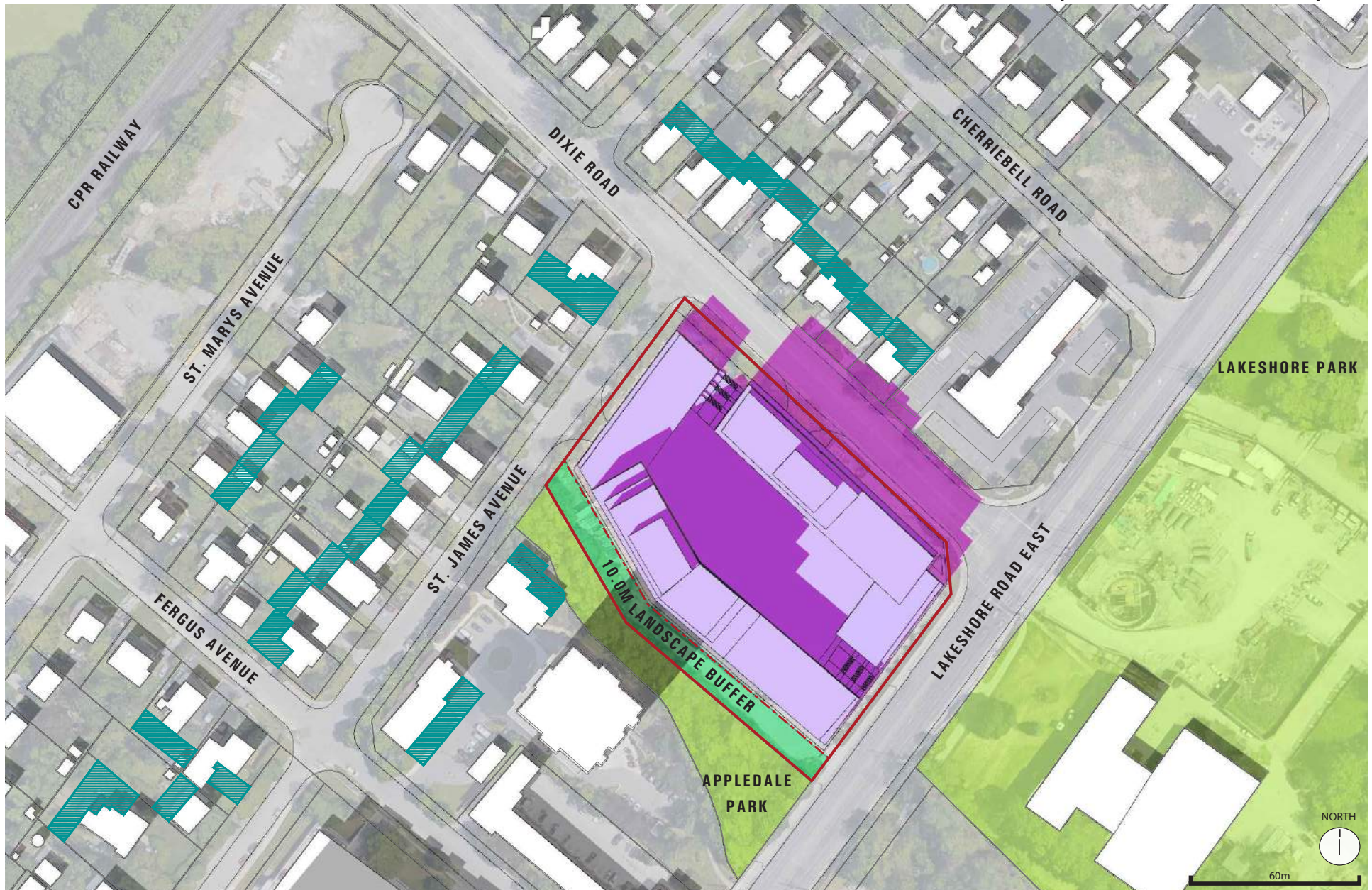
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September 21st - 2:12 pm



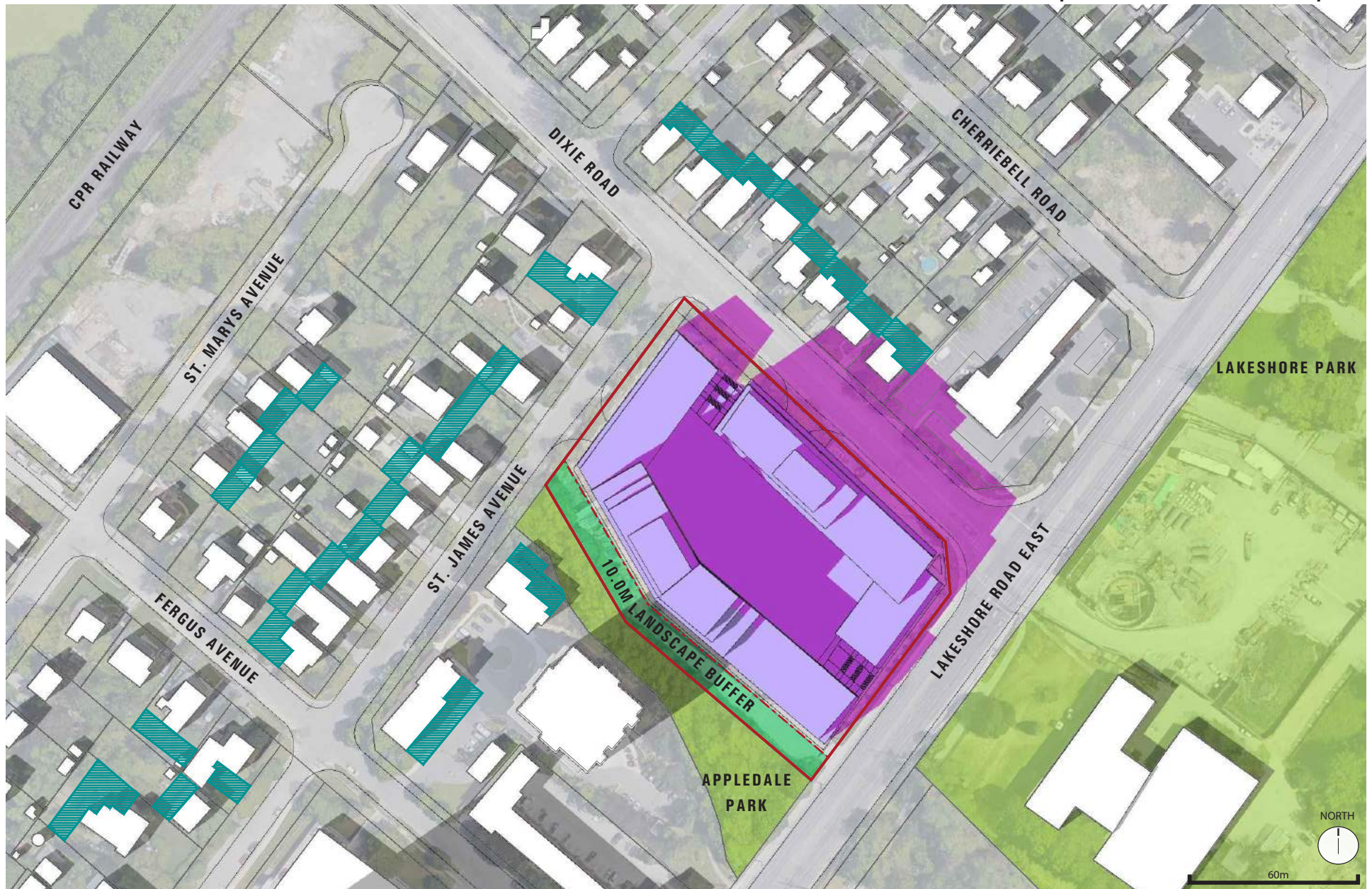
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September 21st - 3:12 pm



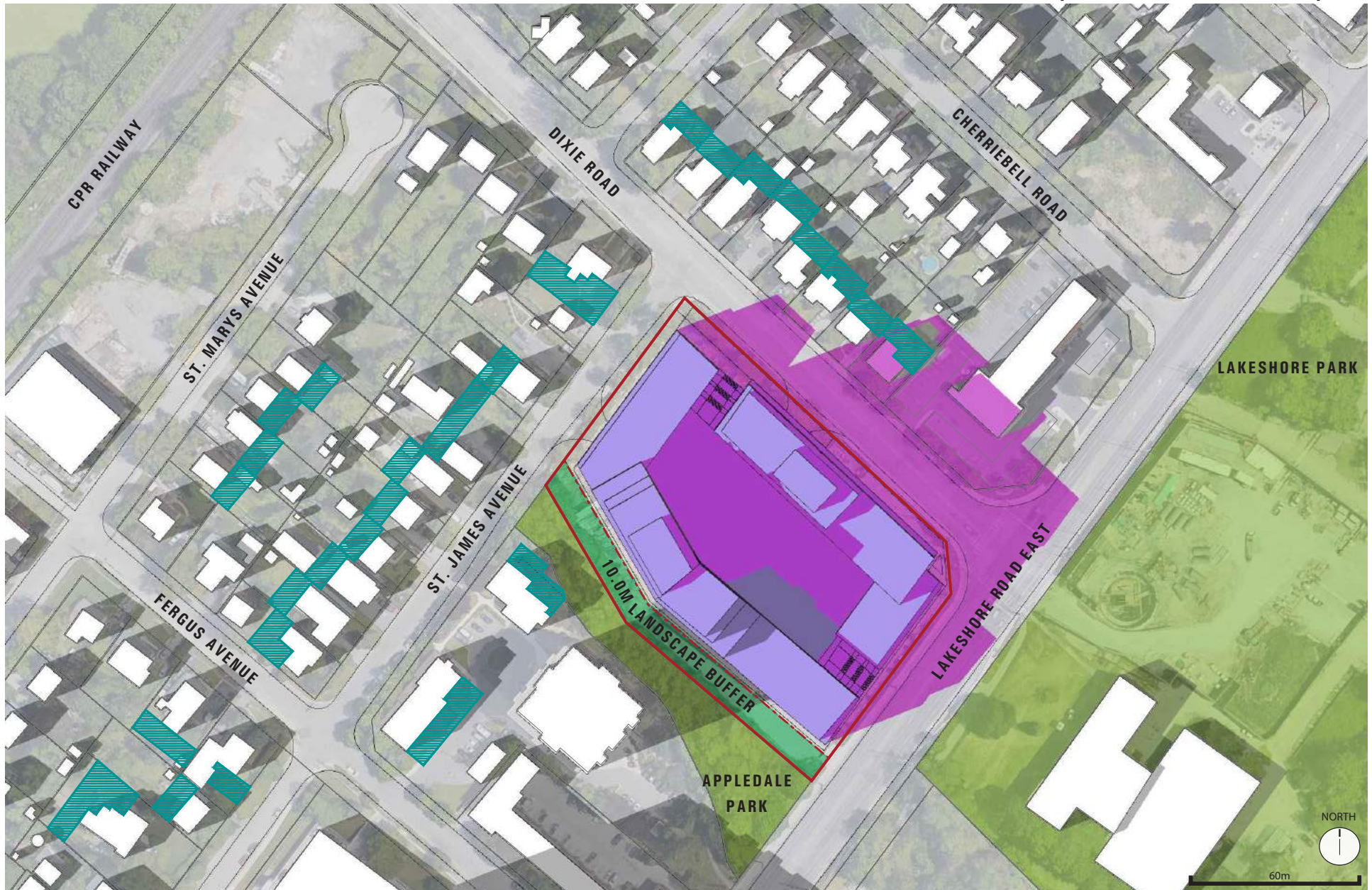
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September 21st - 4:12 pm



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September 21st - 5:12 pm



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September 21st - 5:48 pm



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COMMUNAL OUTDOOR AMENITY AREAS

(SECTION 3.2)

Section 3.2 of the Mississauga Urban Design Terms of Reference - Standards for Shadow Studies requires the identification of communal outdoor amenity areas within the vicinity of the proposed developments. Areas outlined in orange were identified as communal outdoor amenity areas and include children's play areas, school yards, tot lots, and park features such as sandboxes, wading pools etc. It also includes outdoor amenity areas used by seniors and those associated with commercial and employment areas.

Testing times include June 21st, September 21st, and December 21st.

As defined by the Terms of Reference, shadows from a proposed development should allow for full sun on identified areas at least half the time, or 50% sun coverage all the time. If the "sun access factor" is at least 50% or 0.5 on each of the test dates ($As(ave)/AT = 0.5$ or more), then the shadow impact is considered to be in compliance with these terms of reference.

The findings of the shadow analysis show that the proposal for full sun on the communal outdoor amenity areas are in accordance with this standard. As such, the criteria for section 3.2 is met.

Figure 2 - Communal outdoor amenity areas key map identifies all areas in the vicinity.



Figure 2 - Communal outdoor amenity areas key map

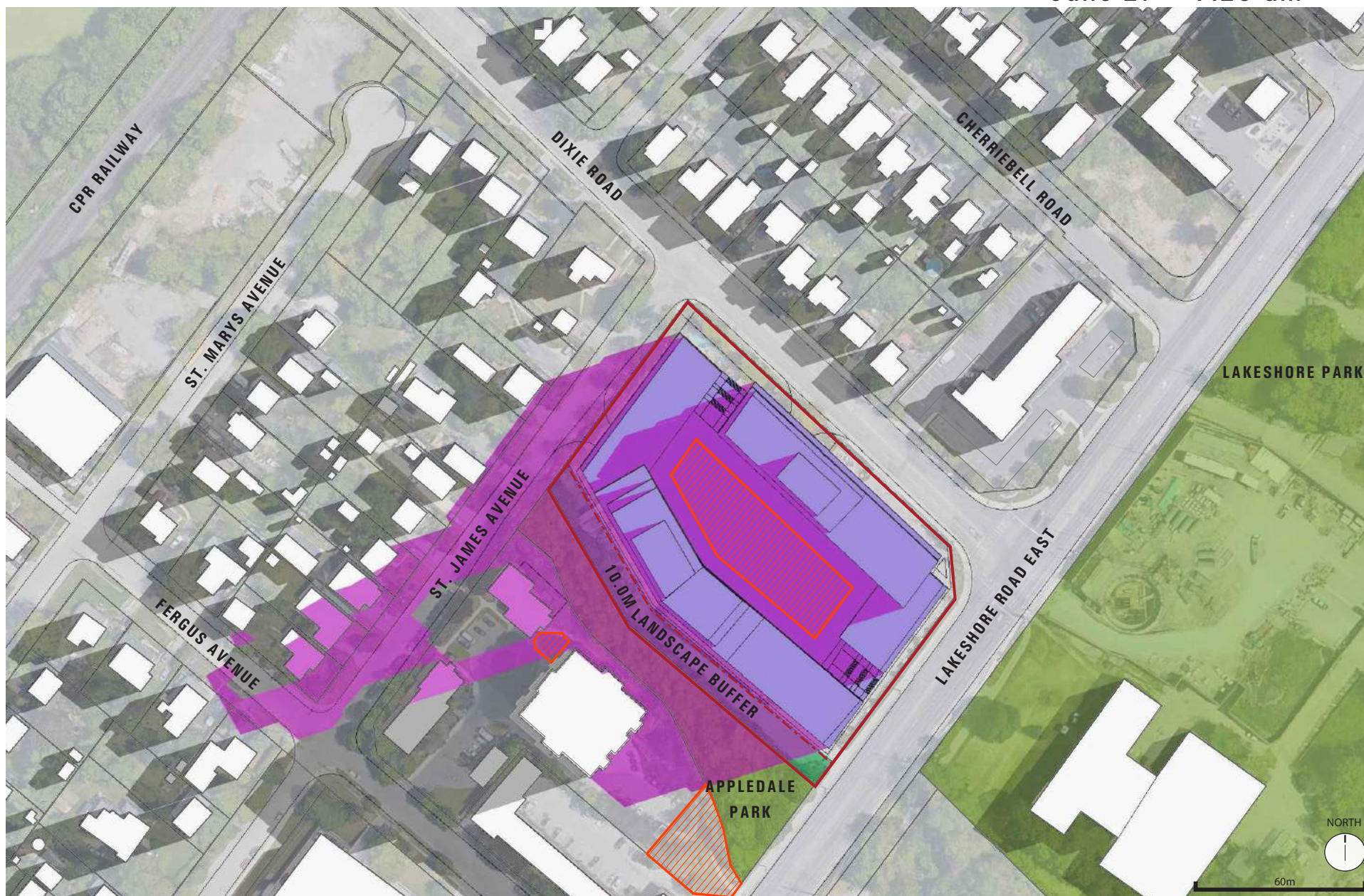
JUNE 21ST

June 21st - 7:07 am



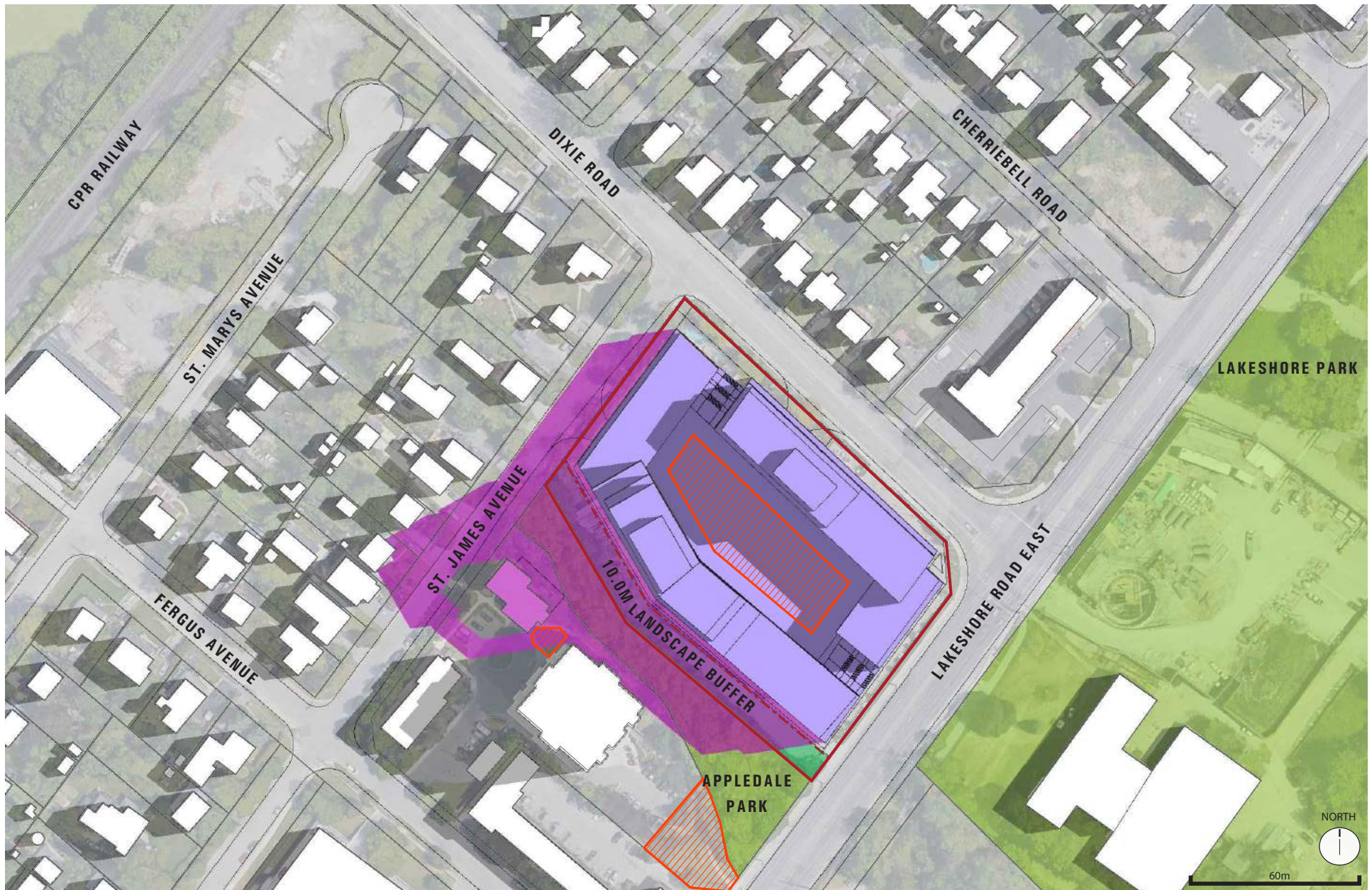
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June 21st - 7:20 am



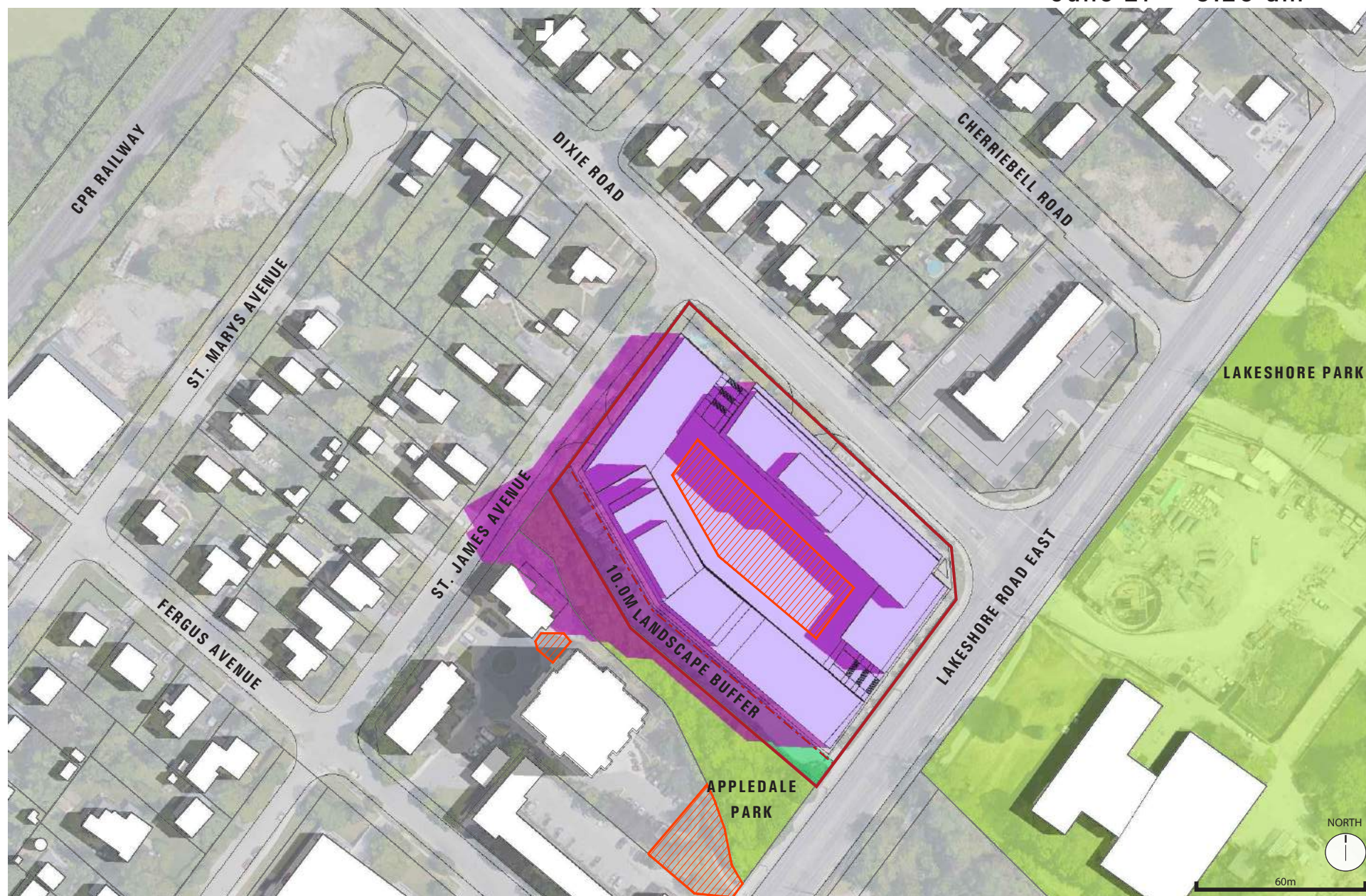
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June 21st - 8:20 am



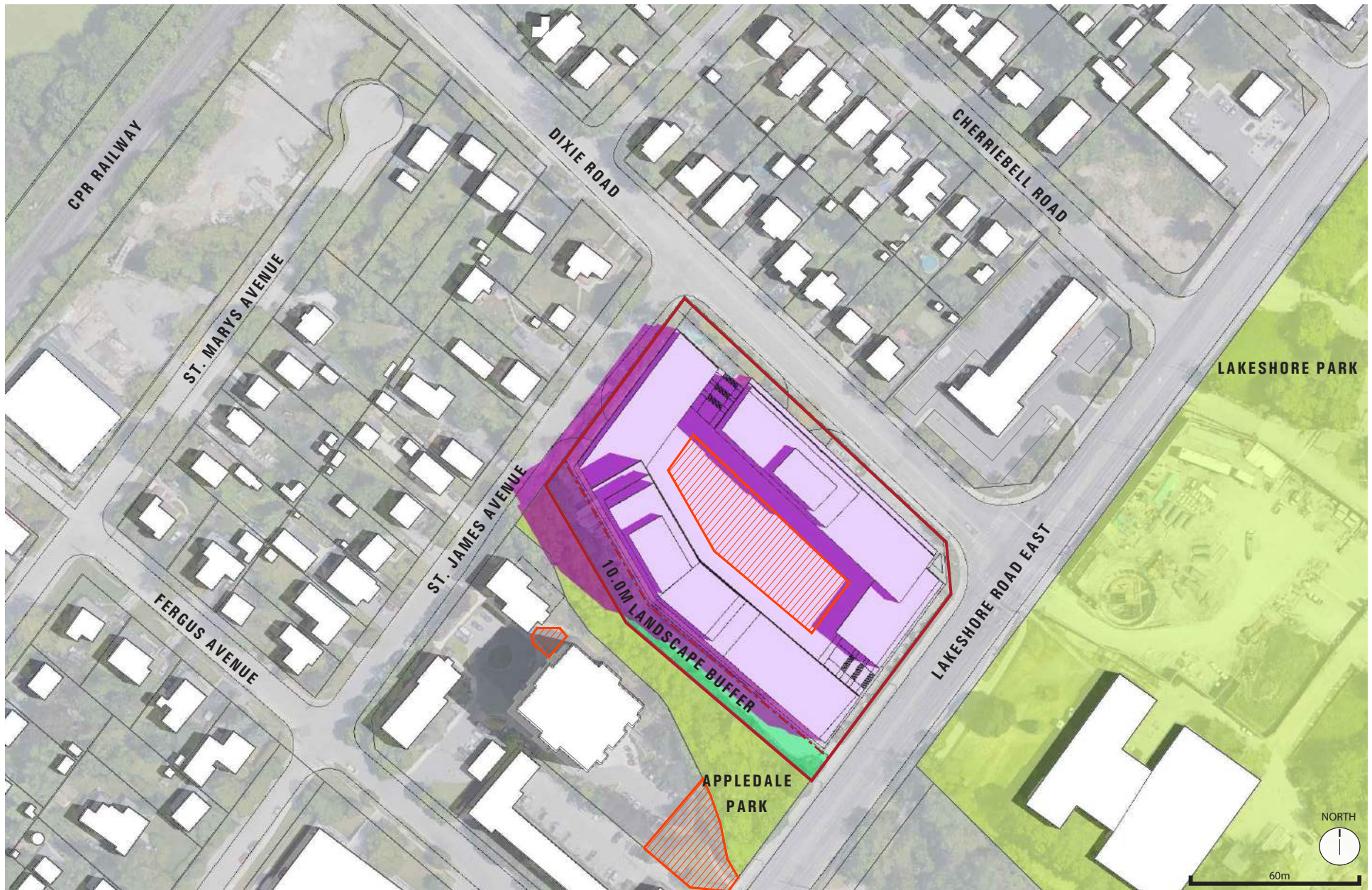
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June 21st - 9:20 am



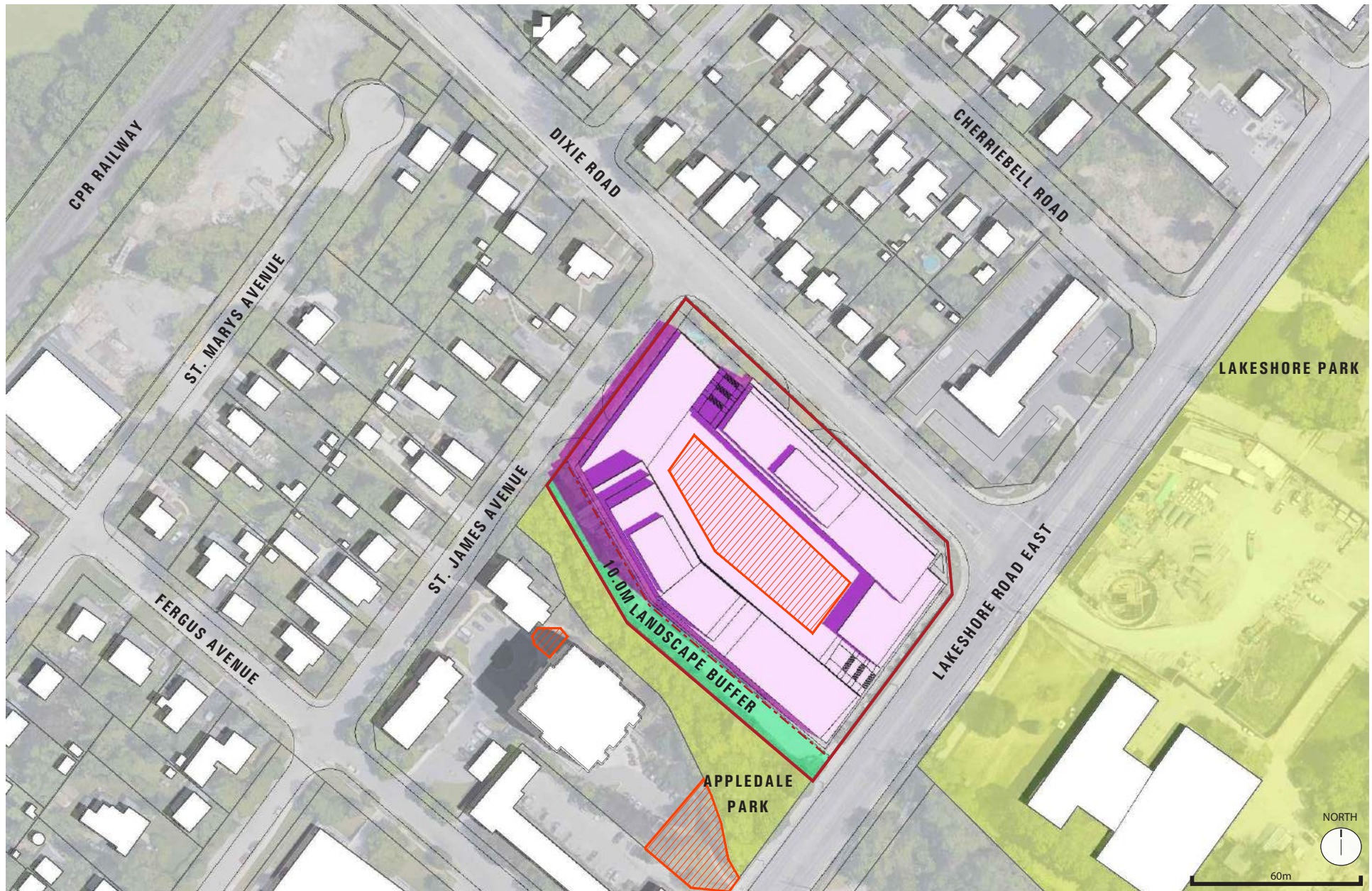
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June 21st - 10:20 am



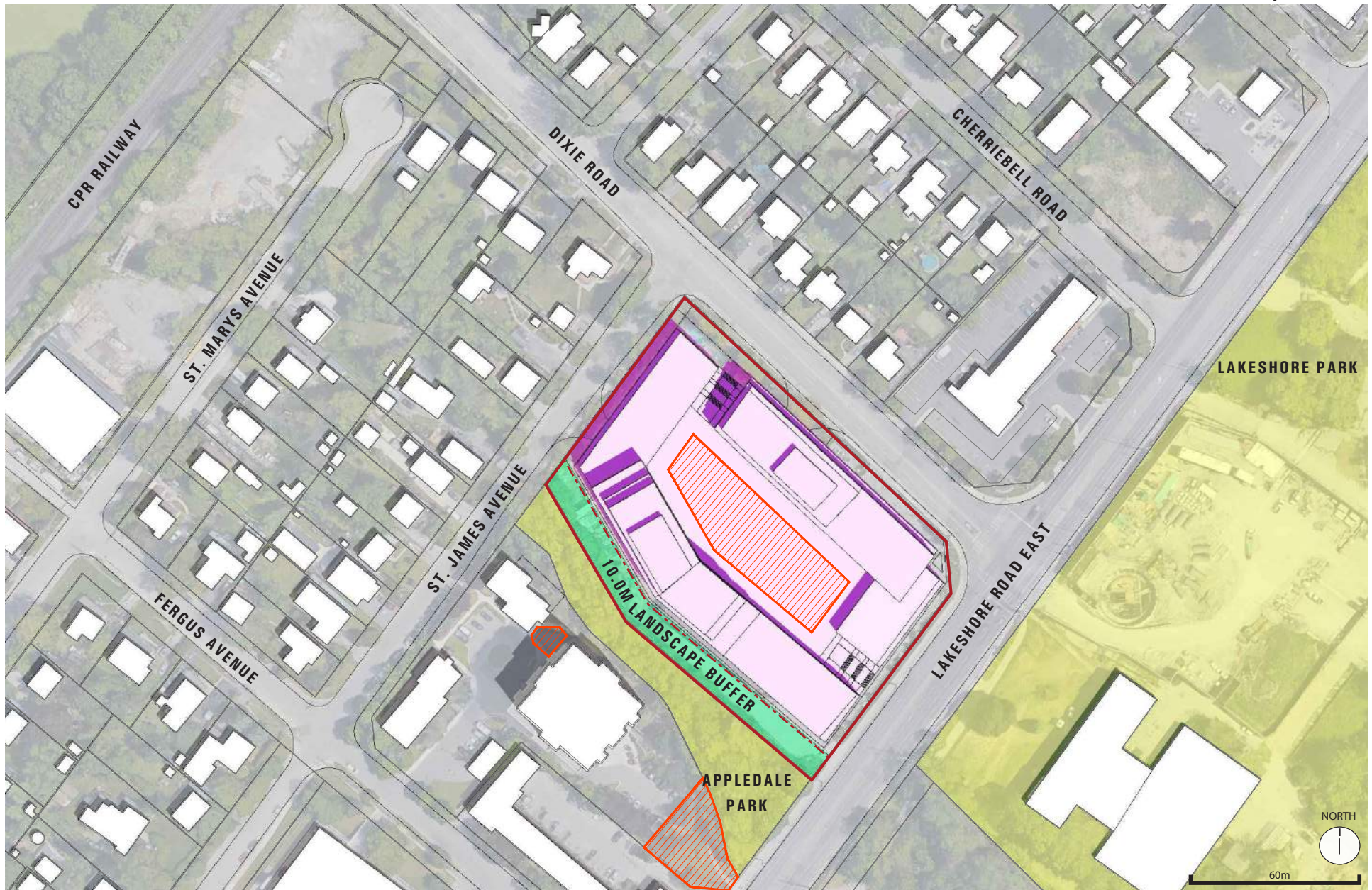
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June 21st - 11:20 am



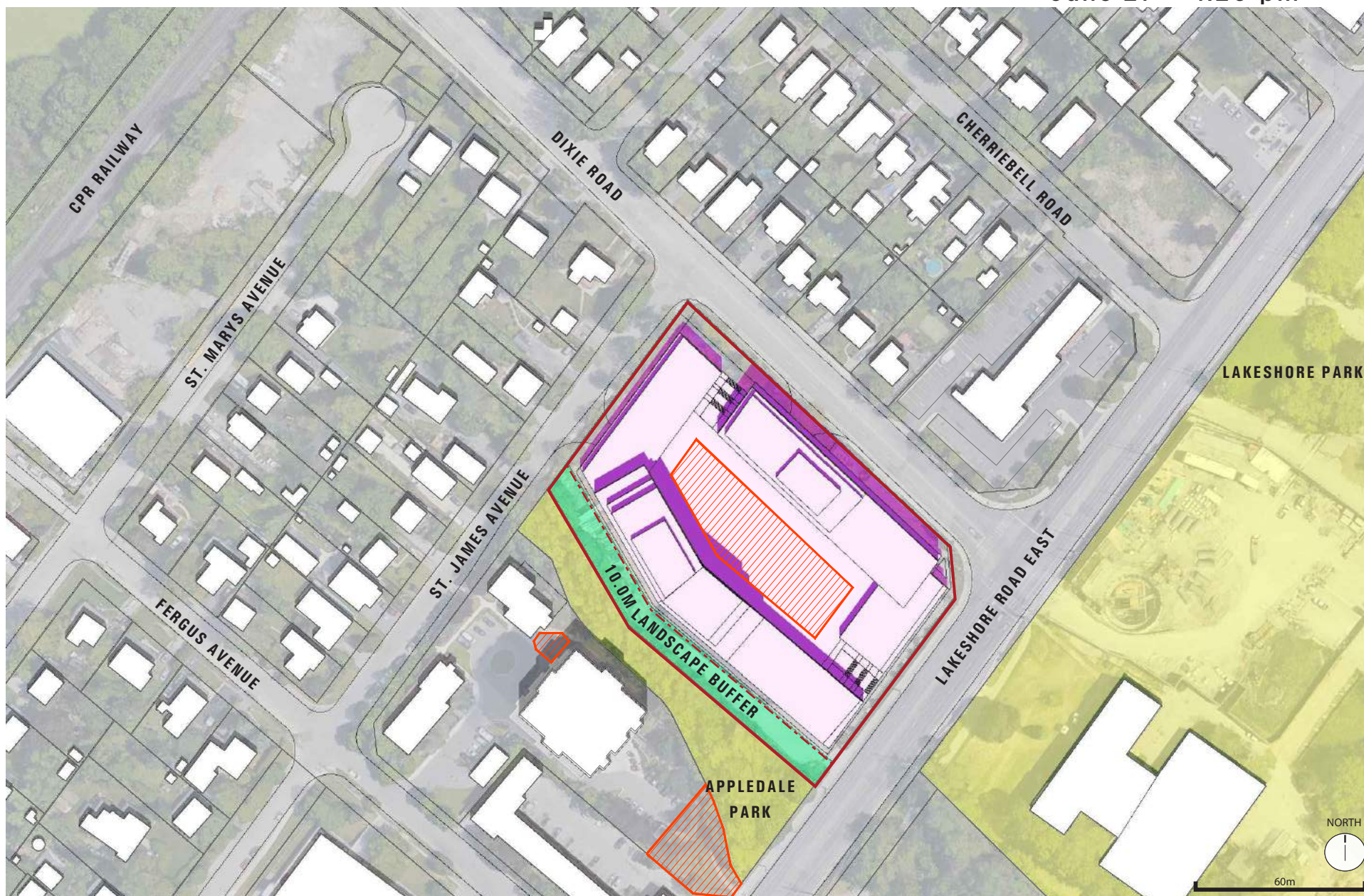
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June 21st - 12:20 pm



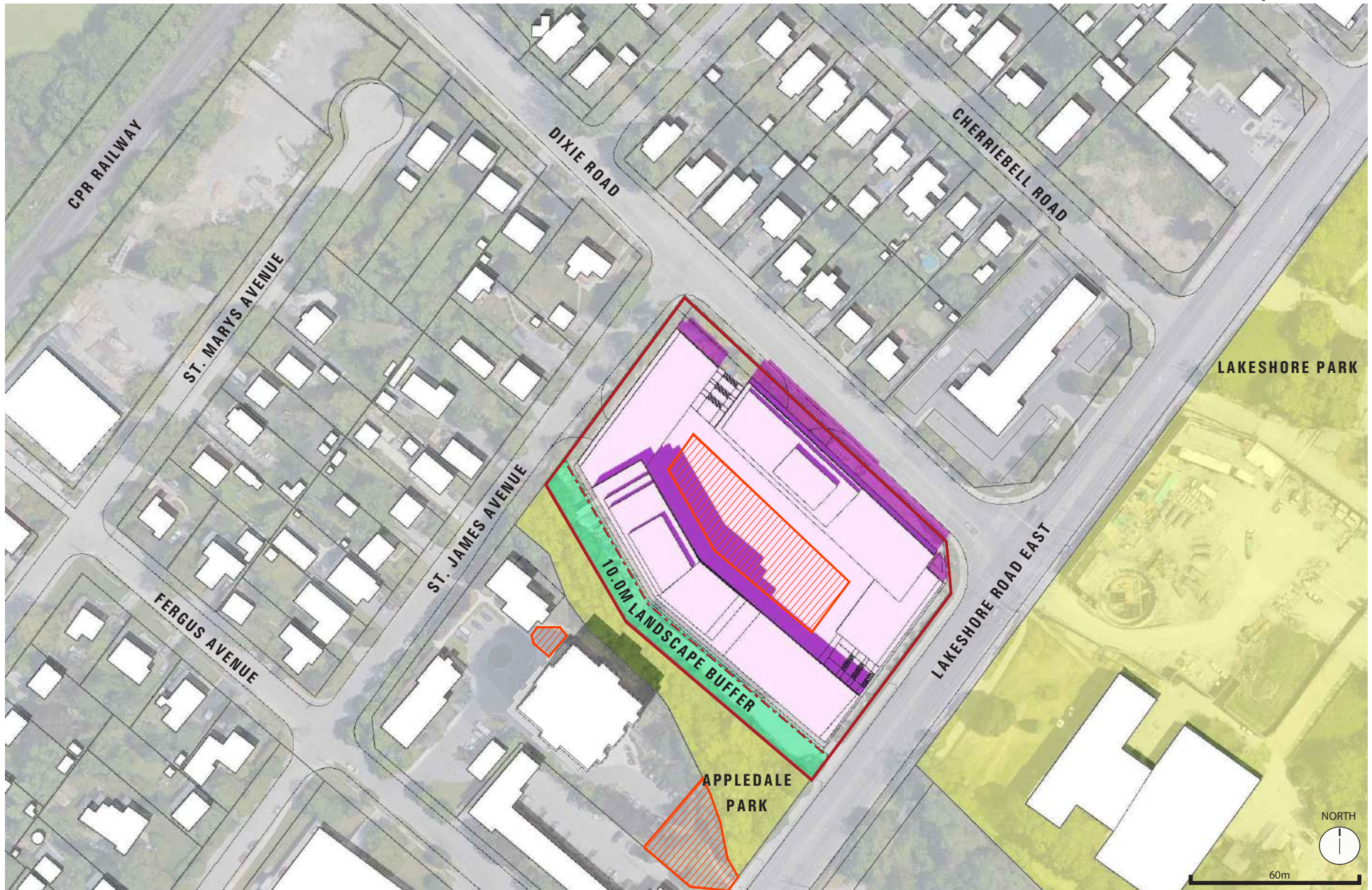
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June 21st - 1:20 pm



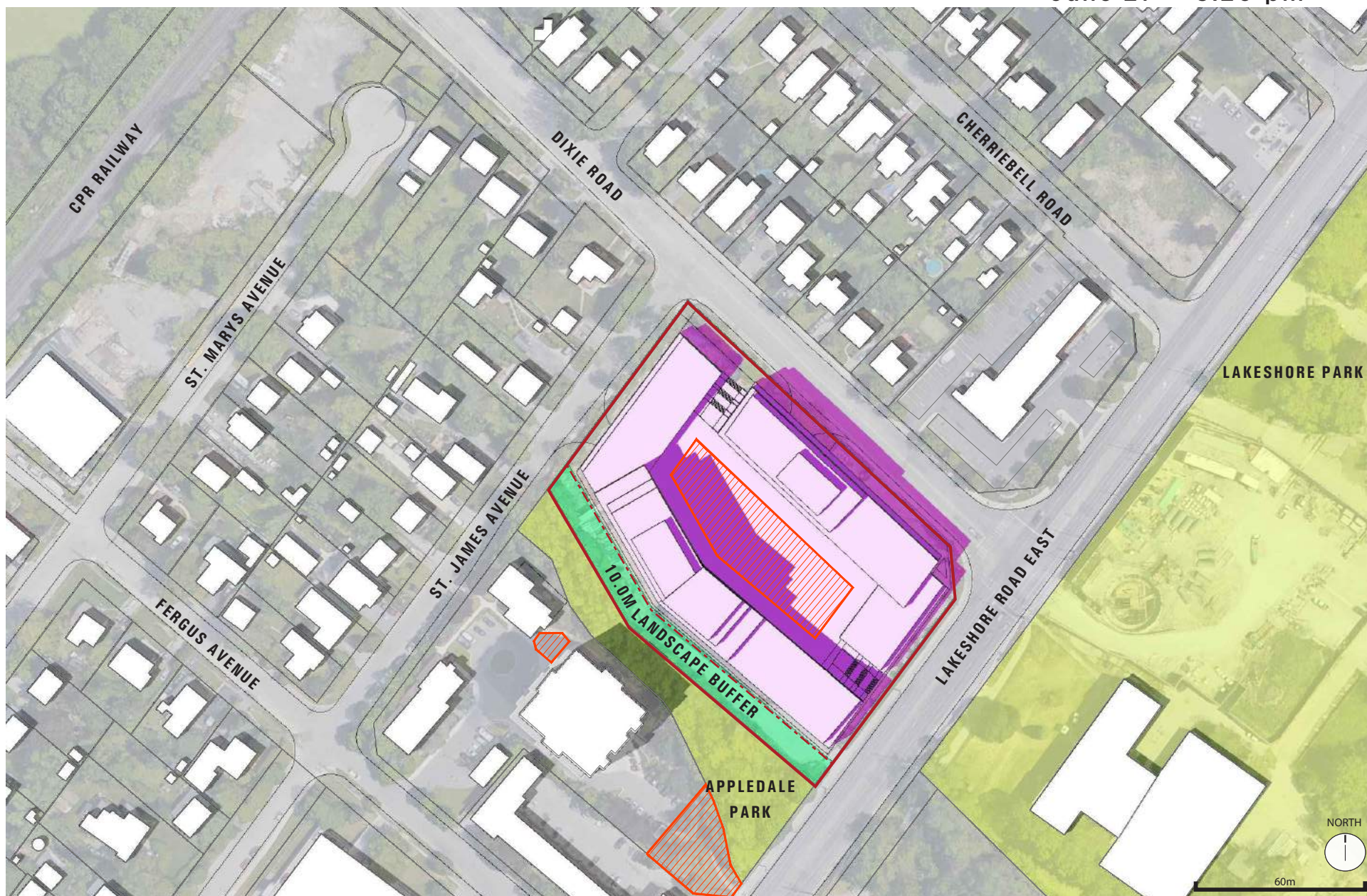
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June 21st - 2:20 pm

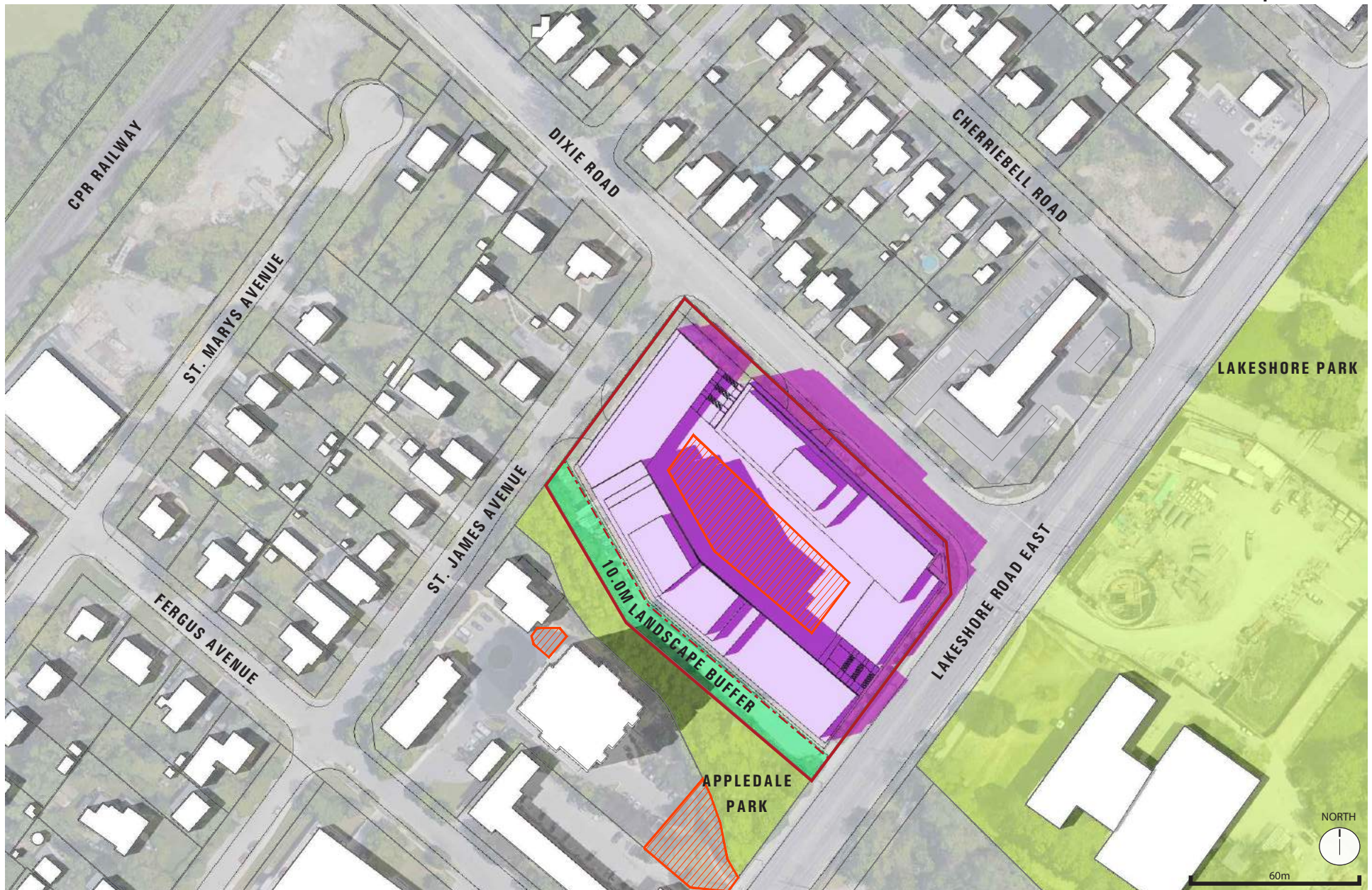


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June 21st - 3:20 pm

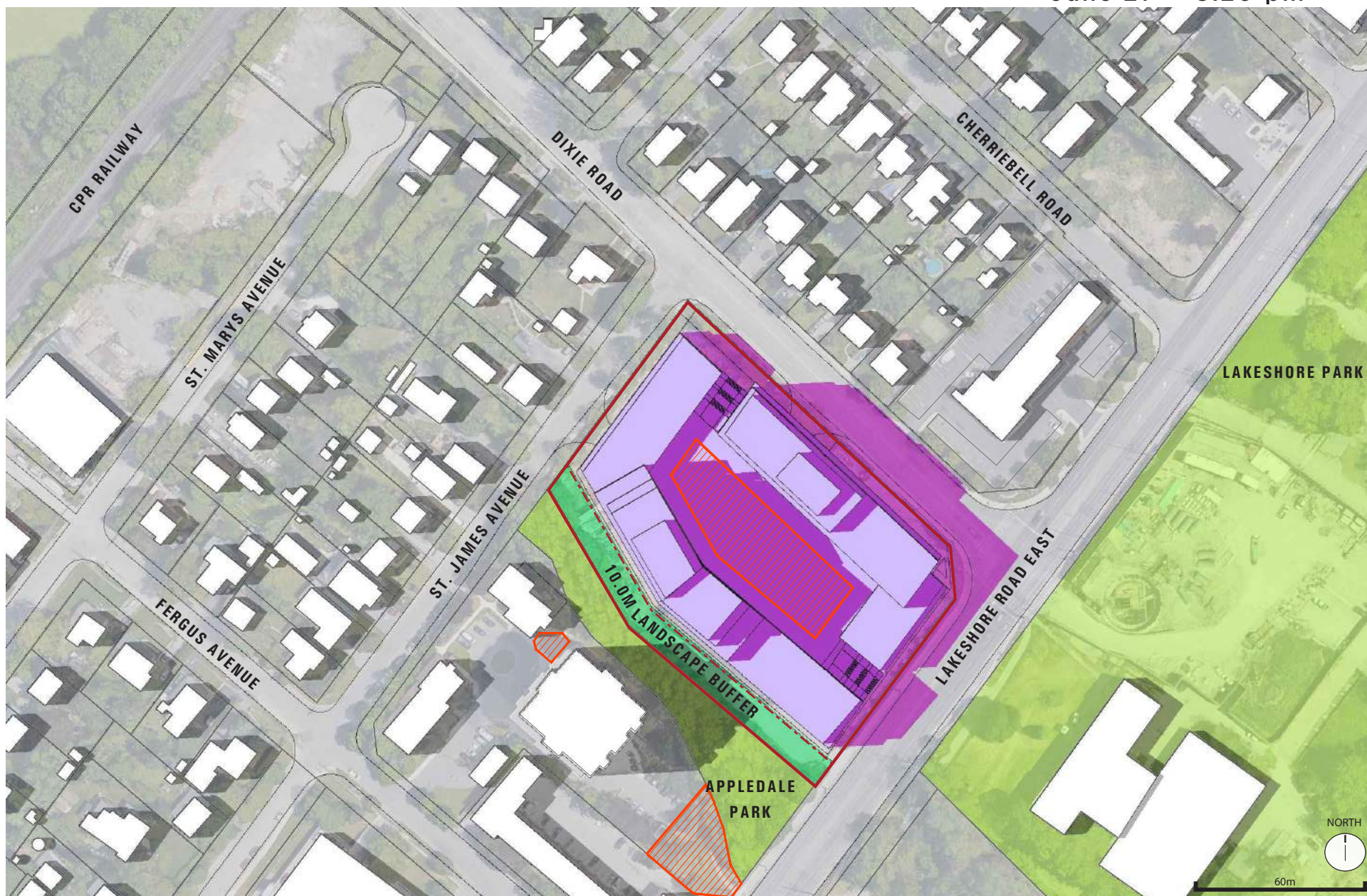


June 21st - 4:20 pm



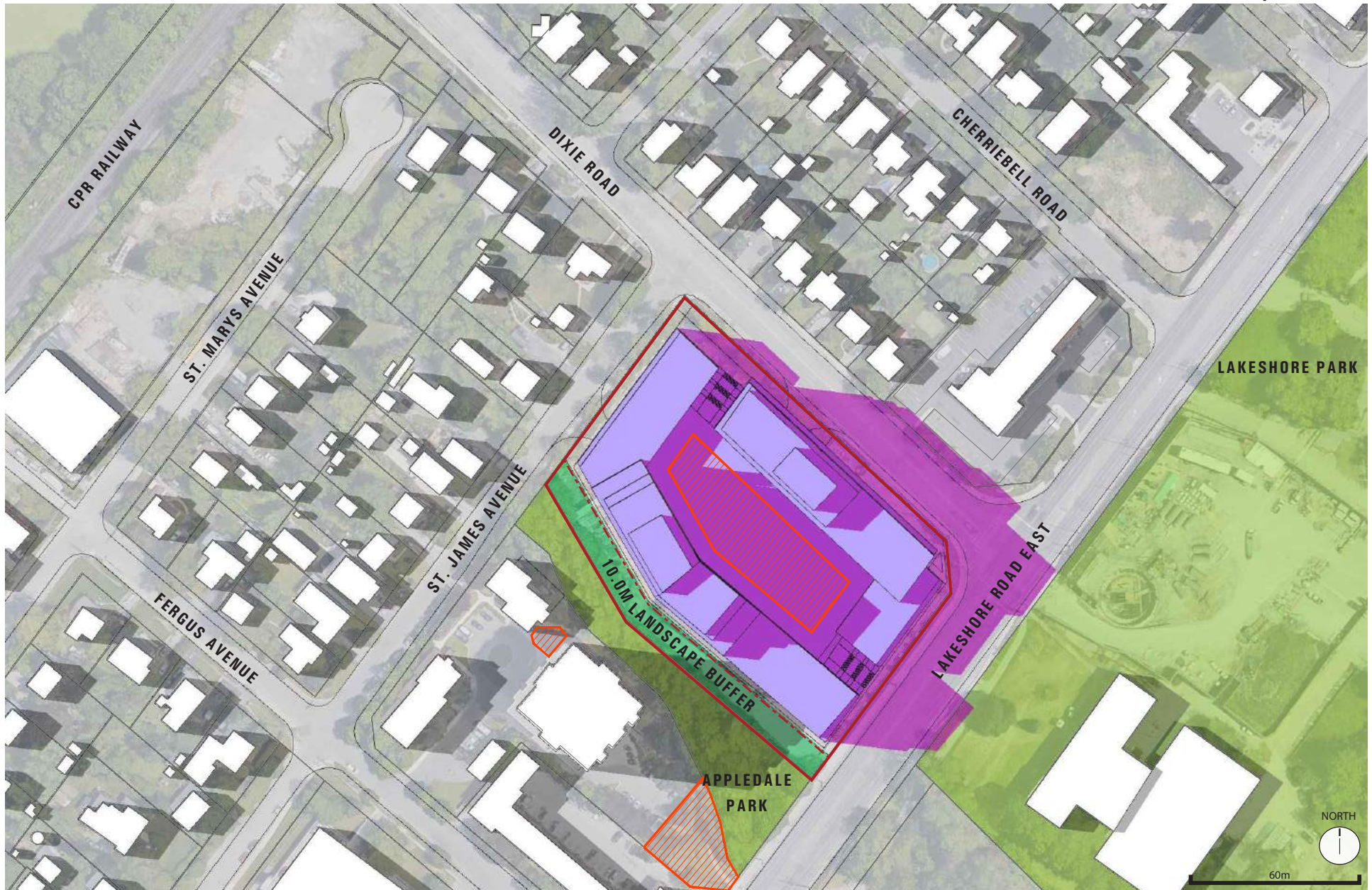
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June 21st - 5:20 pm



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June 21st - 6:20 pm



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June 21st - 7:20 pm



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June 21st - 7:33 pm



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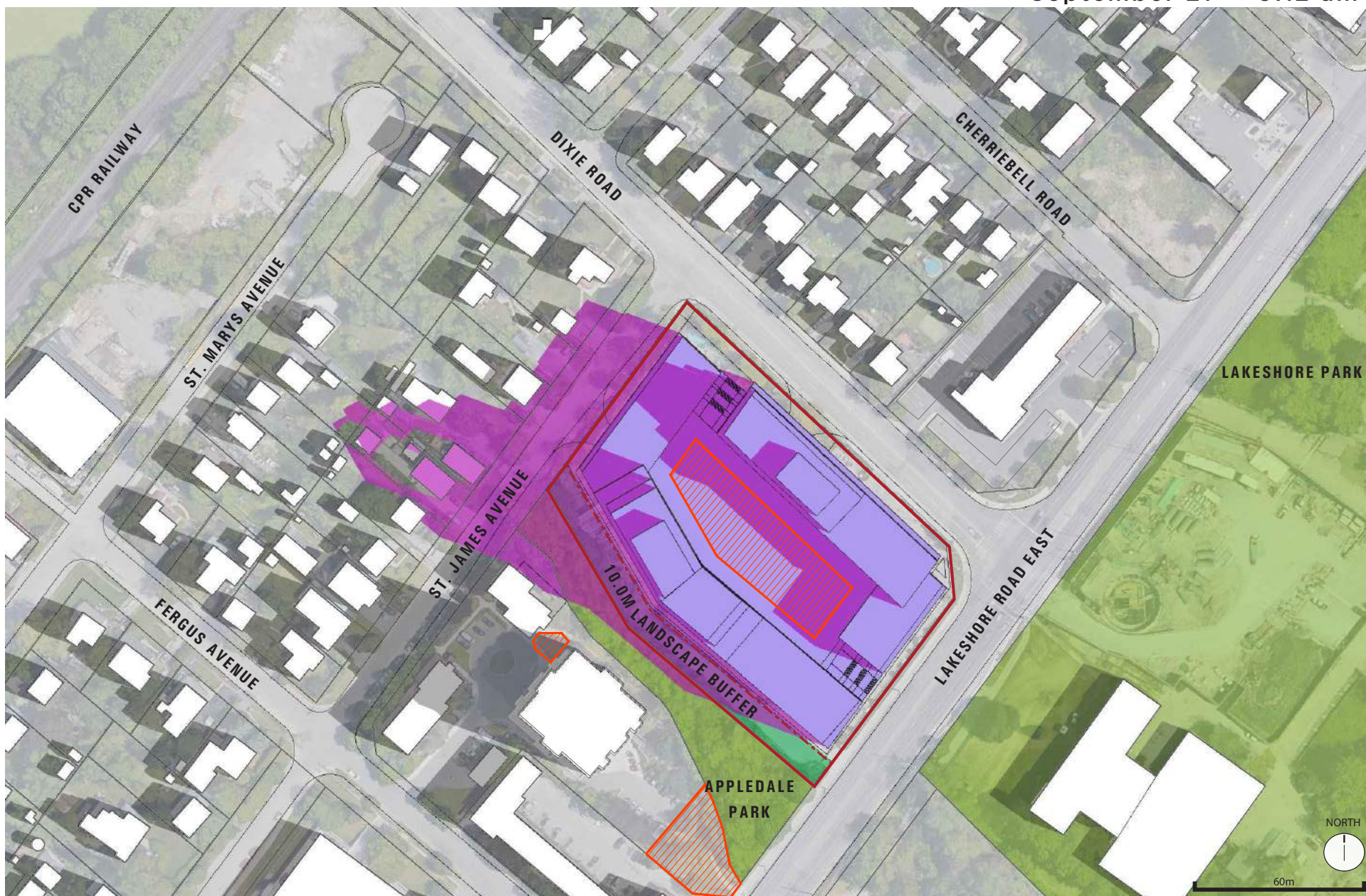
SEPTEMBER 21ST

September 21st - 8:35 am



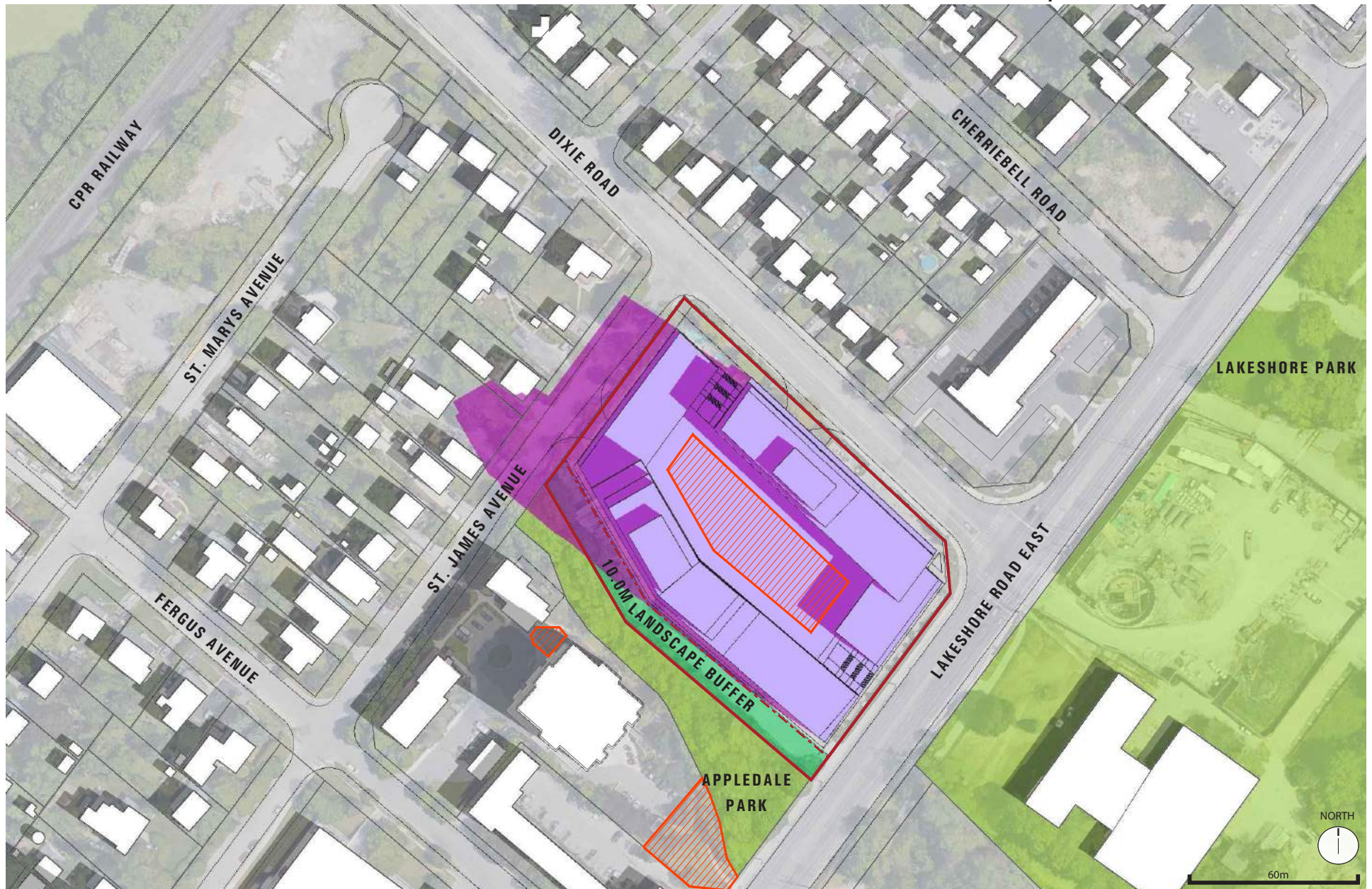
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September 21st - 9:12 am



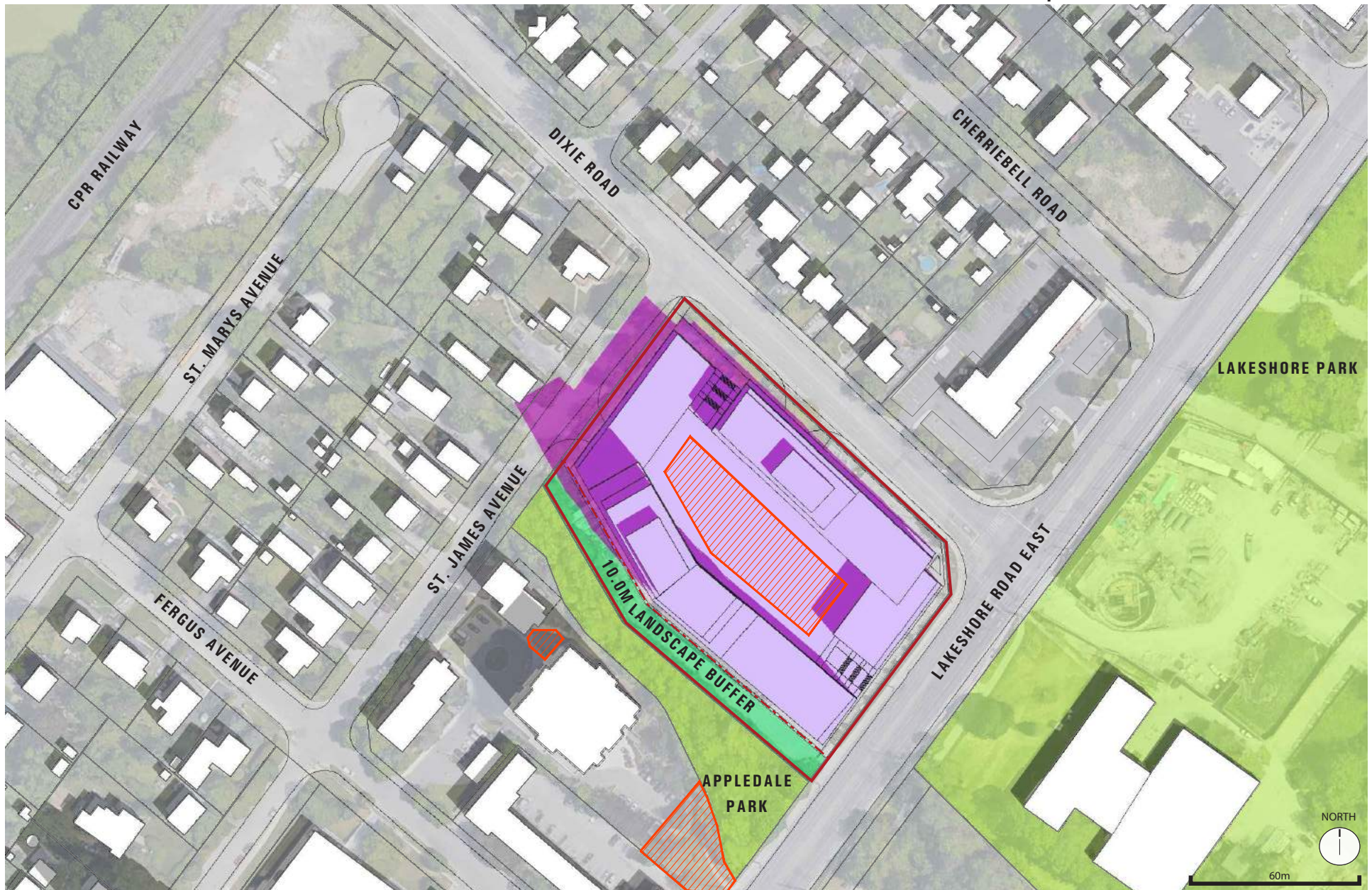
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September 21st - 10:12 am



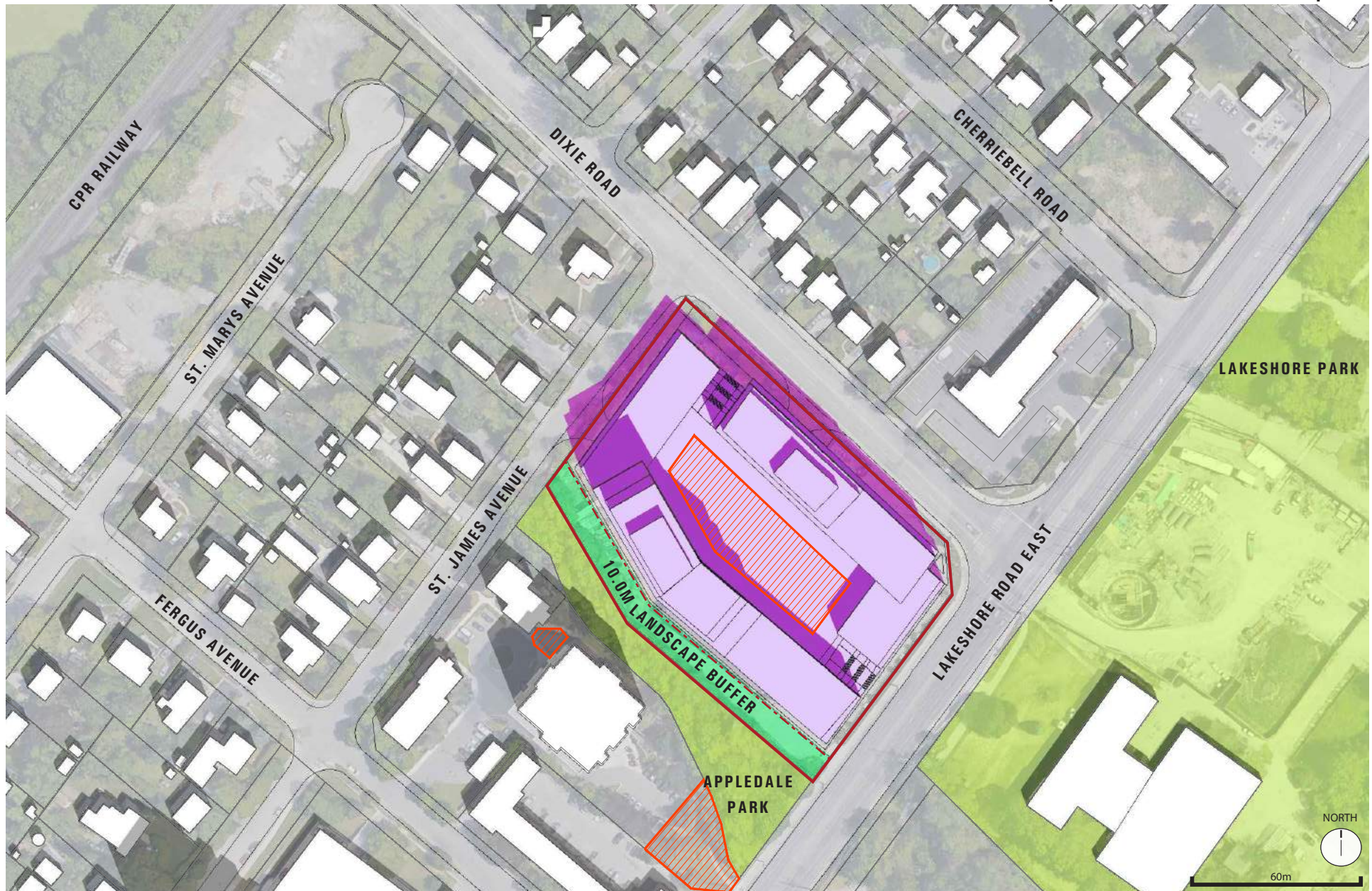
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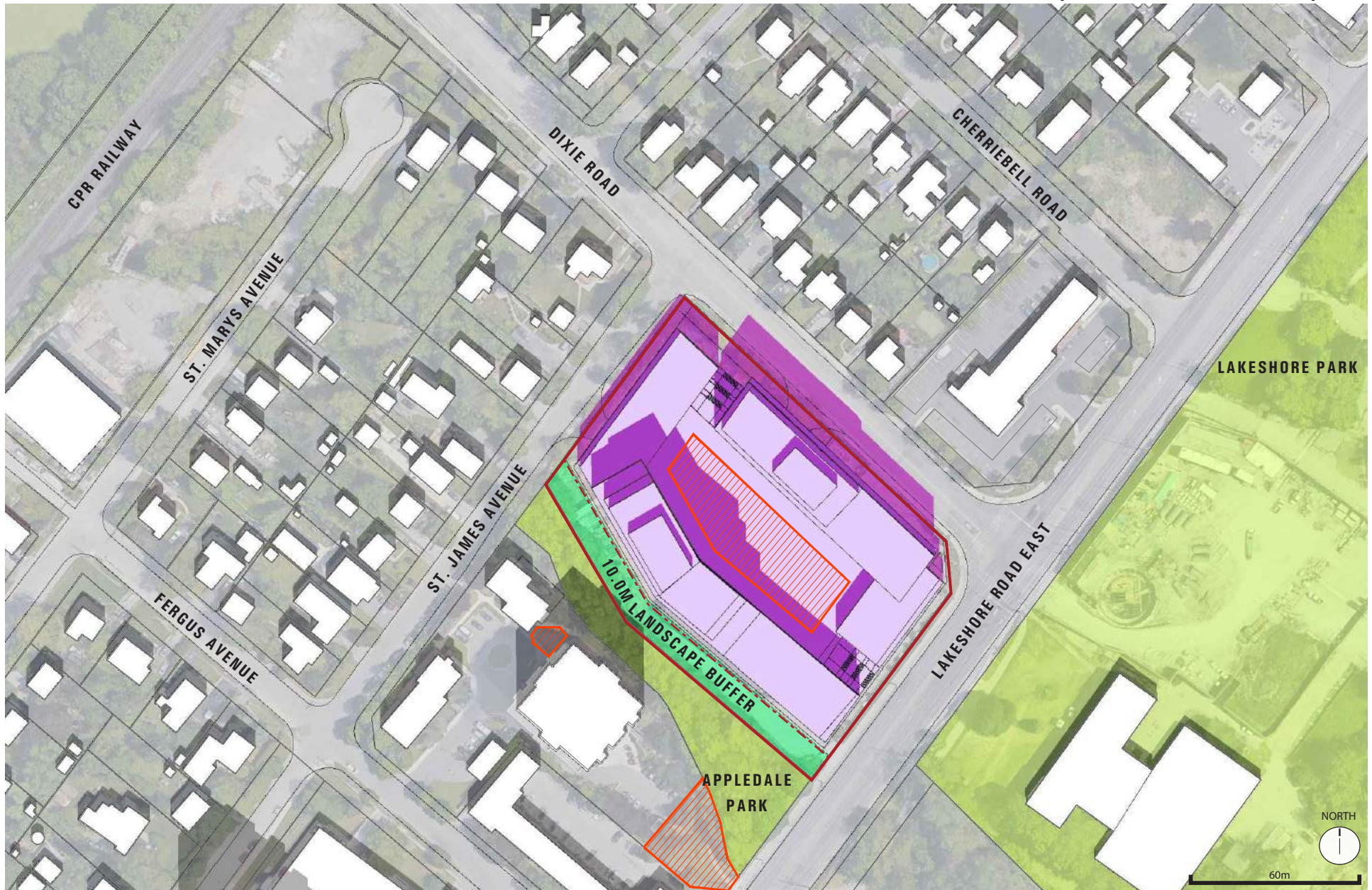
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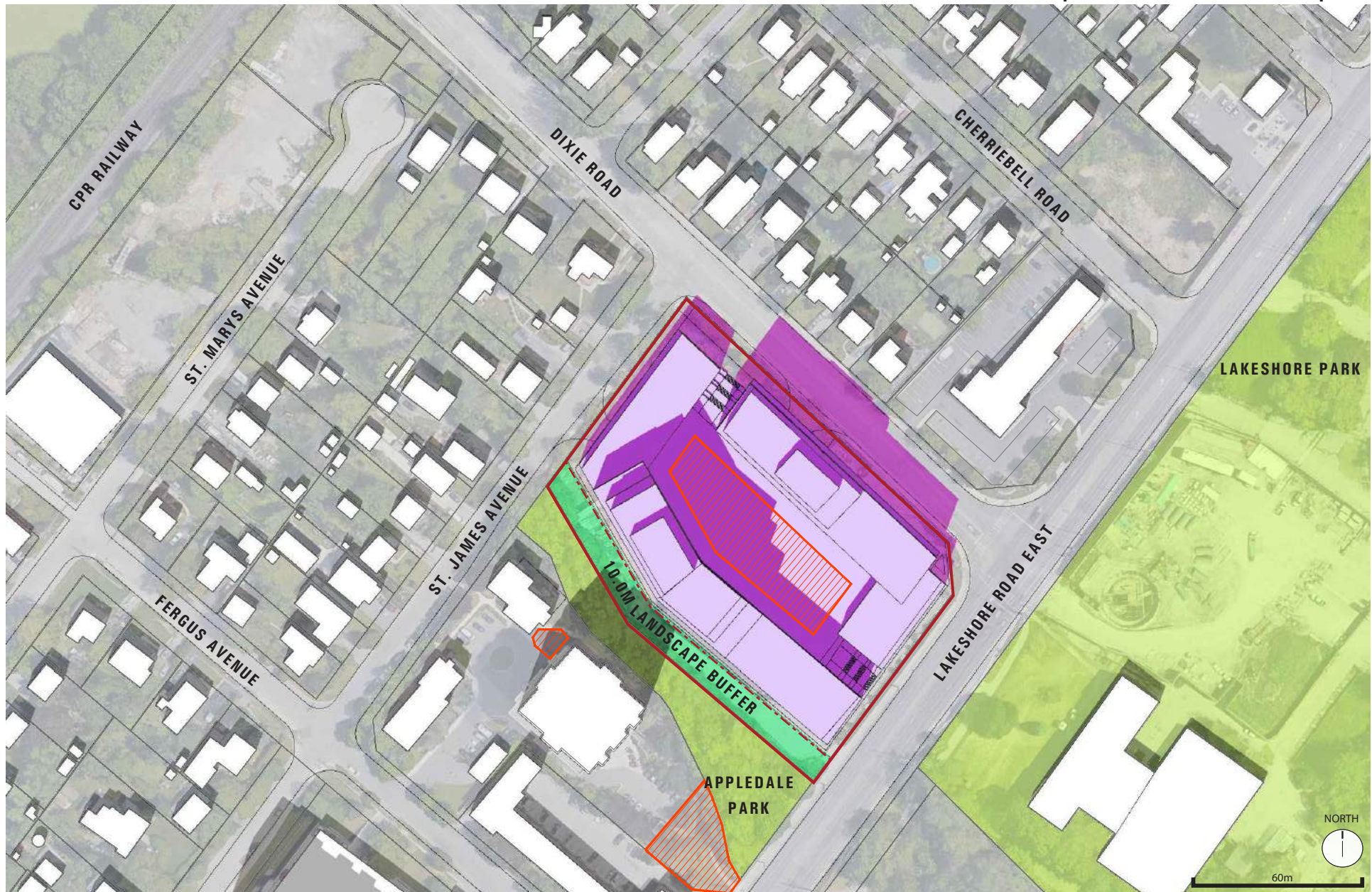
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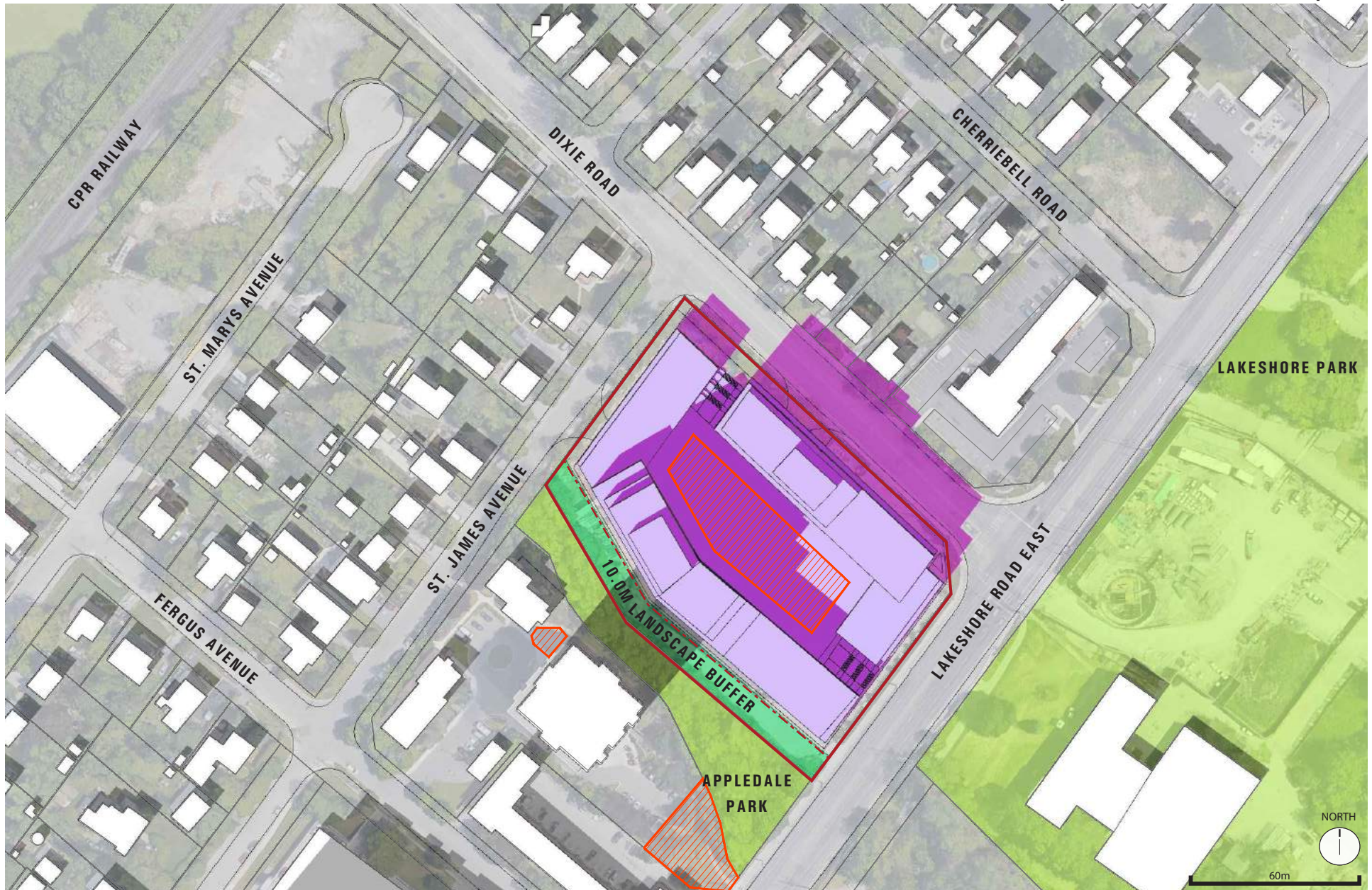
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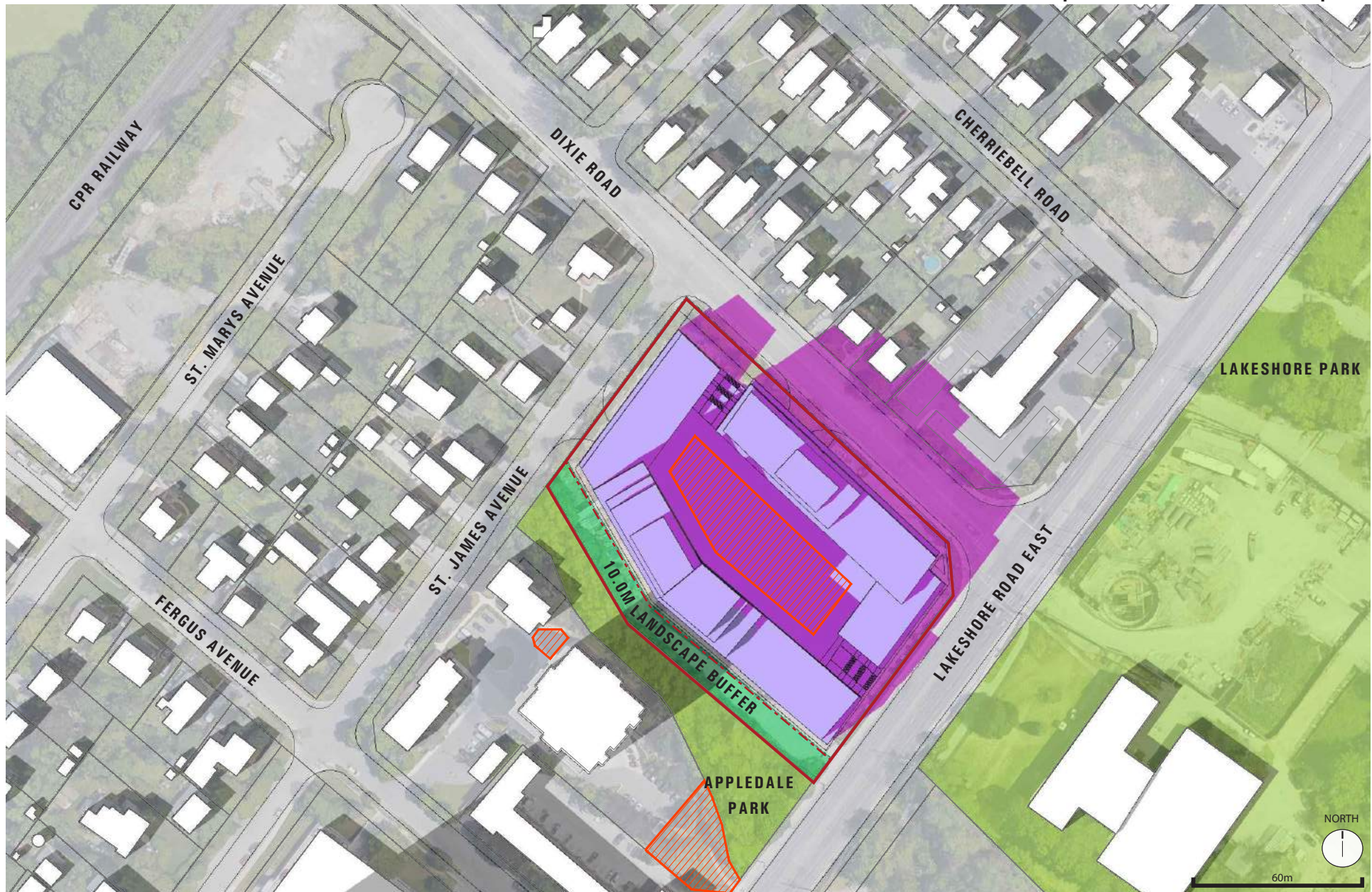
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- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

September 21st - 3:12 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

September 21st - 4:12 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

September 21st - 5:12 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

September 21st - 5:48 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

DECEMBER 21ST

December 21st - 9:19 am



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

December 21st - 10:17 am



December 21st - 11:17 am



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

December 21st - 12:17 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

December 21st - 1:17 pm



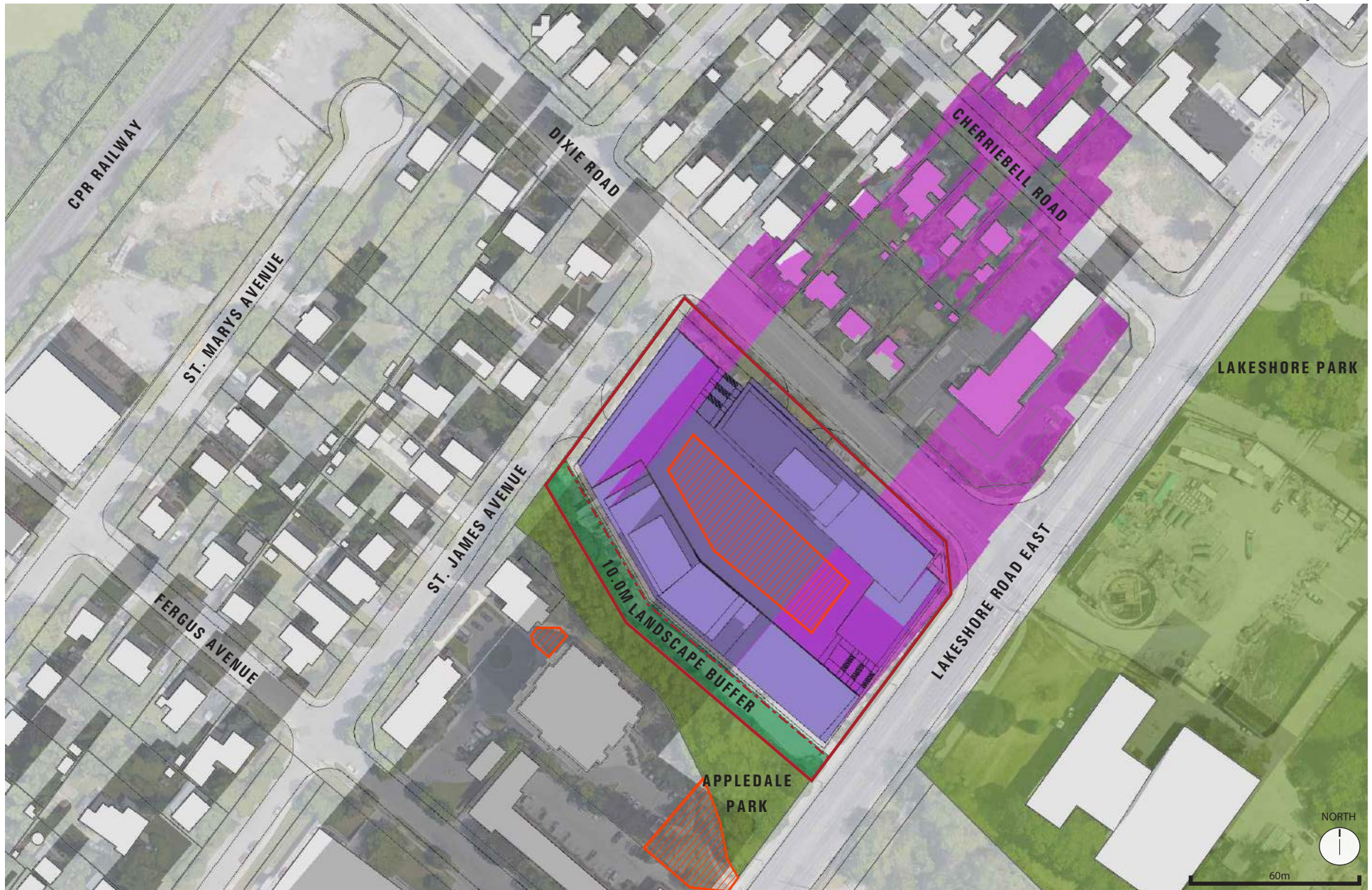
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

December 21st - 2:17 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

December 21st - 3:15 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Communal Outdoor Amenity Areas

Section 3.3 of the Mississauga Urban Design Terms of Reference - Standards for Shadow Studies requires the identification of Public Realm within the vicinity of the proposed development. Areas outlined in yellow were identified as Public Realm and include sidewalks, open spaces, parks and plazas.

Low and Medium Density Residential Streets

As defined by the Terms of Reference, Low and Medium Density Residential Streets should be designed to allow full sunlight on the opposite boulevard including the full width of the sidewalk on September 21st for a total of at least 4 hours between 9:12 am and 11:12 am, and between 3:12 pm and 5:12 pm.

As demonstrated by the shadow study, there is shadow from the proposed development on St. James Avenue sidewalk from 9:12 am to 11:12 am and on Dixie Road sidewalk from 2:12 pm to 5:48 pm, therefore criteria 3.3 Low and Medium Density Residential Streets is not met. However, in examining the shadowing impact on the north side of St. James Avenue, it should be noted that there are no sidewalks on the north side of the street, therefore, it is not expected to be heavily used by pedestrians. With respect to shadowing on the east sidewalk along Dixie Road, it is our opinion that the shadowing impact is limited, as the sidewalk does not front any high traffic public zones such as parks or retail storefronts, etc., rather the sidewalk abuts residential front yards/driveways, and the parking area of the commercial plaza.

Public Open Spaces, Parks and Plazas

As defined by the Terms of Reference, shadows from a proposed developments should allow for full sun on areas identified as Public Realm at least half the time, or 50% sun coverage all the time. If the "sun access factor" is at least 50% or 0.5 on each of the test dates ($As(ave)/AT = 0.5$ or more), then the shadow impact is considered to be in compliance with these terms of reference. The findings of the shadow study conclude that the proposed development complies with this standard.

Figure 3 - Public Realm key map identifies all areas in the vicinity.

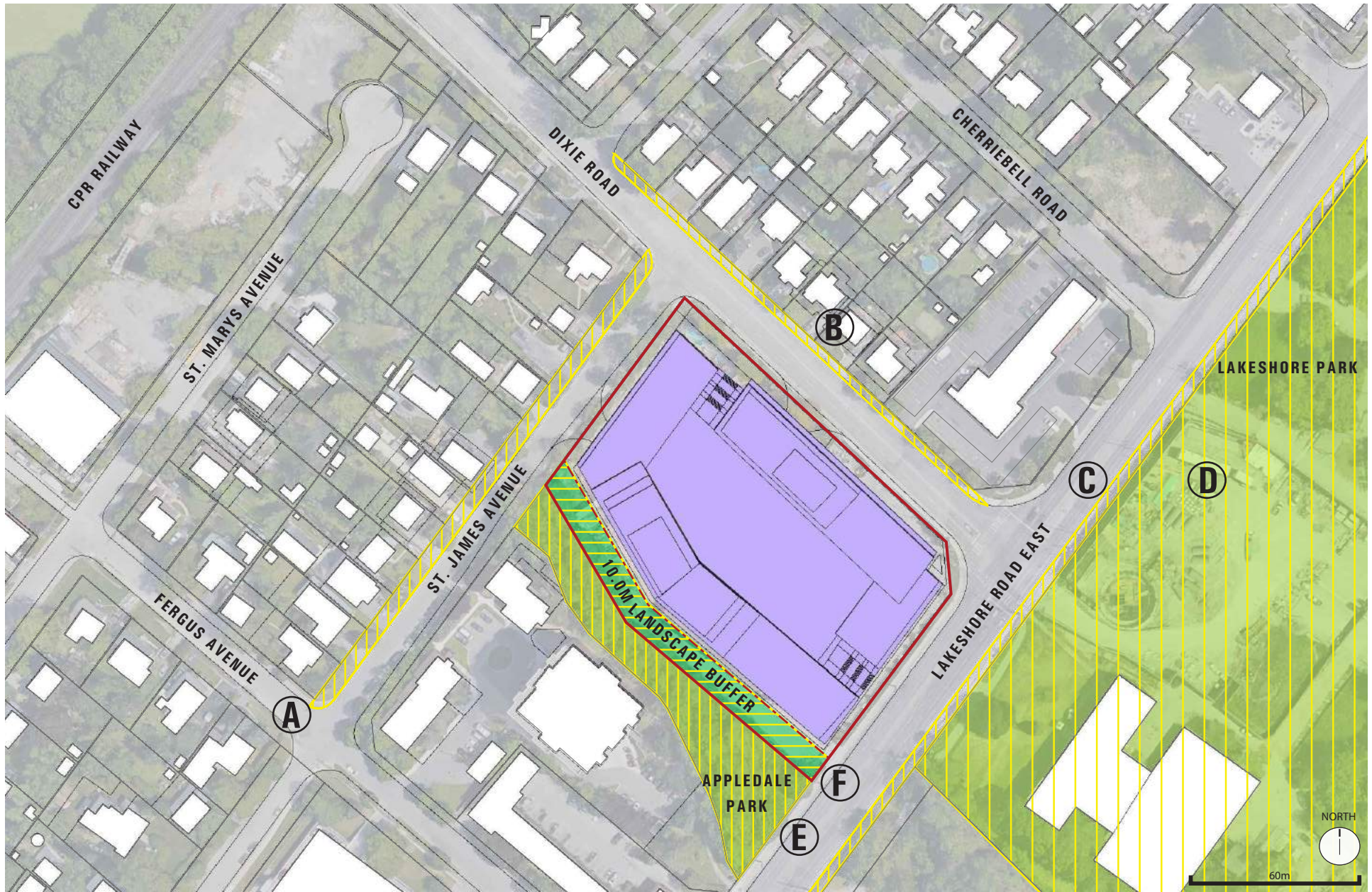


Figure 3 - Public realm key map

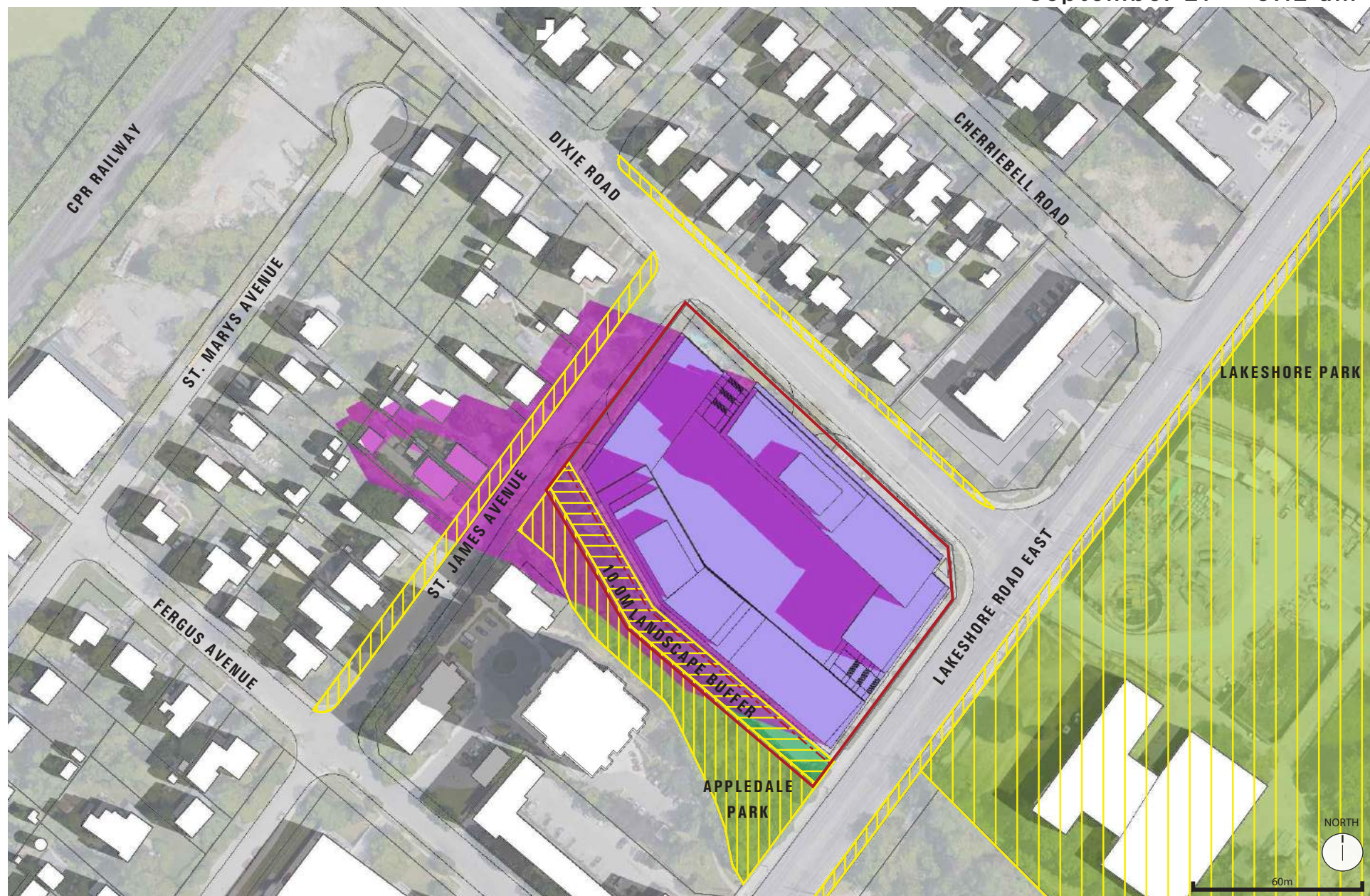
SEPTEMBER 21ST

September 21st - 8:35 am



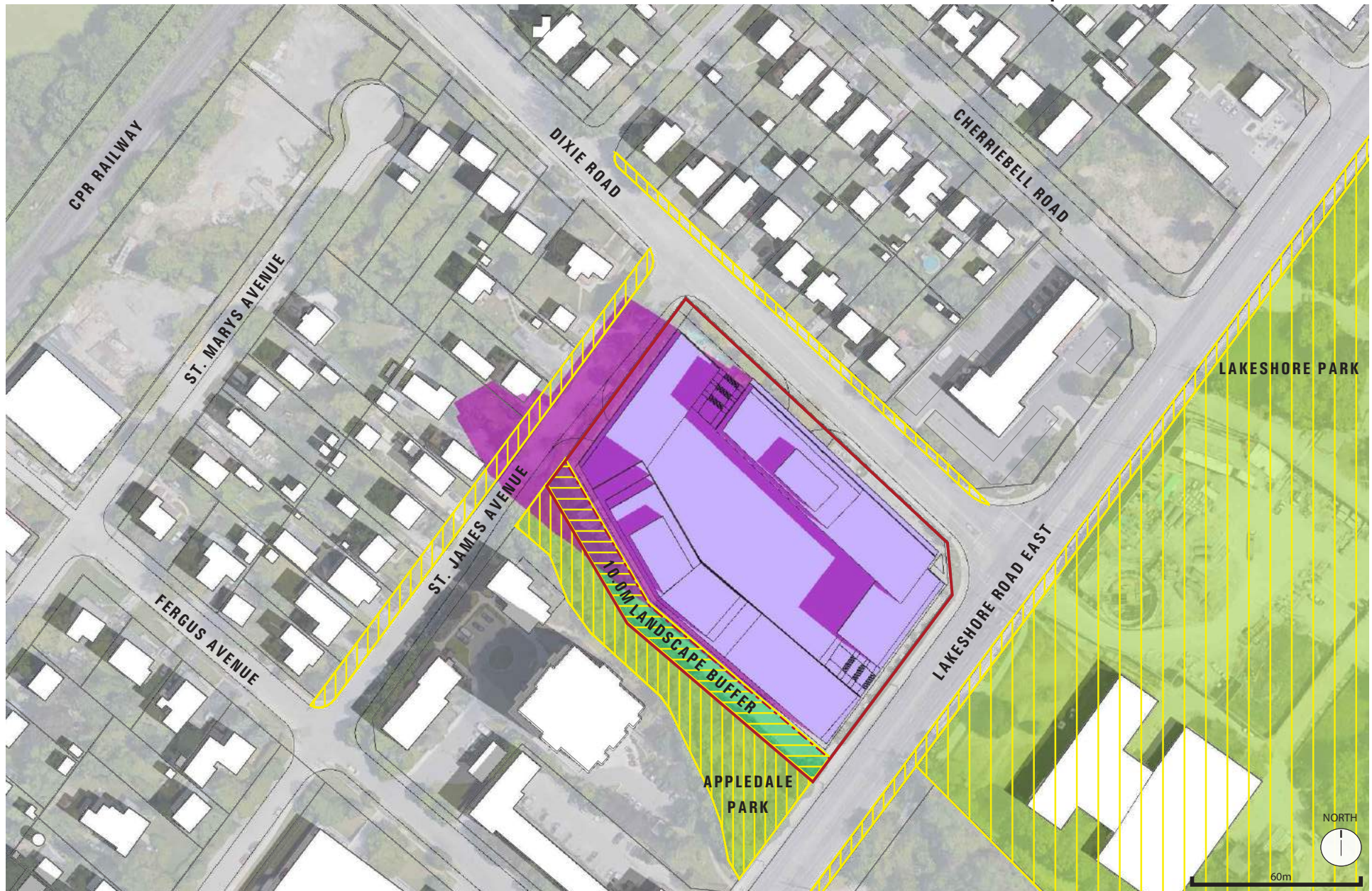
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 9:12 am



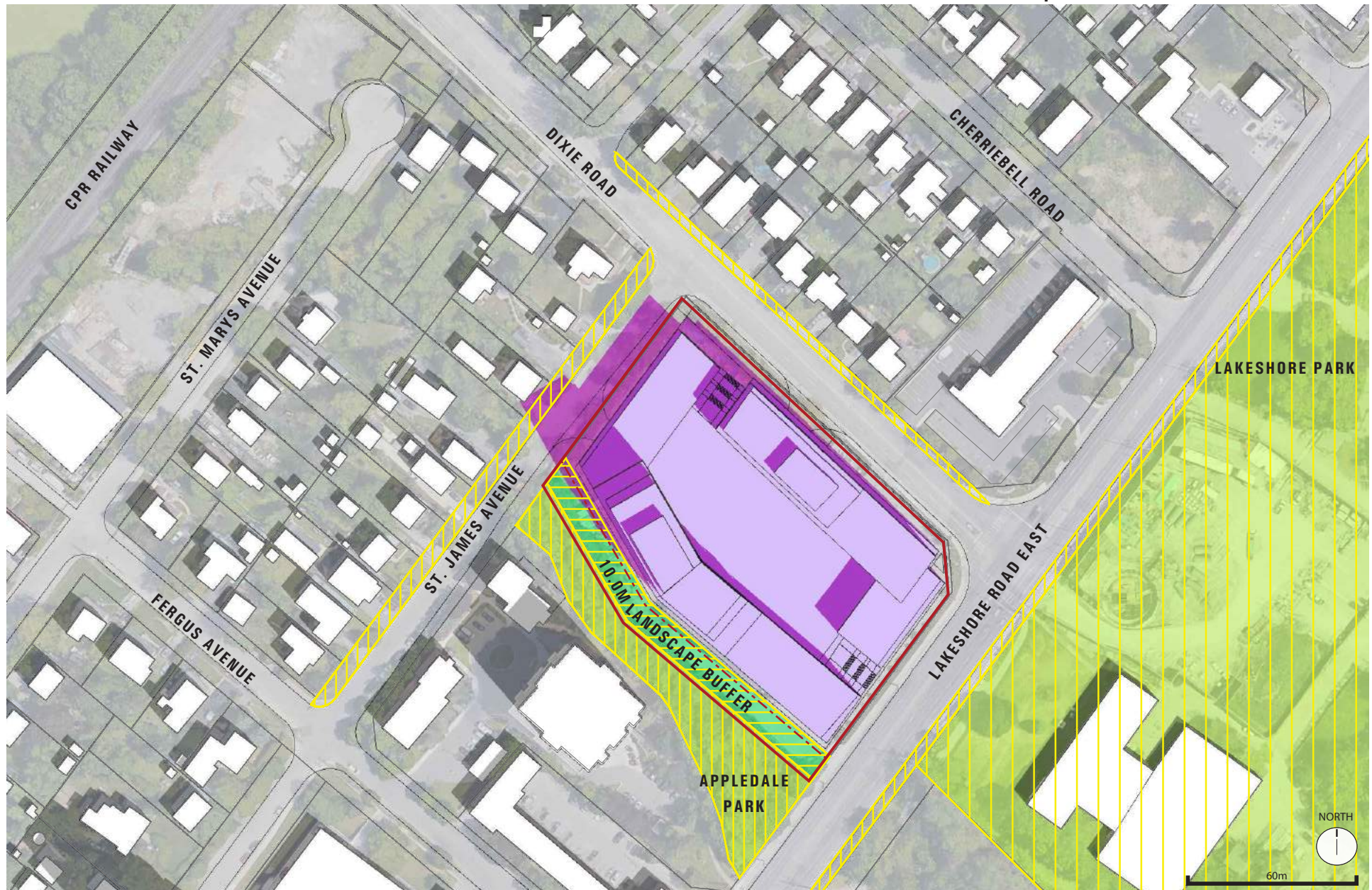
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 10:12 am



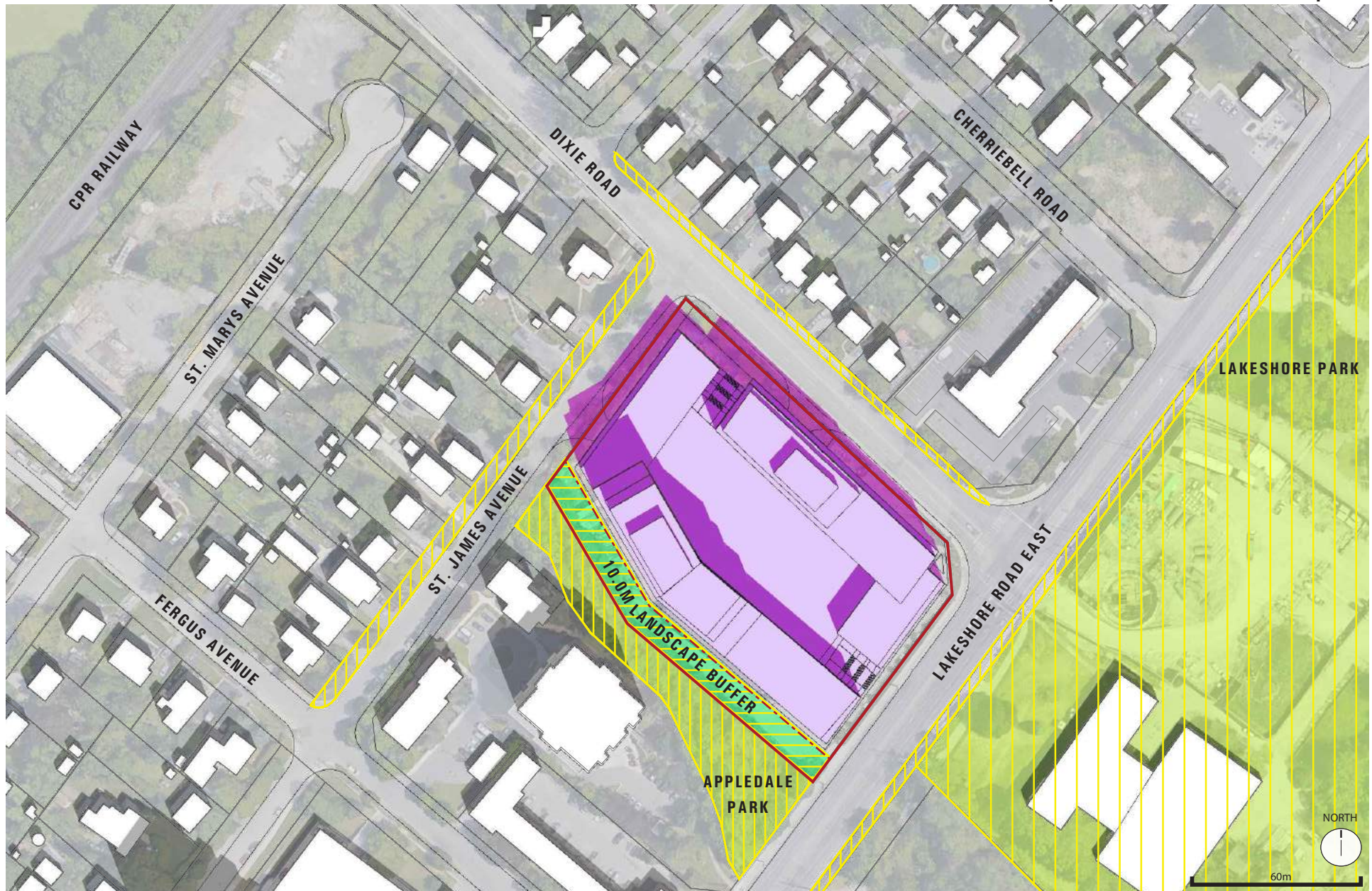
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 11:12 am



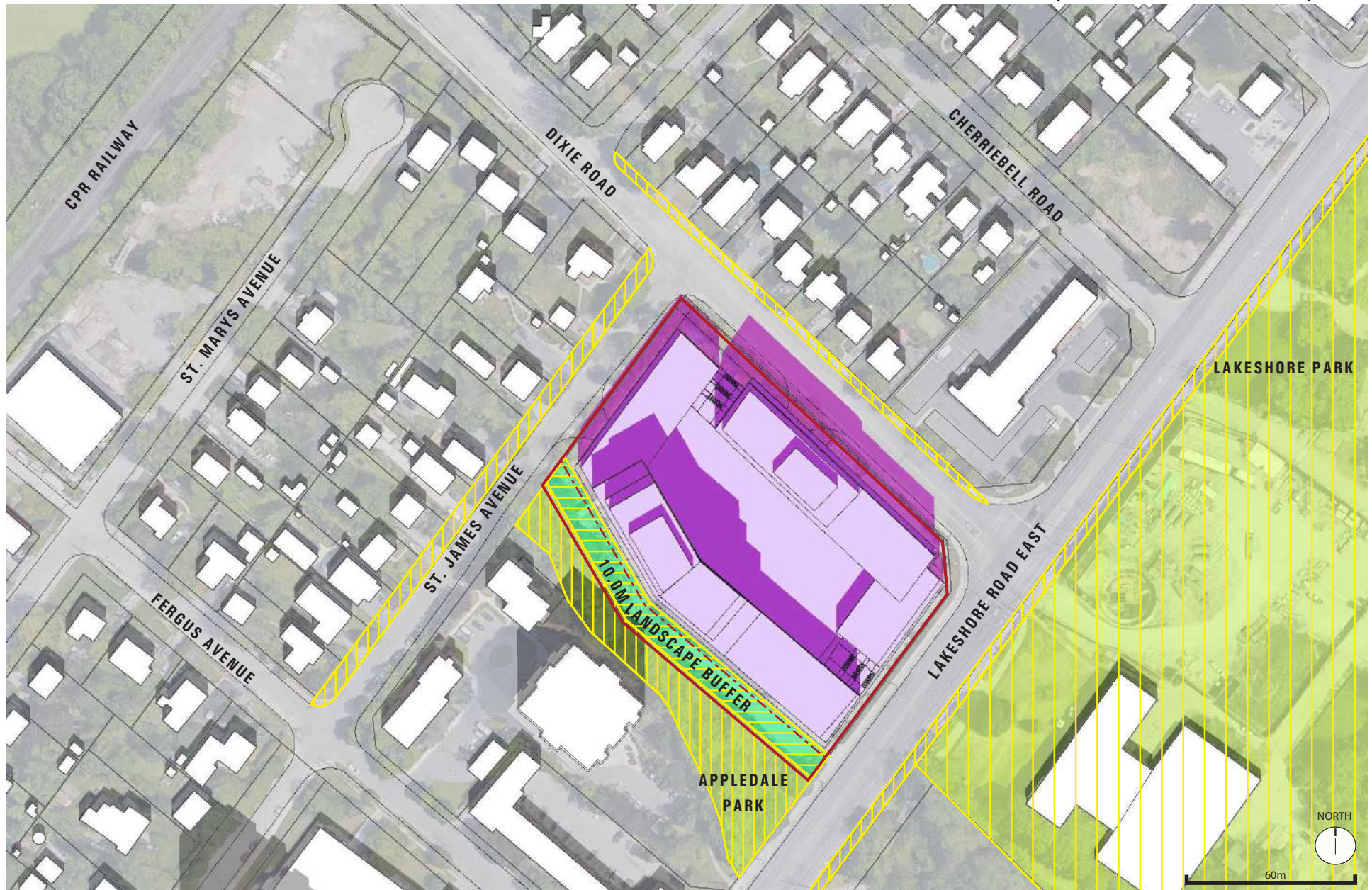
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 12:12 pm



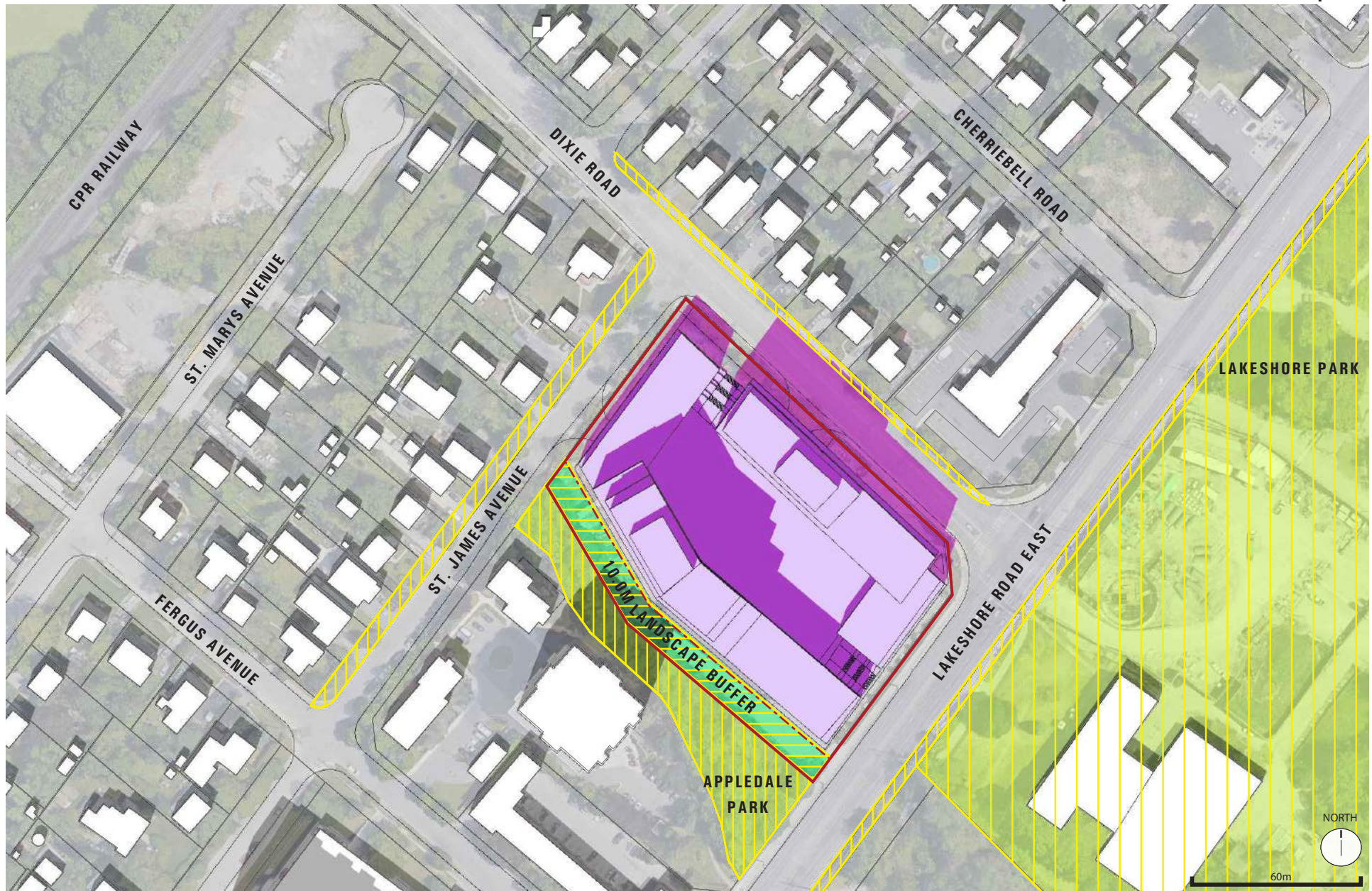
- Subject Site Existing Buildings Proposed Development Shadow Cast by Proposed Development Shadow Cast by existing buildings Existing Park 10.0m Landscape Buffer Public Realm

September 21st - 1:12 pm



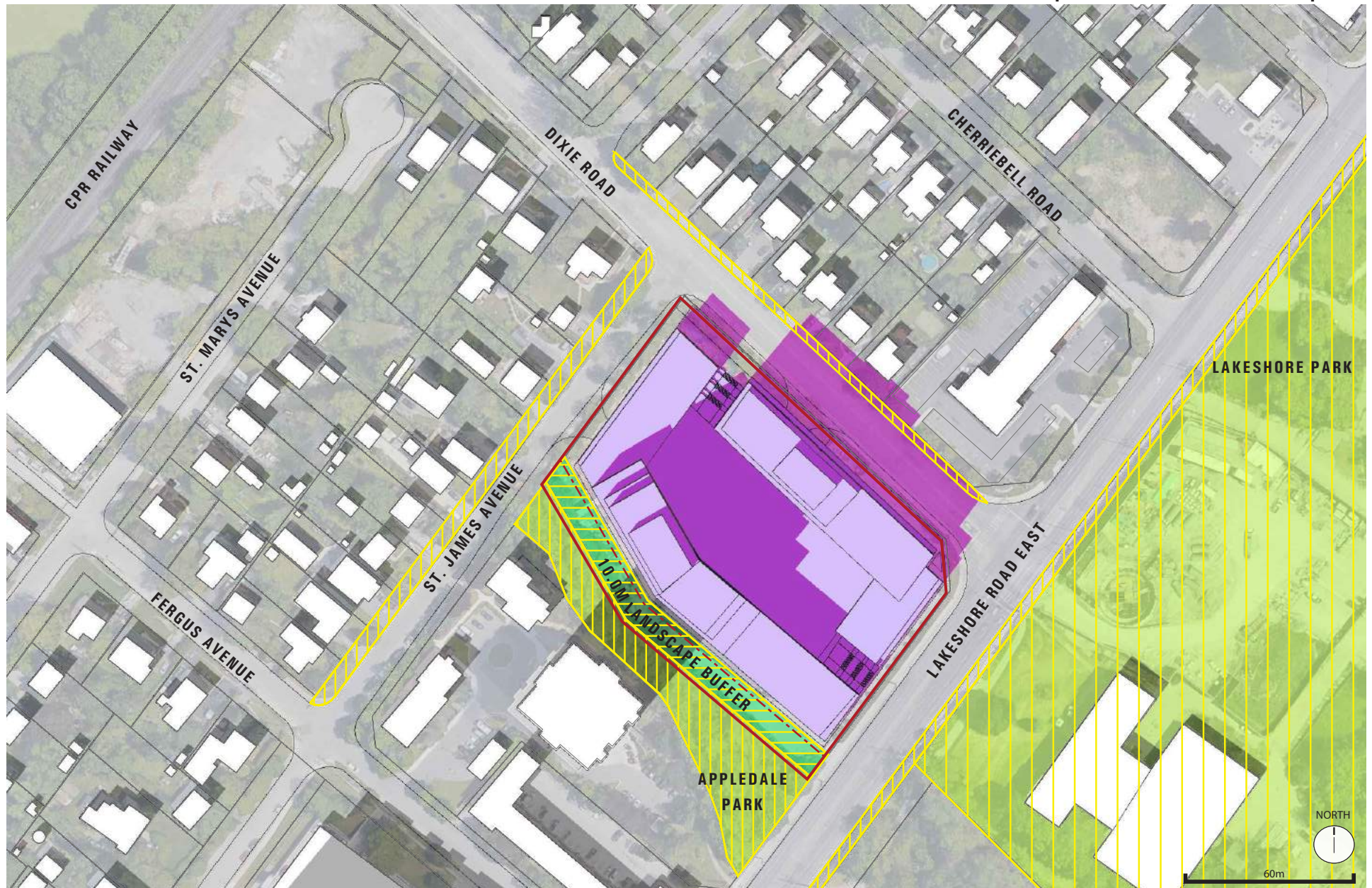
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 2:12 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 3:12 pm

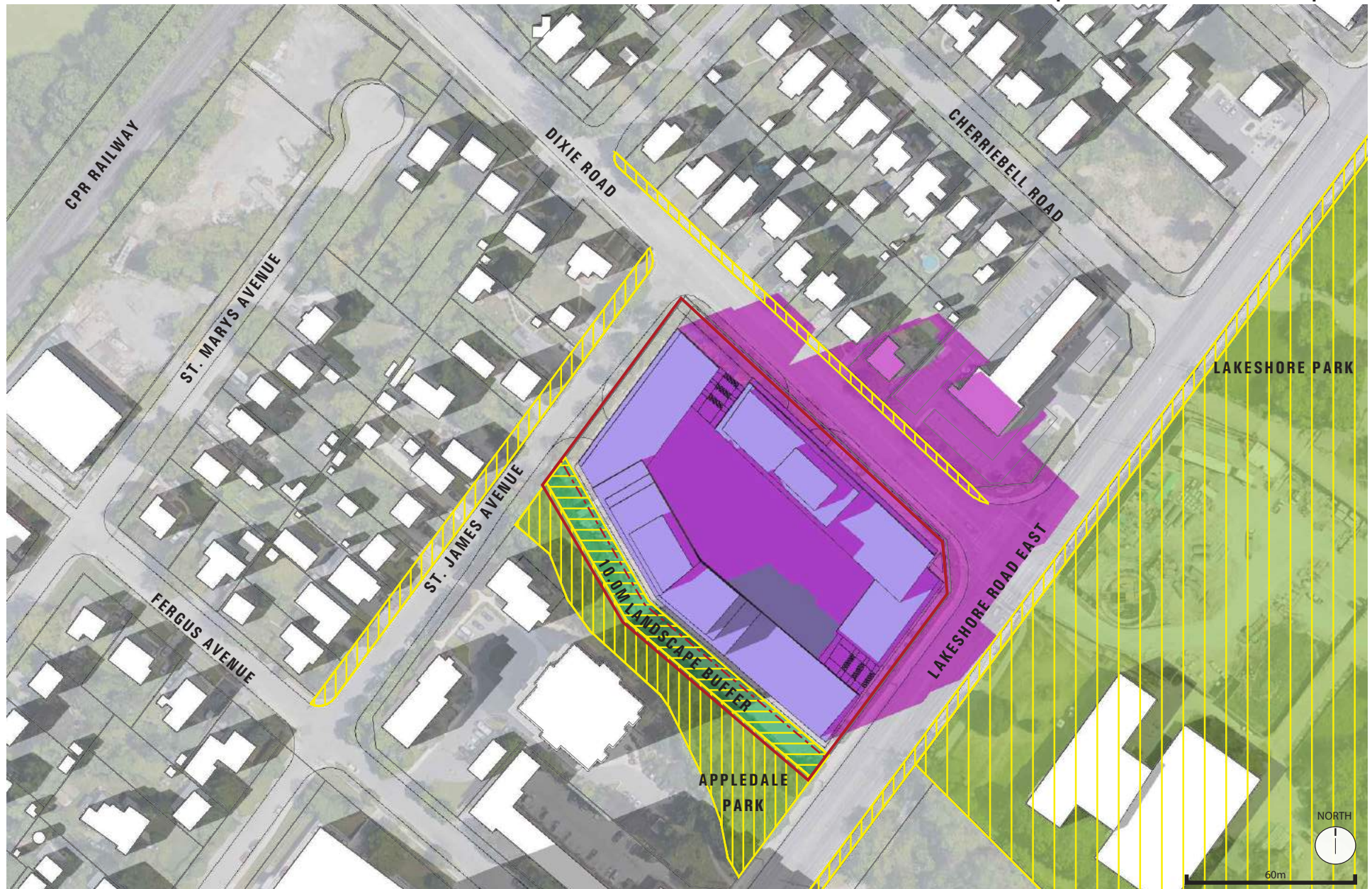


- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 4:12 pm

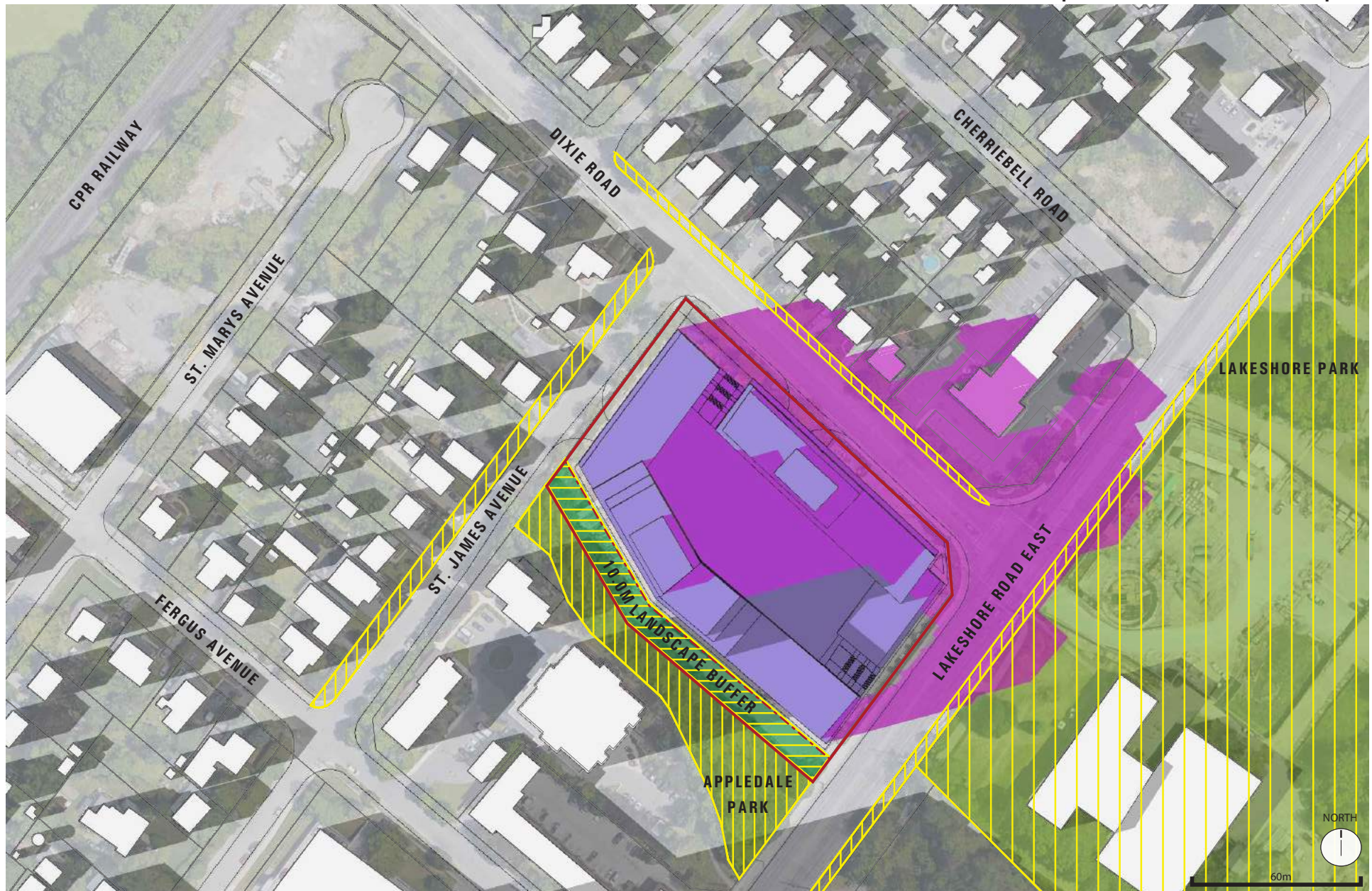


September 21st - 5:12 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

September 21st - 5:48 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Public Realm

TURF AND FLOWER GARDENS IN PUBLIC PARKS (SECTION 3.4)

Section 3.4 of the Mississauga Urban Design Terms of Reference - Standards for Shadow Studies states that proposed developments should allow for adequate sunlight during the growing season from March to October by allowing for a minimum of 6 hours of direct sunlight on September 21.

There are no turf and flower gardens in parks identified on the study area.

BUILDING FACES TO ALLOW FOR POSSIBILITY OF USING SOLAR ENERGY (SECTION 3.5)

Section 3.5 of the Mississauga Urban Design Terms of Reference - Standards for Shadow Studies states that shadow impacts from proposed developments should not exceed one hour in duration on the roofs, front, rear and exterior side walls of adjacent low rise (one to four storeys) residential buildings including townhouses, detached and semi-detached dwellings on September 21, in order to allow for the possibility of harvesting solar energy.

The line of impact assessment shall be a line at grade, 3 m from the front, rear and exterior side wall of the adjacent low rise residential buildings.

This criteria is met if there is shadow impact for no more than two consecutive hourly test times in the "No Impact Zone" (identified in blue) i.e. the space between the front, rear and exterior side walls of the adjacent low rise residential buildings and the respective lines of impact assessment.

The shadow analysis demonstrates that Area C located directly north west of the subject site receives shadowing from 8:35 am to 11:12 am or almost 3 consecutive hourly test times. Additionally, Area F located north east of the subject site receives shadowing from 3:12 pm to 5:48 pm. Therefore, criteria 3.5 is not met.

Although shadowing from the proposed development will impact building faces to the north for the possibility of using solar energy in the early- to late-morning on September 21st, and building faces to the east will be impacted in the mid- to late-afternoon on September 21st, the "sun access factor" will average 0.923 so that the "No Impact Zone" remains in sunlight for the vast majority of the day.

Figure 4 - Building faces to allow for possibility of using solar energy key map identifies all areas in the vicinity.



Figure 4 - Building faces areas key map

September 21st - 8:35 am



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 9:12 am



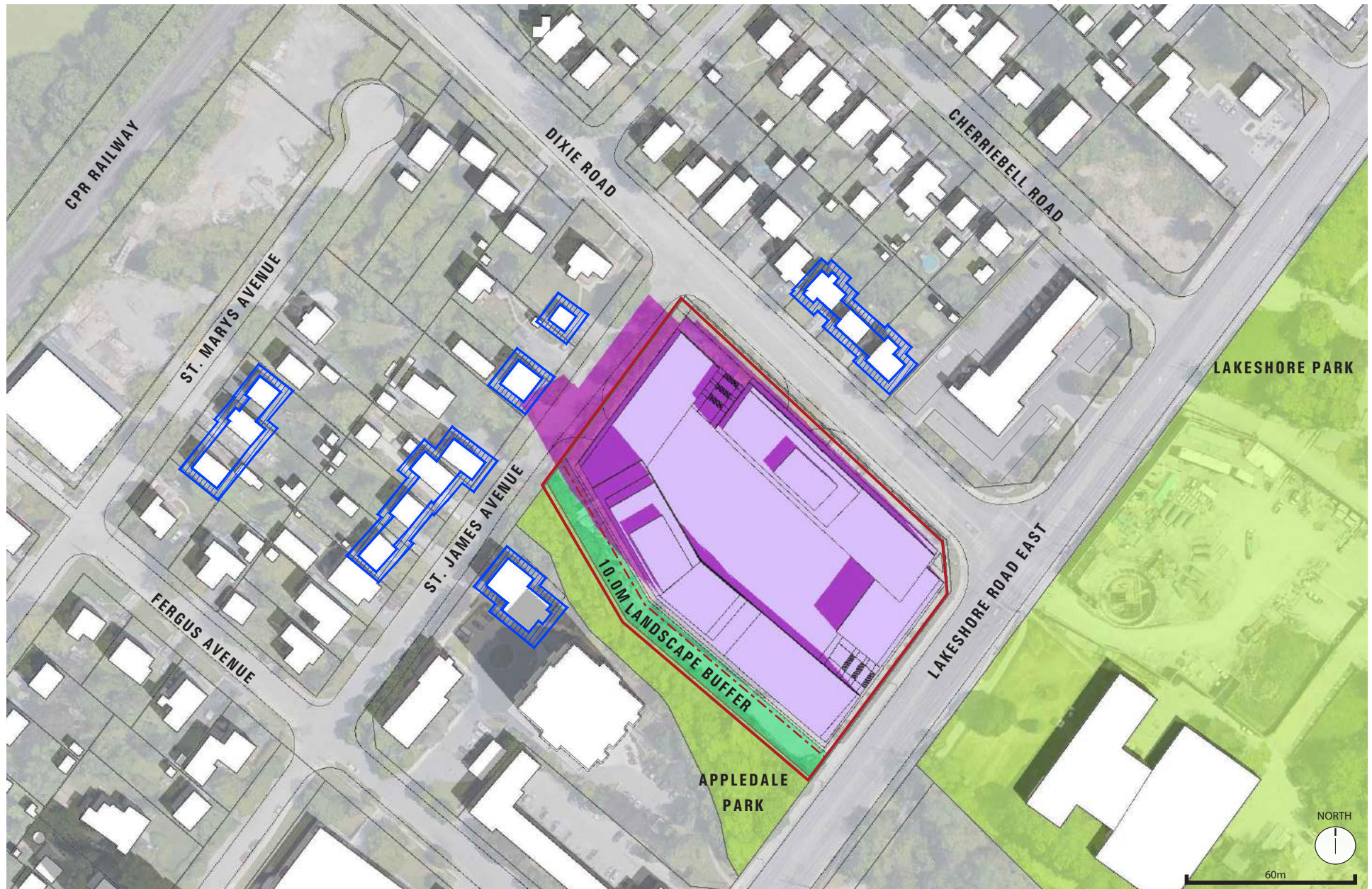
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 10:12 am



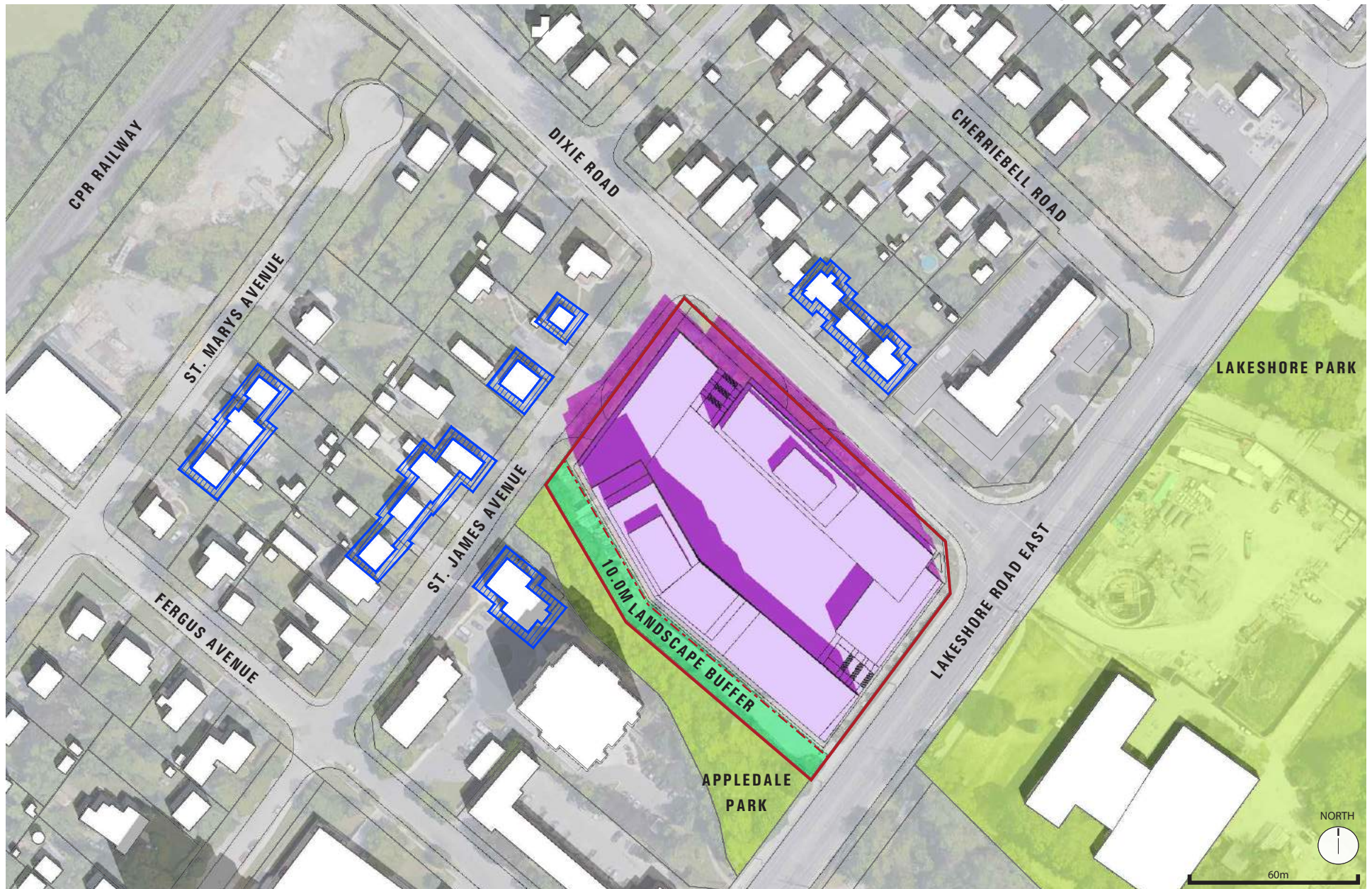
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 11:12 am



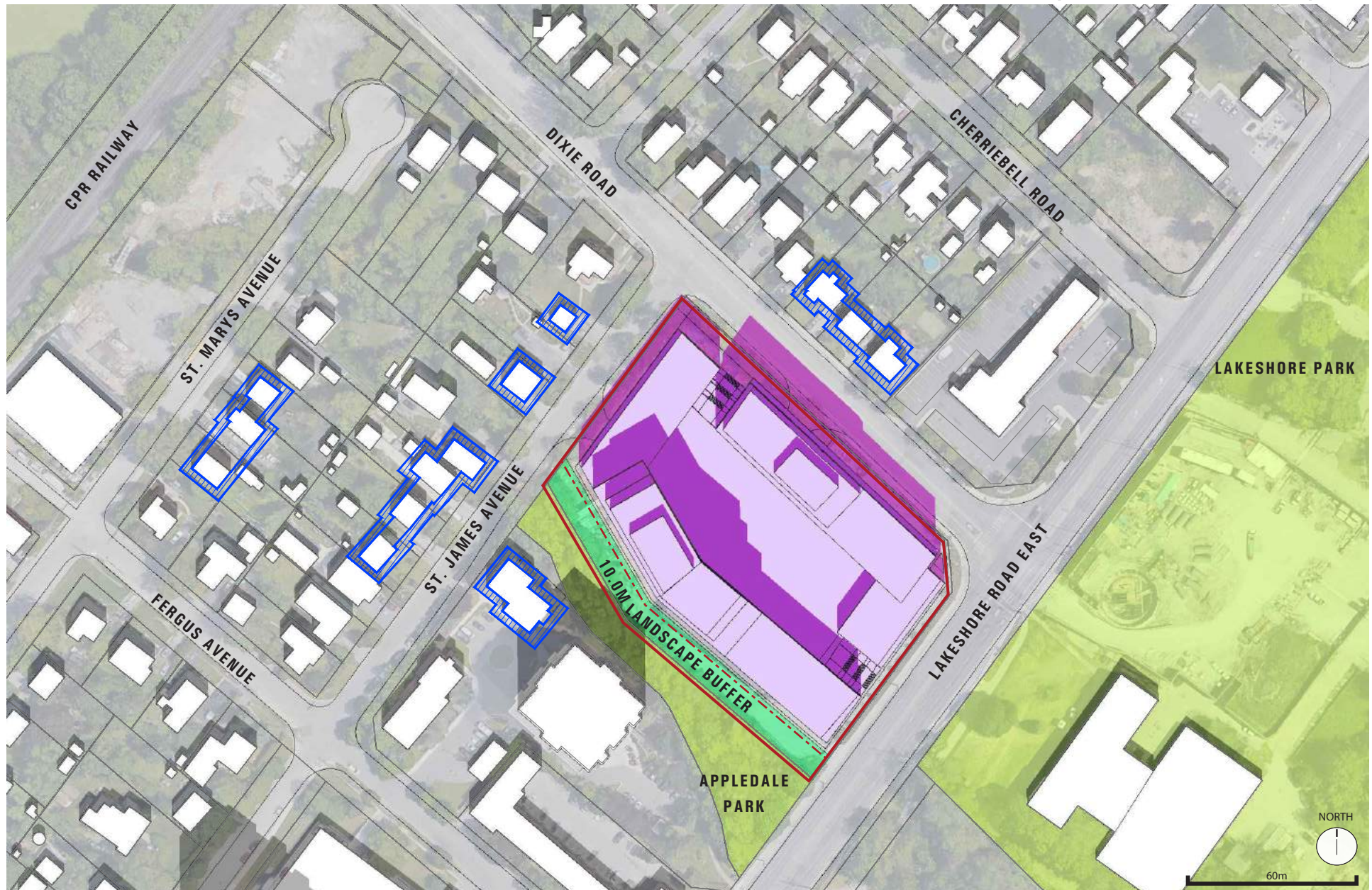
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 12:12 pm



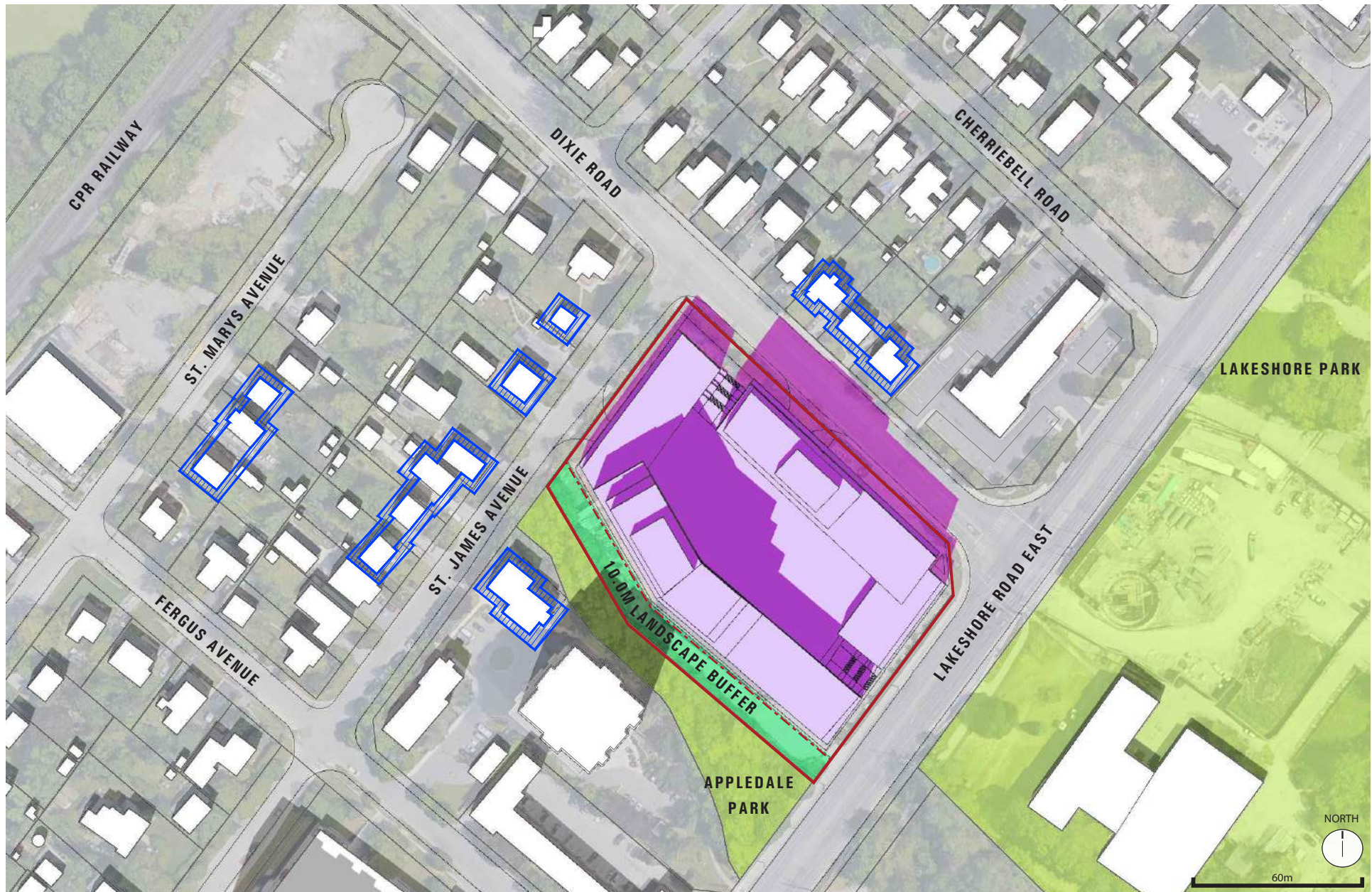
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 1:12 pm



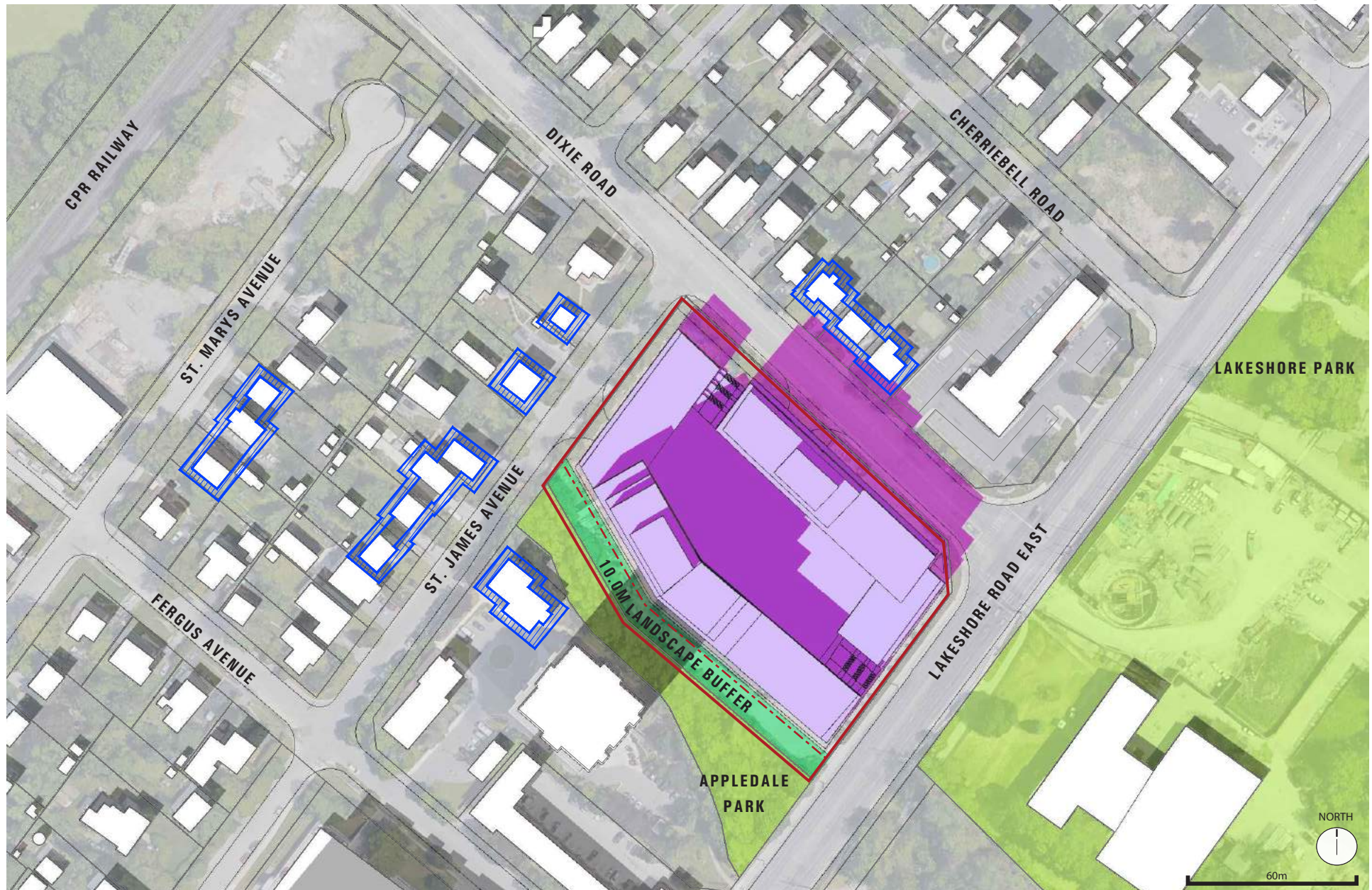
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 2:12 pm



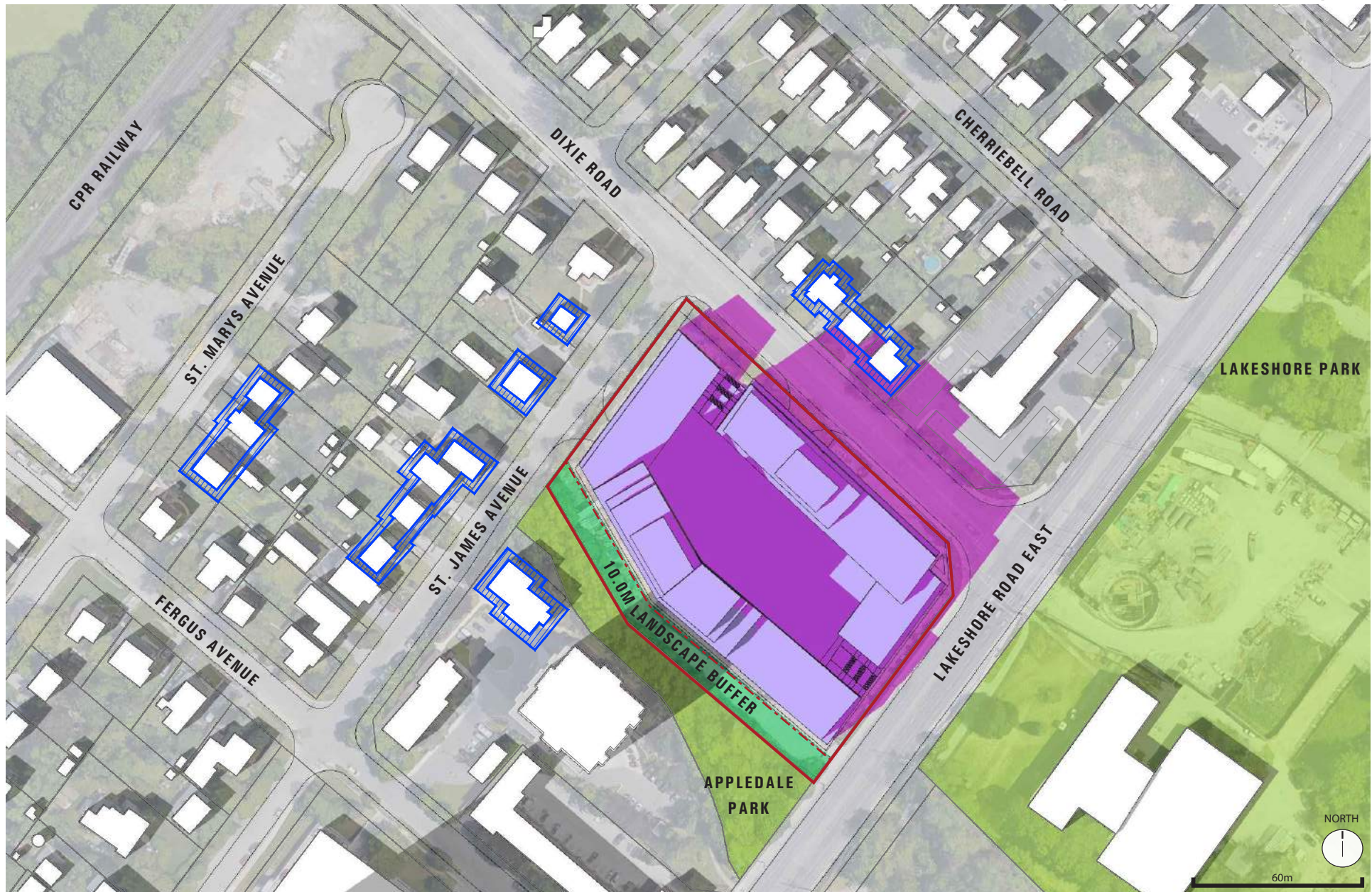
- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 3:12 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 4:12 pm

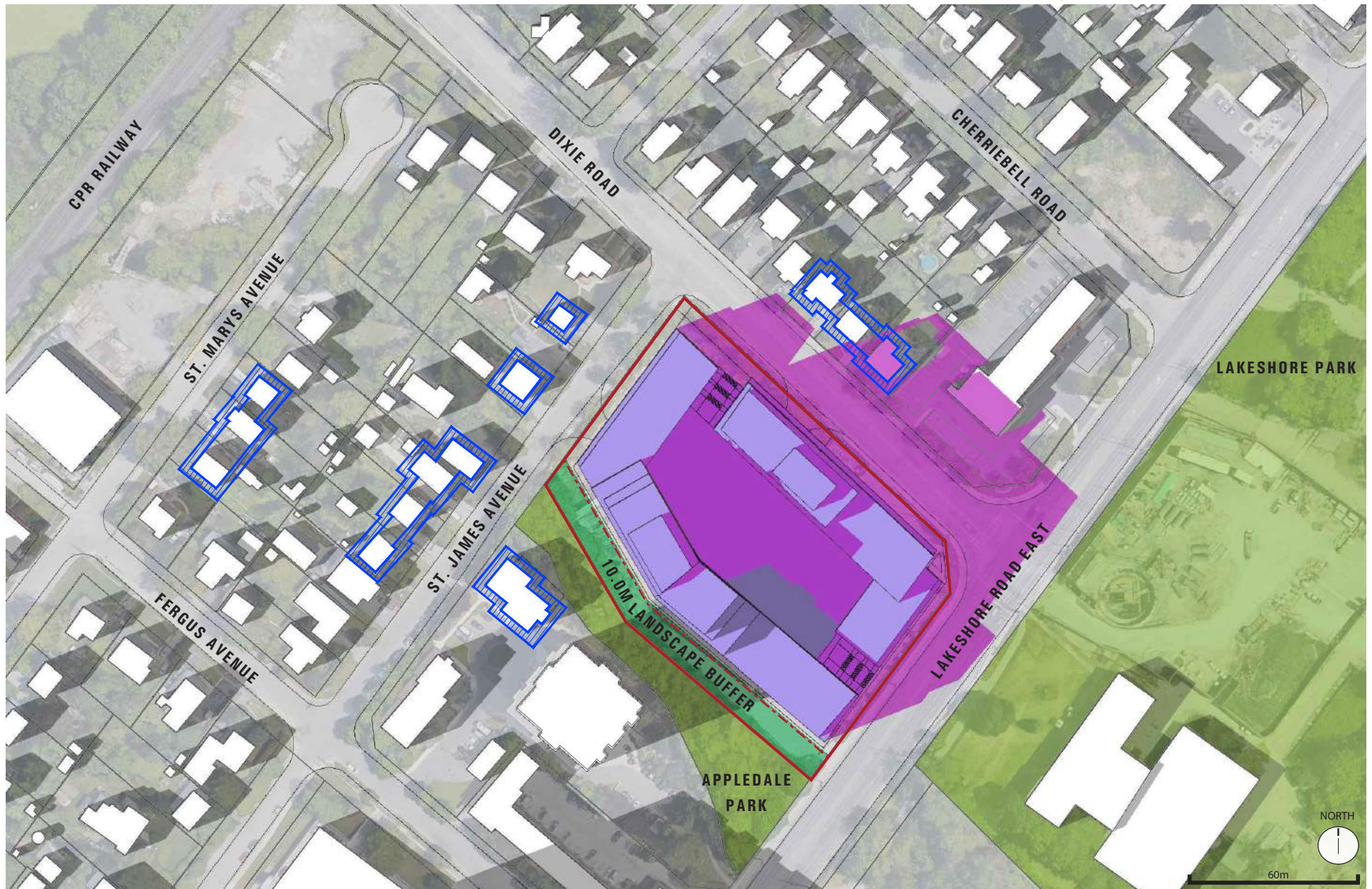


September 21st - 5:12 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

September 21st - 5:48 pm



- Subject Site
- Existing Buildings
- Proposed Development
- Shadow Cast by Proposed Development
- Shadow Cast by existing buildings
- Existing Park
- 10.0m Landscape Buffer
- Building faces to allow for possibility of using solar energy

2.0 CONCLUSION

Based on this analysis, it is our opinion that the proposed development will create minimal and acceptable shadowing impacts on adjacent low-rise neighbourhoods, private amenity areas, and public parks in accordance with Policy 9.2.2.3 and Policy 9.5.3.9 of the Mississauga Official Plan.

3.0 CALCULATIONS

3.2) COMMUNAL OUTDOOR AMMENITY AREA = 2,390M²

June	area in sunshine / total area (m ²)	Sun Access Factor
707	674.2 / 2,390	0.282
720	683 / 2,390	0.286
820	863.8 / 2,390	0.361
920	1,587.8 / 2,390	0.664
1020	2,281 / 2,390	0.954
1120	2,390 / 2,390	1.0
1220	2,390 / 2,390	1.0
120	2,327 / 2,390	0.974
210	1,933 / 2,390	0.809
320	1,475 / 2,390	0.617
420	981 / 2,390	0.410
520	792.6 / 2,390	0.332
620	787.9 / 2,390	0.330
720	769.5 / 2,390	0.322
733	763.9 / 2,390	0.320
Total (Av)		0.577

September	area in sunshine / total area (m ²)	Sun Access Factor
835	801.6 / 2,390	0.335
912	1,470 / 2,390	0.735
1012	2,218 / 2,390	0.601
1112	2,313 / 2,390	0.583
1212	2,177 / 2,390	0.608
112	1,680 / 2,390	0.697
212	1,171 / 2,390	0.789
312	940 / 2,390	0.831
412	787.4 / 2,390	0.858
512	1,020 / 2,390	0.816
548	1,067 / 2,390	0.808
Total (Ave)		0.697
Dec	area in sunshine / total area (m ²)	Sun Access Factor
919	1,774 / 2,390	0.742
1017	1,572 / 2,390	0.658
1117	1,110 / 2,390	0.464
1217	818.7 / 2,390	0.343
117	773 / 2,390	0.323
217	1,428 / 2,390	0.597
315	2,120 / 2,390	0.887
Total (Av)		0.574

3.3) PUBLIC REALM = 68,337M²

September	area in sunshine / total area (m ²)	Sun Access Factor
835	66,605 / 68,337	0.975
912	65,905 / 68,337	0.964
1012	67,383 / 68,337	0.986
1112	68,136 / 68,337	0.997
1212	68,337 / 68,337	1.000
112	68,337 / 68,337	1.000
212	68,316 / 68,337	1.000
312	68,100 / 68,337	0.997
412	68,116 / 68,337	0.997
512	68,078 / 68,337	0.996
548	67,661 / 68,337	0.990
Total (Av)		0.991

3.5) BUILDING FACES TO ALLOW FOR THE POSSIBILITY OF USING SOLAR ENERGY = 1,818M²

September	area in sunshine / total area (m ²)	Sun Access Factor
835	1,179.5 / 1,818	1.000
912	1,466.4 / 1,818	1.000
1012	1,720 / 1,818	1.000
1112	1,791 / 1,818	1.000
1212	1,818 / 1,818	1.000
112	1,818 / 1,818	1.000
212	1,818 / 1,818	0.962
312	1,757 / 1,818	0.866
412	1,693 / 1,818	0.867
512	1,724 / 1,818	0.910
548	1,667.5 / 1,818	0.720
Total (Av)		0.923



BOUSFIELDS INC.