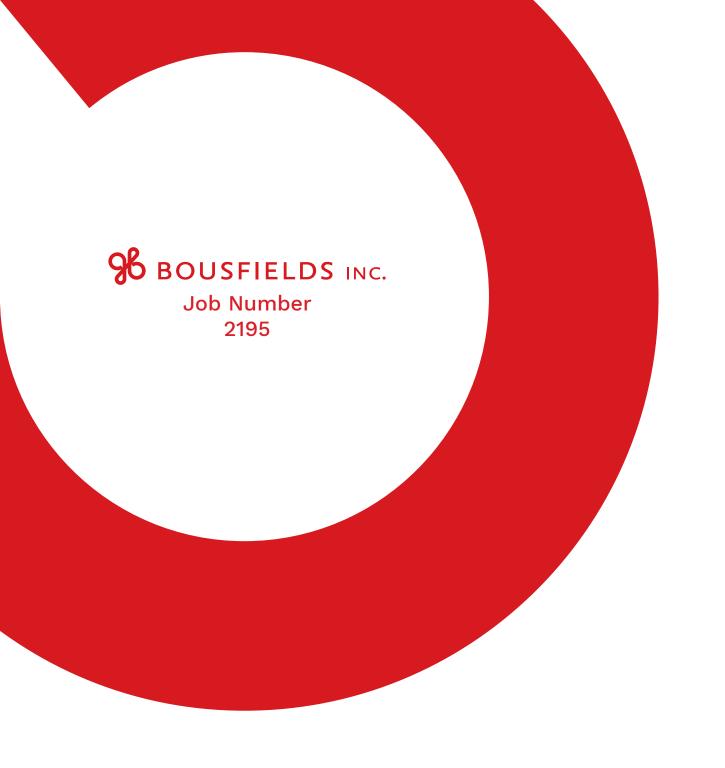
% BOUSFIELDS INC.

Shadow Study

60 Dundas Street EastCity of Mississauga

Almega Asset Management

December 2022



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1 Introduction and Purpose

The following shadow study has been prepared by Bousfields Inc., on behalf of Almega Asset Management, to demonstrate the general shadow impacts for the revised development being proposed at the corner of Dundas Street East and Shepard Avenue — municipally known as 60 Dundas Street East (hereafter referred to as the "Subject Site"). The revised proposal consists of a mixed-use development that includes a 16-storey building in Phase 1, and 27- and 29-storey towers with a 1- to 13-storey podium in Phase 2. Bousfields Inc. has prepared this shadow study report in accordance with Section 19.4.5 of the Mississauga Official Plan. Furthermore, this shadow study is based on the requirements set out in Mississauga's Urban Design Terms of Reference — Standards for Shadow Studies June 2014.

1.1 Site Latitude and Longitude

The latitude and longitude location of the Subject Site was defined by OpenStreetMap:

Latitude: 43° 58′ 12.85′′ N
Longitude: 79° 61′ 37.71′′ W

Astronomic north was determined by geolocating the 3D model in SketchUp Pro and using OpenStreetMap as context. The origin of the base plan was obtained from the City of Mississauga.

1.2 Time Zone

Eastern Time Zone (ET)

Standard Time: UTC - 5 hours - applies on December 21st Daylight Time: UTC - 4 hours - applies on June 21st and

September 21st

1.3 Software Used to Prepare Shadow Analysis

SketchUp Pro was used for 3-dimensional modeling and exporting the shadow study imagery. Calculations were conducted through AutoCAD and final composite images were completed in Adobe Photoshop.

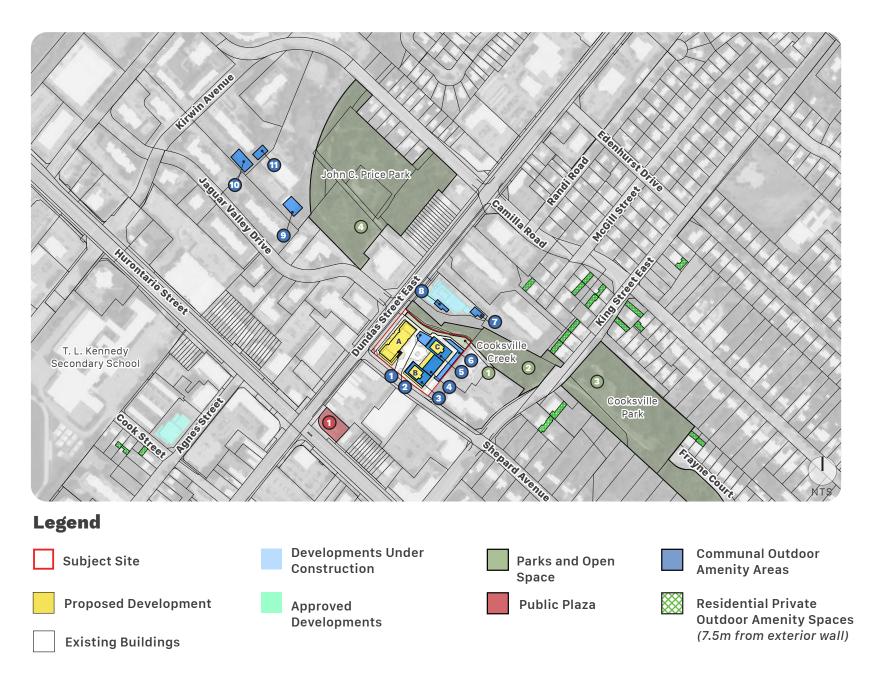
1.4 Identified Areas

As per *Mississauga's Urban Design Terms of Reference* — *Standards for Shadow Studies June 2014*, the study identifies potential key areas surrounding the proposed development. These include:

- Residential Private Outdoor Amenity Spaces, including private rear yards, decks, patios and pools of surrounding residential dwellings;
- Communal Outdoor Amenity Areas, including public amenity areas and common outdoor amenity areas that are part of proposed or existing development;
- Public Realm, including sidewalks, open spaces, parks and plazas;
- Turf and Flower Gardens in public parks within the public realm, and;
- Building Faces to Allow for Possible Use of Solar Energy.

Figure 1 - Key Map, identifies potential areas impacted by shadow(s) (Refer to pages 2-3).

Figure 1 - Key Map





- 1. Proposal: Parkland
- 2. Cooksville Creek
- 3. Cooksville Park
- 4. John C. Price Park

Public Plaza

1. Cooksville Four Corners

Communal Outdoor Amenity Areas

- 1. Proposal: Outdoor Amenity terrace on Level 3 (Tower A)
- 2. Proposal: Outdoor Amenity Area at Grade (between Tower A and C)
- 3. Proposal: Outdoor Amenity Area on rooftop (Tower B)
- 4. Proposal: Outdoor Amenity Area on Level 14 (between podium Tower B and C)
- 5. Proposal: Outdoor Amenity Area on rooftop (Tower C)
- 6. Proposal: Outdoor Amenity Area at Grade (south of Tower B and C)
- 7. Under Construction Artform Condo: South Outdoor Amenity Area at Grade
- 8. Under Construction Artform Condo: North Outdoor Amenity Area at Grade
- 9. 3100 Kirwin Avenue: Outdoor Pool
- 10.3170 Kirwin Avenue: Outdoor Tennis Court
- 11. 3170 Kirwin Avenue: Outdoor Pool

2 Shadow Analysis

2.1 Residential Private Outdoor Amenity Spaces

Section 3.1 of Mississauga's Urban Design Terms of Reference — Standards for Shadow Studies June 2014, states that shadow impacts from a proposed development should not exceed one hour in duration on areas such as private rear yards, decks, patios and pools of surrounding residential dwellings on each of the following dates: June 21st and September 21st. 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 ("No Impact Zone").

Assessment:

Proposed shadows impact private amenity spaces (rear yards) of single-detached lots fronting onto the following streets at certain test times:

- King Street East at 7:20pm and 7:33pm on June 21st;
- Frayne Court at 7:33pm on June 21st;
- McGill Street at 4:12pm on September 21st;
- and King Street East at 5:12pm and 5:48pm on September 21st

The proposed shadows do not exceed one hour in duration on any of the private amenity areas. As a result, the development is in accordance with the criteria.

2.2 Communal Outdoor Amenity Spaces

Section 3.2 of Mississauga's Urban Design Terms of Reference — Standards for Shadow Studies June 2014, states that shadows from proposed developments should allow for full sun on areas such as children's play areas, school yards, tot lots, park features such as sandboxes and wading pools, outdoor amenity areas used by seniors and those associated with commercial and employment areas at least half the time, or 50% sun coverage all the time, on each of the following dates: June 21st, September 21st and December 21st. The criteria is met 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). This criteria also applies to public amenity areas and common outdoor amenity areas that are part of a proposed or existing development.

Assessment:

June 21st:

- There is no shadow impact on Communal Outdoor Amenity Areas 7 to 11 on any of the test times. As a result, the criteria has been met with respect to those areas.
- The proposed outdoor amenity area terrace at Tower A on level 3 (area 1) represents a sun access factor of 0.20. It is noted that because of the south orientation of this space, it will be shadow by Tower A most of the test times.
- The proposed outdoor amenity area between Tower A and Tower C at grade (area 2) provides an overall sun access factor of 0.38. Although this criteria is not met, Area 2 will experience additional shadows due to the incorporation of landscaped elements (such

as trees) that will shade this enhanced landscaped space.

- The proposed rooftop amenity area on Tower B and C at level 28 and 30 (Area 3 and 5) do meet the criteria, representing a sun access factor of 0.78.
- The proposed rooftop amenity area between Tower B and C at level 14 (area 4) do not meet the criteria, representing a sun access factor of 0.46. In our opinion, this is unavoidable because a central location of this amenity space serves as the most logical location, while allowing for appropriate spatial separation between tower elements within the Subject Site.
- The proposed outdoor amenity area south of Tower C at grade (area 6) represents a sun access factor of 0.28. Trees, foliage and a wood privacy fence are proposed along the south property line that will cast additional shadows onto this space. From the total areas that are shadowed (72.3%), 55.1% of that total is from shadows cast by the proposed development; the difference (44.9%) is from shadows cast by existing building to the south (Revera King Gardens).

September 21st:

- There is no shadow impact on Communal Outdoor Amenity Areas 9 to 11 on any of the test times. As a result, the criteria has been met with respect to those areas.
- The outdoor amenity areas from under construction Artform Condo (areas 7 and 8) provide an overall sun access factor of 0.5 and 0.47 that generally comply with the criteria.
- Areas 1, 2, 4 and 6 from the proposed development do not meet the criteria. It is our opinion that the shadow impact is appropriate given the physical constraints of the site and in keeping with the urban form of the development.

December 21st:

- Areas 1, 3, 5, 7, 9, 10, and 11 have an overall sun access factor over
 0.5. As a result, the criteria has been met
- Areas 2, 4, 6 and 8 do not meet the criteria. However, It is noted that these outdoor spaces (i.e. patio, outdoor seating areas and terraces) would be closed for use in the winter season, and as such, the utility of the space will be limited.

2.3 Public Realm

Section 3.3 of *Mississauga's Urban Design Terms of Reference* – *Standards for Shadow Studies June 2014* requires the identification of the Public Realm within the vicinity of the proposed development. Areas identified as the Public Realm include: sidewalks, open spaces, parks and plazas.

2.3.1 Mixed-Use, Commercial, Employment and High Density Residential Streets

As defined by the Terms of Reference, developments should be designed to allow for full sunlight on the opposite boulevard, including the full width for the sidewalk on September 21st as follows:

- For a total of at least 5 hours, which must include the 2 hour period between 12:12pm and 2:12pm; and
- An additional 2 hour period from either 9:12am to 11:12am, or from 3:12pm to 5:12pm.

Assessment:

Shepard Avenue:

The shadow analysis demonstrates that the Shepard Avenue, west of the Subject Site experiences sunlight on the opposite sidewalk on September 21st for at least 5 hours, including the period between 12:12pm to 5:12pm. As a result, the criteria has been met.

Dundas Street Fast:

The criteria has not been met for the boulevards associated with the north side of Dundas Street East. It is our opinion that the shadow impact is appropriate given the site's location along a designated Intensification Corridor (Schedule 1C) where an urban built form context is contemplated. In addition, the proposed shadow length is similar to the under construction building to the east (Artform Condo) and 120 Dundas Street East.

2.3.2 Public Open Spaces, Parks and Plazas

As defined by the Terms of Reference, developments should be designed to provide a sun access factor of at least 50% on public open spaces, parks and plazas on September 21st. If the "sun access factor" is at least 50% or 0.5 on September 21st (As(ave)/AT = 0.5 or more), then the shadow impact is considered to be in compliance with these terms of reference.

Assessment:

Proposed Parkland:

The proposed parkland has a sun access factor of 0.36 on September 21st. It is impacted by both existing buildings and proposed development. As a result, it does not meet the criteria.

Cooksville Creek:

The proposal cast shadows onto Cooksville Creek on September 21st from 11:12am to 5:48pm. The proposal was designed to comply with the standard on September 21st (minimum 0.5), providing a sun access factor of 0.71.

Cooksville Park:

There is no shadow impact on Cooksville Park from the proposed development on September 21st. In general, it has a sun access factor over 0.5 receiving shadows from existing and planned buildings.

John C. Price Park:

There is no shadow impact on John C. Price Park from the proposed development on September 21st. In general, it has a sun access factor over 0.5 receiving shadows from existing and planned buildings.

Cooksville Four Corners Plaza:

There is no shadow impact on Cooksville Four Corners Plaza from the proposed development on September 21st. In general, it has a sun access factor over 0.5 receiving shadows from existing and planned buildings.

2.4 Turf and Flower Gardens

Section 3.4 of Mississauga's Urban Design Terms of Reference – Standards for Shadow Studies June 2014 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 21st.

Assessment:

No identified turf or flower gardens are impacted by the proposal and its shadows.

2.5 Building Faces to Allow for the Possibility of Using Solar Energy

Section 3.5 of *Mississauga's Urban Design Terms of Reference – Standards for Shadow Studies June 2014* states that shadow impacts from proposed developments should not exceed one hour in duration on roofs, front, rear, and exterior side walls of adjacent lower rise (one to four storeys) residential buildings on September 21st. Criteria is met if there is shadow impact for no more than two consecutive hourly test times in the "No Impact Zone" (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).

Assessment:

No building faces have been identified for the possibility of using solar energy , and as such, no impacts are produced by the proposal and its shadows.

3 Sun Access Factor Calculations

3.1 Communal Outdoor Amenity Areas

Calculations have been generated out for communal outdoor areas affected by shadow from the proposed development only.

Test Time	Communal Outdoor Amenity Area Areas in Sunshine								
June 21st					5	6			
	49	397	504	567	504	810			
7:07am	0	111	382	176	382	0			
7:20am	0	297	379	183	379	0			
8:20am	0	243	377	257	377	222			
9:20am	0	186	374	490	374	223			
10:20am	41	109	417	487	417	292			
11:20am	27	50	463	537	463	419			
12:20pm	0	90	477	523	477	592			
1:20pm	43	301	464	397	464	782			
2:20pm	36	392	463	197	463	675			
3:20pm	0	261	438	57	438	155			
4:20pm	0	47	412	13	413	0			
5:20pm	0	47	382	91	382	0			
6:20pm	0	47	331	175	331	0			
7:20pm	0	47	259	207	259	0			
7:33pm	0	47	255	119	255	0			
Average of Areas in Sunshine (As(ave))	10	152	392	261	392	224			
Sun Access Factor	0.20	0.38	0.78	0.46	0.78	0.28			

Test Time	Communal Outdoor Amenity Area Areas in Sunshine								
September 21st	1					6		8	
	49	397	504	567	504	810	192	172	
8:35am	0	102	371	245	371	231	0	0	
9:12am	0	65	371	340	371	223	74	0	
10:12am	0	49	413	476	413	189	192	157	
11:12am	0	0	409	478	409	96	192	172	
12:12pm	9	0	402	462	405	160	192	172	
1:12pm	42	0	408	352	408	347	192	0	
2:12pm	38	93	427	159	427	682	192	83	
3:12pm	35	397	440	0	440	671	17	130	
4:12pm	0	201	422	0	422	201	0	0	
5:12pm	0	0	384	0	385	58	0	65	
5:48pm	0	0	355	0	354	0	0	119	
Average of Areas in Sunshine (As(ave))	11	82	400	228	400	260	96	82	
Sun Access Factor	0.23	0.21	0.79	0.40	0.79	0.32	0.50	0.47	

Test Time	Communal Outdoor Amenity Area Areas in Sunshine										
December 21st	1				5				9	10	11
December 21st	49	397	504	567	504	810	192	172	493	600	270
9:19am	0	0	381	359	381	61	192	151	0	461	0
10:17am	0	0	371	365	371	0	192	0	350	600	116
11:17am	26	0	374	332	374	123	190	110	480	600	203
12:17pm	43	0	377	264	377	258	4	0	493	600	270
1:17pm	39	0	388	107	388	556	0	0	367	600	270
2:17pm	37	212	405	101	405	685	157	72	34	600	270
3:15pm	34	369	431	0	431	668	11	102	0	600	270
Average of Areas in Sunshine (As(ave))	26	83	390	218	390	336	107	62	246	580	200
Sun Access Factor	0.52	0.21	0.77	0.38	0.77	0.41	0.56	0.36	0.50	0.97	0.74

3.2 Public Realm

3.2.1 Proposed Parkland

Proposed Parkland Area	= 1,026 m²
September 21st	Areas in sunshine (As)
8:35am	962
9:12am	837
10:12am	618
11:12am	155
12:12pm	200
1:12pm	200
2:12pm	322
3:12pm	501
4:12pm	123
5:12pm	85
5:48pm	98
Average of Areas in Sunshine (As(ave))	373
Sun Access Factor	0.36
Areas in Shadows	0.637 / 63.7%

Note: For September 21st - From the total areas that are shadowed (63.7%), 77.4% of that total is from shadows cast by the proposed development; the difference (22.6%) is from shadows cast by existing surrounding buildings.

3.2.2 Cooksville Creek

Cooksville Creek Area = ~8,738 m²						
September 21st	Areas in sunshine (As)					
8:35am	8,624					
9:12am	8,686					
10:12am	8,678					
11:12am	8,172					
12:12pm	7,313					
1:12pm	6,874					
2:12pm	6,475					
3:12pm	6,240					
4:12pm	3,616					
5:12pm	1,669					
5:48pm	1,688					
Average of Areas in Sunshine (As(ave))	6,185					
Sun Access Factor	0.71					
Areas in Shadows	~0.292 / 29.2%					

Note: For September 21st - From the total areas that are shadowed (29.2%), 75.9% of that total is from shadows cast by the proposed development; the difference (24.1%) is from shadows cast by existing surrounding buildings.

4 Conclusion

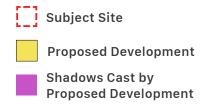
Based on the findings of this report, it is our opinion that the proposed shadow impacts and resulting sun access factors are relatively limited and appropriate.

The revised proposal meets the shadow impact criteria for all existing amenity areas and public spaces. The areas that do not meet the shadow impact criteria are within the proposed development site and adjacent property to the northeast, which includes a building that is currently under construction. Efforts have been made to minimize shadow impacts by locating amenity areas within access to sun exposure.

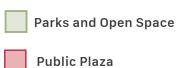
It is our opinion that the shadow impact is appropriate given the site's location along a designated Intensification Corridor (Schedule 1C) where an urban built form context is contemplated. The proposal is supportive of the overall vision for redevelopment and intensification of the Subject Site as contemplated within the Dundas Connects Master Plan. The proposed development has ensured the continued provision of adequate sunlight in the areas surrounding the Subject Site, in accordance with acceptable sun access factors sought by the City through the terms of reference.

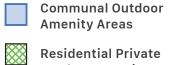
In general, the shadows cast from the proposed development will not cause undue shade on the Subject Site and surrounding context. This includes building facades, private and public outdoor amenity and open spaces, public parkland, sidewalks and other components of the public realm, as outlined in the City's Terms of Reference.































































7:33pm - June 21st





8:35am - September 21st



























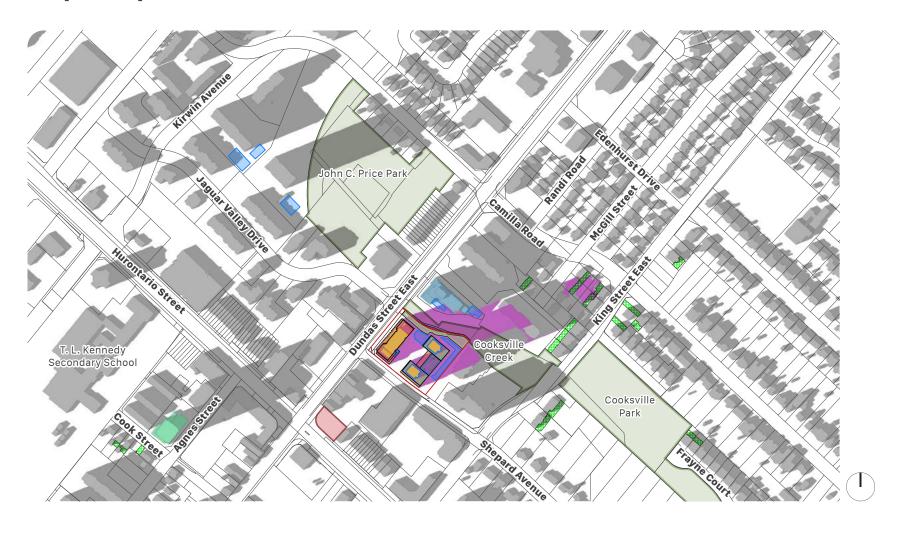


















9:19am - December 21st



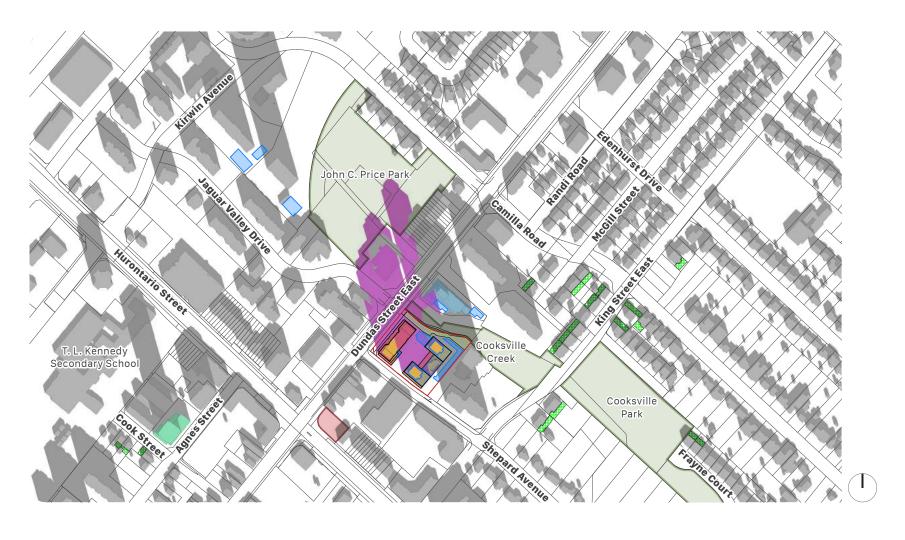


10:17am - December 21st





11:17am - December 21st



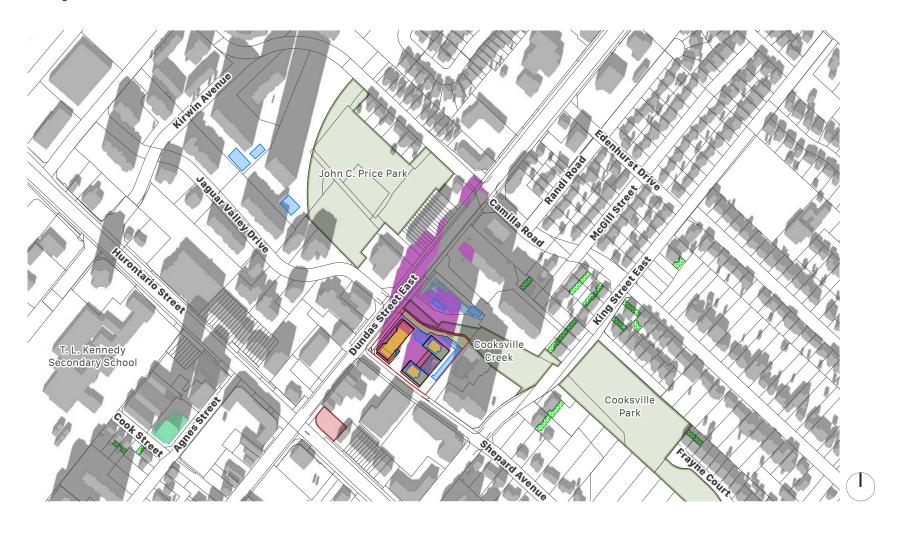


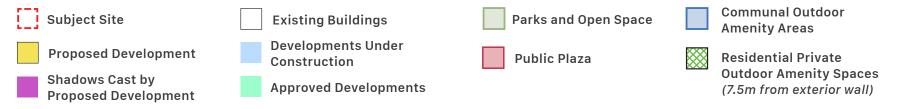
12:17pm - December 21st





1:17pm - December 21st





2:17pm - December 21st





3:15pm - December 21st









