



Shadow Impact Study 2620 Chalkwell Close, Mississauga, ON

Submitted to:

Mehedi Khan

1672735 Ontario Inc.

Submitted by:

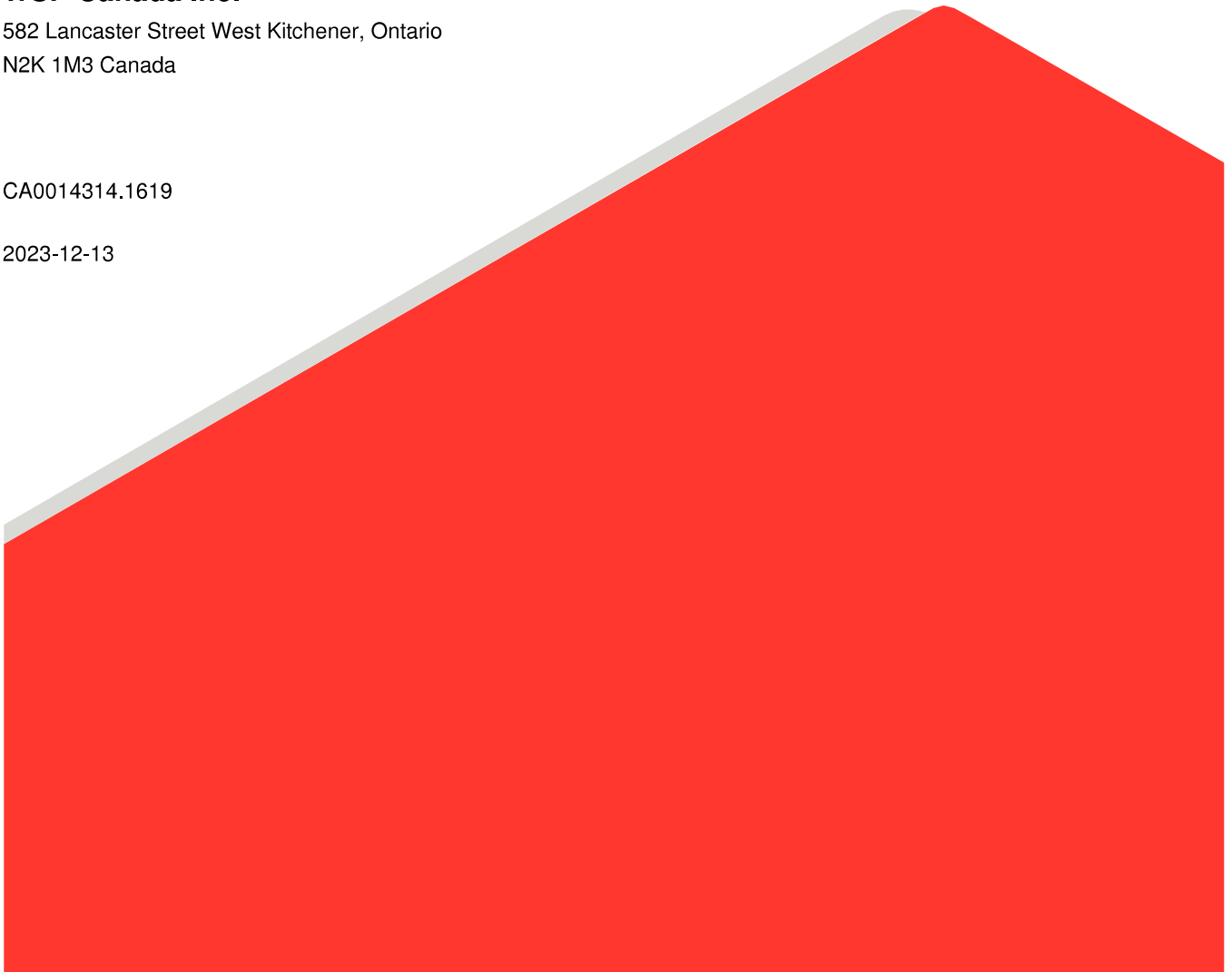
WSP Canada Inc.

582 Lancaster Street West Kitchener, Ontario

N2K 1M3 Canada

CA0014314.1619

2023-12-13



EXECUTIVE SUMMARY

WSP Canada Inc (WSP) was retained by Dunpar Homes to study the shadow impacts of a proposed development to be located at 2620 Chalkwell Close, Mississauga, Ontario (the 'Development'). The objective of this assessment is to provide an evaluation of the impact of the Development in terms of sun and daylight access to the surrounding area, particularly the public sidewalks, Sandgate Park and outdoor amenities, and adjacent neighbouring property yards located on the north, east, and west sides of the Development.

As outlined in the Mississauga Urban Design Terms of Reference - Standards for Shadow Studies (TOR), the analysis is based on the sun locations for the first day of each season (fall equinox and summer/winter solstice) with a predefined increment from sunrise to sunset to determine the shadow coverage areas for the existing conditions (without the Development) and with the Development.

Study Domain

The boundaries of the study domain are based on Section 4 of the TOR, which identifies that the base mapping should be 4 times the height of development to the north, east and west; and 1.5 times to the south. The study domain is immediately surrounded by the following land uses:

- North: Sandgate Crescent, Karenza Road, and a residential area.
- South: Truscott Drive and a residential area.
- East: Karenza Road, Chalkwell Close, and a residential area.
- West: Sandgate Crescent, Lockhart Road., and a residential area.

The Development consists of the construction of 178 back-to-back three-story townhomes over 12 blocks (A through L). All buildings are expected to extend to a height of about 11 m.

Blocks A through J massing runs from west to east and are located to the north of the site, while Blocks K through L massing runs from north-west to south-east and are located on the south side of the site. Furthermore, the Development has two outdoor amenities, one located on the north of blocks G and H and having an area of 922m², and the second one is located on the south of blocks I and J, with an area of 673 m².

Spaces of Interest

When examining shadow impacts, there are several locations or spaces of interest where shadow patterns can limit the daylight accessing these spaces. As outlined in Section 3 of the TOR, the areas of interests are:

Residential private outdoor amenity spaces are determined as private rear yards, decks, patios and pools of surrounding residential dwellings (see Section 3.1 of the TOR). For this study, these areas are located west, east, and south of the Development, along Karenza Road, Chalkwell Close, Truscott Drive and Lockhart Road.

Communal outdoor amenity areas are determined as public amenity areas and common outdoor amenity areas that are part of proposed or existing development (see section 3.2 of TOR). These areas 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. For this study, the two outdoor amenity areas (having areas of 922 m² and 673 m²) have been identified within the study domain and therefore were included in the analysis.

Public realm is determined as sidewalks, open spaces, parks and plazas (see Section 3.3 of TOR). For this study, sidewalks along Chalkwell Close, Karenza Road, Truscott Drive, Lockhart Road, and Sandgate Crescent have been identified as low and medium density residential streets and were included in the analysis. In addition, the Sandgate Park, defined as an open public space, was incorporated in the analysis.

Turf and flower gardens in public parks within the public realm (see section 3.4 of TOR). For this study, no such areas have been identified within the study domain and therefore will not be included in the analysis.

Building faces have been identified to allow for possible use of solar energy (see Section 3.5 of TOR). These areas include the roofs, front, rear and exterior side walls of adjacent low-rise (one to four storeys) residential buildings including townhouses and detached and semi-detached dwellings. For this study, these areas are located east, west, and south of the Development.

Assessment Results

Residential Private Outdoor Amenity Spaces

The shadow analysis has shown that the shadow cast on the private outdoor amenity spaces located on the west (along Lockhart Road), east (along Karenza Road and Chalkwell Close), and south (along Truscott Road) of the Development linger for no more than two consecutive hourly test times. As such, the criterion for TOR Section 3.1 is met.

Communal Outdoor Amenity Areas

Based on predicted hourly SAF values and the overall value at the outdoor amenity spaces, the shadow criterion Section 3.2 is met for the 673 m² outdoor amenity. For the 922m² outdoor amenity space, the shadow criterion from TOR Section 3.2 is met for all tested days except for December 21st where the sun access is about 15% during this day. Given the minimal activity during winter, shadow impacts are expected to be minimal.

Public Realm

The shadow analysis has shown that the sun accesses all opposite sidewalks that abut residential side and back yards for more than four hours between 9:12 am and 11:12 am, and between 3:12 pm and 5:12 pm. Therefore, the criterion for TOR is met for these sidewalks.

For Sandgate Park, the shadow analysis has shown that the sun accesses this park for more than half times during the day (Sun Access Factor = 91%). Therefore, the criterion for TOR Section 3.3 is met for the Sandgate Park.

Turf and Flower Gardens in Public Parks

For this study, no such areas have been identified within the study domain and therefore no shadow analysis was completed for these areas of interest.

Building Faces to Allow for the Possibility of using Solar Energy

The shadow analysis has shown that there no more than two consecutive hourly test times of shadow cast on the building faces during the day. Consequently, the criterion for section 3.5 is met.

Conclusions and Discussions

In conclusion, the proposed development will have minimal shadowing impacts on adjacent low-rise neighbourhoods, private amenity areas, public communal outdoor amenities, and public realm in accordance with the TOR of the city of Mississauga

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Revision History

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Prepared by	Reviewed by	Approved By		
Atta Sojoudi	Thabet Belamri	Caleb Vandenberg		
REVISION 1				

Contributors

CLIENT

Mehedi Khan	Development Coordinator
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WSP

Air Quality Specialist	Atta Sojoudi
Senior Engineer, Environment	Thabet Belamri
Team Lead, Air Quality and Greenhouse Gases	Caleb Vandenberg, P.Eng.

SUBCONSULTANTS

None	
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1 INTRODUCTION

WSP Canada Inc (WSP) was retained by Dunpar Homes to study the shadow impacts of a proposed development to be located at 2620 Chalkwell Close, Mississauga, Ontario (the 'Development'). The objective of this assessment is to provide an evaluation of the impact of the Development in terms of sun and daylight access to the surrounding area, particularly the public sidewalks, Sandgate Park and outdoor amenities, and adjacent neighbouring property yards located on the south, east, and west sides of the Development. As outlined in the TOR, the analysis is based on the sun locations for the first day of each season (fall equinox and summer/winter solstice) with a predefined increment from sunrise to sunset to determine the shadow coverage areas for the existing conditions (without the Development), and with the Development.

1.1 Study Domain

The Development is located at 2620 Chalkwell Close in Mississauga. **Figure 1** displays a satellite view of the Development location and surrounding area. The boundaries of the study domain were determined based on Section 4 of TOR in which the domain extents for the shadow analysis should be 4 times the height of development to the north, east, and west; and 1.5 times to the south.

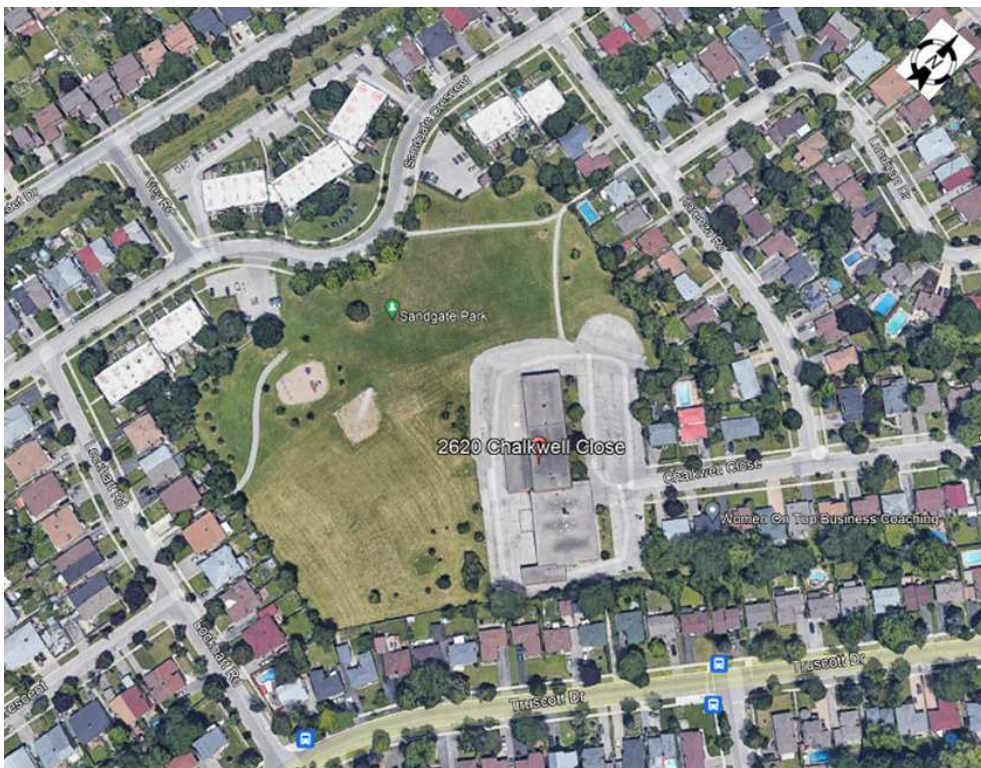


Figure 1: Proposed Development on Chalkwell Close (Source: Google Earth dated December 04, 2023)

The study domain is immediately surrounded by the following land uses:

- North: Sandgate Park, Sandgate Crescent, Karenza Road and a residential area.
- South: Truscott Drive and a residential area.
- East: Karenza Road, Chalkwell Close and a residential area.
- West: Sandgate Crescent, Lockhart Road and a residential area.

The Development consists of the construction of 178 back-to-back three-story townhomes over 12 blocks (A through L). All buildings are expected to extend to a height of about 11 m.

Figure 2 shows a top view of the Development. As shown in **Figure 2**, Blocks A through J massing runs from west to east and are located to the north of the site, while Blocks K through L massing runs from north-west to south-east and are located on the south side of the site. Furthermore, the Development has two outdoor amenities, one (having 922 m² area) located on the north of blocks G and H, and the second one (having 673 m² area) is located on the south of blocks I and J.



Figure 2: Top View of Proposed Development

1.2 Spaces of Interest

When examining shadow impacts, there are several locations or spaces of interest where shadow patterns can limit the daylight accessing these spaces. As outlined in Section 3 of the TOR, the areas of interests are:

Residential private outdoor amenity spaces are determined as private rear yards, decks, patios, and pools of surrounding residential dwellings (see Section 3.1 of TOR). For this study, these areas are located west, east, and south of the Development, along Karenza Road, Chalkwell Close, Truscott Drive, and Lockhart Road (see **Figure 3**).

Communal outdoor amenity areas are determined as public amenity areas and common outdoor amenity areas that are part of proposed or existing development (see section 3.2 of TOR). These areas 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. For this study, the two outdoor amenity areas have been identified within the study domain and therefore will be included in the analysis (see **Figure 6**).

Public realm is determined as sidewalks, open spaces, parks, and plazas (see Section 3.3 of TOR). For this study, sidewalks along Chalkwell Close, Karenza Road, Truscott Drive, Lockhart Road, and Sandgate Crescent have been

identified as low and medium density residential streets and will be included in the analysis. In addition, the Sandgate Park, defined as an open public space, will be incorporated in the analysis (see **Figure 9**).

Turf and flower gardens in public parks within the public realm (see Section 3.4 of TOR) have not been identified within the study domain and therefore will not be included in the analysis.

Building faces have been identified to allow for possible use of solar energy (see Section 3.5 of TOR). These areas include the roofs, front, rear, and exterior side walls of adjacent low rise (one to four storey) residential buildings including townhouses, detached and semi-detached dwellings. For this study, these areas are located east, west, and south of the Development (see **Figure 12**).

1.3 Evaluation Criteria

As outlined in Section 3 of the TOR, the shadow evaluations are established for each area of interest highlighted above:

1) Residential Private Outdoor Amenity Spaces

Section 3.1 of the TOR requires that the line of impact assessment or “no impact zone” for these private outdoor amenity spaces should be within 7.5m of the rear wall or other appropriate exterior building wall. In addition, testing times should include June 21st and September 21st to maximize the use of these spaces. Finally, the criterion 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.

2) Communal Outdoor Amenity Areas

Section 3.2 of the TOR requires that the shadow from the proposed development should allow for full sun on these areas at least half the time, or 50% sun coverage all the time. The Sun Access Factor (SAF) is a measure of the sun penetration to a given space during a specific time frame. The SAF is determined as the ratio of the average area exposed to the sun during the day to the total physical area of the location of interest. The higher the SAF is, the more the space is exposed to the sun. In addition, testing times should include June 21st, September 21st, and December 21st to maximize the use of these spaces. Finally, the criterion 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).

3) Public Realm

Section 3.3 of the TOR requires that the shadow from the proposed development should allow full sunlight on the opposite boulevard including the full width of the sidewalk for “Low and Medium Density Residential Streets”. Testing times should be on September 21st. The criterion is met if the sunlight accesses these areas 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.

Additionally, Section 3.3 of the TOR requires that the shadow from the proposed development should allow for full sun on “public open spaces, parks and plazas” at least half the time, or 50% sun coverage all the time. Testing times should be on September 21st. The criterion 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).

4) Turf and Flower Gardens In Public Parks

Section 3.4 of the TOR requires that the proposed development 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. The criterion is met if full sun is provided on any 7 test times on September 21.

5) Building Faces to Allow for the Possibility of Using Solar Energy

Section 3.5 of the TOR requires that the line of impact assessment or “no impact zone” for these spaces should be within 3m of the front, the rear and the exterior wall of the building. In addition, testing times should include September 21st. Finally, the criterion is met if there is shadow impact for no more than two consecutive hourly test times in the “no impact zone”.

2 METHODOLOGY

2.1 Software Used to Prepare Shadow Analysis

For this assessment, Blender software (see the references section) was used for the analysis including 3D work, calculations, and final composite images. Astronomic north was determined by geolocating the 3D model in Blender software based on OpenStreetMap. The origin of the base plan is from architectural drawings provided by Dunpar Homes and Google Earth satellite imagery.

2.2 Analysis Procedure

The sun shadow assessment is based on computer modeling of the sun location relative to the Development at a given hour of the day during a specific season. Consequently, the shadow movement and patterns during the day are assessed, and shadow outputs based on Section 3 of the TOR. The computer-generated model illustrated the following dates and representative times, based on TOR requirements:

- 1) **Fall Equinox | September 21st** at predefined intervals between sunrise and sunset.
(8:35AM, 9:12AM, 10:12AM, 11:12AM, 12:12PM, 1:12PM, 2:12PM, 3:12PM, 4:12PM, 5:20PM, and 5:48PM)
- 2) **Summer Solstice | June 21st** at predefined intervals between sunrise and sunset
(7:07AM, 7:20AM, 8:20AM, 9:20AM, 10:20AM, 11:20AM, 12:20PM, 1:20PM, 2:20PM, 3:20PM, 4:20PM, 5:20PM, 6:20PM, 7:20PM, and 7:33PM)
- 3) **Winter Solstice | December 21st** at predefined intervals between sunrise and sunset
(9:19AM, 10:17AM, 11:17AM, 12:17PM, 1:17PM, 2:17PM, and 3:15PM)

Note: Spring equinox (March 21st) is not included in the analysis since Spring equinox is considered similar to Fall Equinox and therefore criteria for Fall Equinox are deemed to apply to spring equinox.

In addition, the analysis is based upon the following inputs:

- Longitude | N 43° 35' 20"
- Latitude | W 79° 38' 40"

- Time Zone: Eastern
- Standard Time: UT - 5 hours (UT denotes Universal Time)
- Daylight Time: UT - 4 hours (UT denotes Universal Time)
- Base Plan: Google maps (north as per Google maps)

The modeling includes two simulated conditions. First, it predicts the shadow patterns for the existing condition (without the Development). Second, it establishes the shadow patterns with the presence of the Development based on the Development height of 11 metres. With these two simulated conditions, one can determine the net new shadows, which are incremental shadows that exceed the existing building shadows.

Using the shadow modeling, shadow distributions were predicted for the first day of each season. Using the criteria defined above, shadow impacts at each area of interest were analysed. The results of the shadow modeling for each area of interest, as defined in Section 3 of the TOR, are reported in the following sections.

3 RESULTS

3.1 Residential Private Outdoor Amenity Spaces

Figure 3 identifies all private outdoor amenity areas in the vicinity of the development. In this Figure, the line of impact assessment or “no impact zone” (color light blue in the Figure 3) for these private outdoor amenity spaces is within 7.5m of the rear wall.



Figure 3: Residential Private Outdoor Amenity Spaces in The Vicinity of the Proposed Development.

3.1.1 Shadow Analysis Results for June 21

The model results of shadow patterns for summer solstice from 7:07AM to 7:33PM are shown in **Figure 4**. In **Figure 4**, the new shadow (purple color) represents the shadow due to the Development, while the existing shadow represent the shadow due to the existing buildings. The footprint of the Development is represented by the orange color. For the summer solstice, the shadow patterns are characterized by a slightly longer cast or coverage on the west of the Development for the first two hours in the morning. Then, this coverage shortened once the sun moves towards the noon hour. The shadow coverage extends on the east and south-east side of the Development to reach a maximum length near the sunset hours. Overall, given the short height of the Development, the shadow cast by the Development remains relatively short.





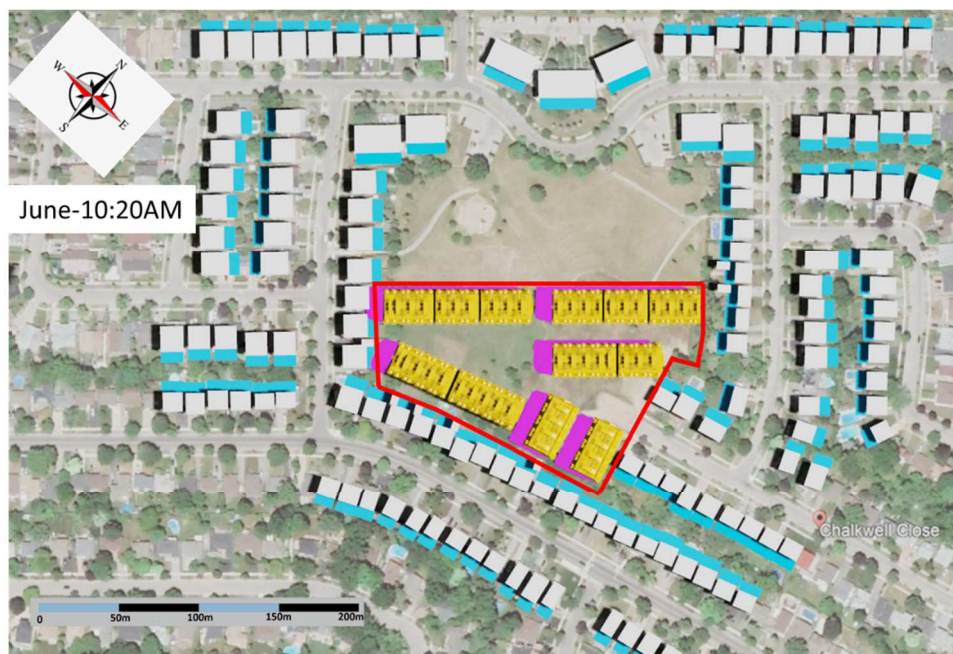
- Existing Building
- Proposed Development
- Site Plan
- Residential Private Outdoor Amenity Areas-7.5m from rear wall
- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development



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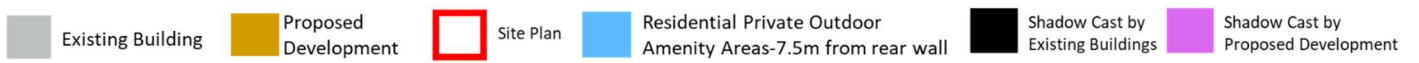
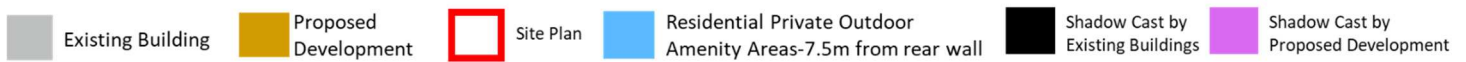
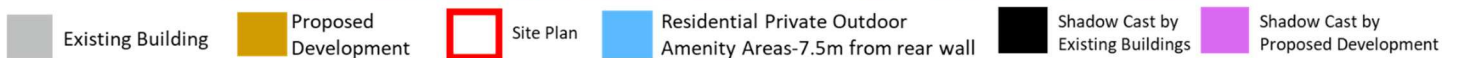


Figure 4: Shadow Patterns at Residential Outdoor Private Amenity Spaces – June 21st

Section 3.1 of the TOR requires that the line of impact assessment or “no impact zone” for these private outdoor amenity spaces should be within 7.5m of the rear wall or other appropriate exterior building wall. The criterion 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. As shown in **Figure 4** above, the findings of the shadow analysis show that the proposal for no more than two consecutive hourly test times are in accordance with this standard. As such, the criterion for Section 3.1 of the TOR is met.

3.1.2 Shadow Analysis Results for September 21

The model results of shadow patterns for fall equinox from 8.35AM to 5.48PM are shown in **Figure 5**. In this **Figure 5**, the new shadow (purple color) represents the shadow due to the Development, while the existing shadow represents the shadow due to the existing buildings. The footprint of the Development is represented by the orange color. For the fall equinox, the shadow patterns are characterized by a slightly longer cast or coverage on the west side of the Development for the first hour in the morning. Then, this coverage shortened once the sun moves towards the noon hour. The shadow coverage extends on the east side of the Development to reach a maximum length near the sunset hours.





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- Proposed Development
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- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development



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- Site Plan
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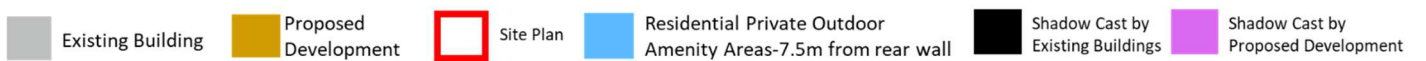
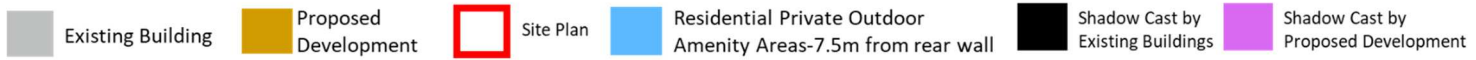


Figure 5: Shadow Patterns at Residential Outdoor Private Amenity Spaces – September 21st.

Section 3.1 of the TOR requires that the line of impact assessment or “no impact zone” for these private outdoor amenity spaces should be within 7.5m of the rear wall or other appropriate exterior building wall. The criterion 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. As shown in **Figure 5** above, the findings of the shadow analysis show that the proposal for no more than two consecutive hourly test times are in accordance with this standard. As such, the criterion for Section 3.1 of the TOR is met.

3.2 Communal Outdoor Amenity Areas

Figure 6 identifies the two outdoor amenity areas in the vicinity of the development (color green in the **Figure 6**).



Figure 6: Communal Outdoor Amenity Spaces in the Vicinity of the Development.

Section 3.2 of the TOR requires that the shadow from the proposed development should allow for full sun on “Communal Outdoor amenity spaces” at least half the time, or 50% sun coverage all the time, for September 21st, June 21st and December 21st. The criterion is met if the overall “sun access factor” is at least 50% or 0.5 on each of the test dates ($As(ave)/AT = 0.5$ or more).

For each hour of the day, the area at each outdoor amenity covered by the sun is calculated. Using the calculated hourly coverage areas, the Sun Access Factor (SAF) is calculated. This SAF is then compared to the criterion from Section 3.2 of the TOR. **Figure 7** and **Figure 8** show the hourly SAF from sunrise to sunset at the two outdoor amenity spaces.

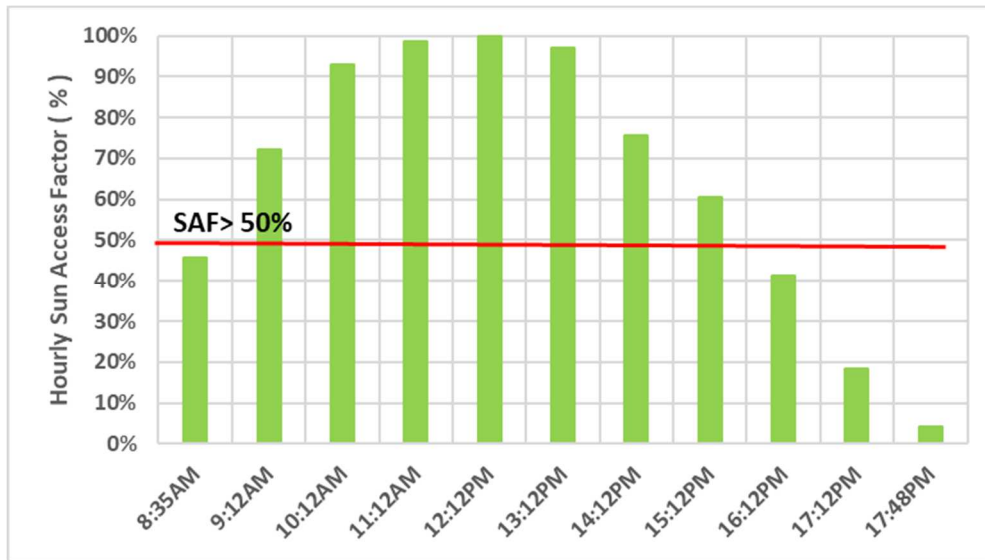


Figure 7: Predicted Hourly SAF at the Outdoor Amenity - 922 m² – September 21st.

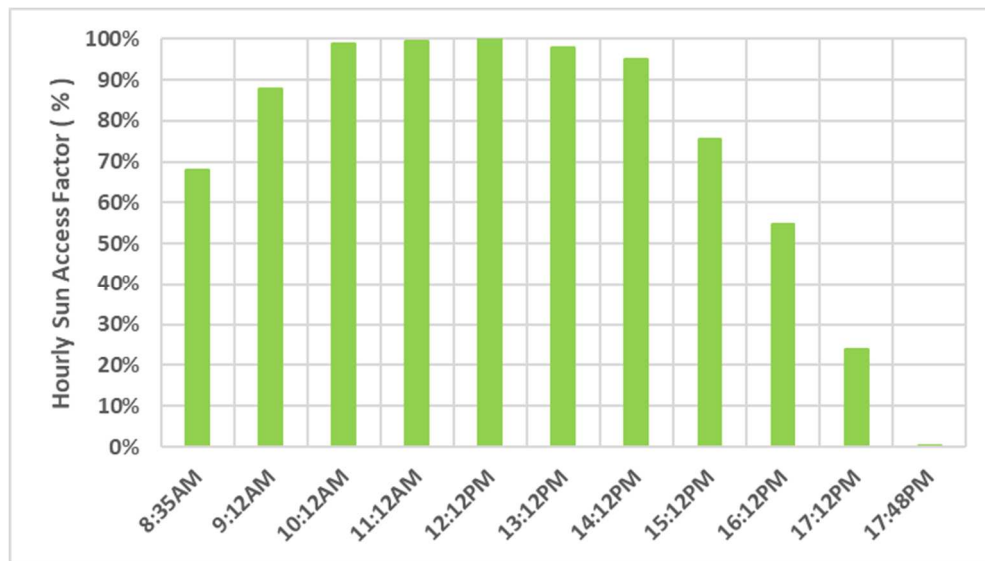


Figure 8: Predicted Hourly SAF at the Outdoor Amenity - 673 m² – September 21st.

Furthermore, the overall daily average SAF value for each outdoor amenity spaces was calculated. As an example, the SAF for 922 m² outdoor space was calculated following the steps below:

Step 1: Calculation of areas exposed to sunshine at each hourly test time (see **Table 1**).

Step 2: Calculation of the average for the one-hour intervals (see **Table 2**).

Step 3: Calculation of the overall daily average SAF (overall area/total physical area) and comparison with the shadow criteria (see **Table 3**).

Table 1: Areas Exposed to Sunshine at Each Hourly Test Time – Outdoor Amenity - 922 m²

Hourly test time	Area (m ²)	SAF (%)
8:35 AM	423	45.9%
9:12 AM	665	72.1%
10:12 AM	858	93.1%
11:12 AM	910	98.7%
12:12 PM	922	100.0%
13:12 PM	895	97.1%
14:12 PM	696	75.5%
15:12 PM	558	60.5%
16:12 PM	380	41.2%
17:12 PM	170	18.4%
17:48 PM	40	4.3%

Table 2: Overall Average Sun Exposed Area – Outdoor Amenity - 922 m²

Average	Area (m ²)
The overall average area in sunshine AS (AVE)	592

Table 3: Overall Daily Average SAF – Outdoor Amenity - 922 m²

Area	Area (m ²)
Total area of outdoor amenity (AT)	922
Overall daily average Sun Access Factor: AS(AVE)/AT	0.64
Meet Shadow Criterion#3.2 (YES/NO) (SAF \geq 0.50)	YES

Using the same procedure, the SAF was calculated for June 21st and December 21st. Table 4 shows the results for both communal outdoor amenities.

Table 4: Overall Daily Average SAF

Day	Area	Overall SAF	Criterion (YES/NO)
June 21 st	922 m ² Outdoor amenity	0.87	YES
	673 m ² Outdoor amenity	0.83	YES
December 21 st	922 m ² Outdoor amenity	0.15	NO
	673 m ² Outdoor amenity	0.50	YES

Based on predicted hourly SAF values and the overall value at the Outdoor amenity spaces, the shadow criterion 3.2 is met for the 673 m² outdoor amenity. For the 922 m² outdoor amenity space, shadow criterion 3.2 is met for all tested days except for December 21st where the sun access is about 15% during this day. Given the minimal activity during winter, shadow impacts are expected to be minimal.

3.3 Public Realm

Figure 9 identifies all public realm in the vicinity of the development (dark blue color in **Figure 9**). For this study, the public realm is comprised of the public sidewalks along Chalkwell Close, Karenza Road, Truscott Drive, Lockhart Road, and Sandgate Crescent as well as the public Sandgate Park.



Figure 9: Public Realm in the Vicinity of the Development.

3.3.1 Shadow Analysis Results for September 21

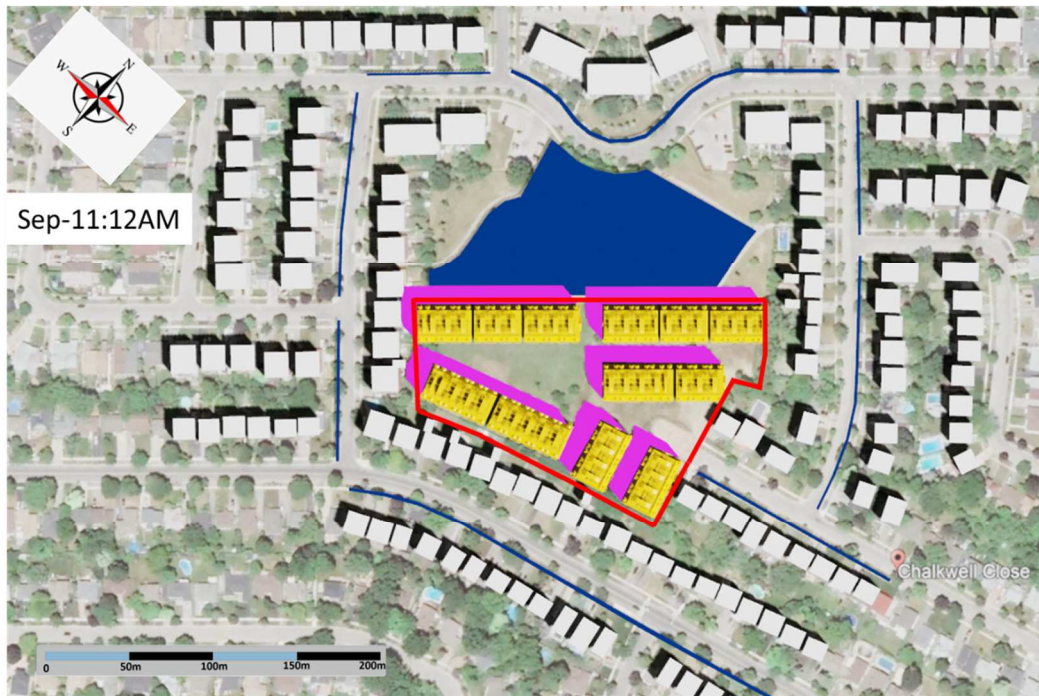
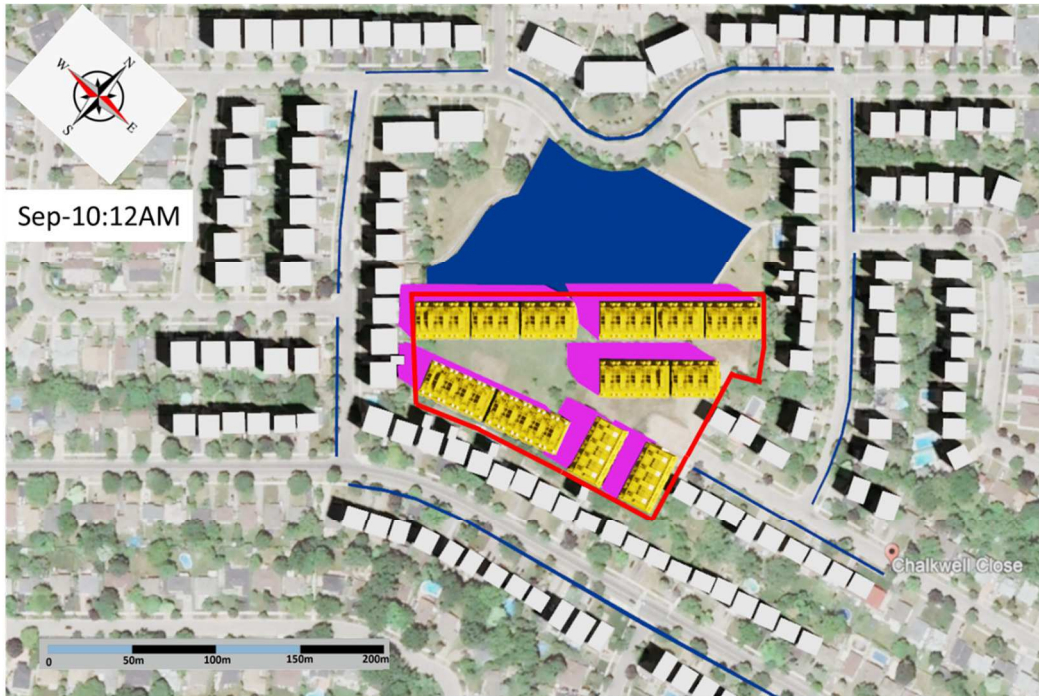
The model results of shadow patterns for fall equinox from 8.35AM to 5.48PM are shown in **Figure 10**. As shown in this **Figure 10**, the new shadow (purple color) represents the shadow due to the Development, while the existing shadow represents the shadow due to the existing buildings. The footprint of the Development is represented by the orange color. For the fall equinox, the shadow patterns are characterized by a slightly longer cast or coverage on the west side of the Development for the first hour in the morning. This coverage shortens once the sun moves towards the noon hour. The shadow coverage extends on the east and south-east sides of the Development to reach a maximum length near the sunset hours.

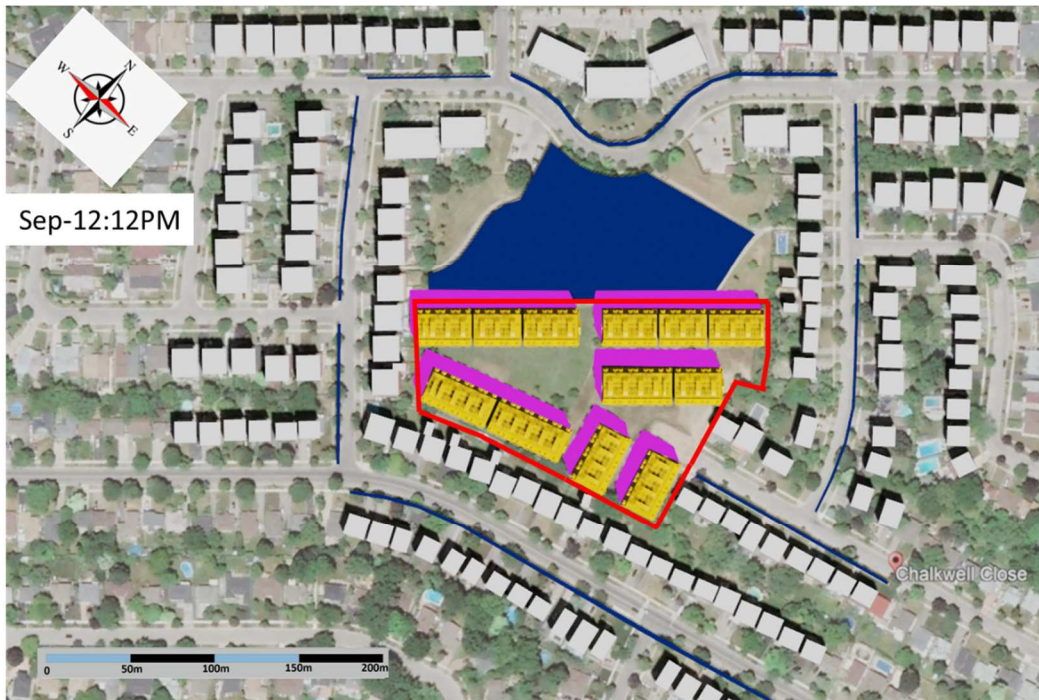


- Existing Building
- Proposed Development
- Site Plan
- Public Realm
- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development



- Existing Building
- Proposed Development
- Site Plan
- Public Realm
- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development







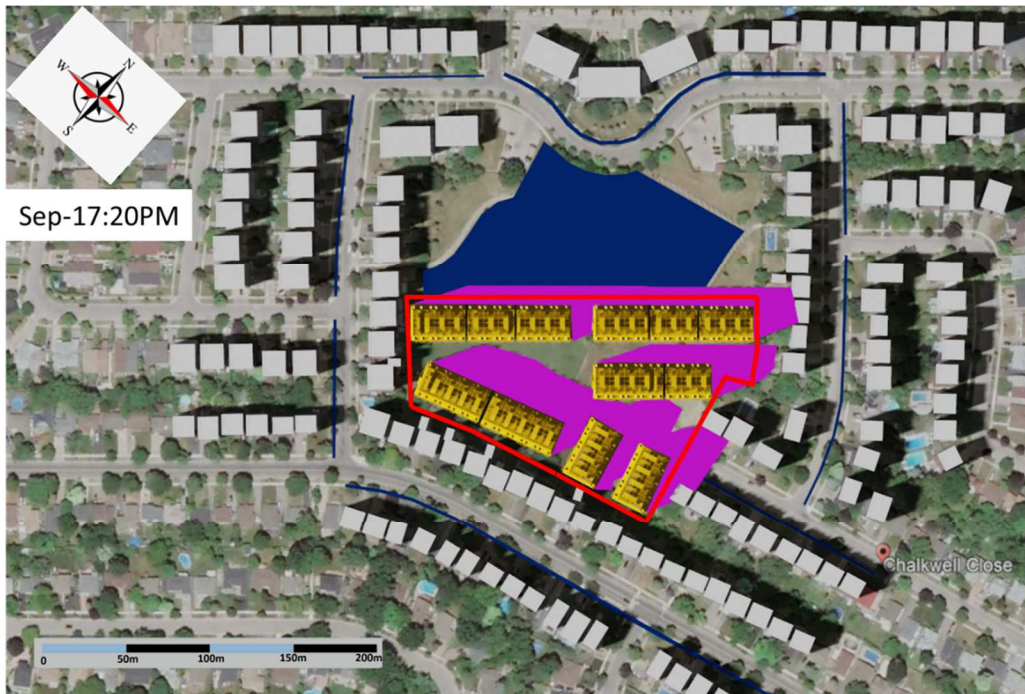
- Existing Building
- Proposed Development
- Site Plan
- Public Realm
- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development



- Existing Building
- Proposed Development
- Site Plan
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- Existing Building
- Proposed Development
- Site Plan
- Public Realm
- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development



- Existing Building
- Proposed Development
- Site Plan
- Public Realm
- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development



Figure 10: Shadow Patterns at Public Realm (Sidewalks and Sandgate Park) – September 21st.

3.3.1.1 Low and Medium Density Residential Streets

Section 3.3 of the TOR requires that the shadow from the proposed development should allow full sunlight on the opposite boulevard including the full width of the sidewalk for “Low and Medium Density Residential Streets”. The criterion is met if the sunlight accesses these areas 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 shown in **Figure 10** above, the sun accesses the opposite sidewalk that abuts residential side and back yards along all sidewalks for more than four hours between 9:12 am and 11:12 am, and between 3:12 pm and 5:12 pm. Therefore, the criterion for Section 3.3 of the TOR is met for these opposite sidewalks.

3.3.1.2 Public Open Spaces, Parks and Plazas

Section 3.3 of the TOR requires that the shadow from the proposed development should allow for full sun on “public open spaces, parks and plazas” at least half the time, or 50% sun coverage all the time. The criterion is met if the overall “sun access factor” is at least 50% or 0.5 on each of the test dates ($As(ave)/AT = 0.5$ or more).

For each hour of the day, the area at the Sandgate Park covered by the sun is calculated. Using the calculated hourly coverage areas, the Sun Access Factor (SAF) is calculated. This SAF is then compared to the criterion from Section 3.3 of the TOR. **Figure 11** shows the hourly SAF from sunrise to sunset at the Sandgate Park.

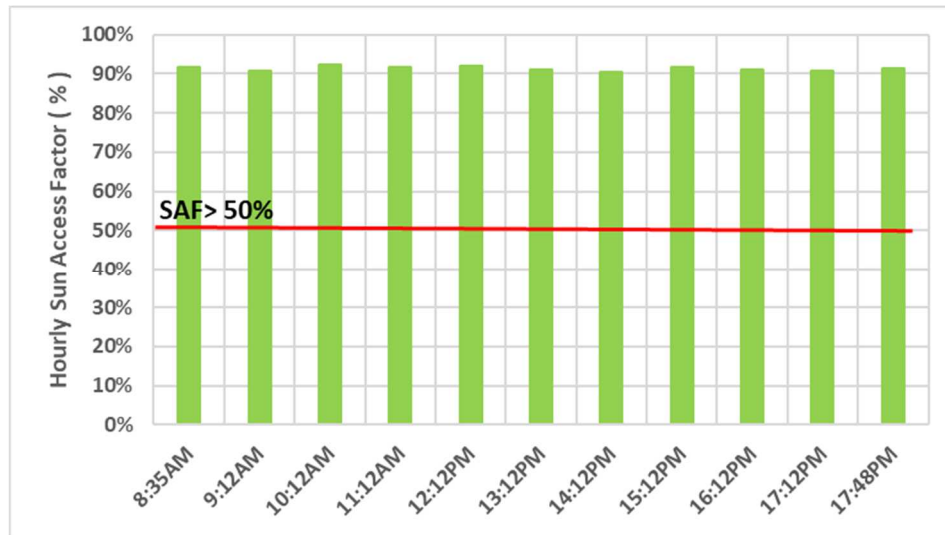


Figure 11: Predicted Hourly SAF at the Sandgate Park – September 21st.

Furthermore, the overall daily average SAF for Sandgate Park was also calculated using similar steps as used above to calculate the SAF values for the outdoor amenity spaces. **Table 5** below shows the results of the calculations.

Table 5: Hourly Average SAF – September 21st - Sandgate Park

Hourly test time	Area (m ²)	SAF (%)
8:35 AM	10595	91.6%
9:12 AM	10,492	90.7%
10:12 AM	10,672	92.2%
11:12 AM	10,598	91.6%
12:12 PM	10,649	92.0%
13:12 PM	10549	91.2%
14:12 PM	10464	90.4%
15:12 PM	10597	91.6%
16:12 PM	10540	91.1%
17:12 PM	10490	90.7%
17:48 PM	10560	91.3%

Table 6: Overall Daily Average SAF – September 21st - Sandgate Park

Parameter	Area (m ²)
Total area of adjacent residential amenity (AT)	10,564
Overall daily average Sun Access Factor: AS(AVE)/AT	0.91
Meet Shadow Criterion#3.3 (YES/NO) (SAF>=0.50)	YES

Based on predicted hourly SAF values and the overall value at the Sandgate Park, the shadow criterion 3.3 is met.

3.4 Turf Flower Gardens in Public Parks

As mentioned above, no such areas have been identified within the study domain and therefore were not included in the analysis.

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

Figure 12 identifies all areas in the vicinity of the development with potential for using solar energy on the roofs, rear, front, and side walls. In this Figure, the line of impact assessment or “no impact zone” (color yellow in the **Figure 12**) for these spaces is within 3.0m of the front, rear, and side walls.



Figure 12: Building Faces in the Vicinity of the Proposed Development

3.5.1 Shadow Analysis Results for September 21

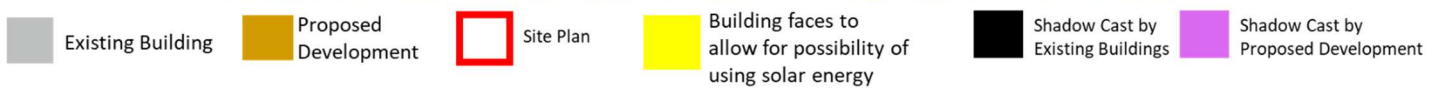
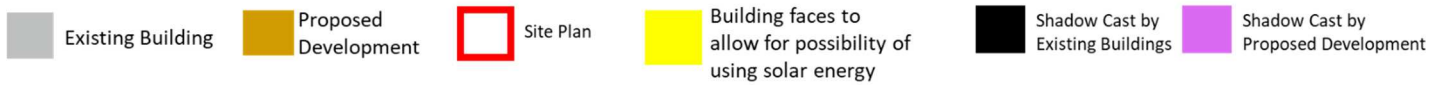
The model results of shadow patterns for fall equinox from 8.35AM to 5.48PM are shown in **Figure 13**. In this **Figure 13**, the new shadow (purple color) represents the shadow due to the Development, while the existing shadow represent the shadow due to the existing buildings. The footprint of the Development is represented by the orange color. For the fall equinox, the shadow patterns are characterized by a slightly longer cast or coverage on the west side of the Development for the first hours in the morning. Then, this coverage shortens once the sun moves towards the noon hour. The shadow coverage extends on the east and south-east side of the Development to reach a maximum length near sunset hours.

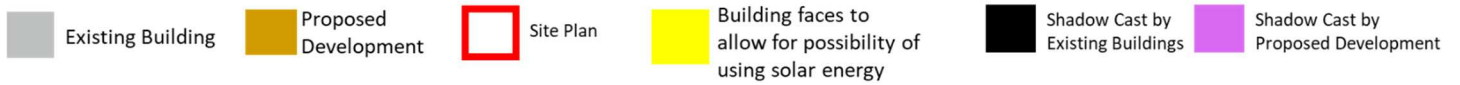
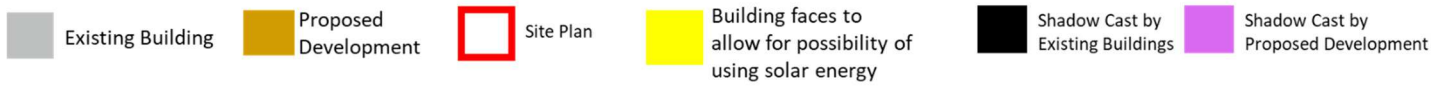
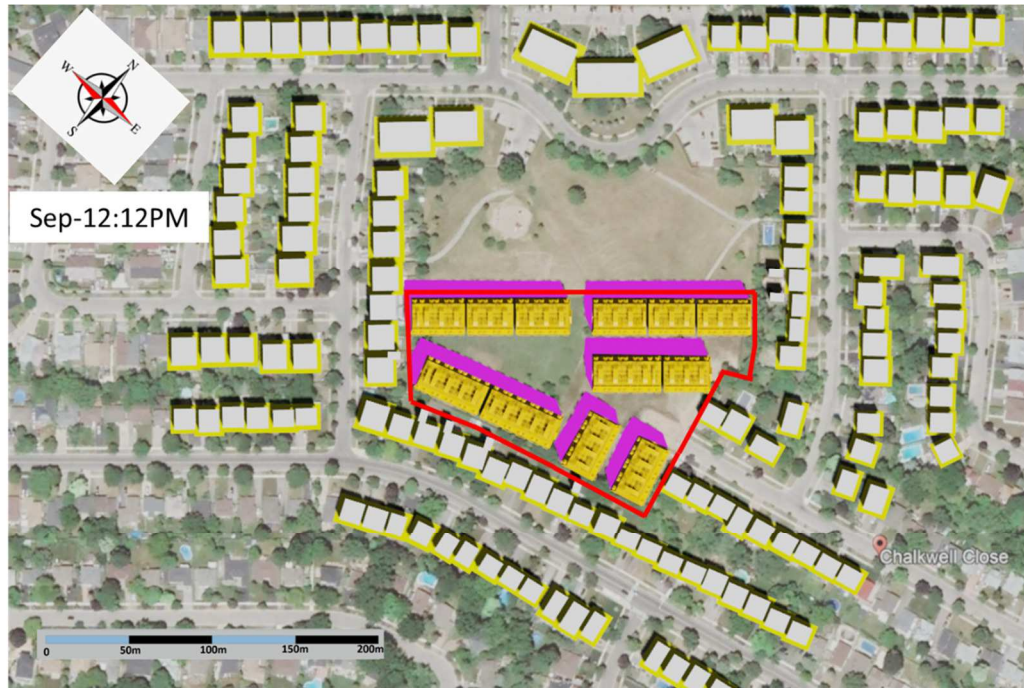


- Existing Building
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- Site Plan
- Building faces to allow for possibility of using solar energy
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- Shadow Cast by Proposed Development



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- Shadow Cast by Existing Buildings
- Shadow Cast by Proposed Development



Figure 13: Shadow Patterns at Building Faces – September 21st.

Section 3.5 of the TOR requires that the line of impact assessment or “no impact zone” for these spaces should be within 3m of the front, the rear and the exterior wall of the building. The criterion is met if there is shadow impact for no more than two consecutive hourly test times in the “no impact zone”. As shown in **Figure 13** above, the findings of the shadow analysis show that the proposal for no more than two consecutive hourly test times are in accordance with this standard. As such, the criterion for Section 3.5 of the TOR is met.

4 CONCLUSION

The shadow analysis has shown that the proposed development will create minimal shadowing impacts on adjacent low-rise neighbourhoods, private amenity areas, communal outdoor amenity spaces and public realm in accordance with TOR of the city of Mississauga.

5 REFERENCES

City of Mississauga. 2023. Terms of References for Shadow study. Accessed at:

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WSP Canada Inc.

Prepared By:

A handwritten signature in black ink, appearing to be 'A. Sojoudi', with a stylized flourish at the end.

Atta Sojoudi, Ph.D., EIT
Air Quality Specialist – Environment

Reviewed By:

A handwritten signature in blue ink, appearing to be 'T. Belamri', with a stylized flourish at the end.

Thabet Belamri, Ph.D., P.Eng.
Senior Engineer - Engineer

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