

WILLOUGHBY SHADOW STUDY

NIAGARA FALLS, ON

AUGUST 29, 2024 | LAWRENCE AVENUE GROUP

FOTENN
Planning + Design

1.0 INTRODUCTION

The subject property is situated in the Chippawa Community towards the southeast corner of the City of Niagara Falls' urban boundary within the smaller Cummings neighbourhood. It is approximately 800 metres away from the shorelines of both the Niagara River and Welland River. The vacant subject property is located at approximately 43°03'05.29"N and 79°02'37.93"W and does not have an assigned municipal address.

The surrounding neighborhood is predominantly residential in nature with considerable open recreational space (such as the Legends of the Niagara golf course) to the southeast side of the subject property. The residential neighbourhood is characterized by a significant proportion of single-detached dwellings with a few low-rise apartment buildings and townhouses in proximity to the site along Willoughby Drive and Weinbrenner Road. Along the eastern side of the property, on the southeast corner of the Willoughby Drive/Caronpost Road intersection, is a three-storey long-term care home.

To the northwest side of the property there exists a strip mall with frontage on Cattell Drive. The strip mall has multiple tenants including a laundromat, convenience store, jewelry and gift store, a pub and eatery, and personal service establishments.

The proposed development consists of three (3) 10-storey buildings and 318 total townhome units (91 front loaded, 81 stacked and 146 back-to-back townhomes) of 3-storeys. Two of the three proposed buildings are located north (Building A) and south (Building B) of the proposed Caronpost Road Right-of-Way, facing Willoughby Drive and are oriented north-south. Building A is positioned to front onto a proposed open space - creating an active street edge. Surface parking and servicing is located behind and adjacent to building A, buffering neighbouring low-rise apartments east of Willoughby Drive.

Building B is setback 11.5m from the western property line abutting a 3-storey long term care home. Surface parking and servicing is located to the south of Building B, creating a buffer between Building B and adjacent 3-storey apartment complexes along the corner of Willoughby Drive and Weinbrenner Road. Building C, oriented east-west, is located along the Weinbrenner Road frontage with parking, loading and servicing located to the rear of the block.

The plan proposes 91 front loaded townhomes along the eastern property line abutting low-rise residential and open recreational space (Legends of the Niagara Golf Course) along the southeastern property line. Proposed along the western property boundary two stacked home buildings with a total of 15 units are proposed to front onto Willoughby Drive, while a combination of stacked and back-to-back townhomes are proposed internally within the subject site.

2.0 SET-UP/PARAMETERS

2.1 Test Times:

April 21st (UTC-04:00): 10am – 6pm
June 21st (UTC-04:00): 10am – 6pm
September 21st (UTC-04:00): 10am – 6pm
December 21st (UTC-05:00): 10am – 6pm

2.2 Shadow Impact Criteria:

The Shadow Impact Analysis within this document responds to the Shadow Impact Criteria outlined in the City of Niagara’s Sun/Shadow Study Terms of Reference. The following subsequent section 3.0 Shadow Analysis, describes the shadow impacts of the proposed 10-storey buildings and respond to the shadow impact criteria outlined in the Terms of Reference.

Private Realm:

Outdoor Residential Amenity Spaces on Adjacent Properties (4.2.1)

To minimize the impact of shadow on existing adjacent properties from new development, adjacent residential amenity areas should receive at a minimum of 6 hours of sunlight between 10am to 6pm.

/ April 21 to September 21

Outdoor Residential Amenity Spaces within the Proposed Development (4.2.2)

To maximize the functionality of private outdoor amenity spaces associated with new developments with rear yards, rooftop spaces, balconies, decks, and other shared common spaces, amenity areas should receive at least 4 hours of sun between 10am to 6pm.

/ April 21 to September 21

Public Realm:

Public Outdoor Amenity Spaces (4.3.1)

Communal Outdoor Amenity Spaces include school yards, children’s play areas, public outdoor pools, community gardens, privately owned public spaces, Civic and Cultural Spaces, and other outdoor public areas. Shadows cast by existing buildings and shadows from proposed buildings should allow for 5 hours of full sun between 10am-6pm on:

/ April 21

School yards and children’s play areas should receive at least 3 hours of sun on:

/ December 21st (10am to 3pm)

Sidewalk Areas and Boulevards along the frontage of the Development (4.3.2)

Streets with residential and mixed-uses, enlivened with people on sidewalks, patio spaces, trees, and where significant numbers walk, cycle, or ride transit should continue to receive a minimum of 4 hours of sun 10am to 6pm.

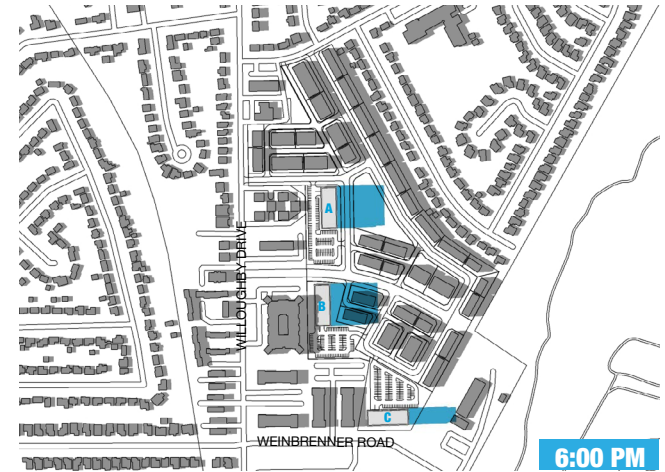
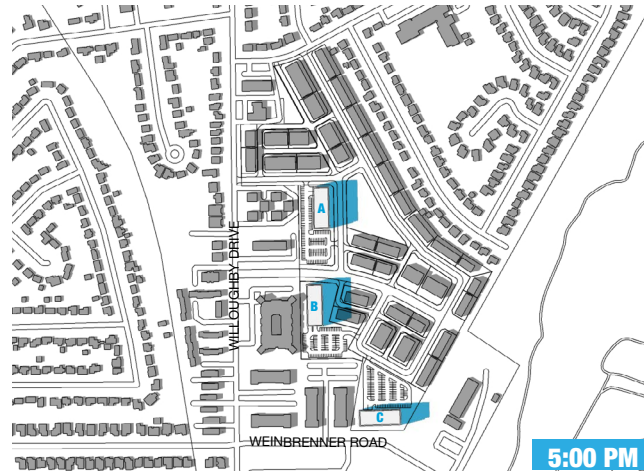
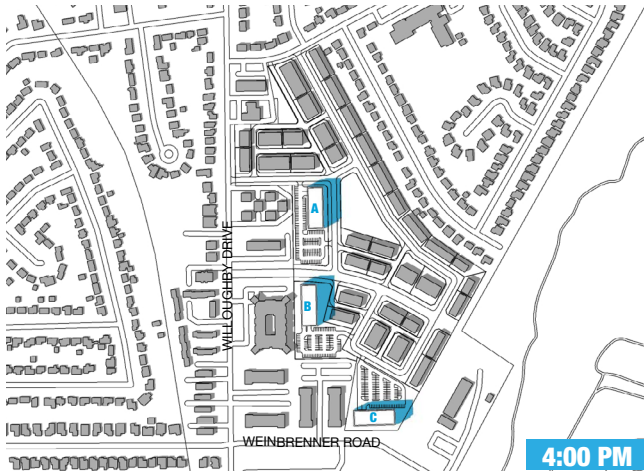
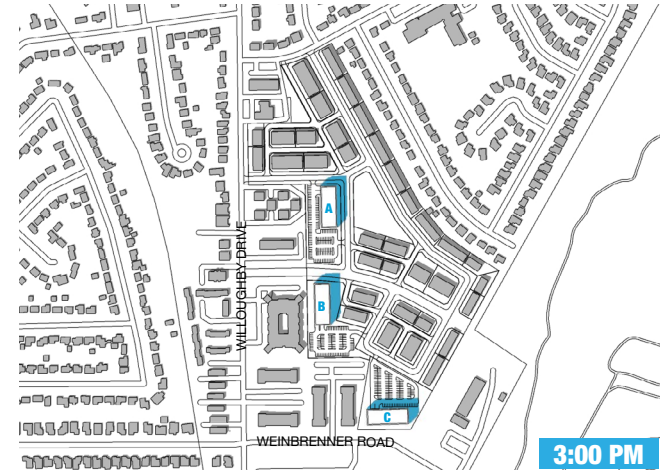
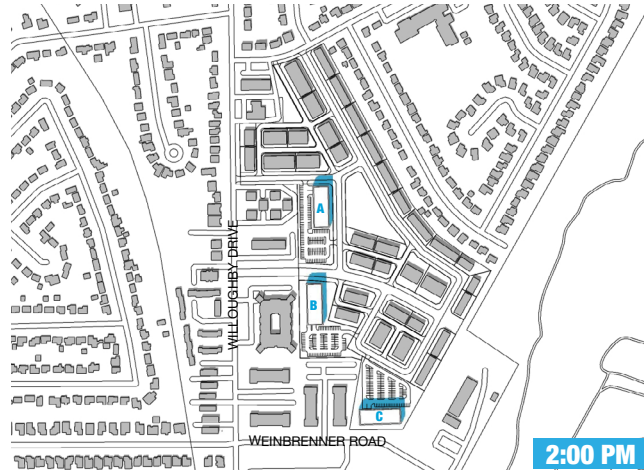
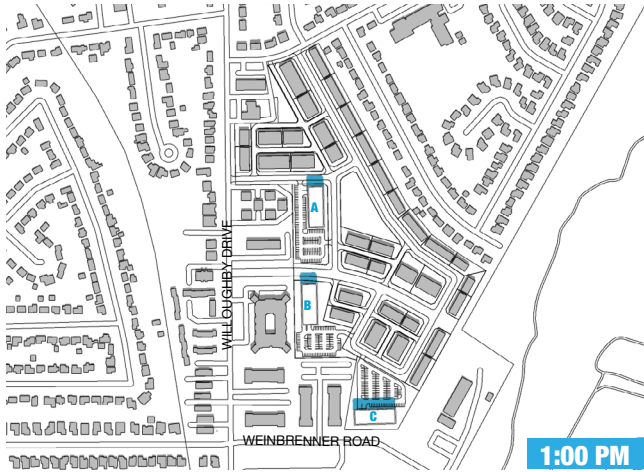
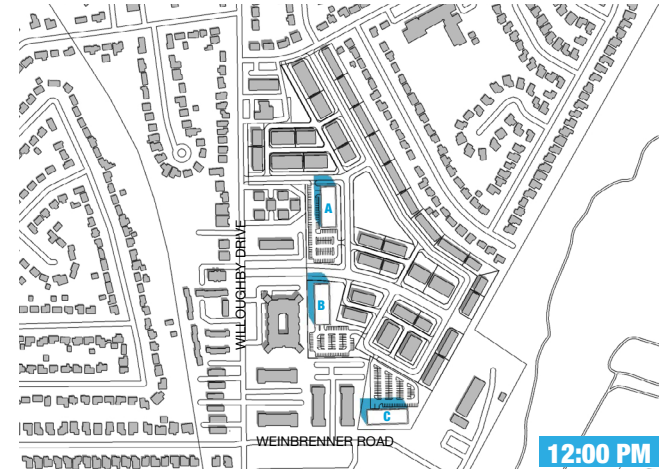
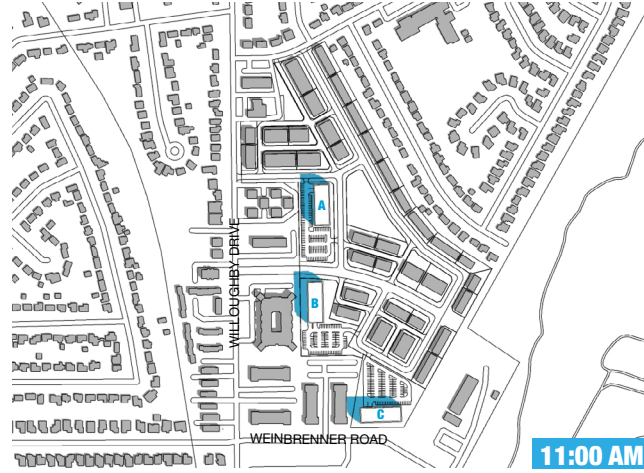
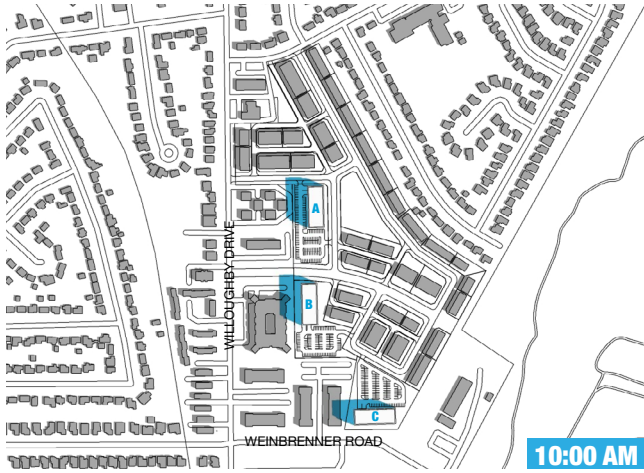
/ April 21st (The south sides of streets with East and West orientations may receive less sunlight)

Parks, Open Spaces, and Natural Heritage Areas (4.3.3)

Shadows cast by existing buildings and proposed developments surrounding parks and other open spaces should not exceed 3 hours in duration between the hours of 10am to 6pm on:

/ April 21st

/ September 21st



3.0 SHADOW ANALYSIS

APRIL 21

The following shadow analysis illustrates and describes the impacts resulting from the shadowing of three (3) proposed 10-storey buildings - Building A, B and C within the proposed site and the surrounding context.

/ During the 10:00am test time, shadowing from Buildings A, B and C impacts residential properties west of the subject site for 1 hour during the day.

/ By 11:00am the shadowing moves off all abutting residential buildings and only impacts a portion of the properties and surface parking areas.

/ By the 12:00pm test time, all shadows have shifted from the abutting low-rise residential buildings, with properties receiving full and continuous sunlight for the duration of the day.

Outdoor Residential Amenity Spaces on Adjacent Properties (4.2.1)

/ Adjacent properties receive at least 6 hours of full sun coverage between the 10:00am and 6:00pm test times.

Outdoor Residential Amenity Spaces within the Proposed Development (4.2.2)

/ Outdoor residential amenity areas within the proposed development receive at least 4 hours of sunlight between the 10:00am and 6:00pm test times.

Public Outdoor Amenity Spaces (4.3.1)

/ Shadowing cast by the proposed buildings permit at least 5 hours of sun coverage for communal outdoor amenity spaces (i.e. central open space) between the 10:00am and 6:00pm test times.

Sidewalk Areas and Boulevards along the frontage of the Development (4.3.2)

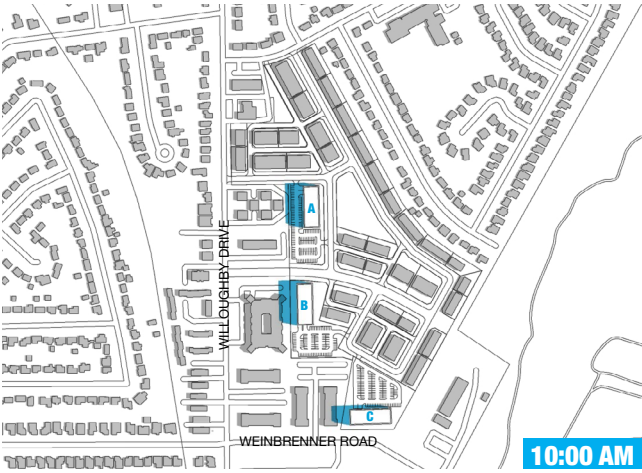
/ Activated sidewalk areas along the street frontages of Building A (fronting onto open space) and Building C receive at least 4 hours of sun coverage between the 10:00am and 6:00pm test times.

/ Shadowing from Building B impacts the south side of Caronpost Road for 7 hours. The shadowing exceeds the criteria for sidewalk areas, however, the building was sited and oriented north-south, to mitigate the impacts. The shadows cast are narrower, and move across the site more quickly with the narrow portion of the building adjacent to the street compared to an east-west orientation.

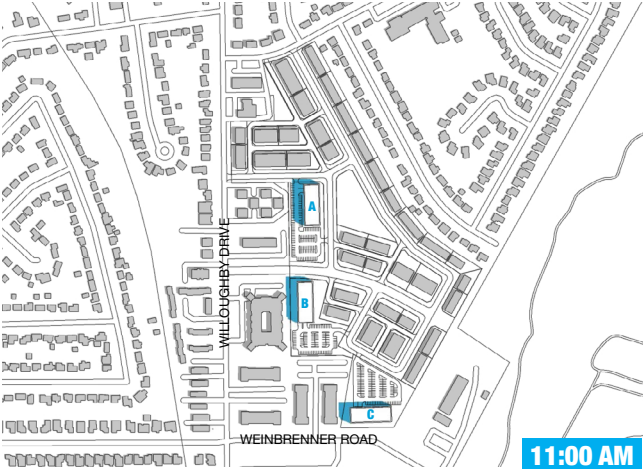
Parks, Open Spaces, and Natural Heritage Areas (4.3.3)

/ Surrounding parks and other open spaces are not impacted by shadowing for more than 3 hours between the test times of 10:00am and 6:00pm on April 21st.

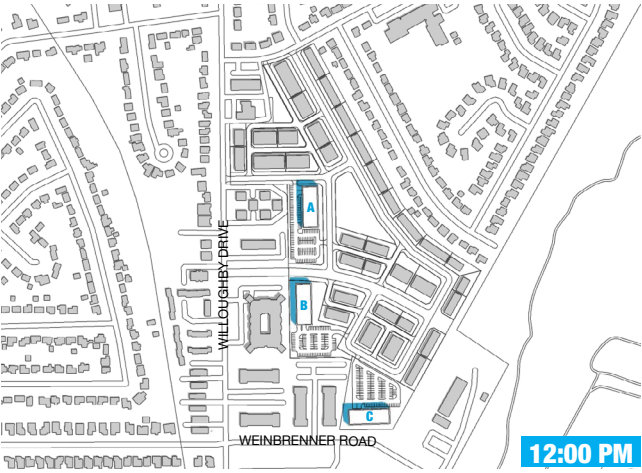
For April 21, the proposed 10-storey buildings meet a majority of the criteria outlined in the Sun/Shadow Study Terms of Reference. As noted above, mitigation measures have been considered to reduce the shadow impacts onto sidewalk areas.



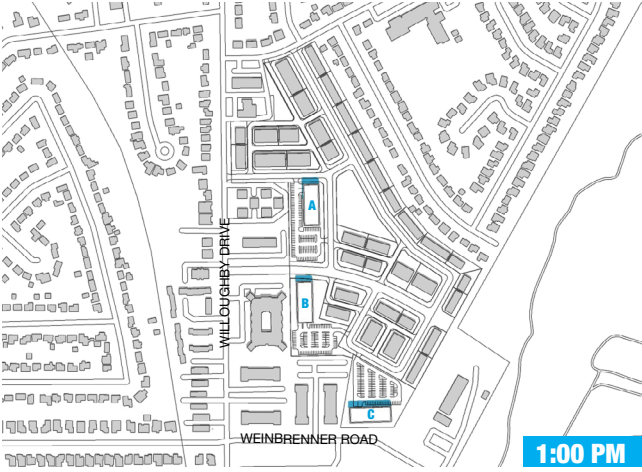
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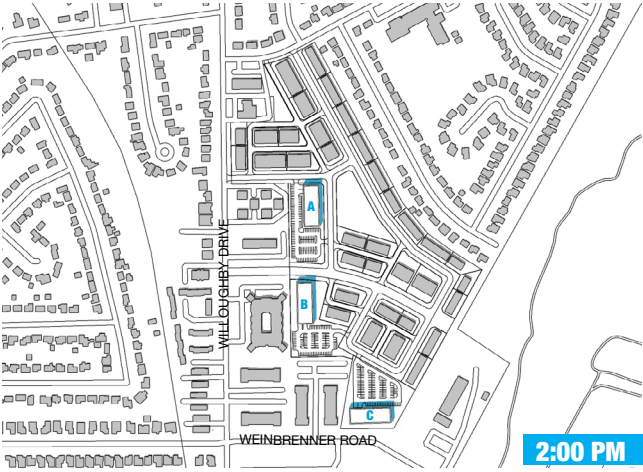
11:00 AM



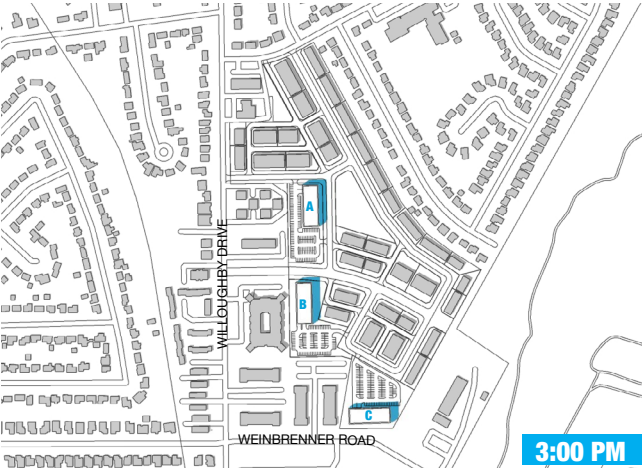
12:00 PM



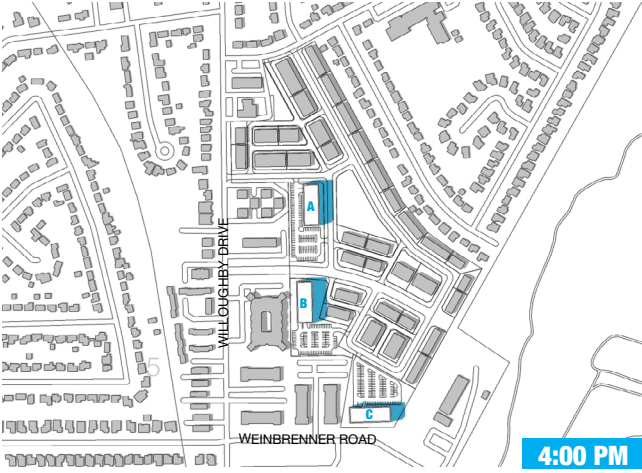
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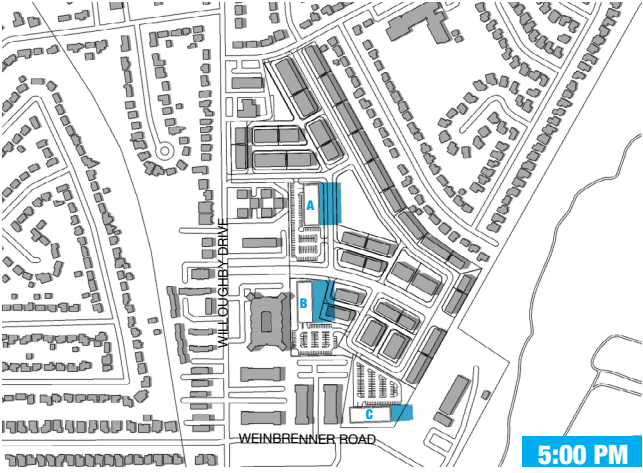
2:00 PM



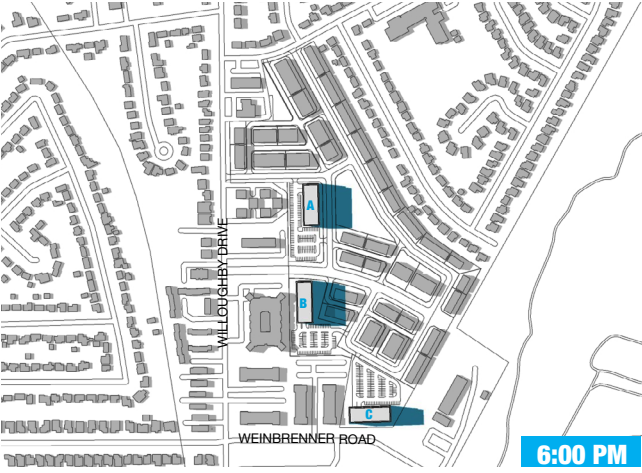
3:00 PM



4:00 PM



5:00 PM



6:00 PM

JUNE 21 SUMMER SOLSTICE

The following shadow analysis illustrates and describes the impacts resulting from the shadowing of three (3) proposed 10-storey buildings - Building A, B and C within the proposed site and the surrounding context.

- / During the 10:00am test time, shadowing from Buildings A, B and C impacts residential properties west of the subject site for 1 hour during the day.
- / By 11:00am the shadowing moves off all abutting residential buildings and only impacts a portion of the properties and surface parking areas.
- / By the 12:00pm test time, all shadows have shifted from the abutting low-rise residential buildings, with properties receiving full and continuous sunlight for the duration of the day.

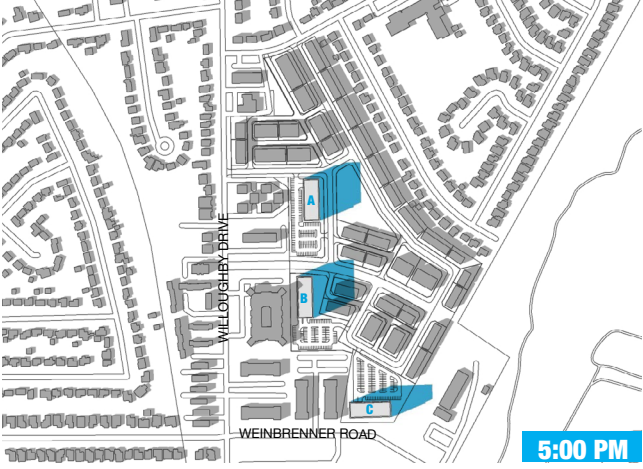
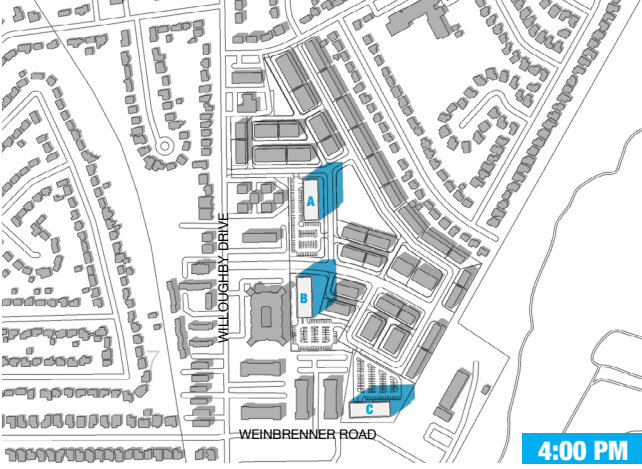
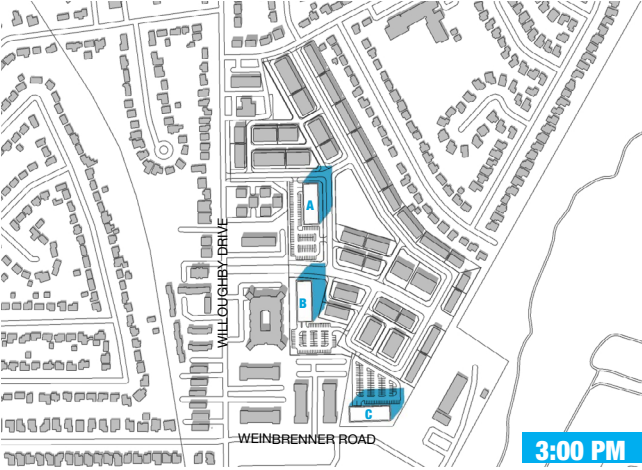
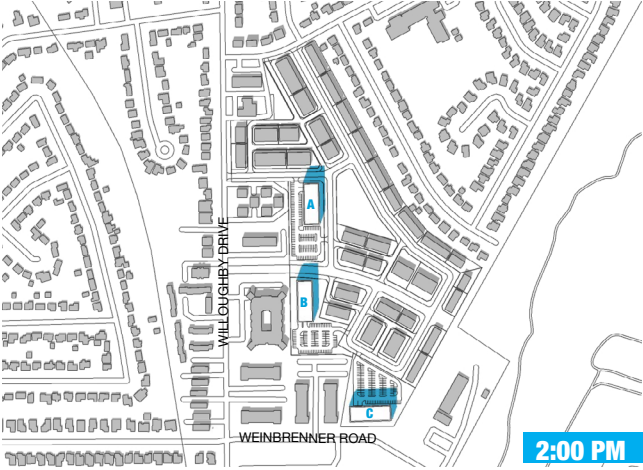
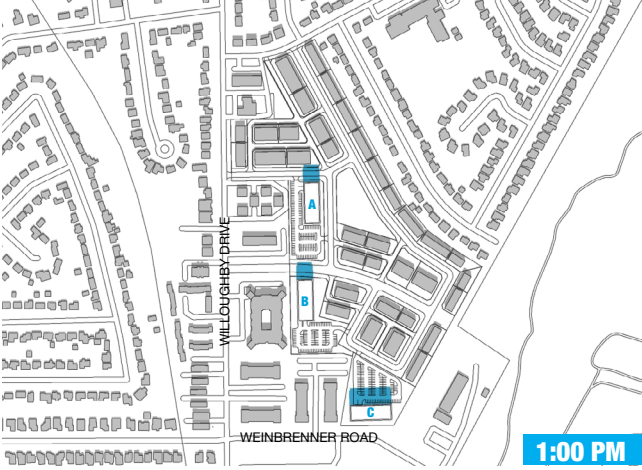
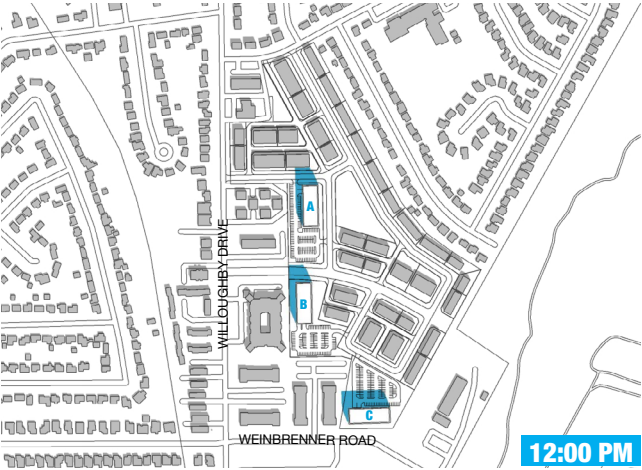
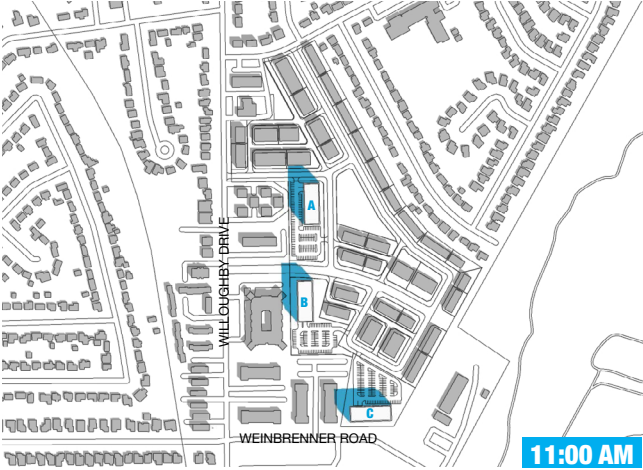
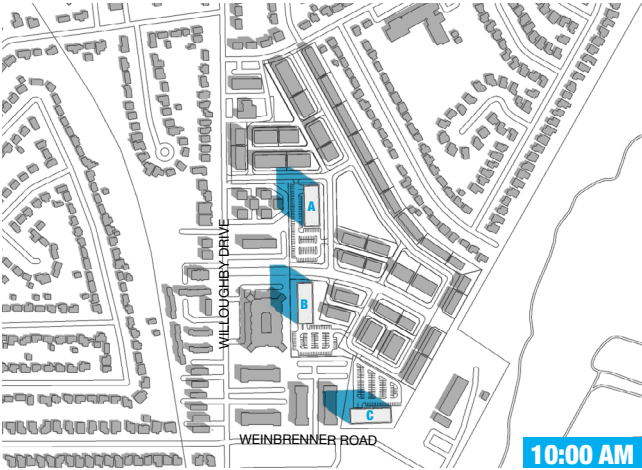
Outdoor Residential Amenity Spaces on Adjacent Properties (4.2.1)

- / Adjacent properties receive at least 6 hours of full sun coverage between the 10:00am and 6:00pm test times.

Outdoor Residential Amenity Spaces within the Proposed Development (4.2.2)

- / Outdoor residential amenity areas within the proposed development receive at least 4 hours of sunlight between the 10:00am and 6:00pm test times.

For June 21, the proposed 10-storey buildings meet the criteria outlined in the Sun/Shadow Study Terms of Reference.



SEPTEMBER EQUINOX

The following shadow analysis illustrates and describes the impacts resulting from the shadowing of three (3) proposed 10-storey buildings - Building A, B and C within the proposed site and the surrounding context.

- / During the 10:00am test time, shadowing from Buildings A, B and C impacts residential properties west of the subject site.
- / By 11:00am the shadowing moves off all abutting residential buildings and only impacts a portion of the properties and surface parking areas.
- / By the 12:00pm test time, only Building C, fronting onto Weinbrenner Road impacts the abutting green space of the neighbouring property.
- / During the 1:00pm test time, all shadows have shifted and properties to the west receive full and continuous sunlight for the duration of the day.
- / There is no further impact on abutting residential properties until 6:00pm, when shadowing from Building A is cast onto low-rise properties abutting the eastern property line.
- / During the 6:00pm test time, shadowing from Building C also impacts a 1-storey maintenance building abutting the Legends of the Niagara Golf Course property southeast of the subject site.

[Outdoor Residential Amenity Spaces on Adjacent Properties \(4.2.1\)](#)

- / Adjacent properties receive at least 6 hours of full sun coverage between the 10:00am and 6:00pm test times.

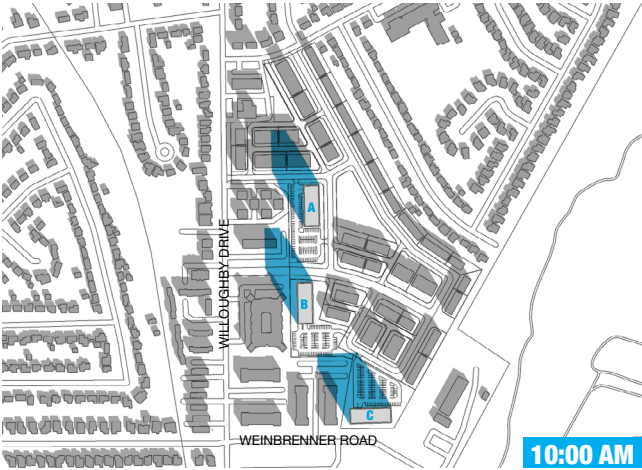
[Outdoor Residential Amenity Spaces within the Proposed Development \(4.2.2\)](#)

- / Outdoor residential amenity areas within the proposed development receive at least 4 hours of sunlight between the 10:00am and 6:00pm test times.

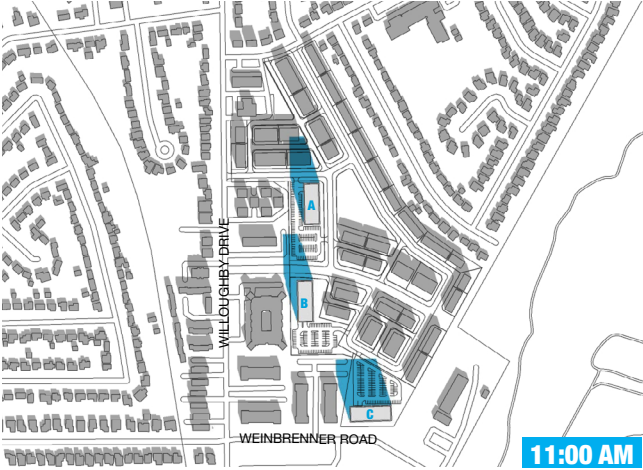
[Parks, Open Spaces, and Natural Heritage Areas \(4.3.3\)](#)

- / Surrounding parks and other open spaces are not impacted by shadowing for more than 3 hours between the test times of 10:00am and 6:00pm on September 21st.

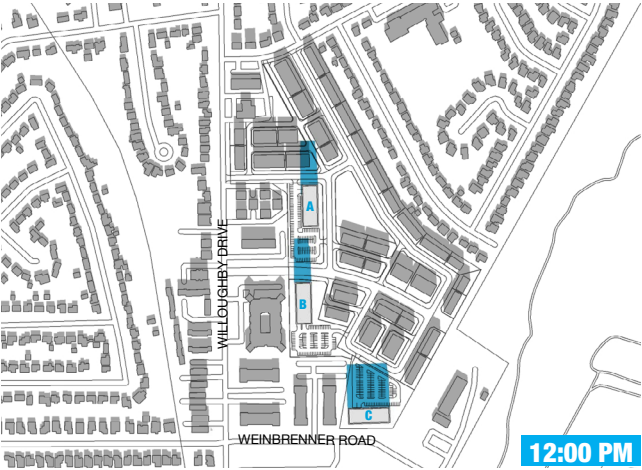
For September 21, the proposed 10-storey buildings meet the criteria outlined in the Sun/Shadow Study Terms of Reference.



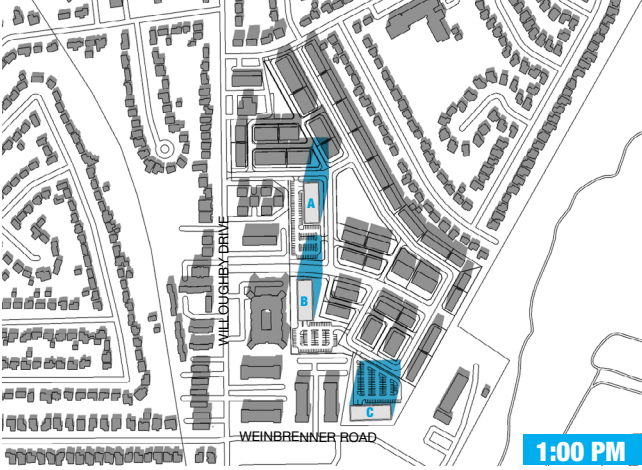
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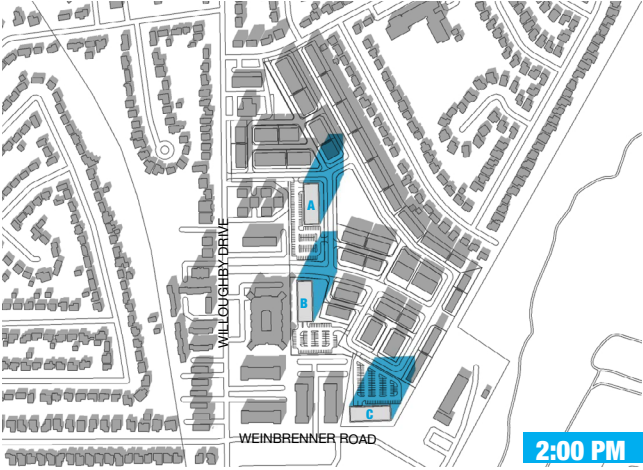
11:00 AM



12:00 PM



1:00 PM



2:00 PM



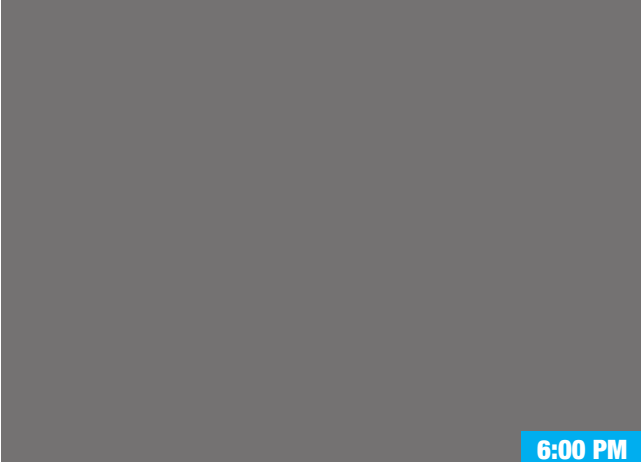
3:00 PM



4:00 PM



5:00 PM



6:00 PM

DECEMBER SOLSTICE

The following shadow analysis illustrates and describes the impacts resulting from the shadowing of three (3) proposed 10-storey buildings - Building A, B and C within the proposed site and the surrounding context.

- / During the 10:00am test time, shadowing from Buildings A, B and C, impacts abutting residential properties west of the subject site.
- / By 11:00am the shadowing moves off all abutting residential buildings and only impacts a portion of the properties and surface parking areas.
- / By the 12:00pm test time, all shadows have shifted from the abutting low-rise residential buildings, with properties receiving full and continuous sunlight for the duration of the day.
- / Between the 11:00am and 2:00pm test times, shadowing predominantly affects surface parking within the proposed building blocks of the subject site.

- / During the 3:00pm test time, shadowing from Building A is cast onto low-rise properties abutting the eastern property line.
- / By the 4:00pm test time, shadowing from Buildings A and B are cast onto low-rise properties abutting the eastern property line. With Building C casting shadowing on the abutting open space of the Legends of the Niagara Golf Course.

Public Outdoor Amenity Spaces (4.3.1)

- / Outdoor public areas (i.e. central open space) within the proposed development receive at least 4 hours of full sun coverage between the 10:00am and 6:00pm test times.

For December 21, the proposed 10-storey buildings meet the criteria outlined in the Sun/Shadow Study Terms of Reference.

4.0 MITIGATION MEASURES

Throughout the design process, shadow analysis was conducted to evaluate the impacts of building height, orientation and placement.

This design approach maximizes sunlight access while mitigating prolonged shadowing impacts for the neighbouring properties, and the properties within the site. The north-south orientations of Buildings A and B allow the shadowing to move quickly off adjacent properties. Building C with an east-west orientation creates a narrower shadow, while the positioning closer to Weinbrenner Road creates an active street edge. With the positioning closer to the street and parking and servicing allocated to the rear, a surface parking buffer helps mitigate shadowing for the proposed townhomes within the subject site.

5.0 CONCLUSION

The shadow analysis and accompanying test times have been used to evaluate the shadow impacts on the immediate and surrounding context. We believe that the proposed development responds appropriately to the context and has taken into consideration any potential shadow impacts.

In Summary:

Outdoor Residential Amenity Spaces on Adjacent Properties receive a minimum of 6 hours of sunlight between 10am to 6pm, April 21 to September 21. (4.2.1)

Outdoor Residential Amenity Spaces within the proposed development such as rear yards, rooftop spaces, balconies, decks, amenity areas and other shared common spaces receive at least 4 hours of sun between 10am to 6pm, April 21 to September 21. (4.2.2)

Public Outdoor Amenity Spaces such as school yards, children's play areas, public outdoor pools, community gardens, privately owned public spaces, Civic and Cultural Spaces, and other outdoor public areas, have access to at least 5 hours of full sun between 10am-6pm on April 21. (4.3.1)

Streets with residential and mixed-uses, enlivened with people on sidewalks, patio spaces, trees, and where significant numbers walk, cycle, or ride transit continue to receive a minimum of 4 hours of sun 10am to 6pm, on April 21st (4.3.2)

Shadows cast by existing buildings and proposed developments surrounding parks and other open spaces do not exceed 3 hours in duration between the hours of 10am to 6pm on April 21st and September 21st (4.3.3).

APPENDIX

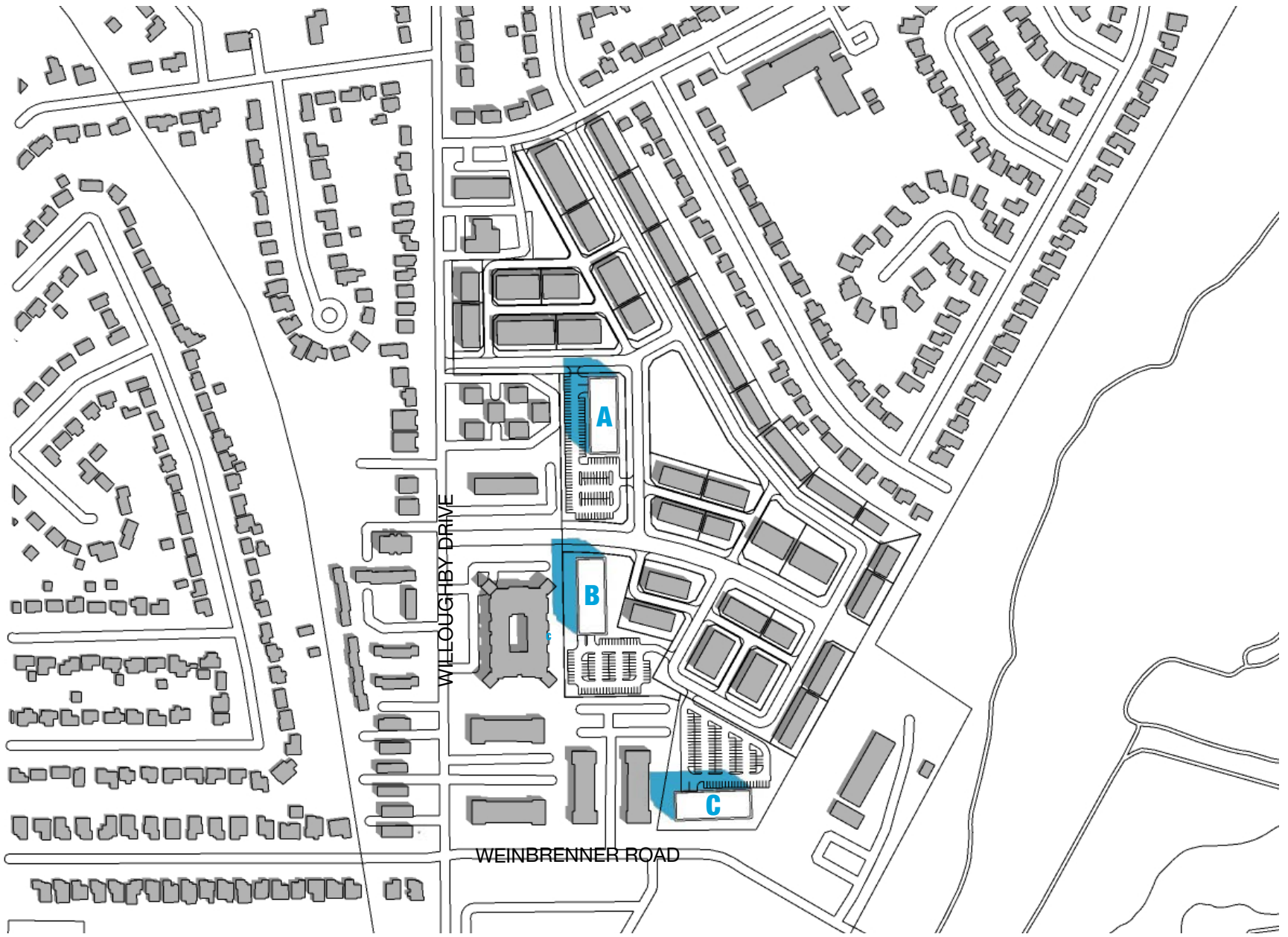
WILLOUGHBY DRIVE
SHADOW ANALYSIS



April 21 | 10:00 AM

UTC -4:00 (EDT)

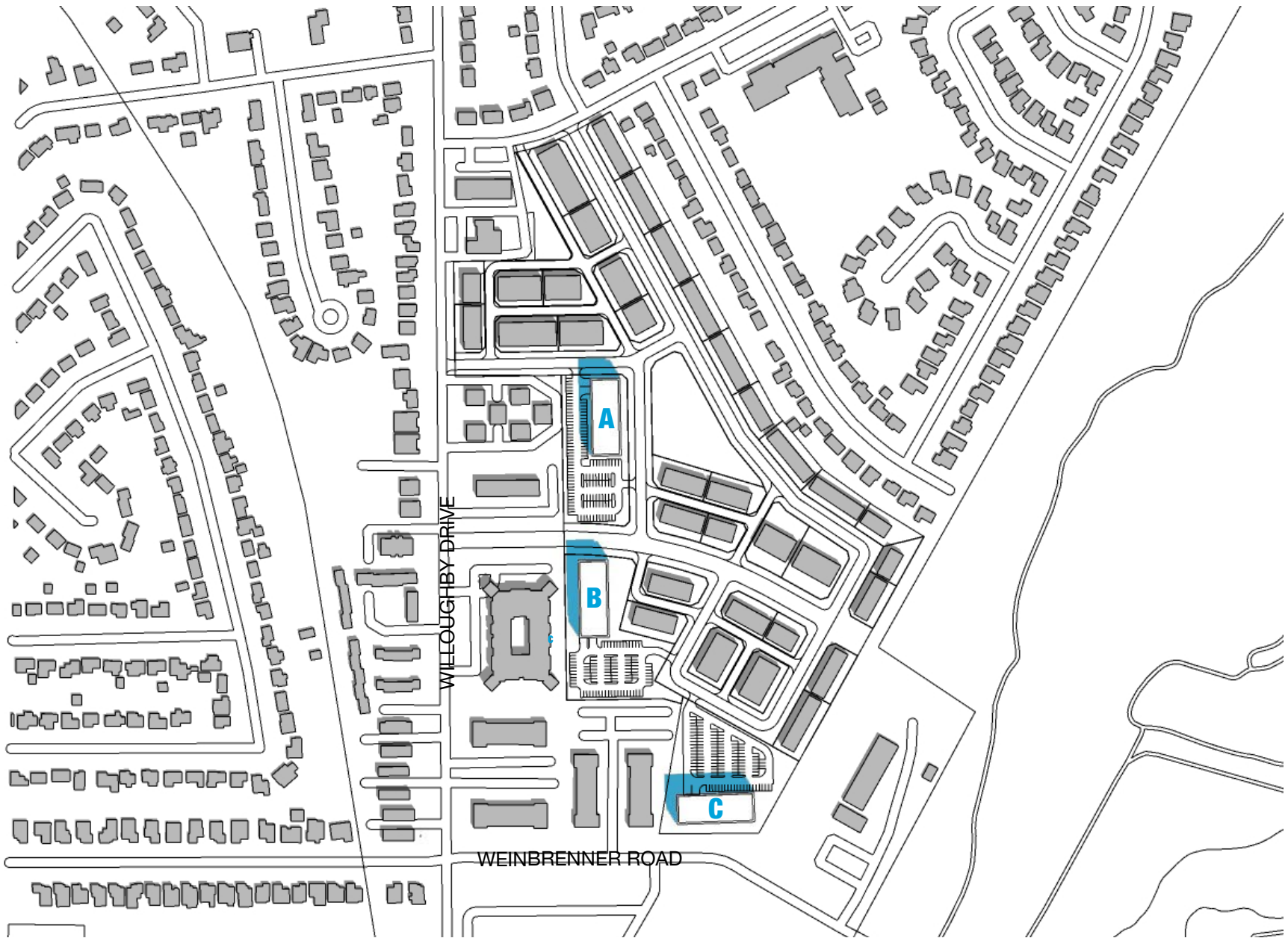
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SHADOW ANALYSIS



April 21 | 11:00 AM

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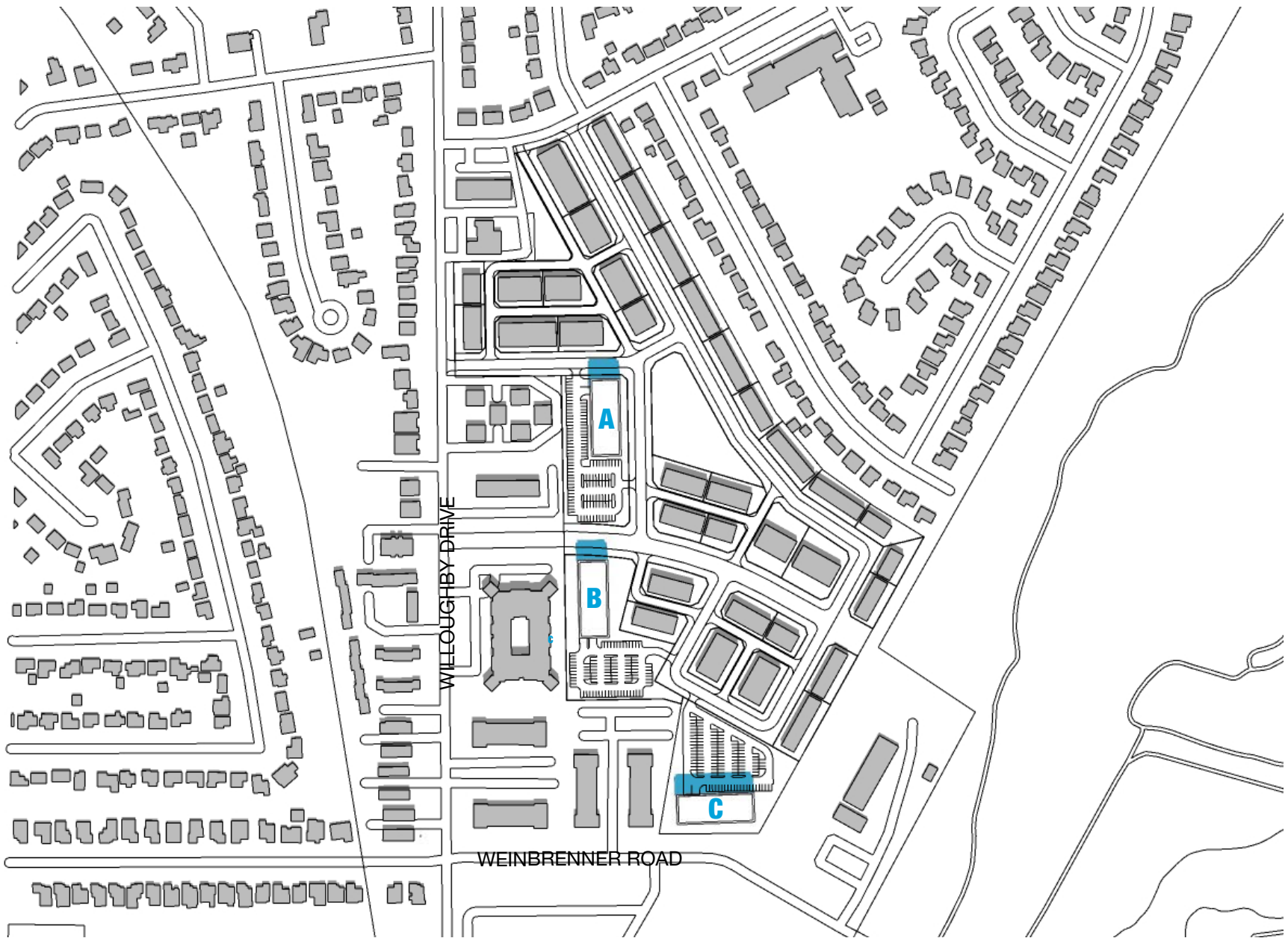
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SHADOW ANALYSIS



April 21 | 12:00 PM

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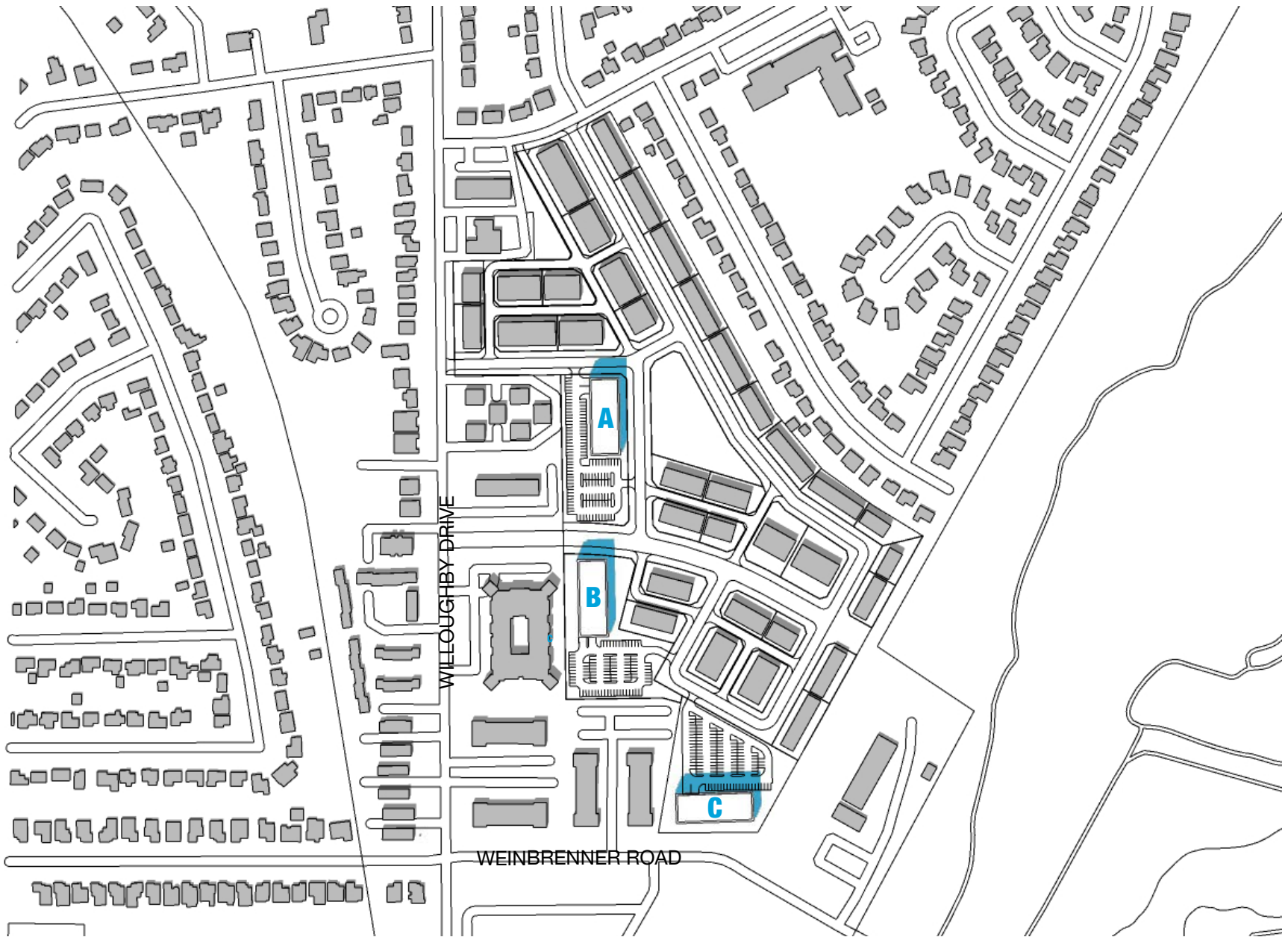
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SHADOW ANALYSIS



April 21 | 1:00 PM

UTC -4:00 (EDT)

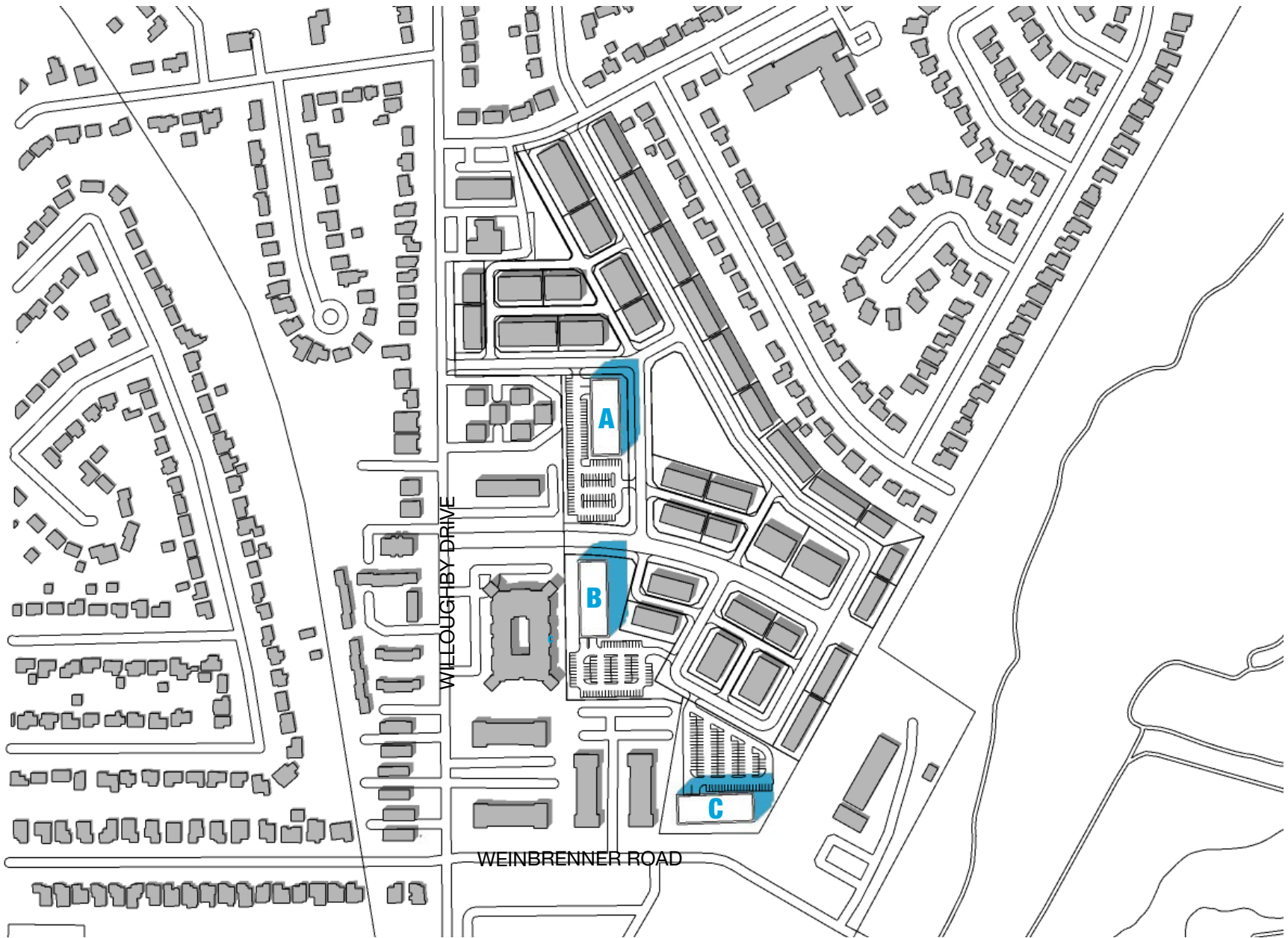
WILLOUGHBY DRIVE
SHADOW ANALYSIS



April 21 | 2:00 PM

UTC -4:00 (EDT)

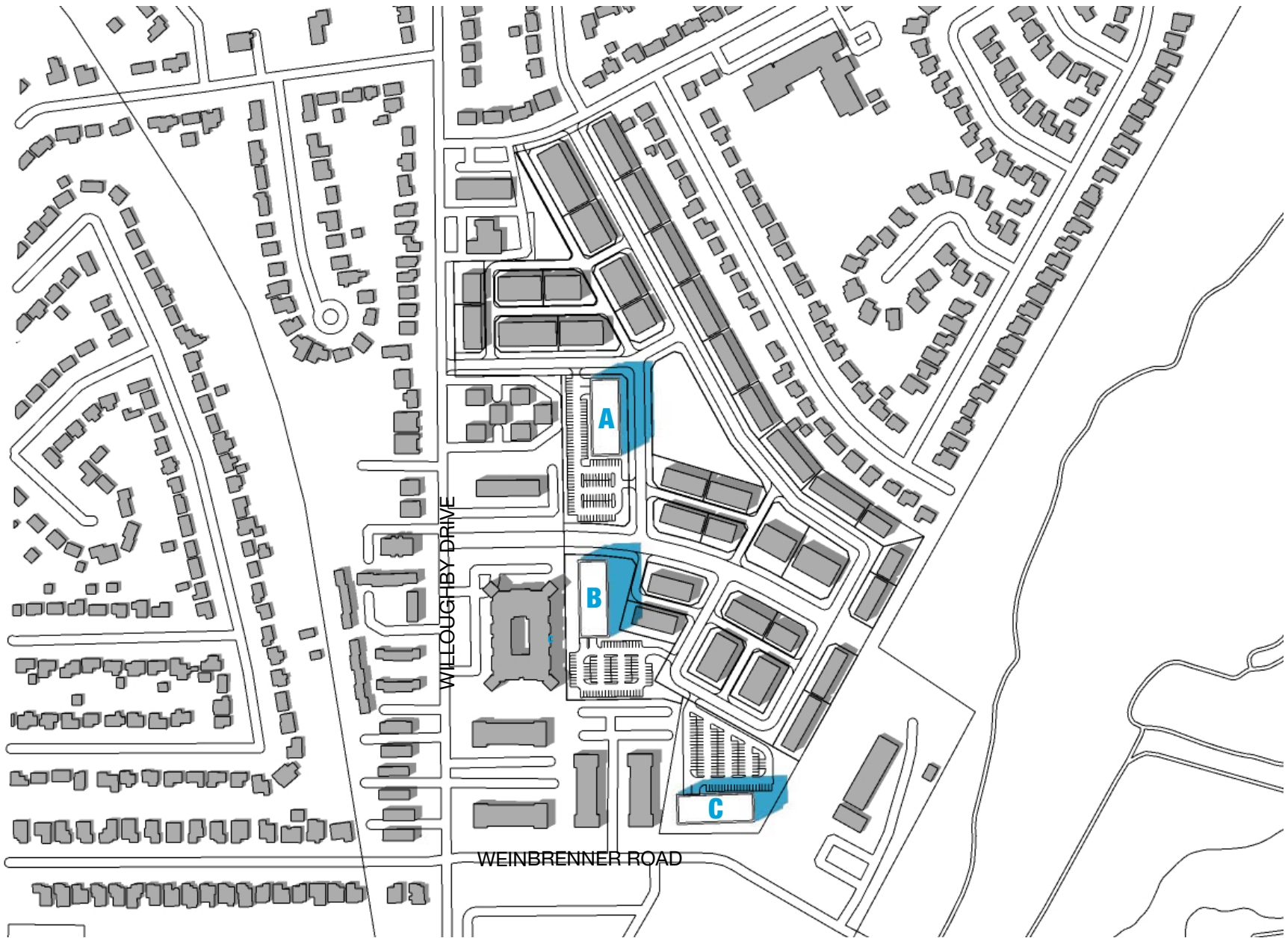
WILLOUGHBY DRIVE
SHADOW ANALYSIS



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UTC -4:00 (EDT)

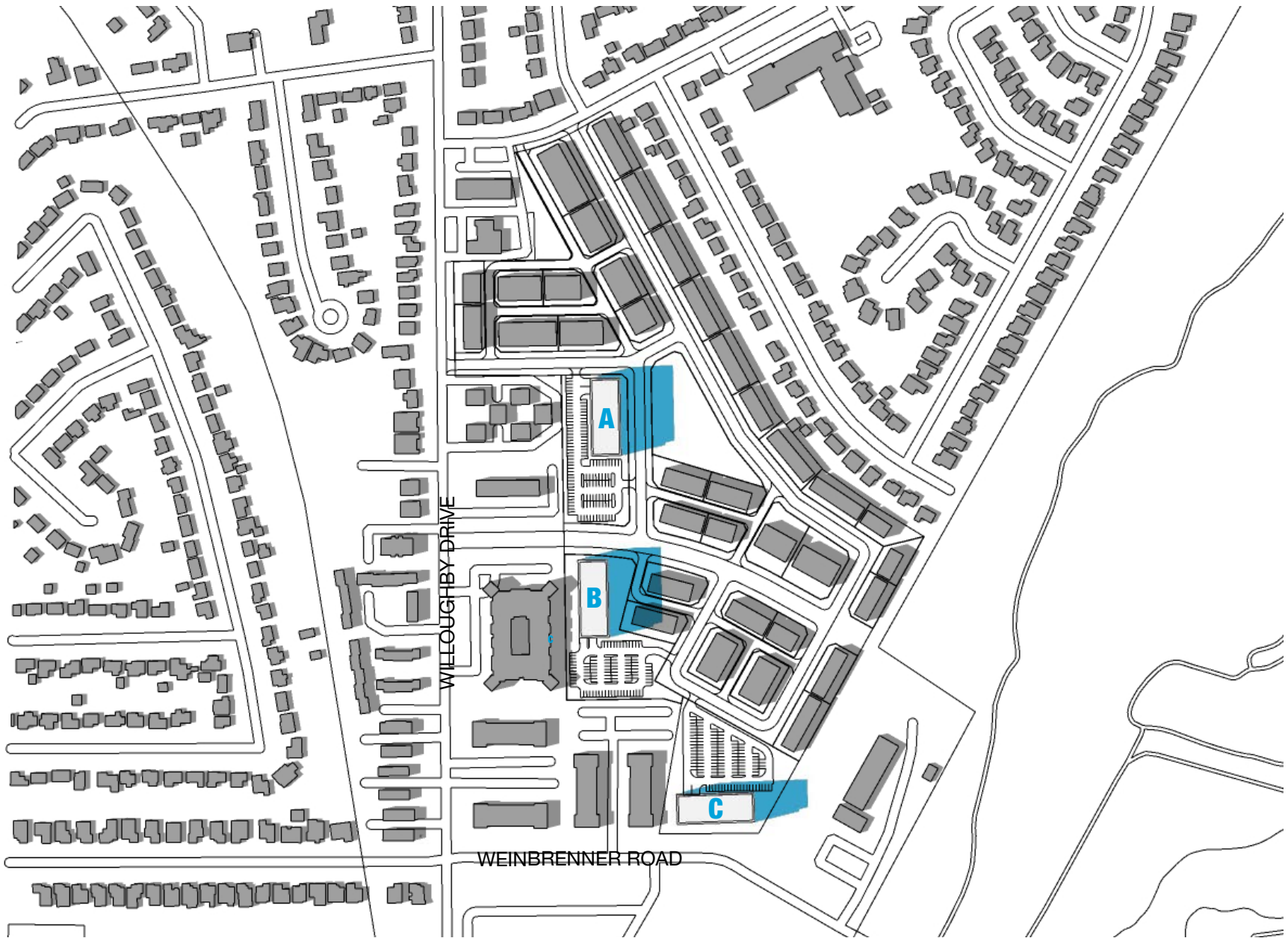
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SHADOW ANALYSIS



April 21 | 4:00 PM

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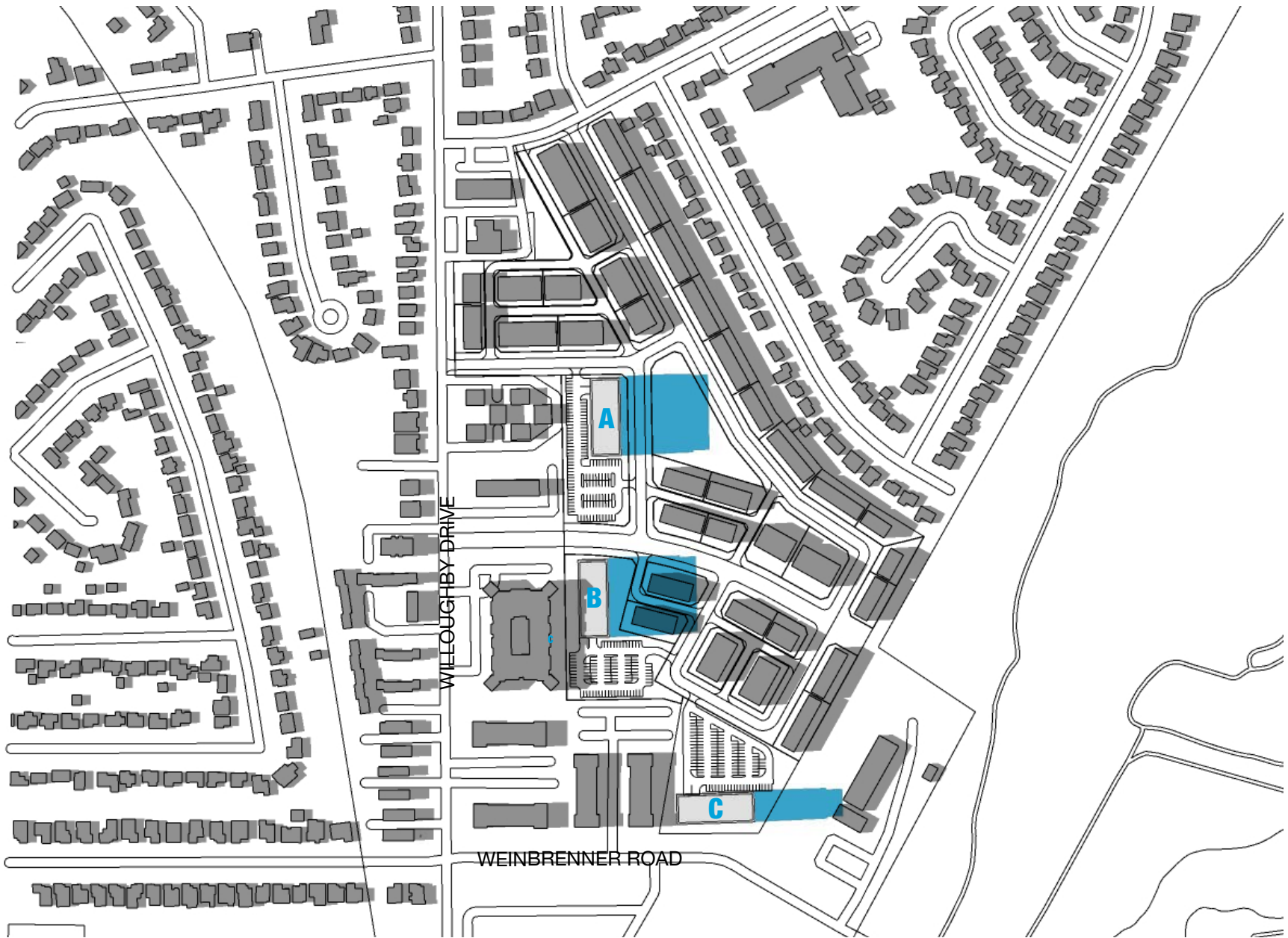
WILLOUGHBY DRIVE
SHADOW ANALYSIS



April 21 | 5:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



April 21 | 6:00 PM

UTC -4:00 (EDT)

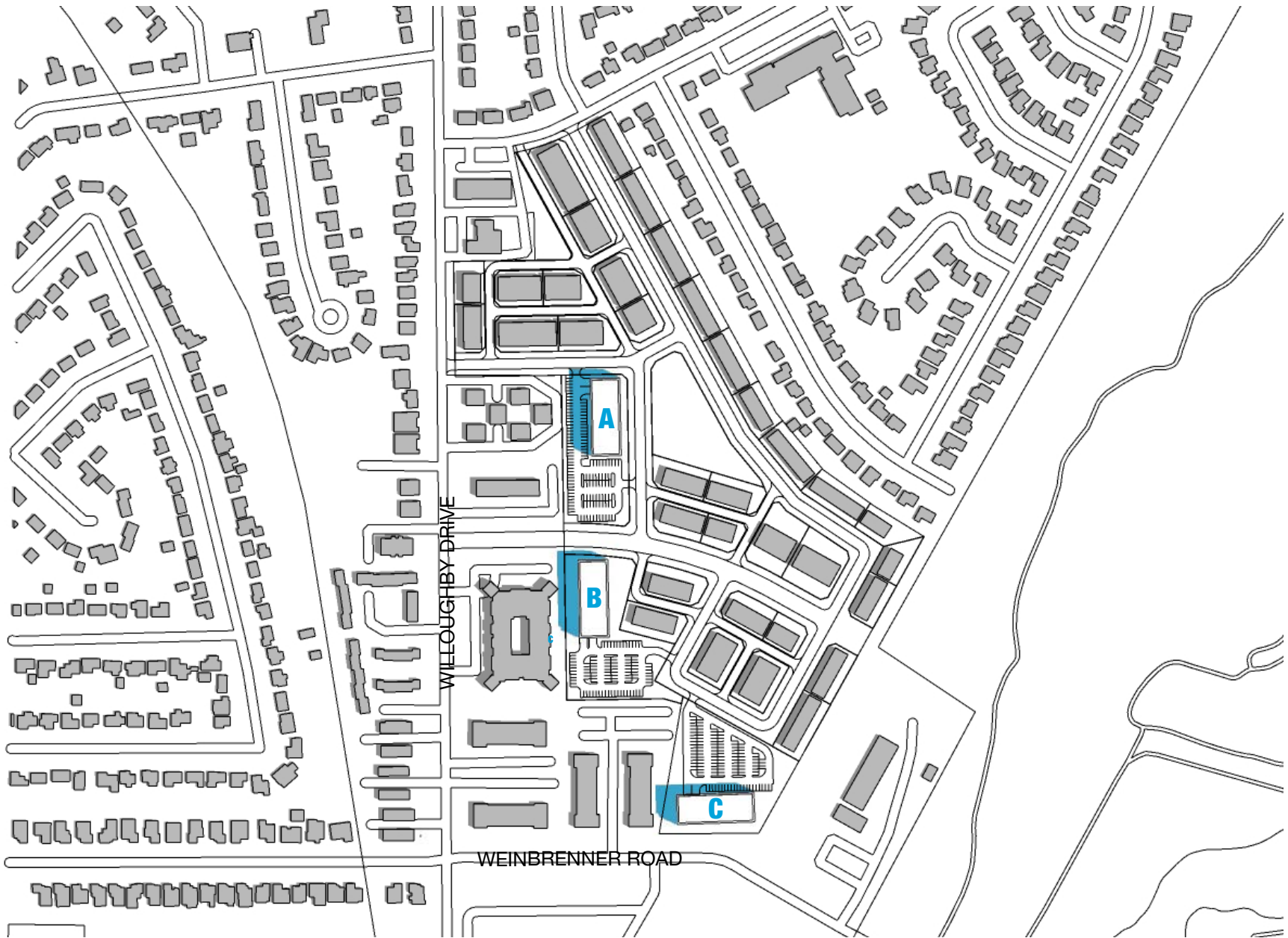
WILLOUGHBY DRIVE
SHADOW ANALYSIS



June 21 | 10:00 AM

UTC -4:00 (EDT)

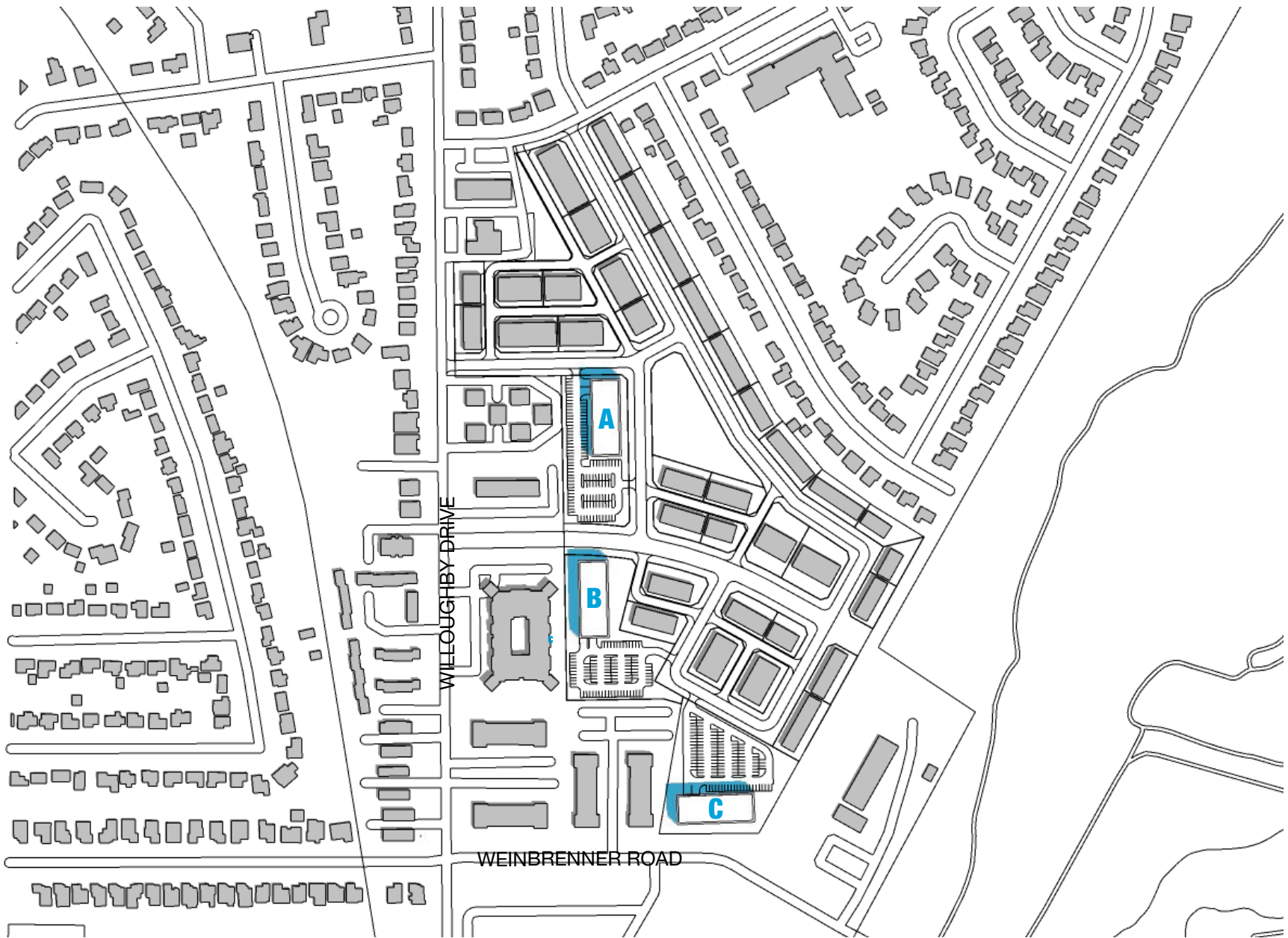
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SHADOW ANALYSIS



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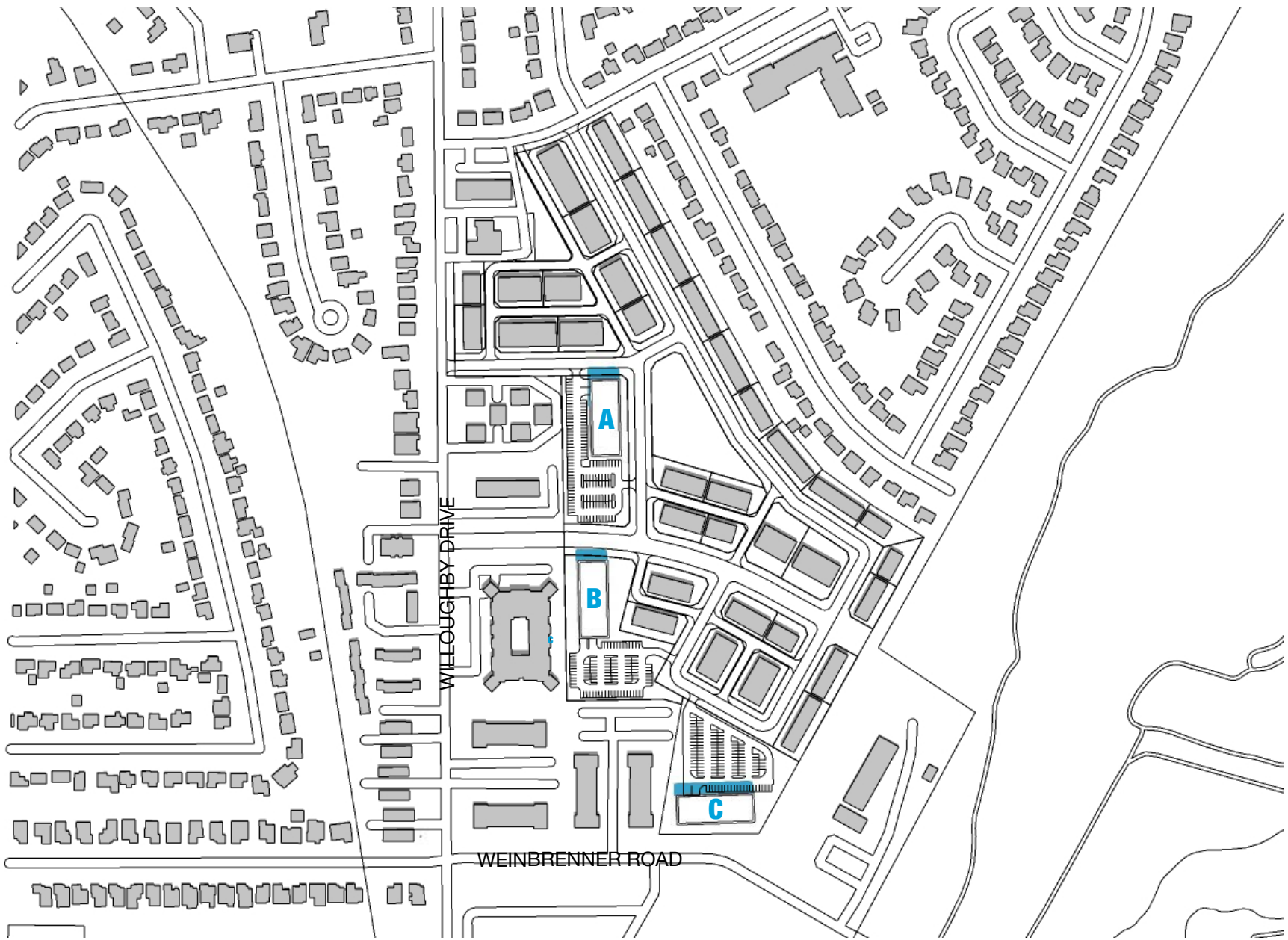
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SHADOW ANALYSIS



June 21 | 12:00 PM

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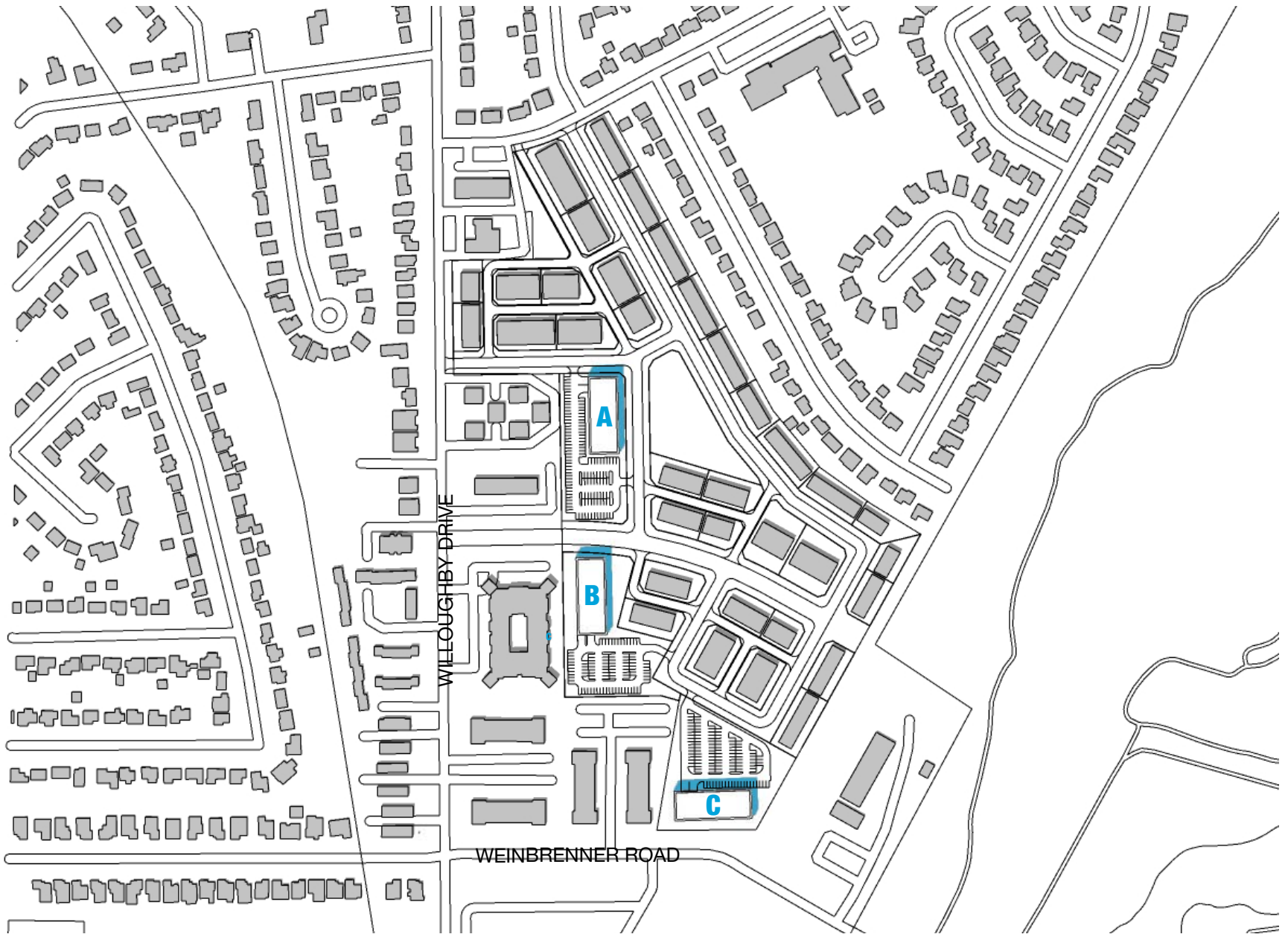
WILLOUGHBY DRIVE
SHADOW ANALYSIS



June 21 | 1:00 PM

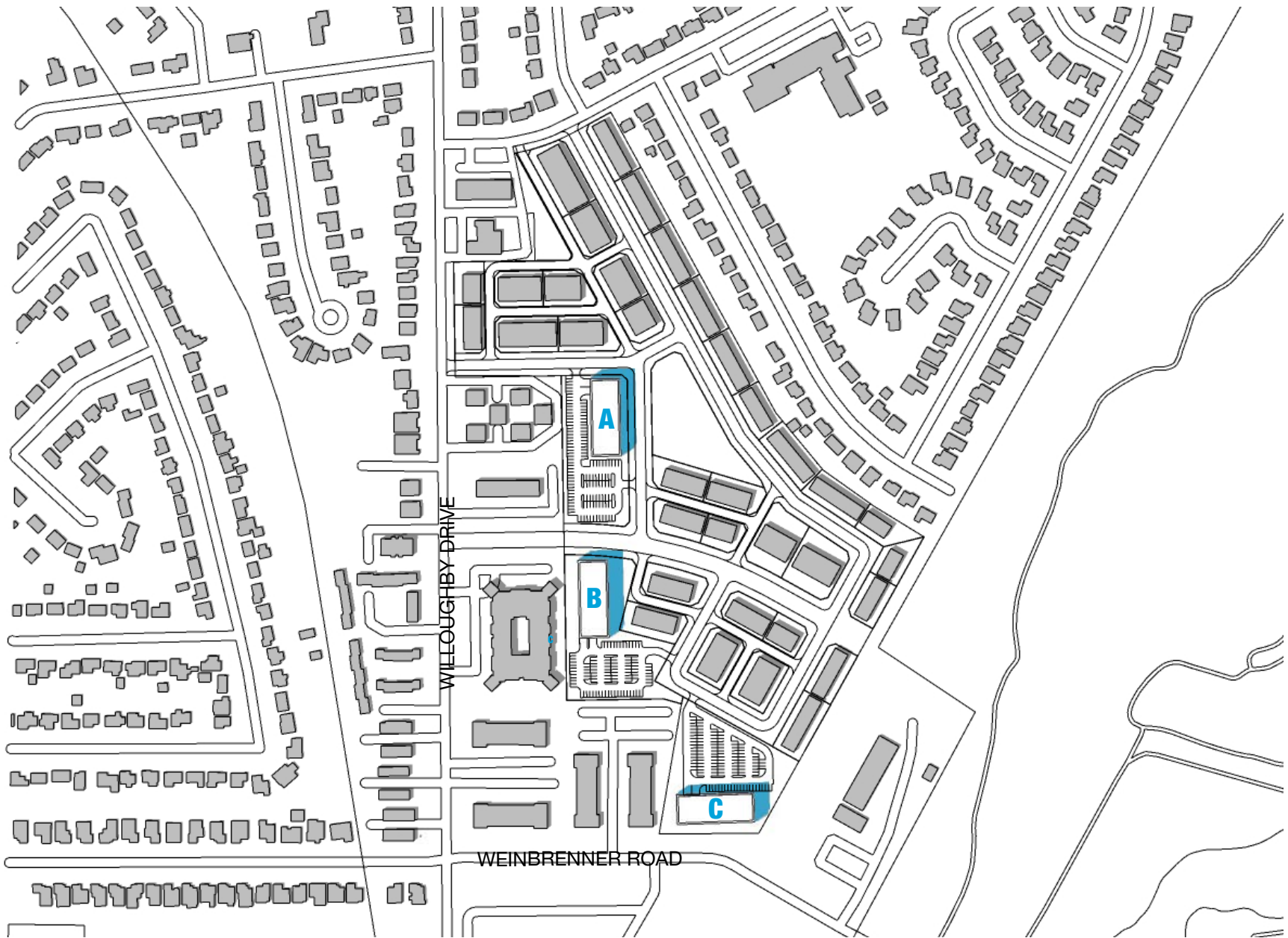
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WILLOUGHBY DRIVE
SHADOW ANALYSIS



June 21 | 2:00 PM
UTC -4:00 (EDT)

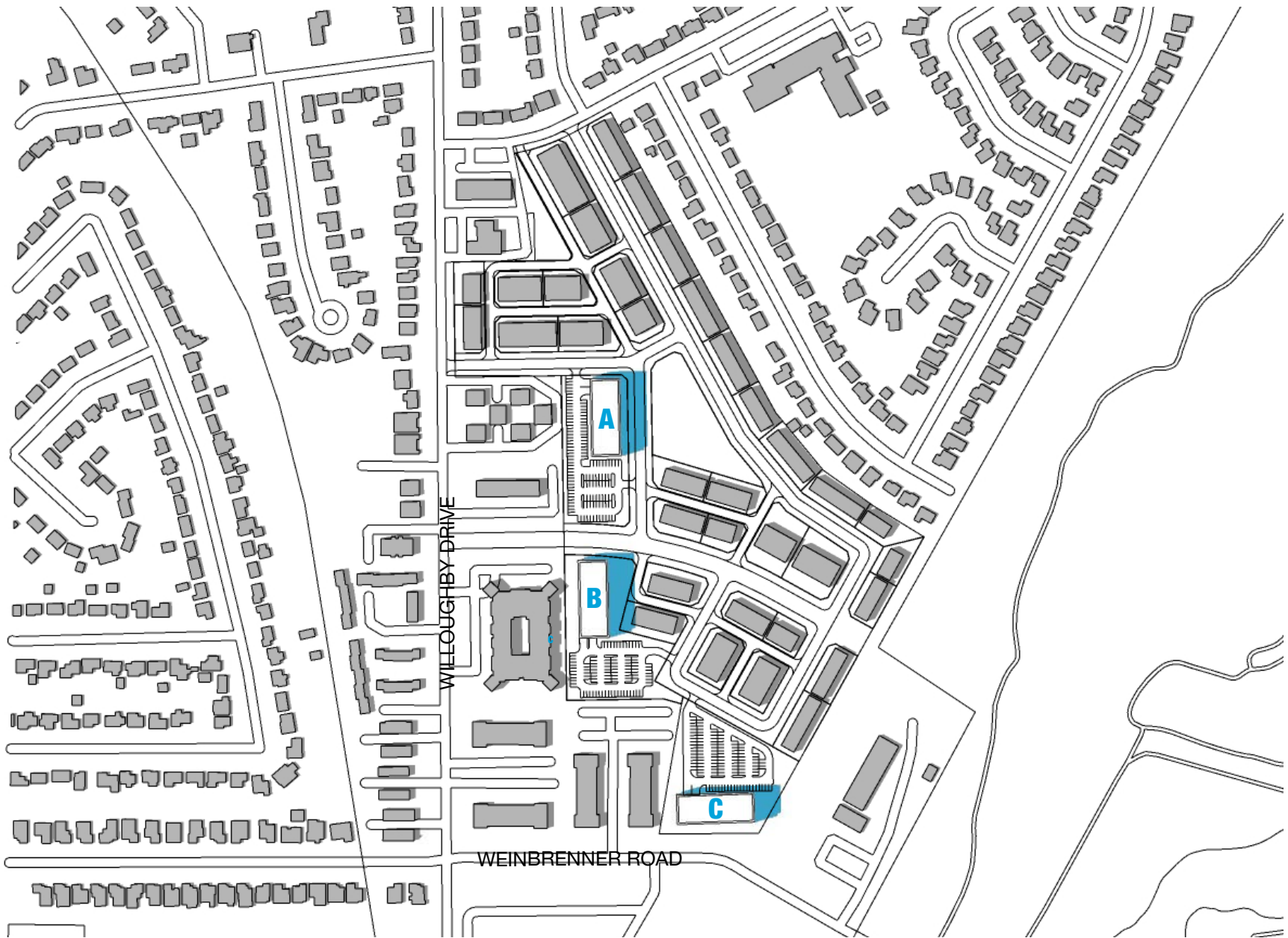
WILLOUGHBY DRIVE
SHADOW ANALYSIS



June 21 | 3:00 PM

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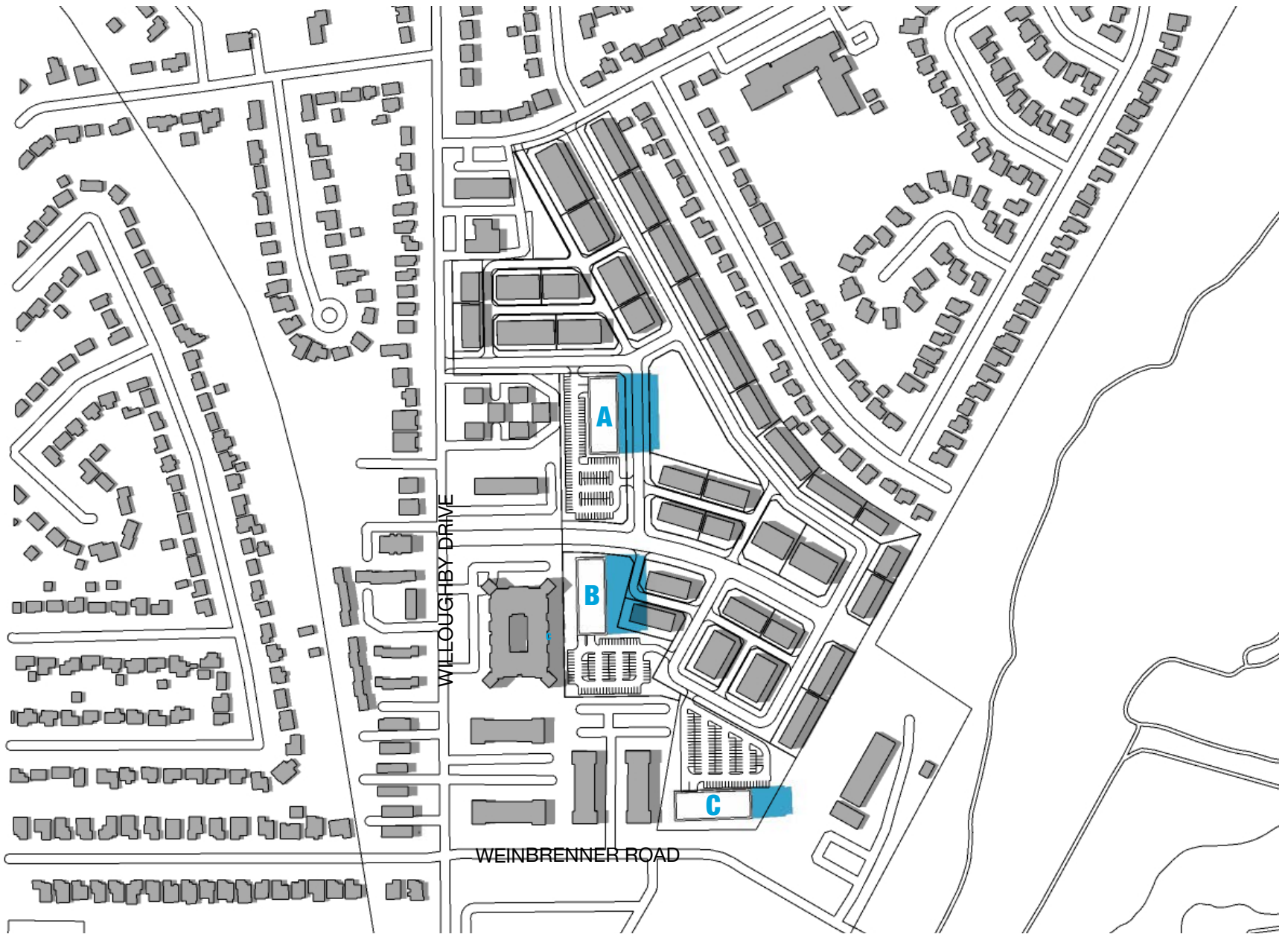
WILLOUGHBY DRIVE
SHADOW ANALYSIS



June 21 | 4:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



June 21 | 5:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



June 21 | 6:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 10:00 AM

UTC -4:00 (EDT)

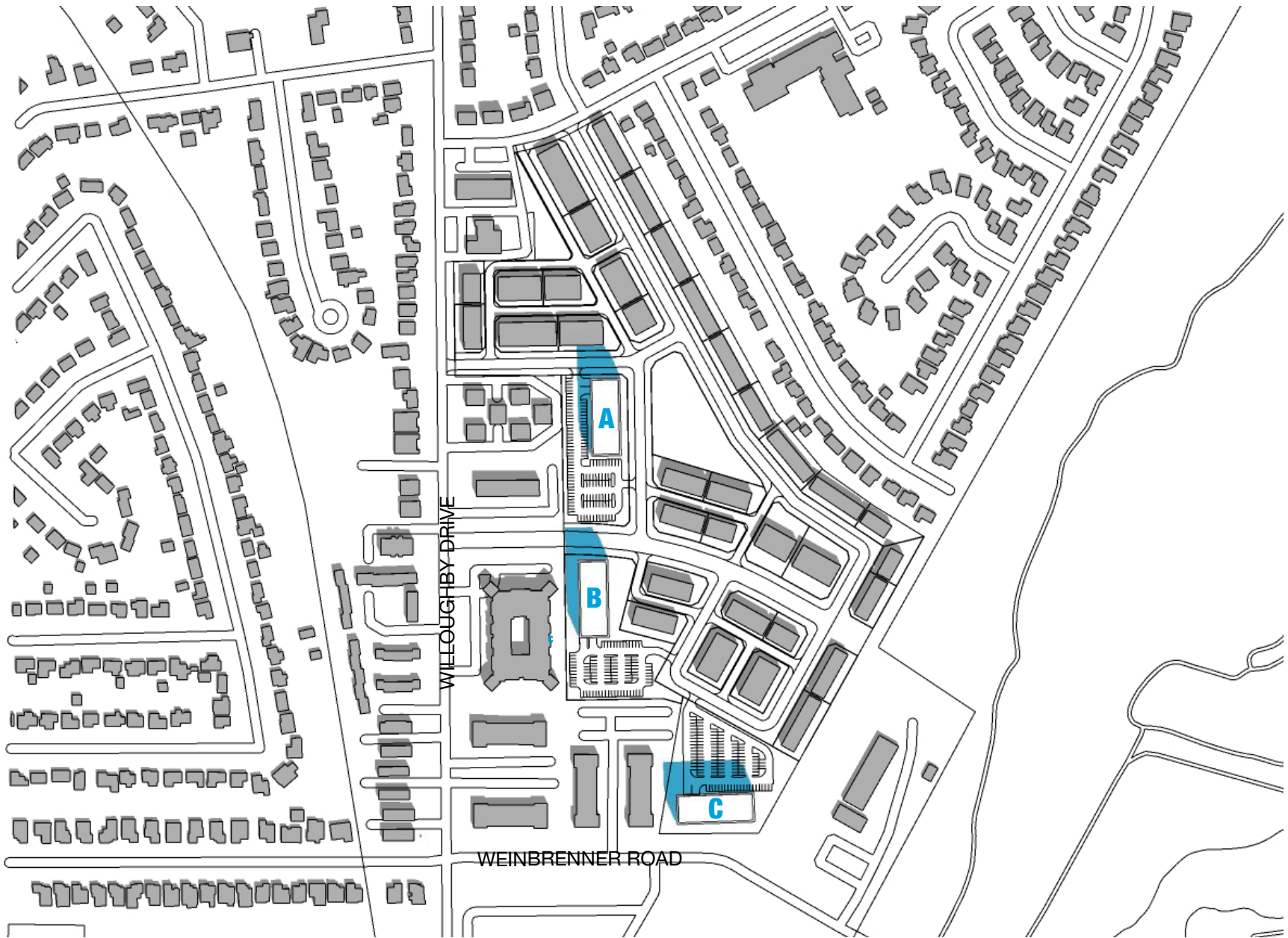
WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 11:00 AM

UTC -4:00 (EDT)

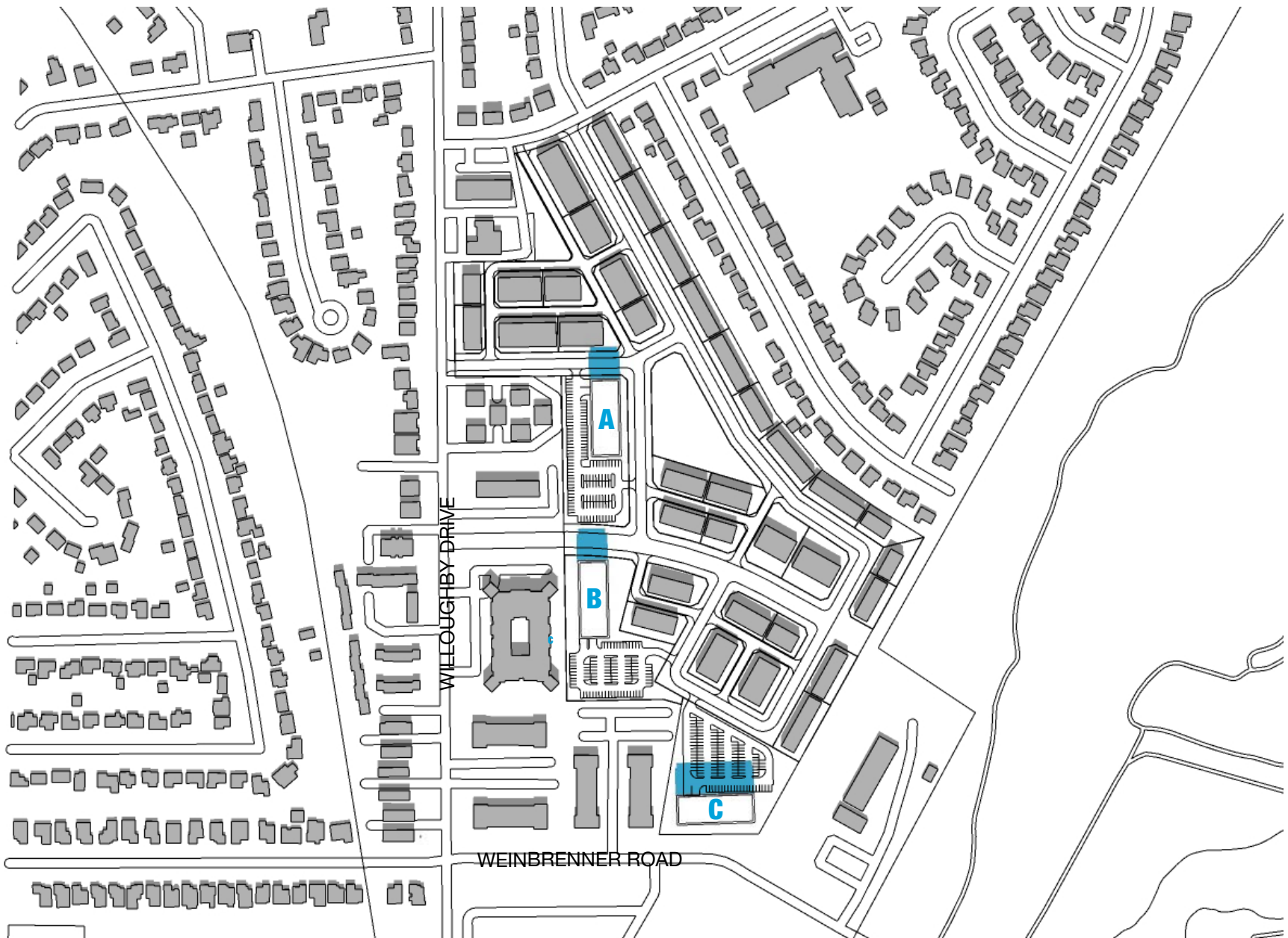
WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 12:00 AM

UTC -4:00 (EDT)

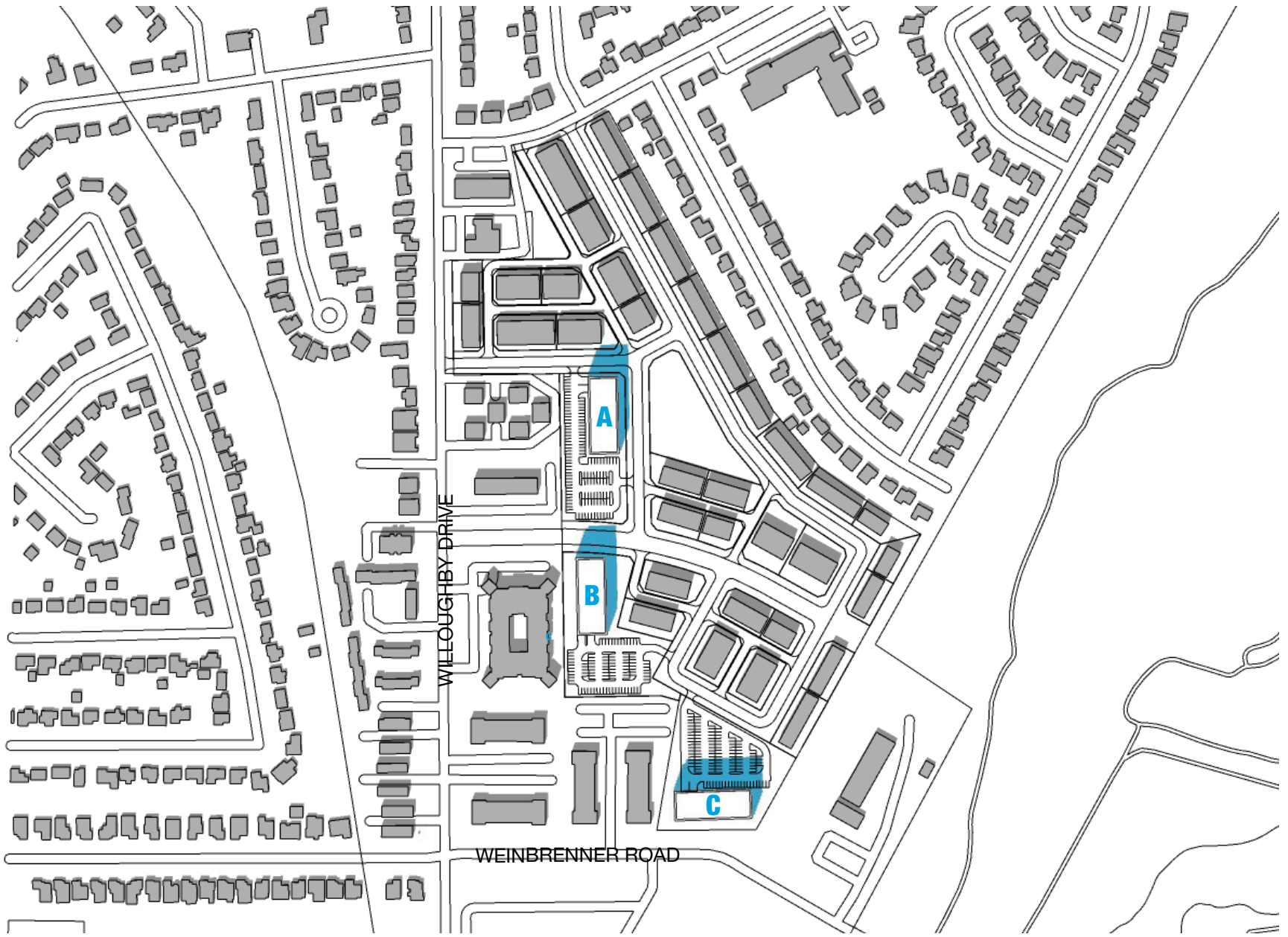
WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 1:00 PM

UTC -4:00 (EDT)

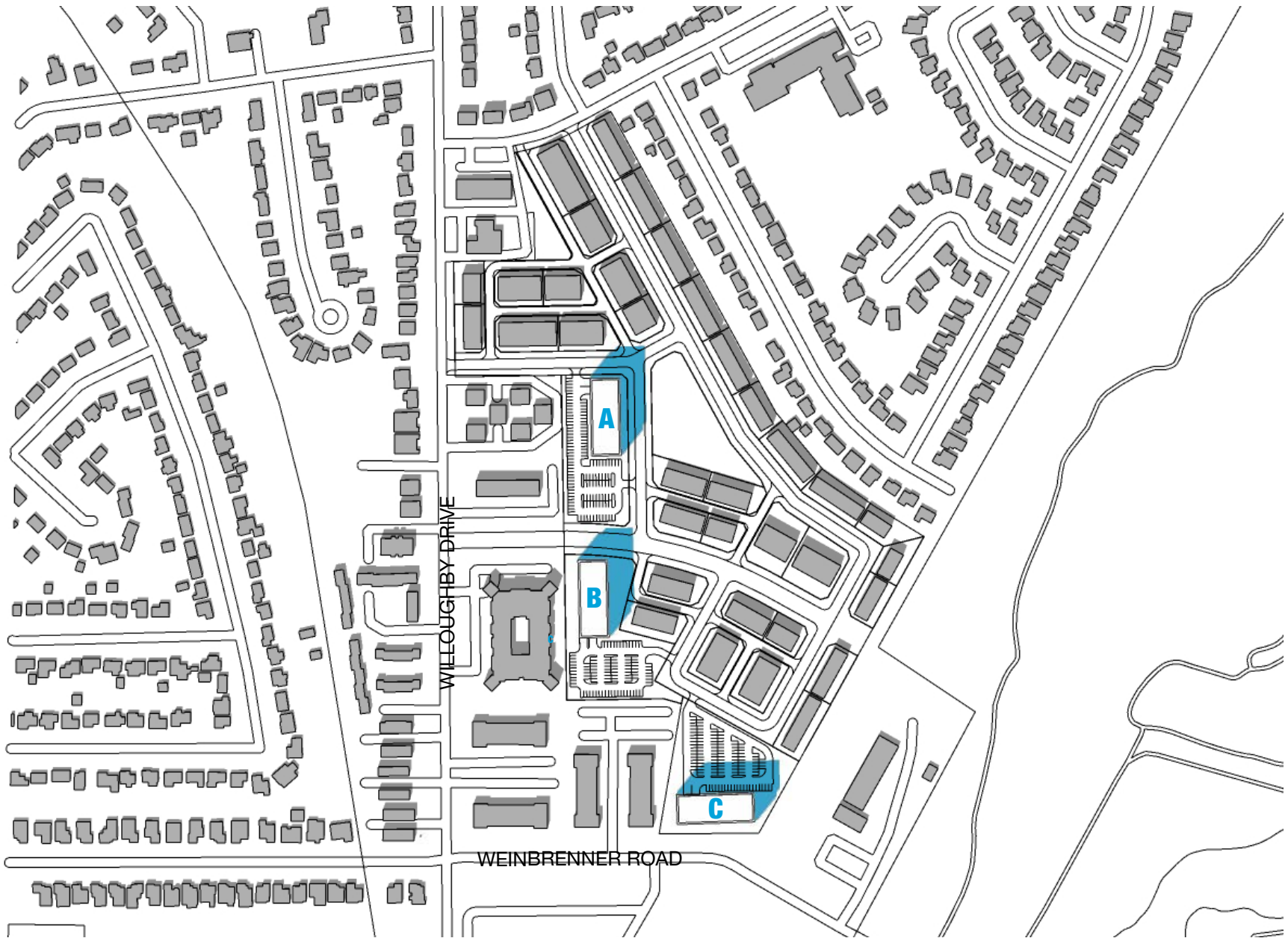
WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 2:00 PM

UTC -4:00 (EDT)

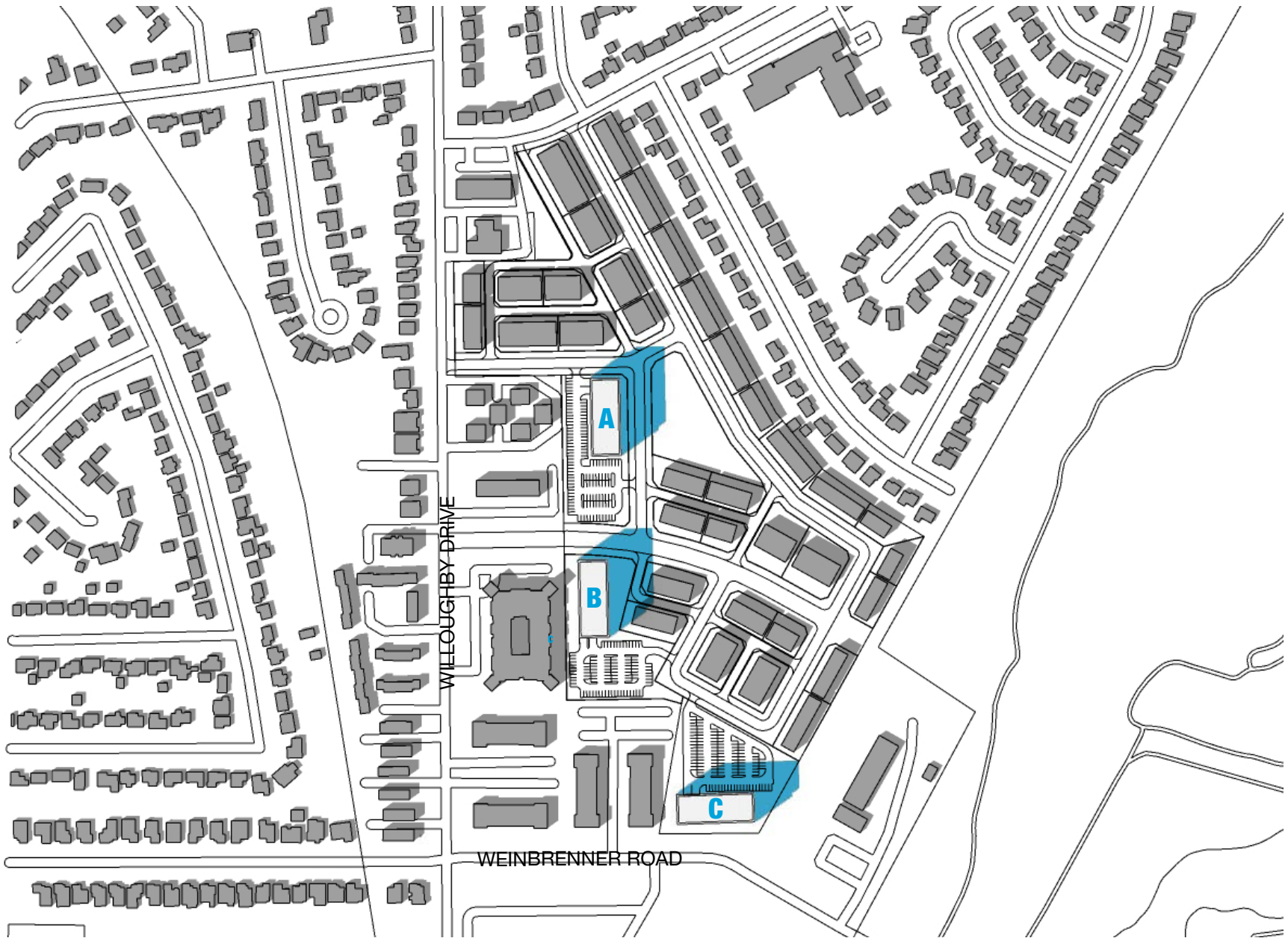
WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 3:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 4:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 5:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



September 21 | 6:00 PM

UTC -4:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



December 21 | 10:00 AM

UTC -5:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



December 21 | 11:00 AM

UTC -5:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



December 21 | 12:00 PM

UTC -5:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



December 21 | 1:00 PM

UTC -5:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



December 21 | 2:00 PM

UTC -5:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



December 21 | 3:00 PM

UTC -5:00 (EDT)

WILLOUGHBY DRIVE
SHADOW ANALYSIS



December 21 | 4:00 PM

UTC -5:00 (EDT)

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Planning + Design