

SHADOW STUDY

454-462 CUMBERLAND AVE &
3255, 3259, & 3265 NEW ST
CITY OF BURLINGTON

AUGUST 2023
WESTON FILE #11463

WESTON CONSULTING

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1.0 INTRODUCTION

This Shadow Study ('Study') has been prepared by Weston Consulting to illustrate the shadow impacts of a proposed residential building on the site composed of 454-462 Cumberland Avenue and 3255, 3259, & 3265 New Street ('subject lands') in the City of Burlington ('the City'). The proposed development integrates a 7-storey retirement building with 124. The proposed site plan is illustrated in Figure 1.

The Study was prepared based on the *City of Burlington's Shadow Study Guidelines and Terms of Reference* (June, 2020) and aims to illustrate the shadow impacts of development to the surrounding context to uphold the City's Urban Design standards. The analysis interprets the impacts of net new shadows of the development onto surrounding buildings, the public realm, recreational and open spaces, and public and private amenity spaces. A Shadow Study is required by the City to support an Official Plan Amendment ('OPA') and Zoning By-law Amendment ('ZBA') applications to allow the proposed 7-storey retirement building on the subject lands.

Section 2.0 of the Study includes a written analysis of the proposed development shadow impacts on the following areas:

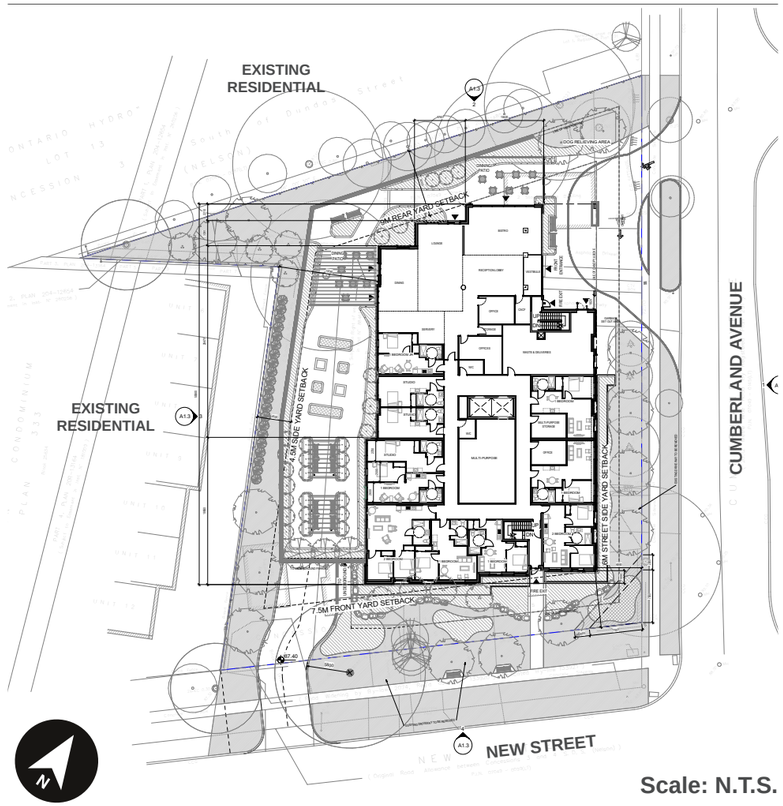
- Private Amenity Spaces;
- Parks and Open Spaces; and
- Sidewalks and the Public Realm

Section 3.0 includes diagrams for the required test dates and times and include a base plan plotted at a standard metric scale with a bar scale on each sheet.

Following the City's Terms of Reference, the Study has been conducted for the following dates: March 21st, June 21st, September 21st and December 21st. As per the City's terms of reference, Daylight Savings Time (UTC-4) was used to determine shadow impacts on March 21st, June 21st, and September 21st, while Standard Time (UTC-5) was used to determine shadow impacts on December 21st. Table 1 outlines the Study test times required by the City and are listed in the terms of reference.

The Study was conducted using a geolocated 3D SketchUp model that tested shadow simulations at the required times. Surrounding building footprints sourced from the City's open data portal as well as aerial imagery where newly buildings were not yet available via open data.

Overall, this shadow study finds that the proposed development surpasses the City's requirements for sun access during the test time and dates outlined in the City's Terms of Reference.



Scale: N.T.S.

Figure 1: Site Plan Prepared by MCL Architects

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2.0 SHADOW IMPACT ANALYSIS

2.1 Key Civic and Cultural Spaces
2.2 Private Outdoor Amenity Spaces
2.3 Parks and Open Spaces
2.4 Places Where Children Play
2.5 Public Realm and Sidewalks

The following section assesses the shadow impacts of the proposed development on a number of areas within the surrounding context including:

- Key Civic and Cultural Spaces;
- Private Outdoor Amenity Spaces;
- Parks and Open Spaces;
- Places Where Children Play; and
- Public Realm and Sidewalks.

Each area of impact was evaluated for each key applicable date throughout the year and the Sun Access Factor ('SAF') was calculated where necessary. The following section outlines the key findings for each area of impact, based on the City's Terms of Reference.

2.1 KEY CIVIC AND CULTURAL SPACES

The proposed development should not cast any net new shadows on Key Civic and Cultural Spaces between 10:00 AM and 4:00 PM on March 21st and September 21st.

Results

- The proposed development is between 2 and 3 kilometres from the Key Civic and Cultural Spaces listed in the City's terms of reference which include Civic Square (426 Brant Street), Elgin Promenade Square (391 Brant Street), and Spencer Smith Park (1340 and 1400 Lakeshore Road). No other Key Civic and Cultural Spaces were identified as being within proximity of the proposed development nor have any been identified as being impacted by the proposed development's net new shadows.

For the relevant shadow impact diagrams, see pages 10-17 and 31-40.

2.2 PRIVATE OUTDOOR AMENITY AREAS

Based on the Terms of Reference, the usability of private outdoor amenity areas should be maximized. Private outdoor amenity areas include rear yards, decks, and (rooftop) patios, including common outdoor amenity areas. Shadows from proposed developments should not exceed 2 hours in duration between the hours of 9:00 AM and 6:00 PM on March 21st. In cases where existing shadows limit access to sun during the previously mentioned date and time frame, the net new shadows from the proposed development should allow a minimum amount of sunlight to reach nearby private residential outdoor amenity areas, at the discretion of the City, between the hours of 9:00 Am and 6:00 PM. The criterion is met is the SAF is at least 0.22 the test date.

Results

- The areas identified as contributing to this criterion were the rear yards of 3243-3243 New Street and the rear yards of 484 and 480 Cumberland Avenue and 3218, 3222, 3228, 3232, 3238,3244, 3248, 3254, 3260, and 3264 Sprucehill Avenue. Aerial imagery and building footprints (sourced from the City's open data portal) were used to delineate the boundaries of rear yard and rooftop private amenity areas.

- The SAF was determined to be 0.99 (99%) for the impacted private amenity areas. These areas were determined to be impacted by net new shadows between 9:00 AM and 10:00 AM on March 21st. The net new shadows did not impact any additional private amenity areas on March 21st during the remaining test times.

Based on the SAF for the identified features impacted by shadows, the criterion is met as the sun access factors are over 0.22 (22%) for the impacted features. For the relevant shadow impact diagrams, see page 18.

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2.3 PARKS AND OPEN SPACES

The City's Terms of Reference outlines that shadows cast by all existing buildings and proposed developments onto lands designated or used for Parks and Open Spaces must allow for either:

a. Full sunlight 50% of the time; or
b. 50% sun coverage at all times during the specified periods.

The City specifies March 21st (9:00 AM - 6:00 PM), September 21st (9:00 AM - 6:00 PM), and December 21st (11:00 AM - 3:00 PM) as the test dates and times for this criterion. The criterion is met if the SAF is at least 0.5 on each of the three test dates.

Results

- The proposed development was not identified as casting any net new shadows on any lands designated as Parks or Open Spaces. As such, calculating the SAF is not necessary and the criterion is deemed to be met.

- While Centennial Trail, located northwest of the subject property, is not designated as a park or open space in the City's Official Plan or Zoning By-Law, it is acknowledged as a trail where sun access would be appreciated by users. On March 21st and September 21st, net new shadows from the development are present from 9:00 AM to around 12:00 PM, providing 6 full hours of sun access and 3 hours of partial sun access. On December 21st, partial sun access is available between 11:00 AM and 12:00 PM resulting from net new shadows on the trail and full sun access is present from 1:00 PM to 3:00 PM.

For the relevant shadow impact diagrams, see pages 10-17, 31-40, and 41-45.

2.4 PLACES WHERE CHILDREN PLAY

On the test dates, shadows cast by all existing buildings and the proposed development onto places where children play including, but not limited to, school yards, playgrounds, and park features such as wading pools, or other outdoor shadow-sensitive activity areas as identified by the City, must allow for either :

a. Full sunlight 50% of time; or
b. 50% sun coverage at all times during the specified test dates and time intervals.

The City specifies March 21st (9:00 AM - 6:00 PM), September 21st (9:00 AM - 6:00 PM), and December 21st (11:00 AM - 3:00 PM - applies to school yards and playground areas only) as the test dates and times for this criterion. The criterion is met if the SAF is at least 0.5 on each of the three test dates.

Results

- The proposed development was not identified as casting any net new shadows on any site or area which could fall under the categories listed in this criterion. As such, calculating the SAF is not necessary and the criterion is deemed to be met.

For the relevant shadow impact diagrams, see pages 10-17, 31-40, and 41-45.

2.5 PUBLIC REALM AND SIDEWALKS

Based on the Terms of Reference, shadows cast on March 21st by all buildings and proposed developments onto the full extents of the boulevard and sidewalk on the opposite side of the adjacent right-of-way, must allow for either:

a. Full sunlight 50% of the time; or
b. 50% sun coverage at all times;

The criterion is met if the SAF is at least 0.5. The boulevard includes the area between the curb and the front property line or the building face, defined by projecting perpendicular lines from the subject site's property lines. Corner sites must include calculations for all frontages identified by the City.

Results

- The front lot line for the proposed development was identified as being the lot line abutting New Street. Lines perpendicular to the front lot line were drawn extending from the point at which the side lot lines meet the front lot lines. These lines were then extended to the building face on the opposite boulevard and the are between the curb and the building face on the opposite boulevard was determined to be the study are for th impact analysis. The front lot line was determined by referencing the definition of "Lot Line, Front' as per the City of Burlington's Zoning By-Law 2020, which states:

  "The lot line that divides a lot from the street provided that in the case of a corner lot, the shorter lot line that abuts a street shall be deemed to be the front lot line, and the longer lot line that abuts a street shall be deemed to be a side lot line abutting a street. In the case of a through lot, only one of the lot lines shall be deemed to be the front lot line. In the case of an irregular shaped lot in a detached residential zone, the straight line joining the two points where the side lot lines respectively intersect the street line shall be not less than 9.1 metres."

- On March 21st, the proposed building does not cast any net new shadows on the opposite boulevard. The only shadows cast on the opposite boulevard are shadows cast by existing buildings on the same site of the boulevard. As such, the criterion is deemed to be met as there were no shadow impacts from the proposed development on the opposite boulevard.

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3.0 SHADOW IMPACT DIAGRAMS

3.1 March 21
3.1.1 March SAF Calculations
3.2 June 21
3.3 September 21
3.4 December 21

The following section illustrates the shadow impacts of the proposed development via shadow diagrams. The following areas, when present, were identified on the diagrams and assigned an identifying colour:

- Key Civic and Cultural Spaces;
- Private Outdoor Amenity Spaces;
- Parks and Open Spaces;
- Places Where Children Play; and
- Public Realm and Sidewalks.

Each area of impact was evaluated for each test date and time date throughout the year, as listed in Table 1, and the Sun Access Factor ('SAF') was calculated where necessary. The SAF was calculated using the formula outlined in the City's Terms of Reference. The SAF calculation for March 21st, which was found to be the only test date in which shadow impacts would necessitate SAF calculations, can be found on page 18.

Table 1. Test Dates and Times

March 21st	June 21st	September 21st	December 21st
9:00 AM	8:00 AM	9:00 AM	11:00 AM
10:00 AM	9:00 AM	10:00 AM	12:00 PM
11:00 AM	10:00 AM	11:00 AM	1:00 PM
12:00 PM	11:00 AM	12:00 PM	2:00 PM
1:00 PM	12:00 PM	1:00 PM	3:00 PM
2:00 PM	1:00 PM	2:00 PM	-
3:00 PM	2:00 PM	3:00 PM	-
4:00 PM	3:00 PM	4:00 PM	-
5:00 PM	4:00 PM	5:00 PM	-
6:00 PM	5:00 PM	6:00 PM	-
-	6:00 PM	-	-
-	7:00 PM	-	-

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3.1 MARCH 21

9:00 AM

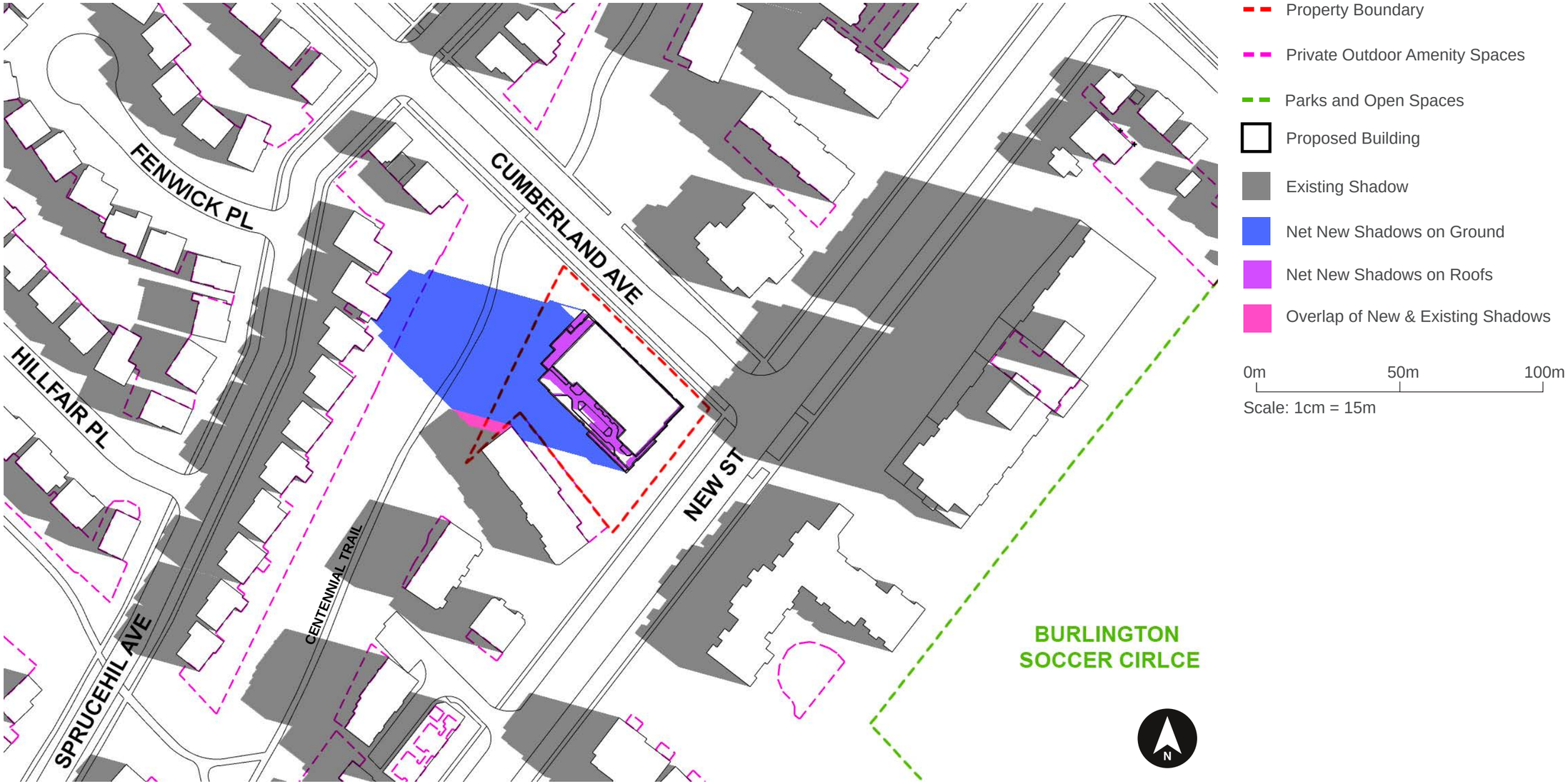


Figure 2: Shadow Study Diagram - March 21st 9:00 AM prepared by Weston Consulting

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3.1 MARCH 21

10:00 AM

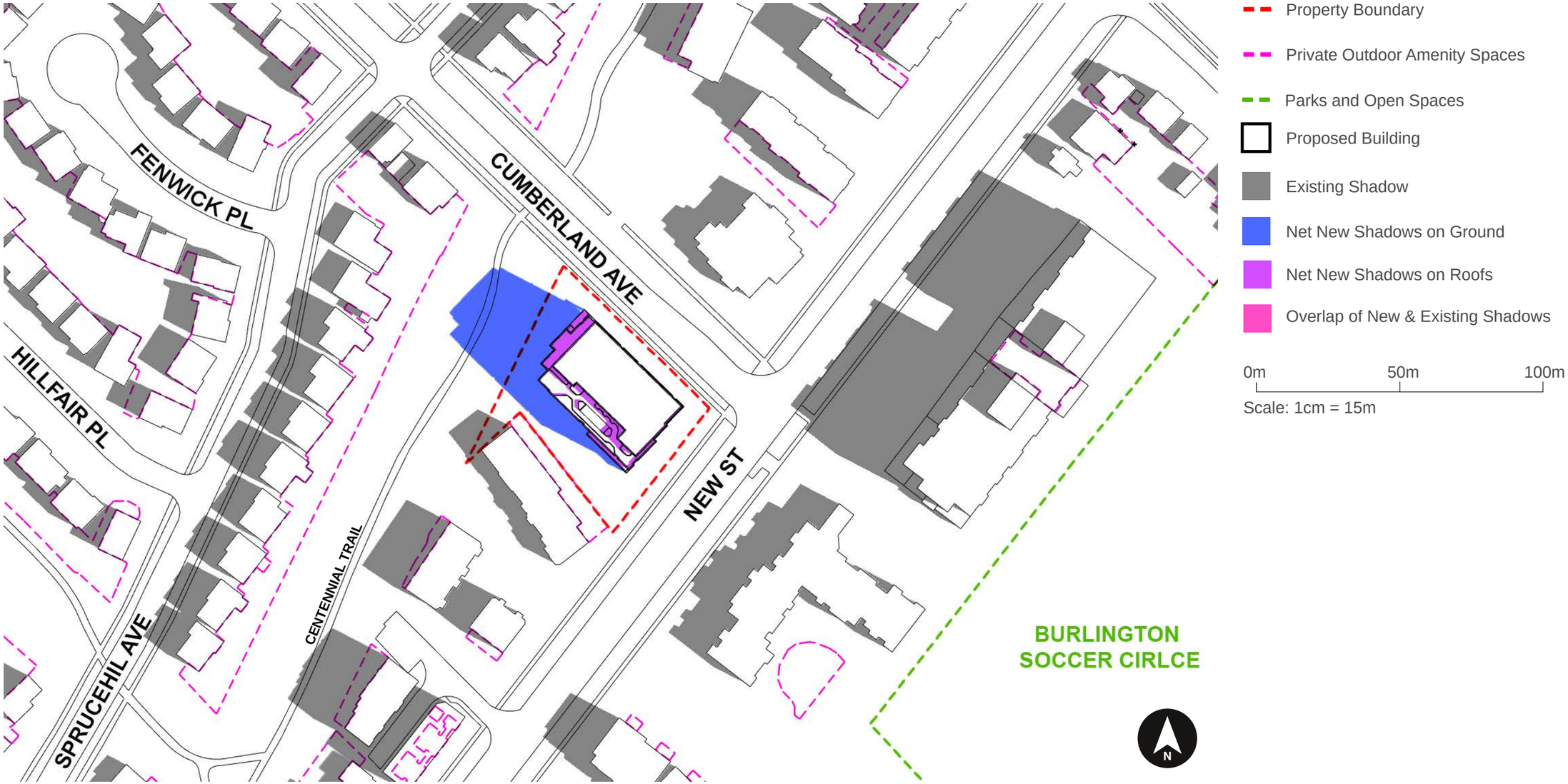


Figure 3: Shadow Study Diagram - March 21st 10:00 AM prepared by Weston Consulting

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3.1 MARCH 21

11:00 AM

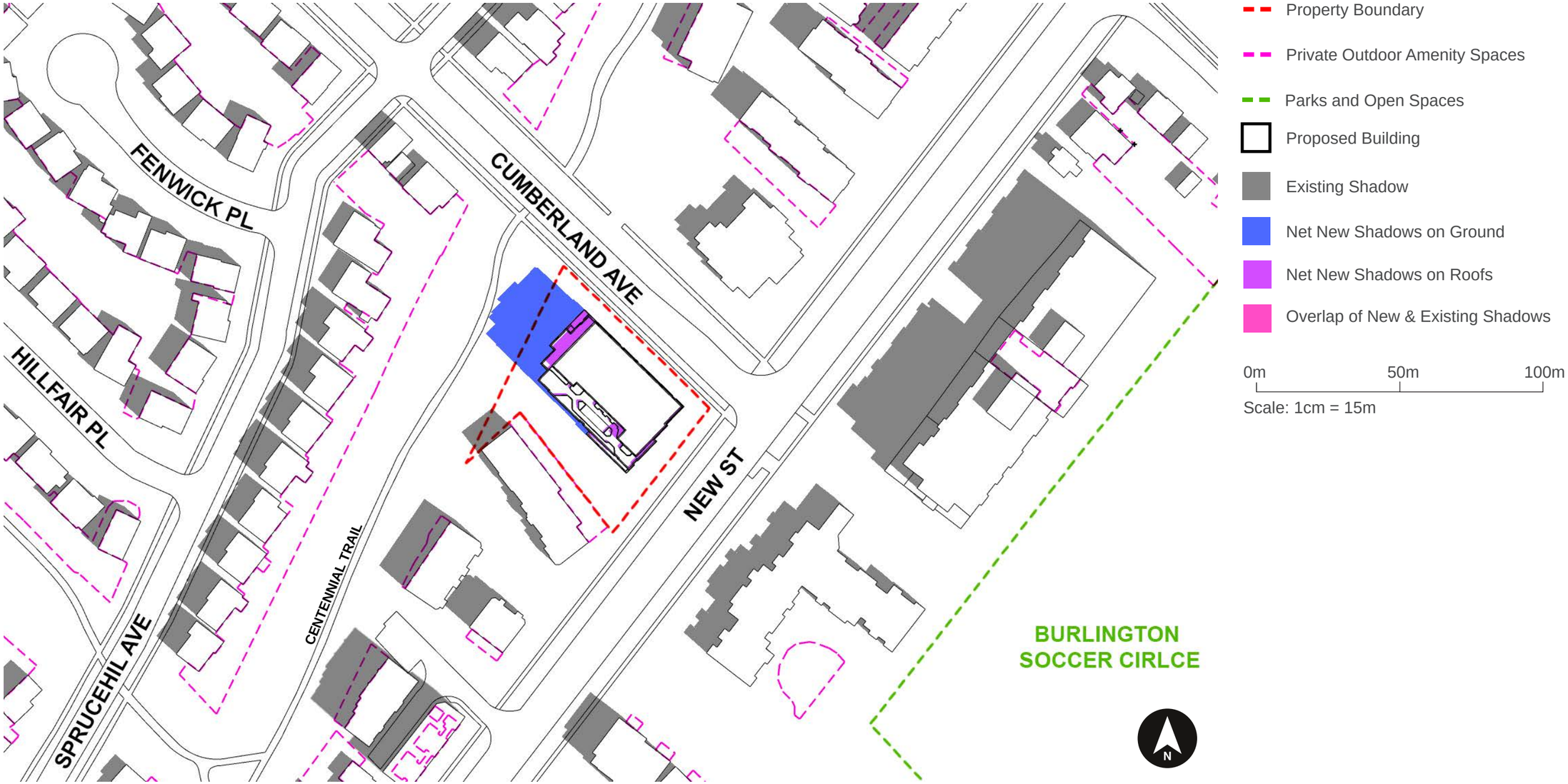


Figure 4: Shadow Study Diagram - March 21st 11:00 AM prepared by Weston Consulting

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3.1 MARCH 21

12:00 PM

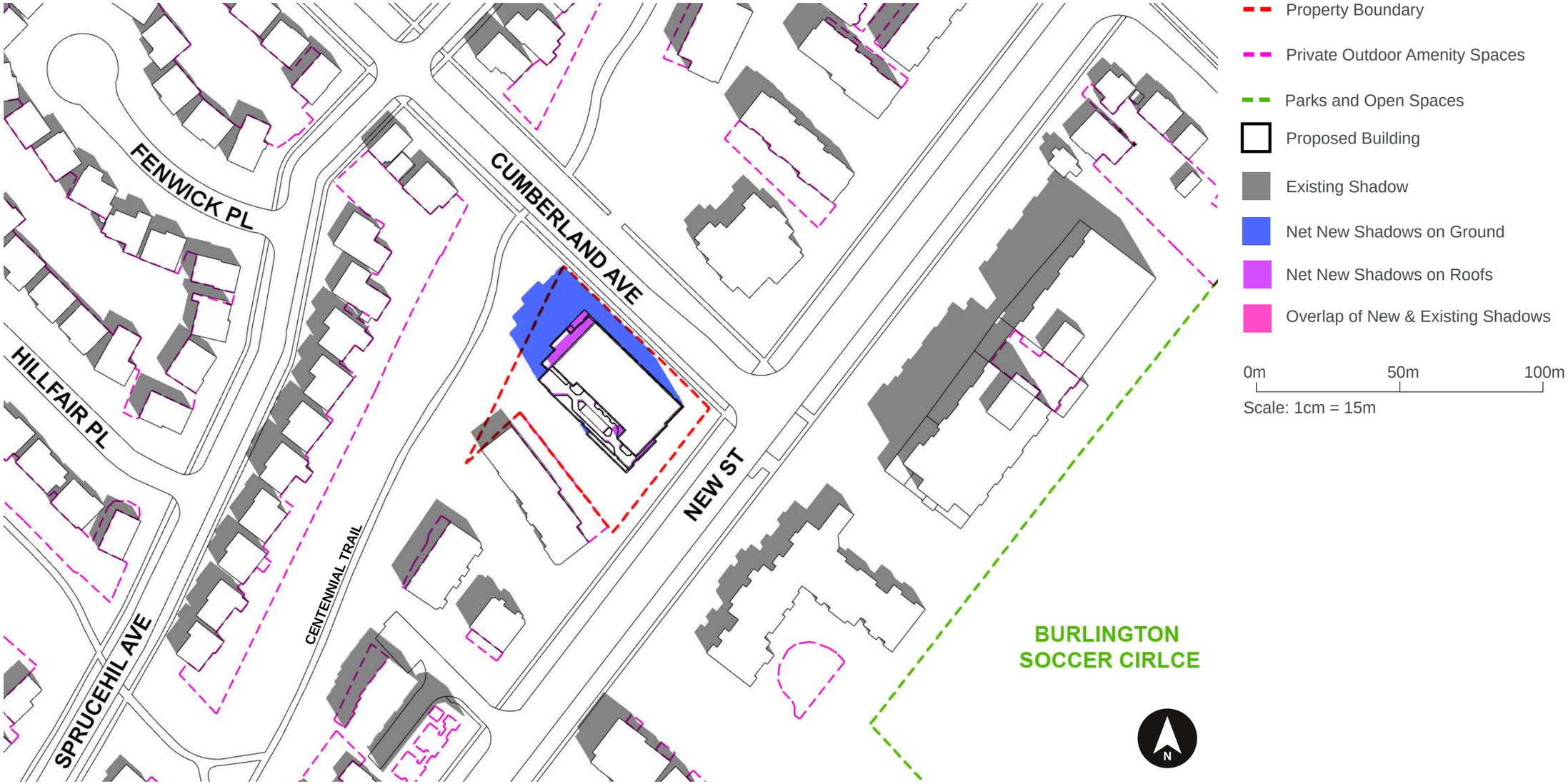


Figure 5: Shadow Study Diagram - March 21st 12:00 PM prepared by Weston Consulting

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3.1 MARCH 21

1:00 PM

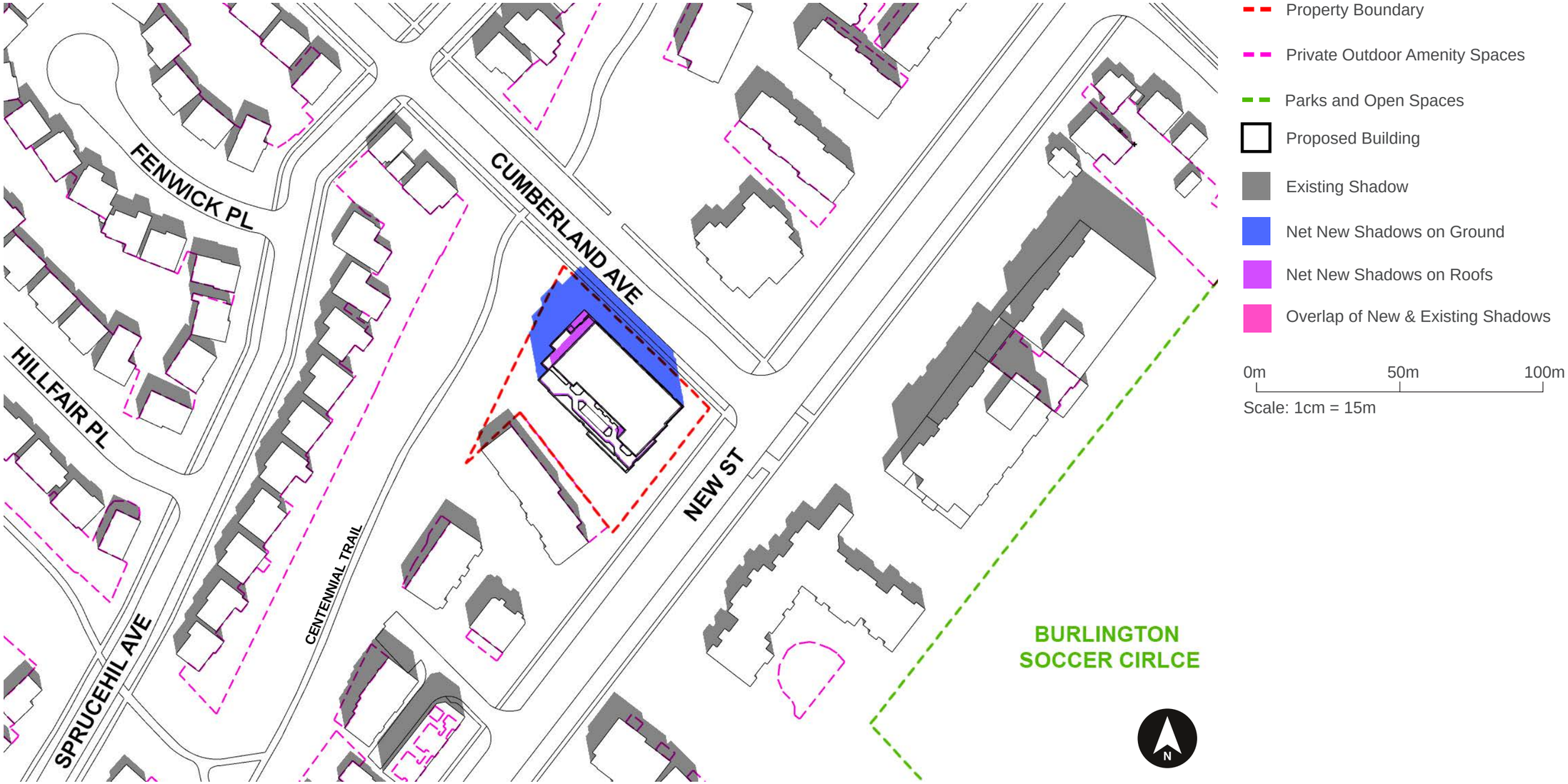


Figure 6: Shadow Study Diagram - March 21st 1:00 PM prepared by Weston Consulting

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3.1 MARCH 21

2:00 PM

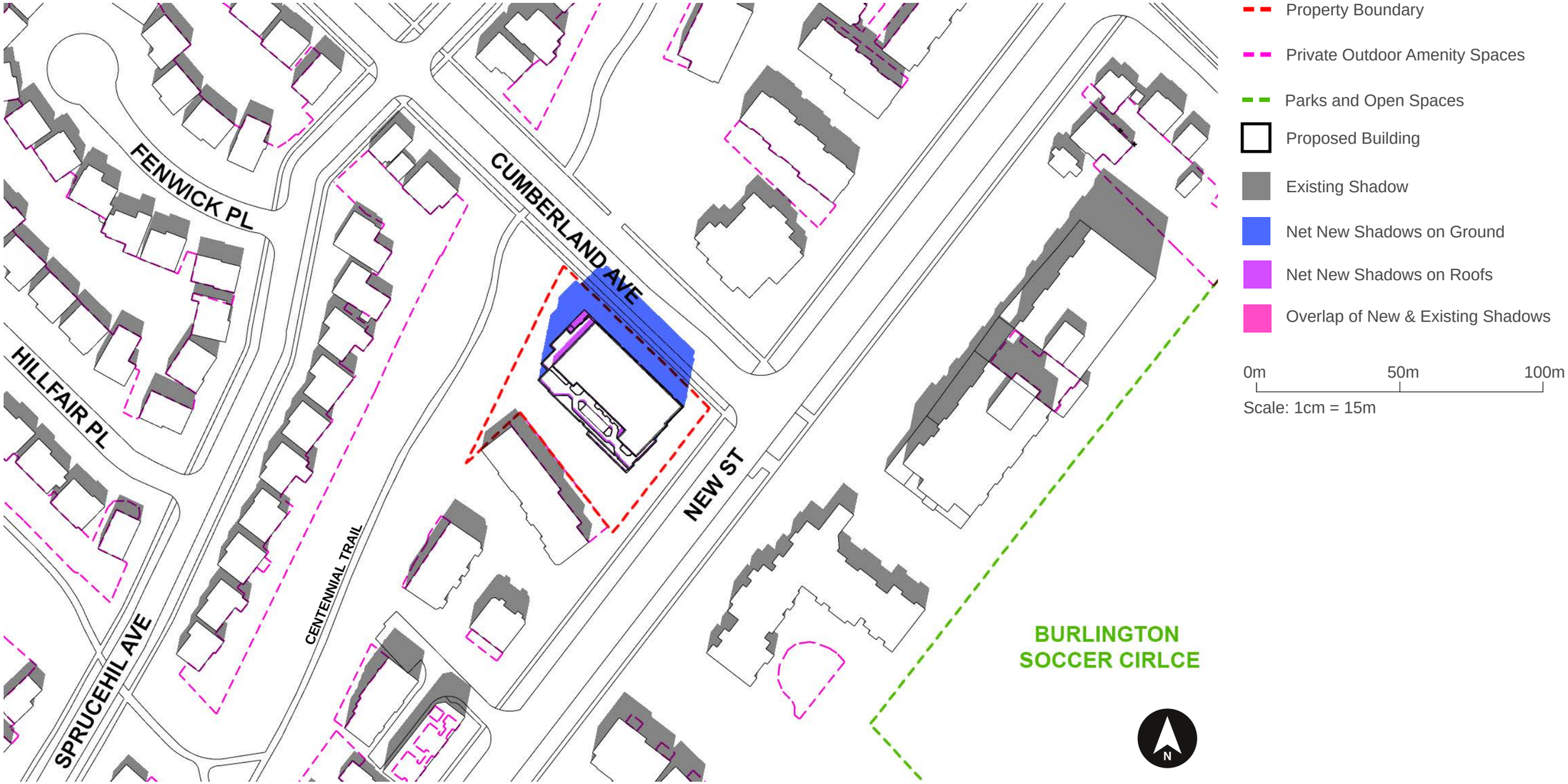


Figure 7: Shadow Study Diagram - March 21st 2:00 PM prepared by Weston Consulting

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3.1 MARCH 21

5:00 PM

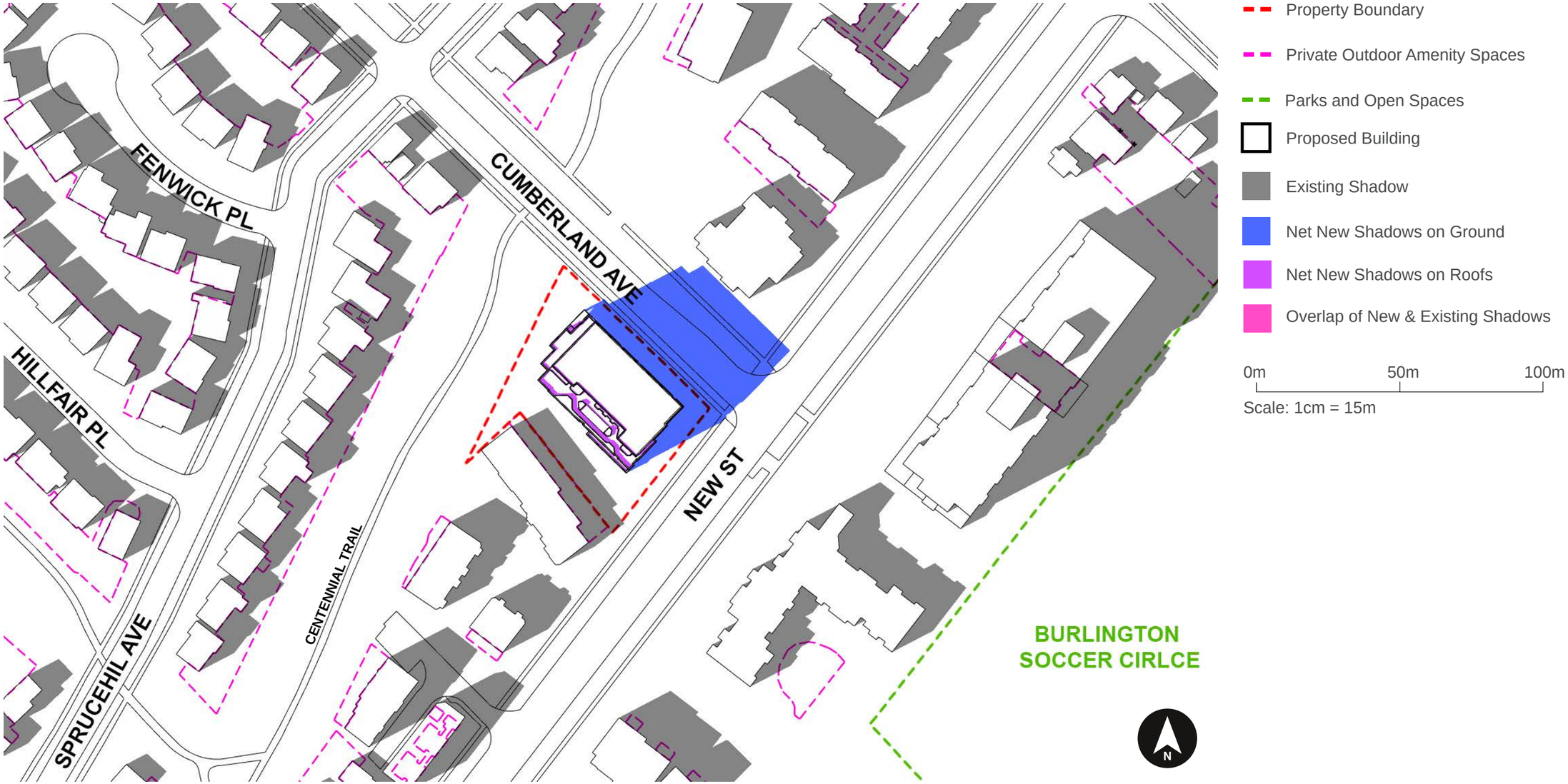


Figure 8: Shadow Study Diagram - March 21st 5:00 PM prepared by Weston Consulting

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3.1 MARCH 21

6:00 PM

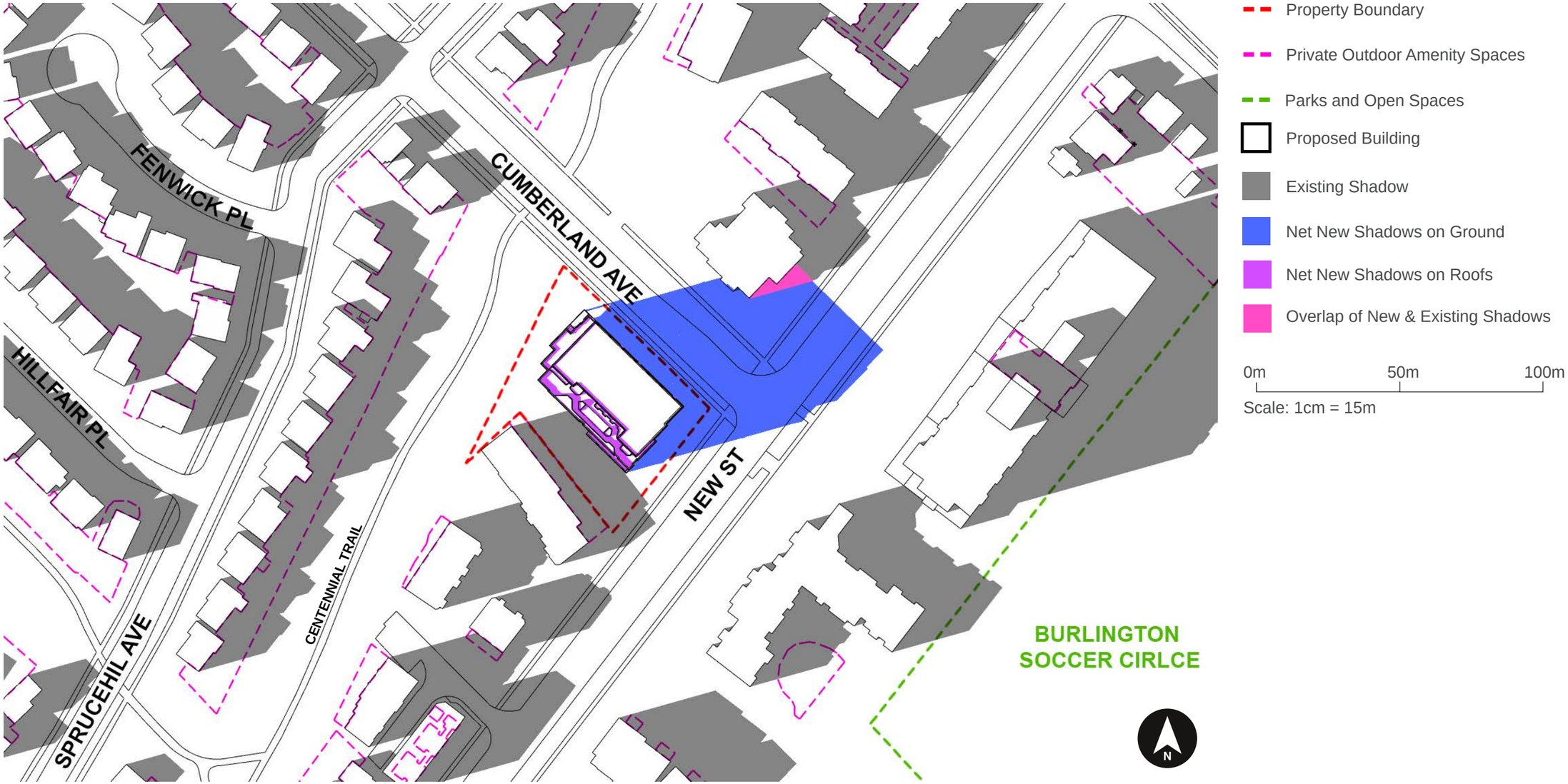


Figure 9: Shadow Study Diagram - March 21st 6:00 PM prepared by Weston Consulting

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3.1.1 MARCH 21 SAF CALCULATIONS

Private Outdoor Amenity Spaces					
Date	Time Interval	Total Area (m^2)	Area Exposed to Sunshine (m^2)		Average Area Exposed to Sunshine (m^2)
			Interval Start	Interval End	
March 21	9:00 - 10:00	3,079.85	2,768.40	3,079.85	2,924.12
March 21	10:00 - 11:00	3,079.85	3,079.85	3,079.85	3,079.85
March 21	11:00 - 12:00	3,079.85	3,079.85	3,079.85	3,079.85
March 21	12:00 - 13:00	3,079.85	3,079.85	3,079.85	3,079.85
March 21	13:00 - 14:00	3,079.85	3,079.85	3,079.85	3,079.85
March 21	14:00 - 15:00	3,079.85	3,079.85	3,079.85	3,079.85
March 21	15:00 - 16:00	3,079.85	3,079.85	3,079.85	3,079.85
March 21	16:00 - 17:00	3,079.85	3,079.85	3,079.85	3,079.85
March 21	17:00 - 18:00	3,079.85	3,079.85	3,079.85	3,079.85
				Overall Average Area Exposed to Sunshine (m^2)	3,062.55
				Sun Access Factor	0.99

Table 10: Solar Access Factor Calculations - March 21st

As discussed on page 6, the Terms of Reference dictate that private outdoor amenity areas, including rear yards, decks, and (rooftop) patios, including common outdoor amenity areas, should not be impacted by net new shadows from the proposed development for more than 2 hours between 9:00 AM and 6:00 PM on March 21st. The criterion is met is the SAF is at least 0.22 the test date.

The SAF was determined to be 0.99 (99%) for the impacted private amenity areas. The net new shadows did not impact any additional private amenity areas on March 21st during the remaining test times.

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3.2 JUNE 21

8:00 AM

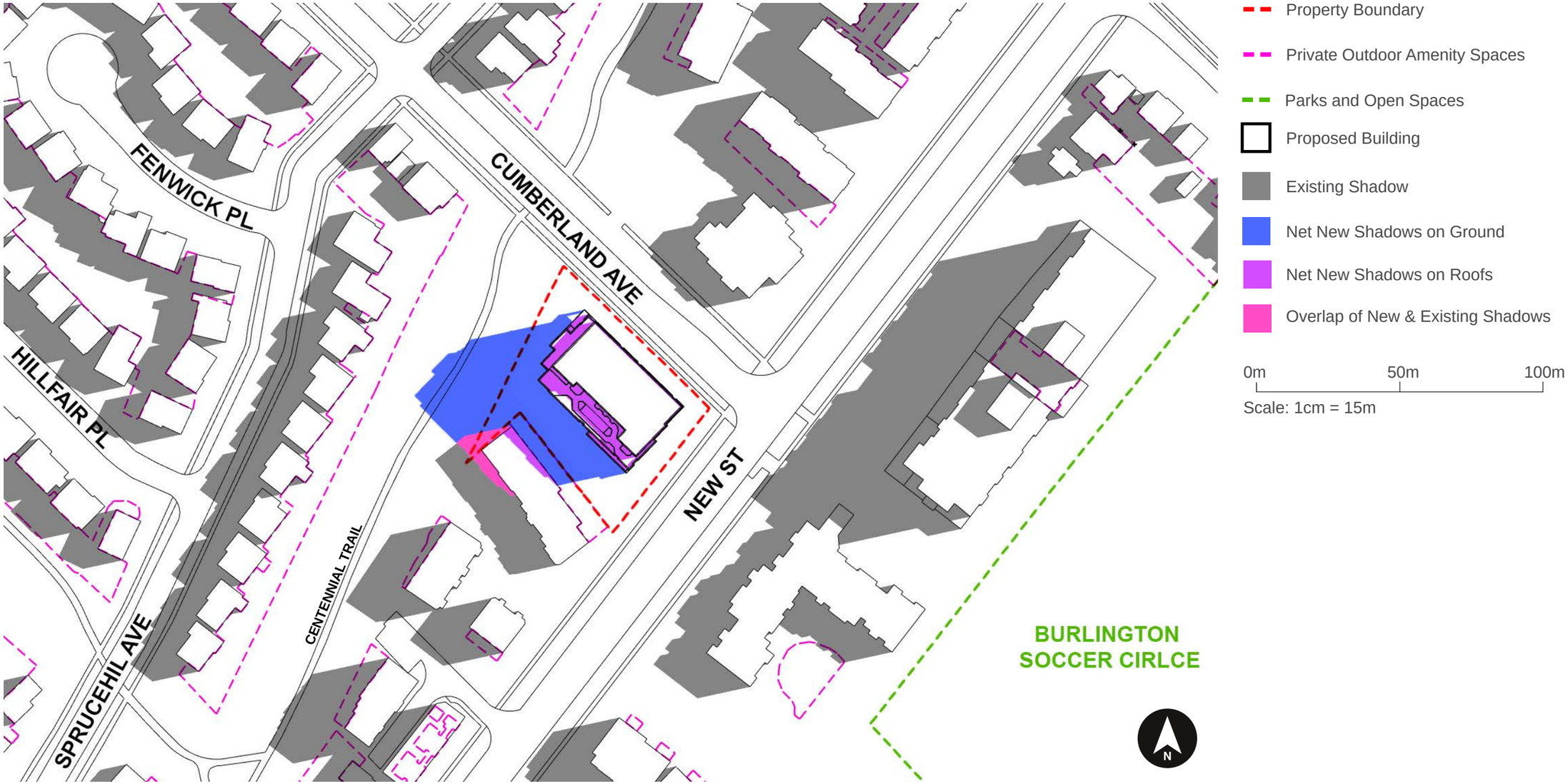


Figure 11: Shadow Study Diagram - June 21st 8:00 AM prepared by Weston Consulting

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3.2 JUNE 21

9:00 AM

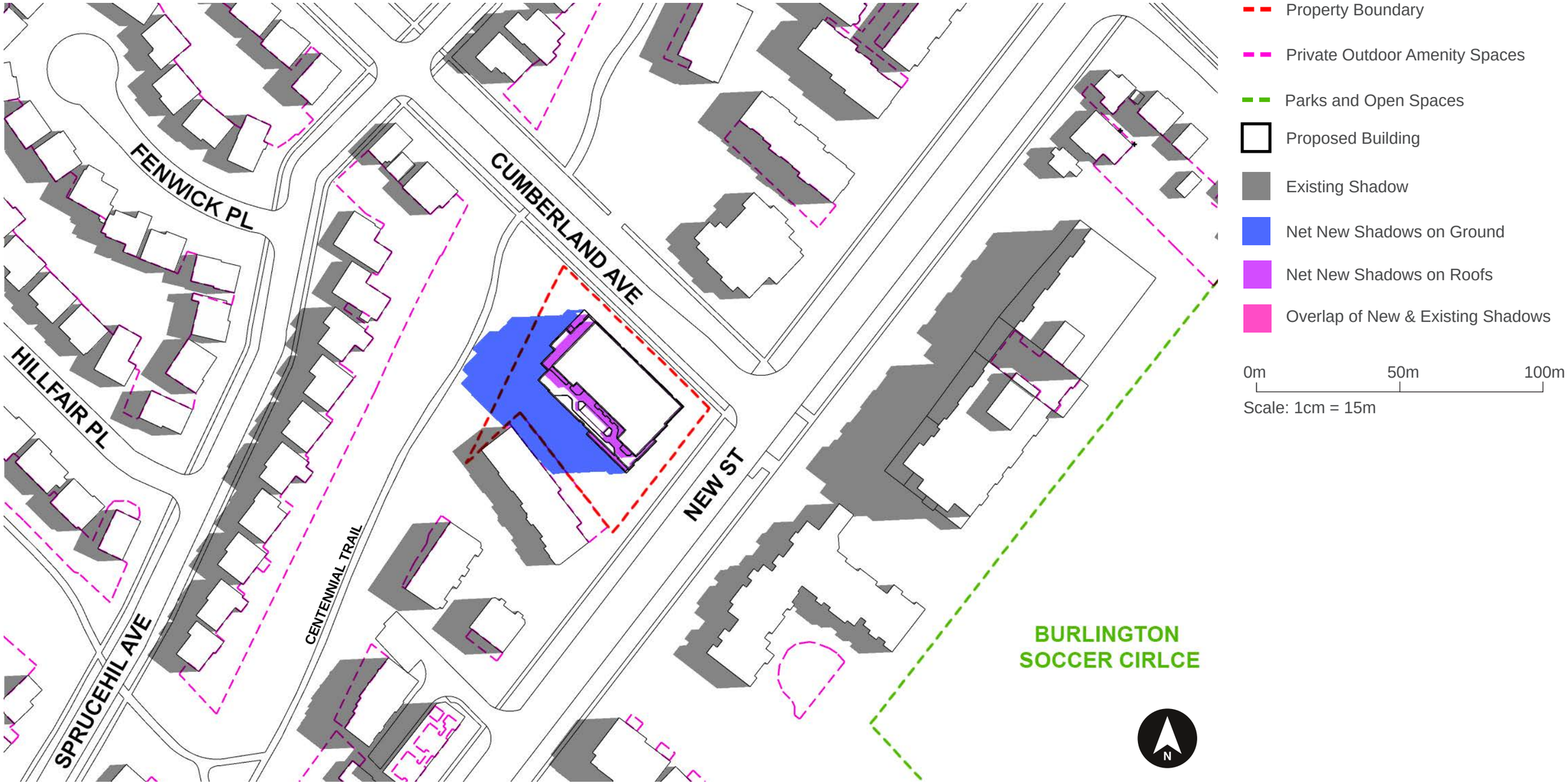


Figure 12: Shadow Study Diagram - June 21st 9:00 AM prepared by Weston Consulting

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3.2 JUNE 21

10:00 AM

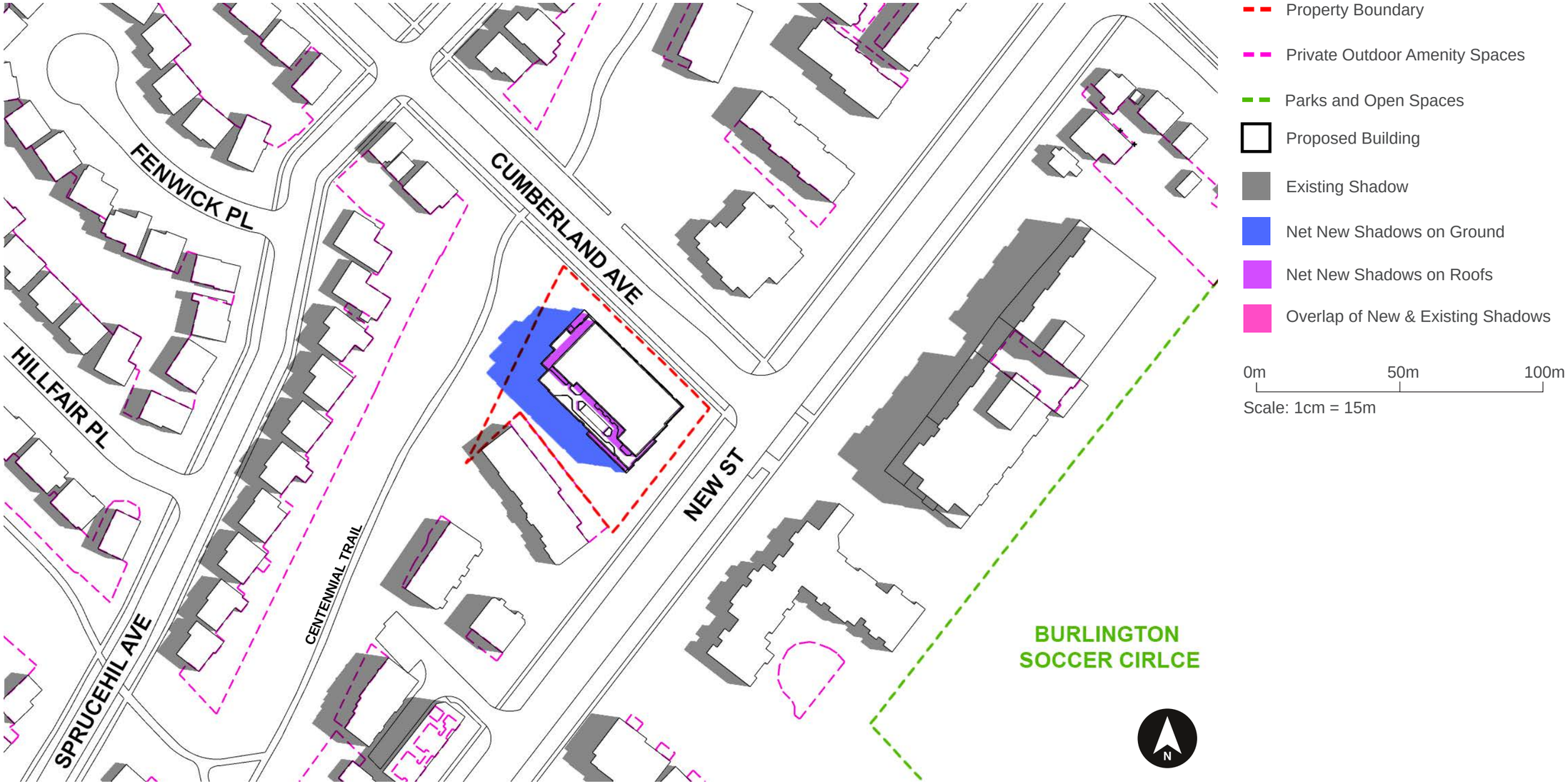


Figure 13: Shadow Study Diagram - June 21st 10:00 AM prepared by Weston Consulting

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3.2 JUNE 21

11:00 AM

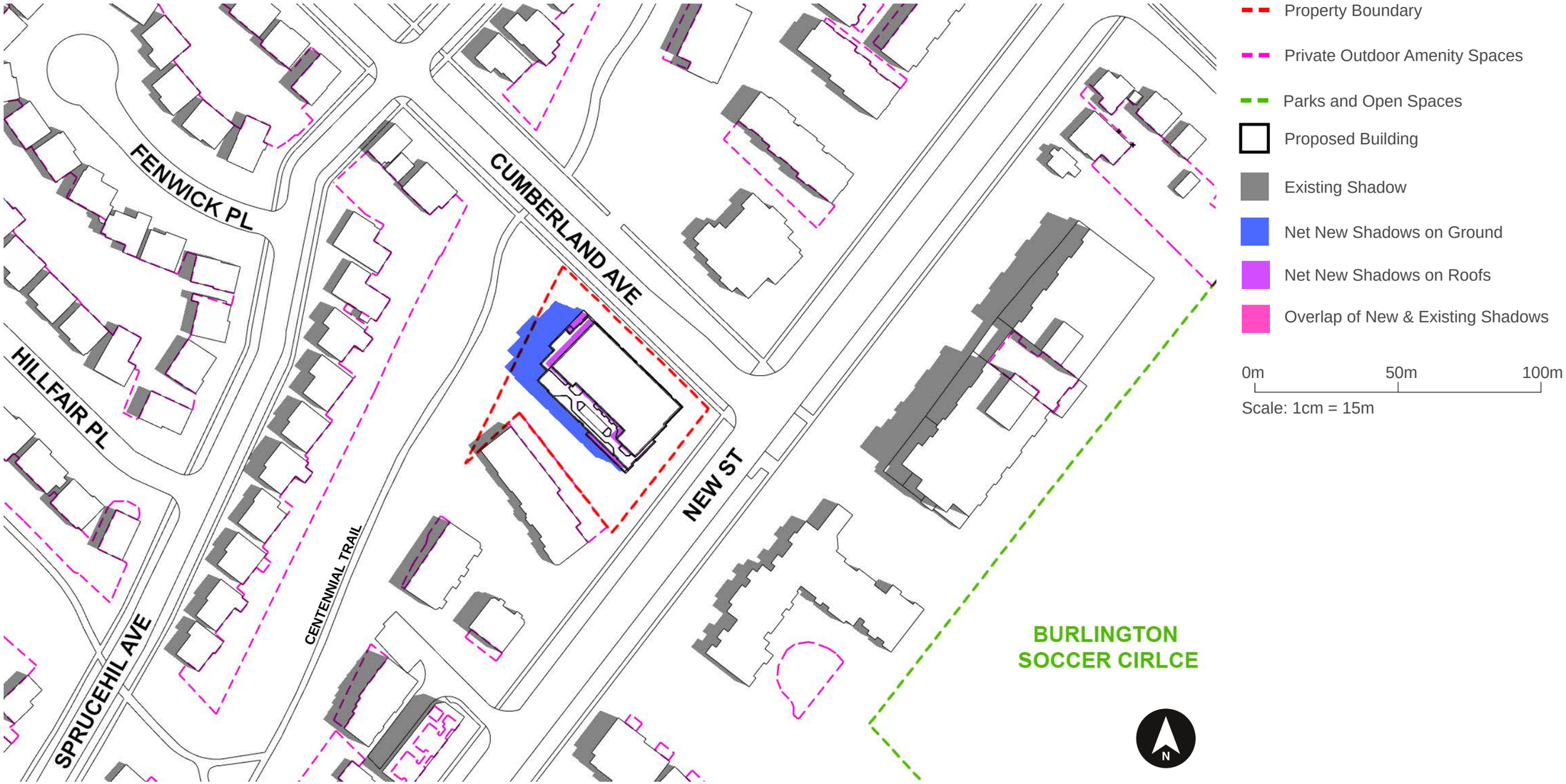


Figure 14: Shadow Study Diagram - June 21st 11:00 AM prepared by Weston Consulting

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westonconsulting.com
1.800.363.3558 F. 905.738.9937

3.2 JUNE 21

12:00 PM

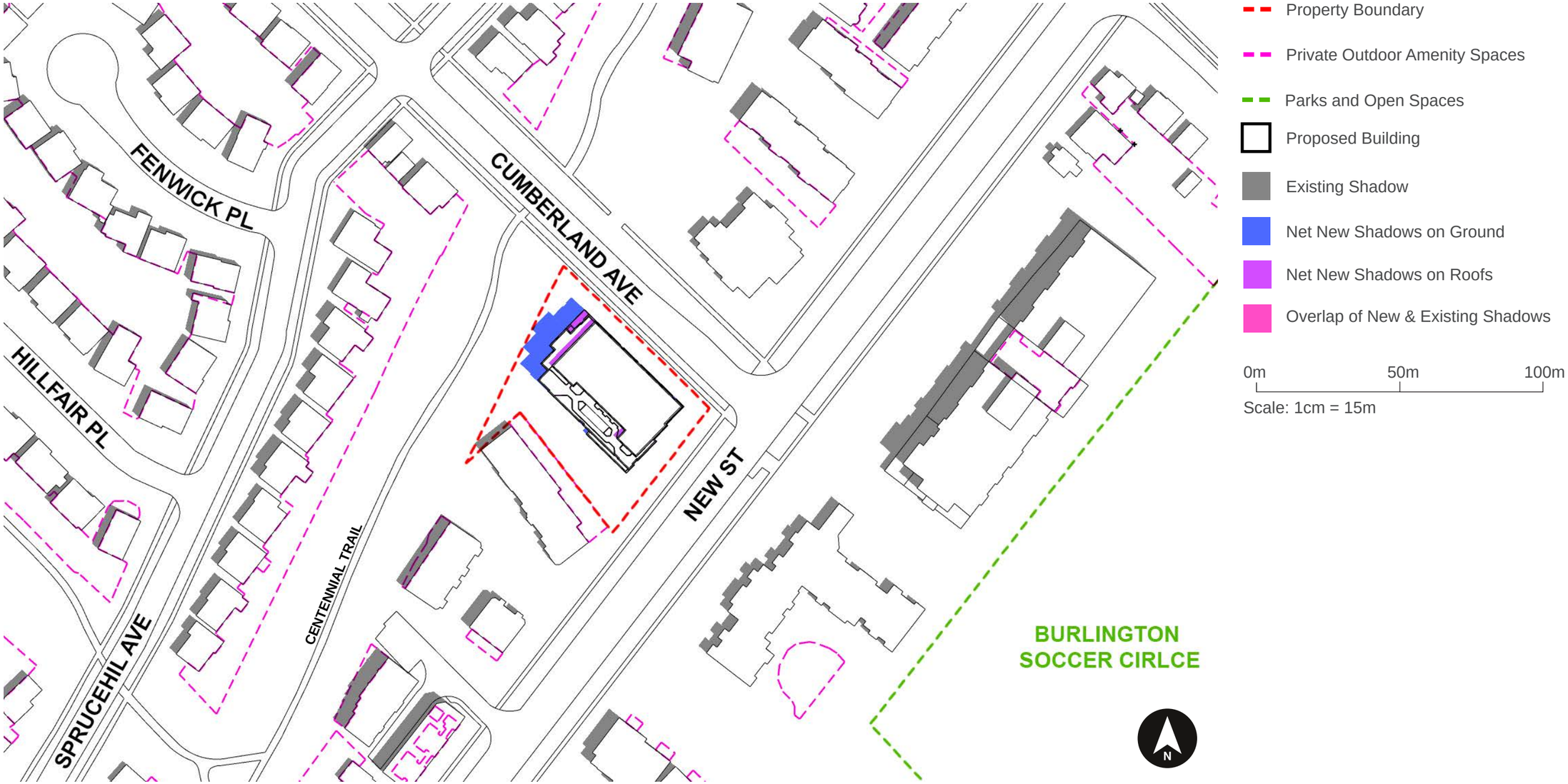


Figure 15: Shadow Study Diagram - June 21st 12:00 PM prepared by Weston Consulting

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3.2 JUNE 21

1:00 PM

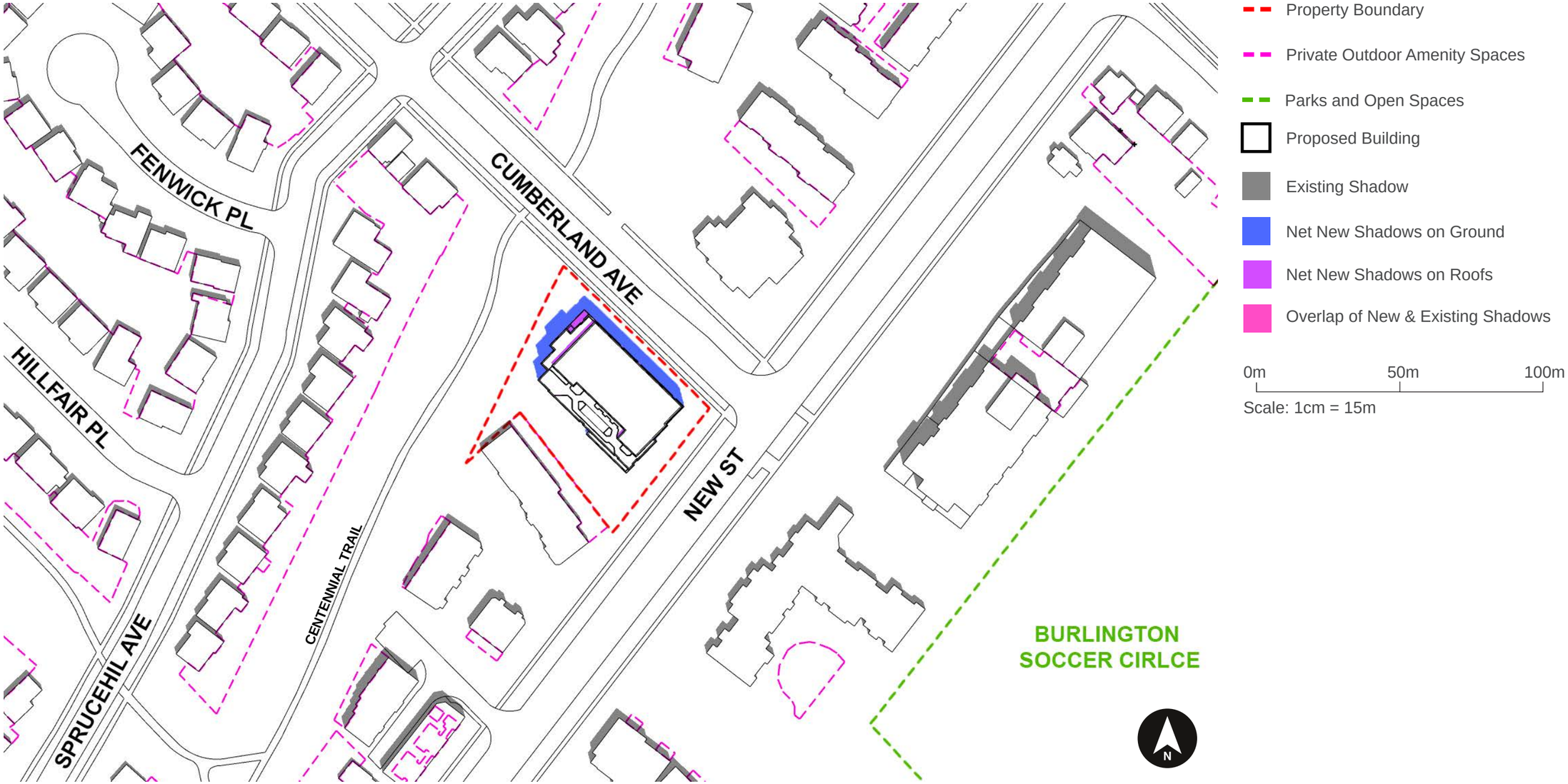


Figure 16: Shadow Study Diagram - June 21st 1:00 PM prepared by Weston Consulting

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1.800.363.3558 F. 905.738.9937

3.2 JUNE 21

2:00 PM

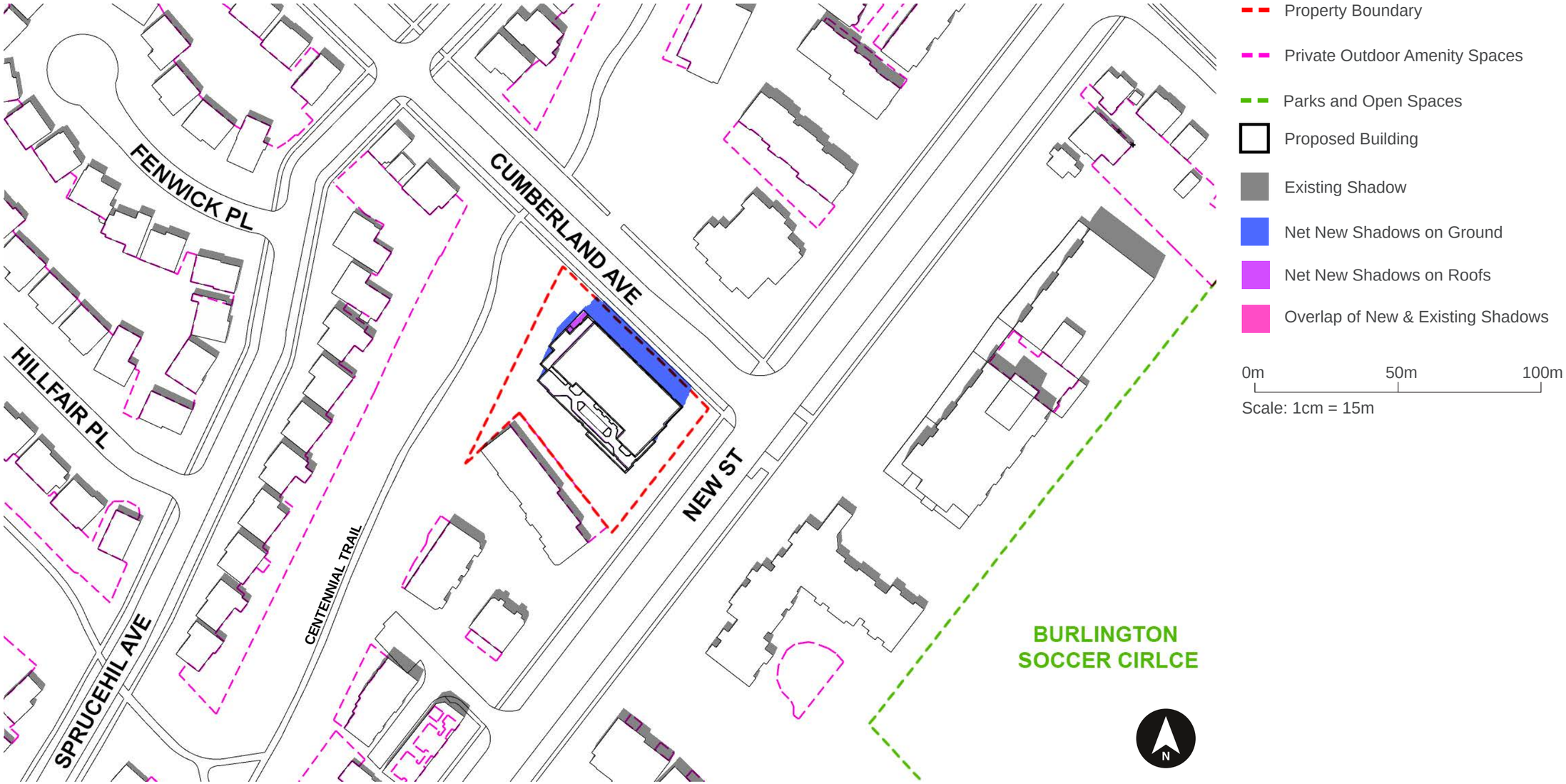


Figure 17: Shadow Study Diagram - June 21st 2:00 PM prepared by Weston Consulting

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3.2 JUNE 21

3:00 PM

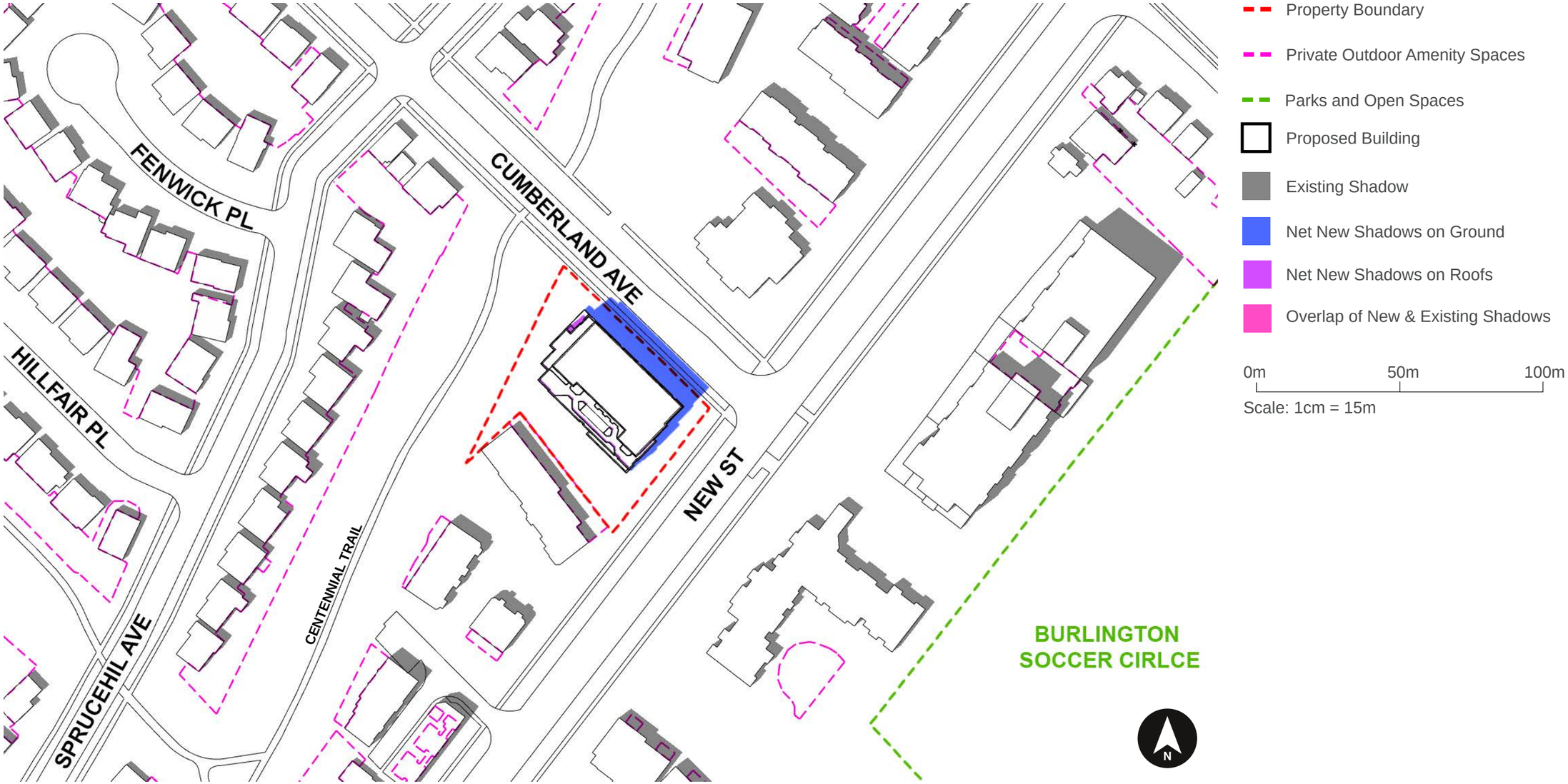


Figure 18: Shadow Study Diagram - June 21st 3:00 PM prepared by Weston Consulting

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3.2 JUNE 21

4:00 PM

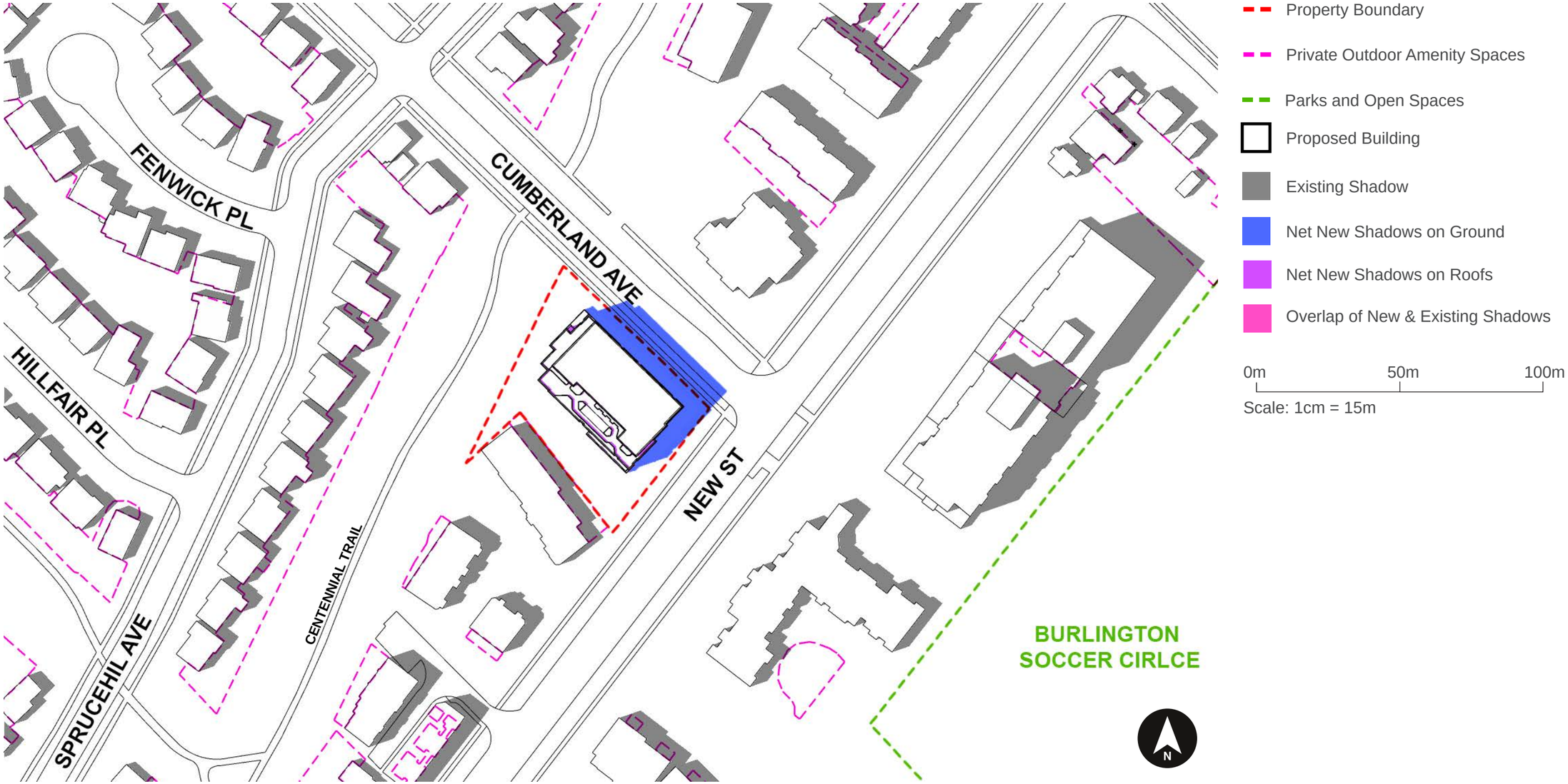


Figure 19: Shadow Study Diagram - June 21st 4:00 PM prepared by Weston Consulting

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3.2 JUNE 21

5:00 PM

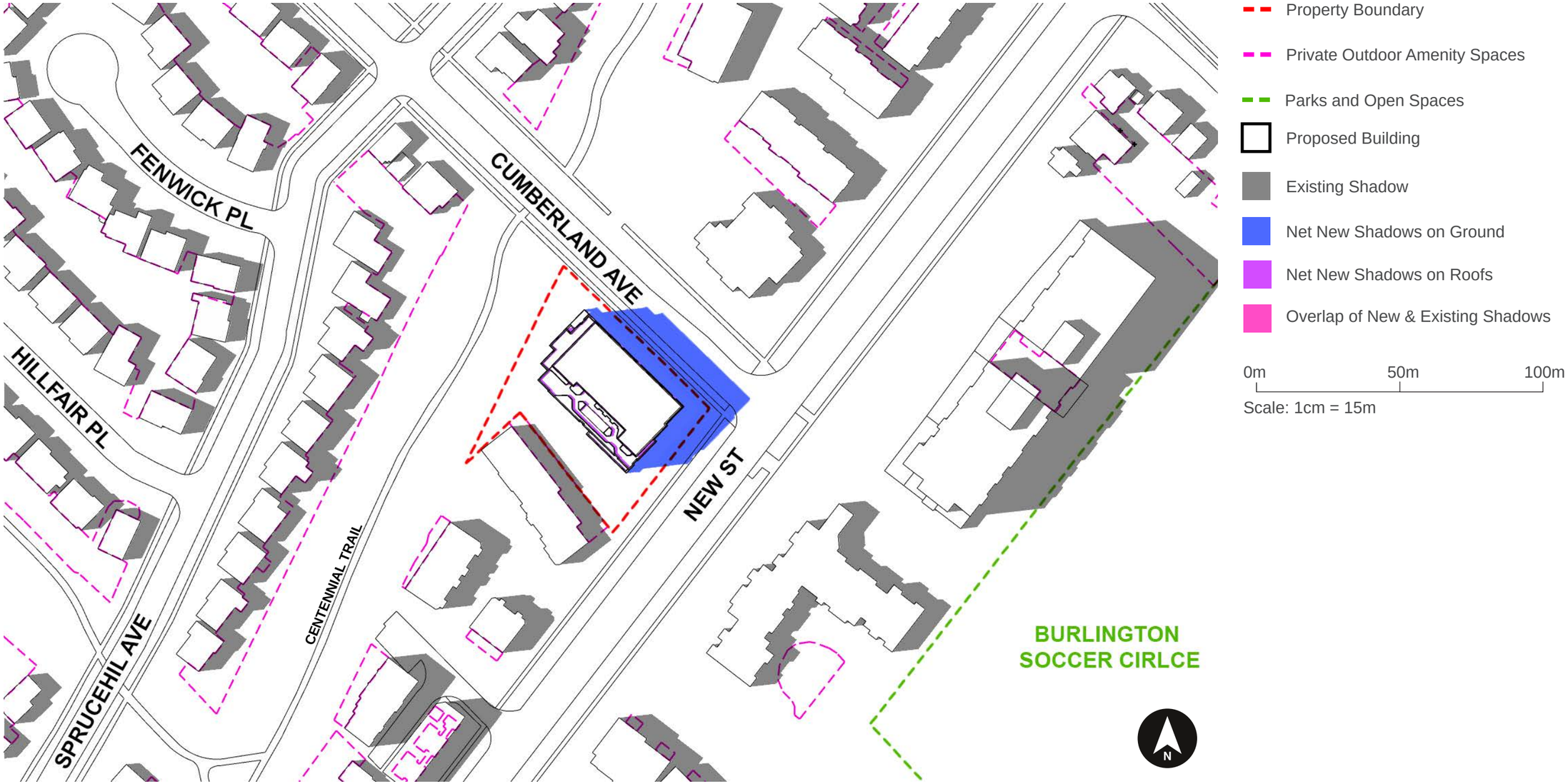


Figure 20: Shadow Study Diagram - June 21st 5:00 PM prepared by Weston Consulting

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3.2 JUNE 21

6:00 PM

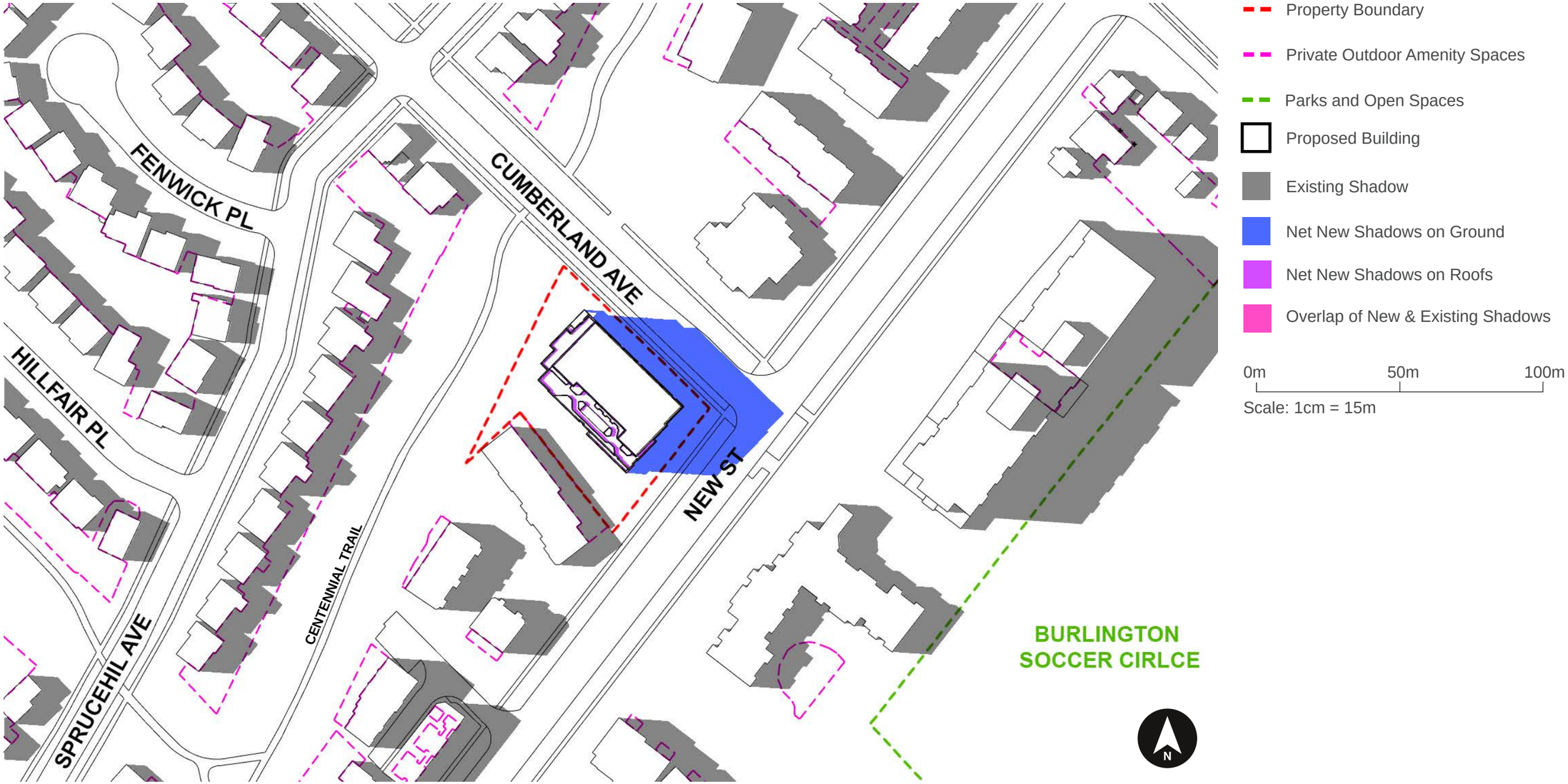


Figure 21: Shadow Study Diagram - June 21st 6:00 PM prepared by Weston Consulting

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3.2 JUNE 21

7:00 PM



Figure 22: Shadow Study Diagram - June 21st 7:00 PM prepared by Weston Consulting

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3.3 SEPTEMBER 21

9:00 AM

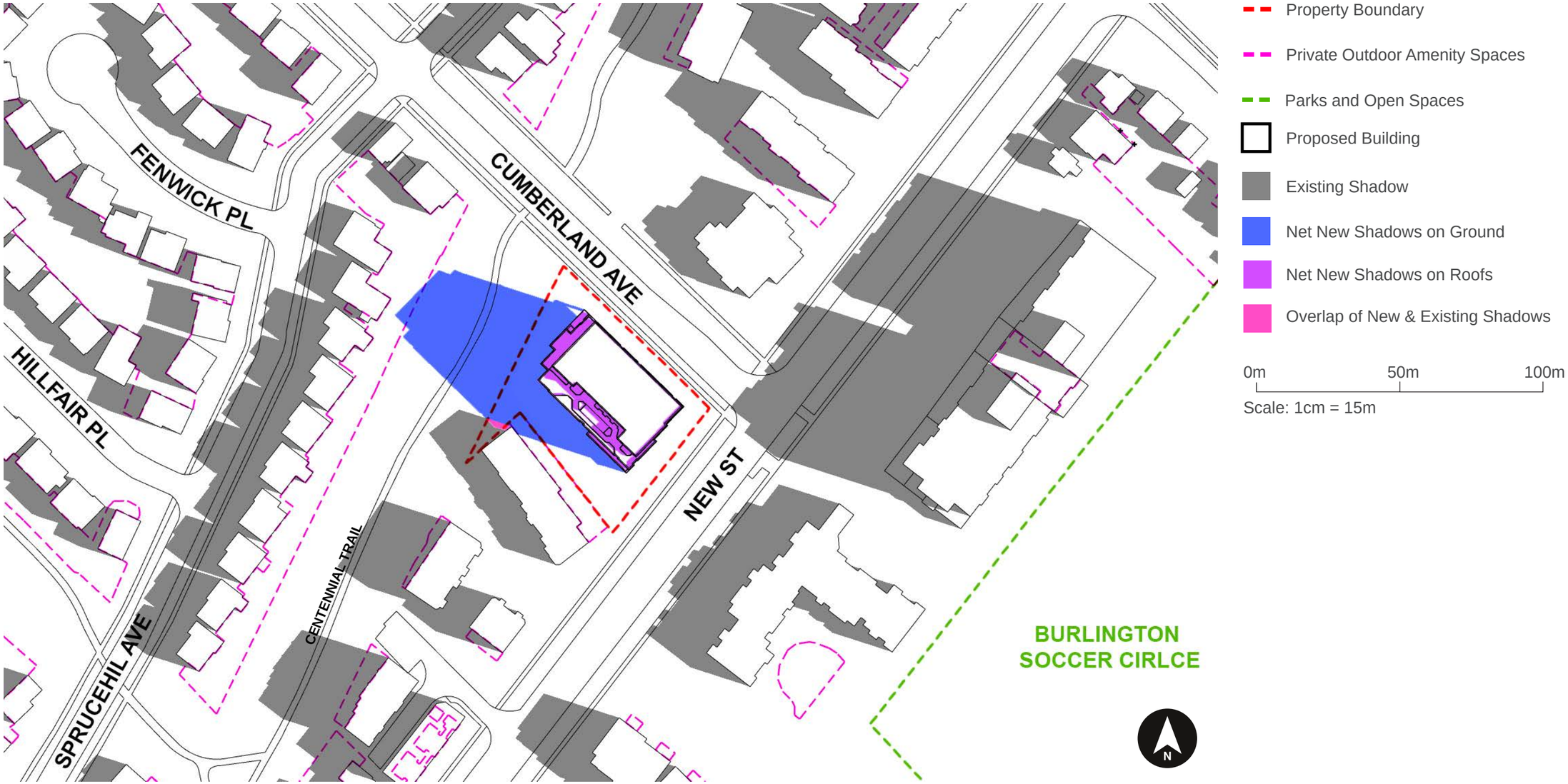


Figure 23: Shadow Study Diagram - September 21st 9:00 AM prepared by Weston Consulting

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3.3 SEPTEMBER 21

10:00 AM



Figure 24: Shadow Study Diagram - September 21st 10:00 AM prepared by Weston Consulting

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3.3 SEPTEMBER 21

11:00 AM

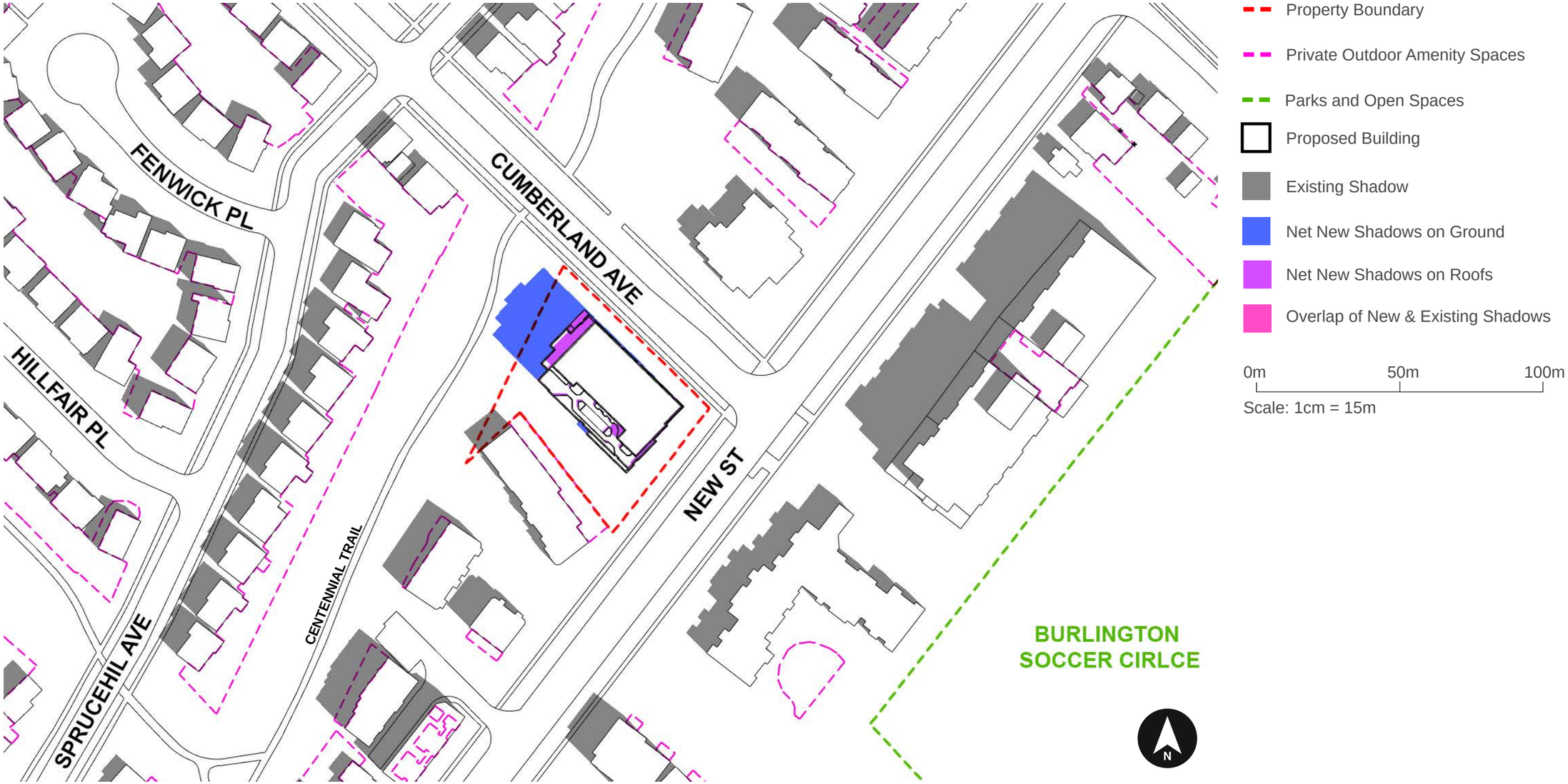


Figure 25: Shadow Study Diagram - September 21st 11:00 AM prepared by Weston Consulting

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3.3 SEPTEMBER 21

12:00 PM

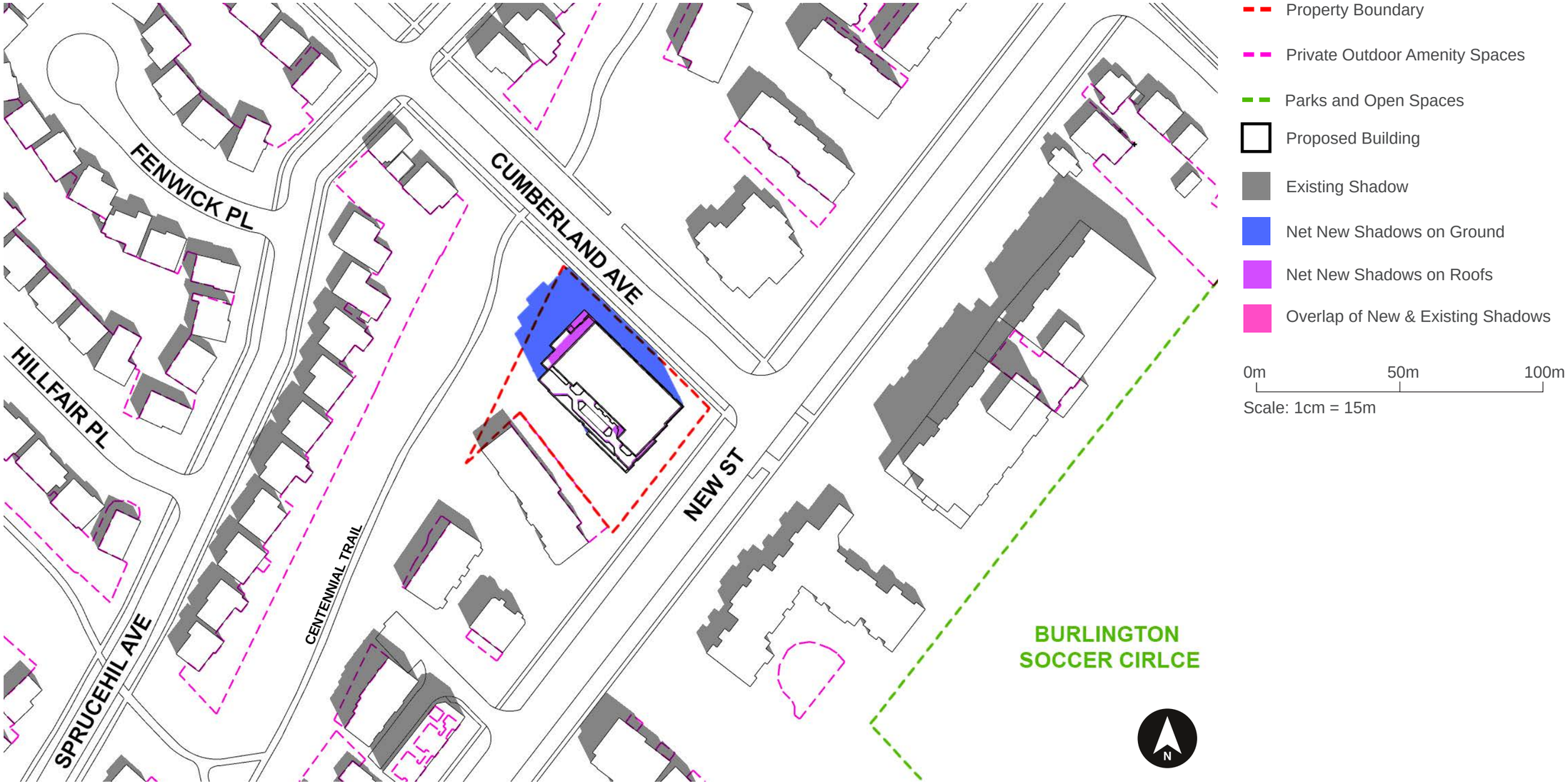


Figure 26: Shadow Study Diagram - September 21st 12:00 PM prepared by Weston Consulting

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3.3 SEPTEMBER 21

1:00 PM

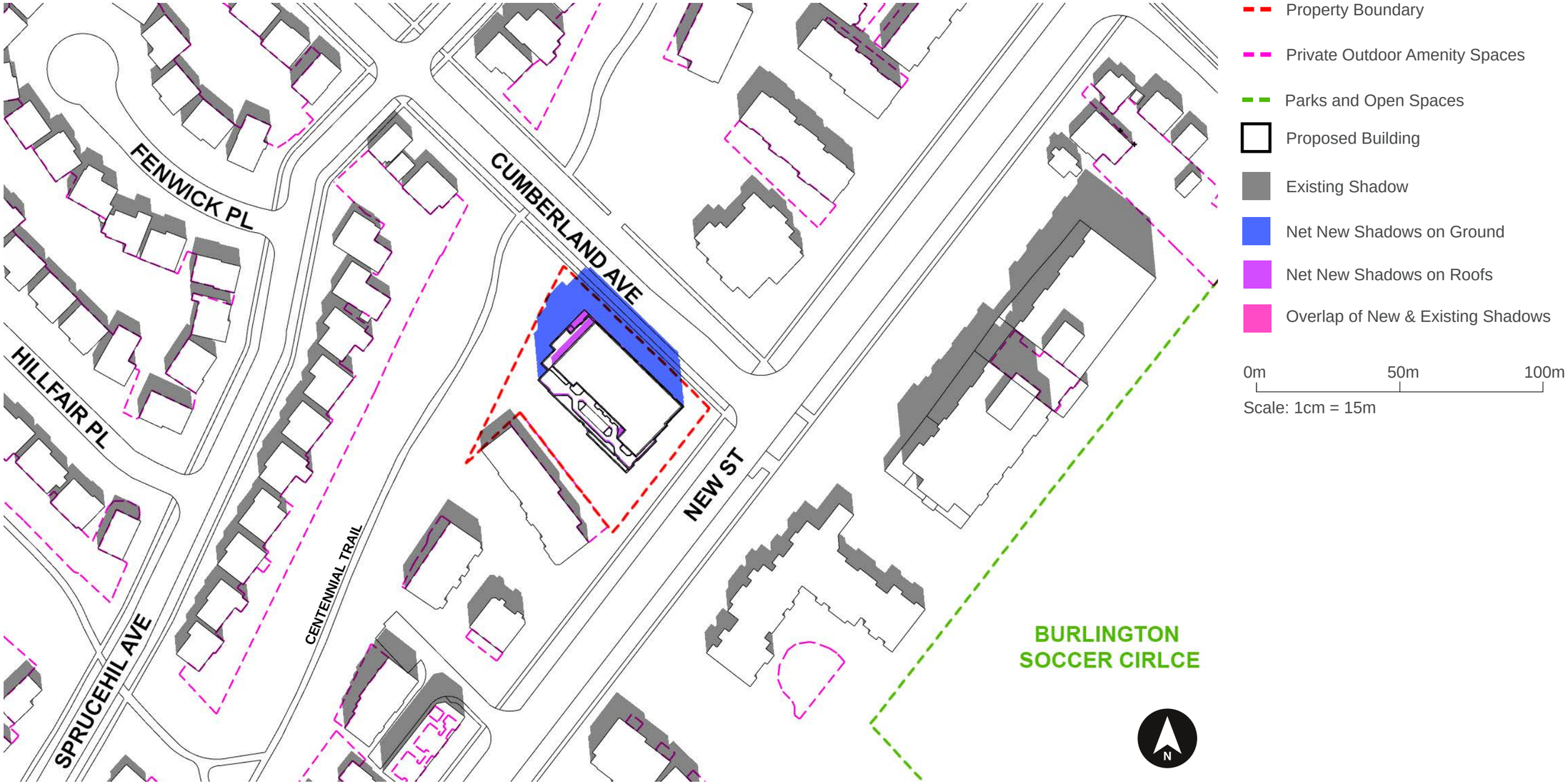


Figure 27: Shadow Study Diagram - September 21st 1:00 PM prepared by Weston Consulting

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3.3 SEPTEMBER 21

2:00 PM

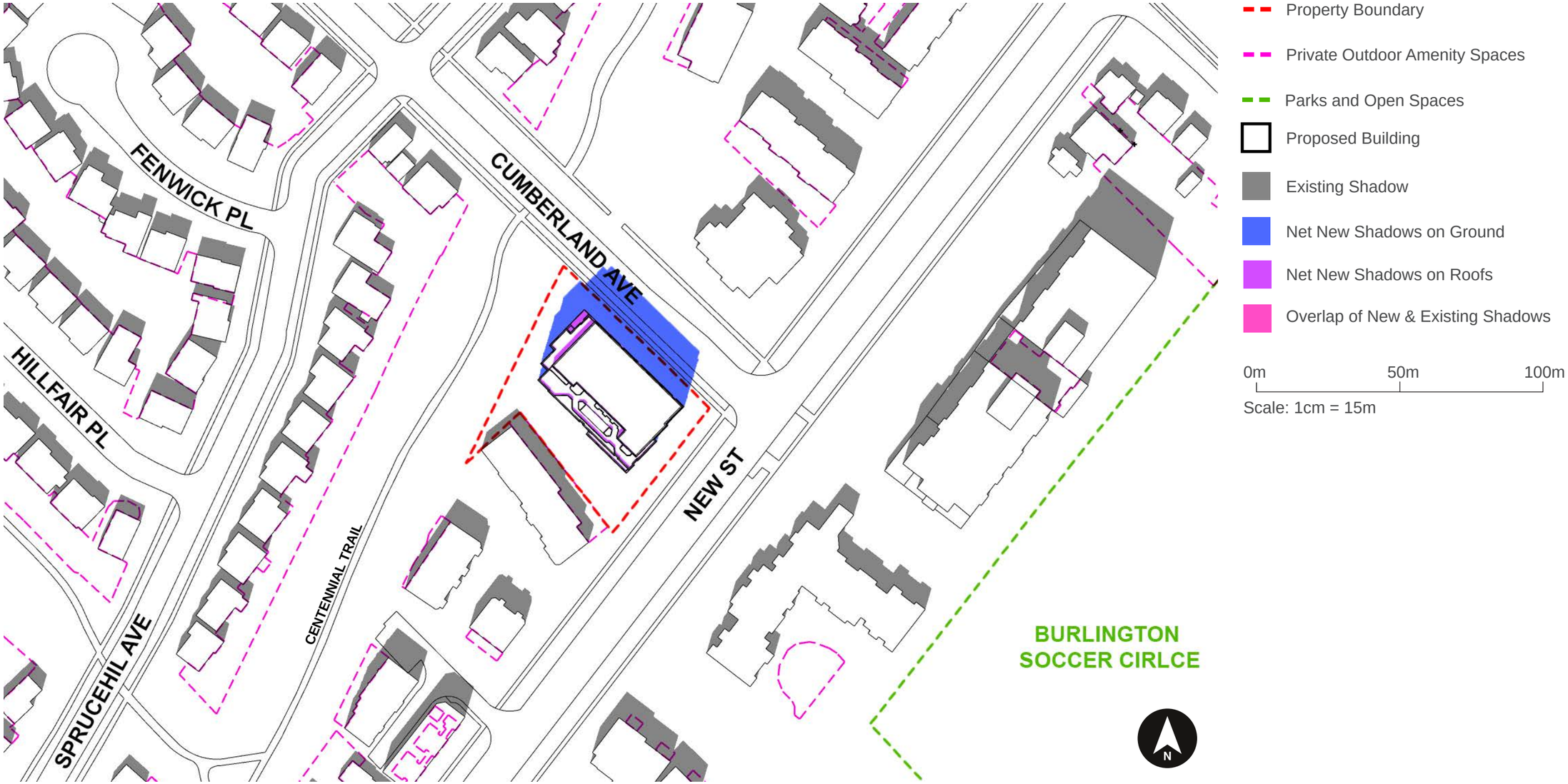


Figure 28: Shadow Study Diagram - September 21st 2:00 PM prepared by Weston Consulting

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3.3 SEPTEMBER 21

3:00 PM

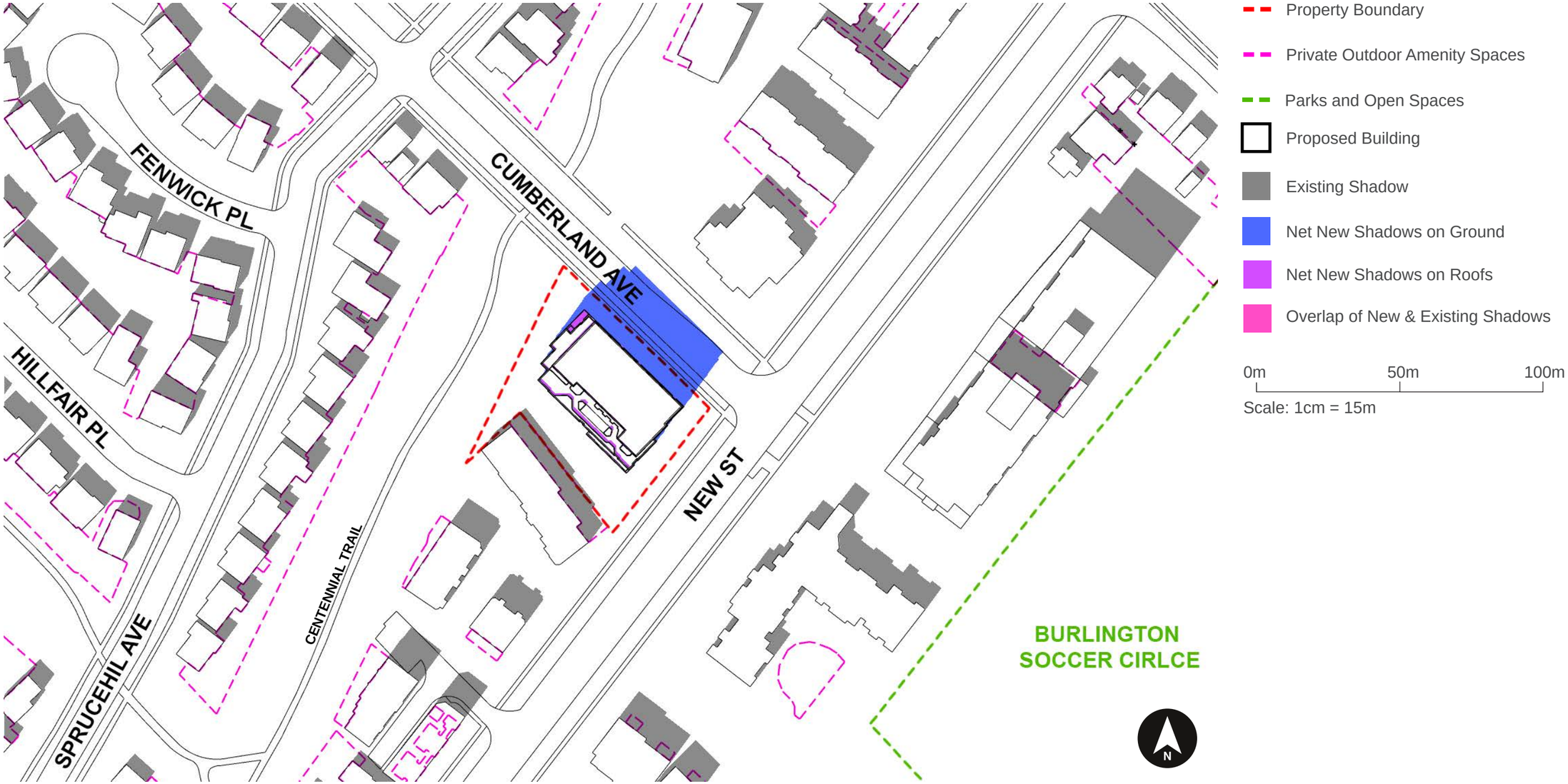


Figure 29: Shadow Study Diagram - September 21st 3:00 PM prepared by Weston Consulting

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3.3 SEPTEMBER 21

4:00 PM

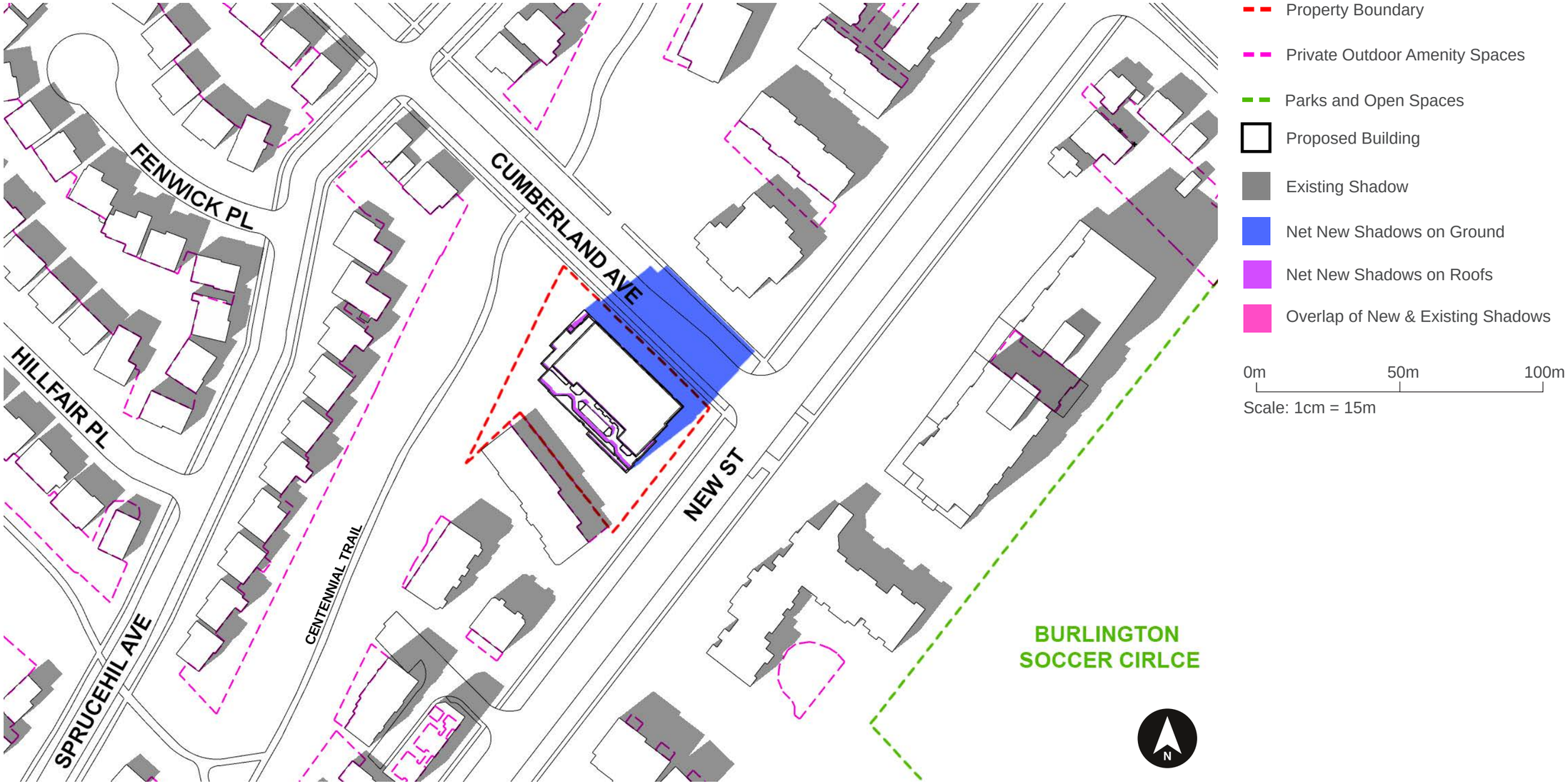


Figure 30: Shadow Study Diagram - September 21st 4:00 PM prepared by Weston Consulting

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3.3 SEPTEMBER 21

5:00 PM

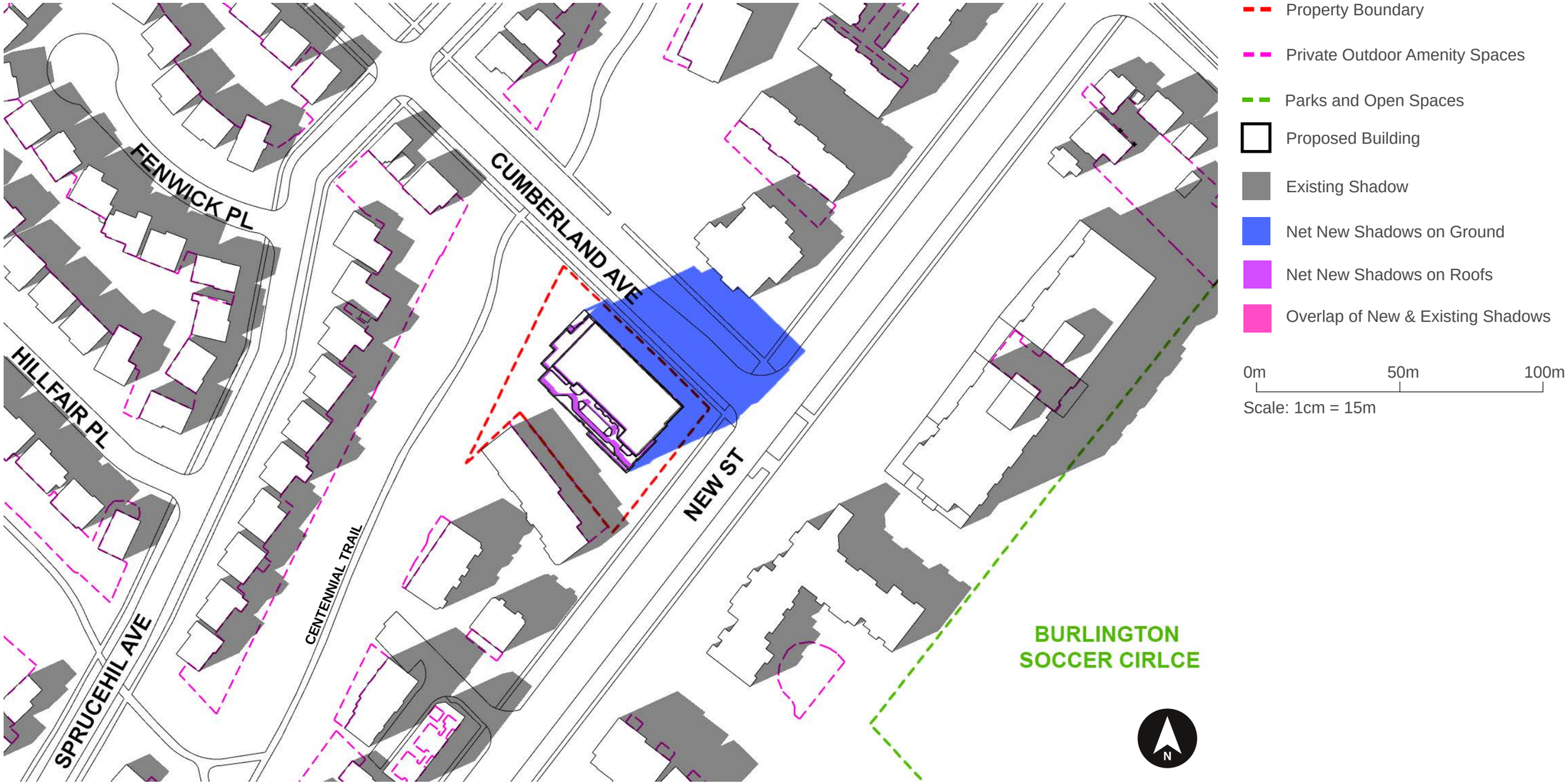


Figure 31: Shadow Study Diagram - September 21st 5:00 PM prepared by Weston Consulting

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3.3 SEPTEMBER 21

6:00 PM



Figure 32: Shadow Study Diagram - September 21st 6:00 PM prepared by Weston Consulting

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3.3 DECEMBER 21

11:00 AM

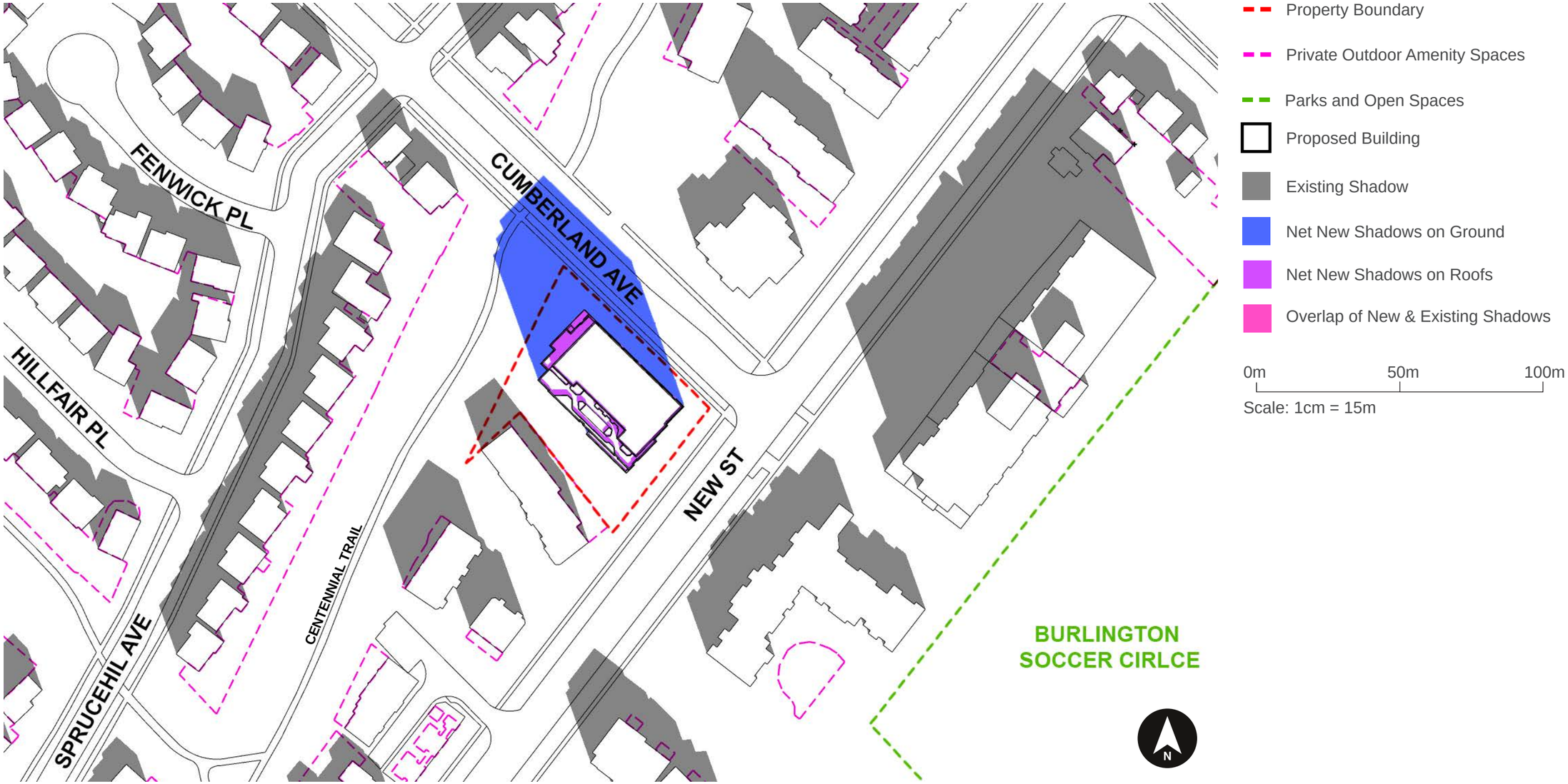


Figure 33: Shadow Study Diagram - December 21st 11:00 AM prepared by Weston Consulting

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3.3 DECEMBER 21

12:00 PM

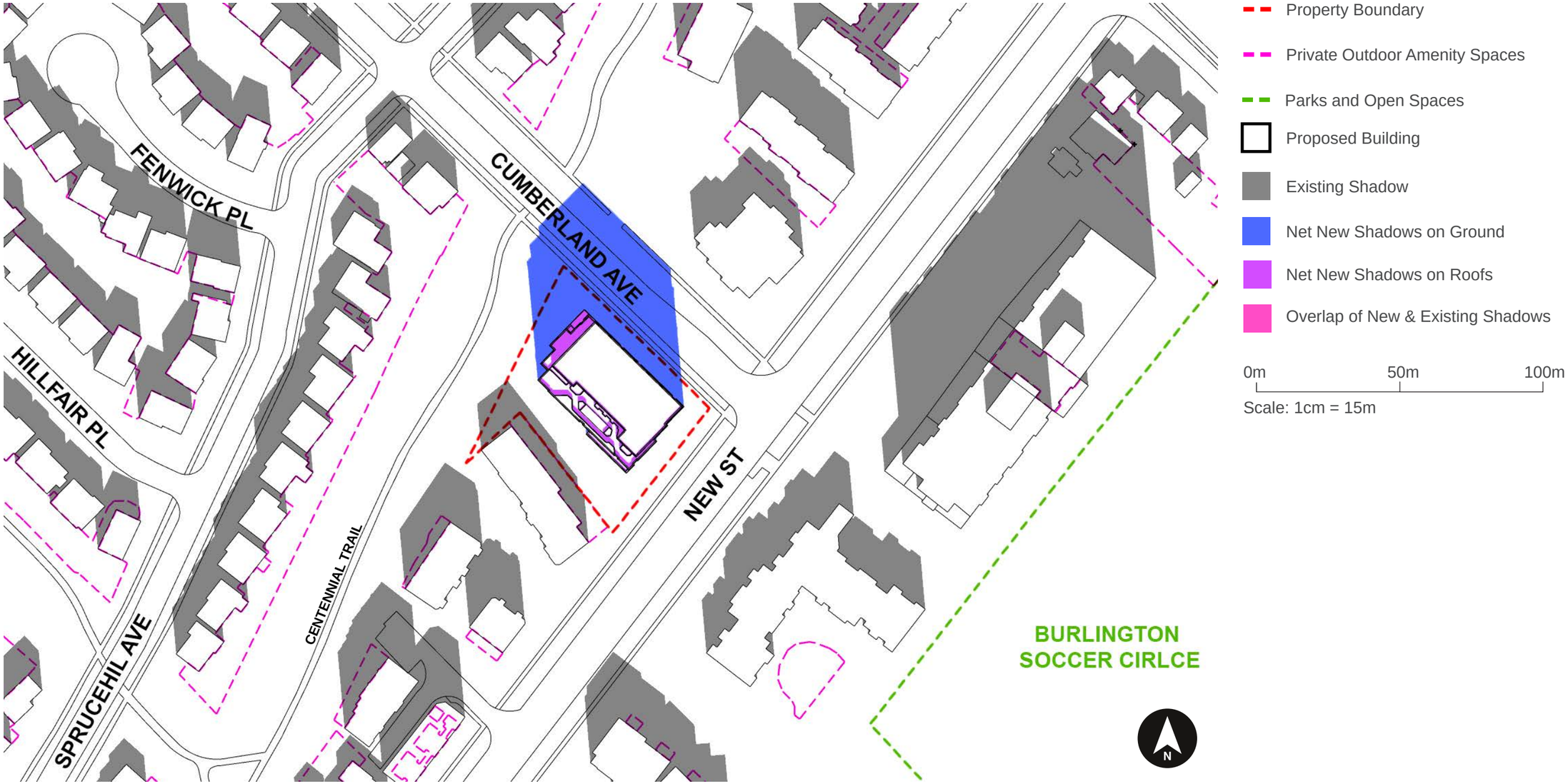


Figure 34: Shadow Study Diagram - December 21st 12:00 PM prepared by Weston Consulting

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3.3 DECEMBER 21

1:00 PM

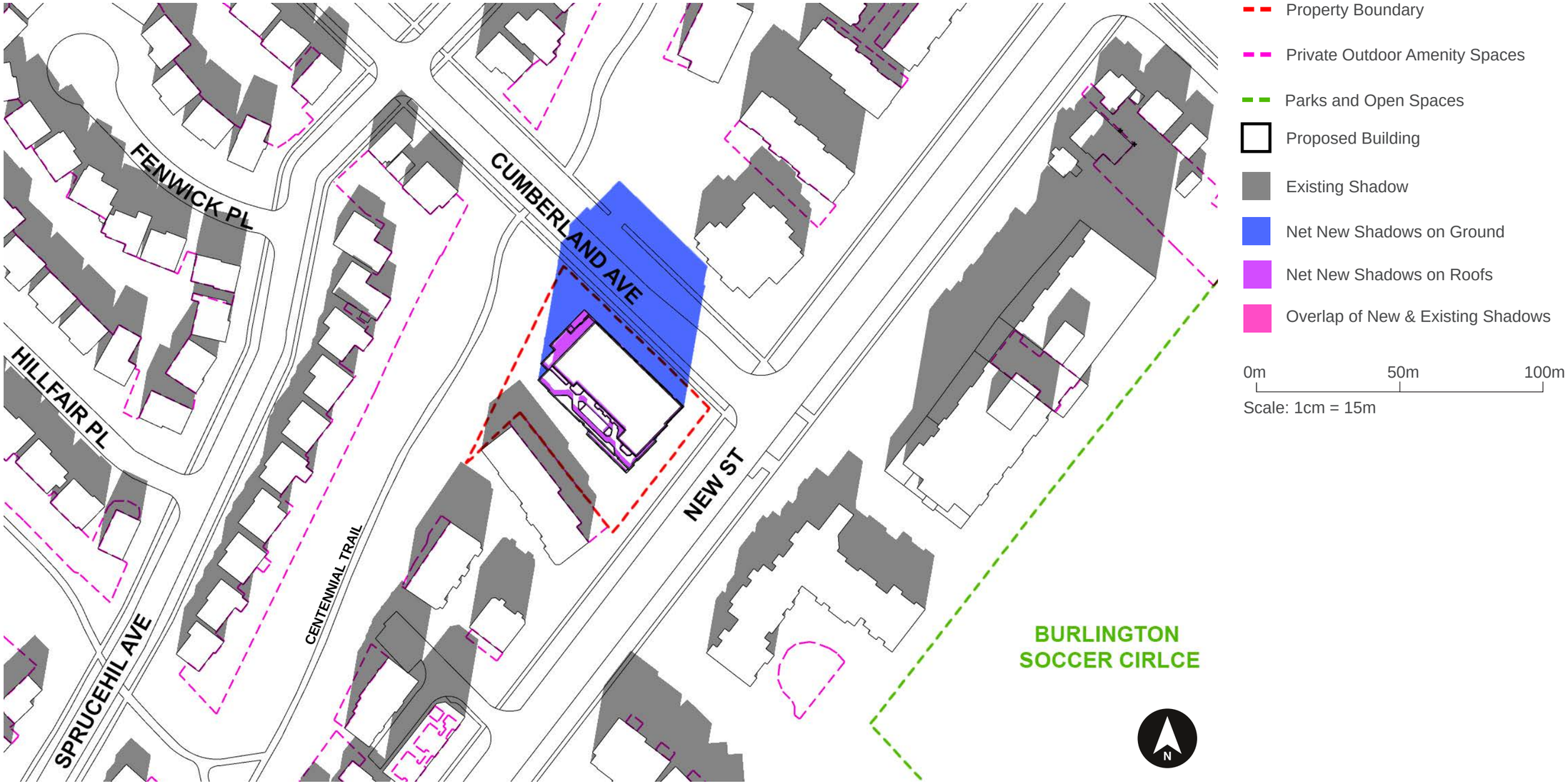


Figure 35: Shadow Study Diagram - December 21st 1:00 PM prepared by Weston Consulting

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3.3 DECEMBER 21

2:00 PM

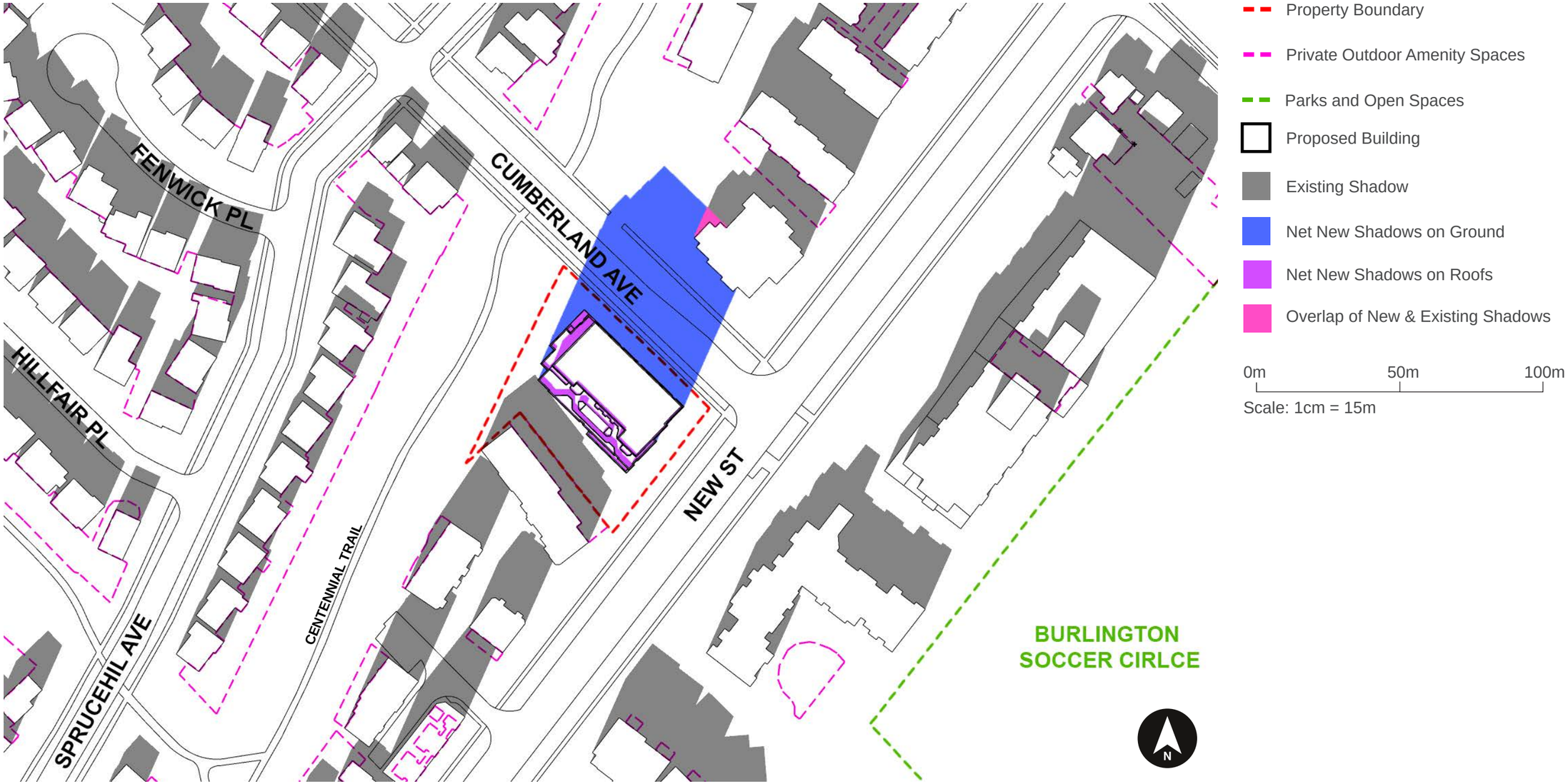


Figure 36: Shadow Study Diagram - December 21st 2:00 PM prepared by Weston Consulting

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3.3 DECEMBER 21

3:00 PM

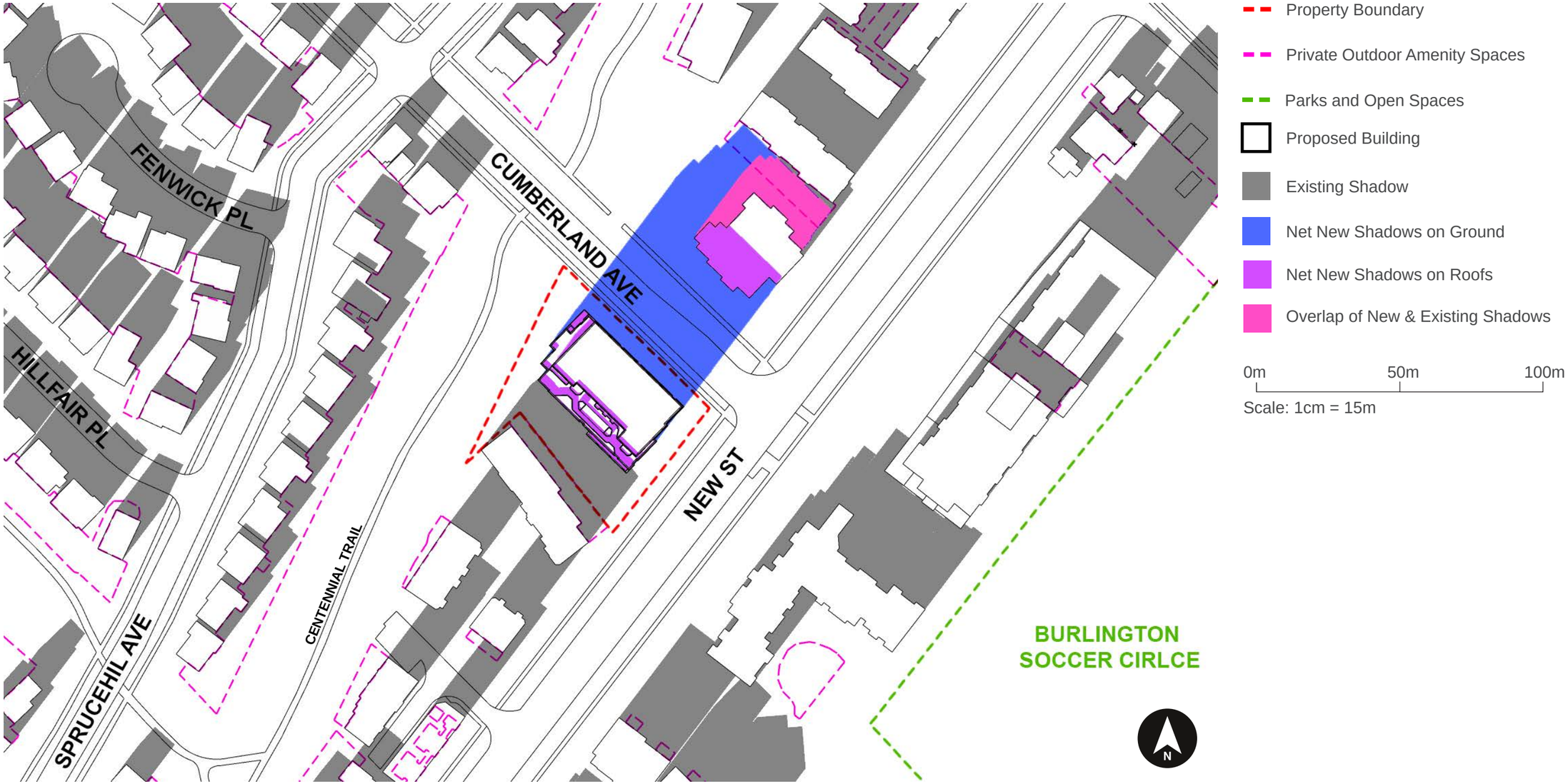


Figure 37: Shadow Study Diagram - December 21st 3:00 PM prepared by Weston Consulting

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