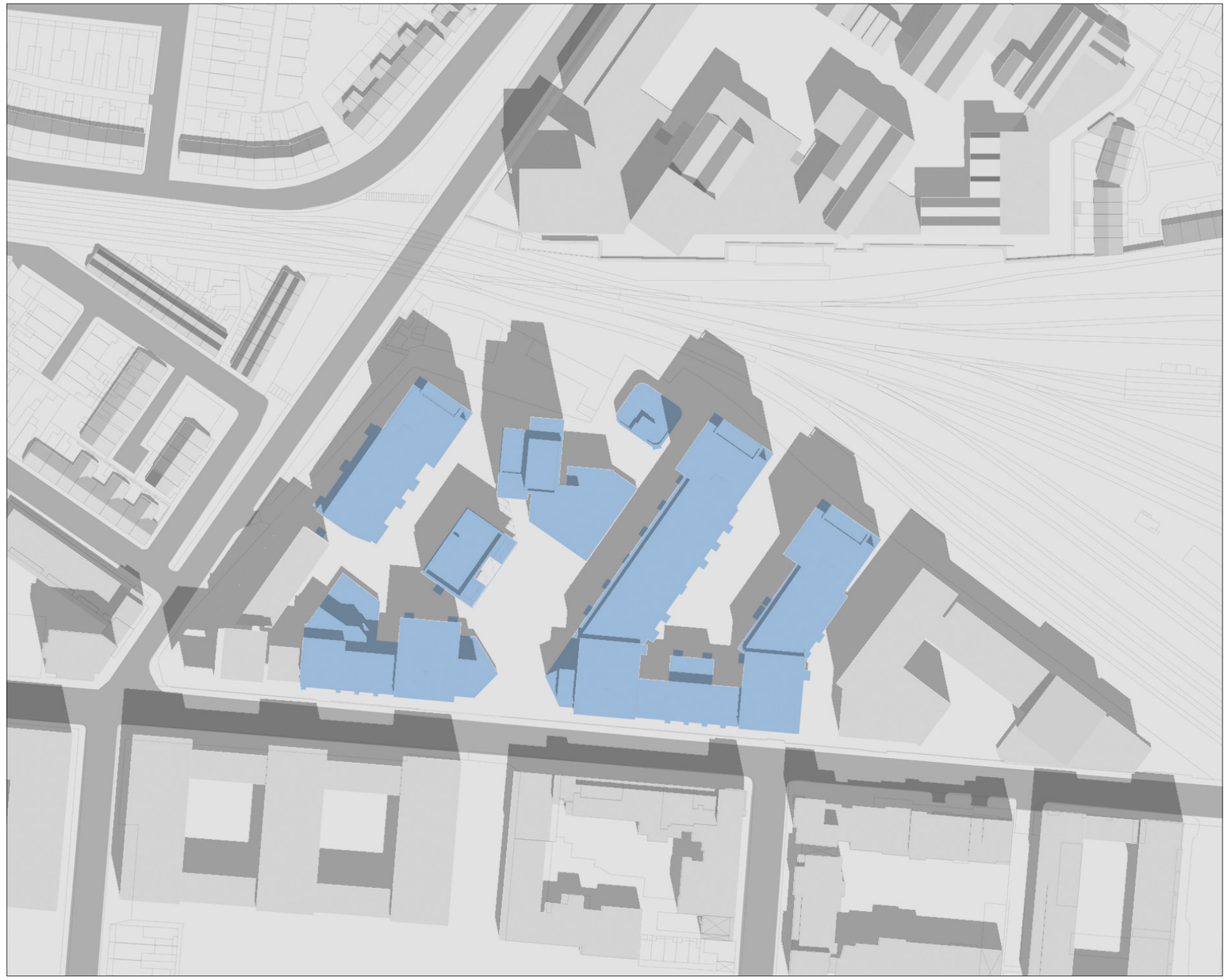

Sunlight and Daylight Access Analysis

of

the Proposed Development

at

Sheriff Street Upper, Dublin 1

November 2020

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1.0 INTRODUCTION

1.1 Introduction

ARC Architectural Consultants Ltd has been retained by the Applicant, Glenveagh Properties Limited, to carry out an analysis of the impact of the proposed development on lands, which form part of Castleforbes Business Park, at Sheriff Street Upper, Dublin 1 on sunlight and daylight access in the surrounding area. Please note that the information set out in Sections 2.0 and 3.0 of this report is also provided in Chapter 15 of the Environmental Impact Assessment Report submitted with this application. This report also includes an assessment of sunlight and daylight access within the proposed development.

Note on Reference to Context under Technical and Guidance Documents and on Reference to Methodology

In order to avoid repetition, the sections outlining the relevant recommendations of technical and guidance documents and the methodologies used in undertaking this assessment have been set out in the Technical Appendix at the end of the written section of this report.

1.2 Receiving Environment

The application site comprises a large brownfield site on the northern side of Sheriff Street Upper located to the south and west of the Dublin Port railway lane. It currently accommodates one to three storey industrial warehouses and commercial buildings, which form part of the Castleforbes Business Park. The site is adjoined on its eastern and western sides by lands, which are also in the ownership of the Applicant. To the east, planning permission has been granted for the demolition of all existing structures and the construction of a commercial office building (6 to 9 storeys) and a 270 bedroom hotel (7 to 10 storeys) under DCC Reg. Ref. 3433/19. To the west, planning permission has been granted for a 219 bedroom hotel, ranging in height from 6 to 9 storeys (DCC Reg. Ref. 2143/20).

The section of East Road opposing the application site to the west is characterised by two storey terraced buildings in residential use at Church Street East, Irvine Court and Irvine Terrace and the single storey cottages at Church Avenue and Irvine Cottages. Lands at the southern end of East Road have been redeveloped with commercial and residential developments, including the Canon Hall development which rises to a height of eleven storeys at the junction of East Road and Sheriff Street Upper. It is notable that the site at Canon Hall site is outside the boundary of the North Lotts and Grand Canal Dock SDZ Planning Scheme and that other development of similar scale and height has been granted permission on lands outside the Strategic Development Zone, including a residential development in 9 no. blocks, ranging in height from 3 to 15 storeys recently permitted on lands at Nos. 1-4 East Road to the north of the application site (ABP Ref. PL29N.304710).

The section of Sheriff Street Upper opposing the application site is characterised by major residential and mixed commercial and residential development ranging in height from six to ten storeys and developed as part of the regeneration of Dublin Docklands Strategic Development Zone. The wider context of lands to the south of the application site is also characterised by recent dense development of significant scale that has occurred as part of the regeneration of the Dublin Docklands area, including the Convention Centre Dublin at Spencer Dock and the Point Village complex at East Wall Road. It is notable that to the southwest of the site, at City Block 2, construction of a seven storey hotel and residential development (permitted under DCC Reg. Ref. DSDZ4111/19) is underway. To the south of the site, at City Block 3, Dublin City Council have granted permission for a residential development (DCC Reg. Ref. DSDZ2186/20) ranging in height from two to seven storeys. Much of the lands on either side of the railway remains vacant or underused (e.g. accommodating low density warehousing).

Given the underutilised character of the site and relatively large areas of low density development surrounding the site, the shadow environment of the existing site and of its immediate surroundings is inconsistent with what would normally be expected in the urban core or the industrial docklands area of a city.

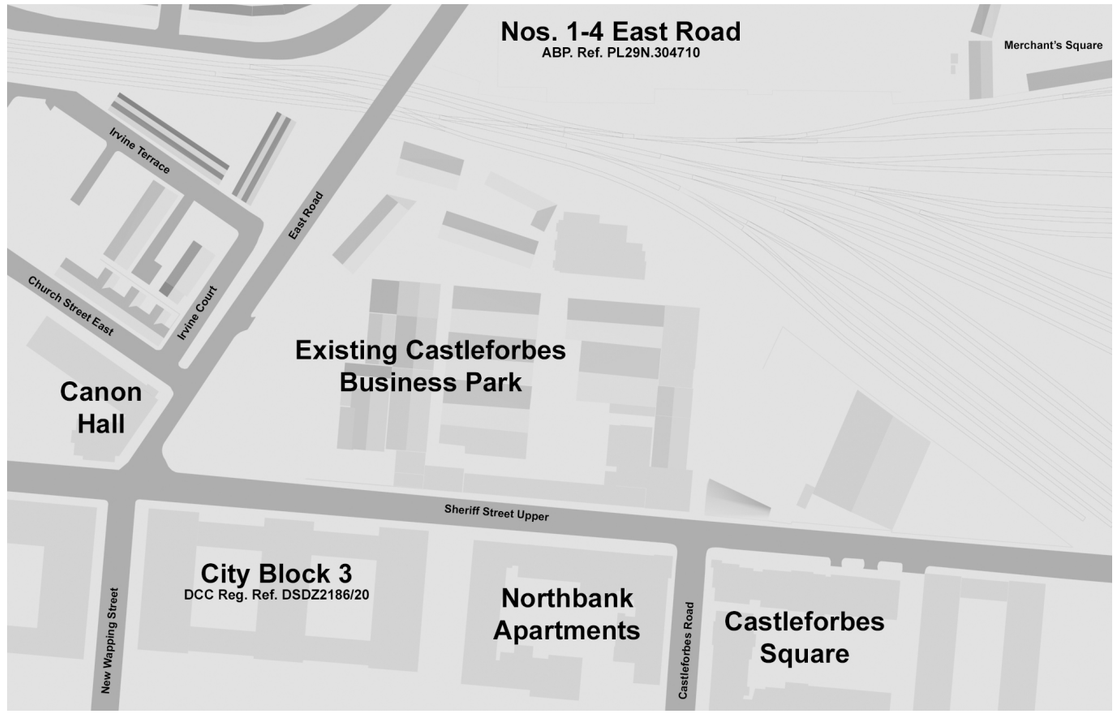

Figure 2.0: Overview diagram showing the existing Castleforbes Business Park in the context of surrounding streets and developments

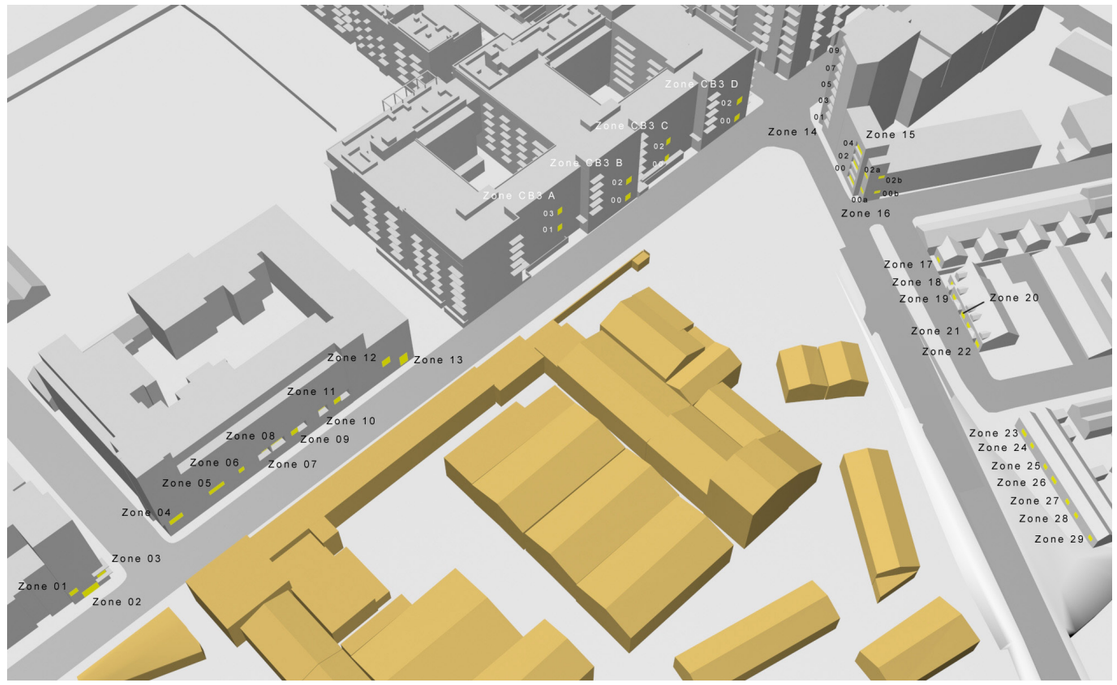

Figure 2.1: Indicative diagram showing location of sample rooms and windows assessed as part of this analysis. [Please note that, as it is yet to be constructed, the sample windows in the permitted City Block 3 scheme (DCC Reg. Ref. DSDZ2186/20) were assessed under Cumulative Impacts only].

1.3 Relevant Characteristics of the Proposed Development

The development will consist of the demolition of all structures on the site and the construction of a mixed use residential development set out in 9 no. blocks, ranging in height from 1 to 18 storeys, above part basement/upper ground level, to accommodate 702 no. build to rent residential units, retail/café/restaurant units, cultural building, creche and residential tenant amenity. The site will accommodate car parking spaces, bicycle parking, storage, services and plant areas. The residential buildings are arranged around a central open space (at ground level) and raised residential courtyards at upper ground level over part basement level. Ground floor level uses located onto Sheriff Street and into the central open space include a cultural building, retail/restaurant/cafe units, and tenant amenity space. Two vehicular access points are proposed along Sheriff Street, and the part basement car parking is split into two areas accordingly, accommodating bicycle parking spaces, car parking spaces, plant, storage areas and other associated facilities. The main pedestrian access is located centrally along Sheriff Street with additional access points from East Rd and from the eastern end of Sheriff Street. The application also includes for a pocket park on the corner of Sheriff Street Upper and East Rd to be provided as a temporary development prior to additional future development on this part of the site. A detailed development description is set out in the Statutory Notices.

2.0 Assessment of the Impact of the Proposed Development on Daylight Access

The BRE Guide provides that *"The quantity and quality of daylight inside a room will be impaired if obstructing buildings are large in relation to their distance away"*. Generally speaking, new development is most likely to affect daylight access in existing buildings in close proximity to the application site.

2.1 Potential Impact of the Proposed Project - Daylight Access

2.1.1 Overview of the potential impact of the proposed development on daylight access to existing buildings outside the application site

The impact of the proposed development on daylight access within existing buildings is likely to be most significant in the case of existing buildings at close proximity with windows directly opposing the application site.

The impact of the proposed development on daylight access to existing buildings (and, indeed, envisaged buildings on lands yet to be developed) to the south on Sheriff Street Upper in proximity to the application site is predicted to range from "slight" to "significant", with a potential for some "moderate" to "very significant" impacts to occur in the case of a limited number of recessed windows at Northbank Apartments. However, having regard to the pattern of development in the area and to statutory planning policy for densification for the urban area, while, under a worst case scenario, the potential impact to lands to the south may be considered to be "significant" to "very significant", the impact of the proposed development on existing buildings in proximity to the application site may be considered to be consistent with an emerging pattern of medium to high density development in the area and, therefore, "moderate" in extent.

There is also a potential for the proposed development to result in "imperceptible" to "slight" impacts on daylight access within existing buildings at East Road, Church Street East, Irvine Court and Irvine Terrace. Potential impacts on daylight access within more distant existing buildings, such as houses to the northwest at Church Road or to the north / northeast at Merchant's Square are likely to range from none to "imperceptible".

Given that the potential for development to result in impacts on daylight access diminishes with distance, it is the finding of ARC's analysis the proposed development will have no undue adverse impact on daylight access within buildings in the wider area surrounding the application site.

2.1.2 Detailed analysis of the potential impact of the proposed development on daylight access (Vertical Sky Component) to existing buildings outside the application site

This Sunlight and Daylight Access Analysis assesses the impact of the proposed development to all potential receptors surrounding the application site; - these impacts are described in Section 2.1.1 above. However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted detailed analysis of the potential for the proposed development to result in impacts on daylight access to a representative sample of sensitive receptors (i.e. rooms) in buildings in proximity to the application site (please see Figure 2.1 above).

The only Irish statutory guidance to provide advice on undertaking sunlight and daylight access impact analysis is set out in the *Advice Notes on Current Practice* prepared by the Environmental Protection Agency (2003), which accompany the *Guidelines on the Information to be Contained in Environmental Impact Statements* prepared by the Environmental Protection Agency (2002). These Advice notes state: *"Climate in an Environmental Impact Statement generally refers to the local climatological conditions or "microclimate" of an area, such as local wind flow, temperature, rainfall or solar radiation patterns ... it is important to identify receptors which may be* ***particularly sensitive*** *to climate change."* [Emphasis added.] Having regard to the Advice Notes, ARC undertook detailed quantitative analysis of those receptors particularly sensitive to changes in the daylight environment in order to provide an empirical basis for the conclusions outlined in Section 2.1.1 above.

In identifying receptors particularly sensitive to changes in the shadow environment, ARC considered two factors:

(i) ***the use of receptors (i.e. buildings) surrounding the application site***: buildings in residential use (and, particularly, habitable rooms within residences) would be considered to be sensitive to changes in the shadow environment;

(ii) ***the location of receptors relative to the application site:*** as set out in section 2.2.21 of the BRE Guide *"If any part of a new building or extension, measured in vertical section perpendicular to a main window wall of an existing building, from the centre of the* ***lowest window****, subtends to an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected."* (Emphasis added).

Given this, the receptors most sensitive to changes in the daylight environment as a result of the construction of development on the application site would be windows facing towards the proposal at low levels of accommodation in buildings in residential use in close proximity to the site (i.e. low level rooms at Sheriff Street Upper, East Road, Church Street East, Irvine Court and Irvine Terrace). Therefore, ARC identified a representative sample of rooms and windows at Sheriff Street Upper, East Road, Church Street East, Irvine Court and Irvine Terrace for detailed quantitative analysis. That representative sample of buildings includes worst case scenario receptors, including windows in existing buildings closest to proposed large or tall structures and windows at lower levels of accommodation.

In carrying out the detailed analysis of the proposed development on neighbouring existing buildings, ARC measured daylight access to existing buildings before and after the construction of the proposed development with reference to Vertical Sky Component. The Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide) defines Vertical Sky Component as the *"Ratio of that part of illuminance, at a point on a given vertical plane, that is received directly from a CIE standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the 'given vertical plane' is the outside of a window wall. The VSC* does not include reflected light, either from the ground or from other buildings".

Section 2.2.21 of the BRE Guide suggests that:

> *"If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if ...*
>
> - *the VSC measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value..."*

The BRE Guide acknowledges that application of a requirement for 27% Vertical Sky Component will not be appropriate in all contexts. At Appendix F: Setting Alternative Target Values for Skylight and Sunlight Access, it states: *"Sections 2.1, 2.2 and 2.3 give numerical target values in assessing how much light from the sky is blocked by obstructing buildings. These values are purely advisory and different targets may be used based on the special requirements of the proposed development or its location... Whatever the targets chosen for a particular development, it is important that they should be self-consistent. Table F1 can be used to ensure this."* Table F1 goes on to describe what Vertical Sky Component would correspondence to which building height to space ratio. In order to help inform interpretation of the results set out in Table 3.1, the following information may be of assistance:

- Assuming a street width of 12.5 m (e.g. 3 m wide footpath + 3.25 m lane + 3.25 m lane + 3 m wide footpath, as set out in the *Design Manual for Urban Roads and Streets*), a Vertical Sky Component of approximately 13% would occur in ground floor rooms of opposing residential buildings of approximately five storeys (approximately 15 m) in height.
- Assuming a street width of 12.5 m (e.g. 3 m wide footpath + 3.25 m lane + 3.25 m lane + 3 m wide footpath, as set out in the *Design Manual for Urban Roads and Streets*), a Vertical Sky Component of approximately 16% would occur in ground floor rooms of opposing residential buildings of approximately four storeys (approximately 12 m) in height.
- Assuming a street width of 12.5 m (e.g. 3 m wide footpath + 3.25 m lane + 3.25 m lane + 3 m wide footpath, as set out in the *Design Manual for Urban Roads and Streets*), a Vertical Sky Component of approximately 21% would occur in ground floor rooms of opposing residential buildings of approximately three storeys (approximately 9 m) in height.

In this regard, it should be noted that the BRE Guide does not set out rigid standards or limits and is preceded by the following very clear warning as to how the design advice contained therein should be used: *"The advice given here is not mandatory and* ***the guide should not be seen as an instrument of planning policy****; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design."* [Emphasis added.]

That the recommendations of the BRE Guide are not suitable for rigid application to all developments in all contexts is of particular importance in the context of national and local policies for the consolidation and densification of urban areas or when assessing applications for highly constrained sites (e.g. lands in close proximity or immediately to the south of residential lands). This is acknowledged in the Department of the Environment, Heritage and Local Government's 2009 publication *Urban Design Manual: A best practice guide; A companion document to the Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas*, which states, at page 43: *"Where design standards are to be used (such as the UK document Site Layout Planning for Daylight and Sunlight, published by the BRE), it should be acknowledged that for higher density proposals in urban areas it may not be possible to achieve the specified criteria, and standards may need to be adjusted locally to recognise the need for appropriate heights or street widths".*

Adherence to the recommendations of the BRE Guide with regard to achieving a Vertical Sky Component of 27% has been shown to lead to densities of development, which would be too low to be sustainable and would be inconsistent with the local, regional and national statutory planning policy in Ireland. Given this and given that Vertical Sky Component offers an incomplete measurement of daylight access within a room (e.g. given that it does not take into account the size and shape of the room, the size of the window relative to the size of the room or the effect of internally or externally reflected light), **the results of assessment of the impact of development on daylight access using Vertical Sky Component must be interpreted with caution.**

The results of ARC's analysis are set out in Table 2.1 below.

Table 2.1: Potential impact of the proposed development on daylight access to sample windows in existing buildings in proximity to the application site*

Zone	Location	Floor	Vertical Sky Component			
			Existing	Proposed	Change (times existing value of VSC)	Potential Impact
Zone 01	Castleforbes Square	Floor 01	37.40%	26.60%	0.71	Slight
Zone 02	Castleforbes Square	Floor 00	28.80%	19.90%	0.69	Slight to Moderate
Zone 03	Castleforbes Square	Floor 01	27.20%	15.90%	0.58	Moderate
Zone 04	Northbank Apts	Floor 01	29.00%	13.70%	0.47	Moderate to Significant
Zone 05	Northbank Apts	Floor 01	34.90%	18.30%	0.52	Moderate
Zone 06	Northbank Apts	Floor 01	35.10%	18.10%	0.52	Moderate
Zone 07	Northbank Apts	Floor 01	13.30%	3.00%	0.23	Moderate to Very Significant
Zone 08	Northbank Apts	Floor 01	13.80%	3.00%	0.22	Moderate to Very Significant
Zone 09	Northbank Apts	Floor 01	32.50%	17.30%	0.53	Moderate
Zone 10	Northbank Apts	Floor 00	12.10%	2.40%	0.20	Moderate to Very Significant
Zone 11	Northbank Apts	Floor 00	35.30%	18.00%	0.51	Moderate
Zone 12	Northbank Apts	Floor 00	36.40%	21.50%	0.59	Moderate
Zone 13	Northbank Apts	Floor 00	30.90%	19.90%	0.64	Moderate
Zone 14	Canon Hall	Floor 01	5.10%	4.30%	0.84	Imperceptible
		Floor 03	6.50%	5.70%	0.88	Imperceptible
		Floor 05	8.50%	7.90%	0.93	Imperceptible
		Floor 07	10.30%	9.90%	0.96	Imperceptible
		Floor 09	10.80%	10.50%	0.97	Imperceptible
Zone 15	Canon Hall	Floor 00	19.00%	16.60%	0.87	Imperceptible
		Floor 02	21.10%	19.00%	0.90	Imperceptible
		Floor 04	23.30%	21.60%	0.93	Imperceptible
Zone 16	Canon Hall	Floor 00a	26.80%	23.40%	0.87	Imperceptible
		Floor 00b	37.80%	35.10%	0.93	Imperceptible
		Floor 02a	28.60%	25.70%	0.90	Imperceptible
		Floor 02b	39.20%	36.60%	0.93	Imperceptible
Zone 17	Church Street East	Floor 00	25.20%	23.40%	0.93	Imperceptible
Zone 18	7 Irvine Court	Floor 00	26.10%	22.90%	0.88	Imperceptible
Zone 19	6 Irvine Court	Floor 00	30.30%	25.00%	0.83	Imperceptible to Slight
Zone 20	5 Irvine Court	Floor 00	32.20%	25.70%	0.80	Imperceptible to Slight
Zone 21	4 Irvine Court	Floor 00	30.60%	24.50%	0.80	Imperceptible to Slight

Zone	Location	Floor	Vertical Sky Component			
			Existing	Proposed	Change (times existing value of VSC)	Potential Impact
Zone 22	3 Irvine Court	Floor 00	32.50%	25.20%	0.78	Imperceptible to Slight
Zone 23	7 Irvine Terrace	Floor 00	35.90%	26.60%	0.74	Imperceptible to Slight
Zone 24	6 Irvine Terrace	Floor 00	36.00%	26.80%	0.74	Imperceptible to Slight
Zone 25	5 Irvine Terrace	Floor 00	36.10%	27.20%	0.75	Imperceptible (VSC remains above 27%)
Zone 26	4 Irvine Terrace	Floor 00	36.10%	27.30%	0.76	Imperceptible (VSC remains above 27%)
Zone 27	3 Irvine Terrace	Floor 00	36.20%	27.60%	0.76	Imperceptible (VSC remains above 27%)
Zone 28	2 Irvine Terrace	Floor 00	32.50%	25.00%	0.77	Imperceptible to Slight
Zone 29	1 Irvine Terrace	Floor 00	32.50%	25.40%	0.78	Imperceptible to Slight

* Survey information of all structures on private lands surrounding the application site was not available. Where insufficient survey information was available and window sizes / locations could not be informed by information available from the Dublin City Council online planning register or from aerial photography, window sizes / locations were estimated by ARC.

2.2 *Cumulative Impacts - Daylight Access*

This section is included for consistency with the Chapter 15 of the submitted Environmental Impact Assessment Report, which requires assessment of the whether a proposed development may, in combination with the effects of other projects, result in cumulative impacts.

A review of the Dublin City Council online planning register identified the following developments for which permission has been granted, which, in combination with the development now proposed, have the potential to result in material cumulative impacts on daylight access to the area surrounding the application site, within the meaning of *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide):

- The permitted development of a commercial office building (6 to 9 storeys) and a 270 bedroom hotel (7 to 10 storeys) on lands adjoining the application site to the east at Sheriff Street Upper (DCC Reg. Ref. 3433/19);
- The permitted development of a 219 bedroom hotel, ranging in height from 6 to 9 storeys adjoining the application site to the west at Sheriff Street Upper (DCC Reg. Ref. 2143/20);
- The permitted residential development of 9 no. blocks, ranging in height from 3 to 15 storeys on lands at Nos. 1-4 East Road to the north of the application site (ABP Ref. PL29N.304710); and
- To the south of the site, at City Block 3, the permitted residential development ranging in height from two to seven storeys (DCC Reg. Ref. DSDZ2186/20).

As part of this assessment, ARC has assessed the potential for the proposed development, in combination with these permitted developments, to result in cumulative impacts on daylight access within existing buildings surrounding the application site.

2.2.1 *Overview of the potential cumulative impact of the proposed development, in combination with nearby permitted developments, on daylight access to existing buildings outside the application site*

ARC's analysis indicates that there is a potential for the proposed development, in combination with nearby permitted developments (i.e. as permitted under DCC Reg. Ref. 3433/19, DCC Reg. Ref. 2143/20, ABP Ref. PL29N.304710 and DCC Reg. Ref. DSDZ2186/20) to result in cumulative impacts on daylight access within existing buildings additional to those already described in Section 2.1.1 above.

While there is little potential for the proposed development, in combination with nearby permitted developments, to result in material impacts on daylight access within the Northbank Apartments, the proposed development has the potential to result in a greater reduction in daylight access in north-facing apartments at Sheriff Street Upper to the southeast (e.g. Castleforbes Square) and to the southwest (e.g. in the case of future development on lands at City Block 3/Cooper's Cross) than as described at Section 2.1.1 above. Cumulative impacts on daylight access, additional to those described at Section 2.1.1 above, are also likely to occur to the west of the site at East Road (e.g. East Road, Church Street East, Irvine Court and Irvine Terrace).

The potential cumulative impact of the proposed development, in combination with developments permitted under DCC Reg. Ref. 3433/19, DCC Reg. Ref. 2143/20, ABP Ref. PL29N.304710 and DCC Reg. Ref. DSDZ2186/20, on daylight access to existing buildings (and, indeed, envisaged buildings on lands yet to be developed) to the south of the application site at Sheriff Street Upper in proximity to the application site is predicted to range from "slight" to "significant", with a potential for some "moderate" to "very significant" impacts to occur in the case of a limited number of recessed windows at Northbank Apartments. To the west, the potential cumulative impact of the proposed development on daylight access in existing buildings at East Road, Church Street East, Irvine Court and Irvine Terrace is likely to range "imperceptible" to "moderate" to "significant". However, having regard to the pattern of development in the area and to statutory planning policy for densification for the urban area, while, under a worst case scenario, the predicted cumulative impact on existing buildings lands to the south and west may be considered to be "significant" to "very significant", the impact of the proposed development on existing buildings in proximity to the application site may be considered to be consistent with an emerging pattern of medium to high density development in the area and, therefore, "moderate" in extent.

Potential cumulative impacts on daylight access within more distant existing buildings, such as houses to the northwest at Church Road or to the north / northeast at Merchant's Square are likely to range from none to "imperceptible" to "moderate".

Given that the potential for development to result in impacts on daylight access diminishes with distance, it is the finding of ARC's analysis the proposed development will have no undue adverse impact on daylight access within buildings in the wider area surrounding the application site.

2.2.2 *Detailed analysis of the potential cumulative impact of the proposed development, in combination with nearby permitted developments, on daylight access within existing buildings outside the application site*

This Sunlight and Daylight Access Analysis assesses the impact of the proposed development to all potential receptors surrounding the application site; - these impacts are described in Section 2.2.1 above. However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted detailed analysis of the potential for the proposed development, in combination with nearby permitted developments, to result in impacts on daylight access to a representative sample of sensitive receptors (i.e. rooms) in buildings in proximity to the application site (please see Figure 2.1 above). The representative sample of buildings includes worst case scenario examples, such as rooms at close proximity to the proposed development and rooms at low levels of accommodation. The results of ARC's analysis are set out in Table 2.2 below:

Table 2.2: Potential cumulative impact of the proposed development on daylight access to sample windows in existing buildings in proximity to the application site*

Zone	Floor	Vertical Sky Component				
		Existing	Existing incl. Proposed	Cumulative Proposed	Change from Existing to Cumulative Proposed (times existing value of VSC)	Potential Overall Cumulative Impact
Zone 01	Floor 01	37.40%	27.60%	17.50%	0.47	Moderate to Significant
Zone 02	Floor 00	28.80%	22.70%	12.80%	0.44	Moderate to Significant
Zone 03	Floor 01	27.20%	20.30%	8.90%	0.33	Moderate to Significant
Zone 04	Floor 01	29.00%	25.90%	11.60%	0.40	Moderate to Significant
Zone 05	Floor 01	34.90%	32.80%	17.40%	0.50	Moderate
Zone 06	Floor 01	35.10%	33.60%	17.60%	0.50	Moderate
Zone 07	Floor 01	13.30%	13.00%	3.00%	0.23	Moderate to Very Significant
Zone 08	Floor 01	13.80%	13.60%	3.00%	0.22	Moderate to Very Significant
Zone 09	Floor 01	32.50%	34.10%	17.10%	0.53	Moderate
Zone 10	Floor 00	12.10%	12.00%	2.40%	0.20	Moderate to Very Significant
Zone 11	Floor 00	35.30%	34.20%	17.90%	0.51	Moderate
Zone 12	Floor 00	36.40%	35.30%	21.30%	0.59	Moderate
Zone 13	Floor 00	30.90%	29.80%	19.80%	0.64	Moderate
Zone 14	Floor 01	5.10%	3.30%	3.30%	0.65	Moderate
	Floor 03	6.50%	4.60%	4.60%	0.71	Slight
	Floor 05	8.50%	7.00%	7.00%	0.82	Imperceptible to Slight
	Floor 07	10.30%	9.40%	9.30%	0.90	Imperceptible
	Floor 09	10.80%	10.50%	10.40%	0.96	Imperceptible
Zone 15	Floor 00	19.00%	7.90%	7.80%	0.41	Moderate to Significant
	Floor 02	21.10%	10.70%	10.60%	0.50	Moderate
	Floor 04	23.30%	14.90%	14.70%	0.63	Moderate
Zone 16	Floor 00a	26.80%	12.30%	12.00%	0.45	Moderate to Significant
	Floor 00b	37.80%	33.90%	33.10%	0.88	Imperceptible
	Floor 02a	28.60%	15.80%	15.40%	0.54	Moderate
	Floor 02b	39.20%	36.00%	35.00%	0.89	Imperceptible
Zone 17	Floor 00	25.20%	20.00%	18.90%	0.75	Slight
Zone 18	Floor 00	26.10%	17.30%	16.70%	0.64	Moderate
Zone 19	Floor 00	30.30%	21.30%	18.60%	0.61	Moderate
Zone 20	Floor 00	32.20%	25.60%	20.90%	0.65	Moderate
Zone 21	Floor 00	30.60%	23.80%	19.70%	0.64	Moderate
Zone 22	Floor 00	32.50%	27.90%	21.80%	0.67	Moderate
Zone 23	Floor 00	35.90%	33.90%	25.30%	0.70	Slight
Zone 24	Floor 00	36.00%	34.20%	25.80%	0.72	Slight
Zone 25	Floor 00	36.10%	34.60%	26.40%	0.73	Imperceptible to Slight
Zone 26	Floor 00	36.10%	34.80%	26.70%	0.74	Imperceptible to Slight
Zone 27	Floor 00	36.20%	35.10%	23.00%	0.64	Moderate
Zone 28	Floor 00	32.50%	31.60%	24.70%	0.76	Slight
Zone 29	Floor 00	32.50%	31.80%	25.10%	0.77	Slight
Zone CB3 A	Floor 01	36.00%	30.20%	17.90%	0.50	Moderate
	Floor 03	38.00%	33.80%	24.60%	0.65	Moderate
Zone CB3 B	Floor 00	36.50%	23.80%	14.20%	0.39	Moderate to Significant
	Floor 02	38.10%	27.40%	19.40%	0.51	Moderate
Zone CB3 C	Floor 00	34.40%	18.80%	15.50%	0.45	Moderate to Significant
	Floor 02	36.30%	27.10%	20.60%	0.57	Moderate
Zone CB3 D	Floor 00	28.00%	19.60%	19.30%	0.69	Slight to Moderate
	Floor 02	30.60%	23.80%	23.50%	0.77	Slight

* Survey information of all structures on private lands surrounding the application site was not available. Where insufficient survey information was available and window sizes / locations could not be informed by information available from the Dublin City Council online planning register or from aerial photography, window sizes / locations were estimated by ARC.

3.0 Assessment of the Impact of the Proposed Development on Sunlight Access

The statistics of Met Eireann, the Irish Meteorological Service, indicate that the sunniest months in Ireland are May and June. During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.4 hours sunlight each day (i.e., only 22% of potential sunlight hours). This can be compared with a mean daily duration of 6.4 hours of sunlight out of a potential 16.7 hours each day received by Dublin during June (i.e., 38% of potential sunlight hours). Therefore, impacts caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months. Due to the low angle of the sun in mid winter, the shadow environment in all urban and suburban areas is generally dense throughout winter.

In assessing the impact of a development on sunlight access, the comments of PJ Littlefair in *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide) should be taken into consideration. The BRE Guide states that *"it must be borne in mind that nearly all structures will create areas of new shadow, and some degree of transient overshadowing of a space is to be expected."*

3.1 Potential Impact of the Proposed Project - Sunlight Access

3.1.1 Overview of the potential impact of shadows cast by the proposed development outside the application site

Given that the application site accommodates low rise development, it is envisaged that the impact of shadows cast by the proposed development will result in a considerable change in the existing shadow environment of the surrounding area. In this regard, it is noted that the shadow environment of the wider area is undergoing a process of considerable change as developments permitted under the North Lotts and Grand Canal Dock SDZ Planning Scheme are constructed to the south and as other vacant and underutilised brownfield lands are being development in line with local, regional and national planning policy for the densification of the urban area.

Shadows cast by the proposed development are likely to extend to the west to East Road and beyond to Church Street East, Irvine Court, Irvine Terrace and Church Road during the mornings throughout the year. The potential impact of the proposed development on these lands to the west is assessed as ranging from "imperceptible" to "moderate", being impacts consistent with emerging trends for development in the area.

To the north, shadows cast by the proposed development have the potential to extend across the railway and to result in "imperceptible" to "moderate" impacts on lands at Nos. 1-4 East Road during the afternoons and the existing residential estate at Merchant's Square to the northeast during the late evenings.

The potential impact of the proposed development on sunlight access to lands to the northeast is likely to range from "imperceptible" to "significant", although it is noted that these lands are in railway use serving Dublin Port.

North-facing rooms in existing buildings to the south, such as those at Castleforbes Square and the Northbank Apartments, receive little sunlight at present and would not have a reasonable expectation within the meaning of the BRE Guide (i.e. do not face within 90°of due south). This will also be the case for any windows facing on to Sheriff Street Upper in whatever development is constructed on the balance of the City Block 3 lands. However, it should be noted that shadows cast by the proposed development have the potential to result in "imperceptible" to "significant" changes in sunlight access to these windows during the early mornings and the late evenings of the summer months (e.g. May, June and July). While, under a worst case scenario, the potential impact to lands to the west may be considered to be "significant", having regard to the scale of development permitted or constructed in the wider area and to local, regional and national planning policy for densification of the urban area, some may consider the impact to be consistent with emerging trends for development in the area or "moderate" in extent, particularly having regard to the scale of development already permitted outside the Strategic Development Zone area.

3.1.2 Detailed analysis of the potential impact of shadows cast by the proposed development on existing buildings outside the application site

This Sunlight and Daylight Access Analysis assesses the impact of the proposed development to all potential receptors surrounding the application site - these impacts are described in Section 3.1.1 above. However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted detailed analysis of the potential for the proposed development to result in impacts on sunlight access to a representative sample of sensitive receptors (i.e. windows) in buildings in proximity to the application site (please see Figure 2.1).

The only Irish statutory guidance to provide advice on undertaking sunlight and daylight access impact analysis is set out in the *Advice Notes on Current Practice* prepared by the Environmental Protection Agency (2003), which accompany the *Guidelines on the Information to be Contained in Environmental Impact Statements* prepared by the Environmental Protection Agency (2002). These Advice notes state: *"Climate in an Environmental Impact Statement generally refers to the local climatological conditions or "microclimate" of an area, such as local wind flow, temperature, rainfall or solar radiation patterns ... it is important to identify receptors which may be* ***particularly sensitive*** *to climate change."* [Emphasis added.] Having regard to the Advice Notes, ARC undertook detailed quantitative analysis of those receptors particularly sensitive to changes in the sunlight environment in order to illustrate the empirical basis for the conclusions outlined in Section 3.1 above.

In identifying receptors particularly sensitive to changes in the shadow environment, ARC considered two factors:

(i) ***the use of receptors (i.e. buildings) surrounding the application site***: buildings in residential use (and, particularly, the living rooms of residences) would be considered to be sensitive to changes in the shadow environment;

(ii) ***the location of receptors relative to the application site:*** as set out in section 3.2.2 of the BRE Guide *"obstruction to sunlight may become an issue if some part of a new development is situated within 90° of due south of a main windows wall of an existing building"* and if *"in the section drawn perpendicular to this existing window wall, the new development subtends an angle greater than 25° to the horizontal measured from the centre of the* ***lowest window*** *to a main living room"* (Emphasis added).

Given this, the receptors most sensitive to changes in the daylight environment as a result of the construction of development on the application site would be low level windows to the west, north and east of the proposal in buildings in residential use, which face within 90° of due south and which are in close proximity to the site (i.e. low level rooms on East Road, Church Street East, Irvine Court and Irvine Terrace). Therefore, ARC identified a representative sample of rooms and windows at East Road, Church Street East, Irvine Court and Irvine Terrace for detailed quantitative analysis. While the BRE Guide does not identify a need to analyse windows in existing buildings facing within 90° of due north, ARC also assessed the potential for shadows cast by the proposed development to affect sunlight access to sample windows facing north, such as those in buildings to the south of the site on Strand Street Little. That representative sample of buildings includes worst case scenario receptors, including windows in existing buildings closest to proposed large or tall structures and windows at lower levels of accommodation.

Section 3.2.1 of the *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide) provides as follows in relation to the assessment of the impact of development on sunlight access to existing buildings.

> *"If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:*
> - *receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March* ***and***
> - *receives less than 0.8 times its former sunlight hours during either period* ***and***
> - *has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours."* [Emphasis added]

This excerpt from the BRE Guide suggests that where the construction of a new development has the potential to reduce sunlight access values below the recommended annual level, to less than 0.8 times the former level of sunlight access or by more than 4% APSH during the relevant periods, the potential impact of that proposed development will not be noticed. However, in the interests of presenting a worst case scenario for the purposes of this assessment, some impacts identified as falling into "imperceptible" ranges under the BRE Guide have been classified as either "imperceptible" to "slight" or "imperceptible" to "moderate" having regard to a range of factors including the extent of sunlight access previously available to the studied window and the extent of potential reduction in sunlight access to the studied windows after the construction of the proposed development.

It should further be noted that the BRE Guide does not outline a recommended level of sunlight access to be achieved by windows facing within 90° of due north (such as those facing towards the application site on Sheriff Street Upper). The BRE Guide also does not describe a threshold for adverse impact on such windows. Notwithstanding this, in the interests of completeness, this chapter includes detailed quantitative analysis of the potential impact of the proposed development on sample north-facing windows at Sheriff Street Upper with reference to the tests outlined for windows facing within 90° of due south.

The results of ARC's analysis are outlined in Table 3.1 below.

*Table 3.1: Potential impact of the proposed development on sunlight access to sample windows** in existing buildings in proximity to the application site*

Zone	Floor	Annual Probable Sunlight Hours						Potential Impact
		Existing			Proposed			
		Annual	Summer*	Winter*	Annual	Summer*	Winter*	
1	Floor 01	12%	12%	0%	10%	10%	0%	Imperceptible to Slight
2	Floor 00	8%	8%	0%	7%	7%	0%	Imperceptible to Slight
3	Floor 01	11%	11%	0%	9%	9%	0%	Imperceptible to Slight
4	Floor 01	11%	11%	0%	9%	9%	0%	Imperceptible to Slight
5	Floor 01	11%	11%	0%	9%	9%	0%	Imperceptible to Slight
6	Floor 01	11%	11%	0%	8%	8%	0%	Imperceptible to Moderate
7	Floor 01	0%	0%	0%	0%	0%	0%	None
8	Floor 01	0%	0%	0%	0%	0%	0%	None
9	Floor 01	10%	10%	0%	7%	7%	0%	Imperceptible to Moderate
10	Floor 00	0%	0%	0%	0%	0%	0%	None
11	Floor 00	11%	11%	0%	6%	6%	0%	Moderate to Significant
12	Floor 00	12%	12%	0%	6%	6%	0%	Moderate to Significant
13	Floor 00	10%	10%	0%	5%	5%	0%	Moderate to Significant
14	Floor 01	10%	6%	4%	8%	4%	4%	Imperceptible to Slight
	Floor 03	10%	6%	4%	9%	5%	4%	Imperceptible
	Floor 05	17%	7%	10%	17%	7%	10%	None
	Floor 07	21%	7%	14%	21%	7%	14%	None
	Floor 09	21%	7%	14%	21%	7%	14%	None
15	Floor 00	43%	35%	8%	38%	30%	8%	Imperceptible
	Floor 02	46%	35%	11%	41%	30%	11%	Imperceptible
	Floor 04	51%	35%	16%	47%	32%	15%	Imperceptible
16	Floor 00 A	35%	31%	4%	29%	26%	4%	Imperceptible to Slight
	Floor 00 B	19%	18%	1%	13%	13%	0%	Slight to Moderate
	Floor 02 A	37%	31%	6%	31%	26%	6%	Imperceptible to Slight
	Floor 02 B	20%	19%	1%	15%	14%	1%	Slight to Moderate
17	Floor 00	35%	32%	3%	34%	31%	3%	Imperceptible to Slight
18	Floor 00	53%	38%	15%	51%	38%	13%	Imperceptible
19	Floor 00	60%	44%	16%	49%	36%	13%	Imperceptible to Moderate
20	Floor 00	55%	45%	10%	43%	36%	7%	Imperceptible to Moderate
21	Floor 00	61%	43%	18%	51%	36%	15%	Imperceptible to Moderate
22	Floor 00	56%	46%	10%	43%	36%	7%	Imperceptible to Moderate
23	Floor 00	62%	45%	17%	49%	38%	11%	Imperceptible to Moderate
24	Floor 00	64%	46%	18%	52%	40%	12%	Imperceptible to Moderate
25	Floor 00	64%	46%	18%	51%	40%	11%	Imperceptible to Moderate
26	Floor 00	64%	46%	18%	52%	41%	11%	Imperceptible to Moderate
27	Floor 00	65%	63%	2%	52%	41%	11%	Imperceptible to Moderate
28	Floor 00	65%	46%	19%	53%	42%	11%	Imperceptible to Moderate
29	Floor 00	65%	46%	19%	52%	42%	10%	Imperceptible to Moderate

* For the purposes of this calculation, summer is taken to mean the period between March and September, and winter is considered to be the period between September and March.

** Survey information of all structures on private lands surrounding the application site was not available. Where insufficient survey information was available and window sizes / locations could not be informed by information available from the Dublin City Council online planning register or from aerial photography, window sizes / locations were estimated by ARC.

3.2 *Cumulative Impacts - Sunlight Access*

This section is included for consistency with the Chapter 15 of the submitted Environmental Impact Assessment Report, which requires assessment of the whether a proposed development may, in combination with the effects of other projects, result in cumulative impacts.

A review of the Dublin City Council online planning register identified the following developments for which permission has been granted, which, in combination with the development now proposed, have the potential to result in material cumulative impacts on sunlight access to the area surrounding the application site, within the meaning of *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide):

- The permitted development of a commercial office building (6 to 9 storeys) and a 270 bedroom hotel (7 to 10 storeys) on lands adjoining the application site to the east at Sheriff Street Upper (DCC Reg. Ref. 3433/19);
- The permitted development of a 219 bedroom hotel, ranging in height from 6 to 9 storeys adjoining the application site to the west at Sheriff Street Upper (DCC Reg. Ref. 2143/20);
- The permitted residential development of 9 no. blocks, ranging in height from 3 to 15 storeys on lands at Nos. 1-4 East Road to the north of the application site (ABP Ref. PL29N.304710); and
- To the south of the site, at City Block 3, the permitted residential development ranging in height from two to seven storeys (DCC Reg. Ref. DSDZ2186/20).

As part of this assessment, ARC has assessed the potential for the proposed development, in combination with these permitted developments, to result in cumulative impacts on sunlight access within existing buildings surrounding the application site.

3.2.1 *Overview of the potential cumulative impact of the proposed development, in combination with nearby permitted developments, on sunlight access to the surrounding area*

ARC's analysis indicates that there is a potential for the proposed development, in combination with nearby permitted developments (i.e. as permitted under DCC Reg. Ref. 3433/19, DCC Reg. Ref. 2143/20, ABP Ref. PL29N.304710 and DCC Reg. Ref. DSDZ2186/20) to result in cumulative impacts on sunlight access to the surrounding area additional to those already described in Section 3.1.1 above.

Specifically, the proposed development has the potential to result in a greater reduction in sunlight access in north-facing apartments at Sheriff Street Upper to the southeast (e.g. Castleforbes Square) and to the southwest (e.g. in the case of future development on lands at City Block 3/Cooper's Cross) than as described at Section 3.1.1 above. Cumulative impacts on daylight access, additional to those described at Section 3.1.1 above, are also likely to occur to the west of the site at East Road (e.g. East Road, Church Street East, Irvine Court and Irvine Terrace).

The potential cumulative impact of the proposed development, in combination with developments permitted under DCC Reg. Ref. 3433/19, DCC Reg. Ref. 2143/20, ABP Ref. PL29N.304710 and DCC Reg. Ref. DSDZ2186/20, on sunlight access to lands in proximity to the application site at Sheriff Street Upper, East Road, Church Street East, Irvine Court and Irvine Terrace is likely to range from "imperceptible" to "significant". While, under a worst case scenario, the potential cumulative impacts on these lands may be considered to be "significant", having regard to the scale of development permitted or constructed in the wider area and to local, regional and national planning policy for densification of the urban area, some may consider the impact to be consistent with emerging trends for development in the area or "moderate" in extent, particularly having regard to the scale of development already permitted outside the Strategic Development Zone area (e.g. at Canon Hall and at Nos. 1-4 East Road).

Potential cumulative impacts on daylight access to more distant lands to the north, such as houses to the northwest at Church Road or to the north / northeast at Merchant's Square are likely to range from none to "imperceptible" to "moderate".

The potential cumulative impact of the proposed development, in combination with nearby permitted development, on sunlight access to lands to the northeast is likely to range from "imperceptible" to "significant", although it is noted that these lands are in railway use serving Dublin Port.

3.2.2 *Detailed analysis of the potential cumulative impact of the proposed development, in combination with nearby permitted developments, on sunlight access within existing buildings outside the application site*

This analysis assesses the potential impact of the proposed development on all potential receptors surrounding the application site - these impacts are described in the section above. However, by way of example in order to illustrate briefly the findings outlined in the overview section, ARC conducted detailed analysis of the potential for the proposed development, in combination with nearby permitted developments, to result in impacts on sunlight access to a representative sample of sensitive receptors (i.e. rooms) in buildings in proximity to the application site (please see Figure 2.1 above). The representative sample of buildings includes worst case scenario examples, such as rooms at close proximity to the proposed development and rooms at low levels of accommodation.

The results of ARC's analysis are set out in Table 3.2 below:

*Table 3.2: Potential cumulative impact of the proposed development on sunlight access to sample windows** in existing buildings in proximity to the application site*

Zone	Floor	Annual Probable Sunlight Hours									Potential Impact
		Existing			Existing incl. Permitted			Cumulative Proposed			
		Annual	Summer*	Winter*	Annual	Summer*	Winter*	Annual	Summer*	Winter*	
1	Floor 01	12%	12%	0%	7%	7%	0%	5%	5%	0%	Moderate to Significant
2	Floor 00	8%	8%	0%	6%	6%	0%	5%	5%	0%	Moderate
3	Floor 01	11%	11%	0%	6%	6%	0%	4%	4%	0%	Moderate to Significant
4	Floor 01	11%	11%	0%	5%	5%	0%	4%	4%	0%	Moderate to Significant
5	Floor 01	11%	11%	0%	6%	6%	0%	5%	5%	0%	Moderate to Significant
6	Floor 01	11%	11%	0%	6%	6%	0%	5%	5%	0%	Moderate to Significant
7	Floor 01	0%	0%	0%	0%	0%	0%	0%	0%	0%	Moderate to Significant
8	Floor 01	0%	0%	0%	0%	0%	0%	0%	0%	0%	None
9	Floor 01	10%	10%	0%	5%	5%	0%	5%	5%	0%	Moderate to Significant
10	Floor 00	0%	0%	0%	0%	0%	0%	0%	0%	0%	None
11	Floor 00	11%	11%	0%	5%	5%	0%	5%	5%	0%	Moderate to Significant
12	Floor 00	12%	12%	0%	5%	5%	0%	5%	5%	0%	Moderate to Significant
13	Floor 00	10%	10%	0%	5%	5%	0%	5%	5%	0%	Moderate to Significant
14	Floor 01	10%	6%	4%	7%	3%	4%	7%	3%	4%	Slight to Moderate
	Floor 03	10%	6%	4%	7%	3%	4%	7%	3%	4%	Slight to Moderate
	Floor 05	17%	7%	10%	14%	4%	10%	14%	4%	10%	Imperceptible to Slight
	Floor 07	21%	7%	14%	20%	6%	14%	20%	6%	14%	Imperceptible
	Floor 09	21%	7%	14%	21%	7%	14%	21%	7%	14%	None
15	Floor 00	43%	35%	8%	18%	12%	6%	18%	12%	6%	Moderate to Significant
	Floor 02	46%	35%	11%	25%	17%	8%	25%	17%	8%	Moderate
	Floor 04	51%	35%	16%	35%	25%	11%	35%	25%	11%	Imperceptible to Moderate

Zone	Floor	Annual Probable Sunlight Hours									Potential Impact
		Existing			Existing incl. Permitted			Cumulative Proposed			
		Annual	Summer*	Winter*	Annual	Summer*	Winter*	Annual	Summer*	Winter*	
16	Floor 00 A	35%	31%	4%	6%	5%	1%	6%	5%	1%	Moderate to Very Significant
	Floor 00 B	19%	18%	1%	4%	4%	0%	3%	3%	0%	Moderate to Very Significant
	Floor 02 A	37%	31%	6%	15%	14%	1%	15%	14%	1%	Moderate to Significant
	Floor 02 B	20%	19%	1%	7%	7%	0%	6%	6%	0%	Moderate to Significant
17	Floor 00	35%	32%	3%	30%	30%	0%	29%	29%	0%	Imperceptible to Moderate
18	Floor 00	53%	38%	15%	40%	34%	6%	40%	34%	6%	Imperceptible to Moderate
19	Floor 00	60%	44%	16%	47%	41%	6%	40%	34%	6%	Imperceptible to Moderate
20	Floor 00	55%	45%	10%	44%	43%	1%	35%	34%	1%	Imperceptible to Significant
21	Floor 00	61%	43%	18%	50%	42%	8%	42%	35%	7%	Imperceptible to Moderate
22	Floor 00	56%	46%	10%	49%	46%	3%	38%	36%	2%	Imperceptible to Significant
23	Floor 00	62%	45%	17%	57%	45%	12%	45%	38%	7%	Imperceptible to Moderate
24	Floor 00	64%	46%	18%	60%	46%	14%	48%	40%	8%	Imperceptible to Moderate
25	Floor 00	64%	46%	18%	61%	46%	15%	49%	40%	9%	Imperceptible to Moderate
26	Floor 00	64%	46%	18%	63%	46%	17%	51%	41%	10%	Imperceptible to Moderate
27	Floor 00	65%	63%	2%	64%	46%	18%	51%	41%	10%	Imperceptible to Moderate
28	Floor 00	65%	46%	19%	64%	46%	18%	52%	42%	10%	Imperceptible to Moderate
29	Floor 00	65%	46%	19%	64%	46%	18%	51%	42%	9%	Imperceptible to Moderate
CB3 1a	Floor 01	5%	5%	0%	4%	4%	0%	1%	1%	0%	Slight to Significant
	Floor 03	5%	5%	0%	4%	4%	0%	3%	3%	0%	Imperceptible to Moderate
CB3 1b	Floor 00	9%	9%	0%	8%	8%	0%	5%	5%	0%	Slight to Moderate
	Floor 02	9%	9%	0%	8%	8%	0%	5%	5%	0%	Slight to Moderate
CB3 1c	Floor 00	4%	4%	0%	4%	4%	0%	1%	1%	0%	Slight to Significant
	Floor 02	5%	5%	0%	5%	5%	0%	2%	2%	0%	Slight to Significant
CB3 1d	Floor 00	9%	9%	0%	8%	8%	0%	5%	5%	0%	Slight to Moderate
	Floor 02	10%	10%	0%	9%	9%	0%	7%	7%	0%	Slight to Moderate

* For the purposes of this calculation, summer is taken to mean the period between March and September, and winter is considered to be the period between September and March.

** Survey information of all structures on private lands surrounding the application site was not available. Where insufficient survey information was available and window sizes / locations could not be informed by information available from the Dublin City Council online planning register or from aerial photography, window sizes / locations were estimated by ARC.

Figure 4.1: Indicative diagram showing location of sample rooms on Floor 00 analysed as part of this assessment of daylight access within the proposed development

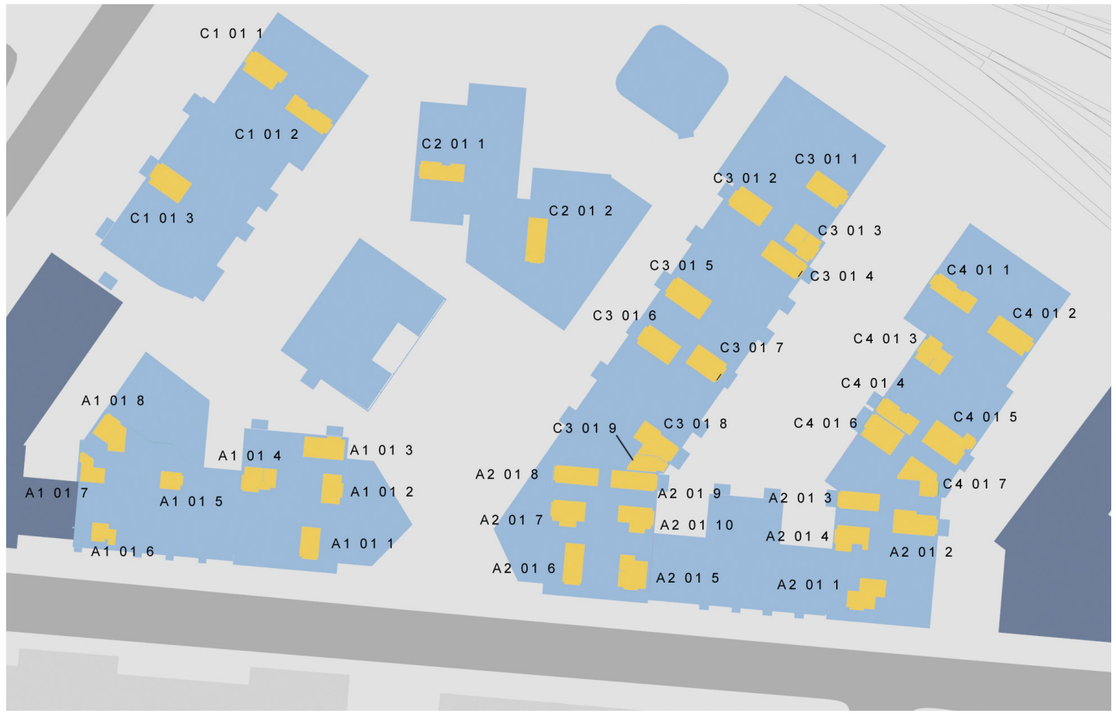

Figure 4.2: Indicative diagram showing location of sample rooms on Floor 01 analysed as part of this assessment of daylight access within the proposed development

4.0 Assessment of Daylight Access within the Proposed Development

The *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* provide that *"planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2: 2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision."* Given this, the standards for daylight access in buildings (and the methodologies for assessment of same) suggested in these documents have been referenced in this report.

The BRE Guide states as follows (at paragraph 2.1.8) in relation to daylight access within new development:

> *"2.1.8 Daylight provision in new rooms may be checked using the average daylight factor (ADF). The ADF is a measure of the overall amount of daylight in a space... BS 8206-2 Code of practice for daylighting, recommends an ADF of 5% for a well daylit space and 2% for a partly daylit space. Below 2% the room will look dull and electric lighting is likely to be turned on. In housing BS 8206-2 also gives minimum value of ADF of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms."*

The British Standard, BS 8206-2[1], goes on to state, at Section 5.6, that *"Where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen the minimum average daylight factor should be 2%."*

As part of this *Assessment of Sunlight & Daylight Access within the Proposed Development,* ARC undertook an assessment of the likely daylight access within the proposed residential units. For the purpose of this analysis, ARC undertook detailed quantitative analysis of a number of sample within the proposed development to illustrate the empirical basis for the conclusions outlined below. In identifying an appropriate sample for analysis, ARC had regard to the BRE Guide, which recommends analysing rooms at the lowest levels of accommodation in new development, these rooms being the most likely to be obstructed from daylight access. Of the rooms proposed on the lower floors, ARC's assessment placed an emphasis on the analysis of single window, living spaces (given that living spaces with more than one window would typically receive more daylight access), although the analysis also includes a number of sample studio units and bedrooms. An emphasis was also placed on analysis of rooms likely to receive lower levels of daylight (e.g. rooms with the potential to receive lower levels of daylight access due to their location within the proposed development and/or due to their layout and fenestration). As such, the sample chosen for analysis includes worst case scenario rooms. For more detail on the methodology used in assessing daylight access, please refer to the Technical Appendix of this Report.

A total of 61 no. rooms on Floors 00 and 01 of the proposed development were analysed (i.e. rooms in 58 no. units of the total 111 no. units on Floors 00 and 01). These 61 no. rooms include 4 no. bedrooms, 11 no. studios, 3 no. kitchen / dining rooms and 43 no. kitchen / living / dining rooms. The locations of the sample study rooms analysed as part of this analysis of daylight access within residences within the proposed development are illustrated at Figures 4.1 and 4.2. The results of ARC's analysis of likely daylight access within the proposed development are set out in Table 4.1 below:

1 It is noted that *BS 8206-2:2008: Lighting for buildings - Part 2: Code of practice for daylighting* was recently replaced with IS EN 17037:2018 Daylight in Buildings. However, given that the *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* refer to the BS 8206-2:2008 and not to IS EN 17037:2018, BS 8206:2008, as quoted in the BRE Guide, has been referenced in the preparation of this report.

Table 4.1: Predicted daylight access to sample rooms within the proposed development

Location	Floor	Room Type	Predicted Average Daylight Factor	Achieves recommended minimum?
Block A1 13				
Zone A1 00 1	Floor 00	Kitchen / living / dining room	2.76%	Yes
Zone A1 00 2	Floor 00	Kitchen / living / dining room	3.68%	Yes
Zone A1 00 3	Floor 00	Kitchen / living / dining room	3.97%	Yes
Zone A1 00 4	Floor 00	Kitchen / living / dining room	3.61%	Yes
Zone A1 00 5	Floor 00	Kitchen / living / dining room	2.32%	Yes
Zone A1 01 1	Floor 01	Kitchen / living / dining room	3.57%	Yes
Zone A1 01 2	Floor 01	Kitchen / living / dining room	3.05%	Yes
Zone A1 01 3	Floor 01	Kitchen / living / dining room	2.95%	Yes
Zone A1 01 4	Floor 01	Studio	4.23%	Yes
Zone A1 01 5	Floor 01	Bedroom	4.10%	Yes
Zone A1 01 6	Floor 01	Bedroom	4.96%	Yes
Zone A1 01 7	Floor 01	Bedroom	2.94%	Yes
Zone A1 01 8	Floor 01	Kitchen / living / dining room	3.87%	Yes
Block A2 17				
Zone A2 00 1	Floor 00	Kitchen / living / dining room	3.79%	Yes
Zone A2 00 2	Floor 00	Studio	2.24%	Yes
Zone A2 00 3	Floor 00	Kitchen / living / dining room	1.98%	No
Zone A2 00 4	Floor 00	Kitchen / living / dining room	3.64%	Yes
Zone A2 00 5	Floor 00	Kitchen / living / dining room	3.60%	Yes
Zone A2 00 6	Floor 00	Kitchen / living / dining room	3.50%	Yes
Zone A2 00 7	Floor 00	Studio	3.54%	Yes
Zone A2 01 1	Floor 01	Kitchen / living / dining room	2.81%	Yes
Zone A2 01 2	Floor 01	Kitchen / living / dining room	1.39%	No
Zone A2 01 3	Floor 01	Living / dining room	2.60%*	Yes
Zone A2 01 4	Floor 01	Studio	1.89%	No
Zone A2 01 5	Floor 01	Studio	2.66%	Yes
Zone A2 01 6	Floor 01	Kitchen / living / dining room	1.89%	No
Zone A2 01 7	Floor 01	Studio	2.29%	Yes
Zone A2 01 8	Floor 01	Living / dining room	3.63%*	Yes
Zone A2 01 9	Floor 01	Living / dining room	2.56%*	Yes
Zone A2 01 10	Floor 01	Studio	2.00%	Yes
Block C1 8				
Zone C1 00 1	Floor 00	Kitchen / living / dining room	2.38%	Yes
Zone C1 00 2	Floor 00	Kitchen / living / dining room	3.37%	Yes
Zone C1 00 3	Floor 00	Kitchen / living / dining room	3.23%	Yes
Zone C1 00 4	Floor 00	Kitchen / living / dining room	4.25%	Yes
Zone C1 00 5	Floor 00	Kitchen / living / dining room	2.37%	Yes
Zone C1 01 1	Floor 01	Kitchen / living / dining room	3.60%	Yes
Zone C1 01 2	Floor 01	Kitchen / living / dining room	2.22%	Yes
Zone C1 01 3	Floor 01	Kitchen / living / dining room	3.36%	Yes
Block C2 2				
Zone C2 01 1	Floor 01	Kitchen / living / dining room	1.90%	No
Zone C2 01 2	Floor 01	Kitchen / living / dining room	2.04%	Yes
Block C3 12				
Zone C3 00 1	Floor 00	Kitchen / living / dining room	2.94%	Yes
Zone C3 00 2	Floor 00	Studio	3.82%	Yes
Zone C3 00 3	Floor 00	Kitchen / living / dining room	3.35%	Yes
Zone C3 01 1	Floor 01	Kitchen / living / dining room	2.86%	Yes
Zone C3 01 2	Floor 01	Kitchen / living / dining room	2.99%	Yes
Zone C3 01 3	Floor 01	Studio	3.49%	Yes
Zone C3 01 4	Floor 01	Kitchen / living / dining room	2.71%	Yes
Zone C3 01 5	Floor 01	Kitchen / living / dining room	2.93%	Yes
Zone C3 01 6	Floor 01	Kitchen / living / dining room	3.20%	Yes
Zone C3 01 7	Floor 01	Kitchen / living / dining room	3.36%	Yes
Zone C3 01 8	Floor 01	Kitchen / living / dining room	3.02%	Yes
Zone C3 01 9	Floor 01	Bedroom	1.65%	Yes
Block C4 9				
Zone C4 00 1	Floor 00	Kitchen / living / dining room	2.73%	Yes
Zone C4 00 2	Floor 00	Kitchen / living / dining room	2.30%	Yes
Zone C4 01 1	Floor 01	Kitchen / living / dining room	2.87%	Yes
Zone C4 01 2	Floor 01	Kitchen / living / dining room	2.48%	Yes
Zone C4 01 3	Floor 01	Studio	3.42%	Yes
Zone C4 01 4	Floor 01	Kitchen / living / dining room	3.68%	Yes
Zone C4 01 5	Floor 01	Kitchen / living / dining room	4.05%	Yes
Zone C4 01 6	Floor 01	Kitchen / living / dining room	2.94%	Yes
Zone C4 01 7	Floor 01	Studio	3.17%	Yes

* ARC was instructed that these units accommodate a living / dining room and a windowless kitchen. For the purposes of this analysis, only the living / dining room was analysed.

ARC's analysis indicates the following in relation to the 61 studied rooms:

- The majority of kitchen / living / dining rooms and studios (i.e. in which the principal space serves as a kitchen / living / dining room and bedroom) or 49 of the 54 studied kitchen / living / dining areas, including those in studios, in studied unit types Floor 00 and 01 are likely to receive a level of daylight access in excess of the recommended 2% Average Daylight Factor for combined use rooms. In other words, 91% of the studied kitchen / living / dining areas (including those in studios) are likely to receive the recommended 2% Average Daylight Factor for combined use rooms.
- The majority of studied living areas or 56 out of 57 living areas (i.e. including studios, living / kitchen / dining rooms, and living / dining rooms) on Floors 00 and 01 of the proposed development will achieve levels of daylight access at or above the minimum Average Daylight Factor recommended by the BRE Guide for living rooms (i.e. 1.5% Average Daylight Factor). In other words, 98% of the studied living areas are likely to receive the recommended 1.5% Average Daylight Factor for living rooms.
- All studied bedrooms were found to achieve above the recommended 1% Average Daylight Factor.

Given that the rooms chosen for analysis on Floors 00 and 01 of the proposed development were those most likely to achieve lower levels of daylight access due to the number of windows, layout of the room or location within the proposal, ARC's analysis suggests that the large majority of rooms within the proposed development will receive a level of daylight access in excess of that recommended by the BRE Guide.

5.0 Assessment of Sunlight Access within the Proposed Open Spaces

Appendix 1 of the *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* sets out the requirements for quantum of communal amenity space associated with developments of new apartments. The Apartment Guidelines do not prescribe requirements on the issue of sunlight access to proposed open spaces and does require that planning authorities have regard to quantitative performance approaches to sunlight provision in amenity spaces set out in the Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide). However, notwithstanding this, ARC referenced Section 3 of the Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* sets out design advice and recommendations for site layout planning to ensure good sunlight access suggests that, for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours sunlight at the equinox.

Detailed quantitative analysis was carried out on the residential communal open spaces (see section 5.1) associated with the residential development; on the open space serving the proposed creche (see section 5.2) and on the proposed public open space (see section 5.3) proposed as part of the proposed development.

Figure 5.3: Indicative diagram showing location of amenity areas analysed as part of this assessment of sunlight access within the proposed development

5.1 Results of assessment of sunlight access within residential communal open spaces proposed as part of the proposed development

As well as the public open space (discussed at Section 5.3 below), the subject application proposes 2 no. podium level communal open spaces and 10 no. roof level spaces.

ARC analysed the likely proportion of these 12 no. communal open spaces to receive sunlight throughout the day on 21st March. The results of ARC's analysis are presented in Table 5.1, with the times at which each space is likely to receive sunlight over more than half of its area on 21st March highlighted in green. The two hours on 21st March during which each space will receive the largest proportion of sunlight access on 21st March is outlined in red. In the interests of completeness, Table 5.1 also sets out the proportion of the space likely to receive sunlight throughout the day on 21st June.

Table 5.1: Approximate areas of proposed communal open spaces predicted to be in sunshine on 21st March and 21st June

Time	PROPOSED* - Percentage Area in Sunlight											
	Communal 01		Communal 02		Roof A1		Roof A2		Roof C1		Roof C3	
	21 March	21 June	21 March	21 June	21 March	21 June	21 March	21 June	21 March	21 June	21 March	21 June
09:00	12%	10%	0%	0%	68%	83%	70%	84%	100%	94%	93%	99%
09:30	14%	17%	0%	2%	71%	84%	73%	85%	100%	95%	97%	100%
10:00	14%	22%	0%	0%	82%	85%	84%	87%	100%	100%	97%	99%
10:30	11%	26%	0%	19%	85%	94%	87%	92%	100%	100%	96%	99%
11:00	9%	35%	0%	32%	91%	96%	92%	98%	100%	100%	95%	99%
11:30	0%	41%	0%	41%	96%	96%	95%	100%	100%	100%	95%	99%
12:00	0%	50%	13%	62%	97%	100%	100%	100%	100%	100%	95%	98%
12:30	2%	70%	24%	82%	100%	100%	100%	100%	100%	100%	95%	99%
13:00	26%	77%	39%	94%	100%	100%	100%	98%	100%	100%	95%	98%
13:30	61%	96%	58%	100%	100%	100%	98%	98%	100%	100%	93%	99%
14:00	82%	100%	60%	99%	100%	100%	95%	95%	100%	100%	93%	99%
14:30	97%	88%	60%	79%	100%	100%	86%	90%	100%	100%	93%	99%
15:00	80%	71%	27%	65%	100%	100%	84%	87%	100%	100%	93%	99%
15:30	27%	46%	0%	33%	100%	100%	79%	82%	100%	100%	93%	99%
16:00	15%	33%	0%	29%	97%	100%	73%	82%	100%	100%	93%	99%
16:30	0%	6%	0%	0%	86%	100%	69%	77%	100%	100%	92%	100%
17:00	0%	0%	0%	0%	64%	100%	46%	69%	100%	100%	93%	100%

Time	Roof C2a		Roof C2b		Roof C2c		Roof C2d		Roof C2e		Roof C4	
	21 March	21 June	21 March	21 June	21 March	21 June	21 March	21 June	21 March	21 June	21 March	21 June
09:00	58%	88%	0%	0%	56%	38%	100%	100%	98%	100%	90%	91%
09:30	47%	82%	0%	0%	65%	44%	100%	100%	98%	100%	86%	95%
10:00	32%	72%	0%	0%	79%	57%	100%	100%	100%	100%	85%	98%
10:30	26%	64%	0%	8%	85%	72%	100%	100%	100%	100%	86%	98%
11:00	13%	63%	4%	33%	89%	85%	100%	100%	100%	100%	85%	98%
11:30	7%	56%	23%	48%	94%	89%	100%	100%	100%	100%	84%	98%
12:00	2%	49%	59%	72%	97%	94%	100%	100%	100%	100%	85%	98%
12:30	0%	56%	70%	94%	100%	100%	100%	100%	100%	100%	85%	98%
13:00	0%	47%	90%	97%	100%	100%	100%	100%	100%	96%	85%	98%
13:30	0%	52%	88%	96%	100%	100%	100%	99%	92%	90%	85%	98%
14:00	9%	57%	82%	94%	100%	100%	100%	98%	74%	85%	84%	98%
14:30	13%	62%	79%	91%	100%	100%	98%	97%	57%	72%	86%	98%
15:00	18%	62%	76%	87%	100%	100%	98%	97%	43%	59%	85%	98%
15:30	28%	69%	66%	85%	100%	100%	97%	95%	21%	37%	84%	98%
16:00	38%	74%	65%	85%	100%	100%	97%	91%	15%	28%	87%	98%
16:30	47%	87%	53%	84%	100%	100%	95%	87%	12%	10%	86%	99%
17:00	67%	92%	29%	75%	100%	100%	91%	77%	5%	0%	87%	99%

While the two communal courtyards at podium level fall below the BRE Guide recommendation (e.g. that at half of the space would receive sunlight for at least two hours on 21st March), it is noted that these spaces receive a level of sunlight in excess of what is typical for residential developments in the area. It is further noted that these spaces receive sunlight for most of the day during the summer months.

As set out in Table 5.1 above, most of the proposed communal open spaces serving the residential elements of the scheme will receive considerably in excess of two hours of sunlight over half their respective areas on the 21st March. In addition to this, several of the communal open spaces on upper floors within the residential elements of the proposed development will receive a high level of sunlight access throughout the day on 21st March. All open spaces are likely to receive some sunlight for a large part of the day on 21st June.

All residents of the scheme will have access to all communal open spaces proposed within the scheme (including all roof terraces). When the combined communal open space provision available to all residents is assessed (as set out in Table 5.2 below), it is evident that more than half of the total communal open space provision for residents of the scheme will be in sunlight for considerably in excess of two hours on 21st March. Indeed, more than half of the total communal open space provision for residents of the scheme will be in sunlight for most of the day on 21st March.

Table 5.2: Approximate proportion of all communal open space provision receiving sunlight access on 21st March

Time	Combined communal open space provision Percentage Area in Sunlight
	21st March
0800	33%
0900	57%
1000	59%
1100	59%
1200	62%
1300	73%
1400	83%
1500	75%
1600	58%
1700	51%
1800	37%

These open spaces will afford residents within the scheme access to a choice of communal open spaces and an opportunity to enjoy sunlight access at almost any time of the day throughout the year. Therefore, in simple terms, ARC's analysis indicated that there will always be somewhere within the proposed development where residents can go to sit (and play) and enjoy the sunshine on a sunny day.

5.2 *Results of assessment of sunlight access within the open space serving the proposed creche as part of the proposed development*

ARC analysed the likely proportion of open space serving the proposed creche to receive sunlight throughout the day on 21st March. The results of ARC's analysis are presented in Table 5.2, with the times at which the space is likely to receive sunlight over more than half of its area on 21st March highlighted in green. The two hours on 21st March during which the space will receive the largest proportion of sunlight access on 21st March is outlined in red. In the interests of completeness, Table 5.3 also sets out the proportion of the space likely to receive sunlight throughout the day on 21st June.

Table 5.3: Approximate areas of the open space serving the creche predicted to be in sunshine on 21st March and 21st June

Time	Open Space CR (Creche Roof) Percentage Area in Sunlight	
	21st March	21st June
09:00	0%	6%
09:30	0%	0%
10:00	0%	0%
10:30	0%	0%
11:00	3%	11%
11:30	20%	27%
12:00	53%	69%
12:30	60%	91%
13:00	67%	91%
13:30	71%	93%
14:00	61%	94%
14:30	59%	38%
15:00	18%	12%
15:30	0%	0%
16:00	0%	0%
16:30	0%	13%
17:00	0%	35%

As suggested by the results set out in Table 5.3, the proposed roof top space serving the proposed creche will receive a level of sunlight in excess of the level recommended by the BRE Guide for amenity spaces. The proposed roof top open space serving the creche will, therefore, appear adequately sunlit throughout the year within the meaning of the BRE Guide.

5.3 Assessment of sunlight access within proposed public open space

As part of this Sunlight and Daylight Access Analysis, ARC has assessed the potential for the proposed public open space to appear adequately sunlit over the course of the year with reference to the recommendations of the BRE Guide. The results of this analysis are set out in Table 5.4 below, with the times at which the space is likely to receive sunlight over more than half of its area on 21st March highlighted in green. The two hours on 21st March during which the space will receive the largest proportion of sunlight access on 21st March is outlined in red. In the interests of completeness, Table 5.4 also includes analysis of the sunlight access to the public park on 21st June.

Table 5.4: Approximate proportion of the proposed public open space predicted to be in sunshine on 21st March and 21st June

Time	Public Open Space Percentage area in sunlight	
	21 March	21 June
09:00	8%	18%
09:30	1%	36%
10:00	10%	39%
10:30	18%	46%
11:00	23%	62%
11:30	36%	65%
12:00	52%	70%
12:30	60%	84%
13:00	63%	84%
13:30	64%	92%
14:00	59%	91%
14:30	52%	75%
15:00	33%	68%
15:30	5%	50%
16:00	3%	48%
16:30	1%	35%
17:00	0%	19%

As suggested by the results set out in Table 5.4, the proposed public open space will receive a level of sunlight very considerably in excess of the level recommended by the BRE Guide for amenity spaces. The proposed public open space will, therefore, appear adequately sunlit throughout the year within the meaning of the BRE Guide. In addition to this, the proposed public open space will receive sunshine over a large proportion of its area throughout the day during the mid summer months (i.e. May, June and July) when the space is most likely to be used.

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November 2020

Technical Appendix

Explanatory Note

In assessing sunlight and daylight access analysis, Irish practitioners tend to refer to the relevant PJ Littlefair's 2011 revision of the 1991 publication *Site layout planning for daylight and sunlight: a guide to good practice* for the Building Research Establishment (the BRE Guide). The standards for daylight and sunlight access in buildings (and the methodologies for assessment of same) suggested in this documents have been referenced in this Sunlight and Daylight Access Impact Analysis.

Indeed, it is noted that the *Dublin City Development Plan 2016-2022* states as follows in relation to residential development: *""Development shall be guided by the principles of Site Layout Planning for Daylight and Sunlight, A guide to good practice (Building Research Establishment Report, 2011)."*

The BRE Guide does not set out rigid standards or limits, but is preceded by the following very clear warning as to how the design advice contained therein should be used:

> *"The advice given here is not mandatory and* ***the guide should not be seen as an instrument of planning policy****; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design."* [Emphasis added.]

That the recommendations of the BRE Guide are not suitable for rigid application to all developments in all contexts is of particular importance in the context of national and local policies for the consolidation and densification of urban areas or when assessing applications for highly constrained sites (e.g. lands in close proximity or immediately to the south of residential lands).

Given that the BRE Guide were drafted in the UK in the context of UK strategic planning policy, recommendations or advices provided in either document that have the potential to conflict with Irish statutory planning policy have been disregarded for the purposes of this analysis.

The purpose of this report is to provide a general indication of daylight performance and sunlight access before and after the construction of the proposed development on the basis of numerous assumptions outlined below and with reference to design tools set out in the guidance documents referenced above. ARC takes no responsibility for any errors introduced by the third party proprietary sunlight and daylight analysis software used to perform the quantitative assessment. This report does not offer a guarantee of daylight performance or sunlight access to existing or future occupants or owners of the application site or neighbouring lands or any other party.

Daylight Access to Buildings

Context under Technical and Guidance Documents

Section 2.2.21 of the BRE Guide suggests that:

> *"If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if ...*
>
> - *the VSC measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value..."*

The BRE Guide states as follows (at paragraph 2.1.8) in relation to daylight access within new development:

> *"2.1.8 Daylight provision in new rooms may be checked using the average daylight factor (ADF). The ADF is a measure of the overall amount of daylight in a space... BS 8206-2 Code of practice for daylighting, recommends an ADF of 5% for a well daylit space and 2% for a partly daylit space. Below 2% the room will look dull and electric lighting is likely to be turned on. In housing BS 8206-2 also gives minimum value of ADF of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms."*

Assessment Methodology for Daylight Access

A three dimensional digital model of the proposed development and of existing buildings in the area was constructed by ARC Consultants based on drawings and three dimensional models supplied by the Design Team. As it is under construction, the permitted development at City Block 2 (DCC Reg. Ref. DSDZ4111/19) was included in the existing baseline model. For the cumulative scenario, ARC included developments permitted on lands adjoining the site to the east and west (DCC Reg. Ref. 3433/19 and DCC Reg. Ref. 2143/20, respectively); development permitted on lands at Nos. 1-4 East Road to the north of the application site (ABP Ref. PL29N.304710); and development permitted on lands to the south of the site at City Block 3 (DCC Reg. Ref. DSDZ2186/20).

Where survey data of surrounding context was not available, assumptions were made, with reference to on-site, satellite and aerial photography and to the online planning register, where relevant, in the creation of the three dimensional model. Existing and proposed landscaping was not included in this model.

In assessing the impact of the proposed development on daylight access, ARC assessed the Vertical Sky Component of each window at a point at the centre of each window.

In assessing daylight access within proposed rooms, assumptions were made as to materials and colour schemes (e.g. reflectances, etc) used in the decoration of the walls, floor and ceiling of the room and the type of glazing used in the window opes. In all cases, rooms are assessed as excluding furniture and window treatments (e.g. curtains, blinds). Assumptions are also made, where relevant, as to the materials and reflectances of external surfaces.

Daylight levels were assessed on the working plane (i.e., at work top level). The results of the analysis describe daylight access in terms of Average Daylight Factor (ADF), which expresses average daylight illuminance as a percentage of unobstructed outdoor illuminance. The factors considered in calculating Average Daylight Factor on the working plane include the light coming from the sky (i.e., the sky component), the light reflected from surfaces outside the room directly to the point being considered (i.e., the externally reflected component) and the light reflected from surfaces inside the room (i.e., the internally reflected component).

Having regard to the extreme variability in sky luminance over the course of any given day depending on weather conditions and the changing seasons, this daylight access analysis uses the Commission Internationale de l'Eclairage (CIE) Standard Overcast Sky Distribution model in its calculations, which is the standard sky most commonly used in daylight access analysis. This model assumes that sky luminance varies from horizon to zenith and is considered to correspond to an overcast day. As such, calculation of daylight levels in a room in circumstances where the sky luminance corresponds to the CIE Standard Overcast Sky Distribution could be considered to represent a worst case scenario.

Definition of Impacts on Daylight Access

The assessment of the impact of the proposed development on daylight access had regard to the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* prepared by the Environmental Protection Agency (Draft of 2017), and to Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the likely effects of certain public and private projects on the environment.

The list of definitions given below is taken from *Table 3.3: Descriptions of Effects* contained in the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* prepared by the Environmental Protection Agency. Some comment is also given below on what these definitions might imply in the case of daylight access. The definitions from the EPA document are in italics.

- ***Imperceptible:*** *An effect capable of measurement but without significant consequences.* The definition implies that the development would cause a change in the daylight received at a location, capable of measurement, but not noticeable to the casual observer. If the development caused no change in daylight access, there could be no effect. Examples of "imperceptible" impacts on daylight access would include:
  (a) a scenario where the proposed development is predicted to reduce the Vertical Sky Component received by a sample window, but the sample window will continue to receive the relevant recommended level of Vertical Sky Component after the construction of the proposed development; and
  (b) a scenario where the proposed development is predicted to reduce the Vertical Sky Component to less than 0.8 times

its former value (i.e. the BRE Guide threshold for an adverse impact).

- ***Not Significant:*** *An effect which causes noticeable2 changes in the character of the environment but without significant consequences* (the footnote "2" to the word *"noticeable"* is: *"for the purposes of planning consent procedures"*). The definition implies that the development would cause a change in the daylight received at a location, which is capable of measurement and capable of being noticed by an observer who is taking an active interest in the extent to which the proposal might affect daylight access.

- ***Slight:*** *An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.* For this definition to apply, the amount of daylight received at a location would be changed by the construction of the development to an extent that is both capable of measurement and is noticeable to a minor degree. However, the daylight environment within an existing building should remain largely unchanged. An example of a "slight" impact would be a scenario where, although the impact of the proposed development is not predicted to reduce the amount of daylight received by a sample window to less than 0.8 times its former value, the amount of light received by the sample window is predicted to fall below a key recommended level, whether that is the BRE Guide recommended target value or an alternative target value. A further example of a "slight" impact would be where, although the construction of the proposed development is predicted to reduce the amount of light received to a level below the BRE Guide threshold for an adverse impact, the predicted reduction is just outside that BRE Guide threshold (e.g. the amount of daylight received by a sample window or sunlight received by a sample window or garden falls to not less than 0.7 times its existing value*). A "slight" impact could also occur where there is a more considerable reduction in daylight or sunlight by a sample window within an existing building, but only a small number of windows within that property are affected to that extent.

- ***Moderate:*** *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.* In this case, a development must bring about a change in the daylight environment within an existing building; and this change must be consistent with a pattern of change that is already occurring, is likely to occur, or is envisaged by policy. A moderate effect would occur where other developments were bringing about changes in daylight access of similar extent in the area. A "moderate" impact might also be considered to occur where the level of daylight received by a sample window falls below the BRE Guide recommended level and to between 0.5 and 0.7 times its existing value, subject to consideration of other factors*.

- ***Significant:*** *An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.* The definition implies that the existence of the development would change the extent of daylight access in a manner that is not *"consistent with existing and emerging baseline trends"*. For example, a development resulting in a *"significant"* diminution of daylight access would reduce daylight to the extent that minimum standards for daylighting are not met and artificial lighting is required for part of the day. A "significant" impact could occur where the predicted reduction in daylight access is greater than what is envisaged to occur if the application site were developed in line with existing and emerging baseline trends. Subject to consideration of other factors, a "significant" impact could occur where daylight access to the sample window falls to between 0.25 and 0.5 times its former value*.

- ***Very Significant:*** *An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.* The definition implies that the existence of the development would change the extent of daylight access to a considerable degree and in a manner that is not *"consistent with existing and emerging baseline trends"*. For example, a *"very significant"* effect would occur where a development would result in daylight received in a room falling well below the minimum standards for daylighting and where artificial lighting would be required in that room as the principal source of lighting all the time. A "very significant" impact could occur where the predicted reduction in daylight access is considerably greater than what is envisaged to occur if the application site were developed in line with existing and emerging baseline trends. Subject to consideration of other factors, a "very significant" impact could occur where daylight access to the sample window or sunlight access to the sample window or garden falls to between 0.01 and 0.25 times its former value*.

- ***Profound:*** *An effect which obliterates sensitive characteristics.* Examples of development resulting in a ***"profound"*** effect on daylight access would include facilitating daylight access to a room in an existing building where the existing room has none (e.g. as a result of the demolition of a building) or by removal of all access to daylight within an existing building.

* Please note that, while this section sets out indicative quantitative ranges that could apply to each type of impact, this assessment considers a range of factors (such as relevant target values, the use of the affected building, the number of rooms affected within the building, etc) in classifying impacts.

In relation to daylight access, it is conceivable that a development could result in positive effects, but this implies that a development would involve a reduction of the size or scale of built form (e.g. such as the demolition of a building, which might result in an increase in daylight access). Though that is possible, it is usually unlikely as most development involves the construction of new obstructions to daylight access.

Sunlight Access to Buildings and Open Spaces

Context under Technical and Guidance Documents

Section 3.2.1 of the *Site layout planning for daylight and sunlight: a guide to good practice* (the BRE Guide) provides as follows in relation to the assessment of the impact of development on sunlight access to existing buildings.

> *"If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:*
> - *receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March* ***and***
> - *receives less than 0.8 times its former sunlight hours during either period* ***and***
> - *has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours."*
>
> [Emphasis added]

The BRE Guide states that *"Any reduction in sunlight access below this level should be kept to a minimum. If the available sunlight hours are both less than the amount above and less than 0.8 times their former value, either over the whole year or just in the winter months (21 September to 21 March), then the occupants of the existing building will notice the loss of sunlight … The room may appear colder and less cheerful and less pleasant"*.

Section 3.3 of the Building Research Establishment's *Site layout planning for daylight and sunlight: a guide to good practice* sets out design advice and recommendations for site layout planning to ensure good sunlight access to amenity spaces and to minimise the impact of new development on existing amenity spaces. The Guide suggests that, for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours sunlight at the equinox. The BRE Guide recommends that, as a rule of thumb, the centre of the space should receive at least two hours of sunlight on the 21st March in order to appear adequately sunlit throughout the year.

Assessment Methodology for Sunlight Access

A three dimensional digital model of the proposed development and of existing buildings in the area was constructed by ARC Consultants based on drawings and three dimensional models supplied by the Design Team. As it is under construction, permitted development at City Block 2 (DCC Reg. Ref. DSDZ4111/19) was included in the existing baseline model. For the cumulative scenario, ARC included developments permitted on lands adjoining the site to the east and west (DCC Reg. Ref. 3433/19 and DCC Reg. Ref. 2143/20, respectively); development permitted on lands at Nos. 1-4 East Road to the north of the application site (ABP Ref. PL29N.304710); and development permitted on lands to the south of the site at City Block 3 (DCC Reg. Ref. DSDZ2186/20).

Where survey data of surrounding context was not available, assumptions were made, with reference to on-site, satellite and aerial photography and to the online planning register, where relevant, in the creation of the three dimensional model. Existing and proposed landscaping was not included in this model.

Using the digital model, shadows were cast by ARC at several times of the day at the summer and winter solstices, and at the equinox. An equinox occurs twice a year: the March or vernal equinox (typically in or around the 20th to 21st March) and the September or autumnal equinox (typically in or around the 21st to 23rd September). For the purposes of this analysis and with reference to the BRE Guide, shadows were cast at several times of the day on 21st March.

The results are presented in shadow study diagrams associated with this report. Three images have been prepared for each time period on each representative date as follows:

- ***Receiving Environment:*** this image shows the shadows cast by the existing buildings only. Existing buildings surrounding the application site are shown in light grey, while existing buildings on the application site are shown in orange. The shadows cast are shown in a dark grey tone.
- ***Proposed Development:*** this image shows the shadows cast by the existing buildings together with the shadows cast by the proposed development. The existing buildings surrounding the site are shown in light grey, while the proposed development on the application site is shown in blue. The shadows cast are shown in a dark grey tone.
- ***Cumulative:*** this image shows the shadows cast by the existing buildings together with the shadows cast by the proposed development and nearby permitted developments. The existing and permitted buildings surrounding the site are shown in light grey, while the proposed development.

In order to calculate sunlight access to rooms, ARC referenced the methodology outlined in *Appendix A: Indicators to calculate access to skylight, sunlight and solar radiation* of the BRE Guide. Using proprietary sunlight and daylight access analysis software, ARC analysed a sunpath diagram overlaid with a shading mask corresponding to the existing or proposed shadow environment (as appropriate) and the sunlight probability diagram for a latitude of 53° N (i.e. Dublin) for a reference point (i.e. the centre point) of each sample study window. The sunlight availability indicator has 100 spots on it. Each of these represents 1% of annual probable sunlight hours (APSH). The percentage of APSH at the reference point is found by counting up all the unobstructed spots.

Definition of Impacts on Sunlight Access

The assessment of the impact of the proposed development on sunlight access had regard to the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* prepared by the Environmental Protection Agency (Draft of 2017), and to Directive 2011/92/EU (as amended by Directive 2014/52/EU) on the assessment of the likely effects of certain public and private projects on the environment.

The list of definitions given below is taken from *Table 3.3: Descriptions of Effects* contained in the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* prepared by the Environmental Protection Agency. Some comment is also given below on what these definitions might imply in the case of sunlight access. The definitions from the EPA document are in italics.

- ***Imperceptible:*** *An effect capable of measurement but without significant consequences.* The definition implies that the development would cause a change in the sunlight received at a location, capable of measurement, but not noticeable to the casual observer. If the development caused no change in sunlight access, there could be no effect. Examples of "imperceptible" impacts on sunlight access would include:
  (a) a scenario where the proposed development is predicted to reduce the amount of sunlight received by a sample window, but the sample window will continue to receive the relevant recommended level of Annual Probable Sunlight Hours after the construction of the proposed development; and
  (b) a scenario where the proposed development is predicted to reduce the Annual Probable Sunlight Hours received by a sample window to less than 0.8 times its existing value (i.e. the BRE Guide threshold for an adverse impact). Similarly, where sunlight access to a sample garden is reduced, the impact of proposed development could be considered to be "imperceptible" or "not significant" where the sample garden continues to the receive at least two hours of sunlight over half its area on 21st March, and, where the area of the garden capable of receiving sunlight on 21st March does not drop to less than 0.8 times its existing level after the construction of the proposed development.

- ***Not Significant:*** *An effect which causes noticeable[2] changes in the character of the environment but without significant consequences* (the footnote "2" to the word *"noticeable"* is: *"for the purposes of planning consent procedures"*). The definition implies that the development would cause a change in the sunlight received at a location, which is capable of measurement and capable of being noticed by an observer who is taking an active interest in the extent to which the proposal might affect sunlight access.

- ***Slight:*** *An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.* For this definition to apply, the amount of sunlight received at a location would be changed by shadows cast by the development to an extent that is both capable of measurement and is noticeable to a minor degree. However, the shadow environment of the surrounding environment should remain largely unchanged. An example of a "slight" impact would be a scenario where, although the impact of the proposed development is not predicted to reduce the amount of sunlight received by a sample window or garden to less than 0.8 times its former value, the amount of light received by the sample window or garden is predicted to fall below a key recommended level, whether that is the BRE Guide recommended target value or an alternative target value. A further example of a "slight" impact would be where, although the construction of the proposed development is predicted to reduce the amount of light received to a level below the BRE Guide threshold for an adverse impact, the predicted reduction is just outside that BRE Guide threshold (e.g. the amount of daylight received by a sample window or sunlight received by a sample window or garden falls to not less than 0.7 times its existing value*). A "slight" impact could also occur where there is a more considerable reduction in sunlight by a sample window within an existing building, but only a small number of windows within that property are affected to that extent.

- ***Moderate:*** *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.* In this case, a development must bring about a change in the shadow environment of the area; and this change must be consistent with a pattern of change that is already occurring, is likely to occur, or is envisaged by policy. A moderate effect would occur where other developments were bringing about changes in sunlight access of similar extent in the area. A "moderate" impact might also be considered to occur where the level of sunlight access to a sample window or garden falls below the BRE Guide recommended level and to between 0.5 and 0.7 times its existing value, subject to consideration of other factors*.

- ***Significant:*** *An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.* The definition implies that the existence of the development would change the extent of sunlight access in a manner that is not *"consistent with existing and emerging baseline trends"*. For example, a development resulting in a *"significant"* diminution of sunlight access would overshadow a location to the extent that there is a significant change in the amount of direct sunlight received at that location. A "significant" impact could occur where the predicted reduction in sunlight access is greater than what is envisaged to occur if the application site were developed in line with existing and emerging baseline trends. Subject to consideration of other factors, a "significant" impact could occur where sunlight access to the sample window or garden falls to between 0.25 and 0.5 times its former value*.

- ***Very Significant:*** *An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.* For example, a *"very significant"* reduction in sunlight access would occur where the development overshadows a location for most of the time that the location would have been in sunlight prior to the construction of the development and where overshadowing of that magnitude is not *"consistent with existing and emerging baseline trends"*. A "very significant" impact could occur where the predicted reduction in sunlight access is considerably greater than what is envisaged to occur if the application site were developed in line with existing and emerging baseline trends. Subject to consideration of other factors, a "very significant" impact could occur where sunlight access to the sample window or garden falls to between 0.01 and 0.25 times its former value*.

- ***Profound:*** *An effect which obliterates sensitive characteristics.* Examples of development resulting in a *"profound"* effect on sunlight access would include facilitating sunlight access at a location where that location has previously had none (e.g. facilitating sunlight access as a result of the demolition of a building) or by removal of all access to sunlight at a location.

* Please note that, while this section sets out indicative quantitative ranges that could apply to each type of impact, this assessment considers a range of factors (such as relevant target values, the use of the affected building, the number of rooms affected within the building, etc) in classifying impacts.

In relation to sunlight access, it is conceivable that there could be positive impacts, but this implies that a development would involve a reduction of the size or scale of built form (e.g. such as the demolition of a building, which might result in an increase in sunlight access). Though that is possible, it is usually unlikely as most development involves the construction of new obstructions to sunlight access.

The range of possible impacts listed above deal largely with the extent of impact; and the extent of the impact of a development is usually proportional to the extent to which that development is large in scale and/or height and its proximity to the location. This proportionality may be modified by the extent to which the development is seen as culturally or socially acceptable, and on the interaction between the proposed development, the character of the existing shadow environment and the land use pattern of the receiving environment.

RECEIVING
ENVIRONMENT

OSI Licence No.AR 0087020

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SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

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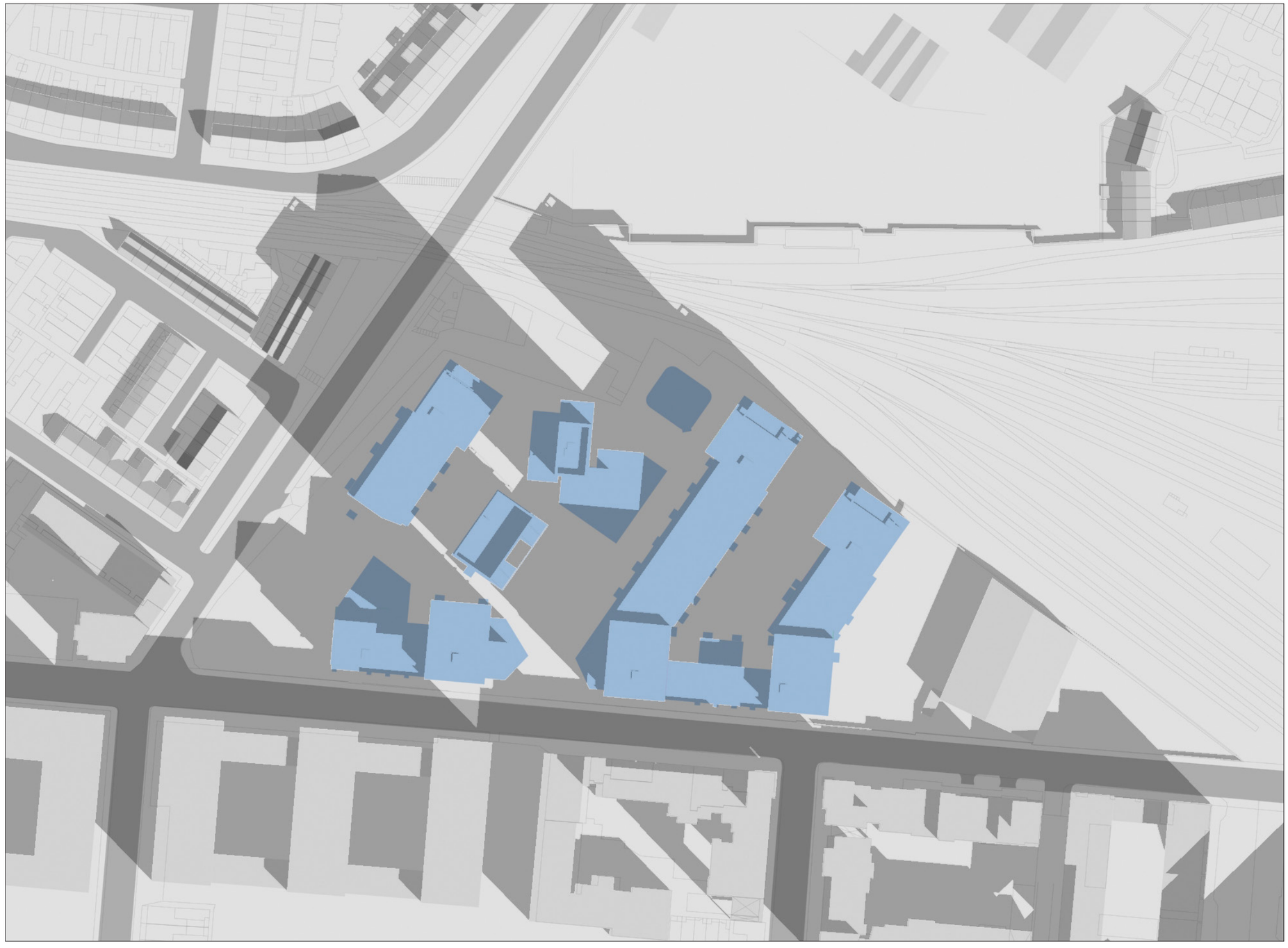
SUNRISE : 6.24 AM
SUNSET : 6.41 PM

TIME :
10.00 AM

PROPOSED
DEVELOPMENT



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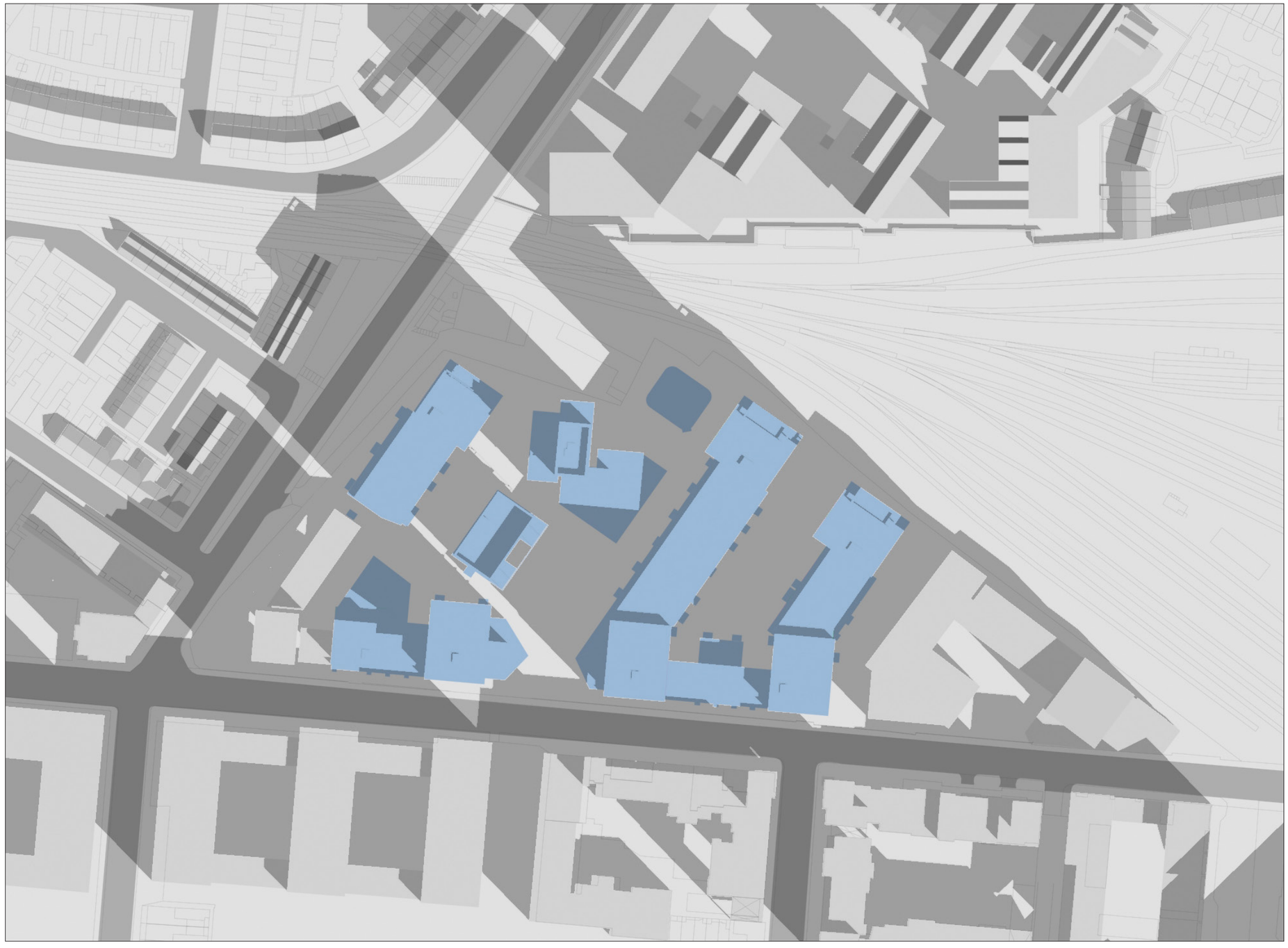

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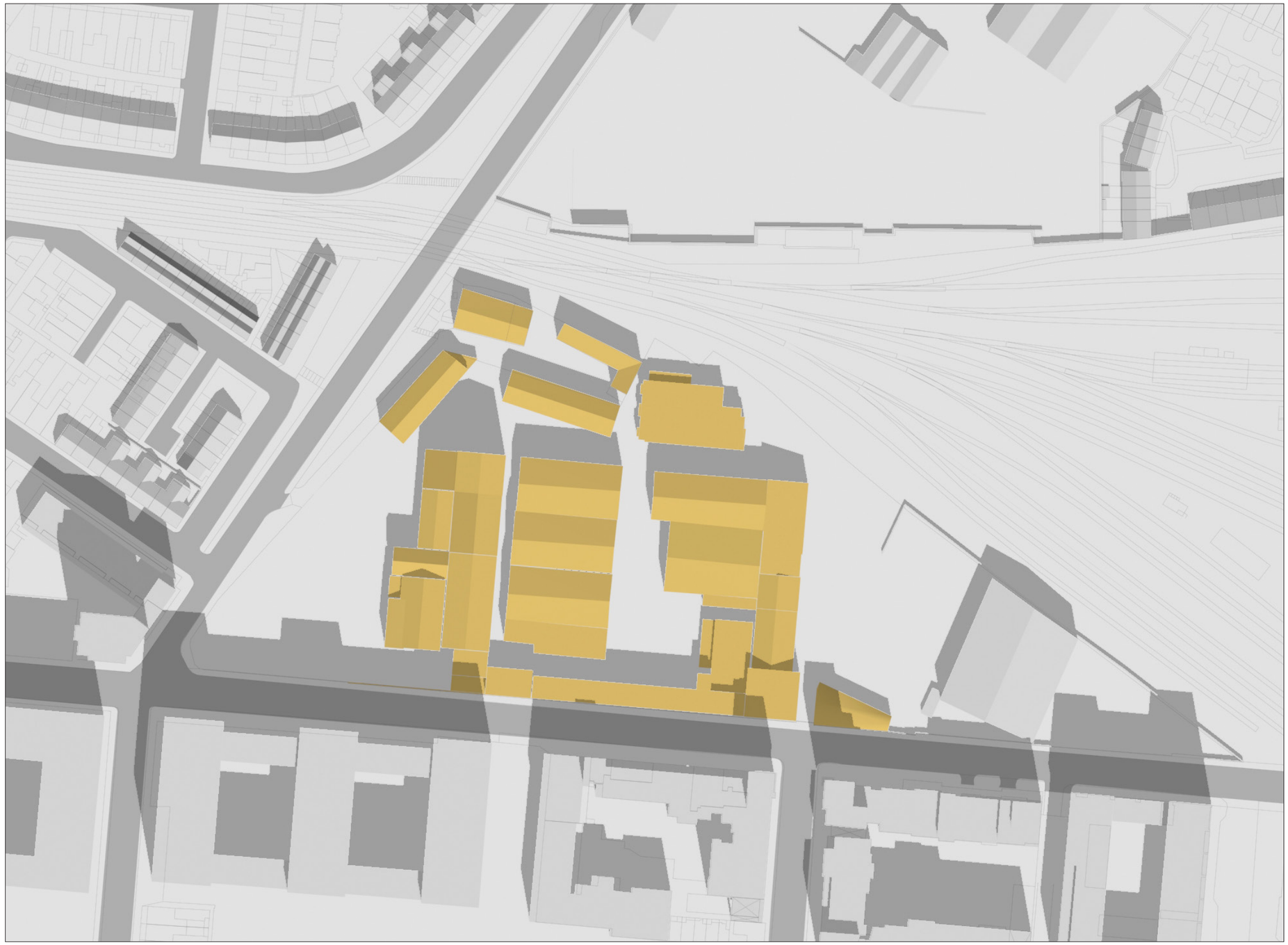

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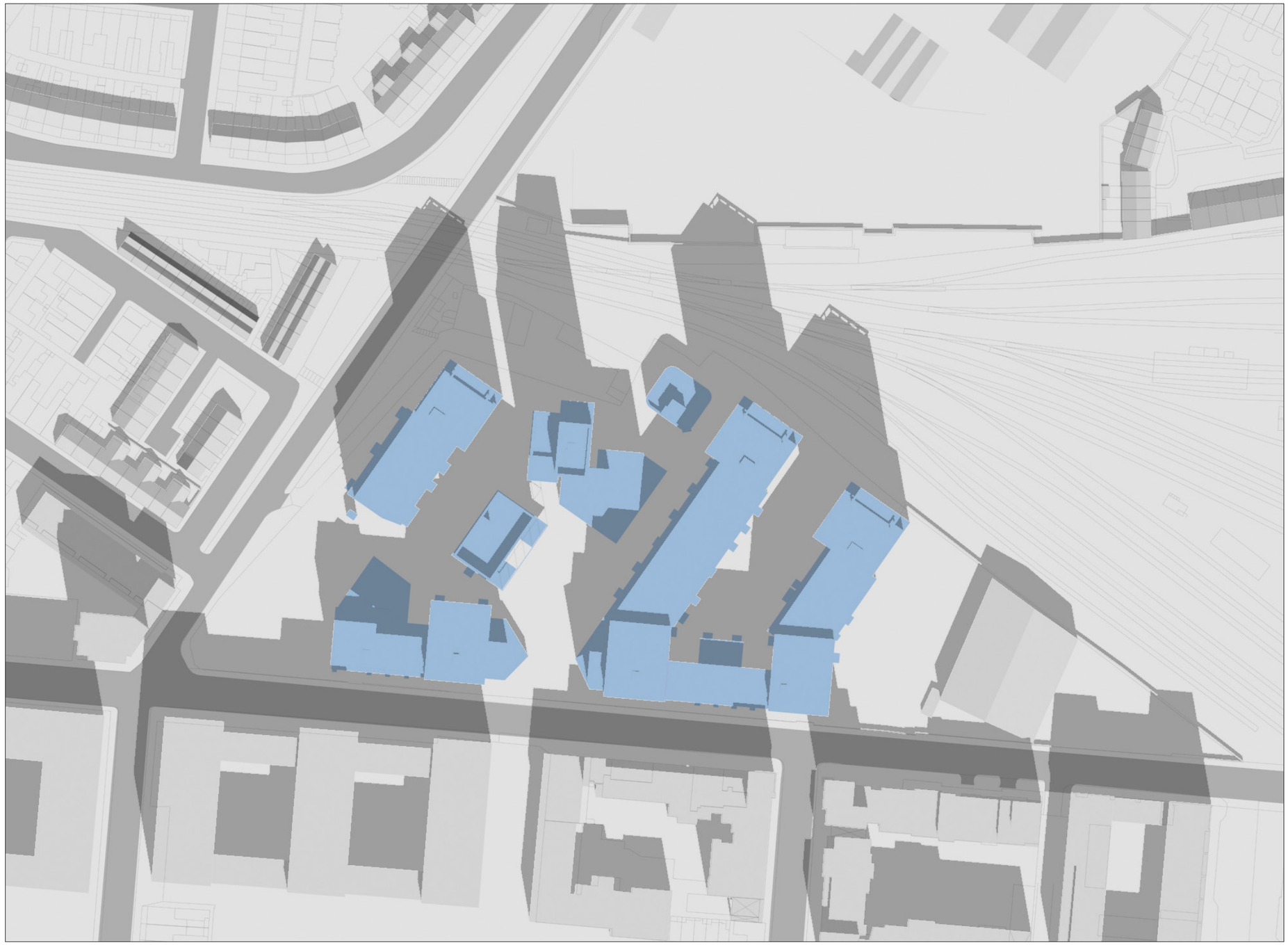

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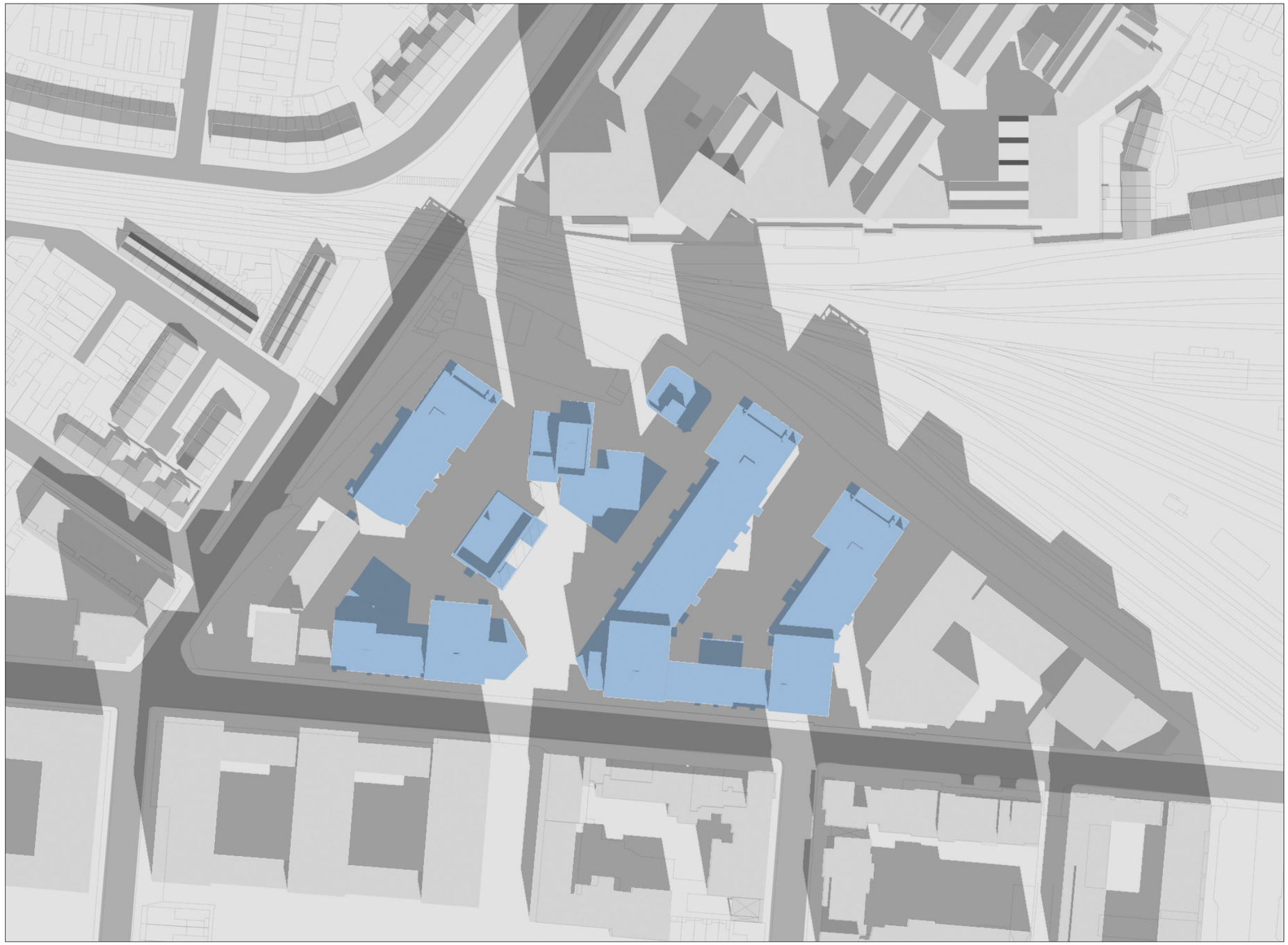

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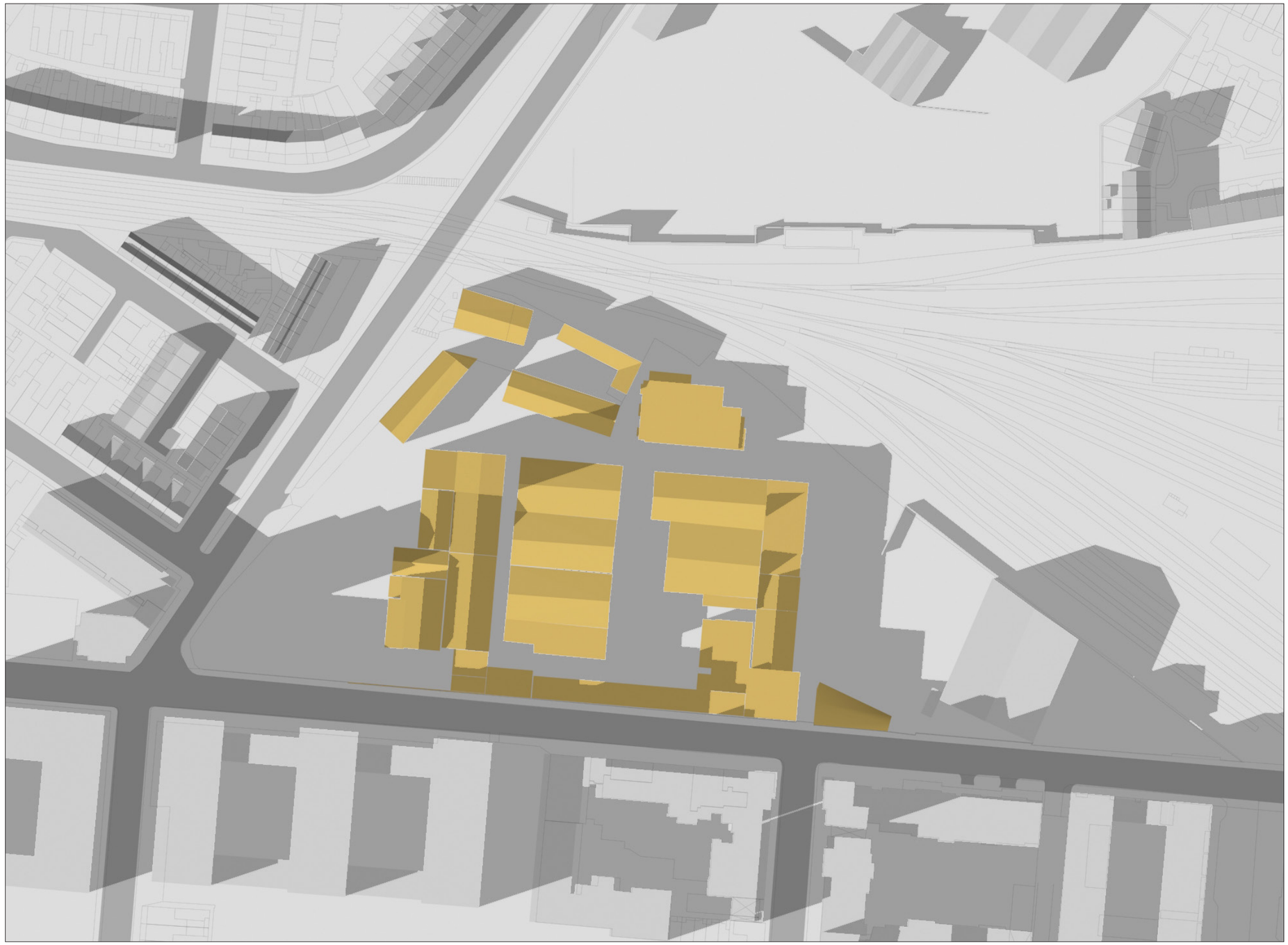

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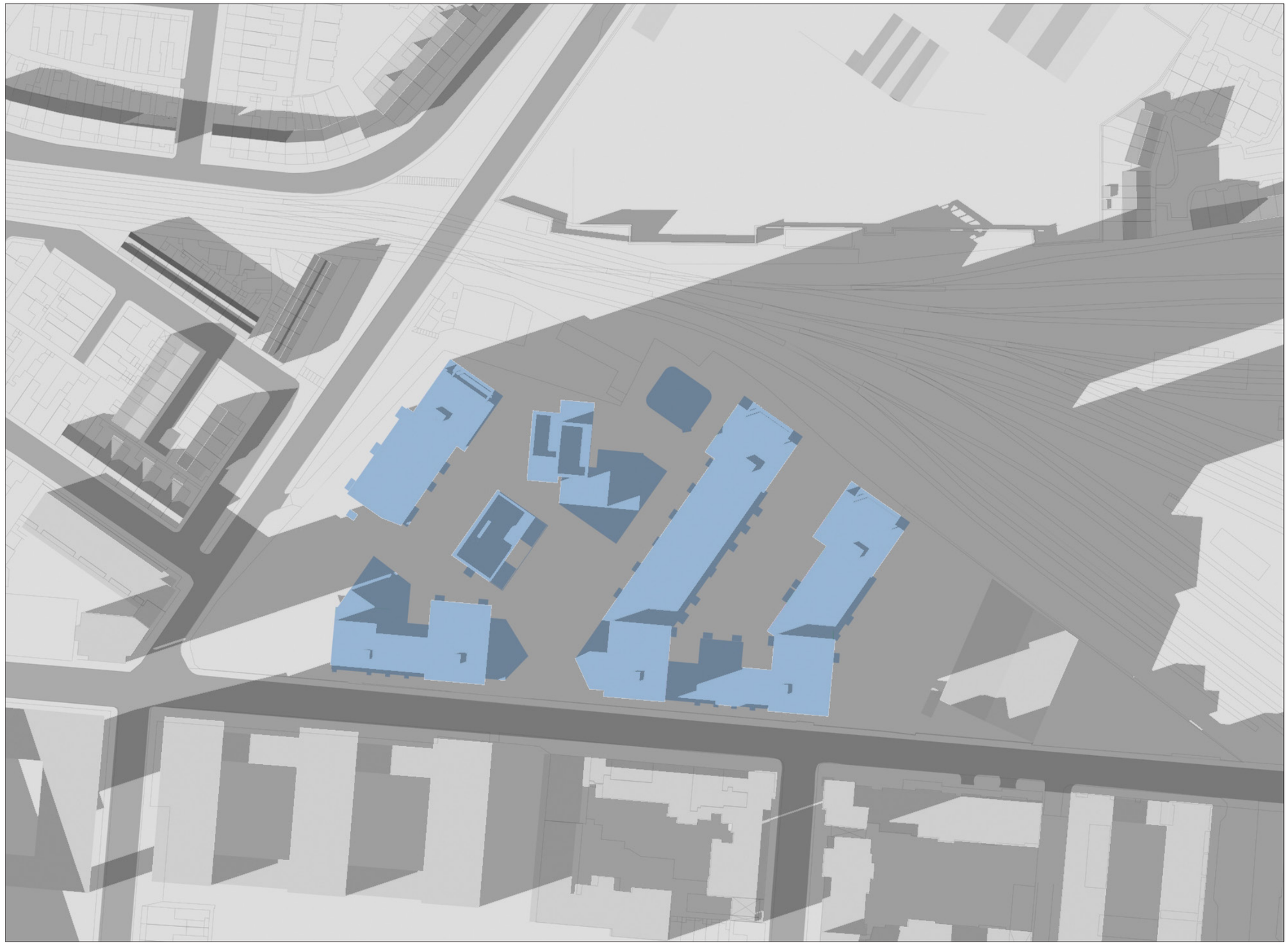

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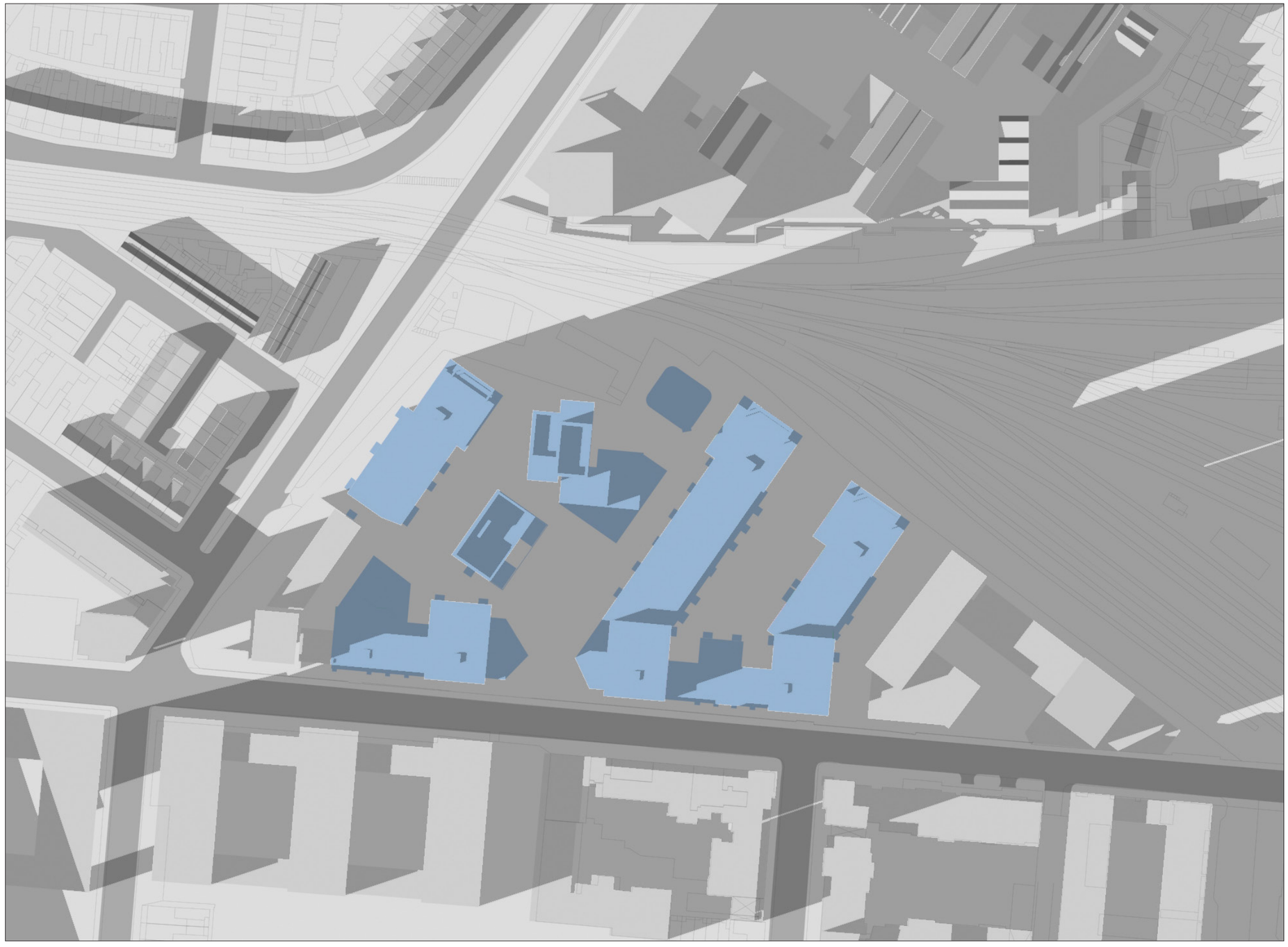

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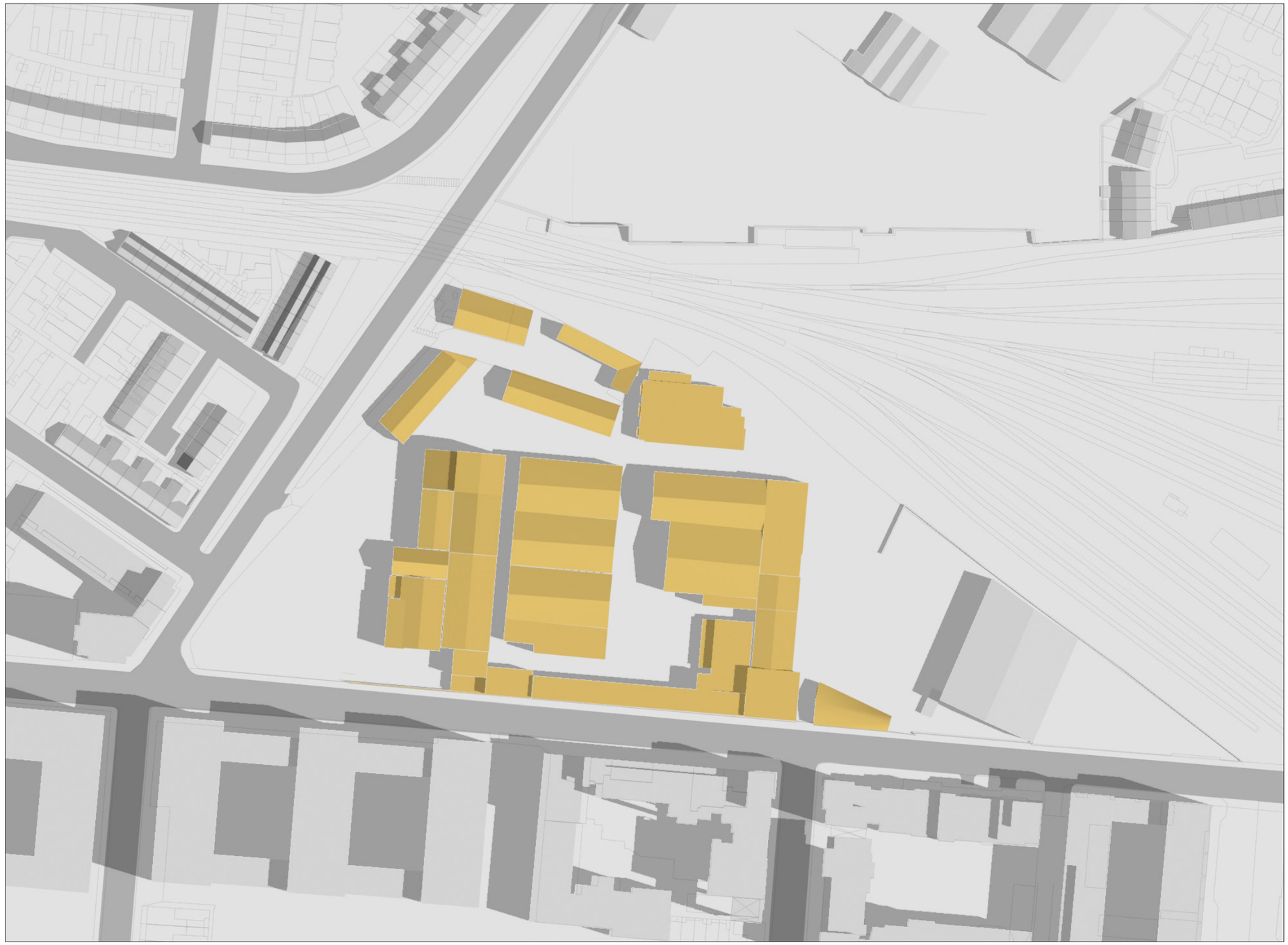

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SHADOW STUDY
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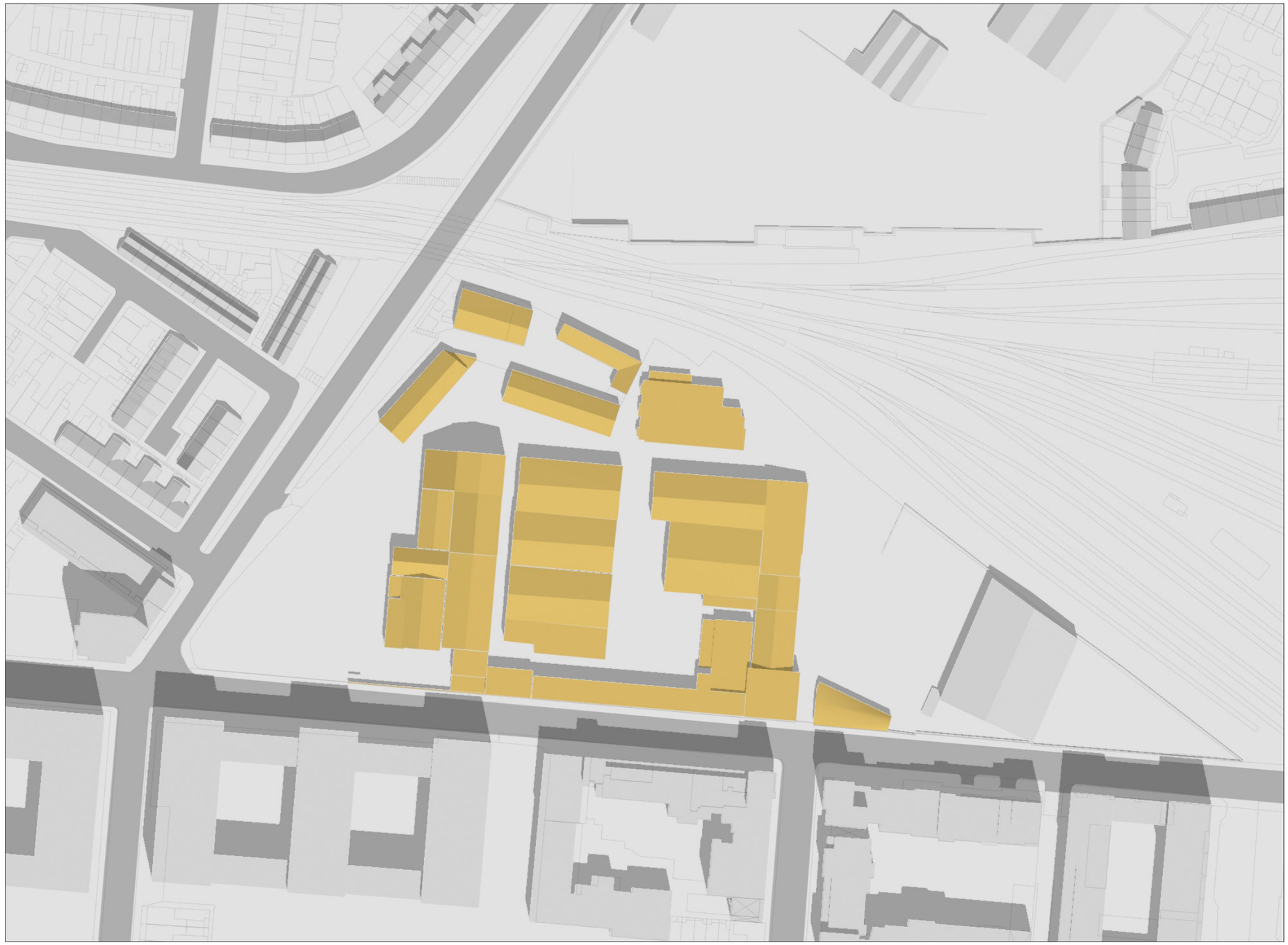

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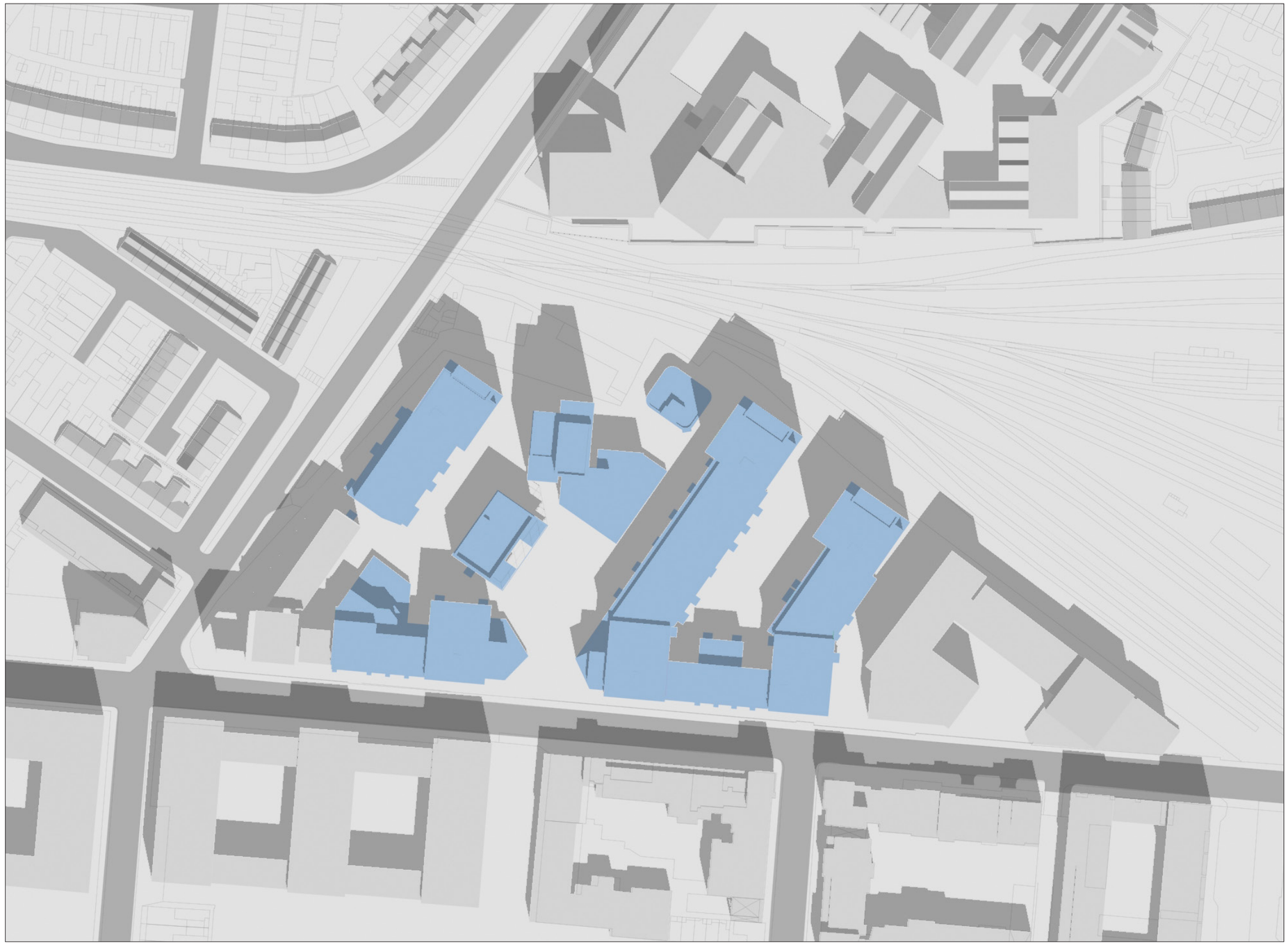

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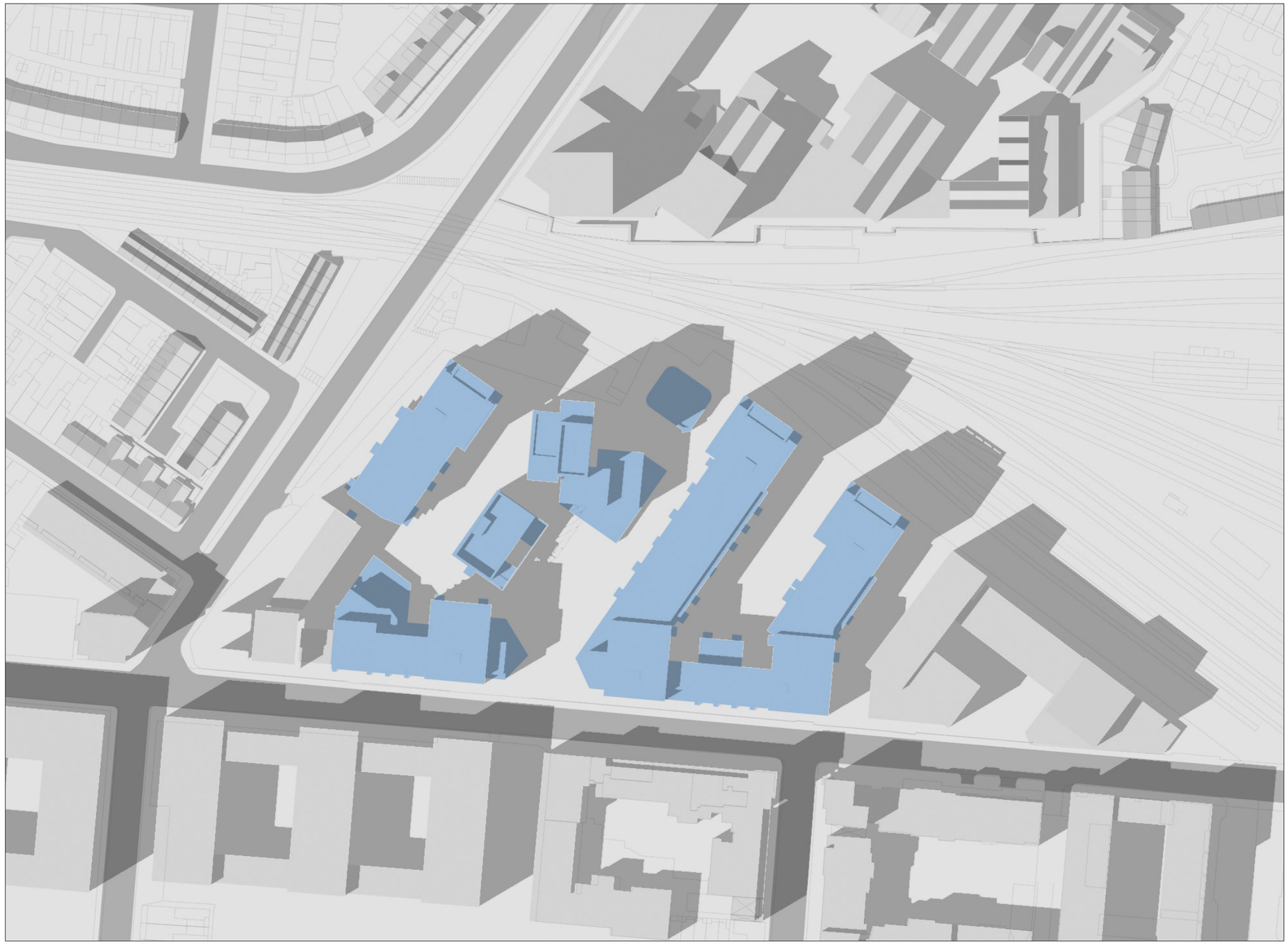

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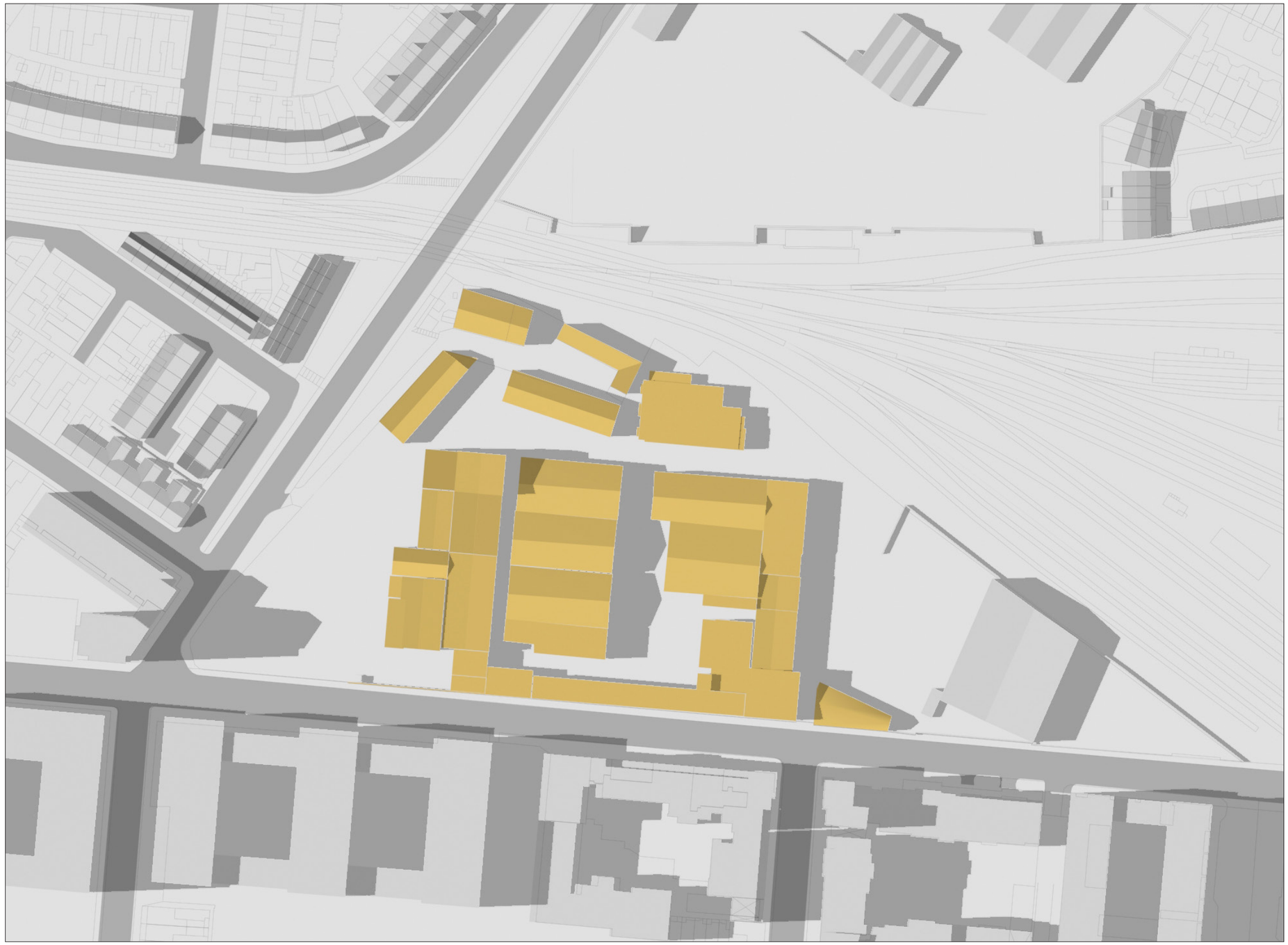

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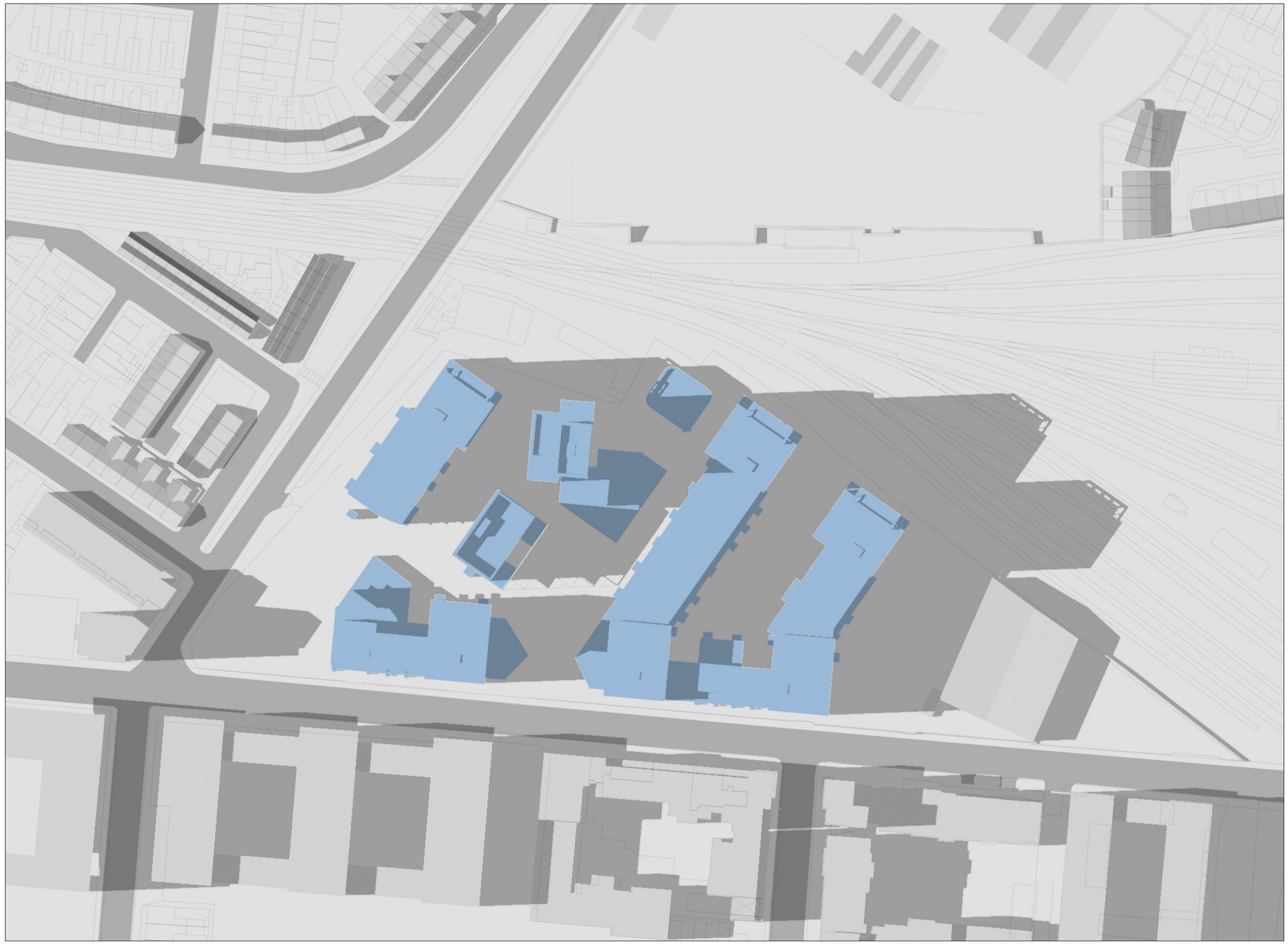

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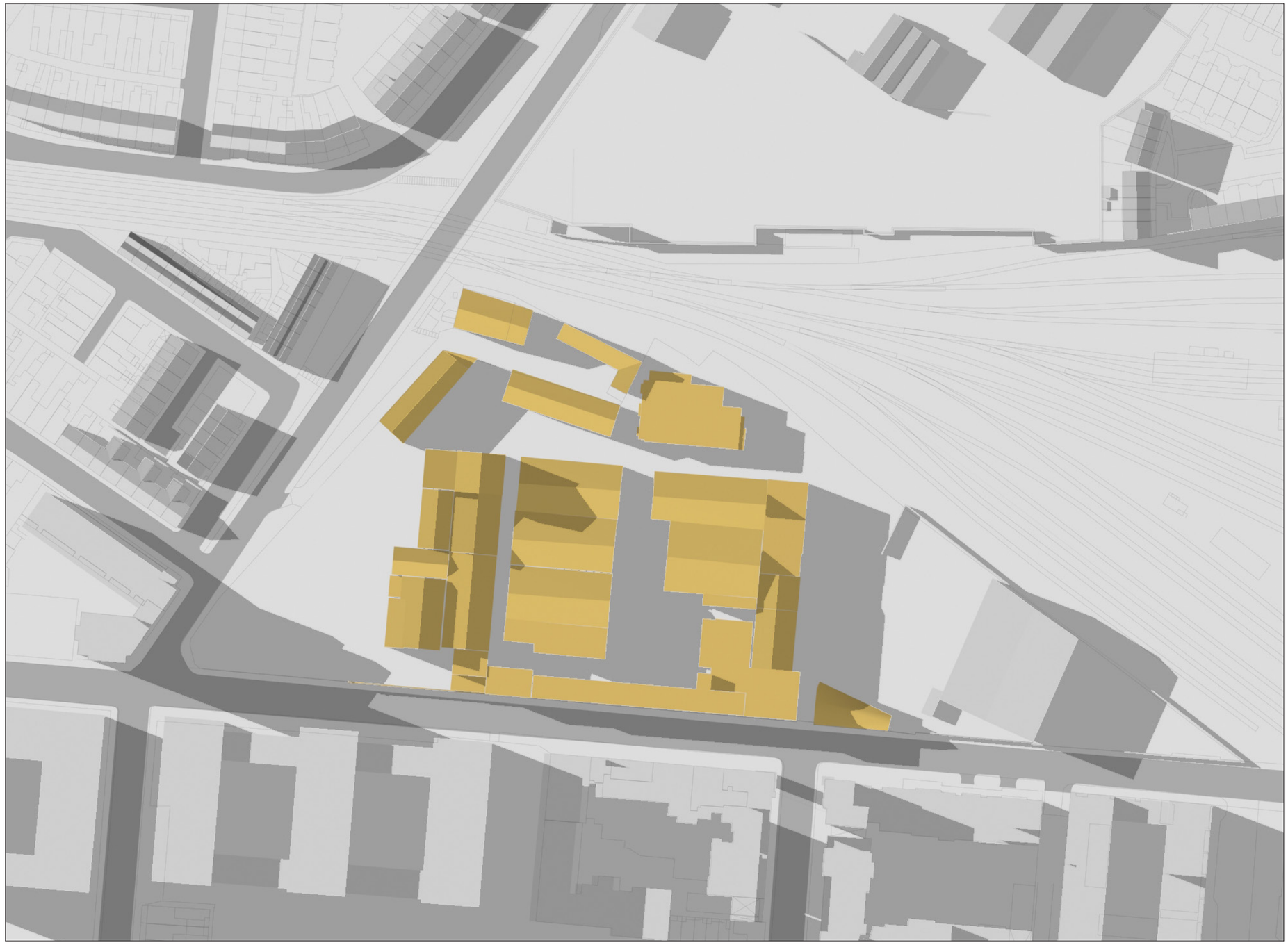

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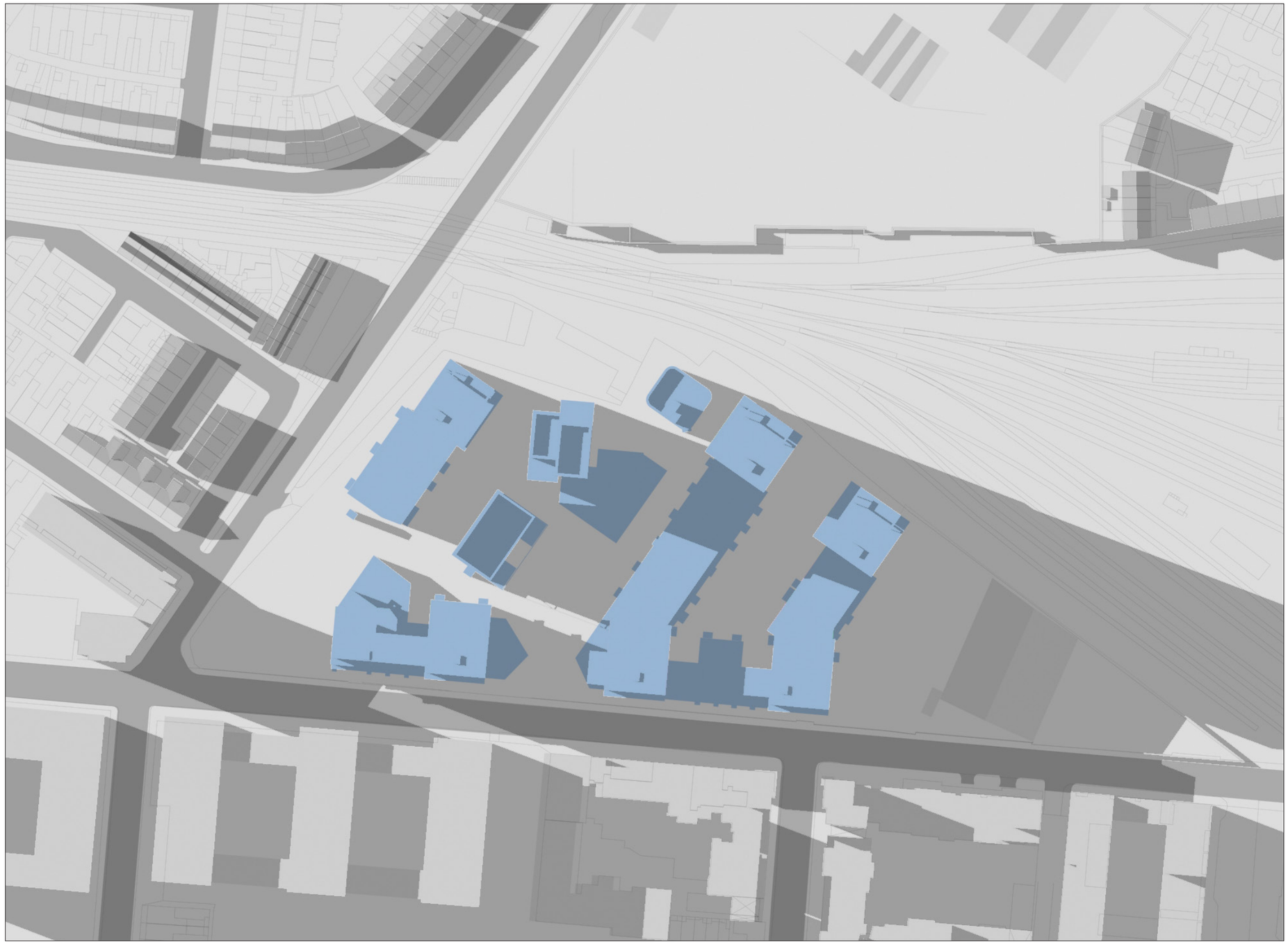

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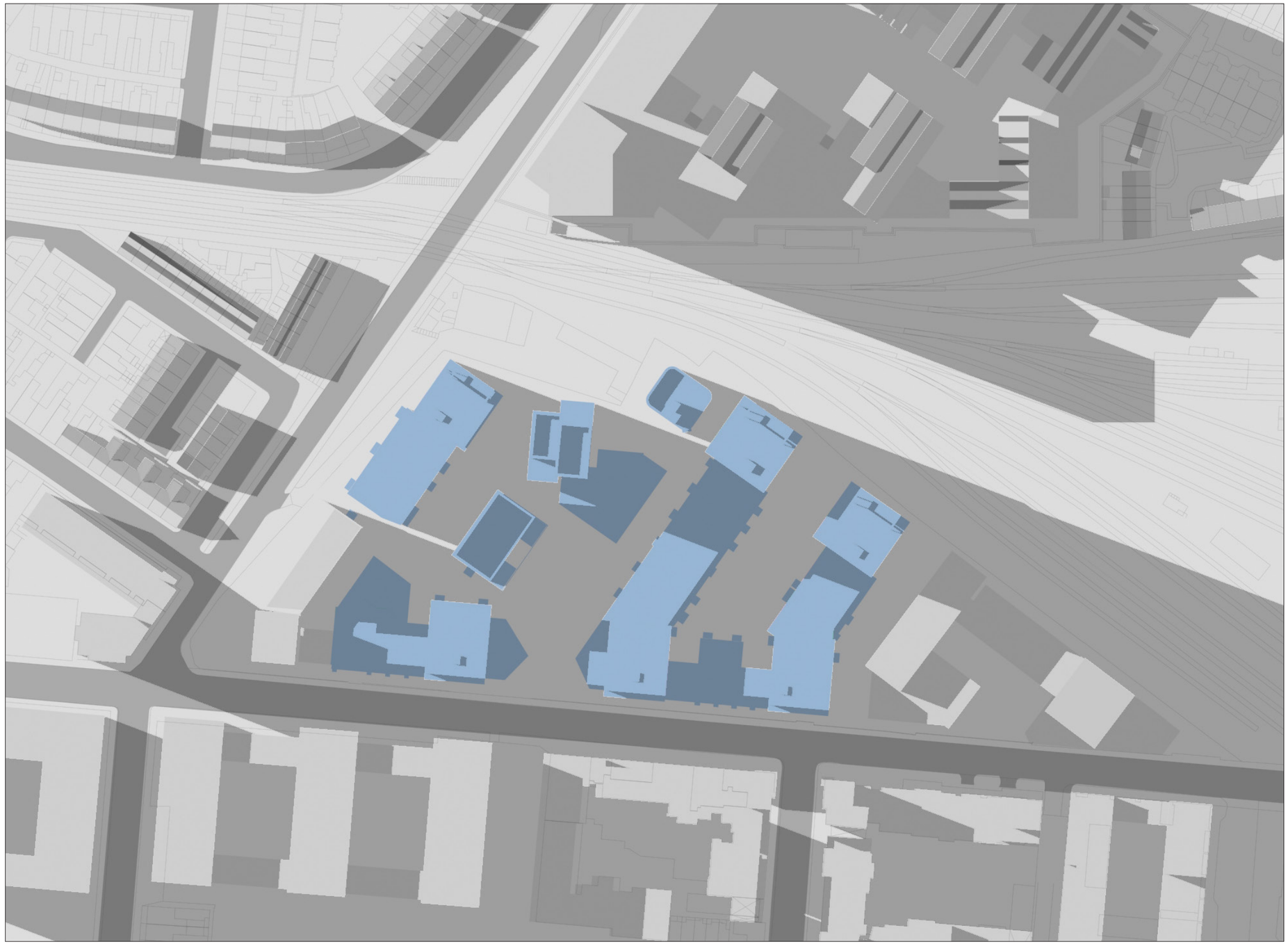
SUNSET : 9.57 PM

TIME :
7.00 PM

CUMULATIVE
PROPOSED



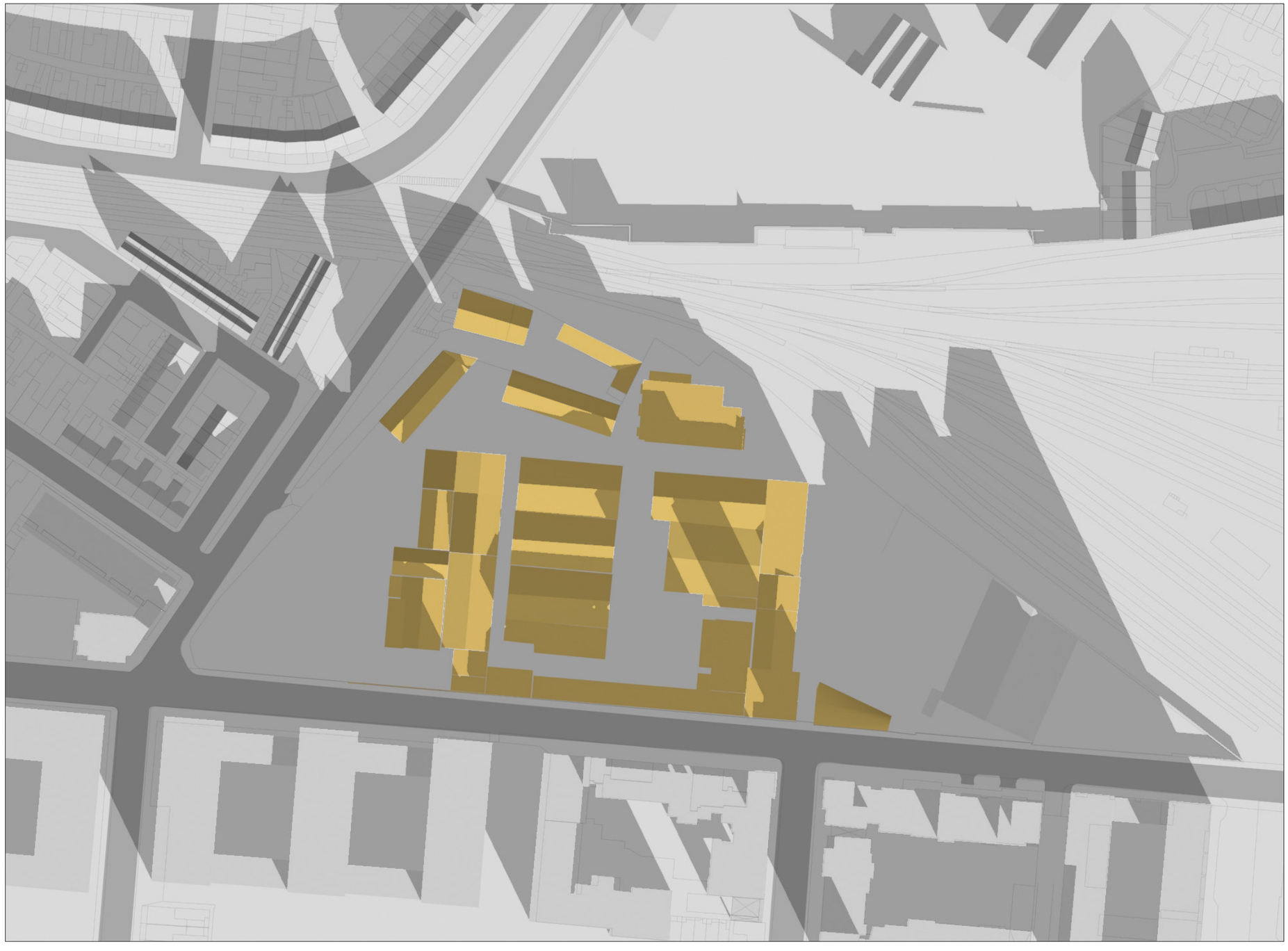
N

SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : JUNE 21ST - SUMMER SOLSTICE
SUNRISE : 4.56 AM
SUNSET : 9.57 PM

TIME :
7.00 PM

RECEIVING
ENVIRONMENT



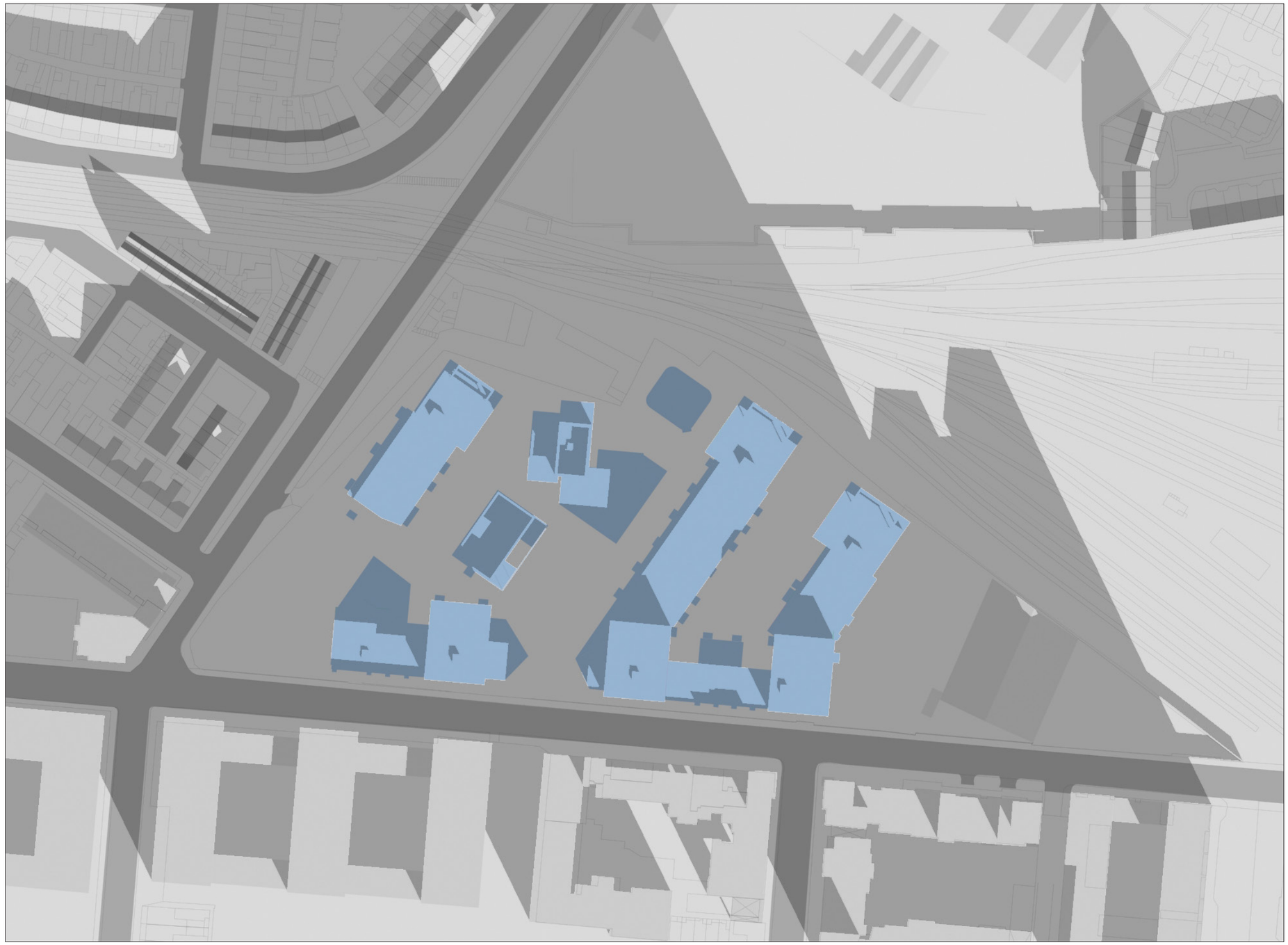
N

SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
10.30 AM

PROPOSED
DEVELOPMENT



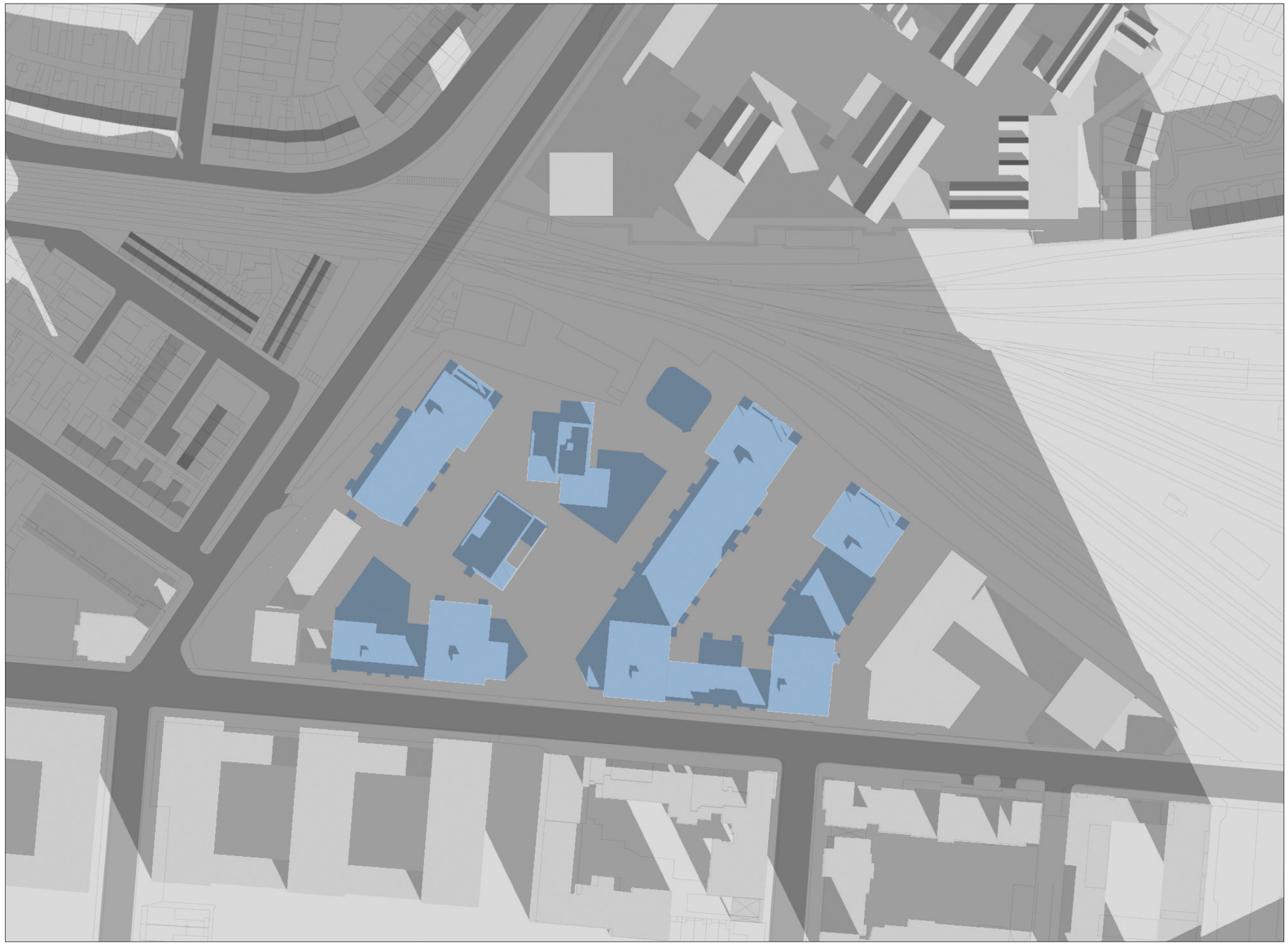
N

SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
10.30 AM

CUMULATIVE
PROPOSED



N

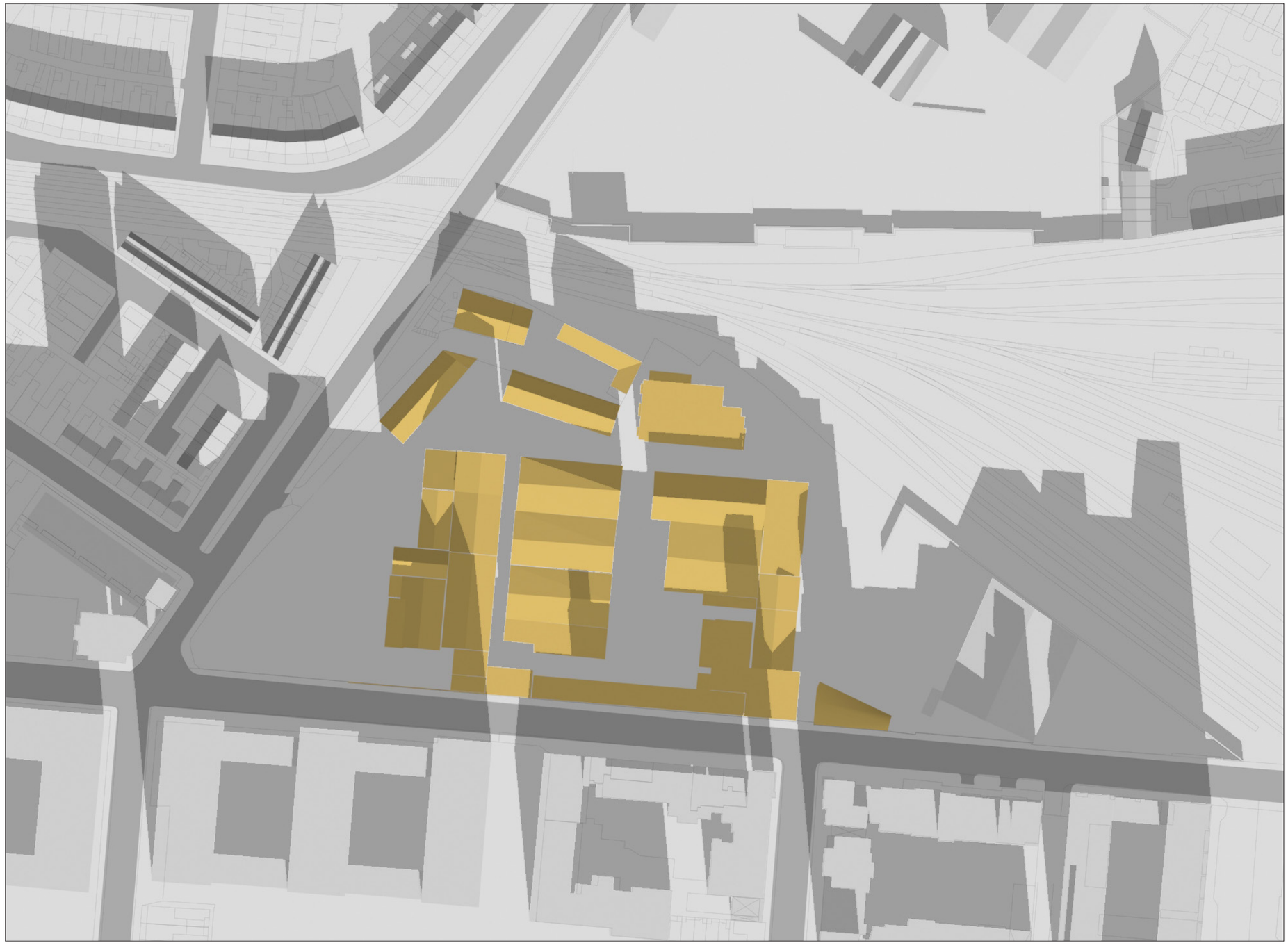
SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
10.30 AM

RECEIVING
ENVIRONMENT

OSI Licence No.AR 0087020

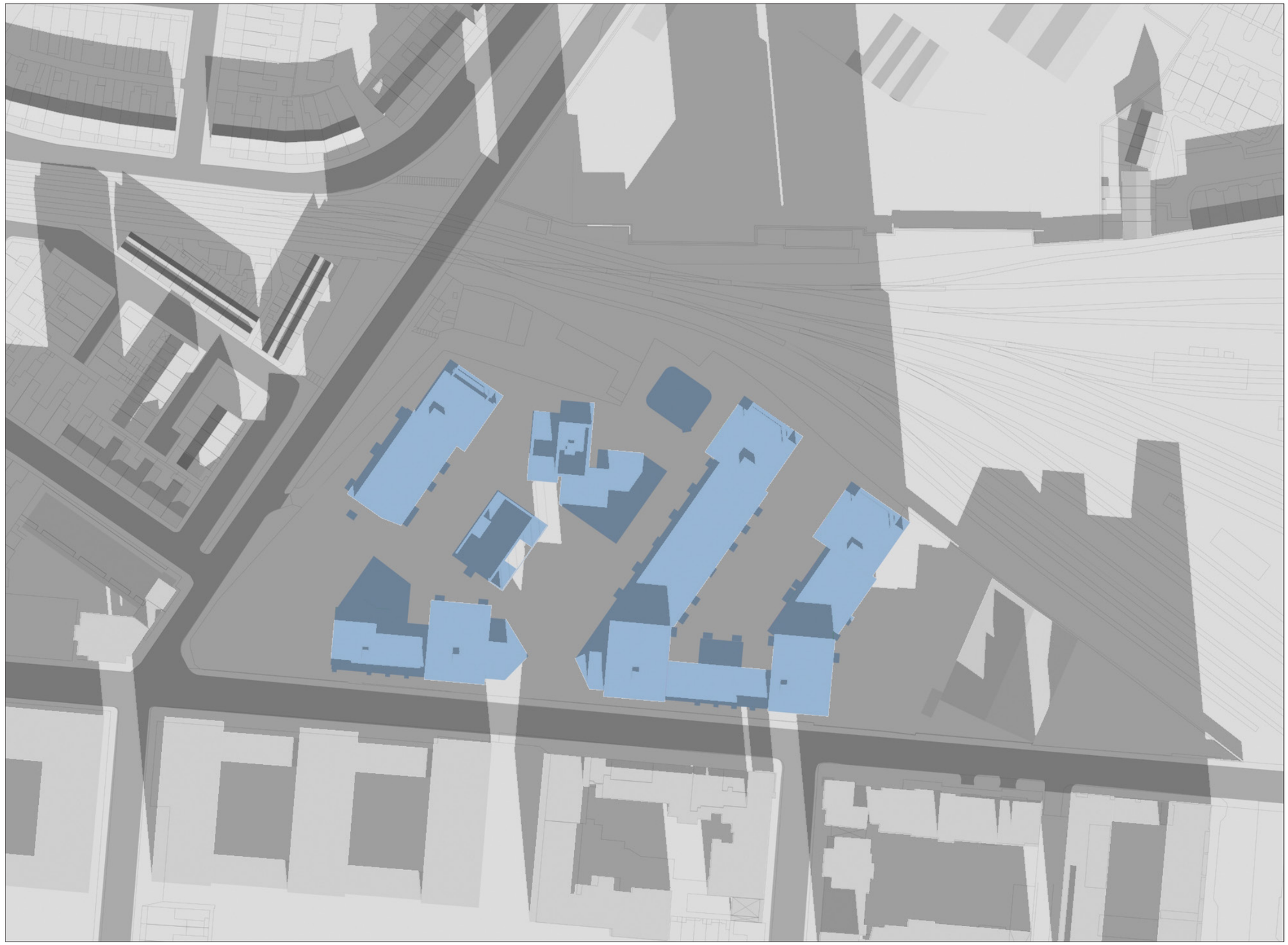


N

SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
12.00 PM



PROPOSED
DEVELOPMENT

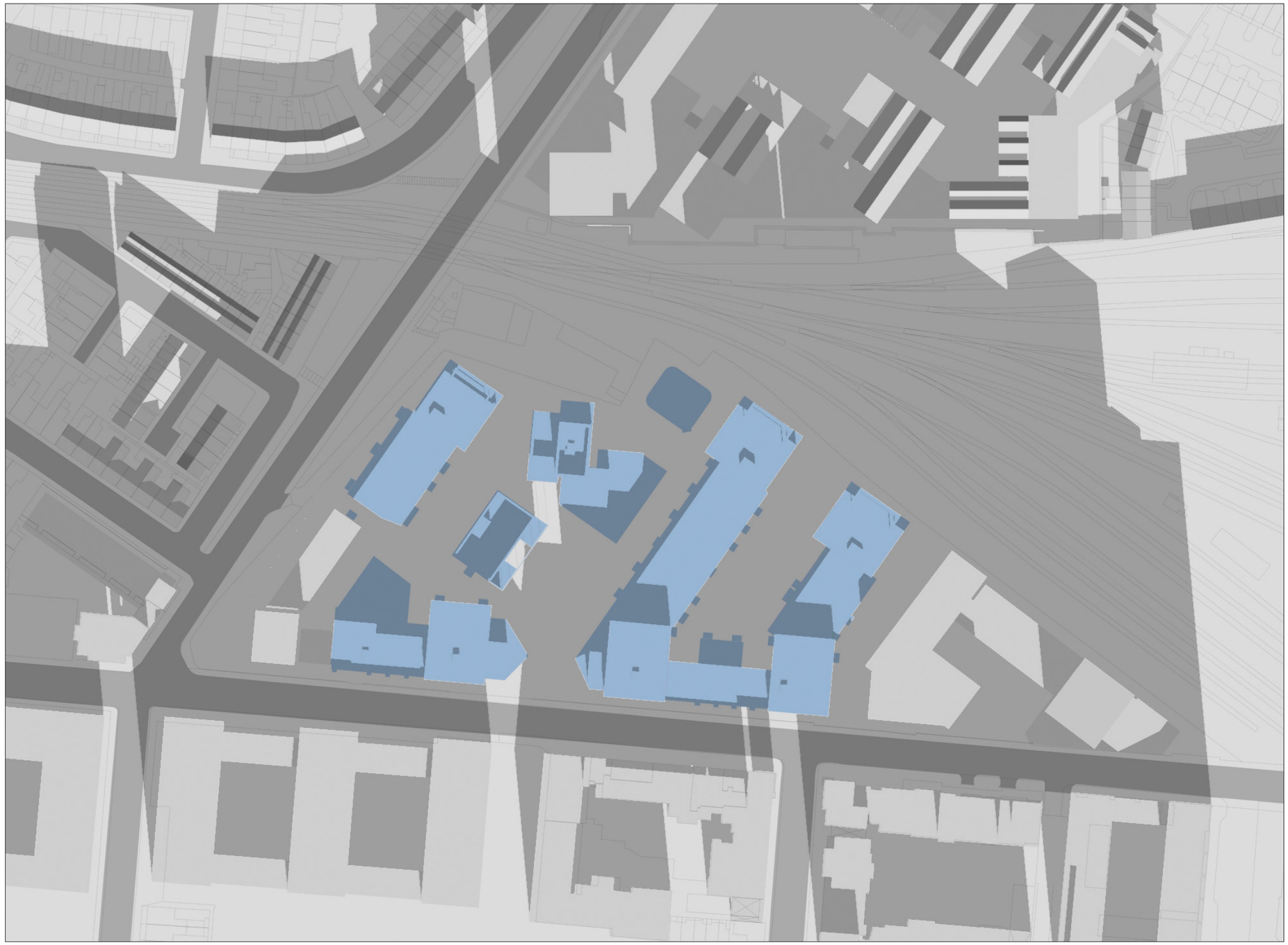
N

SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
12.00 PM

CUMULATIVE
PROPOSED



N

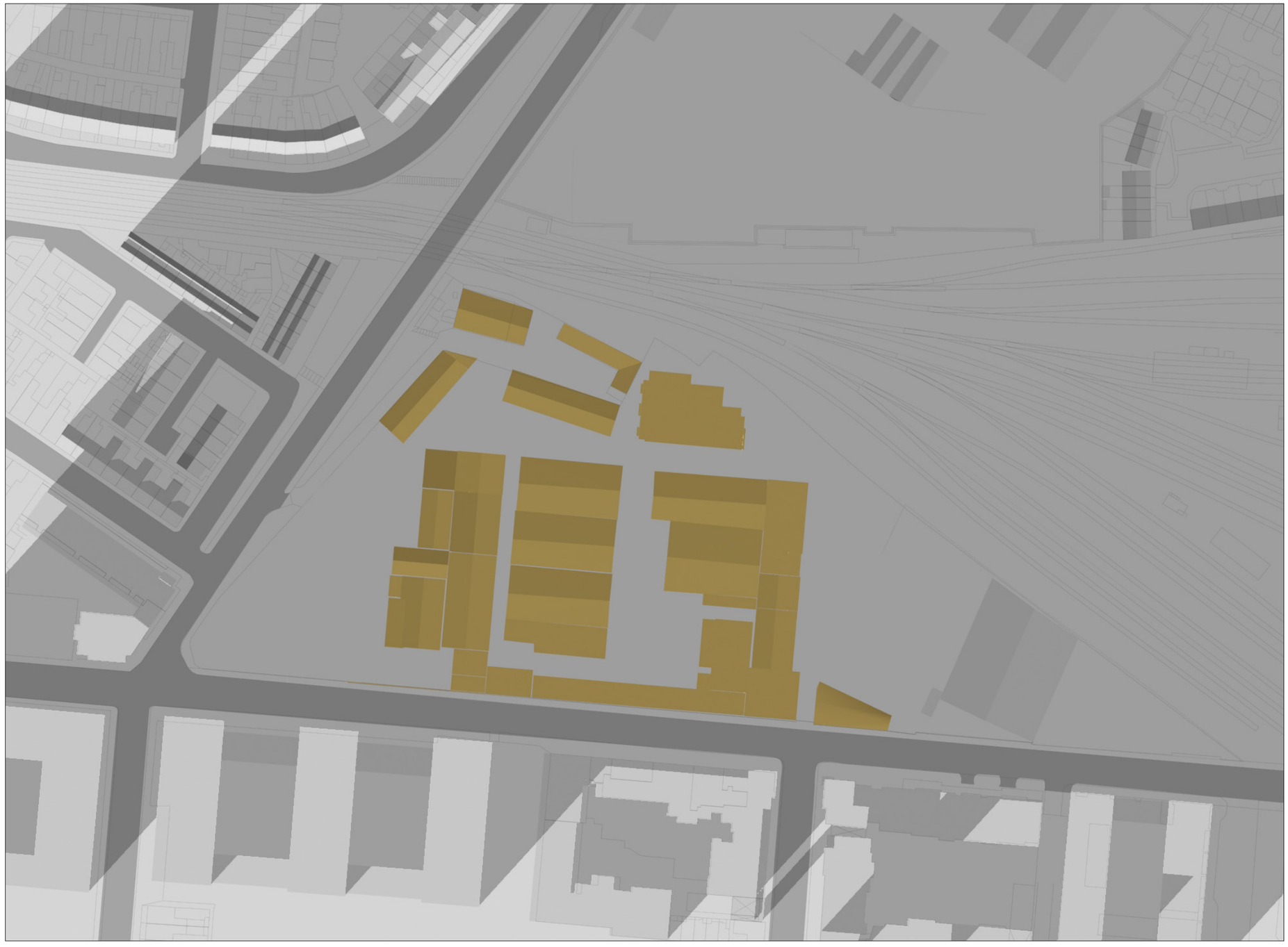
SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
12.00 PM

RECEIVING
ENVIRONMENT

OSI Licence No.AR 0087020



N

SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
3.30 PM

PROPOSED
DEVELOPMENT

N

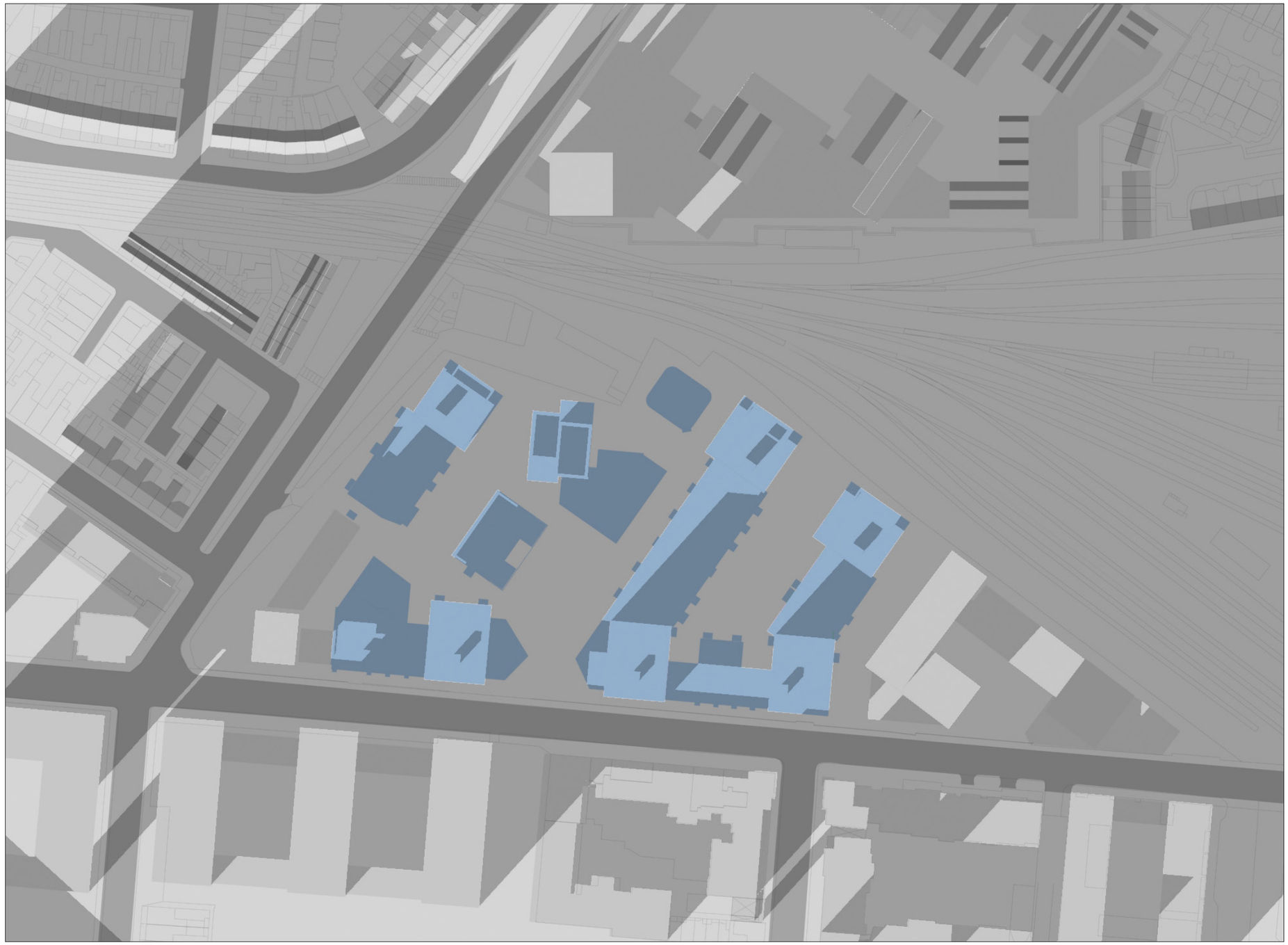
SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
3.30 PM

CUMULATIVE
PROPOSED

OSI Licence No.AR 0087020



N

SHADOW STUDY
LANDS AT SHERIFF STREET UPPER, DUBLIN 1
NOVEMBER 2020

DATE : DECEMBER 21ST - WINTER SOLSTICE
SUNRISE : 8.38 AM
SUNSET : 4.08 PM

TIME :
3.30 PM