COAKLEY O'NEILL
town planning

**PLANNING REPORT**

# THE RAILYARD APARTMENTS, ALBERT QUAY, CORK

Prepared in August, 2024 on behalf of

**PROGRESSIVE COMMERCIAL CONSTRUCTION LIMITED**

Coakley O'Neill Town Planning Ltd.

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# Document Control Sheet

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## 1.0 INTRODUCTION

1.1 We, Coakley O'Neill Town Planning Ltd, NSC Campus, Mahon, Co. Cork, have been instructed by Progressive Commercial Construction Limited to prepare this Planning Report in respect of The Railyard Apartments, Albert Quay, Cork.

1.2 This Planning Report sets out how the proposed scheme complies with the proper planning and development of this area in the context of the relevant national strategic and local planning policy.

1.3 The proposed development site has the benefit of permission for an existing SHD, ABP-305779-19, of a 201no. apartment development of the same height as proposed in this instance.

## 2.0 SITE CONTEXT

2.1 The proposed development site is a pivotal, transitional location between the city centre and the nationally important regeneration project that is Cork's Docklands. Measuring approximately 0.2744 hectares, it is bounded by Albert Quay East to the north, Albert Street to the west, the former Blackrock and Passage Railway Terminus – Ticket Office, a Protected Structure, Ref. No. PS 1138, and which is also a Recorded Monument, CO074-119002, the two-storey former Cork, Blackrock and Passage Railway Offices, Protected Structure, Ref. No. PS 1137, and the Albert Road Post Box, which is also a Protected Structure Ref. No. PS942 and Albert Road to the south, and Navigation Square to the east. The site is accessed by Albert Quay East and Albert Street.

2.2 It is an underutilised, brownfield site, on the waterfront, and comprises a 2-storey trade warehouse building occupied by Park Facilities Management Ltd(1,726m$^2$) to the east, accessed directly off Albert Quay, with a secondary access of Albert Street (N27); the 2-storey former Ticketing Office (368m$^2$) that served the adjoining 1-storey Cork Blackrock & Passage West Railway Station (758m$^2$).

2.3 The proposed development site is located in an area undergoing significant redevelopment for mixed-uses in line with national, regional and local policy, with new intensive 6-7 storey over double basement employment uses to its immediate east and west, a recently permitted 10-storey primarily residential development at the eastern end of the Albert Quay block, the existing 17-storey over basement primarily residential tower of the Elysian to the south-west, and a permitted 34 storey hotel development to the north. The proposed development site itself has permission for a Strategic Housing Development (SHD) of up to 25 storeys over double basement, and an office development of up to 18 storeys over a double basement.

2.4 The proposed development site is located in a highly sustainable area of the City, within 500m of the City Centre and all its amenities, as well Cork's existing public transport hubs (Bus Station and Train Station), all of which can easily be accessed on foot and on bicycle over either the Eamon de Valera bridge or the Clontarf Bridge.


**Figure 1 Site location (generally identified in red)**

**Plate 1 Aerial image of the proposed development site in context**

## 3.0 PROPOSED DEVELOPMENT

**Plate 2 View of the proposed development from Lapp's Quay looking towards the south-east**

3.1 The Railyard Apartments proposed development comprises of the construction of 217 no. apartments comprising 25 no. studio units; 92 no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units apartments in a building that ranges in height from 8 to 11 to 24 storeys over ground floor at the former Carey Tool Hire site, currently principally occupied by Park Facilities Management Ltd, Albert Quay, Cork City.

The proposed works include:

- The construction of 217no. apartments [25no. studio units; 92no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units] in a building that ranges in height from 8 to 11 to 24 storeys over ground floor.
- The provision of external balconies on the east, west and south elevations to the 12th floor on the east and west elevation, and to the 9th floor on the southern elevation.
- The provision of an external public realm area at ground level, an eastern laneway for servicing of the proposed development, in addition to its use as a pedestrian link.
- The provision of internal communal space areas at ground floor, 1st floor, and 2nd floor, and 2no. external rooftop terraces on the 9th floor and the 12th floor.
- The provision of a ground floor community/arts use, with external seating area and a ground floor creche with external covered play area.
- The provision of ground level plant, ancillary uses, and bin store.
- Bicycle spaces at lower ground floor and ground floor level; additional visitor bicycle spaces; and a set down delivery area at ground floor level on Albert Street.
- Set back of the eastern boundary wall to the north and south.
- All site development, public realm and landscaping works.
- The proposed development also involves the demolition of the existing two-storey Carey Tool Hire building, currently principally occupied by Park Facilities Management Ltd.

3.2 The principal development statistics are as follows:

| Development Statistic | Proposed Development |
|---|---|
| **Site Area** | 0.2744 ha (2,744m$^2$) |
| **Gross Demolition Area** | 1,726m$^2$ (Carey Tool Hire) |
| **No. of Apartments** | 217no. apartments, to include:<br>• 25 no. 1 bed studio apartments (12%)<br>• 92 no. 1 bed apartments (42%)<br>• 88 no. 2 bed apartments (3 no. 2 bed (3 person) apartments and 85 no. 2 bed (4 person) apartments) (40.5%)<br>• 12 no. 3 bed apartments (5.5%) |
| **Gross Floor Area** | 22,063m$^2$ |
| **Resident Communal Amenity Space** | 1,368m$^2$, to include:<br>• 300m$^2$ Ground level plaza and public space<br>• 308m$^2$ 1$^{st}$ and 2$^{nd}$ floor communal amenity space<br>• 230m$^2$ Level 09 roof terrace<br>• 530m$^2$ Level 12 roof terrace |
| **Additional Amenities** | 1.732m$^2$, to include:<br>• 200m$^2$ ground floor community/arts use<br>• 208m$^2$ Creche<br>• 1,324m$^2$ Public open space – ground level plaza |
| **Part V** | 48no. residential units in total, to include:<br>• 5no. Studio apartments<br>• 27no. 1 Bed apartments<br>• 4no. 2 Bed apartments<br>• 12no. 3 Bed apartment |
| **Plot Ratio** | 8:1 |
| **Site Coverage** | 51% |
| **Residential Density** | 790 units/ha |
| **Building Height** | 8, 11 to 24 storeys over ground floor (new building) |
| **Aspect** | 53% of residential units benefit from dual aspect |
| **Private Open Space** | 64% of units provide for internalised private amenity to the required area adjacent to the main living space with sliding patio windows with integrated Juliet balconies provided.<br><br>The remaining 36% of units are provided with external balconies, they are located on the lower podium block not higher than Level 11, and are partly sheltered by neighbouring context and the proposed building itself. |
| **Storage Space** | 100% of residential units have individual storage space |
| **Cycle Spaces** | 340no. cycle spaces are proposed. These are distributed as follows:<br>• 160no. lower ground floor bike store<br>• 88no. external ground floor bike store<br>• 88no. spaces in the Terminus building |

| | |
|---|---|
| | An additional 24 no. external bicycle stand spaces parking in the public open space by the Albert Quay entrance to the building, for additional visitor parking. |
| **Car Spaces** | No car spaces are to be provided. |

**Table 1: Key Development Statistics**

3.3 In relation to services, the following is proposed:

- Foul Water Services: There is an existing 1800mm diameter sewer on Albert Quay, which is connected to the siphon chamber at the Victoria Road junction. From this point, the sewage drains to the Atlantic Pond pumping station. The proposed development will connect to this sewer. Uisce Éireann has indicated that this connection is feasible without upgrades to existing Uisce Éireann infrastructure in its Confirmation of Feasibility, reference CDS23008059, dated 21st December, 2023.

- Water Services: There is a 250mm diameter water main on the near side of Albert Quay. There are 3no. hydrants in the vicinity of the development, on the near side of Albert Quay at the entrance to the existing carpark, on Albert Street and on the opposite side of Albert Road. An additional hydrant is proposed on Albert Quay. It is also proposed to provide a new 150mm diameter connection to the 250mm diameter water main on the near side of Albert Quay to serve the overall development. Uisce Éireann has indicated that this connection is feasible without upgrades to existing Uisce Éireann infrastructure in its Confirmation of Feasibility, reference CDS23008059, dated 21st December, 2023.

- Surface Water: It is proposed to utilise an existing outfall to the River Lee located at the Junction of Albert Quay and Victoria Road. The Port of Cork has given consent to utilise this outfall. Although not specifically required to provide attenuation storage, onsite attenuation storage volume of $50m^3$ to allow for storage on site in the case of a 1:20 year flood event. It is proposed to provide a new 375 diameter sewer laid across Albert Quay East with an outfall to the River Lee as described above. In addition, rain gardens are proposed to provide a sustainable urban drainage system for the scheme.

- SuDS: There is $192m^2$ of landscaping, green areas and tree pits incorporated onto the site to work as SuDS in addition to the attenuation tank.

3.4 The construction of the proposed development will be carried out in the following phases, which are estimated to take approximately 2 years:

- Phase 1: Site Preparation & Enabling Works.
- Phase 2: Substructure Works.
- Phase 3: The RC Superstructure Works, including all associated works.
- Phase 4: Public Realm Works.

3.5 The proposed development has been subject to pre-planning consultation with representatives of Cork City Council on 28th November, 2023, 20th December, 2023, and 30th January 2024. The proposed development as presented in the application materials is aligned with the advice received at these meetings.

## 4.0 PLANNING POLICY CONSIDERATIONS

4.1 The key provisions of national, regional and local planning policy as it relates to the proposed development is set out in the following sections.

**Project Ireland 2040 – National Planning Framework (NPF) 2018**

4.2 Having regard to the National Planning Framework (NPF) 2018, the proposed development will:

- Deliver a large-scale mixed-use development in Docklands, the regeneration of which is a national enabler for Cork
- Contribute to the target of an additional 340,000-380,000 people in the Southern Region (NPO 1b)
- Deliver future population growth in Cork City (NPO 2a)
- Assist in delivering at least 40% of all new homes within the built-up footprint of existing settlements (NPO 3a)
- Assist in delivering at least 50% of all new homes within the existing built-up footprint of Cork (NPO 3b)
- Assist in creating an attractive, liveable, well-designed, high quality urban place (NPO 4)
- Assist in enabling Cork City to compete internationally and to be a driver of national and regional growth (NPO 5)
- Regenerate and rejuvenate Cork City with increased residential population and enhanced amenity and design quality (NPO 6)
- Encourage more people and generate more activity within Cork City (NPO 11)
- Provide a well-designed high quality development in an urban area without compromising public safety or the environment (NPO 13)
- Provide new homes at a location that can support sustainable development, that is of an appropriate scale relative to its location (NPO 33), and
- Increase residential density in Cork City through site-based regeneration and increased building height (NPO 35).

As such, it can be concluded that the proposal is in keeping the objectives of the National Planning Framework.

**Climate Action and Low Carbon Development Act 2015 and Climate Action Plan 2024**

4.3 Having regard to the provisions of the Act and Action Plan, the proposed development:

- is located in a highly sustainable area of the city centre of Cork, with transportation modes in favour of walking, cycling and use of public transport,
- will deliver a high-quality built form, reusing and regenerating a brownfield site, that is focused on energy efficiency and sustainability,
- will contribute towards the creation of a compact urban environment, reduced urban sprawl, and improved public realm to facilitate sustainable transportation modes
- will provide no car parking, and
- will provide enhanced cycle provision, and improved pedestrian permeability, as well as the retention and/or relocation of existing built heritage assets.

4.4 The proposed development will have a positive impact on climate change in this context.

**Urban Development and Building Heights Guidelines for Planning Authorities 2018**

4.5 The Guidelines are premised on there being '*a presumption in favour of buildings of increased height in our town /city cores and in other urban locations with good public transport accessibility*' (para 3.1). In this context, and having regard to the Transport Statement prepared by Arup, it is noted that:

- The pedestrian and cycling environment in the area has improved significantly in recent years.
    - Footpaths are provided on both sides of most streets in the vicinity of the proposed development. Cyclist-priority infrastructure is also provided on some of the surrounding streets, in particular on Albert Quay West.
    - Under the Cork Metropolitan Area Cycle Network Plan (2017), a network of cycling facilities has been identified and are due to be implemented. This was further developed as part of the proposed Cork Metropolitan Area Transport Strategy 2040 (CMATS), which includes similar primary and secondary routes near the site, with additional green routes through the Docklands and additional links in the vicinity of Kent Station to reflect new road layouts and developments under construction in that area.
    - Cork City is also served by the TFI Bikes bike share scheme which covers a large portion of the city centre and extends from Munster Technological University Cork in the west to Kent station in the east. The nearest public bike share scheme docking station to the site is on Clontarf Street, outside the Clarion Hotel, approximately 250m walking distance from the proposed pedestrian entrance on Albert Quay East.
    - There are additional bike stations located on Anglesea Street (approximately 300m walking distance), on Lapp's Quay (approximately 320m walking distance), and on Penrose Quay (Brian Boru Bridge – approximately 375m walk from the site).

- Cork City is served by 32 bus services, with the principal stops being at St. Patrick's Street, Merchant's Quay/Parnell Place Bus Station, and South Mall, while several routes also serve the City Hall bus stop.
    - The stop at Parnell Place is approximately 180m to the west of the site. A significant number of Bus Éireann Regional and Commuter services also terminate or stop at Parnell Place bus station.
    - The 202 service passes the site in the outbound direction, with a bus stop nearby at the northern end of Victoria Road, approximately 190m walking distance from the proposed development. Currently, the 202 service travels inbound via Eglinton Street, with a bus stop approximately 160m from the proposed development.
    - St. Patrick's Street which incorporates bus stops for services 203, 205, 207, 208, 209, 213, 214 and 215 is approximately a 675m walk from the proposed development.
    - Merchants Quay/Parnell Place station, which incorporate bus stops for services 202, 205, 207, 212, 213 and 214 is approximately a 600m walk away from the proposed development. South Mall, which incorporates bus stops for services 203, 206, 207, 209, 213, 215, 216, 220 and 223 is approximately a 400m walk from the proposed development. Many of these services are also served by a southbound bus stop on Anglesea Street, which is within a 300m walk from the proposed development.

- The Cork City Black Ash Park and Ride service operates as the 213 city service at 10-minute frequencies at peak times, and at 15-minute frequencies off-peak. The service operates from 07:00-20:30, Monday to Saturday. The nearest inbound service stop to the proposed development site is on Eglinton Street, approximately 160m from the site, and the nearest outbound service stop is on Anglesea Street, approximately 300m from the site.

- The proposed development is approximately 650m walk from Kent Station. Kent Station is the main train station serving Cork City. Services to and from Cobh, Mallow, Midleton, Tralee, Limerick and Dublin arrive and depart from Kent Station. The commuter services to and from Cobh and Midleton run every 30 mins during the AM and PM peak periods i.e. 07:00-09:00 and 16:00-19:00. There are six services from Mallow which arrive in Kent Station during the AM peak period and six services which depart from Cork to Mallow during the PM peak period.

- The new design for the Cork Metropolitan Bus Network, launched in June 2022 as part of the BusConnects Cork Project, is intended to transform the public transport network across the Cork Metropolitan Area, involving the creation of new bus routes and improved bus frequencies to meet the anticipated growth and future demand in the region. The new bus network will be implemented starting in 2023 and 2024. The new network design map indicates that a service (Route 4) is planned to run along Albert Quay, to the north of the site. Route 4 will connect Lehenaghmore and Mahon Point, having a midday frequency of 15 minutes on weekdays. Another service (Route 11) will also run along Albert Quay, to the north of the site. Route 11 will connect Mahon Point and Faranree, with a frequency of 30 minutes. These improvements will further increase accessibility of the site by public transport.

4.6 In justifying the proposed height, Urban Initiatives' Urban Design and Tall Buildings Statement reveals the following:

- Areas that are sensitive to tall buildings are concentrated in the west of the city centre, on elevated land and suburban areas.
- The areas in the east of the City Centre and Docklands are less sensitive to tall buildings.
- Tall buildings areas include areas of high public transport accessibility, urban centres and growth and regeneration areas. This highlights the City Centre and Docklands as suitable areas. The City Harbour Interchange area stands out as the principal area where tall buildings would be appropriate, it being the most accessible area, that is changing rapidly, and that has precedence for tall buildings.

  In this context, the proposed development will:

  - Help deliver economic growth, intensification and regeneration of Cork's city centre and Docks.
  - Increase density in areas well served by public transport, infrastructures and facilities.
  - Sensitively respond to the existing townscape and landscape character and the setting of the city.
  - Effectively contributes to place-making, an enhanced city image and co-ordinated skyline.
  - Enhance legibility and local distinctiveness.
  - Provides a comprehensive development with quality architectural and urban design of the highest order, and
  - Will deliver added regeneration and public benefits.

- The proposed development will make a positive contribution to place-making by introducing a new public space, The proposed development has also been carefully designed to deliver a high-density residential development of simple, elegant form that befits its sustainable location on the waterfront at the entrance to Docks that steps down in height from the front elevation along the River Lee to respect the existing 2no. Protected Structures on the rear elevation.

- The proposed development successfully combines modern architectural form and enlivened built heritage to deliver an appropriate scale of development at a key node in the City, at the junction of the N27 and Albert Quay East, signalling the entrance to Docklands. With its upper level 3-storey lantern feature, it will be a beacon for a city rising in a highly sustainable location, acting as a catalyst for the further regeneration of Docklands in line with national policy aspirations for Cork City, the fastest growing city in the country.

- The proposed development is of high architectural quality, presented as a simple, elegant composition, stepping down in height from a corner tower of 25 storeys, to 12 storeys and 9 storeys, with the 9 storey rear section of a darker palette to ensure it integrates successfully with the existing environment, and set back from the 2no. existing Protected Structures, to maintain the existing streetscape along the south and south-western elevations, while locating the tall building at its rightful location facing the waterfront along the northern elevation.

- The design has been guided by the provisions of the Flooding Guidelines, while ensuring a successful interface between existing and proposed levels. A Flood Risk Assessment (FRA) and Justification Test has been prepared by Arup and is included with this application. The FRA has demonstrated that the risks relating to flooding can be managed and mitigated to acceptable levels and therefore comply with DoEHLG / OPW and Cork City Council planning guidance. The proposed development satisfies the criteria of the development management Justification Test.

- The proposed development has been designed to integrate with the adjacent public space of Navigation Square to the east, presenting a soft core to the built form on the site's edges, while also facilitating ease of access for pedestrians and cyclists through the site, linking up with existing public spaces to the west, and onwards into the City Centre. It will also signal the entrance to the Docklands from other areas of the City.

- With existing and permitted heights of 9 (Penrose Dock), 15 (Prism), 17 (Elysian), and 27 (eastern end of Docklands) storeys in the vicinity, as well as proposed heights of 17 (South Link BTR) and 34 (Custom House Quay) storeys in the immediate area, the proposed 25-12-9 storey residential building will not be out of character with the building typologies in this area of the City.

- The proposed development has been designed with floor to ceiling glazing, with adequate ventilation, for all apartments, therefore maximising views and access to natural daylight as far as possible. 53% of apartments benefit from dual frontage. The design approach has also ensured that there will be minimal overshadowing.

- An assessment of the proposed development has been undertaken by IES (Appendix 1), undertaken in full compliance with the BRE Guidance, as follows:

  ***Shadow Analysis***

  *The shadow analysis illustrates different shadows being cast at key times of the year (March 21st, June 21st and December 21st) for the Existing Situation and the Proposed Scheme. The results from the study are summarised as follows:*

  ***Albert Street - Residential***

  *No additional shading visible from the proposed development on these existing properties throughout the year.*

  ***Albert Road - Residential***

  *No additional shading visible from the proposed development on these existing properties throughout the year.*

  ***Sunlight to Amenity Spaces***

  *On March 21st, 96% of the combined proposed external private communal amenity areas situated within the development site will receive at least 2 hours of sunlight over their total area, thus, complying with the BRE recommendations. When considered individually, all external private communal amenity areas exceed the BRE guidelines.*

  ***Sunlight to Existing Buildings***

  *The proposed development will have no impact to the sunlight received to the existing residential properties.*

  ***Sunlight to Proposed Development***

  *Of the 217 no. points tested, 169 no. points (78%) meet the BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021 sunlight exposure recommendations of greater than 1.5 hours on March 21st.*

  *Where windows do not meet this recommendation, this is predominantly as a result of their orientation, or as a consequence of the impact of balcony projections.*

*Overall, the sunlight provision results to the proposed development in accordance with IS/BS EN 17037-2018+A1-2021 are considered excellent in the context of a suburban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.*

***Daylight to Existing Buildings***

*100% of the 63 points tested have a Proposed VSC value greater than 27% or not less than 0.8 times their former value compared to the Existing and Permitted Situations. The proposed development shows no change to daylight when compared to the permitted design.*

***Daylight to Proposed Development***

*For the daylight to proposed development assessment, two standards have been analysed: IS EN 17037-2018+A1-2021 and BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition).*

*There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 of IS EN 17037-2018+A1-2021 which are summarised as follows:*
*Method 1: This calculation method uses the daylight factor targets on the reference plane as per Table A.3 (refer to Section 10.1.2 of this report). The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.*

*Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1 (refer to Section 10.1.2 of this report). The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.*

*The daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table A.1 of IS EN 17037-2018+A1-2021.*

*The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1.*

*Across the proposed development, 85% of the tested rooms are achieving the daylight provision targets in accordance with Table A.1 of IS EN 17037-2018+A1-2021 using Method 2.*

*Across the proposed development, 95% of the tested rooms are achieving the daylight provision targets in accordance with Table NA.1 of BS EN 17037-2018+A1-2021 using Method 2.*

*It should be noted that throughout the design process the design team worked hard to optimise the whole development to maximise the daylight within the proposed scheme.*

*Design features have been incorporated into the development where rooms do not achieve the daylight provision targets in accordance with the standards they were assessed against. These design features again help to balance off and compensate the lower levels of daylight measured in the applicable spaces and are summarised as follows:*

- *100% of the units have a floor area 10% greater than the minimum floor area requirements as required by the Design Standards (2023). Note that larger floor areas make it more difficult to achieve the recommended daylight levels. However, larger windows have been incorporated into the design which also improves the view out for the building occupants.*

- *53% of the units are dual aspect which is above the 33% minimum requirement as required by the Design Standards (2023). As a result, more apartment units than the recommended minimum will achieve quality daylight from dual-aspect orientations.*

- *The proposed scheme provides 1,451sq.m of communal amenity space, thus exceeding the 1,281sq.m required pursuant to the Design Standards (2023).*

***View Out***

*All the properties would meet the minimum 'View Out' requirement as outlined in IS EN 17037-2018+A1-2021 / BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition).*

***Glare***

*Given that occupants within a domestic setting are free to move around, a glare assessment for the proposed development has not been carried out.*

***Specific Assessments***

The Guidelines indicate that in order to support proposals at some or all of these scales, specific assessments may be required and these may include:

- *Specific impact assessment of the micro-climatic effects such as downdraft. Such assessments shall include measures to avoid/ mitigate such micro-climatic effects and, where appropriate, shall include an assessment of the cumulative micro-climatic effects where taller buildings are clustered.*

  The proposed development has been subject to a wind modelling assessment prepared by B-Fluid (Appendix 2), which concludes that:

  - The development is designed to be a high-quality environment for the scope of use intended of each areas/building (i.e. comfortable and pleasant for potential pedestrian).
  - The development does not introduce any critical impact on the surrounding buildings, or nearby adjacent roads.

- *In development locations in proximity to sensitive bird and / or bat areas, proposed developments need to consider the potential interaction of the building location, building materials and artificial lighting to impact flight lines and / or collision.*

  The proposed development site has been assessed for the presence of bats or other mammals, with the project ecologist reporting that there is no evidence of such protected species.

- *An assessment that the proposal allows for the retention of important telecommunication channels, such as microwave links.*

  The proposed development will not impact telecommunication channels.

- *An assessment that the proposal maintains safe air navigation.*

  The maximum elevation of the proposed building is below the elevation of Cork airport and as such there is no impact to flight procedures. The proposed development is located well outside the Cork Public Safety Zone (Outer).

- *An urban design statement including, as appropriate, impact on the historic built environment.*

Urban Initiatives has prepared a detailed urban design assessment, which sets out an analysis of the receiving urban area; the constraints and opportunities presented by the proposed development site; and how the proposed development accords with accepted urban design principles.

Furthermore, the proposed development has been subject to an Architectural Heritage Statement by Jack Coughlan & Associates (Appendix 3) which notes that the remaining built heritage features on the site have been retained and/or relocated within the site and form part of the landscape strategy for the proposed development. The report concludes that although located within an Architectural Conservation Area, the new buildings are proposed in the context of the Cork City Development Plan 2022-2028, which notes of this ACA that:

> *The aim should not be to retain all existing buildings and features but to encourage appropriate development of vacant land and under-used buildings by retaining the most significant elements of heritage interest as an integral part of the evolving character of the area.*

The Development Plan also states that new development should generally reflect contemporary architectural practice, and not aim to mimic historic building styles, identifying the City Docks as the strategic area for tall buildings in Cork, providing landmark buildings for the area.

In addition, the proposed development has been subject to an Archaeological Impact Assessment by John Cronin Archaeologist (Appendix 4), which recommends that a watching brief of construction phase groundworks should be undertaken by a suitably qualified archaeologist and will be based on regular inspections of the subject site. In the unlikely event that archaeological remains are encountered, groundworks halted in that area while consultation and agreement with Cork City Council and the National Monuments Service on the appropriate further mitigation strategy. A report detailing the results of the archaeological watching brief of the construction phase of the proposed development will be complied and submitted to Cork City Council and the National Monuments Service.

- *Relevant environmental assessment requirements, including SEA, EIA, AA and Ecological Impact Assessment, as appropriate.*

The proposed development has been subject to screening for EIA and AA prepared by Doherty Environmental Consultants, which can be summarised as follows:

- The site was previously subject to a planning permission for a Strategic Housing Development [SHD] for 201 no. apartments (ref. no. ABP-305779-19) granted by An Bord Pleanála ("the Board") on 26th February, 2020. The then proposed development was not subject to a mandatory EIA. However, it was determined that an EIAR should be prepared and submitted with the planning application on the basis that, having regard to the criteria set out in Schedule 7 of the Planning and Development Regulations 2001, as amended ("the 2001 Regulations"), that the then proposed development had the potential to affect cultural heritage in the area (by reason of the fact that the planning application sought permission for the demolition of the former Sextant public house, which was listed on the National Inventory of Architectural Heritage (NIAH), Reg. No. 20508014 in the (then proposed) Albert Quay, Albert Road, Victoria Road Proposed Architectural Conservation Area). However, given that the former Sextant public house has been demolished; that there are no Protected Structures in the proposed development site; and that the planning policy context of the site has also evolved, with sections 11.49 and 11.50 of the Cork City Development Plan 2022 specifically identifying the Tip of the Island/Warehouse Quarter, in which area the site is located, as one of the zones in the City Docks as the strategic area for tall buildings in Cork, it is considered that there are a number of

material differences in the factual and planning circumstances that pertained in respect of the previous development and the current project.

- Given that the project does not fall under a class of development prescribed in Part 1 or Part 2 of Schedule 5, a mandatory EIA has therefore not been triggered under the requirements of the 2001 Regulations.

- No potential for significant effects on the environment to arise from the characteristics of the proposed development. The scale and extent of the works proposed are representative of a project in keeping with recent and recently consented developments in the vicinity and is consistent with Cork City Council land use policy. The project site is located in an area of low ecological value in an area of representative urban land cover and high levels of human activity. Design measures that form part of the project will ensure protection of the receiving environment. These design measures include the implementation of storm water management and SuDS. The implementation of best practice measures to manage noise and vibration levels and dust emissions at sensitive receptors will also ensure that the project does not result in nuisance to the receiving population.

- No significant effects likely to arise associated with the location of the proposed development. The site is not located in an area of high biodiversity or landscape value. It is located adjacent to a sensitive receptor in the form of the River Lee. For the reasons set out above the project will not have the potential to result in likely significant effects to the River Lee and its associated water quality and the fauna supported by it. Effective measures that are considered to be representative of standard measures to manage nuisance such as noise and vibration, air emissions and traffic will be implemented during the construction phase. These measures are set out in Appendix 1 and their effective implementation will ensure that there is no real likelihood of significant effects on the environment. With regard to cultural heritage, there is no likelihood of significant effects on the environment.

- No potential significant effects will arise from the project on environmental parameters. Potential impacts to biodiversity; land and soils; water; air quality; noise and vibration are not considered to be significant and will be further mitigated through the implementation measures that are considered to be representative of standard, best practice measures at development sites. No significant environmental impacts will occur and, furthermore, best practice measure in construction and design have been outlined in this Report to further eliminate the potential for any minor disturbances to arise. These measures are representative of standard industry environmental management that will be effectively implemented to further minimise the impact of projects to the environment.

- The Screening Report for Appropriate Assessment that accompanies the application has found that 2 European Sites, namely the Cork Harbour SPA and the Great Island Channel SAC, occurring within the wider area surrounding the project site are connected to the project site via a hydrological, noise and mobile species pathways. An examination of the project has been carried out to determine whether or not it will have the potential to result in likely significant effects to these European Sites. This examination has found that no impact pathways will connect the project to the Cork Harbour SPA and the Great Island Channel SAC and that the project will not have the potential, alone or in-combination with other plans or projects, to result in adverse impacts to European Sites. In light of the findings of the report it is the considered view of the authors of the Screening Report for Appropriate Assessment that it can be concluded by the competent authority that the project will not, alone or in-combination with other plans or projects, have a significant effect on any European Sites in view of their Conservation Objectives and on the basis of best scientific evidence and there is no reasonable scientific doubt as to that conclusion.

**Planning and Flood Risk Management Guidelines 2009**

4.7 A Flood Risk Assessment (FRA) has been completed. This FRA followed a precautionary approach by assessing that project in the context of its location within an area classified as Flood Zone A, even though parts of the northern area of the site are located within Flood Zone B and the southern area of the site is located within Flood Zone C. The FRA found that the project will not have the potential for significant impact on flood risk off site, as the primary flood risk to the site is tidal.

4.8 In order to minimise the risk of a potential flood event during its operational phase, the building is designed such that the minimum floor level of the proposed buildings are at 3.80mOD. It is further noted that the project site will be afforded additional flood defence as part of the Lower Lee (Cork City) Drainage Scheme, which has been designed to protect properties at and surrounding the project site from the 1 in 100 year fluvial and 1 in 200 tidal events, plus an allowance for freeboard.

**Sustainable Urban Housing: Design Standards for New Apartments 2023**

4.9 Section 2.2 of the Guidelines identifies that the appropriate location for apartment development is within urban areas, noting *'the scale and extent of apartment development should increase in relation to proximity to core urban centres and other relevant factors. Existing public transport nodes or locations where high frequency public transport can be provided, that are close to locations of employment and a range of urban amenities including parks/waterfronts, shopping and other services, are also particularly suited to apartments'*.

4.10 The guidelines identify accessible urban locations which are generally suited to large scale apartment developments include sites within walking distance (i.e. up to 15 minutes or 1,000-1,500m), of principal city centres, or significant employment locations, that may include hospitals and third-level institutions or sites which an easy walking distance (i.e. up to 5 minutes or 400-500m) to/from high frequency (i.e. min 10 minute peak hour frequency) urban bus services.

4.11 The proposed development site, is located within the centre of Cork City which hosts a number of large scale employment areas and is additionally within 400m of the City's bus station and 500m of the City's train station, can be classified as a central and/or accessible urban area.

4.12 A detailed Housing Quality Assessment has been prepared by Henry J Lyons, with the following key facts:

- The housing mix is 12% studio units (25no.); 42% 1-bed units (92no.); 40% 2-bed units (88no.); and 6% 3-bed units (12no.). Having regard to section 2.2.1 of the Guidelines, this mix will deliver much needed social and affordable housing in Cork City. It is noted that 48no. units (22%) are proposed to meet Part V requirements, well over the 10% requirement.
- All apartments meet the requirements of the Guidelines, specifically unit areas, with all proposed units exceed the minimum standards by 10% over the minimum standard;
- All bedroom areas; bedroom aggregate areas; and living/dining/kitchen areas meet the requirements of the Guidelines.
- In addition, 53% of proposed units are dual aspect. There is only 1 unit per floor from level 1 to level 11 that is single aspect north facing, and this unit enjoys views of the river to compensate.
- A minimum floor to ceiling height of 2.4m is achieved.
- The number of apartments per floor per core are below the maximum.
- In relation to private amenity, 64% of units have internalised private amenity areas adjacent to the main living space, and sliding patio doors with integrated juliet balconies are provided. The remaining 36% of units have external balconies. All balconies are a minimum depth of 1.5m.

- A total of 1,368m$^2$ communal amenity space is provided, including 760m$^2$ of external shared amenity in the form of roof terraces at Levels 9 and 12, as well as internal communal amenity spaces totalling 608m$^2$ at Levels 0, 1 and 2, well over the minimum requirement of 1,281m$^2$. There is also a community/arts and creche at ground level.
- In relation to storage, 100% of units have internal storage, and an additional designated storage space of 120m$^2$ in the basement more than compensates for the overall deficit in unit storage space of 37.67m$^2$.

**Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities 2024**

4.13 The guidelines seek to create compact and sustainable settlements in line with the objectives set out in the National Planning Framework.

The guidelines identify that in City Centre/ Urban Centre locations, the key priorities are to:

a) Strengthen city, town and village centres,
b) Protect, restore and enhance historic fabric, character, amenity, natural heritage, biodiversity and environmental quality,
c) Realise opportunities for adaptation, reuse and intensification of existing buildings and for incremental brownfield and infill development,
d) Deliver brownfield and infill development at scale at suitable strategic and sustainable development locations within the existing built up footprint of the city and suburbs area or metropolitan towns

The guidelines outline in regard to development in Cork, '*the city centre and immediately surrounding neighbourhoods6, are the most central and accessible urban locations nationally with the greatest intensity of land uses, including higher order employment, recreation, cultural, education, commercial and retail uses. It is a policy and objective of these Guidelines that residential densities in the range 100 dph to 300 dph (net) shall generally be applied in the centres of Dublin and Cork'.*

The guidelines identify in section 3.3.6 that exemptions to density and ranges can be exceeded where they are plan-led and identified in the relevant statutory plan.

In this context:

- The proposed development is plan-led in that it will deliver an efficient use of land and an increased residential population in a new high-density, high-quality, distinctive residential development in Cork City, which is fully supported by national, regional and local planning policy.
- In addition, Section 11.50 of the Plan highlights four areas of the City Docks which are appropriate locations for tall buildings, to include the 'Tip of the Island/Warehouse Quarter' which includes the proposed development site. It specifically describes this zone as *an existing cluster of tall buildings comprising The Elysian and several planning commitments.* It is noted that the site already has the benefit of an extant planning permission for a tall residential building of up to 25 storeys.
- The proposed development site also has an existing permission for 201no. units at a density of 526 units/ha, which is already above the range identified in the Guidelines. The increased density in this instance reflects the increase in the number of units by 16no. over the permitted development, and the reduced red line boundary site area as a result of the focus on the delivery of an apartment scheme at this location.
- The density of the permitted development would in fact equate to 732.5units/hectare, if the reduced red line boundary was applied. The objective is to maximise the number of apartments that can be delivered at this location to deliver on the requirement for compact growth in a sustainable, accessible city centre location at the permitted height of the previous permissions – no increase in height is proposed.

The applicant remains committed to refurbishing and reusing the 2no. Protected Structures on site (the two-storey former Cork, Blackrock and Passage Railway Offices, Ref. No. PS 1137, and the adjoining single-storey former Blackrock and Passage Railway Terminus – Ticket Office, Ref. No. PS 1138, which is also a Recorded Monument, CO074-119002) in line with the existing permission under application register reference 21/40237, which includes the refurbishment and reuse of the 2no. Protected Structures for office use and public bar/restaurant use with outdoor seating area respectively., during the lifetime of that permission.

The guidelines also identify four key indicators of quality design and placemaking that informs the development of settlements, neighbourhoods and/or an individual sites. These are:

1. Sustainable and Efficient Movement
2. Mix and Distribution of Uses
3. Green and Blue Infrastructure
4. Responsive Built Form

With regard to these key indicators, it can be concluded that the development:

- Well-connected and accessible by sustainable modes, additionally the development prioritises the use of sustainable transport options such as public transport, walking and cycling by way of the provision of 340 no. cycle spaces (not including proposed visitor spaces) and not providing on-site vehicular parking;
- Provides for a mix of uses, providing 217 no. residential units along with a childcare facility and community/arts use at ground floor level.
- A high quality landscaped public plaza at ground floor level.
- Improved pedestrian permeability.
- A built form that responds to the evolving context within which the proposed development is located.

In this context, it can be concluded that the development is in keeping with the Guidelines and constitutes a sustainable and compact residential development, and the increase in density over the permitted development is fully justified.

**Urban Design Manual – A Best Practice Guide**

4.14 The urban design report prepared by Urban Initiatives sets out the urban design rationale for the proposed development in detail. In relation to the 12 criteria, it can be stated as follows:

| *Criterion* | *Commentary* |
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| *01: Context: How does the development respond to its surroundings* | The proposed development responds to the opportunity to mark this important gateway location in the City at the intersection of the South Link Road with Albert Quay and at a principal bridge over the River Lee. Furthermore, the site is at the entrance point into the City Docks and marks the area where the city centre intersects with the Docks regeneration area. There is an opportunity here to mark this special place with a landmark building of the highest quality on the waterfront. The building is distinctive and of a scale and height that is appropriate to its context and its special location within the emerging commercial heart of Cork. As a landmark the development is perceived as a positive addition to the city, and delivers an |

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| | architecturally exemplar building that sets a quality benchmark within Cork.<br><br>The tallest element of the scheme is situated on the prominent corner of Albert Quay and Albert Street, to emphasise this important intersection and to maximise on the visibility from across and along the river. The tower itself is carefully designed and will provide an elegant and slender addition to the skyline in views from close-by as well as over the city. A tall building on this site with its height and location is justified and it would positively contribute to the city's skyline and the image of Cork. The proposed development will step down in height from the tower to respond to the lower level buildings to the rear and to the south of the proposed development site. |
| *02: Connections: How well connected is the new neighbourhood* | The site assumes a strategic position in the network of routes within Cork city centre. It is situated on the last bridge crossing before the City Docks and at the proposed new river promenade along Albert Quay. Albert Street and Albert Road are important connections with South Cork and the Docklands.<br><br>A pedestrianised lane connects Eglinton Street and the City Hall with Albert Road to the south of One Albert Quay, where a pedestrian crossing facility leads to the site. The Navigation Square development on the adjoining site establishes a new public space within the street block accessed by a number of pedestrian lanes.<br><br>The development responds appropriately to the site's accessibility from all directions, establishes permeability and connects the street block internally. The layout of the proposed development responds to the accessibility of the site. The principal frontage and front door is located on Albert Quay, providing good levels of animation, overlooking and passive surveillance. There is a new internal pedestrian route from Albert Road, as well as a pedestrian connection to Albert Quay. |
| *03: Inclusivity: How easily can people use and access the development* | The proposed development benefits from primary entrance from Albert Quay and a secondary entrance from the public courtyard. The ground floor community/arts use will also be accessible to the public. There is a new internal pedestrian route from Albert Road, as well as a pedestrian connection to Albert Quay |
| *04: Variety: How does the development promote a good mix of activities* | The proposed development includes a total of 25no. studio units in 3 apartment types; 92no. 1-bed |

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| | apartments in 11 apartment types; 88no. 2-bed apartments (3no. 2-bed 3 person apartments; 85no. 2-bed 4 person apartments) in 9 apartment types; and 12no. 3-bed apartments in 2 apartment types.<br><br>The proposed development also provides a community/arts use on the ground floor, which is available for the use of residents of the proposed development and is also open to the public. The proposed development also provides a creche use, which will also be of benefit to residents, as well as the wider community.<br><br>The proposed development will add to the mix of the quarter and complement the prevailing commercial uses. Residents will animate the area outside of office hours, and bring life to the streets, especially in the evenings and weekends. The proposed development provides active uses on the ground floor. |
| *05: Efficiency: How does the development make appropriate use of resources, including land* | The proposed development maximises the development potential of this strategic site by providing 217no. apartments in a building that ranges in height from 8, 11 to 24 storeys over ground floor. The proposed development will improve the public realm in the vicinity of the site and will connect to existing public services. |
| *06: Distinctiveness: How does the proposals create a sense of place* | The proposed development positions the slender, well-proportioned tower at the prominent corner of Albert Quay and Albert Street, where it will contribute to a sense of place and be a reference landmark at the entrance to City Docks be widely visible within views along the river as well as from approaching routes.<br><br>The proposed development site is located in an area with a diverse urban grain. The proposed development breaks down the development into a series of buildings and manages to mediate between the larger and smaller buildings on site. The area within which the proposed development is located is transforming into a cohesive urban quarter with a metropolitan character. The proposed development completes the western portion of the street block and establishes a strong urban edge and well-defined street space. The size of the frontages responds to the scale of the street and their prevailing character and enhances the sense of enclosure. |
| *07: Layout: How does the proposal create people friendly streets and spaces* | The proposed development establishes two routes across the site with different character that will integrate with the wider public realm. The space |

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| | between the development and Navigation Square will provide a more formal and direct route from Albert Quay. This space will receive direct sunlight. It will have planted areas, trees and seating. The second route from Albert Street provides a series of high-quality courtyards, which will receive sun throughout the day. |
| *08: Public Realm: How safe, secure and enjoyable are the public areas* | The public realm areas are predominantly internal to the scheme and overlooked by the residential uses with their open façade design, and ground floor commercial uses. There is no vehicular access to the public areas.<br><br>The public area between the proposed development site and the adjacent office site to the east will benefit from a sense of orientation as it faces onto the River Lee. This south-facing space will benefit from sunlight from the middle of the day which will be of benefit to the adjacent office workers as well as residents of the proposed development.<br><br>The provision of landscaped seating areas and feature lighting, as well as the reflected light from the facades, the public space will be a pleasant and bright environment to be in.<br><br>The external public realm areas are well defined, widened outside the main entrance to the building to provide an appropriate setting and avoid footpath conflicts.<br><br>Overall, the public realm areas will be attractive and inviting spaces to be enjoyed by all. |
| *09: Adaptability: How will the building cope with change?* | The proposed development is designed to provide for amalgamation or subdivision of some of the residential units as may be needed, as well as the potential to provide for a conversion of the ground floor commercial spaces to alternative uses. |
| *10. Privacy and Amenity: How does the scheme provide a decent standard of amenity* | The proposed development provides for communal amenities on the ground and first floors. The proposed development also provides for communal roof terraces on the 9th and 12th floor. In addition, there is a ground level plaza area and upgraded public realm.<br><br>There is also a community/arts use on the ground floor, which is available for the use of residents of the proposed development and is also open to the public.<br><br>All apartments meet the requirements of the Guidelines, specifically unit areas; bedroom areas; |

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| | bedroom aggregate areas; and living/dining/kitchen areas. 53% of apartments benefit from dual aspect.<br><br>64% of units have internalised private amenity areas adjacent to the main living space, and sliding patio doors with juliet balconies are provided. The remaining units have external balconies. There is additional shared amenity is provided in the form of roof terraces at Levels 9 and 12.<br><br>In relation to storage, all units have internal storage. |
| *11. Parking: How will the parking be secure and attractive* | There is no parking provided for the scheme. A set down area is provided on Albert Quay for deliveries and drop-off purposes. |
| *12. Detailed Design: How well thought through is the building and landscape design* | As set out in the Architectural Design Statement, the design approach was premised on the following guiding principles:<br><br>• To create an new public space for the city which will allow the development to work within the existing urban grain, will provide permeability and accessibility through the site, and will provide active ground floor frontage and an amenity space for people to linger in and enjoy;<br>• To provide a landmark building of an appropriate scale and stature to reflect the significance and prominence of the site's location at the gateway between the City Centre and City Docks;<br>• To carefully control the massing of the building so that it sits comfortably within the site context, with higher elements located towards the riverfront, in keeping with nearby new developments on the Quays, and gradually stepping down in level across the site to create a transition in scale which respects the more modest heritage buildings to the south of the site;<br>• To create a building composition arranged around the new public space which responds to the different unique aspects of the site and is visually interesting while also unified by the use of an architectural rhythm and a carefully selected colour and materials palette.<br><br>The architectural composition emerged through a rigorous process of design development: |

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| | • The tallest section of the building is located to the northwest at the corner of Albert Quay and Albert Street, where the site addresses the river crossing and the city centre.<br>• The building then steps down in height twice as it stretches to the south towards the lower scale railway buildings on Albert Street.<br>• The slender regular form of the tower is inspired by the local spires which are evident across the city skyline.<br>• Another important aspect to the exercise was the proportional relationship between the tower and the mid-rise element. The resulting geometry and proportions create a composition which is balanced in height and width.<br><br>The landscape design is focused on providing a high quality, attractive, inviting, and durable/easily maintained public plaza and roof terraces for the enjoyment of future residents.<br><br>For these reasons it is considered that the proposed development benefits from a well thought through building and landscape design. |

**Design Manual for Urban Roads and Streets**

4.15 The proposed development site is located on the eastern fringe of Cork City Centre, placing the city centre within a short walking distance, but also ensuring that key transport hubs such as Parnell Place Bus Station, Kent Rail Station and St. Patrick's Street (a key city centre bus interchange location) are easily and readily accessible. It is bordered on three sides by public roads and on the fourth by a pedestrian walkway to the west of the Navigation Square office development. As such, much of the guidance contained within DMURS is not fully applicable to the proposed development, which does not propose to create any new roadways or streets.

4.16 In addition, the proposed Docklands to City Centre Road Network Improvements Scheme along Albert Quay East have been considered by the design team. The proposals have received Part 8 approval, and include a proposed contra-flow bus lane on Albert Quay East which will pass along the northern site frontage, and a two-way cycle track and extensive pedestrian public realm improvements along the northern side of Albert Quay East. The site is therefore excellently positioned to avail of these significant improvements to facilities designed to promote walking, cycling and public transport. These proposals have been considered during the development of the site frontage on Albert Quay East, including the facilitation of wide footpaths for pedestrian comfort, high quality public realm design, and the inclusion of active frontage with a proposed community/arts use.

**Guidelines for Planning Authorities on Childcare Facilities (2001)**

4.17 The Apartment Guidelines 2018 requires that childcare facilities be provided in accordance with the demographic profile of the area and the existing capacity of childcare centres.

4.18 Based on the demographic trends in the Cork City area, the nature of the proposed development and likely demand for childcare spaces to be generated as a result, and the availability of existing facilities in the area, it is considered appropriate that a childcare facility is included in the proposed development.

**Smarter Travel – A New Transport Policy for Ireland 2009**

4.19 The proposed development is located in close proximity to Cork's bus station and train station, as well as the City Centre resources. It is connected to an extensive array of footpath and cycle ways to existing City Centre resources at this sustainable location.

4.20 No car parking is provided. 340no. cycle spaces are proposed, as is improvements to the public realm in the vicinity of the proposed development site. In this respect, it can be concluded that the proposed development is one which prioritises active modes of travel or public transport and is consistent with the requirements of the Smarter Travel Policy.

**Regional, Spatial and Economic Strategy (RSES) for the Southern Region 2020**

4.21 Having regard to the Regional, Spatial and Economic Strategy the proposed development:

- Will strengthen the settlement structure of the Region, facilitating the strategic role our cities play in the region, seeking to support cities and all communities in being engines for growth, in line with RPO 2 of the RSES.
- Will contribute to the achievement of significantly accelerated and urban-focused compact growth in line with RPO 10, which seeks to prioritise development in existing city footprints where it can be served by public transport, walking and cycling.
- Will result in increased residential densities in the City Centre, in close proximity to public transport, within the contiguous area of the city centre integrating the land use with existing and planned transport infrastructure in line with RPO 151.
- The development will allow for future residents to live in close proximity to the extensive range of cultural, entertainment, employment and educational uses within the city centre, contributing to the development of a 10 minute city in line with RPO 176.
- The development will provide an additional childcare facility within the city, this will improve access to such services to those within the development in line with RPO 177.

4.22 With regard to this, it can be assessed that the proposed development will provide for a brownfield site to be redeveloped to provide for a high quality, compact residential development which will increase the vibrancy of the city and wider region.

4.23 Further to this, the RSES sets out the ***Metropolitan Area Strategic Plan*** for the Cork Metropolitan area, having regard to the objectives set out in the Cork MASP, the development:

- Will strengthen Cork's role as an international location of scale and a primary driver of population growth within the Southern Region, representing infrastructure led growth which will consolidate the city centre and regenerate the city docklands, in line with Cork MASP Objective 1.

- Will provide an additional 217 no. of residential units within the city which will contribute to the vibrancy of the city centre in addition to contributing to the create of a high quality, mixed use docklands in keeping with Cork MASP Objective 2.
- Will provide for a strategic development which will contribute to the consolidation of the city centre and regeneration of the city docklands which is located next to integrated transport infrastructure, in keeping with Cork MASP Objective 7.
- Will provide an additional 217 no. residential units which will facilitate the targeted population growth by 75,000 people in Cork City and its suburbs by 2031.

4.24 It can be concluded that the proposed development is aligned with the regional objectives set out in the RSES and will contribute to the growth of the Cork Metropolitan Area to become a City of international scale.

**Cork City Development Plan 2022-2028**

4.25 Having regard to the provisions of the Cork City Development Plan 2022, the proposed development:

- Will result in an increased population that will contribute to the realisation of a compact, sustainable city in line with Strategic Objective 1 and objectives 2.10, 2.28 and 2.31 of the Plan.
- Will assist in meeting the targeted growth in population by 50,948 people for Cork (Table 2.3 of the Plan), delivering 217 of the 2,238 unit target identified for City Docks.
- Will assist in providing 217 additional residential units in the city consistent with objectives 2.32 and 3.3.
- Will assist in creating a well-designed, sustainable residential development in the City Centre in close proximity to social and community assets in line with objective 2.10, 2.13 and 2.14 of the Plan.
- Is consistent with Objective 3.1 of the Plan, as it will encourage the development of sustainable residential neighbourhoods, which seeks to utilise City Neighbourhoods as spatial units to develop sustainable neighbourhoods, employing the 15-Minute City concept, with placemaking at the heart of the scheme.
- Will provide a childcare facility which will meet any generated childcare needs as a result of the development in line with objective 3.21 of the Plan.
- Provides for a mix of uses on the site which will complement the developments residential dwellings and the wider environs in line with objective 2.12 of the Plan.
- Will provide for additional residential dwellings with a mix of unit types which allow for a broad range of residents within the city centre in line with objective 3.2 of the Plan.
- Can be successfully absorbed into the existing character and context of the area, in accordance with Objective 6.14.
- The development is consistent with sections 10.24-10.26 of the Plan which outlines the vision and role for the development of the docklands, seeking to create 'new sustainable neighbourhood in the centre of Cork City that benefits from excellent placemaking, with people-centred streets and spaces, a great place to live and work which is an extension to Cork City Centre and a key destination for the economic, cultural, educational, commercial, civic and social vibrancy of the City. This is consistent with objectives 10.19 and 10.18 of the Plan.
- Responds to the demand for more residential units in line with the recommendation of the Cork Joint Housing Needs Assessment and provides a mix of apartment types, in accordance with objective 11.2 of the Plan.
- Will comply with the ZO 05 City Centre zoning objective, which seeks to promote the continued economic, civic, cultural and residential growth of the City Centre.
- Will deliver a distinctive, elegant, tall building at a pivotal entry point to City Docks, along the river frontage east of Brian Boru Bridge/Clontarf Bridge, within walking distance of Cork's public transport hubs, consistent with the provisions of the Plan and associated guidance in Cork City Urban Density, Building Height and Tall Buildings Study 2021 which indicates the locations that have the potential to accommodate increased building height.
- Will deliver high density residential development in close proximity to existing and planned high frequency public transport in keeping with objective 4.3 of the Plan.

- it is consistent with the Flood Risk Management Guidelines, and a Flood Risk Assessment has been prepared, in accordance with objective 9.10 of the Plan.

4.26 The proposed plot ratio, height and density can be justified as follows:

- The proposed development optimises the potential of this central accessible brownfield site to increase the city's population growth in line with the NPF target of between 315,000-345,000 people to 2040, which represents an increase of 43% to 57% over current levels.

- It also responds to the critical shortage in residential accommodation in Cork, and will contribute to the target of at least 50% of all new homes within the existing built-up footprint of the City. The provision of high-density apartments is widely accepted as the most sustainable form of development to accommodate this growth.

- The proposed development will deliver a large-scale primarily residential scheme at the entrance to the City Docks, the regeneration of which is a national enabler for Cork, as set out in the NPF and the Regional Spatial and Economic Strategy (RSES).

- Objective 3.5 of the Cork City Development Plan 2022 also supports higher densities in certain locations based on a range of 8no. suitabilities, including: identification as a major development opportunity, such as the City Docks; being within or close to an urban centre, such as the location of the proposed development in the City Centre; access to high-quality public transport proposed in CMATS, which applies to the proposed development site; access to local services, which applies to the City Centre location of the proposed development; and access to parks and green space, such as the proposed development site, proximate to Shalom Park and to the City Quays, and Marina Park.

- It is noted in Table 10.4 that the Warehouse Quarter in City Docks is not constrained by a target residential density (dwellings per hectare).

- In addition, Section 11.50 of the Plan highlights four areas of the City Docks which are appropriate locations for tall buildings, to include the 'Tip of the Island/Warehouse Quarter' which includes the proposed development site. It specifically describes this zone as *an existing cluster of tall buildings comprising The Elysian and several planning commitments.* It is noted that the site already has the benefit of an extant planning permission for a tall building of up to 25 storeys.

- The proposed plot ratio and density is reflective of the height and slenderness of the proposed development. An increase in plot ratio and density will be required to deliver the NPF policy objectives for compact growth and increased densification of the City.

4.27 The design strategy prepared for the project site has demonstrated the high-quality of the design and the suitability of the site as a location for a tall building in line with the provisions of the Cork City Development Plan 2022. The proposed development can be successfully absorbed into the existing and permitted environment in which it is located for the following reasons:

- It comprises distinct volumes which break down the scale of the building, emphasise its verticality, and relate it to scale of neighbours.
- Its elevation reflects internal floor heights comparable to the adjacent quayside development.
- The crown of the proposed development with its fine pattern and vertical emphasis gives it a distinctive character.
- It relates well to the neighbouring quay front buildings – Navigation Square & One Albert Quay —with which it now creates a quayside ensemble.

- It supports orientation around this strategic location when viewed both locally and from across the city.
- The dramatic change in scale, land use and building form is consistent with the 'zone of transition' between city centre and port activities.
- The quality of the architectural interface including the set-backs and elevational treatments.
- It contributes to the coherence of the tall buildings cluster in the transition zone between the city centre and docklands.
- It operates visually as an intermediary between other major developments of quite different scale, form and character. This works to bring contemporary mid- and high-rise developments in the city into some correspondence both with each other and with the existing fabric of the city.
- It complements the approved-high rise development at Custom House Quay, establishing a building of intermediate height and scale between it and the surrounding quayside development.

4.28 In built heritage terms, there are no Protected Structures on the proposed development site.

4.29 The planning strategy for the proposed development has been guided by the provisions of the Albert Quay, Albert Road, Victoria Road Architectural Conservation Area (ACA), which states the area *'is located within the South Docks immediately to the east of the city centre. It contains extensive areas of both undeveloped lands and under-used low-rise buildings, mainly single storey, and is likely to be redeveloped during the life of the present Development Plan. It is part of an area identified in "Cork City Harbour – Unlocking Cork Docklands" and the City Centre Strategy as an appropriate location for large floor plate offices, which are of strategic importance for Cork'*. The appraisal identifies that the aim for this ACA is not to '*retain all existing buildings and features but to encourage appropriate development of vacant land and under-used buildings by retaining the most significant elements of heritage interest as an integral part of the evolving character of the area'*. (Section 1.9 Volume Three – Built Heritage, Cork City Development Plan).

4.30 Section 8.36 of the Plan also outlines that new development in Architectural Conservation Areas should *'have regard to existing patterns of development, the city's characteristic architectural forms and distinctive use of materials. However, it is expected that new development should generally reflect contemporary architectural practice, and not aim to mimic historic building styles'*. With regard to this, the Plan indicates that the Tip of the Island/Warehouse Quarter has been identified in the Cork City Urban Density, Building Height and Tall Building Study as an appropriate location for tall buildings because it is suited to higher urban density and building height, and has limited sensitivity to height at a strategic level.

4.31 The development is consistent with Strategic Objective 9 – Placemaking and Managing Development in addition to objectives 2.13, 2.17 and 3.1. The development ensures that high quality placemaking and urban design are integrated into the scheme. The principal aim of the development is to ensure a high-quality urban design response of the scheme and its integration with its context. This has been achieved by creating a distinct landmark building which integrates with the heritage assets, while ensuring to create a well-connected, permeable, legible site which responds to the urban grain. The site animates the street by providing a mix of uses in addition to a well-designed, high-quality public realm. As such the development is in keeping with the objectives of the development plan and will create a sustainable, well-designed neighbourhood which will contribute to the evolving character of the City Docks.

4.32 In regard to the architectural quality and materials form of the development follows that consented through the SHD procedure on 26th February 2020 (ABP-305779-19). It differs in subtle ways but maintains the elegance and simplicity as before with the three elements at 9, 12 and 25 storeys remaining as contextual responses and in integrating the tower element comfortably within that context. The tower remains with a visible base, middle and top through these have undergone changes while maintaining a high quality of design. The primary materials are that of a high-quality cast masonry frame into which high quality aluminium framed glazing systems will be factory fitted, to deliver construction of the highest quality. A neutral colour palette of white and greys ensures the building sits comfortably with both its immediate neighbours and also within the city when seen from distance.

## 5.0 PLANNING HISTORY CONSIDERATIONS

5.1 The site has a positive planning history for development of scale as befits its strategic location, and in line with national, regional and local planning policy, including:

- Application Register Reference 21/40237: Permission granted by Cork City Council on 20th April 2022 for an office building of between 1-5-12-14-16 storeys over ground floor, including plant.

- Application Register Reference ABP-305779-19: Permission granted by An Bord Pleanála on 25th February 2020 for a Strategic Housing Development (SHD) which will consist of the construction of 201 no. build-to-rent apartments, café, pub/restaurant and associated site works at the site of Carey Tool Hire, Albert Quay, Cork City.

5.2 The Board Inspector's key considerations on the previously permitted SHD also apply to the proposed development, specifically:

- The scheme is contemporary in its approach.
- There is a clear rationale to the overall urban design strategy and massing proposed.
- The design of the tower is acceptable and has an appropriate slenderness ratio and composition.
- The massing is well considered and appropriately stepped down to the lower scaled and finer grain buildings to the south.
- High quality materials are proposed throughout, and the development will significantly enhance the public realm.
- The new urban courtyard at ground level provides an appropriate buffer and separation between the old and new elements of the scheme.
- The development will assimilate well with the emerging pattern of development in the area, is an appropriate location for a tall building and overall, will provide a high quality, attractive landmark building on a key strategic site in the city.
- The proposed development would be a welcome addition to the city's urban fabric.
- It is a well-conceived design and a clear rationale and justification has been set out for a building of this magnitude at this location.
- The building will be one of a cluster marking the city harbour interchange and gateway to the Docklands.
- The proposed development would make a positive contribution to the skyline of Cork city become part of a new emerging cluster of tall buildings. It is sufficient architectural quality, will create a local district landmark and will have no significant adverse visual impacts.
- The development is to be located in an existing built-up urban area, where cycle and pedestrian facilities are good. Public transport is available in close proximity.
- This is a serviced, appropriately zoned site at an urban location.
- The drainage and services strategy to the site is adequate.
- The flood risk assessment is considered robust and adequate measures have been put in place to minimise the risk of flooding to the site.

5.3 The Inspector recommended a grant of permission on the SHD for the following reasons, which the Board upheld, and which equally apply to the proposed development:

- *"In conclusion, I consider the principle of residential development to be acceptable on this site. I am of the opinion that this is a zoned, serviceable site within an established urban area where a wide range of services and facilities exist. In my opinion, the proposal will provide a high quality development, with an appropriate mix of units and an*

*acceptable density of development catering to a certain cohort of the population. The height and visual impact of the development is considered acceptable and there is a robust rationale for the design approach adopted".*

- *"I consider the proposal to be generally in compliance with both national and local policy, together with relevant section 28 ministerial guidelines. I also consider it to be in compliance with the proper planning and sustainable development of the area and having regard to all of the above, I recommend that permission is granted, subject to conditions".*

## 6.0 CONCLUSION

6.1 The proposed development is to be subject to an application for permission under Part 8 of the Planning & Development Regulations 2001 as amended.

6.2 In conclusion, having regard to:

- the provisions of the National Planning Framework, which support the escalation of population growth in the existing built-up area of Cork City,
- the Climate Action and Low Carbon Development Act 2015 and Climate Action Plan 2024
- the provisions of the Urban Development and Building Height Guidelines, that advocate a presumption in favour increased density and height in cities, subject to assessment against specific performance criteria,
- the Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities 2023,
- the Sustainable Residential Development and Compact Settlements Guidelines for Planning Authorities 2024
- the provisions of the Regional Spatial and Economic Strategy for the Southern Region, which recognise the need to densify Cork City,
- the Cork City Development Plan 2022-2028 including the policy shift towards compact growth and the location of the proposed development in the Tip of the Island/Warehouse Quarter
- the site's pivotal, waterfront location at the entry to Docklands and the junction of the N27 with Albert Quay,
- the site's proximity to public transport,
- the nature, scale and design of the proposed development,
- the site's planning history, and
- the pattern of existing and permitted development in the area,

it is considered that the proposed development would not seriously injure the residential or visual amenities of the area or of property in the vicinity, would respect and enhance the existing character of the area and would be acceptable in terms of pedestrian and traffic safety and convenience. The proposed development would, therefore, be in accordance with the proper planning and sustainable development of the area.

## APPENDICES

APPENDIX 1 - IES DAYLIGHT SUNLIGHT AND OVERSHADOWING STUDY

APPENDIX 2 – BFLUID WIND MICROCLIMATE

APPENDIX 3 – JCA ARCHITECTURAL HERITAGE STATEMENT

APPENDIX 4 – JOHN CRONIN & ASSOCIATES ARCHAEOLOGICAL IMPACT ASSESSMENT

APPENDIX 1 - IES DAYLIGHT SUNLIGHT AND OVERSHADOWING STUDY

# The Railyard, Albert Quay, Cork

*Daylight, Sunlight and Overshadowing Study*

Not Marked

**Report For: JCD Group**

**Project No: 17687**

# Version History

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## Table of Contents

# 1 Executive Summary

This report summarises the analyses undertaken to quantify the Sunlight and Daylight performance of the proposed The Railyard, Albert Quay located in Cork, Ireland. The report focuses on measuring the daylight and sunlight impact to the existing surrounding buildings as well as the daylight and sunlight performance within the proposed development. In addition, the report will compare the performance of the proposed development when assessed against the permitted design.

## 1.1 Planning Authority Guidelines

The Sustainable Urban Housing: Design Standards for New Apartments 2023 states the following in Section 6.6:

*"Planning authorities should avail of appropriate expert advice where necessary and have regard to quantitative performance approaches to daylight provision outlined in guides like A New European Standard for Daylighting in Buildings IS EN17037:2018, UK National Annex BS EN17037:2018 and the associated BRE guide 209 2022 Edition (June 2022) or any relevant future standards or guidance specific to the Irish context, when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision."*

With regards to daylighting and external sunlight exposure in particular, where different methodologies are found in each of the different standards, all methodologies have been employed for completeness to ensure appropriate and reasonable regard has been taken to address all assessments under all of the different standards. For clarity these are listed below and the following Section 1.2 denotes which standard is applicable for each assessment type:

- BRE Guide –3rd Edition of BR 209 BRE Site Layout Planning for Daylight and Sunlight
- IS EN 17037-2018+A1-2021 – Daylight in Buildings
    - This is the Irish implementation of the European EN 17037-2018+A1-2021 standard
- BS EN 17037-2018+A1-2021 – Daylight in Buildings
    - This is the UK implementation of the European EN 17037-2018+A1-2021 standard. It supersedes BS 8206-2:2008 which is withdrawn in the UK. The BS EN standard includes a National Annex which addresses daylight requirements specific to dwellings which is notable as Ireland's climate matches closely with the UK.

## 1.2 Reference Standards & Summary of Assessments Undertaken

The various daylight and sunlight assessments that were undertaken using the IES VE software are based on a number of different standards which are referenced in the individual sections of this report. For clarity, the assessments that were undertaken are summarised below as well as the reference standards that were used for each (where applicable):

- **Shadow Analysis**
    - Assessed using shadow images cast at key times throughout the year, i.e. March 21st, June 21st and December 21st to determine if any overshadowing impact occurs and to what extent to any existing residential neighbouring buildings in accordance with the BRE Guide (3rd Edition).

- **Sunlight to Amenity Spaces**
    - Assessed using annual Solar Exposure calculations to determine any impact to existing amenities and the sunlight received and also to assess the proposed developments amenity spaces to derive how much sunlight they can expect to receive in accordance with the BRE Guide (3rd Edition).
- **Sunlight to Existing Buildings**
    - Assessed using the Annual Probable Sunlight Hours (APSH) method in accordance with the BRE Guide (3rd Edition) - to determine any impact to sunlight received to the existing neighbouring building main living areas.
- **Sunlight to Proposed Buildings**
    - Assessed using Solar Exposure calculations in accordance with IS/BS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition)
    - In both assessments above the aim is to derive how much sunlight proposed development can expect to receive.
- **Daylight to Existing Buildings**
    - Assessed using the Vertical Sky Component (VSC) method in accordance with the BRE Guide (3rd Edition) - to determine any impact to existing daylight received to the existing building neighbouring the site.
- **Daylight to Proposed Development**
    - Assessed in accordance with IS EN 17037-2018+A1-2021 Method 2 (BRE Guide 3rd Edition)
    - Assessed in accordance with BS EN 17037-2018+A1-2021 National Annex Method 2 (BRE Guide 3rd Edition)
    - In all assessments above the aim is to derive how much daylight will be received within each of the apartments within the proposed development.
- **View Out**
    - Assessed in accordance with IS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition)
- **Glare**
    - Assessed in accordance with IS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition)

The following can be concluded based on the assessments undertaken:

## 1.3 Shadow Analysis

The shadow analysis illustrates different shadows being cast at key times of the year (March 21st, June 21st and December 21st) for the Existing Situation and the Proposed Scheme. The results from the study are summarised as follows:

**Albert Street - Residential**

No additional shading visible from the proposed development on these existing properties throughout the year.

**Albert Road - Residential**

No additional shading visible from the proposed development on these existing properties throughout the year.

The potential shading impact is quantified via the "Sunlight to Amenity Spaces" and "Daylight to Existing Buildings" sections of this report.

## 1.4 Sunlight to Amenity Spaces

As outlined in Section 3.3.17 of the BRE Guide (3rd Edition), for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation.

It should be noted that there were no existing amenity areas that would be affected by the development of the proposed asset.

**Private Amenities**

On March 21st, 96% of the combined proposed external private communal amenity areas situated within the development site will receive at least 2 hours of sunlight over their total area. Thus, complying with the BRE recommendations. When considered individually, all external private communal amenity areas exceed the BRE guidelines.

## 1.5 Sunlight to Existing Buildings

This study considers the proposed scheme and tests if the Annual Probable Sunlight Hours (APSH) results for the living room windows are greater than 25% annual and 5% winter sunlight or are greater than 0.8 times their former value with the proposed development in place or the reduction in sunlight across the year is less than 4% with the proposed development in place.

Based on the criteria outlined in Section 3.2.9 of the BRE Guide 3rd Edition, none of the existing buildings fit the requirements to be assessed and as such the APSH assessment was not conducted for the rest of the properties. The BRE guide (3rd Edition) notes that there should be no impact to sunlight for these properties "It is not always necessary to do a full calculation to check sunlight potential. The guideline above is met provided either the following is true:

- If the window wall faces within 90° of due south and no obstruction, measured in the section perpendicular to the window wall, subtends an angle of more than 25° to the horizontal. Again, obstructions within 90° of due north need not be counted."

Given the statement above, the surrounding dwellings adjacent to the proposed development were verified noting that they were sitting to the south of the proposed development. These existing residential properties have been excluded from the assessment as noted in Section 3.2.9 of the BRE Guide 3rd Edition, that these windows need not be analysed as sunlight impact will be unnoticeable to the existing occupants. As noted regarding the permitted design, the proposed development will have no impact to the sunlight received to the existing residential properties.

## 1.6 Sunlight to Proposed Development

As the sunlight exposure assessment in accordance with BRE Guide 3rd Edition / IS/BS EN 17037-2018+A1-2021 considers the orientation of the rooms the following should be noted from section 3.1.11 of the guide.

*"The BS EN 17037 criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met."*

Of the 217 no. points tested, 169 no. points (78%) meet the BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021 sunlight exposure recommendations of greater than 1.5 hours on March 21st. Where windows do not meet this recommendation, this is predominantly as a result of their orientation, or as a consequence of the impact of balcony projections.

Overall, the sunlight provision results to the proposed development in accordance with IS/BS EN 17037-2018+A1-2021 are considered excellent in the context of a suburban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

Finally, the sunlight exposure results are visually represented in Appendix B.

## 1.7 Daylight to Existing Buildings

This study considers the Proposed Scheme and tests if the VSC results are greater than 27% or not less than 0.8 times the value of the Existing Situation.

Based on the criteria outlined in Section 2.2.5 of the BRE guidance (3rd Edition) two of the residential neighbouring blocks were required to be included within the VSC assessment.

A 100% of the 63 points tested have a Proposed VSC value greater than 27% or not less than 0.8 times their former value compared to the Existing and Permitted Situations. The proposed development shows no change to daylight when compared to the permitted design.

## 1.8 Daylight to Proposed Development

For the daylight to proposed development assessment, two standards have been analysed: IS EN 17037-2018+A1-2021 and BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition). The results under each standard are summarised below.

**BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021**

It is important to note that IS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition) does not provide different illuminance targets for different space types. Therefore, in the case of residential developments; bedrooms, living rooms, kitchens and combined LKDs all have the same daylight provision targets.

There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 of IS EN 17037-2018+A1-2021 which are summarised as follows:

Method 1: This calculation method uses the daylight factor targets on the reference plane as per Table A.3 (refer to Section 10.1.2 of this report). The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.

Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1 (refer to Section 10.1.2 of this report). The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.

As outlined in Section 5.1.4 of the standard, the verification of daylight provision can be determined using either an adequate software or on-site measurements. When using a software, *"a representative model of the space is required together with the key parameters (such as any significant nearby obstructions, the assigned surface reflectance values and glazing transmissivity) that are a reasonable representation of those for the actual, completed building. This can be determined using either Method 1 or Method 2."*

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table A.1 of IS EN 17037-2018+A1-2021.

The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1. Climate based daylight modelling (CBDM) is more accurate compared to a calculation based on a single day during the year, i.e. Method 1. The amount of daylight varies throughout the year, primarily due to the sun's position, so it is essential the impact of daylight variance is properly considered. CBDM utilises an annual simulation linking location, shading, climate data (including solar intensity and cloud cover) together with the building properties. This provides a complete overview on how the daylight performance varies throughout the year due to changes in these factors.

Across the proposed development, 85% of the tested rooms are achieving the daylight provision targets in accordance with Table A.1 of IS EN 17037-2018+A1-2021 using Method 2.

**BRE Guide 3rd Edition / BS EN 17037-2018+A1-2021 National Annex**

In the UK, EN 17037-2018+A1-2021 was adopted to form "BS EN 17037-2018+A1-2021". However, a National Annex was included which states:

*"The UK committee supports the recommendations for daylight in buildings given in BS EN 17037:2018; however, it is the opinion of the UK committee that the recommendations for daylight provision in a space (see Clause A.2) may not be achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions (for example, dwellings situated in a dense urban area or with tall trees outside), or for existing buildings being refurbished or converted into dwellings. This National Annex therefore provides the UK committee's guidance on minimum daylight provision in all UK dwellings."*

Whereas IS EN 17037-2018+A1-2021 does not provide different illuminance targets for different space types, the BS EN 17037-2018+A1-2021 National Annex provides target illuminance values for bedrooms, living rooms and kitchens within residential developments as per Table NA.1 (refer to Section 10.1.3 of this report). It is also important to note that as the climate in Ireland is similar to the UK, the targets outlined in the BS EN National Annex could also be applied to dwellings in Ireland.

The BS National Annex also states:

*"Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx."*

Therefore, combined LKDs were assessed using a 200-lux target illuminance ($E_T$).

Across the proposed development, 95% of the tested rooms are achieving the daylight provision targets in accordance with Table NA.1 of BS EN 17037-2018+A1-2021 using Method 2.

**Compensatory Measures**

With regards to internal daylighting, Section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments 2023, states the following:

*"Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specifics. This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

Having regard to the statements above, it should be noted that throughout the design process the design team worked hard to optimise the whole development to maximise the daylight within the proposed scheme.

Design features have been incorporated into the development where rooms do not achieve the daylight provision targets in accordance with the standards they were assessed against. These design features again help to balance off and compensate the lower levels of daylight measured in the applicable spaces and are summarised as follows:

- 100% of the units have a floor area 10% greater than the minimum floor area requirements as required by the Design Standards (2023). Note that larger floor areas make it more difficult to achieve the recommended daylight levels. However, larger windows have been incorporated into the design which also improves the view out for the building occupants.
- 53% of the units are dual aspect which is above the 33% minimum requirement as required by the Design Standards (2023). As a result, more apartment units than the recommended minimum will achieve quality daylight from dual-aspect orientations.
- The proposed scheme provides 1,451sq.m of communal amenity space, thus exceeding the 1,281sq.m required pursuant to the Design Standards (2023).

In addition to this, specific compensatory measures for each space below the recommendations can be found in the table within Appendix A section 12.2.

## 1.9 View Out

The View Out assessment is related to buildings such as offices or schools where seating layouts are typically fixed compared to domestic settings where an occupant can move around the space freely. In their own home occupants can choose to sit near to or even at a window which will inevitably provide the varying layers of a 'View Out' such as the ground, landscape or sky. This ability to choose their position within a domestic setting means they would always have access to a position in the apartment with the minimum requirements of 'View Out'. Therefore, all the properties would meet the minimum requirement as outlined in IS EN 17037-2018+A1-2021 / BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition).

## 1.10 Glare

As outlined in IS EN 17037-2018+A1-2021 / BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition), a Glare assessment is suggested in spaces where the *"expected activities are comparable to reading, writing or using display devices and the user is not able to choose freely their position and viewing direction".* Given that occupants within a domestic setting are free to move around, on this basis a glare assessment for the proposed development has not been carried out.

## 1.11 Observations

It is important to note that the recommendations within the BRE Guide (3rd Edition) itself states "*although it gives numerical guidelines these should be interpreted flexibly because natural lighting is only one of many factors in site layout design"*, Although this is true appropriate and reasonable regard has still been taken to the BRE guide.

Whilst the results shown relate to the criteria as laid out in the BRE Guide (3rd Edition), it is important to note that the BRE targets are guidance only and should therefore be used with flexibility and caution when dealing with different types of sites.

In addition, BRE Guide 3rd Edition also notes:

"This report is a comprehensive revision of the 2011 edition of Site layout planning for daylight and sunlight: a guide to good practice. It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location."

Taking all of the above information into account and based on the results from each of the assessments undertaken, the proposed development performs well when compared to the recommendations in the BRE Guide 3rd Edition and IS EN 17037-2018+A1-2021 /BS EN 17037-2018+A1-2021 National Annex. With regards to the existing properties there is a negligible impact when considering sunlight and daylight as a result of the proposed development, in particular when the design is compared to the permitted development results are identical. The proposed development itself performs very well with the same regard.

# 2 Introduction

This report summarises the analyses undertaken to quantify the Sunlight and Daylight performance of the proposed The Railyard, Albert Quay located in Cork, Ireland. The report focuses on measuring the daylight and sunlight impact to the existing surrounding buildings as well as the daylight and sunlight performance within the proposed development. In addition, the report will compare the performance of the proposed development when assessed against the permitted design.

## 2.1 Development Description

The Railyard Apartments proposed development comprises of the construction of 217 no. apartments comprising 25 no. studio units; 92 no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units apartments in a building that ranges in height from 8 to 11 to 24 storeys over ground floor at the former Carey Tool Hire site, currently principally occupied by Park Facilities Management Ltd, Albert Quay, Cork City.

The development site, measuring approximately 0.2744 hectares, is bounded by Albert Quay East to the north, Albert Street to the west, the former Blackrock and Passage Railway Terminus – Ticket Office, a Protected Structure, Ref. No. PS 1138, and which is also a Recorded Monument, CO074-119002, the two-storey former Cork, Blackrock and Passage Railway Offices, Protected Structure, Ref. No. PS 1137, and the Albert Road Post Box, which is also a Protected Structure Ref. No. PS942 and Albert Road to the south, and Navigation Square to the east. The site is accessed by Albert Quay East and Albert Street.

The proposed works include:

- The construction of 217no. apartments [25no. studio units; 92no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units] in a building that ranges in height from 8 to 11 to 24 storeys over ground floor.
- The provision of external balconies on the east, west and south elevations to the 12$^{th}$ floor on the east and west elevation, and to the 9$^{th}$ floor on the southern elevation.
- The provision of an external public realm area at ground level, an eastern laneway for servicing of the proposed development, in addition to its use as a pedestrian link.
- The provision of internal communal space areas at ground floor, 1$^{st}$ floor, and 2$^{nd}$ floor, and 2no. external rooftop terraces on the 9$^{th}$ floor and the 12$^{th}$ floor.
- The provision of a ground floor community/arts use, with external seating area and a ground floor creche with external covered play area.
- The provision of ground level plant, ancillary uses, and bin store.
- Bicycle spaces at lower ground floor and ground floor level; additional visitor bicycle spaces; and a set down delivery area at ground floor level on Albert Street.
- Set back of the eastern boundary wall to the north and south.
- All site development, public realm and landscaping works.
- The proposed development also involves the demolition of the existing two-storey Carey Tool Hire building, currently principally occupied by Park Facilities Management Ltd.

# 3 BRE – Site Layout Planning for Daylight and Sunlight (3rd Edition)

Access to daylight and sunlight is a vital part of a healthy environment. Sensitive design should provide sufficient daylight and sunlight to new residential developments while not obstructing light to existing homes nearby.

The 3rd Edition of the BR 209 BRE Site Layout Planning for Daylight and Sunlight, advise on planning developments for good access to daylight and sunlight and is widely used by local authorities to help determine the performance of new developments.

## 3.1 Impact Classification Discussion

BRE guidance in Appendix H (BRE Guide 3rd Edition) – Environmental Impact Assessment suggests impact classifications as minor, moderate and major adverse. It provides further classifications of these impacts with respect to criteria summarised in the table below.

Where the loss of skylight or sunlight fully meets the guidelines in the BRE guide (3rd Edition), the impact is assessed as negligible or minor adverse. Where the loss of skylight or sunlight does not meet the BRE guidelines, the impact is assessed as minor, moderate or major adverse.

| Impact | Description |
|---|---|
| *Negligible adverse impact* | • *Loss of light well within guidelines,* ***or***<br>• *only a small number of windows losing light (within the guidelines)* ***or*** *limited area of open space losing light (within the guidelines)* |
| *Minor adverse impact (a)* | • *Loss of light only just within guidelines* ***and***<br>  ○ *a larger number of windows are affected* ***or***<br>  ○ *larger area of open space is affected (within the guidelines)* |
| *Minor adverse impact (b)* | • *only a small number of windows or limited open space areas are affected*<br>• *the loss of light is only marginally outside the guidelines*<br>• *an affected room has other sources of skylight or sunlight*<br>• *the affected building or open space only has a low-level requirement for skylight or sunlight*<br>• *there are particular reasons why an alternative, less stringent, guideline should be applied* |
| *Major adverse impact* | • *large number of windows or large open space areas are affected*<br>• *the loss of light is substantially outside the guidelines*<br>• *all the windows in a particular property are affected*<br>• *the affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight (living rooms / playground)* |

# 4 Methodology

## 4.1 Planning Authority Guidelines

The Sustainable Urban Housing: Design Standards for New Apartments 2023 states the following in Section 6.6:

*"Planning authorities should avail of appropriate expert advice where necessary and have regard to quantitative performance approaches to daylight provision outlined in guides like A New European Standard for Daylighting in Buildings IS EN17037:2018, UK National Annex BS EN17037:2018 and the associated BRE guide 209 2022 Edition (June 2022) or any relevant future standards or guidance specific to the Irish context, when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision."*

With regards to daylighting and external sunlight exposure in particular, where different methodologies are found in each of the different standards, all methodologies have been employed for completeness to ensure appropriate and reasonable regard has been taken to address all assessments under all of the different standards. For clarity these are listed below and the following Section 1.2 denotes which standard is applicable for each assessment type:

- BRE Guide –3rd Edition of BR 209 BRE Site Layout Planning for Daylight and Sunlight
- IS EN 17037-2018+A1-2021 – Daylight in Buildings
    - This is the Irish implementation of the European EN 17037-2018+A1-2021 standard
- BS EN 17037-2018+A1-2021 – Daylight in Buildings
    - This is the UK implementation of the European EN 17037-2018+A1-2021 standard. It supersedes BS 8206-2:2008 which is withdrawn in the UK. The BS EN standard includes a National Annex which addresses daylight requirements specific to dwellings which is notable as Ireland's climate matches closely with the UK.

Furthermore, the EN 17037-2018+A1-2021 standard has already been adopted in the UK to inform the BS EN 17037-2018+A1-2021 standard which supersedes BS 8206-2:2008 which is now withdrawn. It is important to note that BS EN 17037-2018+A1-2021 includes a National Annex which specifically addresses daylight provision in residential dwellings in the UK. A similar annex is not included in the IS EN 17037-2018+A1-2021 standard.

Finally, the latest BRE guide 'Site Layout Planning for Daylight and Sunlight' (3rd Edition) has just been published (June 2022). This now directly links to the new daylighting standards EN 17037-2018+A1-2021. Aside refinements to the BRE guide, the assessments are the same to what is found within the BRE guide 2nd Edition.

Therefore, with regards to interior daylighting and external sunlight exposure in particular, where different methodologies are found in each of the different standards, all have been carried out for completeness to ensure appropriate and reasonable regard has been taken to address all assessments under all of the different standards.

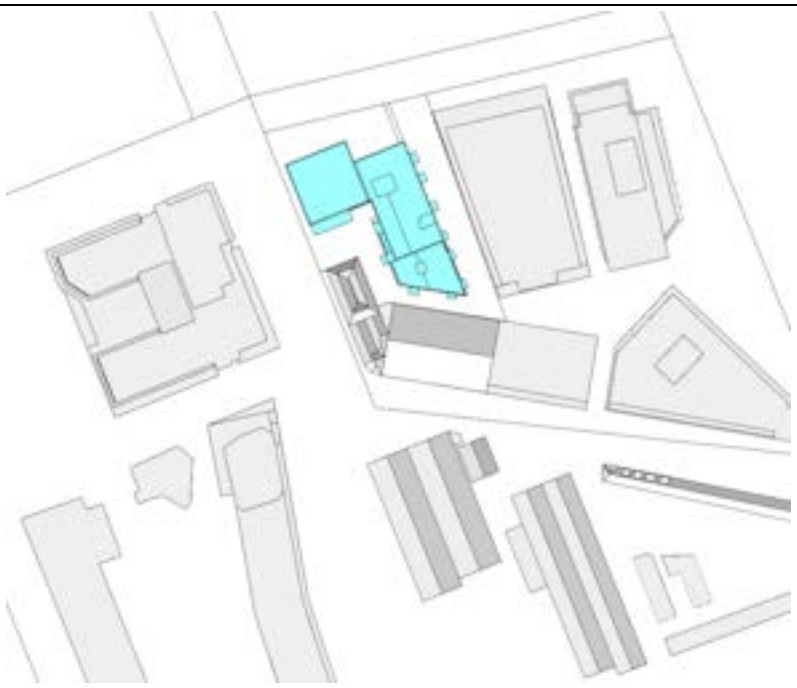
## 4.2 Reference Standards & Summary of Assessments Undertaken

The various daylight and sunlight assessments that were undertaken using the IES VE software are based on a number of different standards which are referenced in the individual sections of this report. For clarity, the assessments that were undertaken are summarised below as well as the reference standards that were used for each (where applicable):

- **Shadow Analysis**
  - Assessed using shadow images cast at key times throughout the year, i.e. March 21st, June 21st and December 21st to determine if any overshadowing impact occurs and to what extent to any existing neighbouring dwellings in accordance with the BRE Guide (3rd Edition).
- **Sunlight to Amenity Spaces**
  - Assessed using annual Solar Exposure calculations to determine any impact to existing amenities and the sunlight received and also to assess the proposed developments amenity spaces to derive how much sunlight they can expect to receive in accordance with the BRE Guide (3rd Edition).
- **Sunlight to Existing Buildings**
  - Assessed using the Annual Probable Sunlight Hours (APSH) method in accordance with the BRE Guide (3rd Edition) - to determine any impact to sunlight received to the existing neighbouring building main living areas.
- **Sunlight to Proposed Buildings**
  - Assessed using Solar Exposure calculations in accordance with IS/BS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition)
  - In both assessments above the aim is to derive how much sunlight proposed development can expect to receive.
- **Daylight to Existing Buildings**
  - Assessed using the Vertical Sky Component (VSC) method in accordance with the BRE Guide (3rd Edition) - to determine any impact to existing daylight received to the existing building neighbouring the site.
- **Daylight to Proposed Development**
  - Assessed in accordance with IS EN 17037-2018+A1-2021 Method 2 (BRE Guide 3rd Edition)
  - Assessed in accordance with BS EN 17037-2018+A1-2021 National Annex Method 2 (BRE Guide 3rd Edition)
  - In all assessments above the aim is to derive how much daylight will be received within each of the apartments within the proposed development.
- **View Out**
  - Assessed in accordance with IS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition)
- **Glare**
  - Assessed in accordance with IS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition)

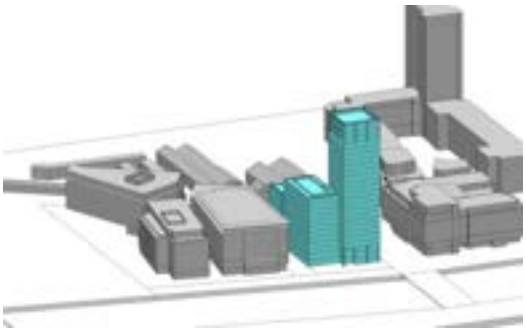
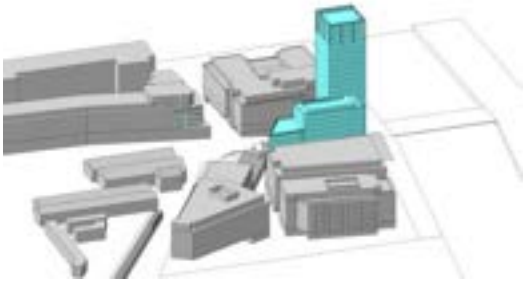
## 4.3 Orientation

The model orientation has been taken from drawings provided by the Architect with the resulting angle shown below used in the analysis.

| Orientation | |
|---|---|
|  |  |
|  |  |

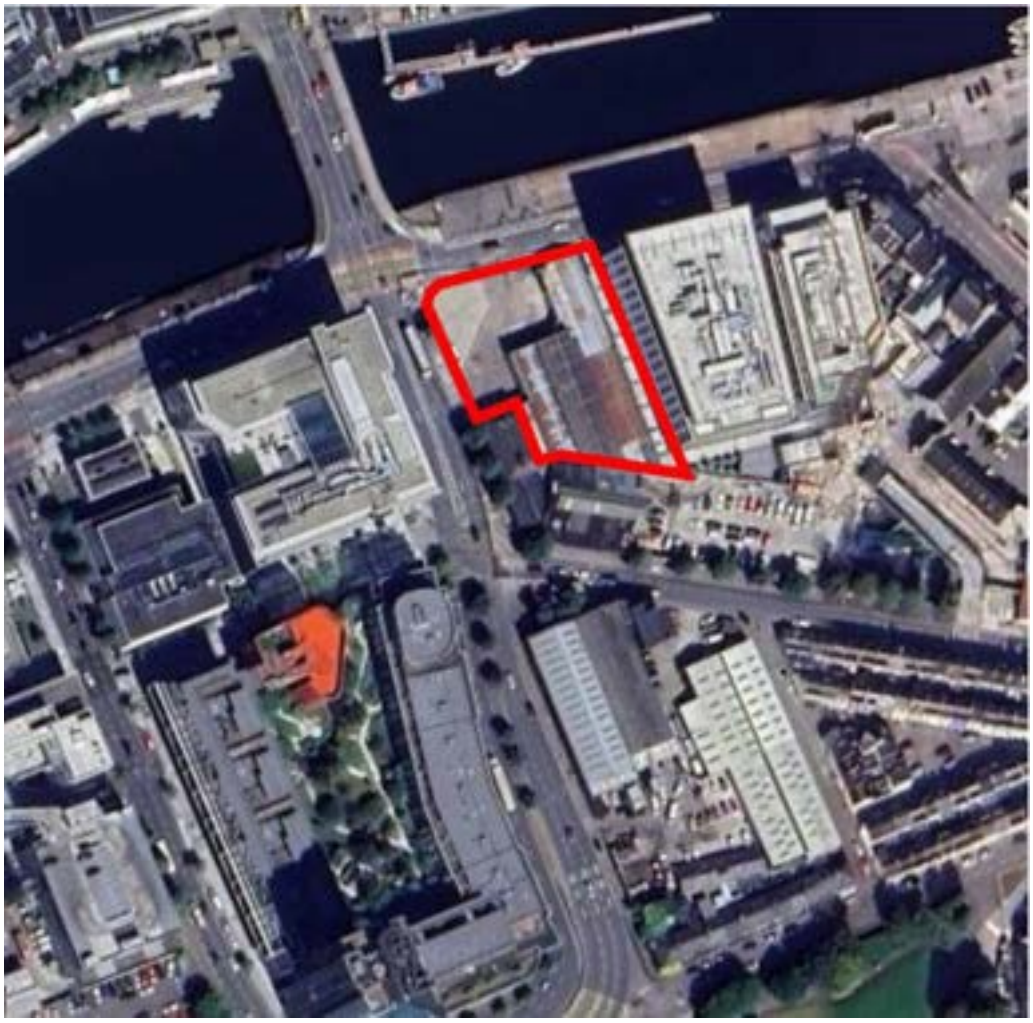
## 4.4 Proposed Model

The following images illustrate the models created from the architectural information provided and the use of Google/Bing maps where information was absent.

| | Permitted Situation | Proposed Scheme |
|---|---|---|
| View looking from North of Site |  |  |
| View looking from East of Site |  |  |
| View looking from South of Site |  |  |
| View looking from West of Site |  |  |

## 4.5 Potential Sensitive Receptors

To help understand the potential impact to surrounding buildings, potential sensitive receptors were identified as illustrated below.



| | |
|---|---|
| | Proposed Site (approximate site boundary) |
| | Albert Street - Residential |
| | Albert Road - Residential |

# 5 Shadow Analysis

The statistics of Met Eireann, the Irish Meteorological Service, show that the sunniest months in Ireland are May and June, based on 1981-2010 averages or latest:
https://www.met.ie/climate/30-year-averages.

The following can also be shown:

- During December a mean daily duration of 1.7 hours of sunlight out of a potential 7.3 hours sunlight each day is received (i.e. only 23% of potential sunlight hours).
- During June a mean daily duration of 5.8 hours of sunlight out of a potential 15.9 hours sunlight each day is received (i.e. only 36% of potential sunlight hours).

Therefore, the impacts caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months.

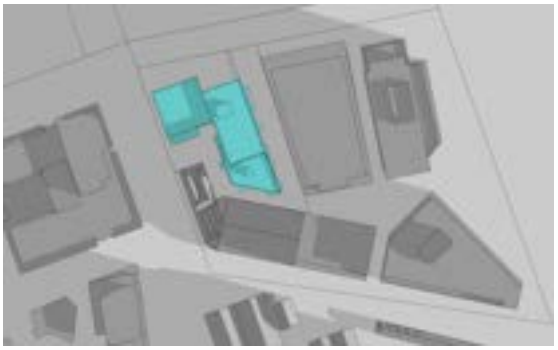
This section will consider the shadows cast by the proposed development on the following dates:

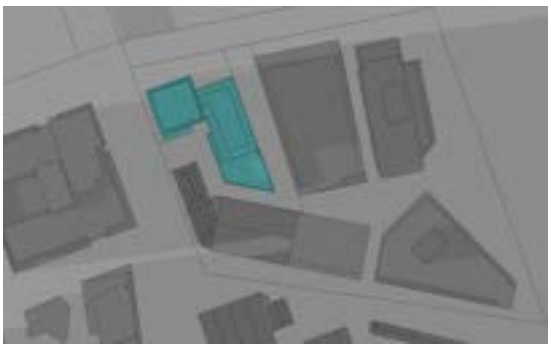
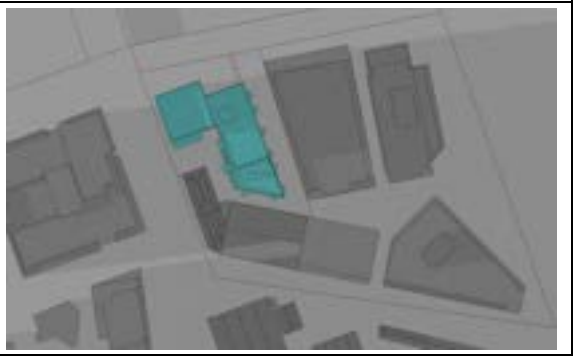
- March 21st / September 21st (Equinox)
- June 21st (Summer Solstice)
- December 21st (Winter Solstice)

These images illustrate shadows cast for 'perfect sunny' conditions with no clouds and assumed that the sun is shining for every hour shown. Given the discussion above it is important to remember that this is not always going to be the case.

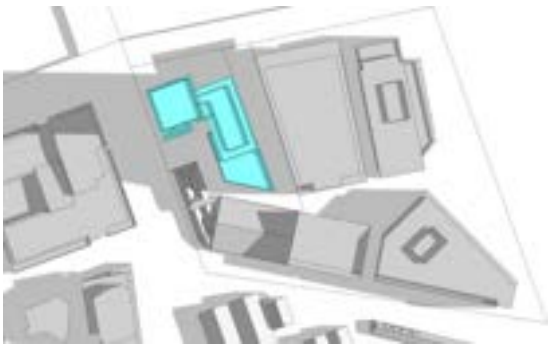
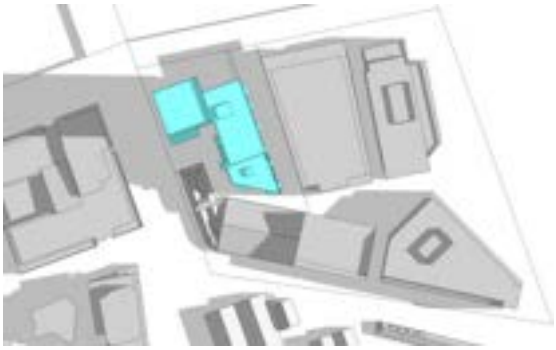
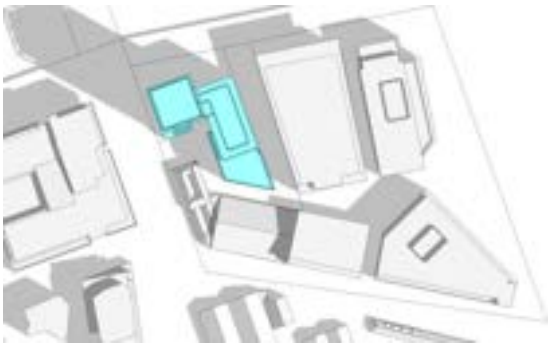
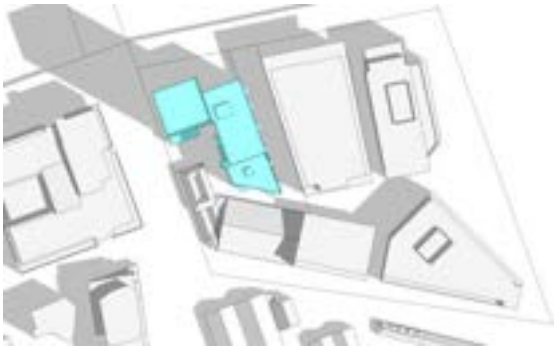
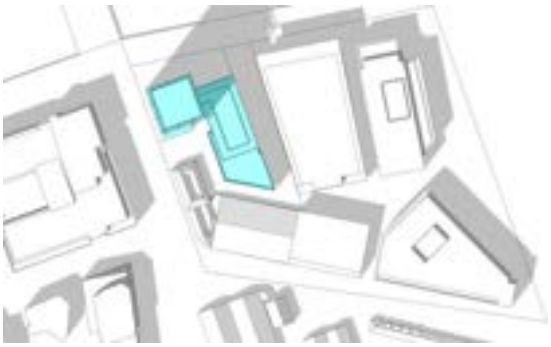
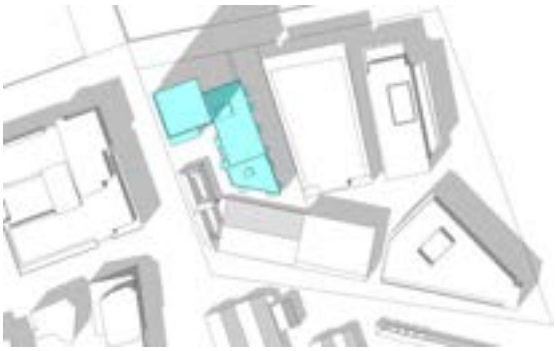
## 5.1 Plan View

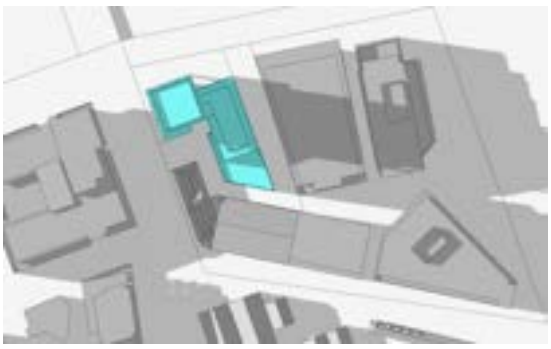
### 5.1.1 March 21st

| | Permitted | Proposed |
|---|---|---|
| March 21st - 8:00 |  |  |
| March 21st - 10:00 |  |  |
| March 21st - 12:00 |  |  |
| March 21st - 14:00 |  |  |

| | Permitted | Proposed |
|---|---|---|
| March 21st - 16:00 |  |  |
| March 21st - 18:00 |  |  |

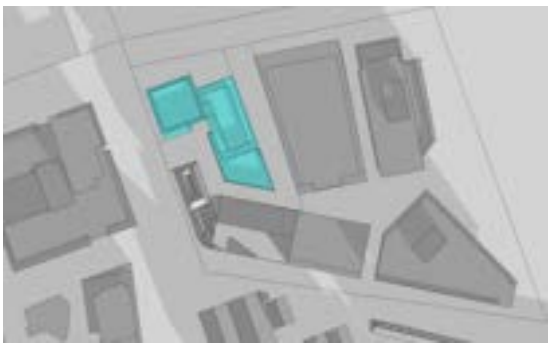
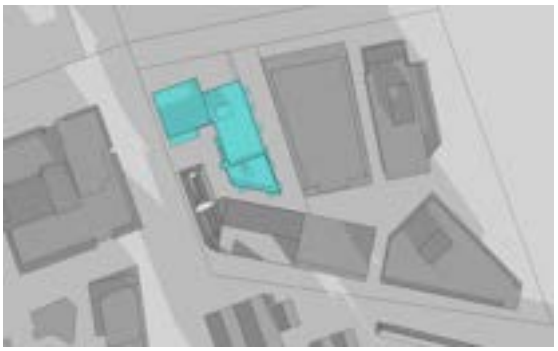
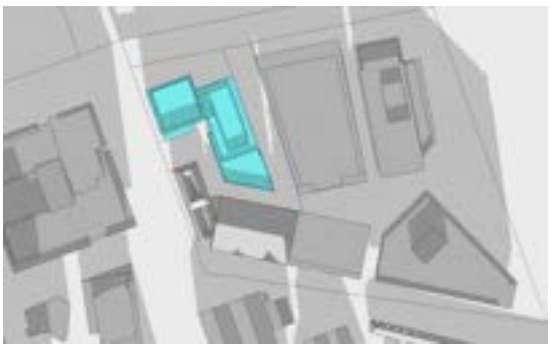
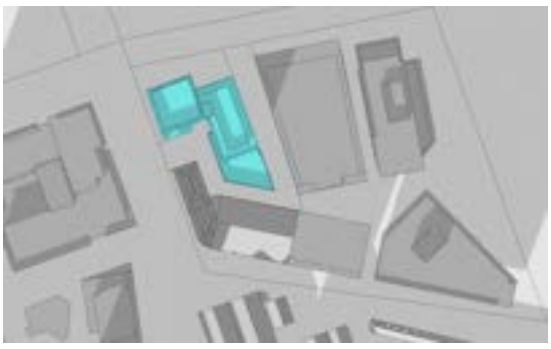
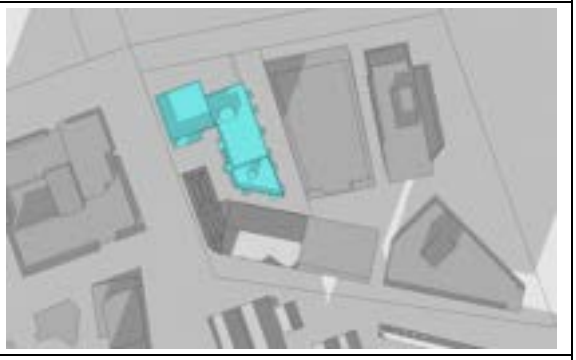
### 5.1.2 June 21st

| | Permitted | Proposed |
|---|---|---|
| June 21st - 8:00 |  |  |
| June 21st - 10:00 |  |  |
| June 21st - 12:00 |  |  |
| June 21st - 14:00 |  |  |

| | Permitted | Proposed |
|---|---|---|
| June 21st - 16:00 |  |  |
| June 21st - 18:00 |  |  |
| June 21st – 20:00 |  |  |

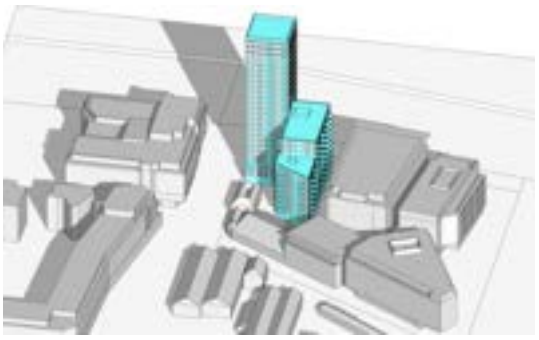
### 5.1.3 December 21st

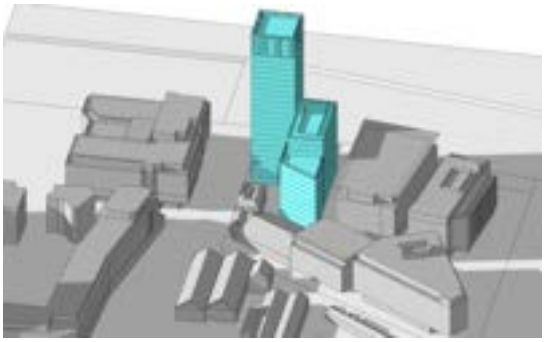
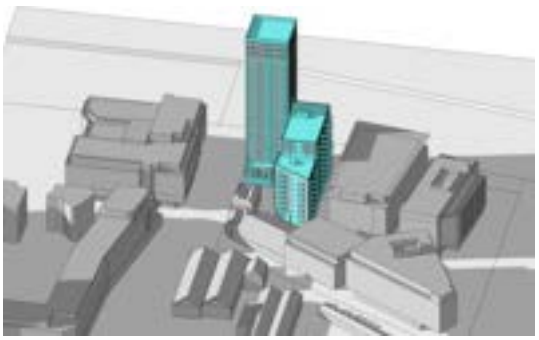
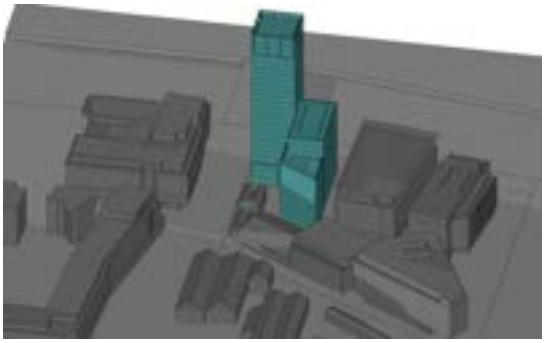
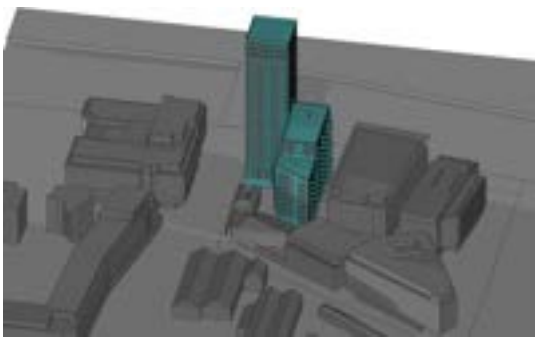
| | Permitted | Proposed |
|---|---|---|
| December 21st - 8:00 |  |  |

| | Permitted | Proposed |
|---|---|---|
| December 21st - 10:00 |  |  |
| December 21st - 12:00 |  |  |
| December 21st - 14:00 |  |  |
| December 21st - 16:00 |  |  |

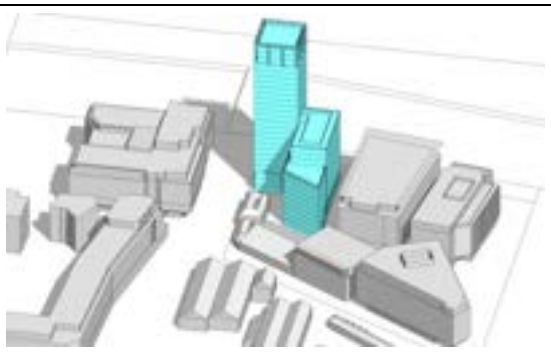
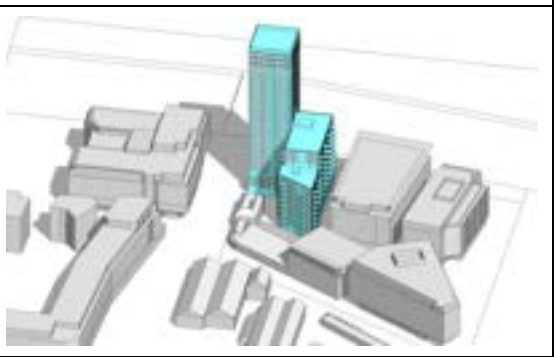
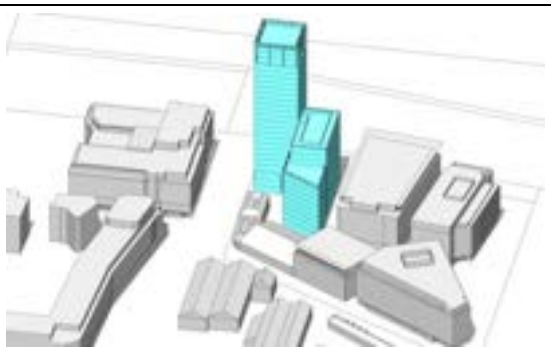
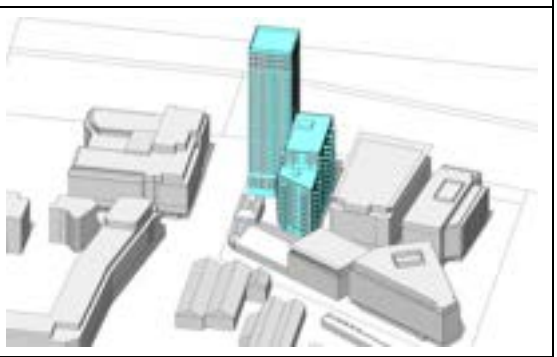
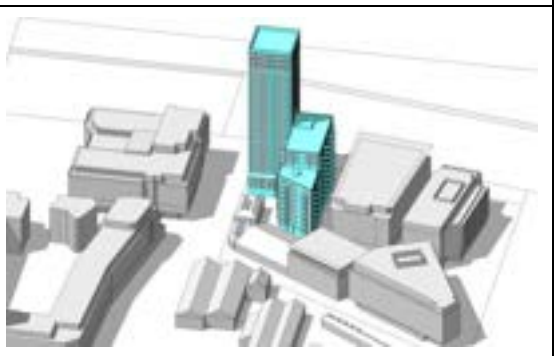
## 5.2 3D View

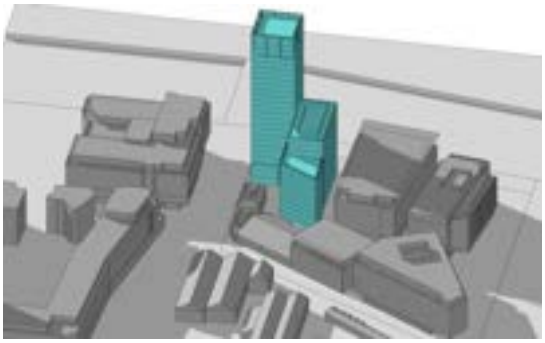
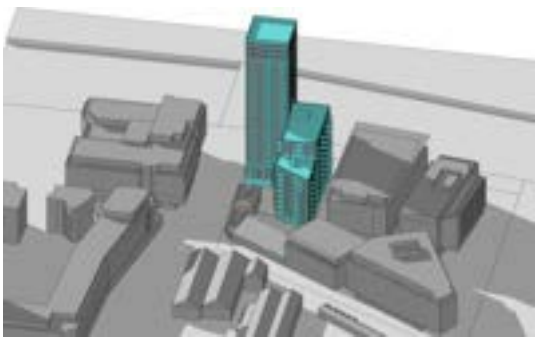
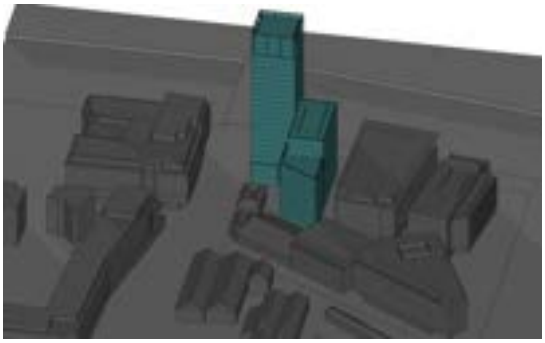
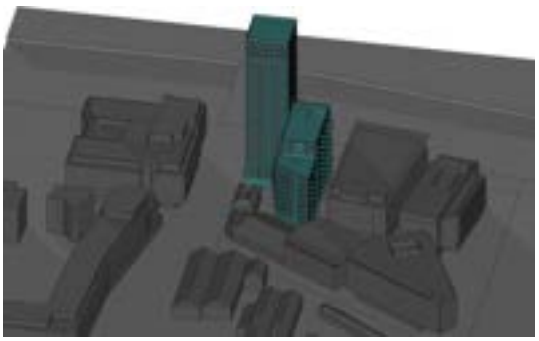
### 5.2.1 March 21st

| | Existing | Proposed |
|---|---|---|
| March 21st - 8:00 |  |  |
| March 21st - 10:00 |  |  |
| March 21st - 12:00 |  |  |
| March 21st - 14:00 |  |  |

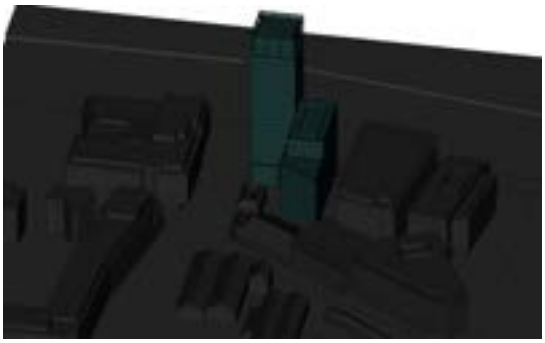
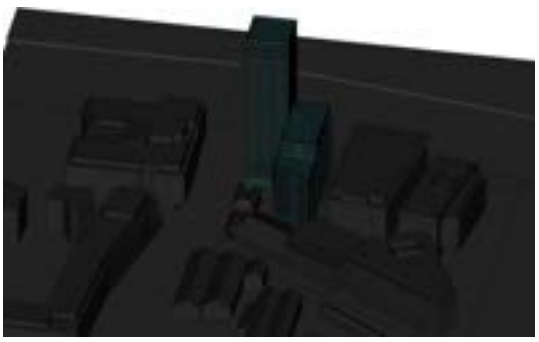
| | Existing | Proposed |
|---|---|---|
| March 21st - 16:00 |  |  |
| March 21st - 18:00 |  |  |

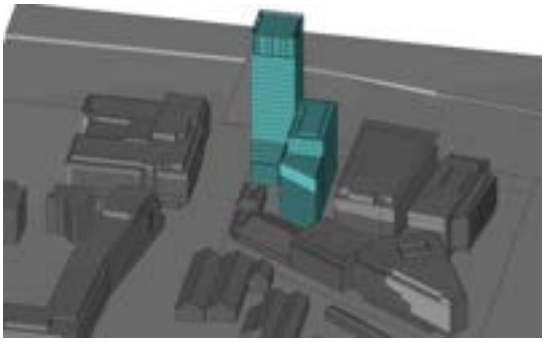
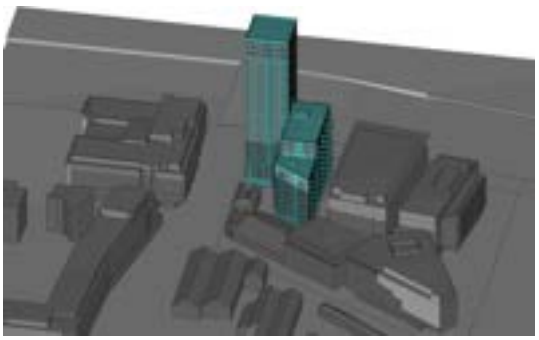
### 5.2.2 June 21st

| | Existing | Proposed |
|---|---|---|
| June 21st - 8:00 |  |  |
| June 21st - 10:00 |  |  |
| June 21st - 12:00 |  |  |
| June 21st - 14:00 |  |  |

| | Existing | Proposed |
|---|---|---|
| June 21st - 16:00 |  |  |
| June 21st - 18:00 |  |  |
| June 21st - 20:00 |  |  |

### 5.2.3 December 21st

| | Existing | Proposed |
|---|---|---|
| December 21st - 8:00 |  |  |
| December 21st - 10:00 |  |  |
| December 21st - 12:00 |  |  |
| December 21st - 14:00 |  |  |

| | Existing | Proposed |
|---|---|---|
| December 21st - 16:00 |  |  |

## 5.3 Discussion

The shadow analysis illustrates different shadows being cast at key times of the year (March 21st, June 21st and December 21st) for the Existing Situation and the Proposed Scheme. The results from the study are summarised as follows:

**Albert Street - Residential**

No additional shading visible from the proposed development on these existing properties throughout the year.

**Albert Road - Residential**

No additional shading visible from the proposed development on these existing properties throughout the year.

The potential shading impact is quantified via the "Sunlight to Amenity Spaces" and "Daylight to Existing Buildings" sections of this report.

# 6 Sunlight to Amenity Spaces

## 6.1 Guidance Requirements

The impact of the proposed development on the sunlight availability to the amenity spaces will be considered to determine how the amenity spaces perform when assessed against the BRE Guide (3rd Edition) which states the following in Section 3.3.17:

> Summary
>
> 3.3.17 It is recommended 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 of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area that can receive two hours of sun on 21 March is less than 0.80 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March.

The BRE Guide (3rd Edition) states that for a space to appear adequately sunlit throughout the year, at least half of a garden or amenity space should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation.

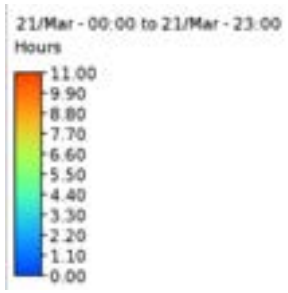
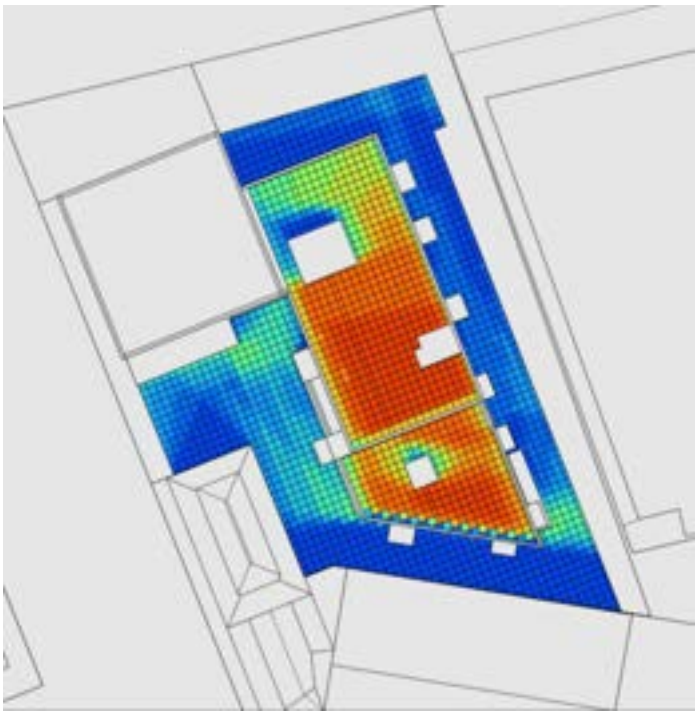
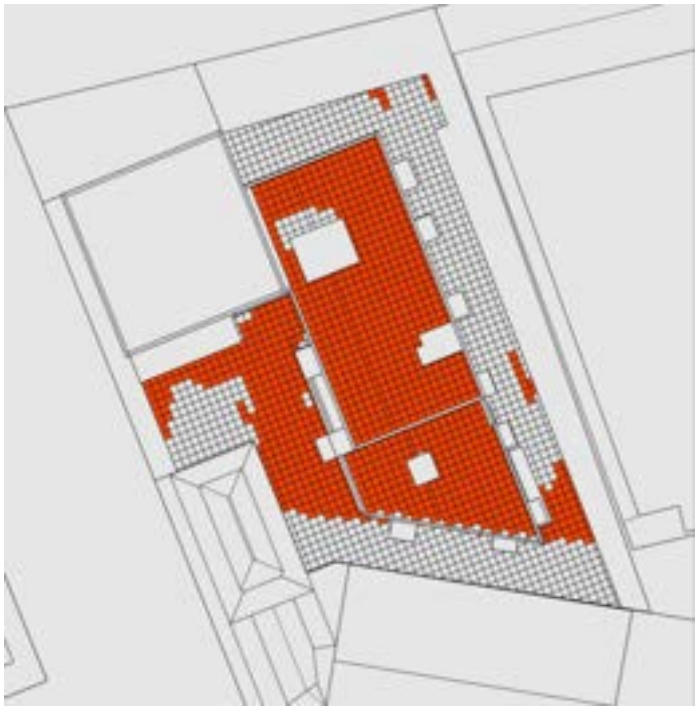
## 6.2 Proposed Amenity Spaces

This analysis will be performed on the amenity spaces illustrated in the image below.

| Proposed Amenity Spaces | |
|---|---|
| Proposed Roof Terraces<br>Proposed Public Plaza |  |

The following images illustrate the predicted results with respect to this space receiving at least 2 hours of sunlight on March 21st. Any areas that receive less than 2 hours of sunlight are colour-coded in grey.

### 6.2.1 Proposed Amenity Space Results

| Proposed Development in place: Absolute Scale Showing all Hours of Sunlight Received | |
|---|---|
|  |  |
| **Proposed Development in place: Absolute Scale Showing all Hours of Sunlight Received** | |
| Receives more than 2 hours of sunlight<br>Receives less than 2 hours of sunlight |  |

### 6.2.3 Proposed Amenity Results

| Proposed Amenity Results | |
|---|---|
| Proposed Private Amenities<br>Proposed Public Plaza |  |

**Private Amenities:**

| Ref | Total Area ($m^2$) | Area Receiving >2h ($m^2$) | Percent Receiving >2h | Comment |
|---|---|---|---|---|
| 1 | 243 | 232 | 95% | ✓ |
| 2 | 578 | 560 | 97% | ✓ |
| **Total** | **821** | **792** | **96%** | ✓ |

## 6.3 Discussion

As outlined in Section 3.3.17 of the BRE Guide (3rd Edition), for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation.

It should be noted that there were no existing amenity areas that would be affected by the development of the proposed asset.

**Private Amenities**

On March 21st, 96% of the combined proposed external private communal amenity areas situated within the development site will receive at least 2 hours of sunlight over their total area. Thus, complying with the BRE recommendations. When considered individually, all external private communal amenity areas exceed the BRE guidelines.

# 7 Sunlight to Existing Buildings

## 7.1 Guidance – BRE Guide (3rd Edition)

The BRE Guide (3rd Edition) states that interiors where the occupants expect sunlight should receive at least one quarter (25%) of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months, between 21st September and 21st March.

Here 'probable sunlight hours' means the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question.

If a window reference point can receive more than 25% of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months between 21st September and 21st March, then the room should still receive enough sunlight. 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 given and less than 0.8 times their former value, either over the whole year or just during the winter months (21st September to 21st March) and reduction in sunlight across the year has a greater reduction than 4%, then the occupants of the existing building will notice the loss of sunlight.

Summary

3.2.13 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 and less than 0.80 times its former annual value; or less than 5% of annual probable sunlight hours between 21 September and 21 March and less than 0.80 times its former value during that period;
- and also has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.

BRE 3rd Edition guidance document Site Layout Planning for Daylight and Sunlight

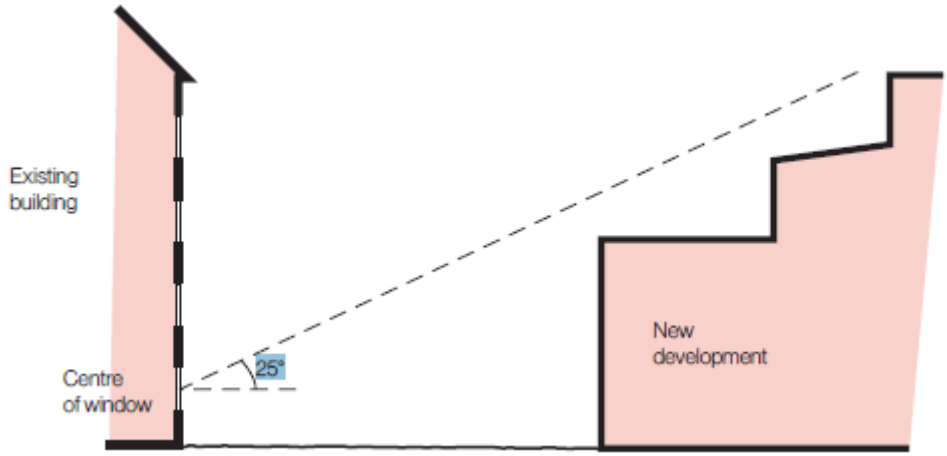
As such this study will compare the Existing Scheme and Proposed Schemes and consider if the values on the existing buildings meet the requirements outlined above when compared to their former value (that of the Existing scheme).

## 7.2 APSH Exclusions

The BRE recommendations note that if a new development sits within 90° of due south of any main living room window of an existing dwelling, then these should be assessed for APSH. However, there are several exceptional cases in which APSH is not required to be calculated, as indicated below:

3.2.9 It is not always necessary to do a full calculation to check sunlight potential. The guideline above is met provided either of the following is true:

- If the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window (note: obstructions within 90° of due north of the existing window need not count here).
- The window wall faces within 90° of due south and no obstruction, measured in the section perpendicular to the window wall, subtends an angle of more than 25° to the horizontal (Figure 14 in section 2.2). Again, obstructions within 90° of due north of the existing window need not be counted.
- The window wall faces within 20° of due south and the reference point has a VSC (section 2.1) of 27% or more.




BRE 3rd Edition guidance document Site Layout Planning for Daylight and Sunlight

Consequently, APSH will only be calculated for adjacent windows which meet the following conditions:

1. The height distance rule it not met and the existing building has living room with a main window which faces within 90 degrees of due south with the 25° rule not being met either.
2. Existing building is located to the North, East, or West of the Proposed Development.
3. The existing main living room window lies within 20 degrees of due south and has a VSC of less than 27%.

Taking the above into consideration, the existing properties north facing the proposed development have been excluded from this analysis. The existing dwellings which have living area windows that face within 90 degrees of South have been included in this assessment.

## 7.3 Discussion

This study considers the proposed scheme and tests if the Annual Probable Sunlight Hours (APSH) results for the living room windows are greater than 25% annual and 5% winter sunlight or are greater than 0.8 times their former value with the proposed development in place or the reduction in sunlight across the year is less than 4% with the proposed development in place.

Based on the criteria outlined in Section 3.2.9 of the BRE Guide 3rd Edition, none of the existing buildings fit the requirements to be assessed and as such the APSH assessment was not conducted for the rest of the properties. The BRE guide (3rd Edition) notes that there should be no impact to sunlight for these properties "It is not always necessary to do a full calculation to check sunlight potential. The guideline above is met provided either the following is true:

- If the window wall faces within 90° of due south and no obstruction, measured in the section perpendicular to the window wall, subtends an angle of more than 25° to the horizontal. Again, obstructions within 90° of due north need not be counted."

Given the statement above, the surrounding dwellings adjacent to the proposed development were verified noting that they were sitting to the south of the proposed development. These existing residential properties have been excluded from the assessment as noted in Section 3.2.9 of the BRE Guide 3rd Edition, that these windows need not be analysed as sunlight impact will be unnoticeable to the existing occupants. As noted regarding the permitted design, the proposed development will have no impact to the sunlight received to the existing residential properties.

# 8 Sunlight to Proposed Development

## 8.1 Guidance – BRE Guide 3rd Edition / IS/BS EN 17037-2018+A1-2021

Section 5.3.1 of IS/BS EN 17037-2018+A1-2021 states that *"exposure to sunlight is an important quality criterion of an interior space and can contribute to human well-being."* Table A.6 from IS/BS EN 17037-2018+A1-2021 summarises the recommendation for daily sunlight exposure.

**Table A.6 — Recommendation for daily sunlight exposure**

| Level of recommendation for exposure to sunlight | Sunlight exposure |
|---|---|
| Minimum | 1,5 h |
| Medium | 3,0 h |
| High | 4,0 h |

Within the context of a domestic property, BRE Guide 3rd Edition/IS EN 17037:2018 states that at least one habitable space within a dwelling should receive the recommended minimum value of 1.5 hours of sunlight on the 21st of March. The test is carried out on a clear, cloud free day.

## 8.2 Sunlight Exposure Assessment

Based on the above criteria for BRE Guide 3rd Edition/IS/BS EN 17037-2018+A1-2021, all main living room windows within the proposed development have been assessed with the results included in the following sections.

Please note, the "Comment" symbol in each of the tables represents the following:

BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021

✓ These rooms achieve the minimum 1.5 hours of recommended sunlight exposure on March 21st.

x These rooms do not achieve the minimum 1.5 hours of recommended sunlight exposure on March 21st.

### 8.2.1 View 01


| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 1 | ✓ |
| 2 | ✓ |
| 3 | ✓ |
| 4 | ✓ |
| 5 | ✓ |
| 6 | ✓ |
| 7 | ✓ |
| 8 | ✓ |
| 9 | ✓ |
| 10 | ✓ |
| 11 | ✓ |

| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 12 | ✓ |
| 13 | ✓ |
| 14 | ✓ |
| 15 | ✓ |
| 16 | ✓ |
| 17 | ✓ |
| 18 | ✓ |
| 19 | ✓ |
| 20 | ✓ |
| 21 | ✓ |
| 22 | ✓ |

| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 23 | ✓ |
| 24 | ✓ |
| 25 | ✓ |
| 26 | ✓ |
| 27 | ✓ |
| 28 | ✓ |
| 29 | ✓ |
| 30 | ✓ |
| 31 | ✓ |
| 32 | ✓ |
| 33 | ✓ |
| 34 | ✓ |
| 35 | ✓ |
| 36 | ✓ |
| 37 | ✓ |
| 38 | ✓ |
| 39 | ✓ |
| 40 | ✓ |
| 41 | ✓ |
| 42 | ✓ |
| 43 | ✓ |
| 44 | ✓ |
| 45 | ✓ |
| 46 | ✓ |
| 47 | ✓ |
| 48 | ✓ |
| 49 | ✓ |
| 50 | ✓ |
| 51 | ✓ |
| 52 | ✓ |
| 53 | ✓ |
| 54 | ✓ |
| 55 | ✓ |
| 56 | ✓ |
| 57 | ✓ |
| 58 | ✓ |
| 59 | ✓ |
| 60 | ✓ |
| 61 | ✓ |
| 62 | ✓ |
| 63 | ✓ |

| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 64 | ✓ |
| 65 | ✓ |
| 66 | ✓ |
| 67 | ✓ |
| 68 | ✓ |
| 69 | ✓ |
| 70 | ✓ |
| 71 | ✓ |
| 72 | ✓ |
| 73 | ✓ |
| 74 | ✓ |
| 75 | ✓ |
| 76 | ✓ |
| 77 | ✓ |
| 78 | ✓ |
| 79 | ✓ |
| 80 | ✓ |
| 81 | ✓ |
| 82 | ✓ |
| 83 | ✓ |
| 84 | ✓ |
| 85 | ✓ |
| 86 | ✓ |
| 87 | ✓ |
| 88 | ✓ |
| 89 | ✓ |
| 90 | ✓ |
| 91 | ✓ |
| 92 | ✓ |
| 93 | ✓ |
| 94 | ✓ |
| 95 | ✓ |
| 96 | ✓ |
| 97 | ✓ |
| 98 | ✓ |
| 99 | ✓ |
| 100 | ✓ |
| 101 | ✓ |
| 102 | ✓ |
| 103 | ✓ |
| 104 | ✓ |

| Ref. | BRE Guide 3rd Edition<br>IS EN 17037:2018<br>Sunlight Exposure<br>> 1.5 hrs |
|---|---|
| | Comment |
| 105 | ✓ |
| 106 | ✓ |
| 107 | ✓ |
| 108 | ✓ |
| 109 | ✓ |
| 110 | ✓ |
| 111 | ✓ |
| 112 | ✓ |
| 113 | ✓ |
| 114 | ✓ |
| 115 | ✓ |
| 116 | ✓ |
| 117 | ✓ |
| 118 | ✓ |
| 119 | ✓ |
| 120 | ✓ |
| 121 | ✓ |
| 122 | ✓ |
| 123 | ✓ |
| 124 | ✓ |
| 125 | ✓ |
| 126 | ✓ |
| 127 | ✓ |
| 128 | ✓ |
| 129 | ✓ |
| 130 | ✓ |
| 131 | ✓ |
| 132 | ✓ |

### 8.2.2 View 02

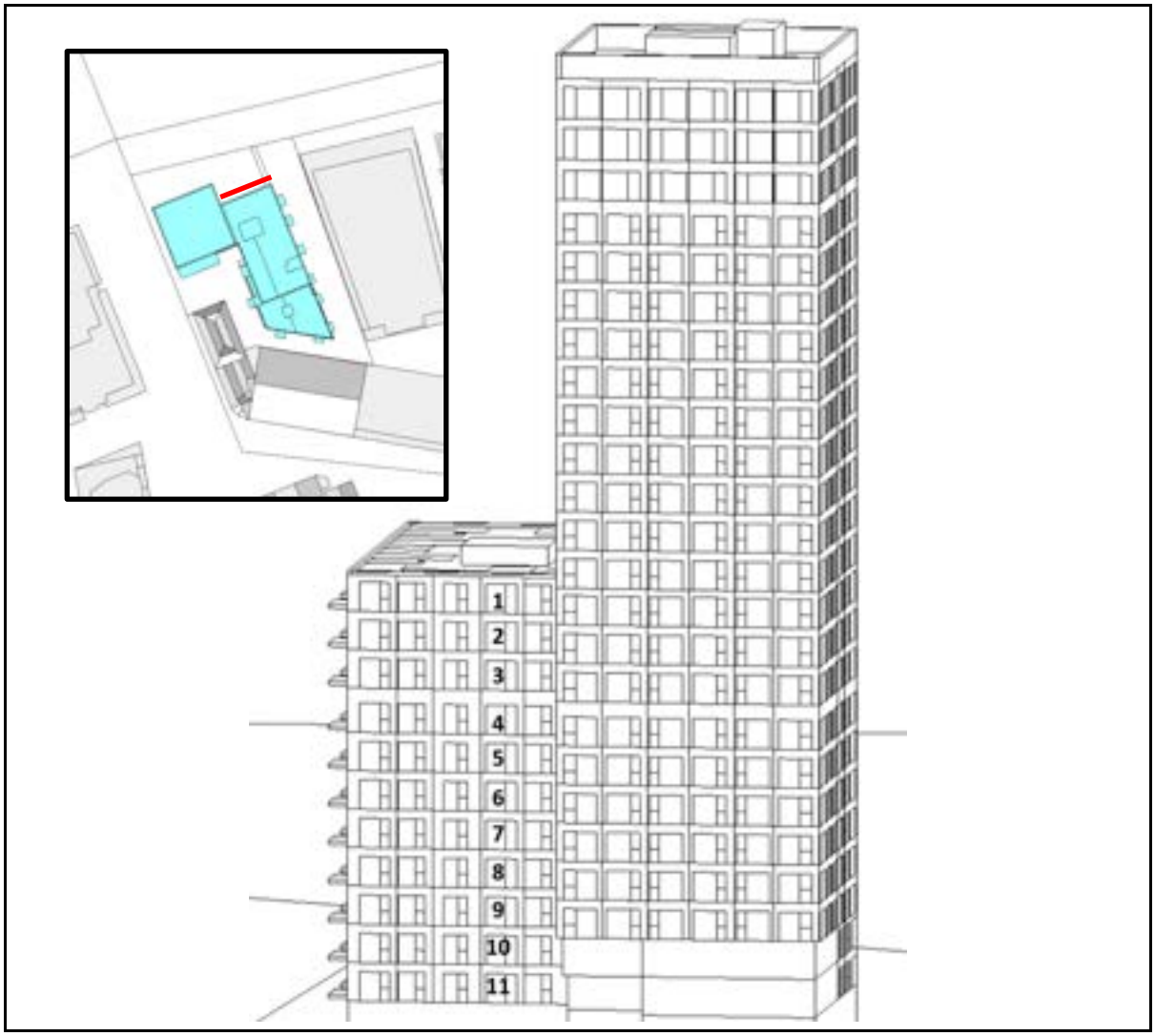

| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 1 | ✓ |
| 2 | ✓ |
| 3 | ✓ |
| 4 | X |
| 5 | X |
| 6 | X |
| 7 | X |
| 8 | X |
| 9 | ✓ |

| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 10 | ✓ |
| 11 | ✓ |
| 12 | ✓ |
| 13 | ✓ |
| 14 | X |
| 15 | X |
| 16 | X |
| 17 | X |
| 18 | X |

| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 19 | X |
| 20 | ✓ |
| 21 | ✓ |
| 22 | ✓ |
| 23 | ✓ |
| 24 | ✓ |
| 25 | X |
| 26 | X |
| 27 | X |
| 28 | X |
| 29 | X |
| 30 | X |
| 31 | ✓ |
| 32 | ✓ |
| 33 | ✓ |
| 34 | ✓ |
| 35 | ✓ |
| 36 | ✓ |
| 37 | X |
| 38 | X |
| 39 | X |
| 40 | X |
| 41 | X |
| 42 | ✓ |
| 43 | ✓ |
| 44 | ✓ |
| 45 | ✓ |
| 46 | ✓ |
| 47 | X |
| 48 | X |
| 49 | X |
| 50 | X |
| 51 | X |
| 52 | X |
| 53 | ✓ |
| 54 | ✓ |
| 55 | ✓ |
| 56 | ✓ |
| 57 | ✓ |
| 58 | ✓ |
| 59 | ✓ |

| Ref. | BRE Guide 3rd Edition IS EN 17037:2018 Sunlight Exposure > 1.5 hrs |
|---|---|
| | Comment |
| 60 | ✓ |
| 61 | ✓ |
| 62 | ✓ |
| 63 | ✓ |
| 64 | ✓ |
| 65 | ✓ |
| 66 | ✓ |
| 67 | X |
| 68 | X |
| 69 | X |
| 70 | X |
| 71 | X |
| 72 | X |
| 73 | X |
| 74 | X |

### 8.2.3 View 03




| Ref. | BRE Guide 3rd Edition<br>IS EN 17037:2018<br>Sunlight Exposure<br>> 1.5 hrs |
|---|---|
| | Comment |
| 1 | X |
| 2 | X |
| 3 | X |
| 4 | X |
| 5 | X |
| 6 | X |
| 7 | X |
| 8 | X |
| 9 | X |
| 10 | X |
| 11 | X |

## 8.3 Discussion

**BRE Guide 3rd Edition / IS/BS EN 17037-2018+A1-2021**

As the sunlight exposure assessment in accordance with BRE Guide 3rd Edition / IS/BS EN 17037-2018+A1-2021 considers the orientation of the rooms the following should be noted from section 3.1.11 of the guide.

*"The BS EN 17037 criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met."*

Of the 217 no. points tested, 169 no. points (78%) meet the BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021 sunlight exposure recommendations of greater than 1.5 hours on March 21st. Where windows do not meet this recommendation, this is predominantly as a result of their orientation, or as a consequence of the impact of balcony projections.

Overall, the sunlight provision results to the proposed development in accordance with IS/BS EN 17037-2018+A1-2021 are considered excellent in the context of a suburban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

Finally, the sunlight exposure results are visually represented in Appendix B.

# 9 Daylight to Existing Buildings

## 9.1 Guidance – BRE Guide (3rd Edition) / IS/BS EN 17037-2018+A1-2021

When designing a new development, it is important to safeguard the daylight to nearby buildings. The BRE Guide provides numerical values that are purely advisory. Different criteria may be used based on the requirements for daylighting in an area viewed against other site layout constraints. Another issue is whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light. Any reduction in the total amount of skylight can be calculated by determining the vertical sky component at the centre of key reference points. The vertical sky component definition from the BRE Guide (3rd Edition) is described below:

| | |
|---|---|
| **Vertical sky component (VSC)** | This is a measure of the amount of light reaching a window. It is 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. |

The maximum possible VSC value for an opening in a vertical wall, assuming no obstructions, is 40%. This VSC at any given point can be tested in RadianceIES, a module of IES VE.

For typical residential schemes the BRE Guide (3nd Edition) states the following in Section 2.2.7:

> 2.2.7 If this VSC is greater than 27% then enough skylight should still be reaching the window of the existing building. Any reduction below this level should be kept to a minimum. If the VSC, with the new development in place, is both less than 27% and less than 0.8 times its former value, occupants of the existing building will notice the reduction in the amount of skylight. The area lit by the window is likely to appear more gloomy, and electric lighting will be needed more of the time.

As such this study will compare the Existing scheme, permitted and Proposed schemes and consider if the values on the existing buildings are above 27% or not less than 0.8 times their former value (that of the Existing/Permitted schemes).

It is also important to note that Section 2.1.6 of the BRE Guide states that if the VSC is between 15% and 27%, special measures such as larger windows can provide adequate daylight (refer to extract below).

> 2.1.6 The amount of daylight a room needs depends on what it is being used for. But roughly speaking, if $\theta$ is:
>
> - greater than 65° (obstruction angle less than 25° or VSC at least 27%) conventional window design will usually give reasonable results.
> - between 45° and 65° (obstruction angle between 25° and 45°, VSC between 15% and 27%) special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight.
> - between 25° and 45° (obstruction angle between 45° and 65°, VSC between 5% and 15%) it is very difficult to provide adequate daylight unless very large windows are used.
> - less than 25° (obstruction angle greater than 65°, VSC less than 5%) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed.

## 9.2 Assessment

Based on the above criteria, the locations in the following sections have been modelled and analysed with the results also included.

Please note, the "Comment" symbol in each of the tables represents the following:

✓ For these locations, the Proposed Scheme VSC value is greater than 27% or 0.8 times their former value (that of the Existing Situation/Permitted Scheme).

✓[1] For these locations, the Proposed Scheme VSC value is less than 0.8 times its former value (that of the Existing). However, the Proposed Scheme VSC values are between 15% and 27% and hence adequate daylight should still be expected (as per Section 2.1.6 of the BRE Guide) given the presence of larger than conventional windows.

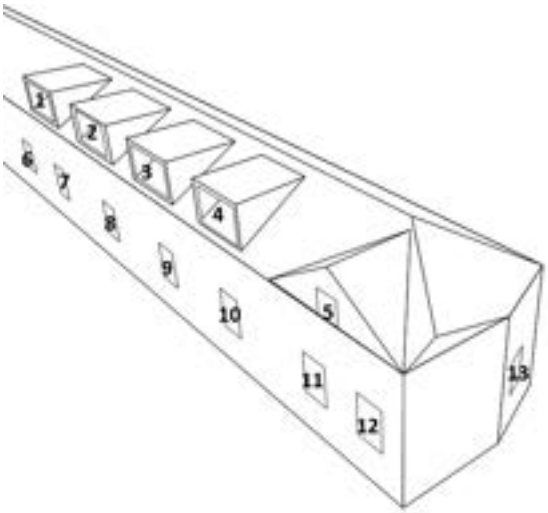
x For these locations, the Proposed Scheme VSC value is less than 15% and less than 0.8 times its former value (that of the Existing Situation), therefore, it does not achieve the BRE recommendations.

### 9.2.1 View 1: Albert Street - Residential


| Ref. | Existing Situation | Permitted Scheme VSC | Permitted VSC as a % of Existing Situation | Comment | Proposed Scheme VSC | Proposed VSC as a % of Permitted Situation | Comment |
|---|---|---|---|---|---|---|---|
| 1 | 38.96 | 37.53 | 96% | ✓ | 37.53 | 100% | ✓ |
| 2 | 38.85 | 37.22 | 96% | ✓ | 37.22 | 100% | ✓ |
| 3 | 38.84 | 37.16 | 96% | ✓ | 37.16 | 100% | ✓ |
| 4 | 38.82 | 36.97 | 95% | ✓ | 36.97 | 100% | ✓ |
| 5 | 38.46 | 33.47 | 87% | ✓ | 33.47 | 100% | ✓ |
| 6 | 38.26 | 34.71 | 91% | ✓ | 34.71 | 100% | ✓ |
| 7 | 38.49 | 37.16 | 97% | ✓ | 37.16 | 100% | ✓ |
| 8 | 38.56 | 36.82 | 95% | ✓ | 36.82 | 100% | ✓ |
| 9 | 38.54 | 36.71 | 95% | ✓ | 36.71 | 100% | ✓ |
| 10 | 38.55 | 36.47 | 95% | ✓ | 36.47 | 100% | ✓ |
| 11 | 37.36 | 32.03 | 86% | ✓ | 32.03 | 100% | ✓ |
| 12 | 36.27 | 32.36 | 89% | ✓ | 32.36 | 100% | ✓ |
| 13 | 38.02 | 36.04 | 95% | ✓ | 36.04 | 100% | ✓ |
| 14 | 37.99 | 35.81 | 94% | ✓ | 35.81 | 100% | ✓ |
| 15 | 13.79 | 12.46 | 90% | ✓ | 12.46 | 100% | ✓ |
| 16 | 18.00 | 15.39 | 86% | ✓ | 15.39 | 100% | ✓ |
| 17 | 24.07 | 21.22 | 88% | ✓ | 21.22 | 100% | ✓ |
| 18 | 36.53 | 33.70 | 92% | ✓ | 33.70 | 100% | ✓ |
| 19 | 32.09 | 27.33 | 85% | ✓ | 27.33 | 100% | ✓ |
| 20 | 26.74 | 27.14 | 101% | ✓ | 27.14 | 100% | ✓ |
| 21 | 30.71 | 26.74 | 87% | ✓ | 26.74 | 100% | ✓ |

| Ref. | Existing Situation | Permitted Scheme VSC | Permitted VSC as a % of Existing Situation | Comment | Proposed Scheme VSC | Proposed VSC as a % of Permitted Situation | Comment |
|---|---|---|---|---|---|---|---|
| 22 | 29.70 | 26.89 | 91% | ✓ | 26.89 | 100% | ✓ |
| 23 | 37.72 | 35.31 | 94% | ✓ | 35.31 | 100% | ✓ |
| 24 | 37.79 | 35.08 | 93% | ✓ | 35.08 | 100% | ✓ |
| 25 | 12.91 | 11.72 | 91% | ✓ | 11.72 | 100% | ✓ |
| 26 | 16.28 | 14.86 | 91% | ✓ | 14.86 | 100% | ✓ |
| 27 | 17.00 | 14.76 | 87% | ✓ | 14.76 | 100% | ✓ |
| 28 | 18.36 | 16.13 | 88% | ✓ | 16.13 | 100% | ✓ |
| 29 | 28.54 | 23.77 | 83% | ✓ | 23.77 | 100% | ✓ |
| 30 | 26.94 | 23.57 | 87% | ✓ | 23.57 | 100% | ✓ |
| 31 | 26.11 | 23.10 | 88% | ✓ | 23.10 | 100% | ✓ |
| 32 | 25.21 | 22.93 | 91% | ✓ | 22.93 | 100% | ✓ |
| 33 | 37.22 | 35.18 | 95% | ✓ | 35.18 | 100% | ✓ |
| 34 | 37.18 | 34.35 | 92% | ✓ | 34.35 | 100% | ✓ |
| 35 | 12.64 | 11.04 | 87% | ✓ | 11.04 | 100% | ✓ |
| 36 | 16.25 | 14.09 | 87% | ✓ | 14.09 | 100% | ✓ |
| 37 | 16.16 | 14.35 | 89% | ✓ | 14.35 | 100% | ✓ |
| 38 | 17.73 | 14.29 | 81% | ✓ | 14.29 | 100% | ✓ |
| 39 | 24.97 | 20.86 | 84% | ✓ | 20.86 | 100% | ✓ |
| 40 | 22.97 | 20.08 | 87% | ✓ | 20.08 | 100% | ✓ |
| 41 | 21.92 | 19.62 | 90% | ✓ | 19.62 | 100% | ✓ |
| 42 | 21.30 | 19.16 | 90% | ✓ | 19.16 | 100% | ✓ |
| 43 | 36.39 | 33.90 | 93% | ✓ | 33.90 | 100% | ✓ |
| 44 | 36.48 | 33.62 | 92% | ✓ | 33.62 | 100% | ✓ |
| 45 | 12.40 | 10.29 | 83% | ✓ | 10.29 | 100% | ✓ |
| 46 | 14.70 | 13.35 | 91% | ✓ | 13.35 | 100% | ✓ |
| 47 | 15.42 | 13.08 | 85% | ✓ | 13.08 | 100% | ✓ |
| 48 | 16.99 | 13.61 | 80% | ✓ | 13.61 | 100% | ✓ |
| 49 | 22.05 | 17.74 | 80% | ✓ | 17.74 | 100% | ✓ |
| 50 | 19.68 | 17.39 | 88% | ✓ | 17.39 | 100% | ✓ |
| 51 | 18.81 | 16.80 | 89% | ✓ | 16.80 | 100% | ✓ |
| 52 | 17.76 | 16.32 | 92% | ✓ | 16.32 | 100% | ✓ |

### 9.2.2 View 2: Albert Road - Residential




| Ref. | Existing Situation | Permitted Scheme VSC | Permitted VSC as a % of Existing Situation | Comment | Proposed Scheme VSC | Proposed VSC as a % of Permitted Situation | Comment |
|---|---|---|---|---|---|---|---|
| 1 | 16.73 | 16.85 | 100% | ✓ | 16.85 | 100% | ✓ |
| 2 | 16.86 | 16.69 | 99% | ✓ | 16.69 | 100% | ✓ |
| 3 | 17.56 | 16.77 | 96% | ✓ | 16.77 | 100% | ✓ |
| 4 | 17.34 | 17.58 | 100% | ✓ | 17.58 | 100% | ✓ |
| 5 | 18.12 | 17.66 | 97% | ✓ | 17.66 | 100% | ✓ |
| 6 | 14.82 | 14.55 | 98% | ✓ | 14.55 | 100% | ✓ |
| 7 | 14.56 | 14.50 | 100% | ✓ | 14.50 | 100% | ✓ |
| 8 | 14.45 | 14.48 | 100% | ✓ | 14.48 | 100% | ✓ |
| 9 | 14.82 | 14.67 | 99% | ✓ | 14.67 | 100% | ✓ |
| 10 | 15.37 | 15.04 | 98% | ✓ | 15.04 | 100% | ✓ |
| 11 | 15.13 | 15.28 | 100% | ✓ | 15.28 | 100% | ✓ |
| 12 | 16.14 | 16.04 | 99% | ✓ | 16.04 | 100% | ✓ |
| 13 | 25.01 | 24.85 | 99% | ✓ | 24.85 | 100% | ✓ |

## 9.3 Discussion

This study considers the Proposed Scheme and tests if the VSC results are greater than 27% or not less than 0.8 times the value of the Existing Situation.

Based on the criteria outlined in Section 2.2.5 of the BRE guidance (3rd Edition) two of the residential neighbouring blocks were required to be included within the VSC assessment.

A 100% of the 63 points tested have a Proposed VSC value greater than 27% or not less than 0.8 times their former value compared to the Existing and Permitted Situations. The proposed development shows no change to daylight when compared to the permitted design.

# 10 Daylight to Proposed Development

This section addresses daylight provision to the proposed development. The purpose of the calculations is to quantify an overall percentage of units which exceeds the daylight provision recommendations. Our proposed methodology is to complete the calculations for a sample of the apartments within the development. The objective of the design team is to maximise the number of units which exceed the minimum recommendations.

## 10.1 Reference Standards

The daylight provision to the proposed development was assessed against the following standards for completeness:

- BRE Guide (3rd Edition) / IS EN 17037-2018+A1-2021
- BRE Guide (3rd Edition) / BS EN 17037-2018+A1-2021

The following sections summarise the various requirements of each standard.

### 10.1.1 BRE Guide (3rd Edition) / IS EN 17037-2018+A1-2021

As outlined in Section 5.1.2 of the IS EN 17037-2018+A1-2021 standard:

*"A space is considered to provide adequate daylight if a target illuminance level is achieved across a fraction of the reference plane within a space for at least half of the daylight hours. In addition, for spaces with vertical or inclined daylight openings, a minimum target illuminance level is also to be achieved across the reference plane".*

Annex A of IS EN 17037-2018+A1-2021 gives three levels of recommendation for the assessment of daylight provision in interior spaces which are summarised as follows:

*"The three levels are: minimum, medium and high, and the minimum recommendation should be provided."*

It is important to note that IS EN 17037-2018+A1-2021 does not provide different illuminance targets for different space types. Therefore, in the case of residential developments; bedrooms, living rooms, kitchens and combined LKDs all have the same daylight provision targets.

Table A.1 of IS EN 17037-2018+A1-2021 (included below) provides recommendations for daylight provision by daylight openings in vertical and inclined surfaces. Note, Table A.2 provides similar recommendations for daylight openings in horizontal surfaces, e.g. rooflights. As there are no rooflights in the proposed development, the recommendations in Table A.2 are not followed.

To achieve the minimum level of daylight provision for vertical and inclined openings as per Table A.1, the following must be achieved:

- A target illuminance ($E_T$) of 300 lux must be achieved on over 50% of the floor area for over 50% of the available daylight hours, and
- A minimum target illuminance ($E_{TM}$) of 100 lux must be achieved on over 95% of the floor area for over 50% of the available daylight hours.

- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

**Table A.1 — Recommendations of daylight provision by daylight openings in vertical and inclined surface**

| Level of recommendation for vertical and inclined daylight opening | Target illuminance $E_T$ lx | Fraction of space for target level $F_{plane,\%}$ | Minimum target illuminance $E_{TM}$ lx | Fraction of space for minimum target level $F_{plane,\%}$ | Fraction of daylight hours $F_{time,\%}$ |
|---|---|---|---|---|---|
| Minimum | 300 | 50 % | 100 | 95 % | 50 % |
| Medium | 500 | 50 % | 300 | 95 % | 50 % |
| High | 750 | 50 % | 500 | 95 % | 50 % |
| NOTE Table A.3 gives target daylight factor ($D_T$) and minimum target daylight factor ($D_{TM}$) corresponding to target illuminance level and minimum target illuminance, respectively, for the CEN capital cities. | | | | | |

The recommendations in Table A.1 can also be expressed in terms of a daylight factor "D". Table A.3 provides the corresponding daylight factor (D) relative to a recommended target illuminance $E_T$ (lx) and target minimum illuminance $E_{TM}$ (lx) depending on the location for daylight openings in vertical and inclined surfaces. Note, Table A.4 provides similar target values for openings in horizontal surfaces, e.g. rooflights. As there are no rooflights in the proposed development, the recommendations in Table A.4 are not followed.

The extract from Table A.3 below is for Dublin with the daylight factor targets highlighted, i.e. to achieve the target illuminance ($E_T$) of 300 lux outlined in Table A.1, an equivalent target daylight factor is 2.0%. Furthermore, to achieve the minimum target illuminance ($E_{TM}$) of 100 lux outlined in Table A.1, an equivalent target daylight factor is 0.7%.

**Table A.3 — Values of *D* for daylight openings to exceed an illuminance level of 100, 300, 500 or 750 lx for a fraction of daylight hours $F_{time,\%}$ = 50 % for 33 capitals of CEN national members**

| Nation | Capital [a] | Geographical latitude $\varphi$ [°] | Median External Diffuse Illuminance $E_{v,d,med}$ | *D* to exceed 100 lx | *D* to exceed 300 lx | *D* to exceed 500 lx | *D* to exceed 750 lx |
|---|---|---|---|---|---|---|---|
| Ireland | Dublin | 53,43 | 14 900 | 0,7 % | 2,0 % | 3,4 % | 5,0 % |

Therefore, to achieve the minimum level of daylight provision for vertical and inclined openings as per Table A.3, the following must be achieved:

- A target daylight factor ($D_T$) of 2.0% must be achieved on over 50% of the floor area for over 50% of the available daylight hours, and
- A minimum target daylight factor ($D_{TM}$) of 0.7% must be achieved on over 95% of the floor area for over 50% of the available daylight hours.
- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 which are summarised as follows:

Method 1: This calculation method uses the daylight factor targets on the reference plane as per Table A.3. The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.

Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1. The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.

As outlined in Section 5.1.4, the verification of daylight provision can be determined using either an adequate software or on-site measurements. When using a software, *"a representative model of the space is required together with the key parameters (such as any significant nearby obstructions, the assigned surface reflectance values and glazing transmissivity) that are a reasonable representation of those for the actual, completed building. This can be determined using either Method 1 or Method 2."*

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table A.1 of IS EN 17037-2018+A1-2021.

The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1. Climate based daylight modelling (CBDM) is more accurate compared to a calculation based on a single day during the year, i.e. Method 1. The amount of daylight varies throughout the year, primarily due to the sun's position, so it is essential the impact of daylight variance is properly considered. CBDM utilises an annual simulation linking location, shading, climate data (including solar intensity and cloud cover) together with the building properties. This provides a complete overview on how the daylight performance varies throughout the year due to changes in these factors.

### 10.1.2 BRE Guide 3rd Edition / BS EN 17037-2018+A1-2021 National Annex

In the UK, EN17037-2018+A1-2021 was adopted to form "BS EN 17037-2018+A1-2021". However, a "National Annex NA" was included which states:

*"The UK committee supports the recommendations for daylight in buildings given in BS EN 17037:2018; however, it is the opinion of the UK committee that the recommendations for daylight provision in a space (see Clause A.2) may not be achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions (for example, dwellings situated in a dense urban area or with tall trees outside), or for existing buildings being refurbished or converted into dwellings. This National Annex therefore provides the UK committee's guidance on minimum daylight provision in all UK dwellings."*

Whereas IS EN 17037-2018+A1-2021 does not provide different illuminance targets for different space types, the BS EN 17037:2018 National Annex provides target illuminance values for bedrooms, living rooms and kitchens within residential developments as per Table NA.1 below. It is also important to

note that as the climate in Ireland is similar to the UK, the targets outlined in the BS EN National Annex could also be applied to dwellings in Ireland.

**Table NA.1 — Values of target illuminance for room types in UK dwellings**

| Room type | Target illuminance $E_T$ (lx) |
|---|---|
| Bedroom | 100 |
| Living room | 150 |
| Kitchen | 200 |

The BS National Annex also states:

*"Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx."*

Therefore, combined LKDs are to be assessed using a 200 lux target illuminance ($E_T$).

Finally, the BS National Annex also states that:

*"It is the opinion of the UK committee that the recommendation in Clause A.2 – that a target illuminance level should be achieved across the entire (i.e. 95 %) fraction of the reference plane within a space – need not be applied to rooms in dwellings."*

Therefore, when assessing the daylight provisions in residential dwellings in accordance with BS EN 17037-2018+A1-2021, only the target illuminance ($E_T$) or target daylight factor ($D_T$) will be assessed for Bedrooms, Living Rooms, Kitchens (or combined LKDs) on over 50% of the floor area over 50% of the available daylight hours. The minimum target illuminance ($E_{TM}$) or minimum target daylight factor ($D_{TM}$) will not be assessed.

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table NA.1 of BS EN 17037-2018+A1-2021.

## 10.2 Daylight Model Inputs

The following inputs were used in the study:

BRE Guide (3rd Edition) / IS EN / BS EN 17037-2018+A1-2021

- Weather File: Cork.epw (15-year average)

Common Inputs to all Standards

- Working Plane Height: 0.85m
- Glazing Light Transmittance: 70%
- Window Frame thickness: 50 mm

The following surface reflectance values are used in the study:

| Material Surface | Reflectance |
|---|---|
| External Wall – Default | 0.20 |
| Internal Partition – White | 0.80 |
| Roof – Default | 0.20 |
| Ground – Default | 0.20 |
| Floor – Light Veneers | 0.40 |
| Ceiling – White | 0.80 |

## 10.3 Daylight Results

The following tables summarise the daylight provision results for the apartment block assessed against the various standards. Individual room results can be viewed in Appendix A.

The purpose of the calculations is to quantify an overall percentage of rooms which exceed the recommendations. The objective of the design team is to maximise the number of units which exceed the recommendations.

The results are summarised in the following tables:

## Total for the Development

The daylight provision results for the tested spaces in the development under the various standards are summarised below. Under BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021 Method 2, a compliance rate of 85% is achieved which increases to 95% under BRE Guide 3rd Edition / BS EN 17037-2018+A1-2021 Method 2 National Annex.

| Rooms Tested | Total No. Rooms |
|---|---|
| **Total No. Bedrooms Tested** | 304 |
| **Total No. LKDs Tested** | 192 |
| **Total No. Studios Tested** | 25 |
| **Total No. Spaces Tested** | **521** |

| BRE Guide 3rd Edition / IS EN 17037:2018 Method 2 Assessment | | | | |
|---|---|---|---|---|
| **Room Type** | **Pass (No.)** | **Pass (%)** | **Fail (No.)** | **Fail (%)** |
| **No. Bedrooms** | 267 | 88% | 37 | 12% |
| **No. LKDs** | 149 | 78% | 43 | 22% |
| **No. Studios** | 25 | 100% | 0 | 0% |
| **Total No.** | **441** | **85%** | **80** | **15%** |

| BRE Guide 3rd Edition / BS EN 17037:2018 Method 2 Assessment - National Annex | | | | |
|---|---|---|---|---|
| **Room Type** | **Pass (No.)** | **Pass (%)** | **Fail (No.)** | **Fail (%)** |
| **No. Bedrooms** | 304 | 100% | 0 | 0% |
| **No. LKDs** | 164 | 85% | 28 | 15% |
| **No. Studios** | 25 | 100% | 0 | 0% |
| **Total No.** | **493** | **95%** | **28** | **5%** |

## 10.4 Compensatory Measures

## 10.5 Irish Standards and Design Development

With regards to internal daylighting, Section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments 2023, states the following:

*"Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be*

*set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specifics. This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

Having regard to the statements above, it should be noted that throughout the design process the design team worked hard to optimise the whole development to maximise the daylight within the proposed scheme.

Design features have been incorporated into the development where rooms do not achieve the daylight provision targets in accordance with the standards they were assessed against. These design features again help to balance off and compensate the lower levels of daylight measured in the applicable spaces and are summarised as follows:

- 100% of the units have a floor area 10% greater than the minimum floor area requirements as required by the Design Standards (2023). Note that larger floor areas make it more difficult to achieve the recommended daylight levels. However, larger windows have been incorporated into the design which also improves the view out for the building occupants.
- 53% of the units are dual aspect which is above the 33% minimum requirement as required by the Design Standards (2023). As a result, more apartment units than the recommended minimum will achieve quality daylight from dual-aspect orientations.
- The proposed scheme provides 1,451sq.m of communal amenity space, thus exceeding the 1,281sq.m required pursuant to the Design Standards (2023).

In addition to this, specific compensatory measures for each space below the recommendations can be found in the table within Appendix A section 12.2.

# 11 Conclusion

The following can be concluded based on the assessments undertaken:

## 11.1 Shadow Analysis

The shadow analysis illustrates different shadows being cast at key times of the year (March 21st, June 21st and December 21st) for the Existing Situation and the Proposed Scheme. The results from the study are summarised as follows:

**Albert Street - Residential**

No additional shading visible from the proposed development on these existing properties throughout the year.

**Albert Road - Residential**

No additional shading visible from the proposed development on these existing properties throughout the year.

The potential shading impact is quantified via the "Sunlight to Amenity Spaces" and "Daylight to Existing Buildings" sections of this report.

## 11.2 Sunlight to Amenity Spaces

As outlined in Section 3.3.17 of the BRE Guide (3rd Edition), for a space to appear adequately sunlit throughout the year, at least half of the garden or amenity area should receive at least 2 hours of sunlight on March 21st. In the case of existing amenity spaces, if they are already below the 50% threshold then the BRE recommends the results kept to within 80% of the existing situation.

It should be noted that there were no existing amenity areas that would be affected by the development of the proposed asset.

**Private Amenities**

On March 21st, 96% of the combined proposed external private communal amenity areas situated within the development site will receive at least 2 hours of sunlight over their total area. Thus, complying with the BRE recommendations. When considered individually, all external private communal amenity areas exceed the BRE guidelines.

## 11.3 Sunlight to Existing Buildings

This study considers the proposed scheme and tests if the Annual Probable Sunlight Hours (APSH) results for the living room windows are greater than 25% annual and 5% winter sunlight or are greater than 0.8 times their former value with the proposed development in place or the reduction in sunlight across the year is less than 4% with the proposed development in place.

Based on the criteria outlined in Section 3.2.9 of the BRE Guide 3rd Edition, none of the existing buildings fit the requirements to be assessed and as such the APSH assessment was not conducted for the rest of the properties. The BRE guide (3rd Edition) notes that there should be no impact to sunlight

for these properties "It is not always necessary to do a full calculation to check sunlight potential. The guideline above is met provided either the following is true:

- If the window wall faces within 90° of due south and no obstruction, measured in the section perpendicular to the window wall, subtends an angle of more than 25° to the horizontal. Again, obstructions within 90° of due north need not be counted."

Given the statement above, the surrounding dwellings adjacent to the proposed development were verified noting that they were sitting to the south of the proposed development. These existing residential properties have been excluded from the assessment as noted in Section 3.2.9 of the BRE Guide 3rd Edition, that these windows need not be analysed as sunlight impact will be unnoticeable to the existing occupants. As noted regarding the permitted design, the proposed development will have no impact to the sunlight received to the existing residential properties.

## 11.4 Sunlight to Proposed Development

As the sunlight exposure assessment in accordance with BRE Guide 3rd Edition / IS/BS EN 17037-2018+A1-2021 considers the orientation of the rooms the following should be noted from section 3.1.11 of the guide.

*"The BS EN 17037 criterion applies to rooms of all orientations, although if a room faces significantly north of due east or west it is unlikely to be met."*

Of the 217 no. points tested, 169 no. points (78%) meet the BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021 sunlight exposure recommendations of greater than 1.5 hours on March 21st. Where windows do not meet this recommendation, this is predominantly as a result of their orientation, or as a consequence of the impact of balcony projections.

Overall, the sunlight provision results to the proposed development in accordance with IS/BS EN 17037-2018+A1-2021 are considered excellent in the context of a suburban environment, due to the fact that not all living rooms can face south and the inclusion of balconies.

Finally, the sunlight exposure results are visually represented in Appendix B.

## 11.5 Daylight to Existing Buildings

This study considers the Proposed Scheme and tests if the VSC results are greater than 27% or not less than 0.8 times the value of the Existing Situation.

Based on the criteria outlined in Section 2.2.5 of the BRE guidance (3rd Edition) two of the residential neighbouring blocks were required to be included within the VSC assessment.

A 100% of the 63 points tested have a Proposed VSC value greater than 27% or not less than 0.8 times their former value compared to the Existing and Permitted Situations. The proposed development shows no change to daylight when compared to the permitted design.

## 11.6 Daylight to Proposed Development

For the daylight to proposed development assessment, two standards have been analysed: IS EN 17037-2018+A1-2021 and BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition). The results under each standard are summarised below.

**BRE Guide 3rd Edition / IS EN 17037-2018+A1-2021**

It is important to note that IS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition) does not provide different illuminance targets for different space types. Therefore, in the case of residential developments; bedrooms, living rooms, kitchens and combined LKDs all have the same daylight provision targets.

There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 of IS EN 17037-2018+A1-2021 which are summarised as follows:

Method 1: This calculation method uses the daylight factor targets on the reference plane as per Table A.3 (refer to Section 10.1.2 of this report). The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.

Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1 (refer to Section 10.1.2 of this report). The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.
As outlined in Section 5.1.4 of the standard, the verification of daylight provision can be determined using either an adequate software or on-site measurements. When using a software, *"a representative model of the space is required together with the key parameters (such as any significant nearby obstructions, the assigned surface reflectance values and glazing transmissivity) that are a reasonable representation of those for the actual, completed building. This can be determined using either Method 1 or Method 2."*

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 2 climate-based approach and targeting the minimum recommended values outlined in Table A.1 of IS EN 17037-2018+A1-2021.

The Method 2 climate-based approach was selected as it is a far more accurate assessment method compared to Method 1. Climate based daylight modelling (CBDM) is more accurate compared to a calculation based on a single day during the year, i.e. Method 1. The amount of daylight varies throughout the year, primarily due to the sun's position, so it is essential the impact of daylight variance is properly considered. CBDM utilises an annual simulation linking location, shading, climate data (including solar intensity and cloud cover) together with the building properties. This provides a complete overview on how the daylight performance varies throughout the year due to changes in these factors.

Across the proposed development, 85% of the tested rooms are achieving the daylight provision targets in accordance with Table A.1 of IS EN 17037-2018+A1-2021 using Method 2.

**BRE Guide 3rd Edition / BS EN 17037-2018+A1-2021 National Annex**

In the UK, EN 17037-2018+A1-2021 was adopted to form "BS EN 17037-2018+A1-2021". However, a National Annex was included which states:

*"The UK committee supports the recommendations for daylight in buildings given in BS EN 17037:2018; however, it is the opinion of the UK committee that the recommendations for daylight provision in a space (see Clause A.2) may not be achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions (for example, dwellings situated in a dense urban area or with tall trees outside), or for existing buildings being refurbished or converted into dwellings. This National Annex therefore provides the UK committee's guidance on minimum daylight provision in all UK dwellings."*

Whereas IS EN 17037-2018+A1-2021 does not provide different illuminance targets for different space types, the BS EN 17037-2018+A1-2021 National Annex provides target illuminance values for bedrooms, living rooms and kitchens within residential developments as per Table NA.1 (refer to Section 10.1.3 of this report). It is also important to note that as the climate in Ireland is similar to the UK, the targets outlined in the BS EN National Annex could also be applied to dwellings in Ireland.

The BS National Annex also states:

*"Where one room in a UK dwelling serves more than a single purpose, the UK committee recommends that the target illuminance is that for the room type with the highest value – for example, in a space that combines a living room and a kitchen the target illuminance is recommended to be 200 lx."*
Therefore, combined LKDs were assessed using a 200 lux target illuminance ($E_T$).

Across the proposed development, 95% of the tested rooms are achieving the daylight provision targets in accordance with Table NA.1 of BS EN 17037-2018+A1-2021 using Method 2.

**Compensatory Measures**
With regards to internal daylighting, Section 6.7 of the Sustainable Urban Housing: Design Standards for New Apartments 2023, states the following:

*"Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specifics. This may arise due to design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

Having regard to the statements above, it should be noted that throughout the design process the design team worked hard to optimise the whole development to maximise the daylight within the proposed scheme.

Design features have been incorporated into the development where rooms do not achieve the daylight provision targets in accordance with the standards they were assessed against. These design

features again help to balance off and compensate the lower levels of daylight measured in the applicable spaces and are summarised as follows:

- 100% of the units have a floor area 10% greater than the minimum floor area requirements as required by the Design Standards (2023). Note that larger floor areas make it more difficult to achieve the recommended daylight levels. However, larger windows have been incorporated into the design which also improves the view out for the building occupants.
- 53% of the units are dual aspect which is above the 33% minimum requirement as required by the Design Standards (2023). As a result, more apartment units than the recommended minimum will achieve quality daylight from dual-aspect orientations.
- The proposed scheme provides 1,451sq.m of communal amenity space, thus exceeding the 1,281sq.m required pursuant to the Design Standards (2023).

In addition to this, specific compensatory measures for each space below the recommendations can be found in the table within Appendix A section 12.2.

## 11.7 View Out

The View Out assessment is related to buildings such as offices or schools where seating layouts are typically fixed compared to domestic settings where an occupant can move around the space freely. In their own home occupants can choose to sit near to or even at a window which will inevitably provide the varying layers of a 'View Out' such as the ground, landscape or sky. This ability to choose their position within a domestic setting means they would always have access to a position in the apartment with the minimum requirements of 'View Out'. Therefore, all the properties would meet the minimum requirement as outlined in IS EN 17037-2018+A1-2021 / BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition).

## 11.8 Glare

As outlined in IS EN 17037-2018+A1-2021 / BS EN 17037-2018+A1-2021 National Annex (BRE Guide 3rd Edition), a Glare assessment is suggested in spaces where the *"expected activities are comparable to reading, writing or using display devices and the user is not able to choose freely their position and viewing direction".* Given that occupants within a domestic setting are free to move around, on this basis a glare assessment for the proposed development has not been carried out.

## 11.9 Observations

It is important to note that the recommendations within the BRE Guide (3rd Edition) itself states "*although it gives numerical guidelines these should be interpreted flexibly because natural lighting is only one of many factors in site layout design"*, Although this is true appropriate and reasonable regard has still been taken to the BRE guide.

Whilst the results shown relate to the criteria as laid out in the BRE Guide (3rd Edition), it is important to note that the BRE targets are guidance only and should therefore be used with flexibility and caution when dealing with different types of sites. They

In addition, BRE Guide 3rd Edition also notes

"This report is a comprehensive revision of the 2011 edition of Site layout planning for daylight and sunlight: a guide to good practice. It is purely advisory and the numerical target values within it may be varied to meet the needs of the development and its location."

Taking all of the above information into account and based on the results from each of the assessments undertaken, the proposed development performs well when compared to the recommendations in the BRE Guide 3rd Edition and IS EN 17037-2018+A1-2021 /BS EN 17037-2018+A1-2021 National Annex. With regards to the existing properties there is a negligible impact when considering sunlight and daylight as a result of the proposed development, in particular when the design is compared to the permitted development results are identical. The proposed development itself performs very well with the same regard.

# 12 Appendix A – Daylight Provision Results

The tables in the following sections summarise the daylight provision results for the rooms that were assessed in the proposed development. Note, within the tables the code "LKD" equates to combined Living, Kitchen, Dining area.

The results for the following daylight standards are included in each table:

- BRE Guide (3rd Edition) / IS EN 17037-2018+A1-2021
- BRE Guide (3rd Edition) / BS EN 17037-2018+A1-2021 National Annex

Please note, the "Comment" symbol in each of the tables represents the following:

BRE Guide (3rd Edition) / IS EN 17037-2018+A1-2021

✓ These rooms achieve both the target illuminance ($E_T$) and minimum target illuminance ($E_{TM}$) over the minimum floor area requirements, i.e. 300 lux for over 50% of their floor area ($E_T$) and 100 lux for over 95% of their floor area ($E_{TM}$).

x These rooms do not achieve both the target illuminance ($E_T$) and minimum target illuminance ($E_{TM}$) over the minimum floor area requirements.

BRE Guide (3rd Edition) / BS EN 17037-2018+A1-2021 National Annex

✓ These rooms achieve the target illuminance ($E_T$) over the minimum floor area requirements, i.e. 100 lux for over 50% of bedroom floor areas, and 200 lux for over 50% of LKD floor areas.

x These rooms do not achieve the target illuminance ($E_T$) over the minimum floor area requirements.

## 12.1 Daylight Provision Results

### 12.1.1 Level 01


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 73 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 10 | 100 | X | 100 | ✓ |
| 7 | LKD | 0 | 28 | X | 4 | X |
| 8 | Bedroom | 0 | 100 | X | 100 | ✓ |
| 9 | Bedroom | 2 | 100 | X | 100 | ✓ |
| 10 | LKD | 0 | 11 | X | 0 | X |
| 11 | Bedroom | 0 | 88 | X | 88 | ✓ |
| 12 | LKD | 0 | 20 | X | 0 | X |
| 13 | Bedroom | 0 | 77 | X | 77 | ✓ |
| 14 | LKD | 0 | 19 | X | 0 | X |
| 15 | Bedroom | 11 | 100 | X | 100 | ✓ |
| 16 | Bedroom | 10 | 100 | X | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 65 | 100 | ✓ | 86 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | Bedroom | 82 | 100 | ✓ | 100 | ✓ |
| 23 | LKD | 30 | 59 | X | 38 | X |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 25 | LKD | 38 | 100 | X | 59 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 27 | Bedroom | 98 | 100 | ✓ | 100 | ✓ |
| 28 | Studio | 66 | 99 | ✓ | 87 | ✓ |
| 29 | LKD | 34 | 100 | X | 67 | ✓ |
| 30 | Bedroom | 83 | 100 | ✓ | 100 | ✓ |
| 31 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 32 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.2 Level 02


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 77 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 10 | 100 | X | 100 | ✓ |
| 7 | LKD | 0 | 23 | X | 3 | X |
| 8 | Bedroom | 4 | 100 | X | 100 | ✓ |
| 9 | Bedroom | 4 | 100 | X | 100 | ✓ |
| 10 | LKD | 0 | 7 | X | 0 | X |
| 11 | Bedroom | 0 | 70 | X | 70 | ✓ |
| 12 | LKD | 0 | 13 | X | 0 | X |
| 13 | Bedroom | 0 | 69 | X | 69 | ✓ |
| 14 | LKD | 0 | 12 | X | 0 | X |
| 15 | Bedroom | 11 | 100 | X | 100 | ✓ |
| 16 | Bedroom | 22 | 100 | X | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 93 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 71 | 100 | ✓ | 94 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 23 | LKD | 37 | 79 | X | 48 | X |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 25 | LKD | 40 | 100 | X | 61 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | Studio | 75 | 100 | ✓ | 97 | ✓ |
| 29 | LKD | 35 | 100 | X | 54 | ✓ |
| 30 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 31 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 32 | Bedroom | 99 | 100 | ✓ | 100 | ✓ |

### 12.1.3 Level 03


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 92 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 11 | 100 | X | 100 | ✓ |
| 7 | LKD | 0 | 23.61 | X | 3.47 | X |
| 8 | Bedroom | 8 | 100 | X | 100 | ✓ |
| 9 | Bedroom | 11 | 100 | X | 100 | ✓ |
| 10 | LKD | 0 | 7 | X | 0 | X |
| 11 | Bedroom | 3 | 75 | X | 75 | ✓ |
| 12 | LKD | 0 | 16 | X | 1 | X |
| 13 | Bedroom | 3 | 64 | X | 64 | ✓ |
| 14 | LKD | 0 | 18 | X | 0 | X |
| 15 | Bedroom | 21 | 100 | X | 100 | ✓ |
| 16 | Bedroom | 18 | 100 | X | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 93 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 77 | 100 | ✓ | 99 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 23 | LKD | 39 | 73 | X | 50 | ✓ |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 25 | LKD | 45 | 100 | X | 63 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | LKD | 38 | 96 | X | 58 | ✓ |
| 29 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 30 | Studio | 85 | 100 | ✓ | 99 | ✓ |
| 31 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 32 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 33 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 34 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 35 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 36 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 37 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 38 | LKD | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.4 Level 04


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 17 | 100 | X | 100 | ✓ |
| 7 | LKD | 0 | 24 | X | 4 | X |
| 8 | Bedroom | 22 | 100 | X | 100 | ✓ |
| 9 | Bedroom | 19 | 100 | X | 100 | ✓ |
| 10 | LKD | 0 | 8 | X | 0 | X |
| 11 | Bedroom | 15 | 76 | X | 76 | ✓ |
| 12 | LKD | 0 | 19 | X | 5 | X |
| 13 | Bedroom | 10 | 64 | X | 64 | ✓ |
| 14 | LKD | 0 | 22 | X | 2 | X |
| 15 | Bedroom | 28 | 100 | X | 100 | ✓ |
| 16 | Bedroom | 31 | 100 | X | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 92 | 100 | ✓ | 100 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 23 | LKD | 42 | 82 | X | 55 | ✓ |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 25 | LKD | 41 | 89 | X | 56 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

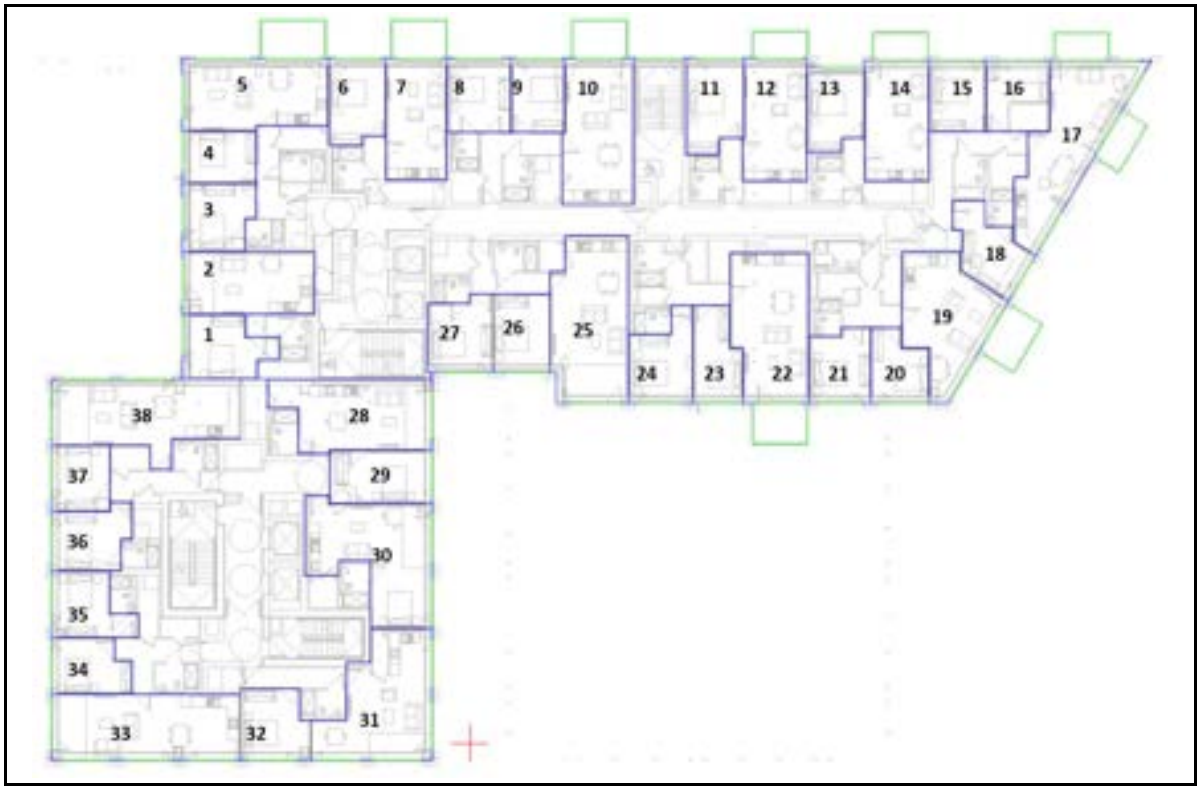
| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | LKD | 98 | 100 | ✓ | 64 | ✓ |
| 29 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 30 | Studio | 97 | 100 | ✓ | 100 | ✓ |
| 31 | LKD | 43 | 98 | X | 64 | ✓ |
| 32 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 33 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 34 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 35 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 36 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 37 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 38 | LKD | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.5 Level 05


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 30 | 100 | X | 100 | ✓ |
| 7 | LKD | 1 | 31 | X | 8 | X |
| 8 | Bedroom | 37 | 100 | X | 100 | ✓ |
| 9 | Bedroom | 33 | 100 | X | 100 | ✓ |
| 10 | LKD | 0 | 12 | X | 3 | X |
| 11 | Bedroom | 27 | 92 | X | 92 | ✓ |
| 12 | LKD | 3 | 26 | X | 7 | X |
| 13 | Bedroom | 26 | 100 | X | 100 | ✓ |
| 14 | LKD | 0 | 26 | X | 6 | X |
| 15 | Bedroom | 46 | 100 | X | 100 | ✓ |
| 16 | Bedroom | 42 | 100 | X | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 99 | 100 | ✓ | 100 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 23 | LKD | 48 | 100 | X | 63 | ✓ |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 25 | LKD | 52 | 100 | ✓ | 73 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | LKD | 50 | 100 | ✓ | 73 | ✓ |
| 29 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 30 | Studio | 86 | 100 | ✓ | 99 | ✓ |
| 31 | LKD | 50 | 100 | ✓ | 73 | ✓ |
| 32 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 33 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 34 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 35 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 36 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 37 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 38 | LKD | 100 | 100 | ✓ | 100 | ✓ |

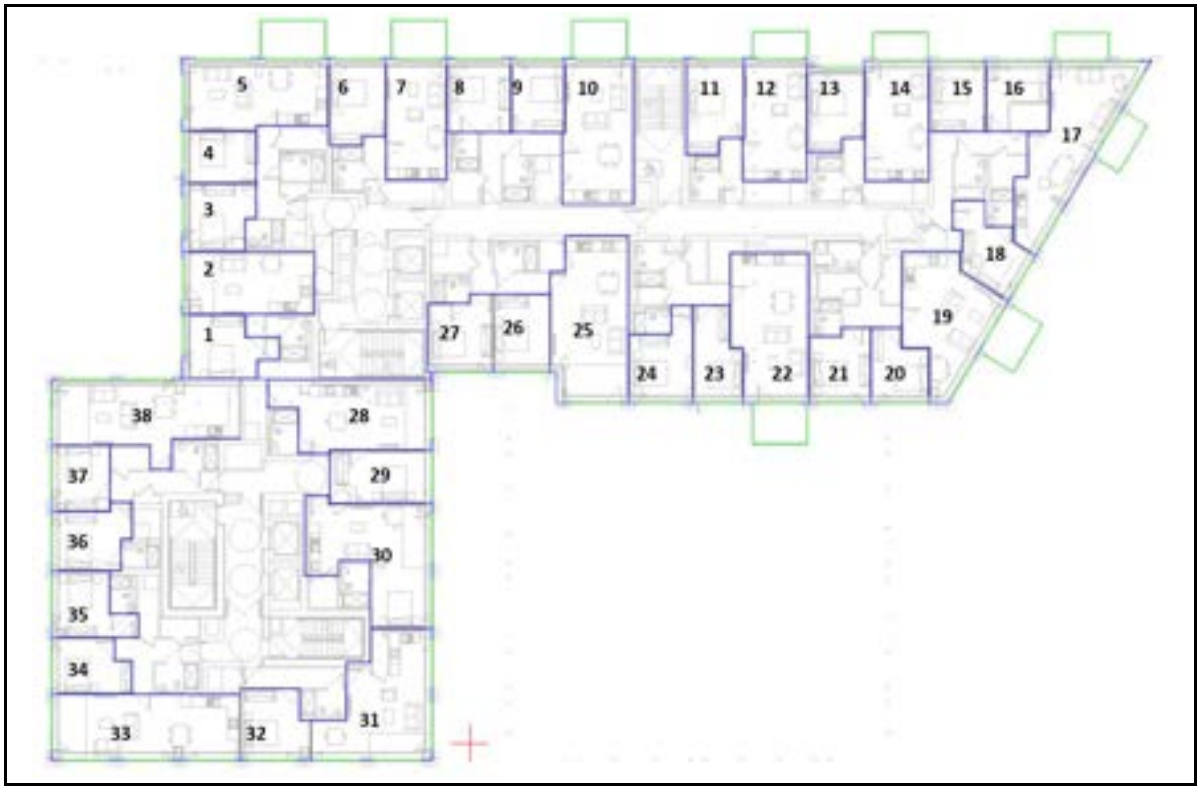
## 12.1.6 Level 06




| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 52 | 100 | ✓ | 100 | ✓ |
| 7 | LKD | 8 | 42 | X | 15 | X |
| 8 | Bedroom | 56 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 63 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 5 | 27 | X | 11 | X |
| 11 | Bedroom | 48 | 100 | X | 100 | ✓ |
| 12 | LKD | 14 | 42 | X | 19 | X |
| 13 | Bedroom | 45 | 100 | X | 100 | ✓ |
| 14 | LKD | 19 | 100 | X | 100 | ✓ |
| 15 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 16 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | LKD | 34 | 100 | X | 53 | ✓ |
| 23 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 25 | LKD | 52 | 100 | ✓ | 73 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | LKD | 50 | 100 | ✓ | 71 | ✓ |
| 29 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 30 | Studio | 96 | 100 | ✓ | 100 | ✓ |
| 31 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 32 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 33 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 34 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 35 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 36 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 37 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 38 | LKD | 100 | 100 | ✓ | 100 | ✓ |

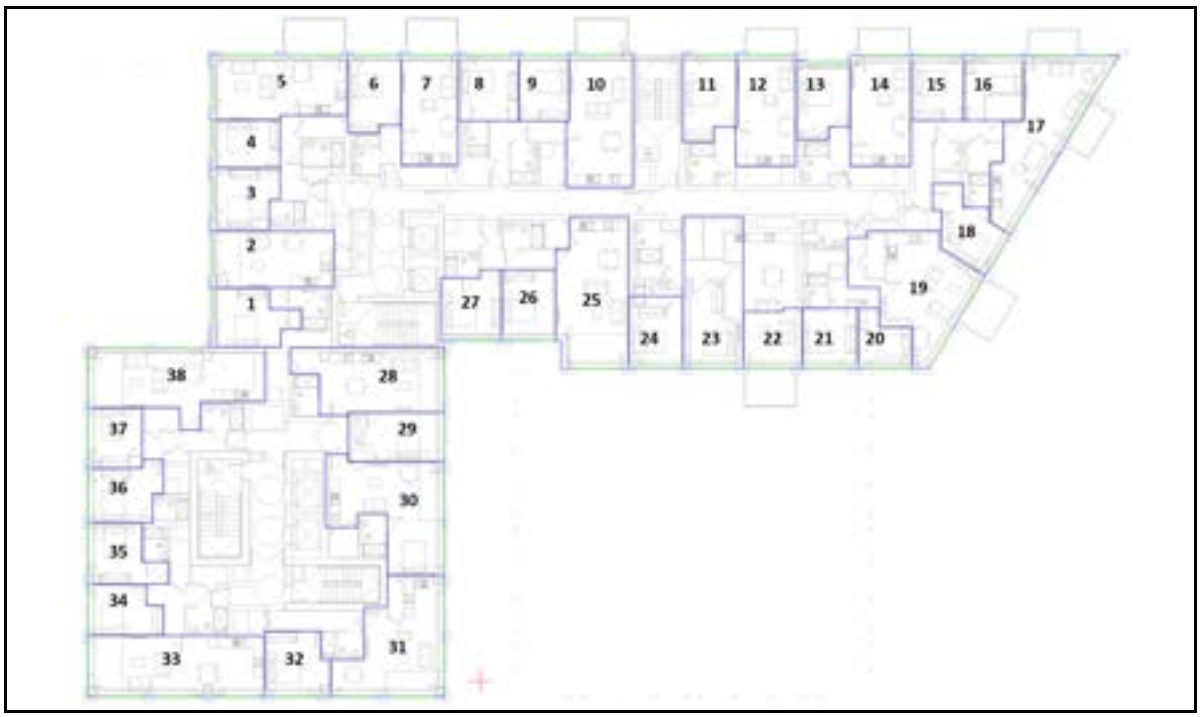
## 12.1.7 Level 07




| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 99 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 90 | 100 | ✓ | 100 | ✓ |
| 7 | LKD | 27 | 77 | X | 45 | X |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 19 | 51 | X | 29 | X |
| 11 | Bedroom | 85 | 100 | ✓ | 100 | ✓ |
| 12 | LKD | 33 | 80 | X | 47 | X |
| 13 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 14 | LKD | 40 | 100 | X | 99 | ✓ |
| 15 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 16 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | LKD | 34 | 100 | X | 55 | ✓ |
| 23 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 25 | LKD | 64 | 100 | ✓ | 89 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | LKD | 54 | 100 | ✓ | 79 | ✓ |
| 29 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 30 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 31 | LKD | 54 | 100 | ✓ | 79 | ✓ |
| 32 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 33 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 34 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 35 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 36 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 37 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 38 | LKD | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.8 Level 08




| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | LKD | 61.81 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 41 | 100 | X | 59 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 12 | LKD | 64 | 100 | ✓ | 100 | ✓ |
| 13 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 14 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 15 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 16 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 17 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 22 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 23 | Bedroom | 59 | 100 | ✓ | 83 | ✓ |
| 24 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 25 | LKD | 75 | 100 | ✓ | 100 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | LKD | 59.01 | 100 | ✓ | 93.24 | ✓ |
| 29 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 30 | Studio | 97 | 100 | ✓ | 100 | ✓ |
| 31 | LKD | 59 | 100 | ✓ | 93 | ✓ |
| 32 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 33 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 34 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 35 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 36 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 37 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 38 | LKD | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.9 Level 09


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 12 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 13 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 14 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 15 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 16 | LKD | 88 | 100 | ✓ | 100 | ✓ |
| 17 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 64 | 100 | ✓ | 94 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Studio | 99 | 100 | ✓ | 100 | ✓ |
| 22 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 23 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 24 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 25 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 29 | LKD | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.10 Level 10


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 12 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 13 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 14 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 15 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 16 | LKD | 96 | 100 | ✓ | 100 | ✓ |
| 17 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 61 | 100 | ✓ | 92 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 22 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 23 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 24 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 25 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 29 | LKD | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.11 Level 11


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 2 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 3 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 12 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 13 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 14 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 15 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 16 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 17 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 18 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 19 | LKD | 92 | 100 | ✓ | 97 | ✓ |
| 20 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 21 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 22 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 23 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 24 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 25 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 26 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 27 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 28 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 29 | LKD | 100 | 100 | ✓ | 100 | ✓ |

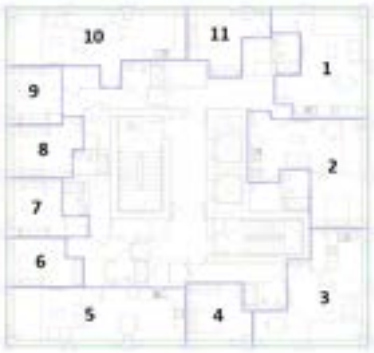
### 12.1.12 Level 12


| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.13 Level 13

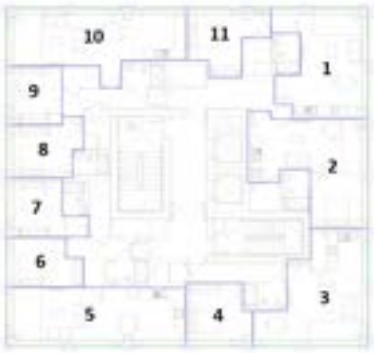

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 96 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.14 Level 14



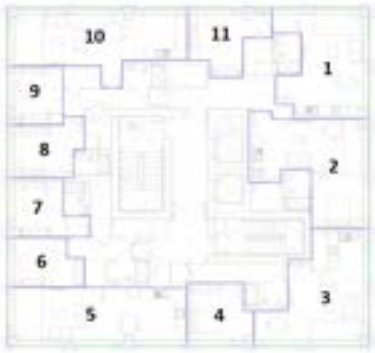

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.15 Level 15



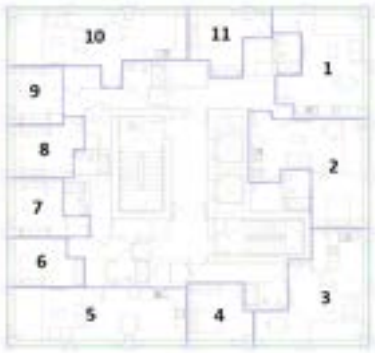

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.16 Level 16



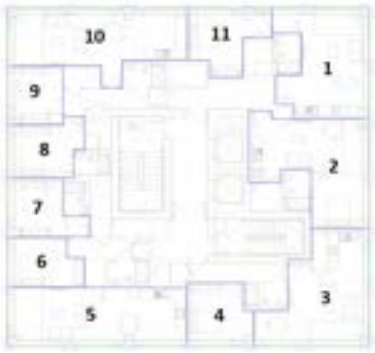

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.17 Level 17



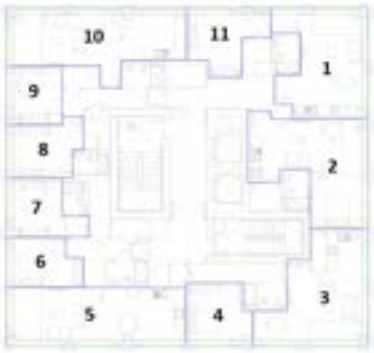

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.18 Level 18



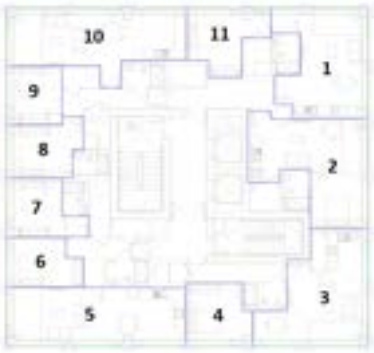

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.19 Level 19



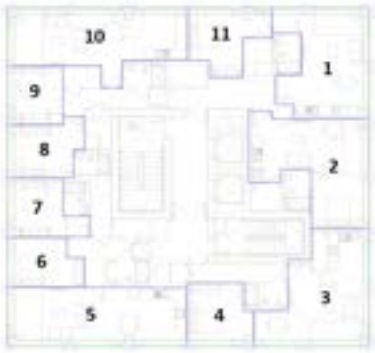

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.20 Level 20



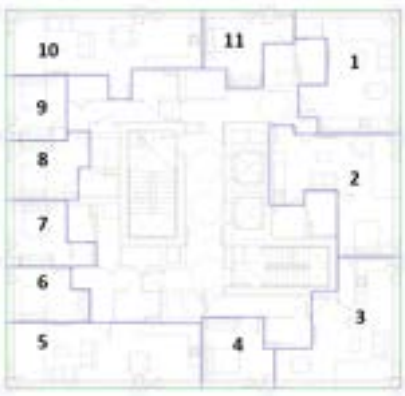

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

## 12.1.21 Level 21



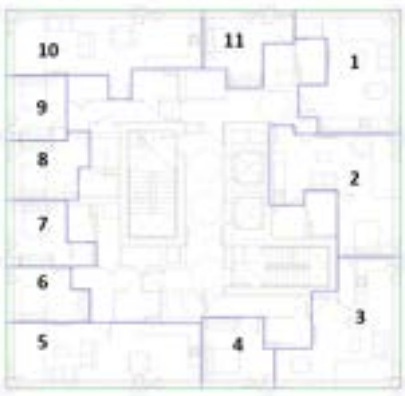

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.22 Level 22



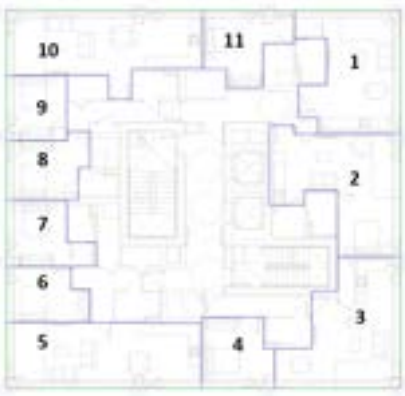

| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.23 Level 23




| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

### 12.1.24 Level 24




| Ref. | Room Activity | BRE Guide 3rd Edition IS EN 17037:2018 Method 2 | | | BRE Guide 3rd Edition BS EN 17037:2018 Method 2 National Annex | |
|---|---|---|---|---|---|---|
| | | Floor Area > $E_T$ (%) | Floor Area > $E_{TM}$ (%) | Comment | Floor Area > $E_T$ (%) | Comment |
| 1 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 2 | Studio | 100 | 100 | ✓ | 100 | ✓ |
| 3 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 4 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 5 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 6 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 7 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 8 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 9 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |
| 10 | LKD | 100 | 100 | ✓ | 100 | ✓ |
| 11 | Bedroom | 100 | 100 | ✓ | 100 | ✓ |

## 12.2 Compensatory Measures Table

| Unit | IES Ref | Unit GIA (m²) | Compensatory Measures | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Unit floor area > minimum standard | Unit floor area ≥ 10% minimum standard | Private amenity area ≥ minimum standard | Unit has direct access to amenity space | Unit overlooks public or communal open space | Floor to ceiling height in excess of 2.4m | Dual aspect Room |
| **Level 1** | | | | | | | | | |
| L01: 03_Bedroom | 6 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 03_LKD | 7 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 04_Bedroom 2 | 8 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 04_Bedroom 1 | 9 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 05_Bedroom | 11 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 05_LKD | 12 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 06_Bedroom 1 | 13 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 06_LKD | 14 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 07_Bedroom 2 | 15 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 07_Bedroom 3 | 16 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 09_LKD | 23 | 55.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 10_LKD | 25 | 81.5 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L01: 12_LKD | 29 | 62.5 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| **Level 2** | | | | | | | | | |
| L02: 03_Bedroom | 6 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02 03_LKD | 7 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 04_Bedroom 1 | 8 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 04_Bedroom 2 | 9 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 05_Bedroom | 11 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 05_LKD | 12 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 06_Bedroom 1 | 13 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 06_LKD | 14 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 07_Bedroom 2 | 15 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 07_Bedroom 3 | 16 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 09_LKD | 23 | 55.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 10_LKD | 25 | 81.5 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L02: 12_LKD | 29 | 62.5 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| **Level 3** | | | | | | | | | |
| L03: 03_Bedroom | 6 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 03_LKD | 7 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 04_Bedroom 2 | 8 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 04_Bedroom 1 | 9 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 05_Bedroom | 11 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 05_LKD | 12 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 06_Bedroom 1 | 13 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 06_LKD | 14 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 07_Bedroom 2 | 15 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 07_Bedroom 3 | 16 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 09_LKD | 23 | 55.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 10_LKD | 25 | 81.5 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L03: 11_LKD | 28 | 50.2 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| **Level 4** | | | | | | | | | |
| L04: 03_Bedroom | 6 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 03_LKD | 7 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 04_Bedroom 1 | 8 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 04_Bedroom 2 | 9 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 05_Bedroom | 11 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| L04: 05_LKD | 12 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 06_Bedroom 1 | 13 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 06_LKD | 14 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 07_Bedroom 2 | 15 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 07_Bedroom 3 | 16 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 09_LKD | 23 | 55.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L04: 10_LKD | 25 | 81.5 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| **Level 5** | | | | | | | | | |
| L05: 03_Bedroom | 6 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 03_LKD | 7 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 04_Bedroom 1 | 8 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 04_Bedroom 2 | 9 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 05_Bedroom | 11 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 05_LKD | 12 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 06_Bedroom 1 | 13 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 06_LKD | 14 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 07_Bedroom 2 | 15 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 07_Bedroom 3 | 16 | 103.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L05: 09_LKD | 23 | 55.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| **Level 6** | | | | | | | | | |
| L06: 03_LKD | 7 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L06: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L06: 05_Bedroom | 11 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L06: 05_LKD | 12 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L06: 06_Bedroom 1 | 13 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L06: 06_LKD | 14 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L06: 09_LKD | 22 | 88.3 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| **Level 7** | | | | | | | | | |
| L07: 03_LKD | 7 | 50 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L07: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L07: 05_LKD | 12 | 52.8 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L07: 06_LKD | 14 | 51.1 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| L07: 09_LKD | 22 | 88.3 | ✓ | ✓ | ✓ | | ✓ | ✓ | |
| **Level 8** | | | | | | | | | |
| L08: 04_LKD | 10 | 81.6 | ✓ | ✓ | ✓ | | ✓ | ✓ | |

# 13 Appendix B – Sunlight Exposure Results

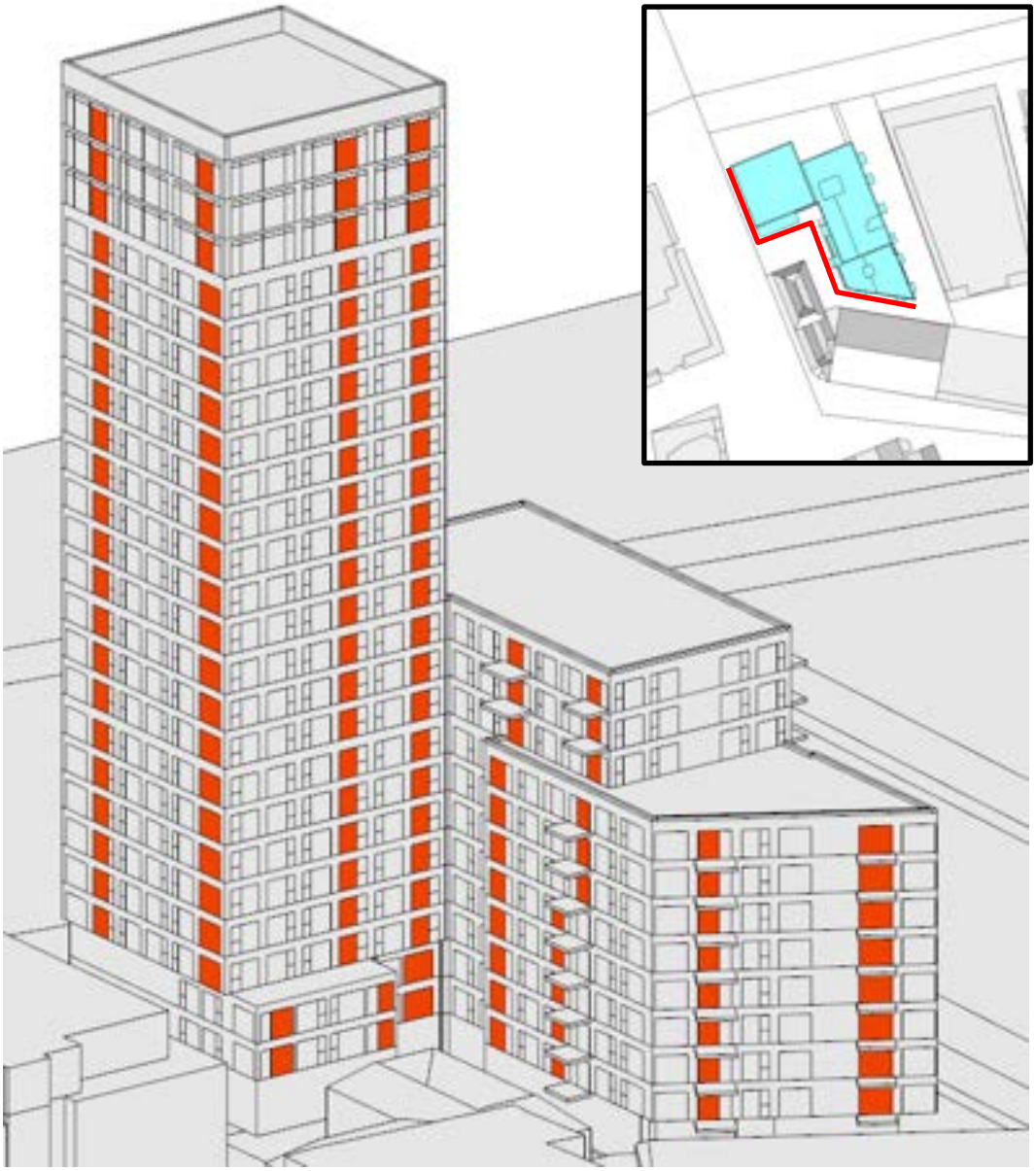
## 13.1 Sunlight Exposure Results

The IS EN 17037-2018+A1-2021 (BRE Guide 3rd Edition) sunlight exposure results tabulated in Section 8.2 for the proposed development are visually represented in the following images. The windows highlighted in "red" achieve the minimum 1.5 hours of recommended sunlight on March 21st, while the windows highlighted in "blue" do not achieve the recommended value.

### 13.1.1 View 01

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

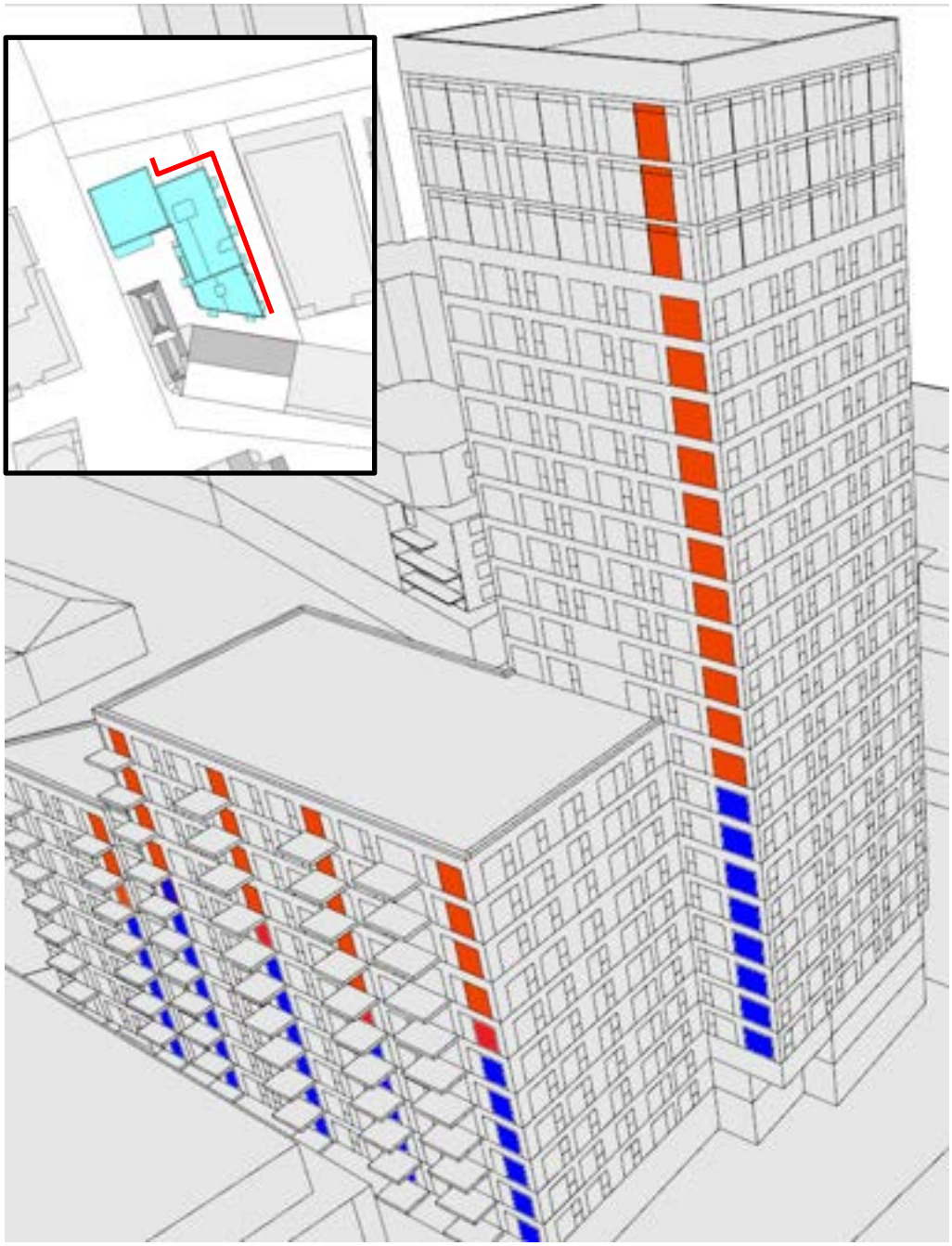


**132 out of 132 windows passing**

### 13.1.2 View 02

Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight

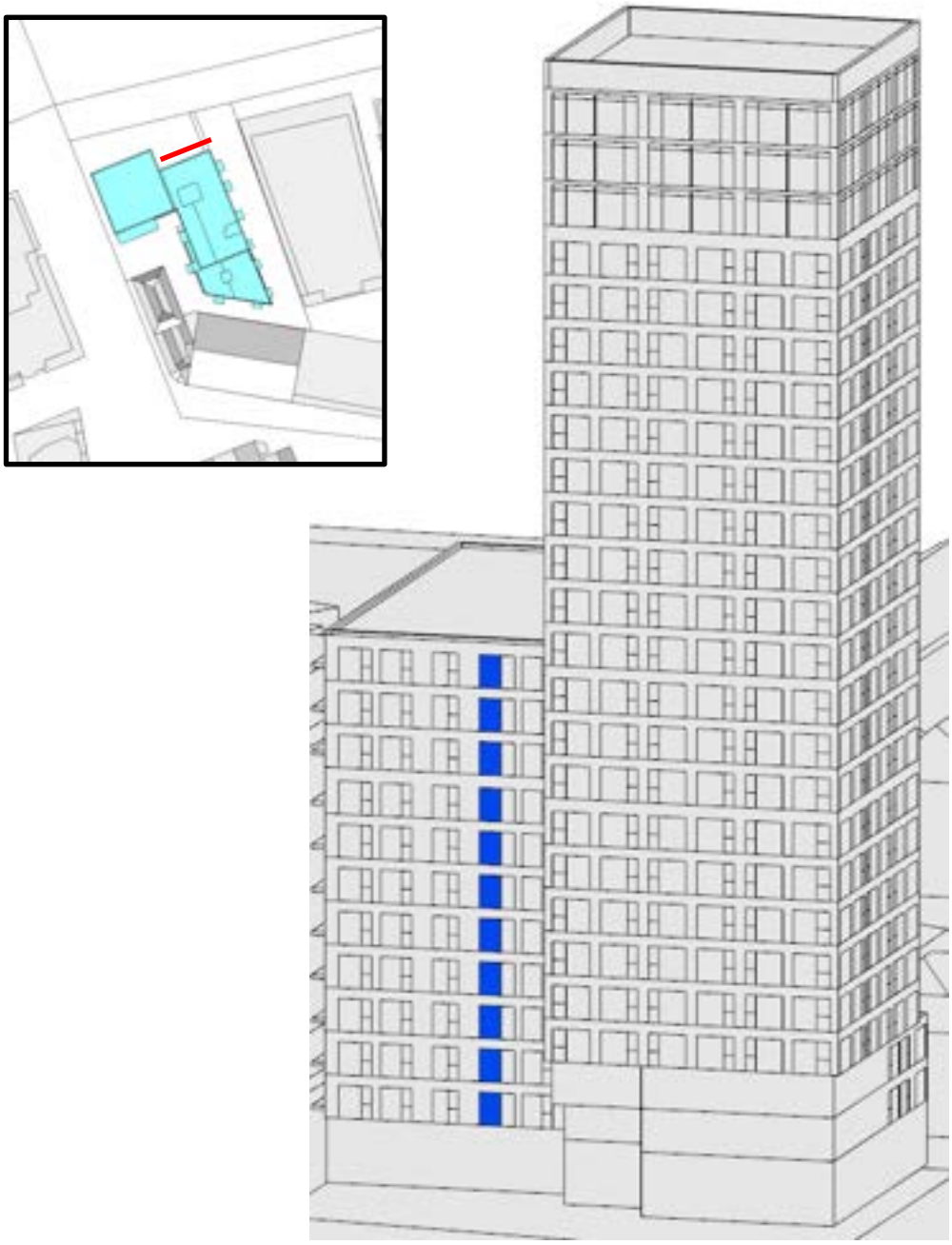


**37 out of 74 windows passing**

### 13.1.3 View 03

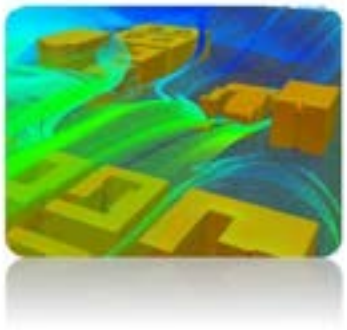
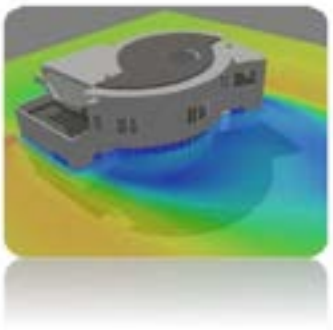
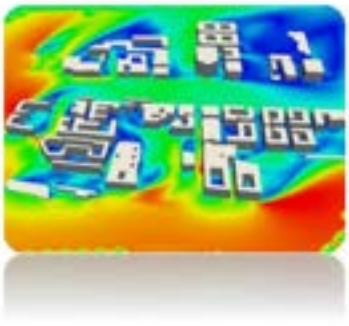
Receives more than 1.5 hours of sunlight

Receives less than 1.5 hours of sunlight



**0 out of 11 windows passing**

APPENDIX 2 – BFLUID WIND MICROCLIMATE

# WIND MICROCLIMATE MODELLING

The Railyard

Albert Quay, Cork

Use the B-Fluid App for Video Access:

Prepared by: B-Fluid Ltd.| Buildings Fluid Dynamics Consultants

For: Progressive Commercial Construction Ltd

B-Fluid
Buildings Fluid Dynamics

| Document Reference | | |
|---|---|---|
| Project Name | WIND MICROCLIMATE MODELLING<br>The Railyard<br>Albert Quay, Cork | |
| Project Ref. | *W*_2309485 | |
| Site location | Albert Street, Ballintemple, Cork | |
| CFD Study by | B-Fluid Ltd. | |
| Engineers | Dr. Cristina Paduano<br>CFD Modelling Specialist<br>CEng MIEI, PhD. Mech Eng., MEng. Aerospace Eng. | |
| | Dr. Yuxiang Zhang<br>MIEI, CFD Engineer<br>PhD. Civil Eng., MSc. Structural.Eng. | Dr. Guido Lupieri<br>CFD Modelling Specialist<br>PhD. Applied Geo. & Hydraulics |
| Report issued on | August 7, 2024 | |

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# Contents

# 1. EXECUTIVE SUMMARY

B-Fluid Limited has been commissioned by 'Progressive Commercial Construction Ltd' to perform a Wind Microclimate Study for The Railyard at Albert Street, Ballintemple, Cork.

The site is bounded to the north by Albert Quay on the River Lee by Albert Road to the south with existing residential area, by Albert Street to the east with office buildings and by corporate offices to the west on Navigation Square.

Figure 1.1 shows a view of the proposed development (colored in orange) in the existing urban context.

Figure 1.1: 3D View of The Railyard

The method for the study of wind microclimate combines the use of Computational Fluid Dynamics (CFD) to predict wind velocities and wind flow patterns, with the use of wind data from suitable meteorological station and the recommended comfort and safety standards (Lawson Criteria).

The effect of the geometry, height and massing of the proposed development and existing surroundings including topography, ground roughness and landscaping of the site, on local wind speed and direction is considered as well as the pedestrian activity to be expected (sitting, standing, strolling and fast walking).

The results of the assessment are presented in the form of contours of the Lawson criteria at pedestrian level.

The assessment has comprised the following scenarios:

- **Baseline Existing Scenario**: this consist of the existing wind microclimate at the site without the proposed development. Figure 1.2 shows a view of the existing surrounding buildings (in grey).

Figure 1.2: Buildings in the Baseline Scenario (Existing buildings in grey)

- **Proposed Development Scenario**: this consist of the assessment of the wind microclimate of the site with the proposed development surrounded by existing buildings. Figure 1.3 shows a view of the buildings in the proposed development (colored in orange) and existing surrounding buildings (in grey).

Figure 1.3: Buildings in the Proposed Scenario (Proposed development in orange, existing buildings in grey)

Based on the analysis conducted, it can be concluded that:

- The wind profile was built using the annual average of meteorology data collected at Cork Airport Weather Station purchased from Meteoblue. The local wind speed was determined from CFD simulations with combination of the parameters inside Weibull probability distribution function, which was obtained form historical meteorological data recorded 10m above ground level at Cork Airport.
- A 12-discrete set of wind direction is used in order to evaluate the probability of exceedance at any given threshold velocity. It is found that the prevailing wind direction in the south-west has the largest contribution of the discomfort exceedance probability.
- Microclimate Assessment of The Railyard and its environment was performed utilizing a CFD (Computational Fluid Dynamics) methodology.
- The evaluation of the proposed scenario indicates that the planned development aligns with the Lawson Comfort Criteria, confirming that no areas are unsafe and the proposed development does not create conditions of distress. All the ground amenities outlined in the report can be utilized according to their intended scope.
- The analysis of wind speed results and Lawson map at a height of 1.5 meters above the terrace reveals that both terraces (Terraces I and II) are suitable for sitting/standing. It is important to note that fluctuations in velocity on rooftop terraces may lead to door slamming issues. Therefore, it is recommended to consider such conditions in terrace design. Possible means of reducing the risk of door slamming include installing door actuators, using automatic or sliding doors, etc.
- The Lawson Comfort and Distress Map on the 1.5m above balconies indicates that all balconies are safe for occupants with no identified distress areas.
- The following mitigation measures will be implemented to further improve pedestrian comfort around the development:
    - *Preserving the existing trees along the walkway on the west side of the development:* The presence of these existing trees along the walkway enhances the comfort for pedestrians.
    - *Introducing additional trees and other plants on ground amenities of the development:* These additional plants will help reduce wind speed, increasing comfort levels in all ground amenities of the development.
    - *Introducing terrace gardens on terraces at the 9th and the 12th floors:* The introduction of terrace gardens will further improve the wind comfort level on the terraces and also help reduce corner effects.
    - The balcony railings are acting as wind deflectors, helping to reduce the impact of wind. This shows that the balconies are designed with considerations for prevailing wind directions.
    - The balconies also function as windbreaks, providing additional shelter to pedestrians by blocking or reducing the downwash or corner effects of wind that arrives

at ground level.

- As a result of the proposed development construction, the wind on the surrounding urban context remains suitable for the intended use when compared with the baseline situation.
- The proposed development does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings. Moreover, in terms of distress, no critical conditions were found for “Frail persons or cyclists” and for members of the ”General Public” in the surrounding of the development.

Therefore, the CFD study carried out has shown that under the assumed wind conditions typically occurring within Cork for the past 15 years:

- **The development is designed to be a high-quality environment for the scope of use intended of each areas/building (i.e. comfortable and pleasant for potential pedestrian).**
- **The development does not introduce any critical impact on the surrounding buildings, or nearby adjacent roads.**

# 2. INTRODUCTION

B-Fluid Limited has been commissioned by 'Progressive Commercial Construction Ltd' to perform a Wind Microclimate Study for The Railyard at Albert Street, Ballintemple, Cork.

Figure 2.1 shows a view of the proposed development (colored in orange) in the existing urban context.

Figure 2.1: The Railyard (colored in orange) and Existing Buildings (colored in grey)

This report is completed by Dr. Cristina Paduano, Dr. Guido Lupieri, and Dr. Yuxiang Zhang.

Dr. Cristina Paduano is a Chartered Engineer (CEng) and member of Engineers Ireland who specialises in computational fluid dynamics applications for urban environment and the construction industry with over 18 years experience. She holds a PhD in Mechanical Engineering from Trinity College Dublin, with M.Eng and B.Eng in Aerospace Engineering.

Dr. Yuxiang Zhang is a member of Engineers Ireland and CFD Engineer who specialises in flow-structure interactions and bridge aerodynamics. He holds a PhD in Civil Engineering from University College Dublin, a M.Sc. in Structural Engineering and a B.Eng in Civil Engineering.

Dr. Guido Lupieri is a CFD modelling specialist. He holds a PhD in Applied Geophysics and Hydraulics and a Master of Science in Physics from University of Trieste.

A wind microclimate study considers the possible wind patterns formed under both mean and peak wind conditions typically occurring on the site area, accounting for a scenario where the proposed development is inserted in the existing environment (potential impact) and, for a scenario where the proposed development is analysed together with the existing environment and any permitted development (not constructed yet) that can be influenced by the wind patterns generated by the proposed one (cumulative impact).

The potential receptors include those areas, in the surrounding of the development, which can be exposed to potential risks generated by the elevated wind speed or building massing wind effects. In particular:

- Amenity areas (pedestrian level), areas likely to be utilised for leisure purposes and as such should be comfortable surroundings.
- Pedestrian routes and seating areas – to determine if locations are comfortable for leisure activities.
- Entrance to the buildings – to determine if there is potential for pressure related issues for entrances or lobbies.
- Landscaped areas – where there are sheltered areas.
- Impact to existing or adjoining developments – where the proposed buildings will cause discomfort conditions through proximity related issues.

The acceptance criteria which define the acceptable wind velocities in relation to the perception of comfort level experienced while carrying out a specific pedestrian activity is known as the "Lawson Criteria for Pedestrian Comfort and Distress". A wind microclimate study analyzes the wind flow in an urban context (considering the wind conditions typically occurring on the site during a typical year) to develop the so called "Lawson Comfort and Distress Map"; the map identifies where a specific pedestrian activity can be carried out comfortably during most of the time.

The assessment can be performed by physical testing in wind tunnels or by performing "virtual wind tunnel testing" through numerical simulation using Computational Fluid Dynamics (CFD), as done for this project. The scope of the numerical study is to simulate the wind around the development, in order to predict the wind speeds the pedestrians will be exposed to and the level of comfort they will experience when carrying out a specific activity (i.e. walking, strolling, sitting).

The following sections details the methodology, acceptance criteria, CFD wind simulations and the impact of the proposed development on the local wind microclimate against best practice guidelines for pedestrian comfort and safety.

## 2.1 GUIDANCE and LEGISLATION

According to the 'Urban Development and Building Heights, Guidelines for Planning Authorities (Government of Ireland, December 2020)' document, specific wind impact assessment of the microclimatic effects should be performed for 'buildings taller than prevailing building heights in urban areas'. In the same guidance, standard buildings height is considered 6 storeys. Above this height, buildings are considered 'taller' for Cork standards.

The recommended approach to wind microclimate studies is outlined in the "Wind Microclimate Guidelines for Developments in the City of London '(August 2019) and in the guidelines and recommendations contained in BRE Digest (DG) 520, "Wind Microclimate Around Buildings" (BRE, 2011). The Lawson Criteria of Comfort and Distress is used to benchmark the pedestrian wind microclimate.

The document also indicates how to use Computational fluid dynamics (CFD) to assess wind microclimate conditions and how to generate high quality outputs to provide a good understanding of the fundamental flow features around an urban context.

Usually, the recommended approach to wind microclimate studies is based on the building height, as presented in Figure 2.2.

| Building Height | Recommended Approach to Wind Microclimate Studies |
|---|---|
| Similar or lower than the average height of surrounding buildings<br><br>**Up to 25m** | Wind studies are not required, unless sensitive pedestrian activities are intended (e.g. around hospitals, transport hubs, etc.) or the project is located on an exposed location |
| Up to double the average height of surrounding buildings<br><br>**25m to 50m** | Computational Fluid Dynamics (CFD) Simulations **OR** Wind Tunnel Testing |
| Up to 4 times the average height of surrounding buildings<br><br>**50m to 100m** | Computational Fluid Dynamics (CFD) Simulations **AND** Wind Tunnel Testing |
| High Rise<br><br>**Above 100m** | Early-Stage Massing Optimization: Wind Tunnel Testing **OR** Computational Fluid Dynamics (CFD) Simulations<br><br>Detailed Design: Wind Tunnel Testing **AND** Computational Fluid Dynamics (CFD) Simulations |

Figure 2.2: Recommended Approach to Wind Microclimate Studies based on Building Height, as prescribed by the Wind Microclimate Guidelines for Developments in the City of London (August 2019)

## 2.2 URBAN WIND EFFECTS

Buildings and topography affect the speed and direction of wind flows. Wind speed increases with increasing height above the ground, assuming a parabolic profile.

Flow near the ground level encounters obstacles represented by terrain roughness/buildings that reduce the wind speed and introduce random vertical and horizontal velocity components. This turbulence causes vertical mixing between the air moving horizontally at one level, and the air at those levels immediately above and below it. For this reason, the wind velocity profile is given by a fluctuating velocity along a mean velocity value. Figure 2.3 shows the wind velocity profile, as described above.

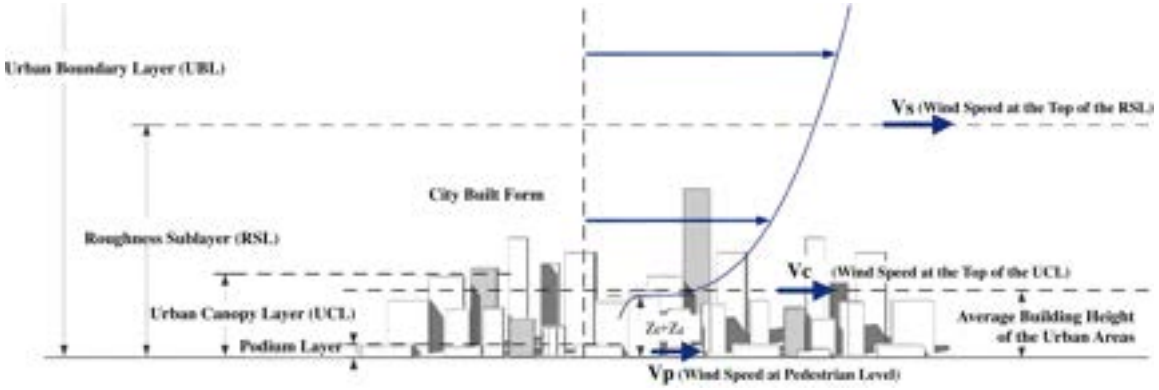



Figure 2.3: Wind Velocity Profile

In an urban context, wind speeds at pedestrian level are generally low compared with upper-level wind speeds, however, the wind can create adverse patterns when flowing in between buildings which can cause local wind accelerations or re-circulations. This wind patterns effect pedestrian safety and comfort. In general, the wind effects to be avoided/mitigated in an urban context include the following:

- **Funnelling Effects**: The wind can accelerate significantly when flowing through a narrow passage between building structures. The highest speeds are experienced at the point where the restriction of the area is the greatest.

- **Downwash Effects**: The air stream when striking a tall building can flow around it, over it and a part can be deflected towards the ground. This downward component is called downwash effect and its intensity depends on the pressure difference driving the wind. The higher the building, the higher this pressure difference can be.

- **Corner Effects**: Wind can accelerate around the corners of the buildings. Pedestrians can experience higher wind speeds as well as more sudden changes in wind speeds. The reason for this is that there are narrow transition zones between the accelerated flows and the adjacent quiescent regions. This effect is linked to the downwash effect as the downward stream component subsequently flows around the corners towards the leeward side of the building.

- **Wake Effect**: Excessive turbulence can occur in the leeward side of the building. This can cause sudden changes in wind velocity and can raise dust or lead to accumulation of debris. This effect is also dependent on the height of the building.


Figure 2.4: Parameters to know for Wind Conditions Assessment

The anticipation of the likely wind conditions resulting from new developments are important considerations in the context of pedestrian comfort and the safe use of the public realm. While it is not always practical to design out all the risks associated with the wind environment, it is possible to provide local mitigation to minimise risk or discomfort where required.

# 3. ASSESSMENT METHODOLOGY

## 3.1 METHOD OF ASSESSMENT

The method for the study of wind microclimate combines the use of Computational Fluid Dynamics (CFD) to predict wind velocities and wind flow patterns, with the use of wind data from suitable meteorological station and the recommended comfort and safety standards (Lawson Criteria). The effect of the geometry, height and massing of the proposed development and existing surroundings including topography, ground roughness and landscaping of the site, on local wind speed and direction is considered as well as the pedestrian activity to be expected (sitting, standing, strolling and fast walking). The results of the assessment are presented in the form of contours of the Lawson criteria at pedestrian level.

The assessment has comprised the following scenarios:

- **Baseline Existing Scenario**: this consists of the existing wind microclimate at the site without the proposed development.

- **Proposed Development in the Existing Scenario**: this consists of the assessment of the wind microclimate of the site with the proposed development surrounded by existing buildings.

In accordance with the guideline cited in section 2.1, the wind microclimate study should consider the effect of the proposed development together with buildings (existing and/or permitted) that are within 600m from the centre of the site, as shown in Figure 3.1. Other taller buildings outside of this zone that could have an influence on wind conditions within the project site should be included for wind directions where they are upwind of the project site.

Figure 3.1: Area of interest to be modelled

In particular, the following has been undertaken:

- Topography of the site with buildings (proposed and adjacent existing/permitted developments massing, depending on the scenario assessed “baseline or proposed”) have been modelled using OpenFOAM Software.

- Suitable wind conditions have been determined based on historic wind data. Criteria and selected wind scenarios included means and peaks wind conditions that need to be assessed in relation to the Lawson Criteria.

- Computational Fluid Dynamics (CFD) has been used to simulate the local wind environment for the required scenarios (”baseline, proposed”).

- The impact of the proposed development massing on the local wind environment has been determined (showing the wind flows obtained at pedestrian level).

- Potential receptors (pedestrian areas) have been assessed through review of external amenity/public areas (generating the Lawson Comfort and Distress Map).

- Potential mitigation strategies for any building related discomfort conditions (where necessary) have been explored and their effect introduced in the CFD model produced.

## 3.2 ACCEPTANCE CRITERIA

Pedestrian Wind Comfort is measured in function of the frequency of wind speed threshold exceeded based on the pedestrian activity. The assessment of pedestrian level wind conditions requires a standard against which measured or expected wind velocities can be compared.

Only gust winds are considered in the safety criterion. These are usually rare events, but deserve special attention in city planning and building design due to their potential impact on pedestrian safety. Gusts cause the majority of cases of annoyance and distress and are assessed in addition to average wind speeds. Gust speeds should be divided by 1.85 and these "gust equivalent mean" (GEM) speeds are compared to the same criteria as for the mean hourly wind speeds. This avoids the need for different criteria for mean and gust wind speeds.

The following criteria are widely accepted by municipal authorities as well as the international building design and city planning community:

- DISCOMFORT CRITERIA: Relates to the activity of the individual.
  Onset of discomfort:
  - Depends on the activity in which the individual is engaged and is defined in terms of a mean hourly wind speed (or GEM) which is exceeded for 5% of the time.

- DISTRESS CRITERIA: Relates to the physical well-being of the individual.
  Onset of distress:
  - 'Frail Person Or Cyclist': equivalent to an hourly mean speed of 15 m/s to be exceeded more than 0.023% per year. This is intended to identify wind conditions which less able individuals or cyclists may find physically difficult. Conditions in excess of this limit may be acceptable for optional routes and routes which less physically able individuals are unlikely to use.
  - 'General Public': A mean speed of 20 m/s or larger speed to be exceeded more than 0.023% per year, when aerodynamic forces approach body weight makes it impossible for anyone to remain standing. If wind speeds exceed these values, pedestrian access should be discouraged.

The above criteria set out six pedestrian activities and reflect the fact that calm activity requires calm wind conditions, which are summarised by the Lawson scale, shown in Figure 3.2. Lawson scale assesses pedestrian wind comfort in absolute terms and defines the reaction of an average person to the wind. Each wind type is associated to a number, corresponding to the Beaufort scale. Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea or on land. A 20% exceedance is used in these criteria to determine the comfort category, which suggests that wind speeds would be comfortable for the corresponding activity at least 80% of the time or four out of five days.

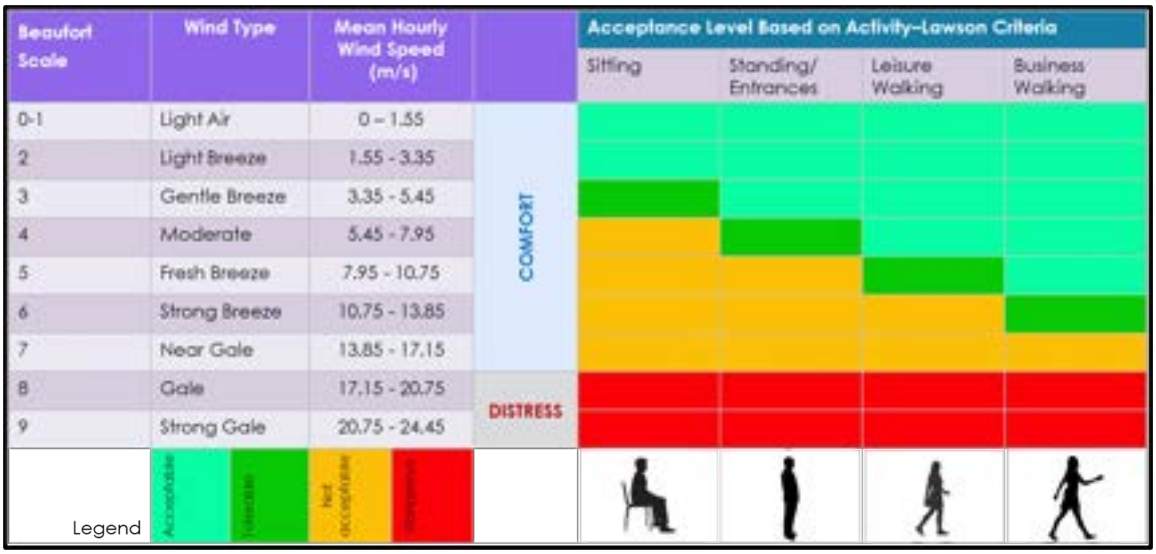



Figure 3.2: Lawson Scale

These criteria for wind forces represent average wind tolerances. They are subjective and variable depending on thermal conditions, age, health, clothing, etc. which can all affect a person's perception of a local microclimate. Moreover, pedestrian activity alters between winter and summer months. The criteria assume that people will be suitably dressed for the time of year and individual activity. It is reasonable to assume, for instance, that areas designated for outdoor seating will not be used on the windiest days of the year. Weather data measured are used to calculate how often a given wind speed will occur each year over a specified area.

Pedestrian comfort criteria are assessed at 1.5m above ground level. Unless in extremely unusual circumstances, velocities at pedestrian level increase as you go higher from ground level.

A breach of the distress criteria requires a consideration of:

- whether the location is on a major route through the complex,
- whether there are suitable alternate routes which are not distressful.

If the predicted wind conditions exceed the threshold, then conditions are unacceptable for the type of pedestrian activity and mitigation measure should be implemented into the design.

| Pedestrian Comfort Category (Lawson Scale) | Mean and Gem wind speed not to be exceeded more than 5% of the time | Description |
|---|---|---|
| Long-Term Sitting | 4m/s | Acceptable for frequent outdoor sitting use, i.e., restaurant /café |
| Standing | 6m/s | Acceptable for occasional outdoor sitting use, i.e., public outdoor spaces |
| Walking/Strolling | 8m/s | Acceptable for entrances/bus stops /covered walkaways |
| Business Walking | 10m/s | Acceptable for external pavements, walkways |
| Unacceptable/Distress | >10m/s | Start of not comfortable/distress level for pedestrian access |

Figure 3.3: Lawson Categories Scale - Comfort

| Pedestrian Safety Category (Lawson Scale) | Mean and Gem wind speed not to be exceeded more than 0.0022% of the time | Description |
|---|---|---|
| Unsafe for public | >20m/s | Distress/safety concern for pedestrian |
| Unsafe for cyclists or frail person | >15m/s | Distress/safety concern for cyclist/frail person |

Figure 3.4: Lawson Categories Scale - Distress/Safety

## 3.3 SIGNIFICANCE CRITERIA

The significance of on-site measurement locations are defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, using the table provided by the Lawson Comfort and Distress Criteria.

The significance of off-site measurement locations are defined by comparing the wind comfort/safety levels with the intended pedestrian activity at each location, prior and after the introduction of the proposed development.

| Significance | Trigger | Mitigation required? |
|---|---|---|
| Major Adverse | Conditions are "unsafe" | Yes |
| Moderate Adverse | Conditions are "unsuitable" (in terms of comfort) for the intended pedestrian use. | Yes |
| Negligible | Conditions are "suitable" for the intended pedestrian use. | No |
| Moderate Beneficial | Conditions are calmer than required for the intended pedestrian use (by at least one comfort category). | No |

Figure 3.5: Significance Criteria for On-site Receptors

| Significance | Trigger | Mitigation required? |
|---|---|---|
| Major Adverse | Conditions that were "safe" in the baseline scenario became "unsafe" as a result of the Proposed Development.<br>*OR*<br>Conditions that were "suitable" in terms of comfort in the baseline scenario became "unsuitable" because of the Proposed Development.<br>*OR*<br>Conditions that were "unsafe" in the baseline scenario are made worse because of the Proposed Development. | Yes |
| Moderate Adverse | Conditions that were "suitable" in terms of comfort in the baseline scenario are made windier (by at least one comfort category) as a result of the Proposed Development but remain "suitable" for the intended pedestrian activity. | No |
| Negligible | Conditions remain the same as in the baseline scenario. | No |
| Major Beneficial | Conditions that were "unsafe" in the baseline scenario became "safe" because of the Proposed Development. | No |
| Moderate Beneficial Potential Receptors | Conditions that were "unsuitable" in terms of comfort in the baseline scenario became "suitable" because of the Proposed Development.<br>*OR*<br>Conditions that were "unsafe" in the baseline scenario are made better as a result of the Proposed Development (but not so as to make them "safe". | No |

Figure 3.6: Significance Criteria for Off-site Receptors

# 4. CFD MODELLING METHOD

## 4.1 INTRODUCTION OF CFD TECHNIQUE

Computational Fluid Dynamics (CFD) is a numerical technique to simulate fluid flow, heat and mass transfer, chemical reaction and combustion, multiphase flow, and other phenomena related to fluid flows. CFD modelling includes three main stage: pre-processing, simulation and post-processing as described in Figure 4.1. The Navier-Stokes equations, used within CFD analysis, are based entirely on the application of fundamental laws of physics and therefore produce extremely accurate results providing that the scenario modelled is a good representation of reality.

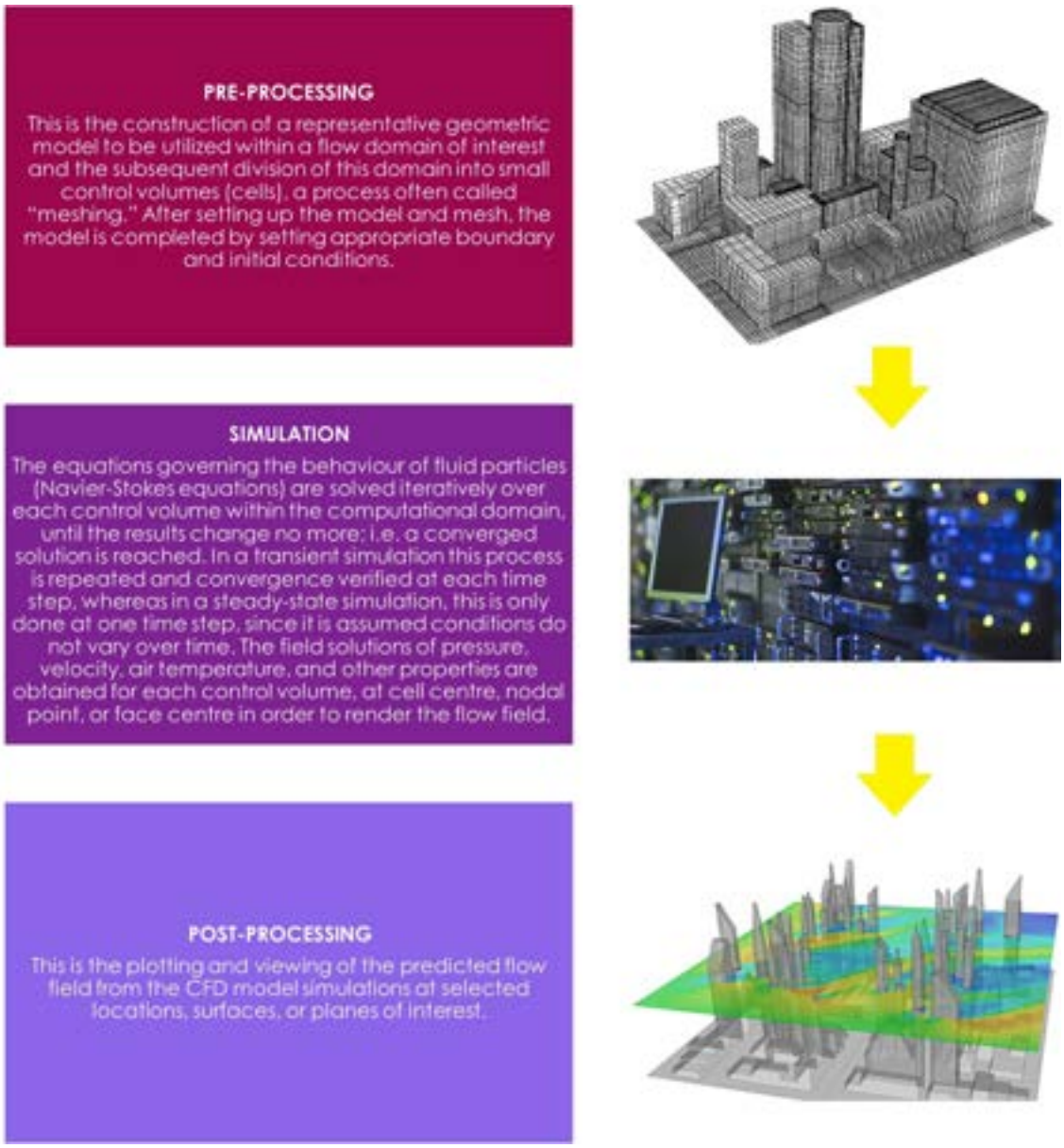



Figure 4.1: CFD Modelling Process Explanation

## 4.2 CFD SOFTWARE DETAILS

This report employs OpenFOAM Code, based on the concept of Reynolds-Averaged Navier-Stokes (RANS) formulations and the post-processing visualisation tool ParaView. OpenFOAM is a CFD software released and developed primarily by OpenCFD Ltd, since 2004. It has a large user base across most areas of engineering and science, from both commercial and academic organisations. OpenFOAM has an extensive range of features to solve anything from complex fluid flows involving chemical reactions, turbulence and heat transfer, to acoustics, solid mechanics and electromagnetics.

## 4.3 CFD MODEL DETAILS

### FLOW ASSUMPTIONS & TURBULENCE MODELLING

In this study, the air flow is assumed to be incompressible, Newtonian, and statistically steady with temperature and gravity effects neglected. The flow is governed by the Reynolds-Averaged Navier–Stokes (RANS) formulation for mass and momentum where the turbulence is modeled using the k-$\omega$ SST turbulence model.

### MODELED GEOMETRIES

The extent of the built area (e.g. buildings, structures or topography) that is represented in the numerical domain depends on the influence of the features on the region of interest. According to the Best Practice Guideline (COST Action 732), a building with height H (height of the tallest proposed building is ≈86 m) may have a minimal influence if its distance from the region of interest is greater than 6-10H (we considered 600m which is in that range).

The modelled layout and dimensions of the surrounding environment are outlined in the table below (Table 4.1).

Table 4.1: Modelled Environment Dimensions

| | MODELLED CFD ENVIRONMENT DIMENSIONS | | |
|---|---|---|---|
| | Width | Length | Height |
| Computational Domain | Approx. 600m | Approx. 600m | Approx. 300m |

A 3D view of the proposed development massing model in the domain is presented in Figure 4.2. Geometries used in this study include two parts:

- The massing model of The Railyard (colored in orange), which is generated based on the Revit models provided by Progressive Commercial Construction Ltd;
- The massing model of the building blocks within 600 m from the development (colored in grey).

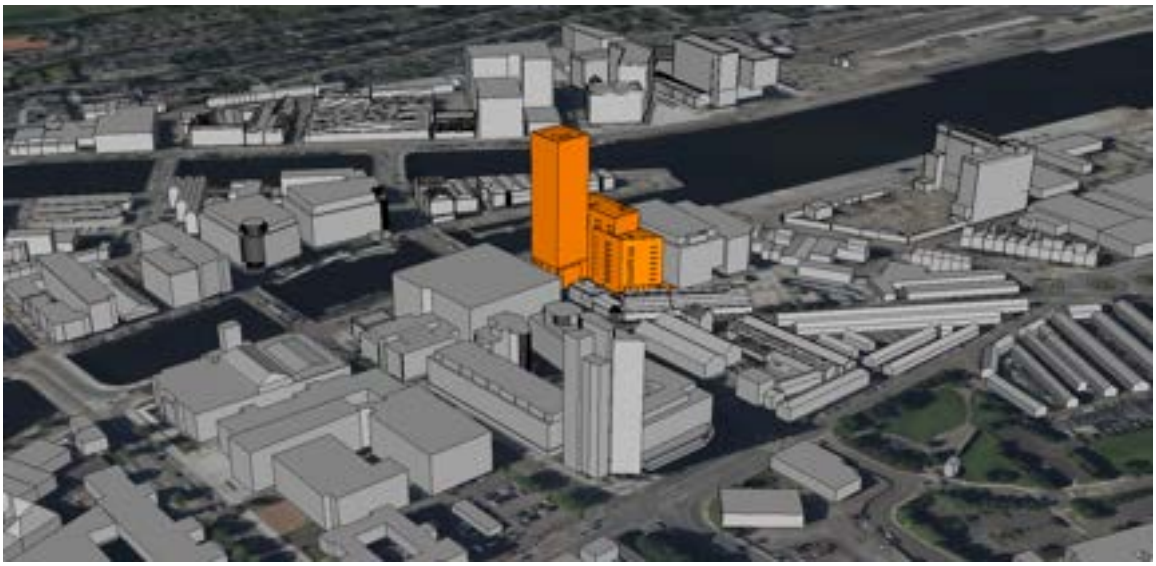


Figure 4.2: 3D View of the Massing Models of The Railyard (colored in orange) and Surrounding Building Blocks (colored in grey)

### COMPUTATIONAL MESH

The computational mesh used in this report is created using OpenFOAM utilities blockMesh and snappyHexMesh. It is a hybrid mesh containing a structured background grid and an unstructured hexahedron-dominated mesh in the near-wall region. The largest cell has a depth of 5 m, where the smallest has a depth of 0.15 m. The total cell count is approx. 115 million. An isometric view of the geometry captured by the computational mesh is shown in Figure 4.3.

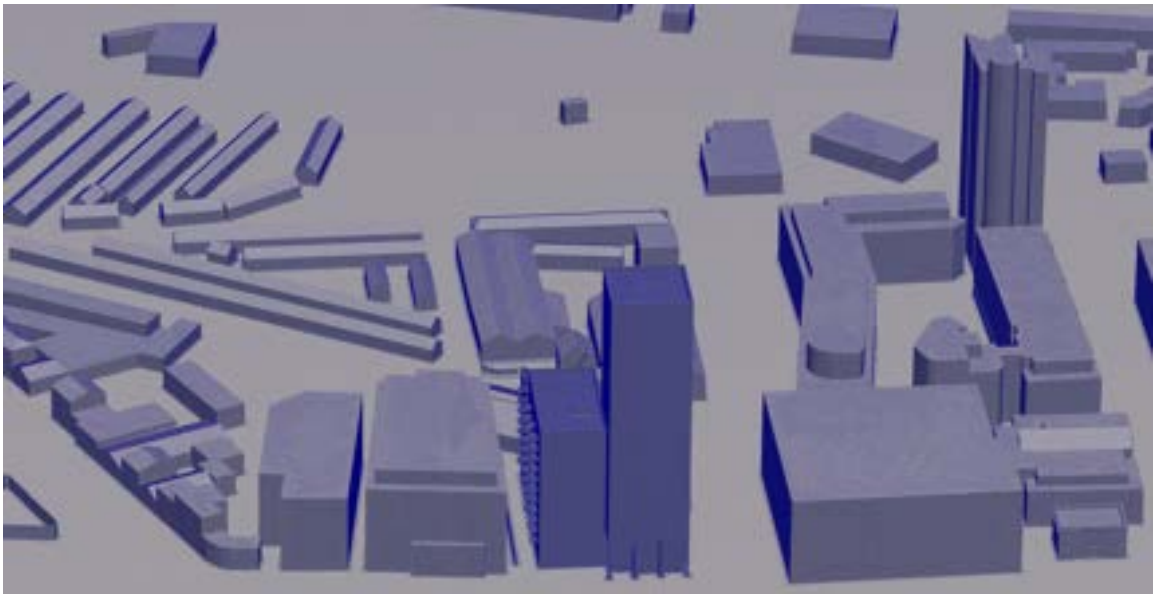


Figure 4.3: Computational Mesh of The RailyardDevelopment

### BOUNDARY CONDITIONS

For each wind directions, an initial wind velocity was set based on logarithmic wind profile. Surfaces within the model were specified as having 'no slip' condition. This boundary condition, ensures that flow moving parallel to a surface is brought to rest at the point where it meets the surface. All the other domain boundaries are set as "Open Boundaries".

The wind velocity data provided by the historical data collection and by the local data measuring are used in the formula below for the logarithmic wind profile to specify the wind velocity profile (wind velocity at different heights) to be applied within the CFD model:

$$u_{(z)} = \frac{u^{\star}}{K} \cdot ln(\frac{z+z_0}{z_0}) \tag{4.1}$$

where:

- $u_{(z)}$ = wind speed measured at the reference height $z$
- $z$ = height to measure $u_{(z)}$
- $z_0$ = roughness length selected According to Eurocode (2005)
- $u^{\star}$ = friction velocity
- $K$ = Karman constant

### NUMERICAL CONFIGURATIONS

In this study, all simulations employ the SIMPLE algorithm to perform the pressure–velocity coupling (simpleFoam solver in OpenFOAM). All terms in the RANS equations are discretized using the nominally second-order cell-centred finite volume method, where gradient and Laplacian terms are discretized using Gaussian integration with linear interpolation. Convection/advection terms are discretized using a second-order accurate linear-upwind scheme.

### PARALLEL CONFIGURATIONS

The computational mesh was decomposed using the SCOTCH algorithm. All simulations in this study are performed in parallel on an in-house HPC cluster. Key parameters of the CFD model used in this wind microclimate study are summarised in Table 4.2.

Table 4.2: Key parameters of the CFD model for each wind scenario

| KEY PARAMETERS OF THE CFD MODEL | |
|---|---|
| Air Density ($\rho$) | 1.2 kg/m$^3$ |
| Turbulence Model | k-$\omega$ SST Model |
| Cell Size | Approx. 0.15 m at the development<br>Approx. 0.3 m in the surroundings<br>5 m elsewhere |
| Total Cell Count | Approx. 115 million |

# 5. LOCAL WIND CLIMATE

## 5.1 THE EXISTING RECEIVING ENVIRONMENT

In this chapter, wind impact has been assessed on the existing receiving environment considered the existing buildings and the topography of the site prior of the construction of the proposed development. A statistical analysis of 15 years historical weather wind data has been carried out to assess the most critical wind speeds, directions and frequency of occurrence of the same. The aim of this assessment has been to identify the wind microclimate of the area that may cause critical conditions for pedestrians comfort criteria.

### Site Location And Surrounding Area

The Railyard will be situated in Albert Street, Ballintemple, Cork. The Existing Environment site is shown in Figure 5.1. The area considered for the existing environment and proposed development assessment comprises an Approx. 1.5 km$^2$ area around The Railyard as represented in Figure 5.2.

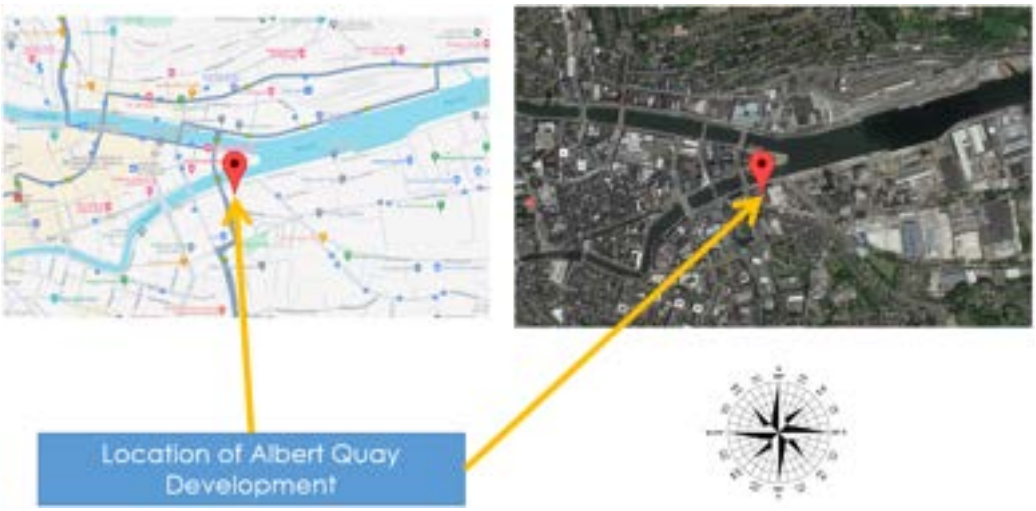



Figure 5.1: The Railyard Site Location and Existing Environment

Figure 5.2: Extents of Analysed Existing Environment Around The Railyard

Figure 5.3 shows an aerial photograph of the terrain surrounding the construction site at The Railyard. The Railyard Site is located in Albert Quay, Cork. Therefore, the area surrounding the site can be characterised as urban environment with river cutting through it north of the development.

Figure 5.3: Built-in Environment Around Construction Site at The Railyard

## 5.2 LOCAL WIND CONDITIONS

This analysis considers the whole development being exposed to the typical wind condition of the site. The building is oriented as shown in the previous sections. The wind profile is built using the annual average of meteorology data collected at Cork Airport Weather Station. Figure 5.4 shows on the map, the position of The Railyard and the position of Cork Airport.

Regarding the transferability of the available wind climate data, the following considerations have been made:

- *Terrain*: The meteorological station is located on the flat open terrain of the airport, whereas the development site is in an urban area with built-in structures including buildings of around 10 m height in average (warehouses and houses).

- *Wind Directions*: The landscape around the development site can in principle be characterized as flat terrain. Isolated elevations in the near area of the development should have no influence on the wind speed and wind directions. With respect to the general wind climate no significant influence is expected. Based on the above considerations it can be concluded that the data from the meteorological station at Dublin Airport are applicable for the desktop assessment of the wind comfort at the development site.

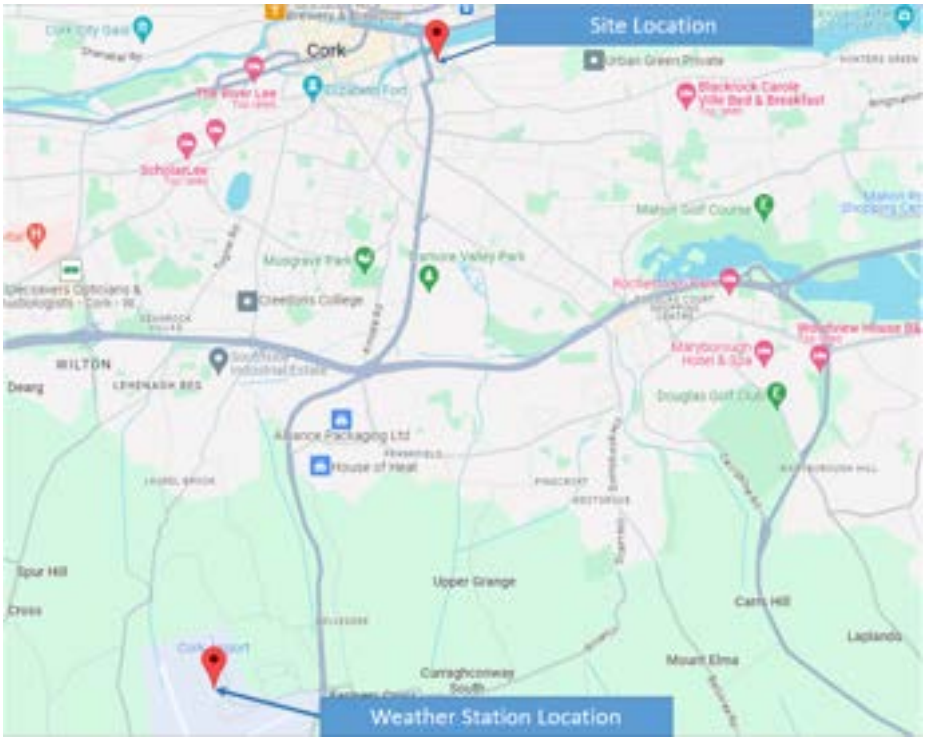



Figure 5.4: Map showing the position of The Railyard and Cork Airport

The assessment of the wind comfort conditions at the new development will be based on a discrete set of wind data throughout a year (annual wind statistic) provided by Meteoblue for Cork airport meteological wind station. In this study, a 12-discrete set of wind direction is used in order to evaluate the probability of exceedance at any given threshold speed. A Weibull probability distribution is used to fit the given wind data into a continuous one for each wind direction. From Weibull distribution function, the probability, P, can be obtained for each wind direction by:

$$P = e^{(-\frac{U}{c})^k}$$

Where c is the scale parameter and k is the shape parameter for a wind speed U.

Statistical analysis of the number of hours and magnitudes of wind is performed in order to indicate the pedestrian comfort and distress analysis as per Lawson Criteria. Each of the wind directions was interpolated to calculate the probability that a velocity threshold will be exceeded. Based on the criterion of occurrence frequency, if the proposed site is exposed to a wind from a specific direction for more than 5 percent of the time, then the microclimate analysis should consider the impact of this wind (accounting for its direction and most frequent speed) on the local microclimate. However, to get a complete picture, simulations were conducted for wind from 12 distinct directions equally spaced around the development (every 30°).

As stated above, the local wind climate is determined from historical meteorological data recorded at Cork Airport. The data set analyzed for this assessment is based on the meteorological data associated with the maximum daily wind speeds recorded over a 15-year period between 2008 and 2023 at a weather station at the airport, which is located 10m above ground. Figure 5.5 shows the wind speed record during the latest 5 years.

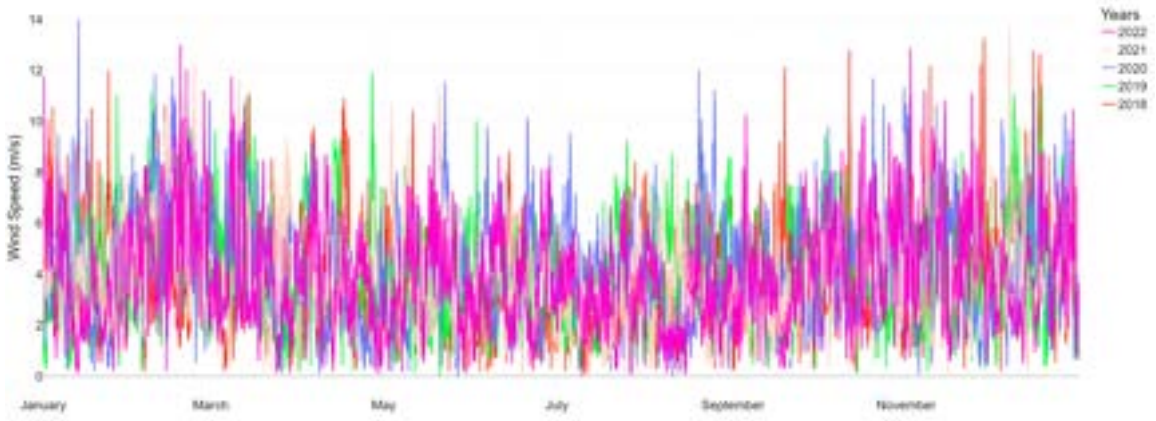



Figure 5.5: Local Wind Conditions - Wind Speed - 2018-2022

Figure 5.6, presenting the wind speed diagram for Cork, shows the days per month, during which the wind reaches a certain speed. It is evident from this figure that strong winds are more prevalent during the winter season (December, January, and February) and the start of spring season (March) compared to other seasons.

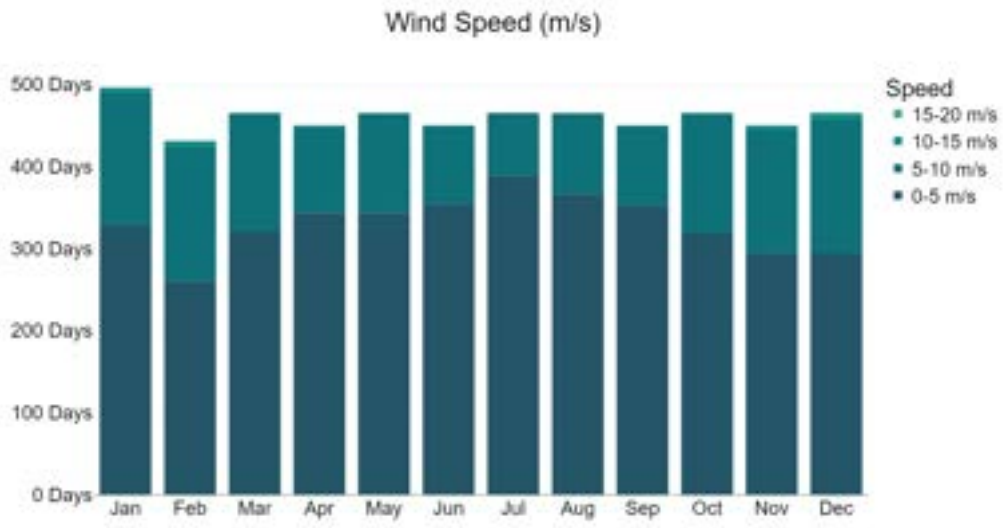



Figure 5.6: Cork Wind Speed Diagram

Figure 5.7 displays the wind rose for The Railyard, revealing the percentage of wind coming from different directions over a 15-year period. Detailed percentages for each direction are outlined in Table 5.1. As depicted in Figure 5.7 and highlighted in Table 5.1, the highest probability of wind occurrence lies in the wind blowing from 210° to 300° with 210° being most prevalent. This finding indicates that south-west winds are the prevailing wind directions and contribute significantly to the probability of discomfort exceedance. In addition, seasonal changes were analysed in order to indicate the prevailing wind directions (Fig 5.8).

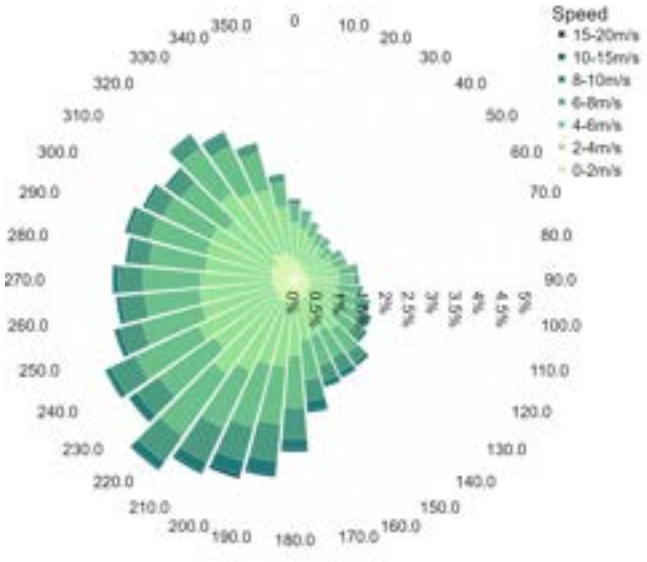
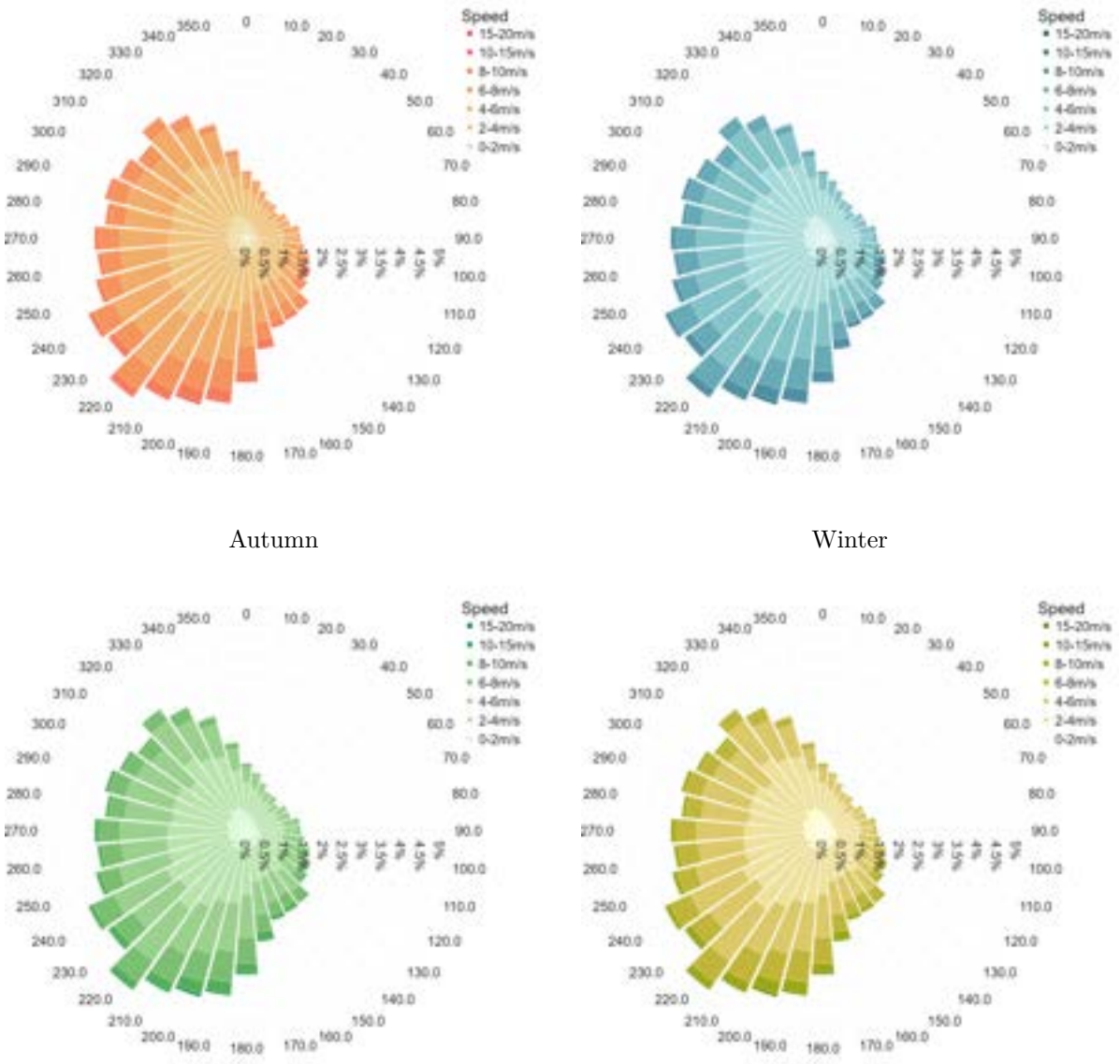



Figure 5.7: Cork Wind Rose

Table 5.1: A detailed table includes wind occurrences, wind patterns, and roughness lengths for different wind directions.

| Wind Direction | Scale Parameter | Shape Parameter | Roughness Length ($z_0$) | Frequency |
|---|---|---|---|---|
| 210.00° | 1.74 | 4.10 | 0.30 | 13.53% |
| 240.00° | 1.63 | 3.47 | 0.30 | 13.51% |
| 270.00° | 1.88 | 3.90 | 0.30 | 11.45% |
| 300.00° | 2.17 | 4.27 | 0.30 | 11.40% |
| 180.00° | 2.08 | 5.09 | 0.30 | 10.85% |
| 330.00° | 1.93 | 3.59 | 0.30 | 9.89% |
| 150.00° | 1.76 | 4.15 | 0.30 | 6.73% |
| 120.00° | 1.74 | 3.81 | 0.30 | 5.79% |
| 0.00° | 1.72 | 3.11 | 0.30 | 5.54% |
| 90.00° | 1.95 | 3.59 | 0.30 | 4.27% |
| 30.00° | 1.70 | 2.84 | 0.30 | 3.54% |
| 60.00° | 1.44 | 2.43 | 0.30 | 3.34% |

In addition to the annual statistical analysis of wind occurrences (Figure 5.7), a detailed examination has been conducted to comprehend the wind conditions during each season. As illustrated in Figure 5.8, the wind patterns in spring closely resemble those in summer, with a higher percentage of winds coming from the east and north-east compared to the same direction in summer. Although in autumn the wind pattern is similar to winter, during winter, the winds occur more frequently and are stronger. In general, the predominant winds come from the south-west at higher speeds compared to other wind directions throughout all seasons.




Autumn Winter

Spring Summer

Figure 5.8: Wind speeds and wind directions at different seasons

# 6. CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

## 6.1 DESCRIPTION OF PROPOSED DEVELOPMENT

The Railyard Apartments proposed development comprises of the construction of 217 no. apartments comprising 25 no. studio units; 92 no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units apartments in a building that ranges in height from 8 to 11 to 24 storeys over ground floor at the former Carey Tool Hire site, currently principally occupied by Park Facilities Management Ltd, Albert Quay, Cork City.

The development site, measuring approximately 0.2744 hectares, is bounded by Albert Quay East to the north, Albert Street to the west, the former Blackrock and Passage Railway Terminus – Ticket Office, a Protected Structure, Ref. No. PS 1138, and which is also a Recorded Monument, CO074-119002, the two-storey former Cork, Blackrock and Passage Railway Offices, Protected Structure, Ref. No. PS 1137, and the Albert Road Post Box, which is also a Protected Structure Ref. No. PS942 and Albert Road to the south, and Navigation Square to the east. The site is accessed by Albert Quay East and Albert Street.

The proposed works include:

- The construction of 217no. apartments [25no. studio units; 92no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units] in a building that ranges in height from 8 to 11 to 24 storeys over ground floor.
- The provision of external balconies on the east, west and south elevations to the 12$^{th}$ floor on the east and west elevation, and to the 9$^{th}$ floor on the southern elevation.
- The provision of an external public realm area at ground level, an eastern laneway for servicing of the proposed development, in addition to its use as a pedestrian link.
- The provision of internal communal space areas at ground floor, 1$^{st}$ floor, and 2$^{nd}$ floor, and 2no. external rooftop terraces on the 9$^{th}$ floor and the 12$^{th}$ floor.
- The provision of a ground floor community/arts use, with external seating area and a ground floor creche with external covered play area.
- The provision of ground level plant, ancillary uses, and bin store.
- Bicycle spaces at lower ground floor and ground floor level; additional visitor bicycle spaces; and a set down delivery area at ground floor level on Albert Street.
- Set back of the eastern boundary wall to the north and south.
- All site development, public realm and landscaping works.
- The proposed development also involves the demolition of the existing two-storey Carey Tool Hire building, currently principally occupied by Park Facilities Management Ltd.

Figures 6.1 and 6.2 show 3D views of the proposed development (colored in orange) and existing surround buildings (colored in grey).

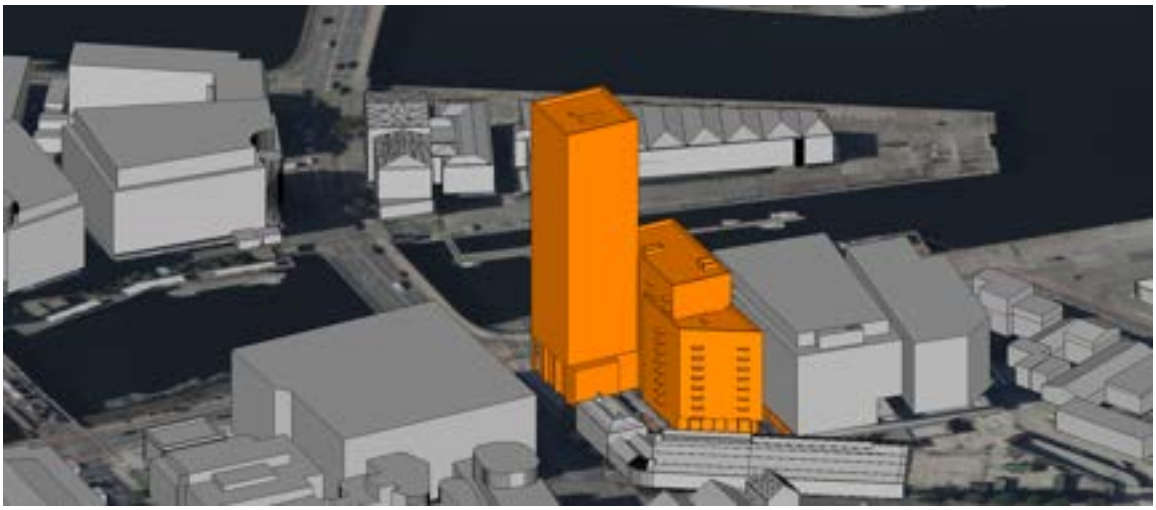


Figure 6.1: The Railyard - 3D View from South

Figure 6.2: The Railyard - 3D View from North

## 6.2 POTENTIAL RECEPTORS

Potential receptors for the wind assessment are all pedestrian circulation routes, building entrances and leisure open areas within the site and in neighboring adjacent areas. The pedestrian levels are considered at 1.5m above the ground and terraces.

Figures 6.3 and 6.4 show the pedestrian activity area on the ground and on the terraces (Roman numerals), respectively. These areas are considered as sensitive potential receptors for the wind microclimate analysis.


Figure 6.3: Potential Sensitive Receptors on the Ground


Figure 6.4: Potential Sensitive Receptors on Terraces

Table 6.1 lists the descriptions of potential receptors as shown in Figures 6.3 and 6.4.

Table 6.1: List of the Receptors

| On-Site Potential Receptors ID | Description | Off-Site Potential Receptors ID | Description |
|---|---|---|---|
| 1. | Pedestrian Footpath | A. | Custom House Street |
| 2. | Cycle and Pedestrian Connection. | B. | Albert Street |
| 3. | Cycle and Pedestrian Connection. | C. | Crossing of Albert Street and Albert Road |
| 4. | Cycle and Pedestrian Connection. | D. | Albert Road |
| 5. | Creche Outdoor Space | E. | Parking Lot |
| 6. | Garden | F. | Victoria Road |
| 7. | Pedetrian Footpath | G. | Albert Quay East |
| 8. | West Entrance | | |
| I | Terrace at 12th Floor | | |
| II | Terrace at 9th Floor | | |

# 7. BASELINE WIND MICROCLIMATE

## 7.1 BASELINE SCENARIO

The wind microclimate of the baseline scenario is defined by the wind patterns that develop on the site and its the surroundings (existing buildings and topography) under the local wind conditions relevant for the assessment of the Pedestrian Comfort and Distress.

In this scenario the assessment has considered the impact of wind on the existing area. Results of wind microclimate at pedestrian level (1.5m height - flow speeds) are collected throughout the modelled site. These flow velocities identify if locally, wind speeds at pedestrian-level are accelerated or decelerated in relation to the undisturbed reference wind speed due to the presence of the existing baseline environment.

The impact of these speeds are then combined with their specific frequency of occurrence and presented in the maps that show the area of comfort and distress in accordance with Lawson Criteria, these maps are produced at pedestrian level on the ground and identify the suitability of each areas to its prescribed level of usage and activity.

### 7.1.1 WIND SPEEDS - Pedestrian Level

Results of wind speeds and their circulations at pedestrian level of 1.5m above the development ground are presented in Figures 7.1 to 7.12 in order to assess wind flows at ground floor level of The Railyard.

Wind flow speeds are shown to be within tenable conditions. Higher velocity and recirculation effects are found in the existing site.

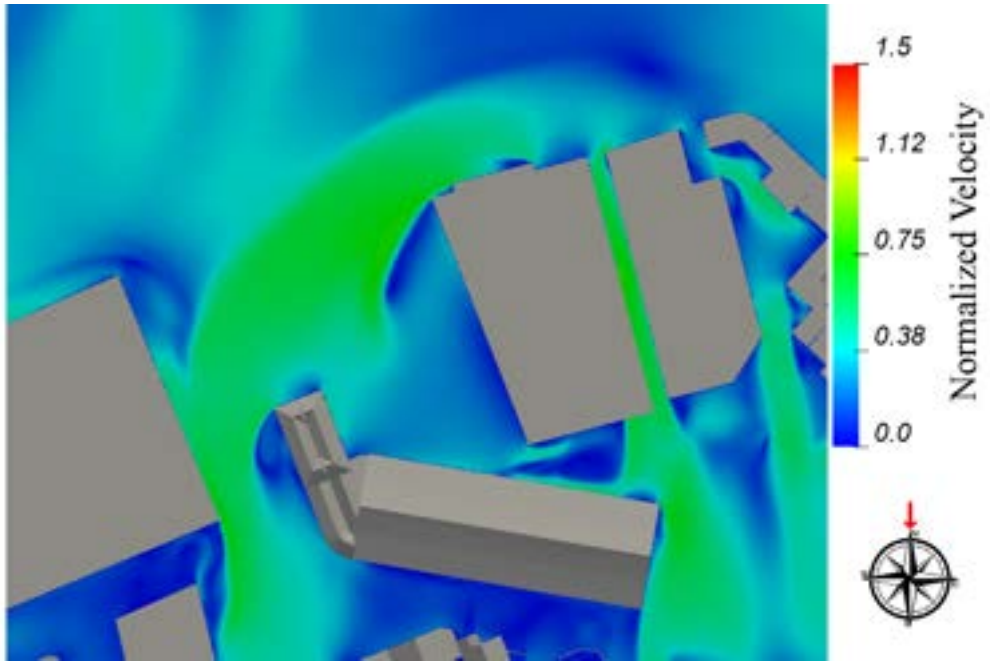



Figure 7.1: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 0°

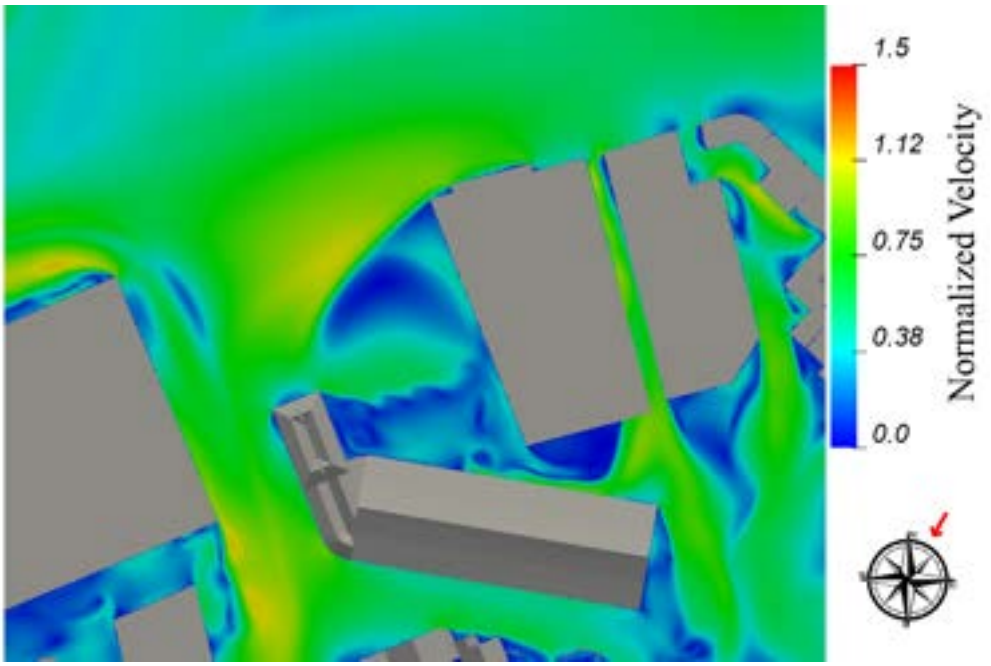



Figure 7.2: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 30°

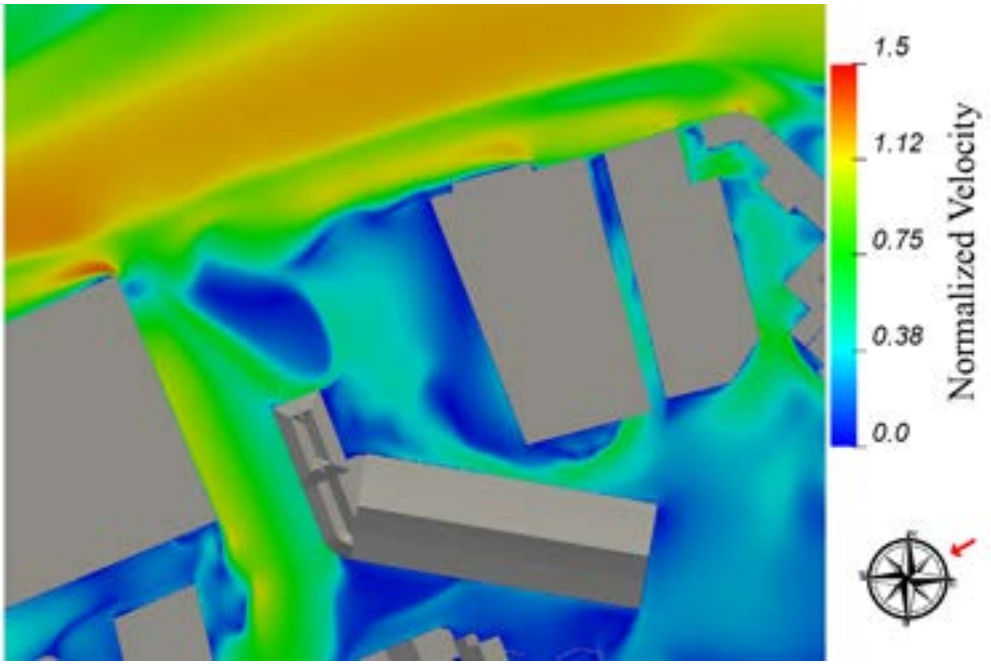



Figure 7.3: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 60°

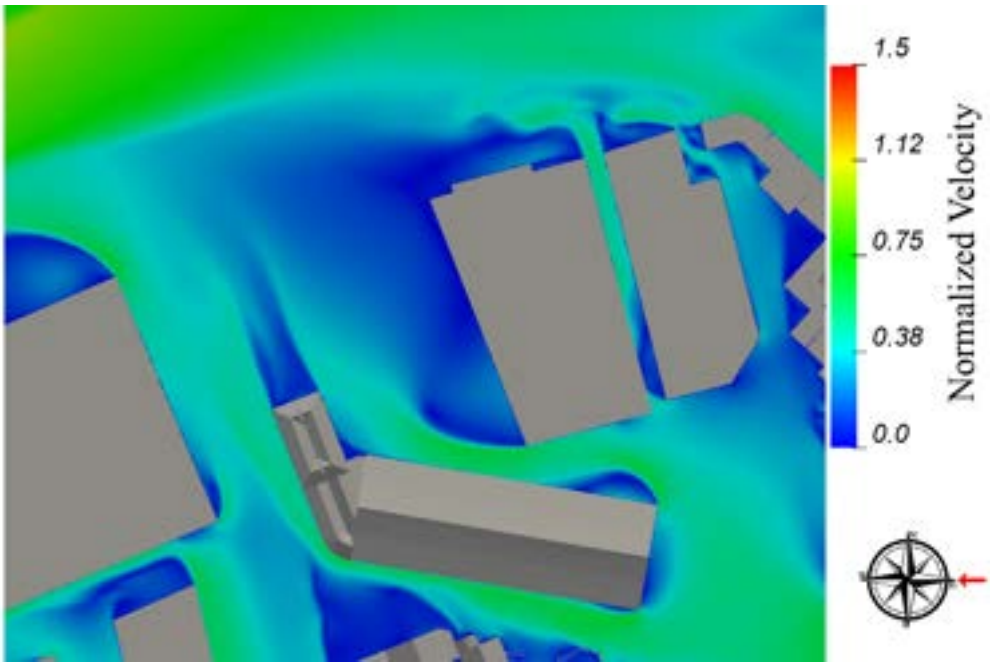



Figure 7.4: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 90°

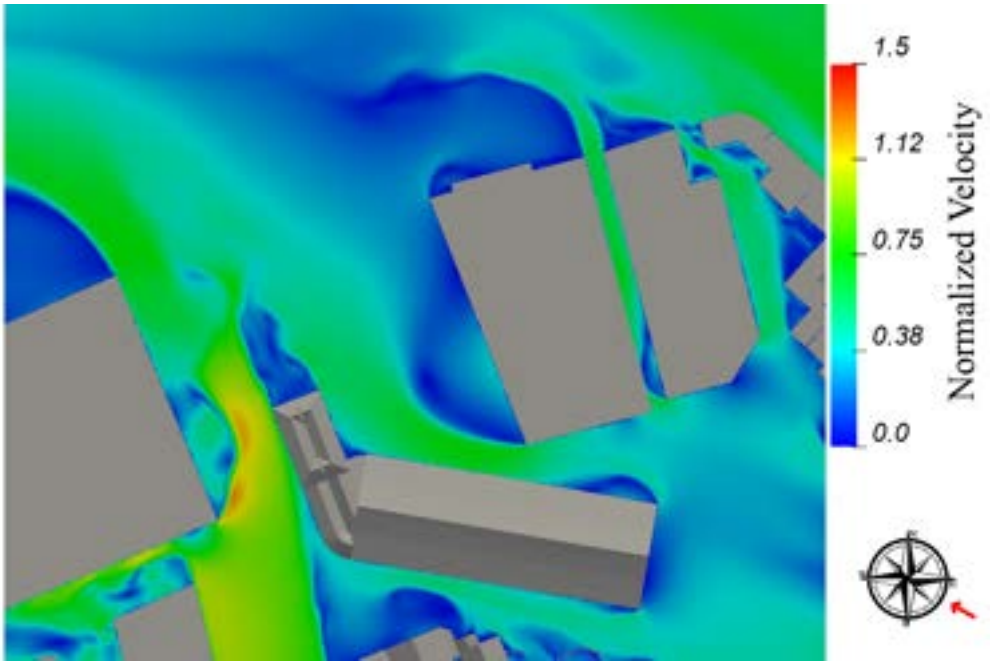



Figure 7.5: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 120°

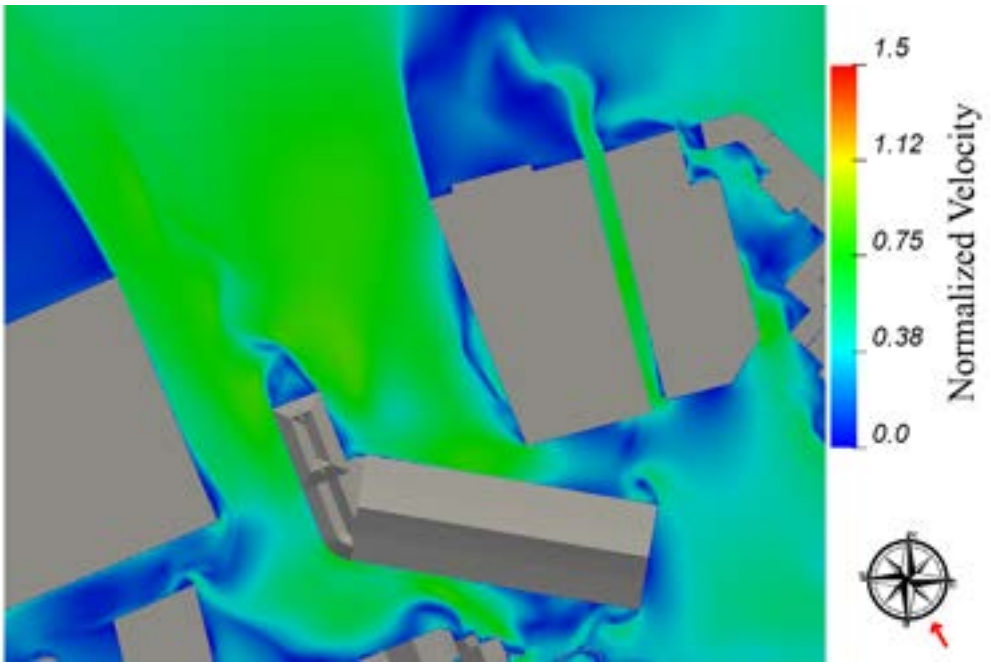



Figure 7.6: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 150°

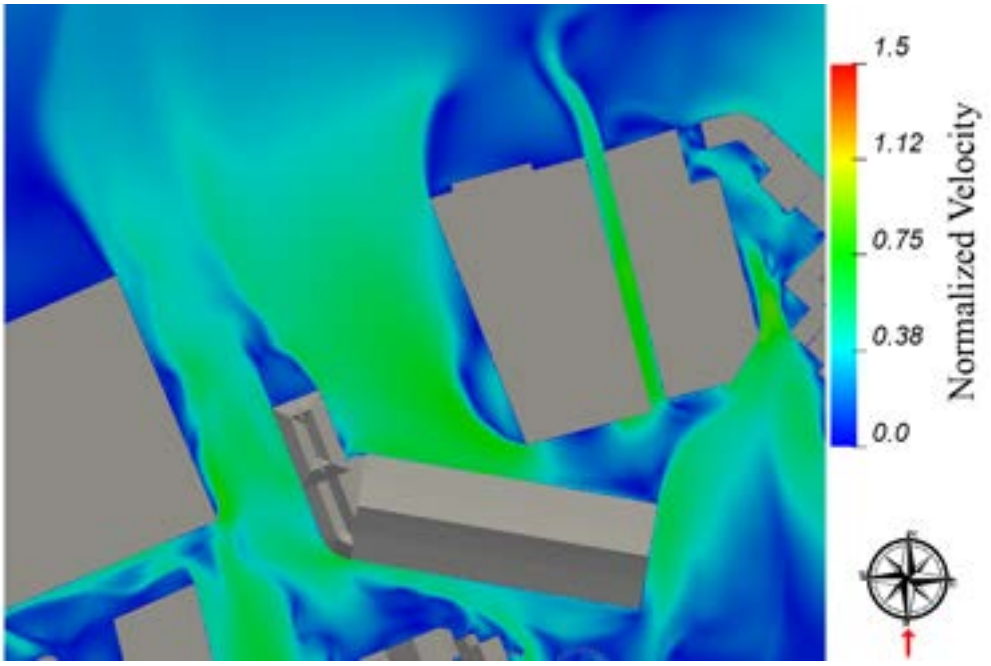



Figure 7.7: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 180°

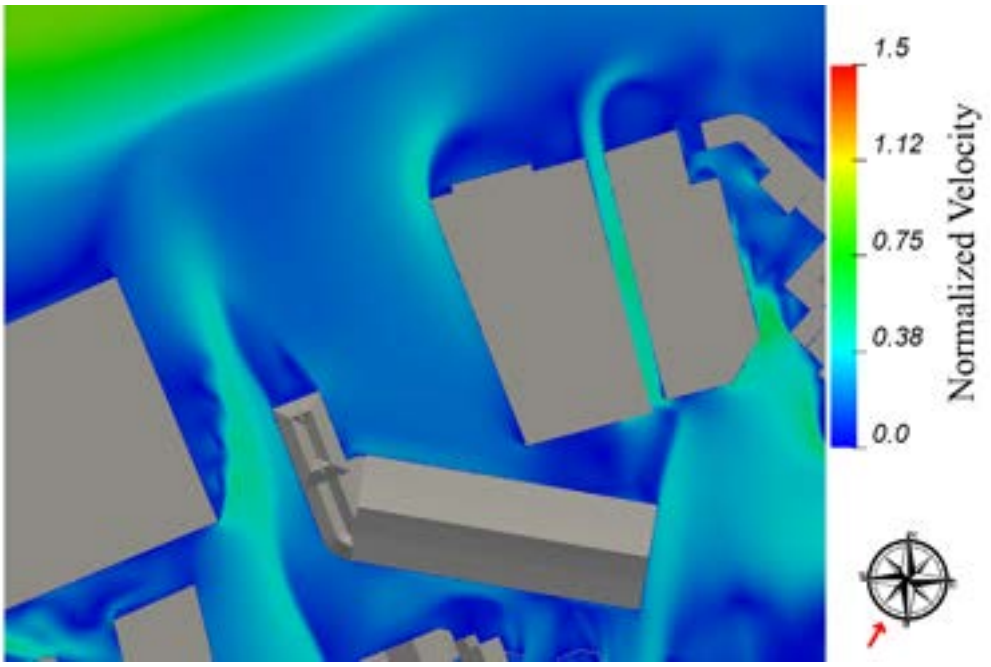



Figure 7.8: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 210°

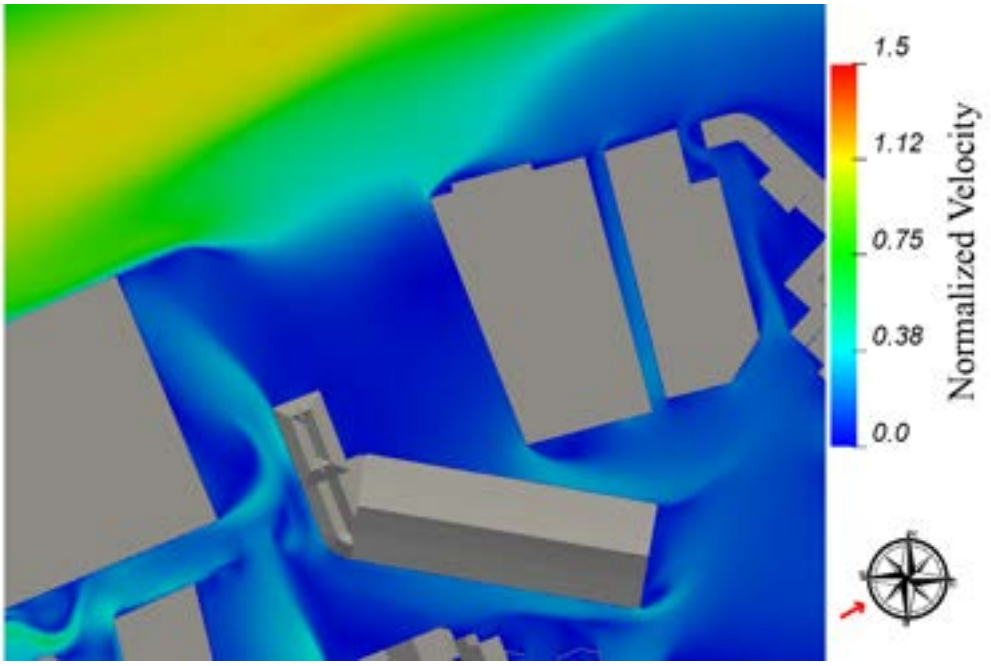



Figure 7.9: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 240°

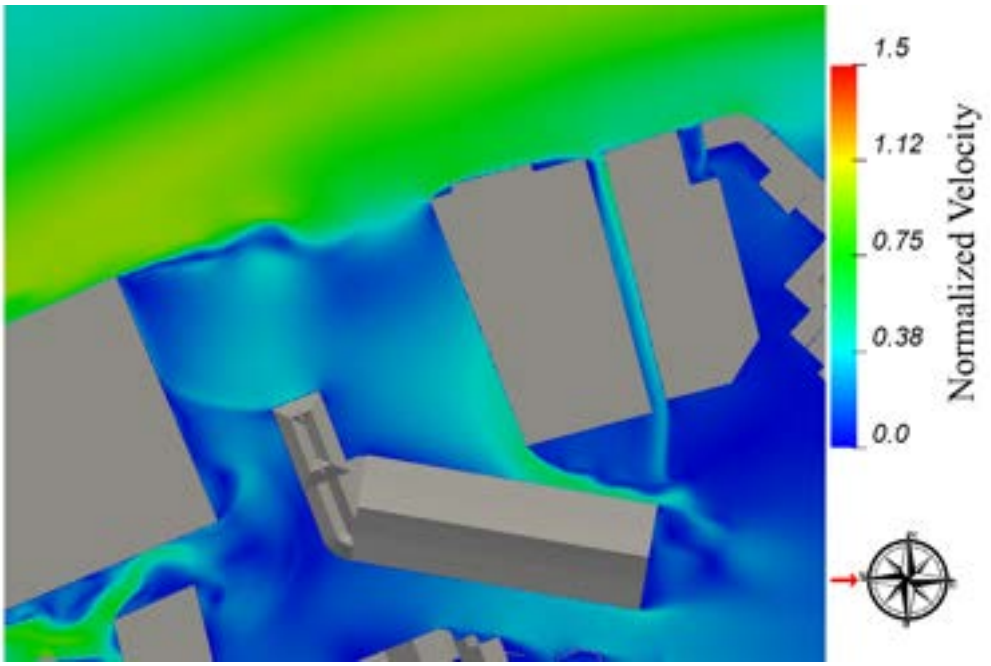



Figure 7.10: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 270°

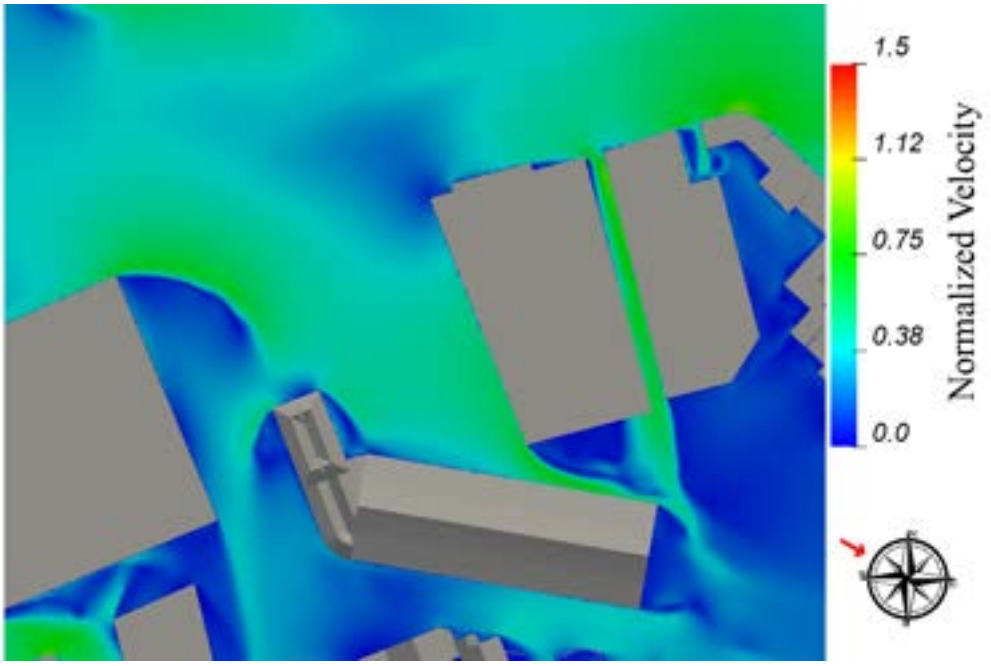



Figure 7.11: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 300°

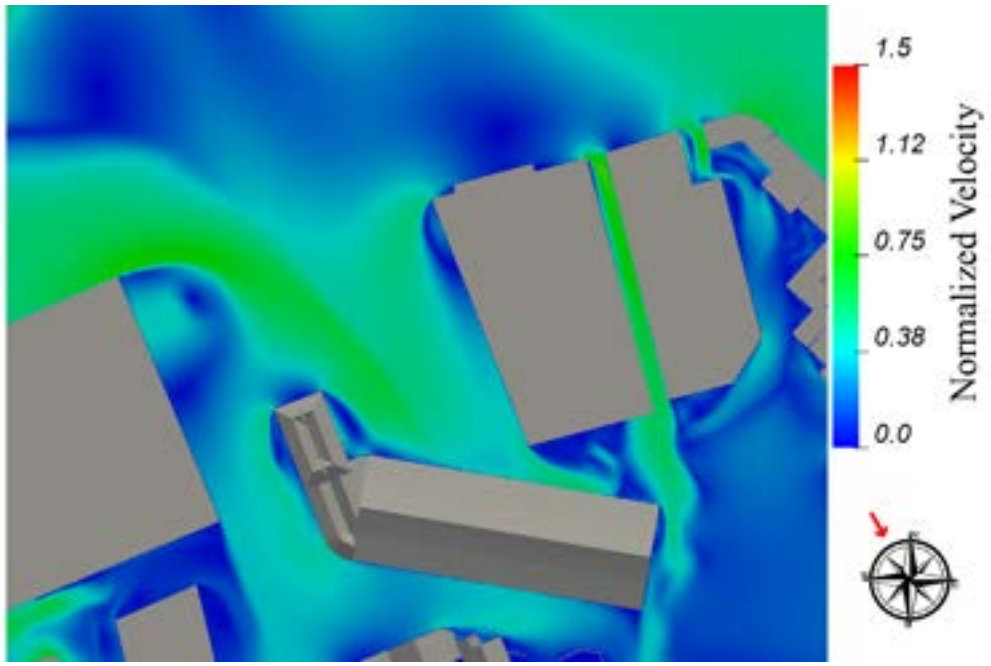



Figure 7.12: Ground Floor Level - Flow Velocity Results at Z=1.5m above the ground - Wind Direction: 330°

### 7.1.2 BASELINE WIND MICROCLIMATE - Lawson Criteria

The wind flow results obtained simulating the different direction and wind speeds, are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows. The comfort/distress conditions are presented in Figure 7.13 using a colour coded diagram formulated in accordance with the Lawson Criteria.

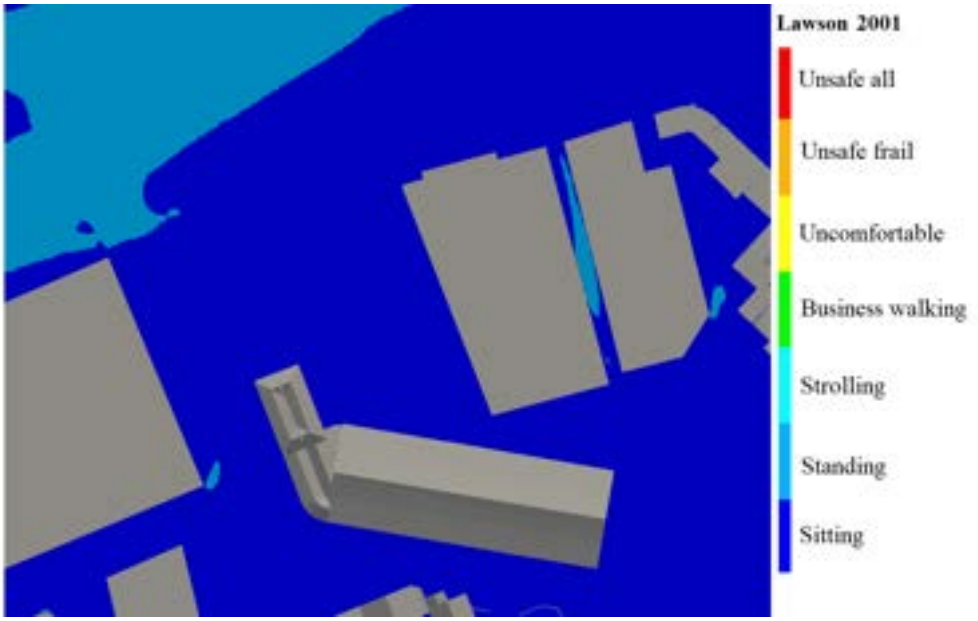



Figure 7.13: Ground Floor - Lawson Discomfort Map - Top View

From the simulation results the following observations are pointed out:

- The assessment of the baseline scenario has shown that no area is unsafe and no conditions of distress are created in the existing environment under the local wind climate.

- The site is usable for sitting/standing, the roads in the surrounding are usable for their intended scope.

# 8. IMPACT OF THE PROPOSED DEVELOPMENT

This section assessed the potential impact of the proposed development on the already existing environment, and the suitability of the proposed development to create and maintain a suitable and comfortable environment for different pedestrian activities.

## 8.1 CONSTRUCTION PHASE

As the finalization of the development proceeds, the wind setting at the site would progressively conform to those of the completed development. Due to the fact that windier conditions are acceptable within a construction area (not accessible to the public), and the proposed development would not be the reason for critical wind conditions on-Site (and are slightly calmer when the development is in site), the impacts evaluated on-Site are considered to be insignificant. Thus, the predicted impacts during construction phase are identified as not significant or negligible.

In summary, as construction of The Railyard progresses, the wind conditions at the site would gradually adjust to those of the completed development. During the construction phase, predicted impacts are classified as negligible.

## 8.2 OPERATIONAL PHASE

This section shows CFD results of wind microclimate assessment carried out considering the ”Operational Phase” of The Railyard. In this case the assessment has considered the impact of wind on the existing area including The Railyard. Wind simulations have been carried out on all the various directions for which the development could show critical areas in terms of pedestrian comfort and safety.

Results of wind microclimate at pedestrian level (1.5m height - flow speeds) are collected throughout the modelled site(potential receptors). These flow velocities identify if locally, wind speeds at pedestrian-level are accelerated or decelerated in relation to the undisturbed reference wind speed due to the presence of the existing baseline environment.

The impact of these speeds are then combined with their specific frequency of occurrence and presented in the maps that show the area of comfort and distress in accordance with Lawson Criteria, these maps are produced at pedestrian level on the ground or on the courtyards, and identify the suitability of each areas to its prescribed level of usage and activity.

### 8.2.1 WIND SPEEDS - Pedestrian Level

Results of wind speeds and their circulations at pedestrian level of 1.5m above the potential receptors are presented in Figures 8.1 to 8.24 in order to assess wind flows at the ground floor level and terraces of The Railyard.

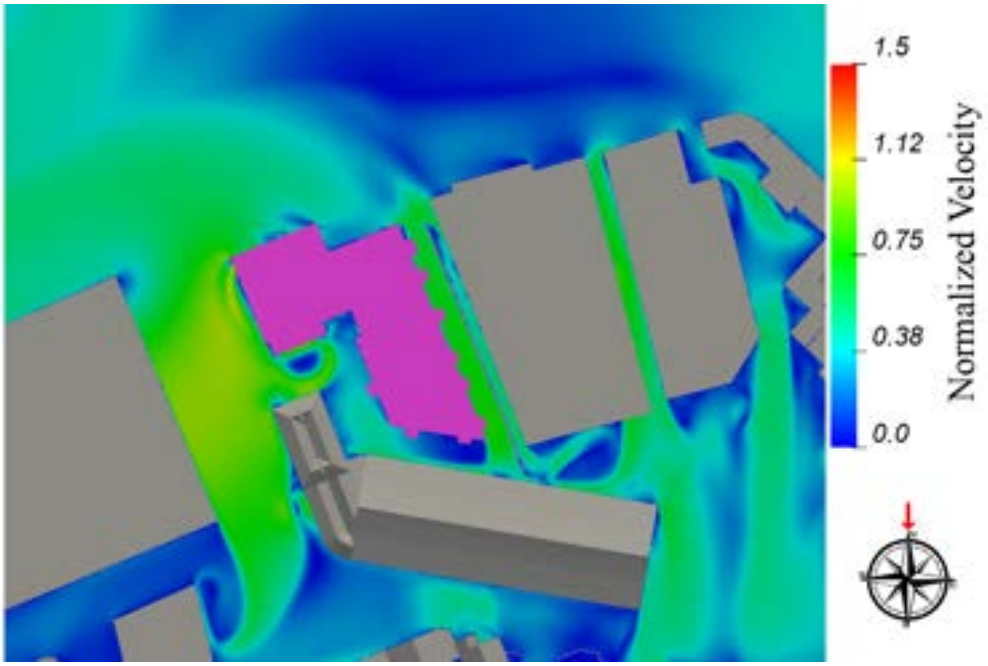



Figure 8.1: Flow Velocity Results at 1.5m above the ground - Wind Direction: 0°

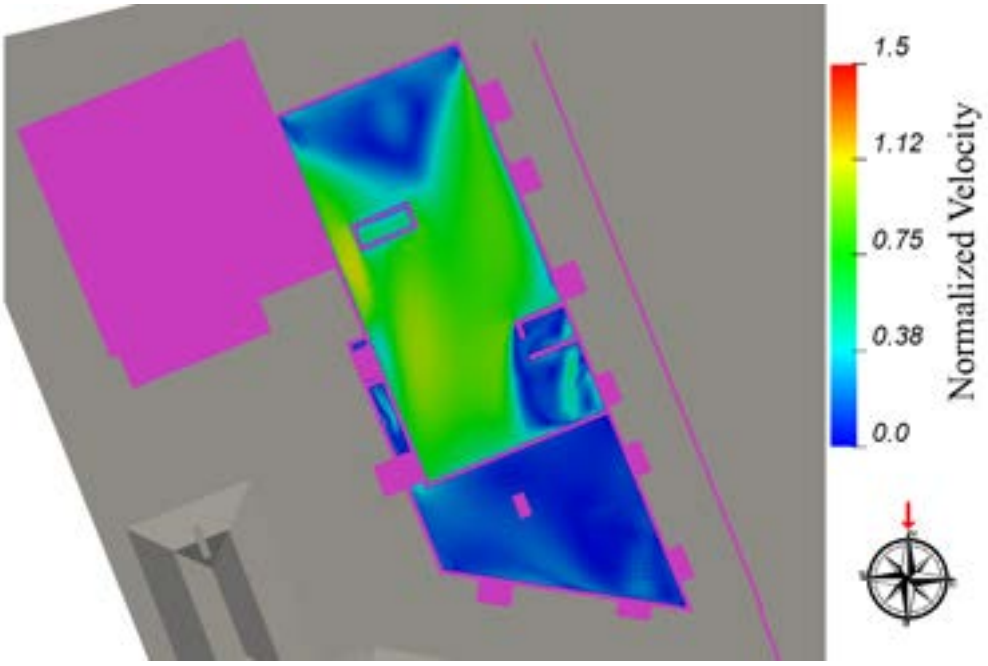



Figure 8.2: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 0°

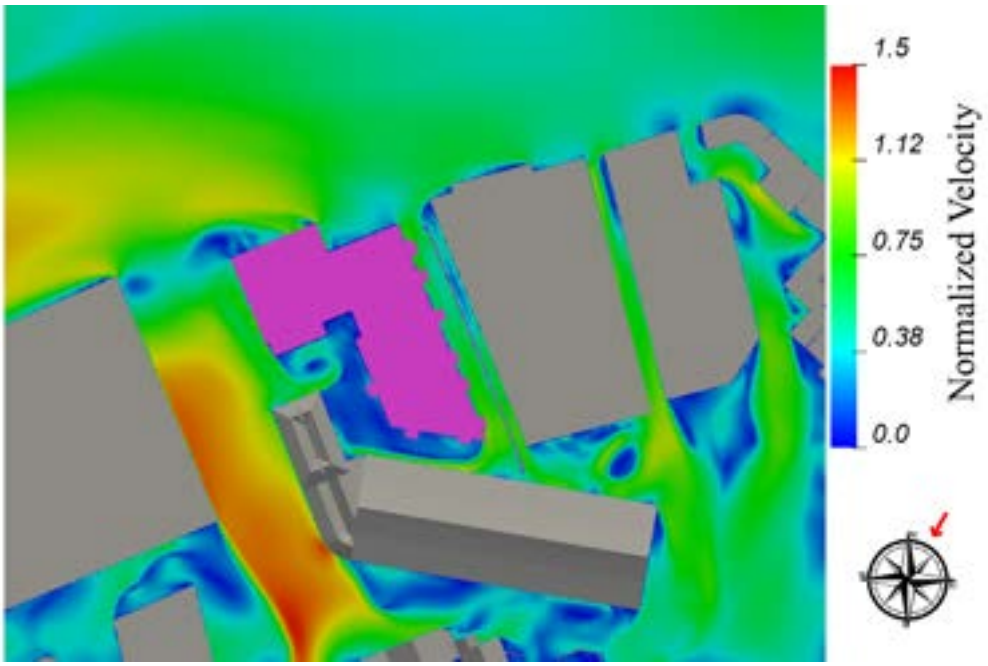



Figure 8.3: Flow Velocity Results at 1.5m above the ground - Wind Direction: 30°

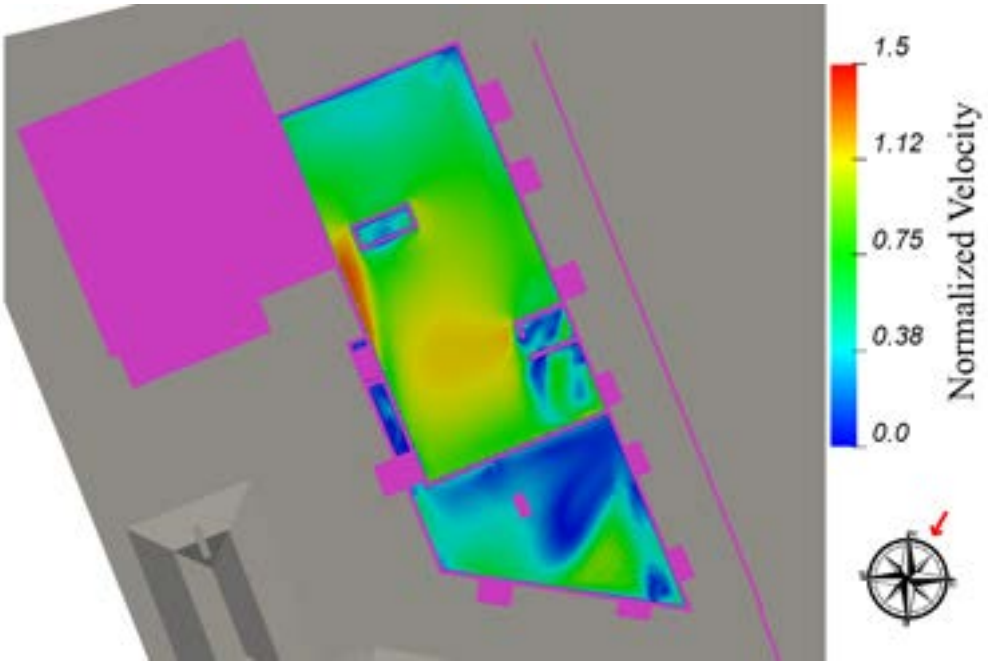



Figure 8.4: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 30°

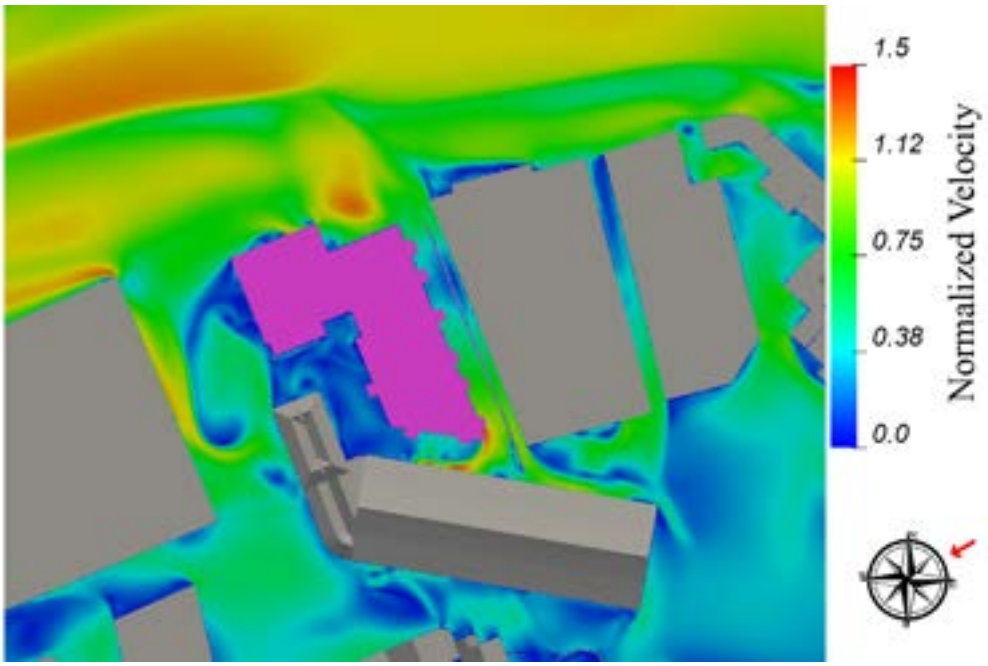



Figure 8.5: Flow Velocity Results at 1.5m above the ground - Wind Direction: 60°

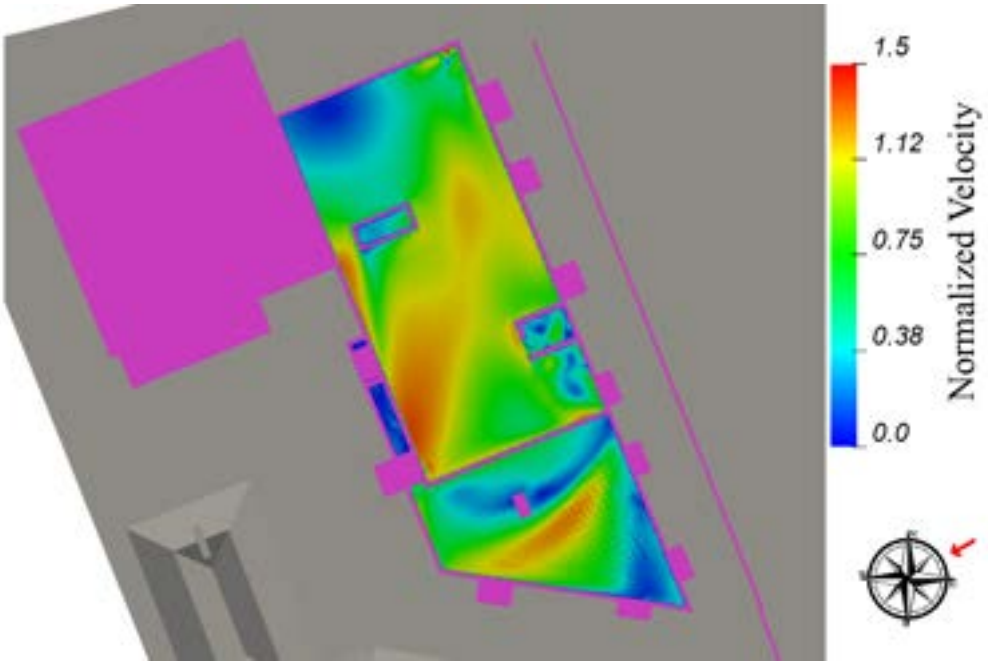



Figure 8.6: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 60°

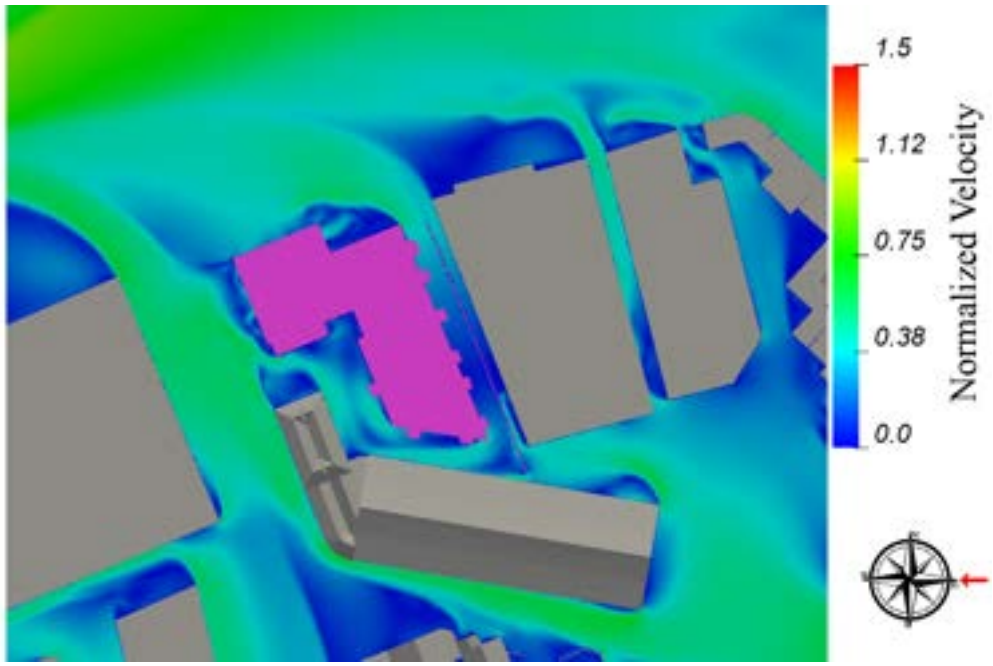



Figure 8.7: Flow Velocity Results at 1.5m above the ground - Wind Direction: 90°

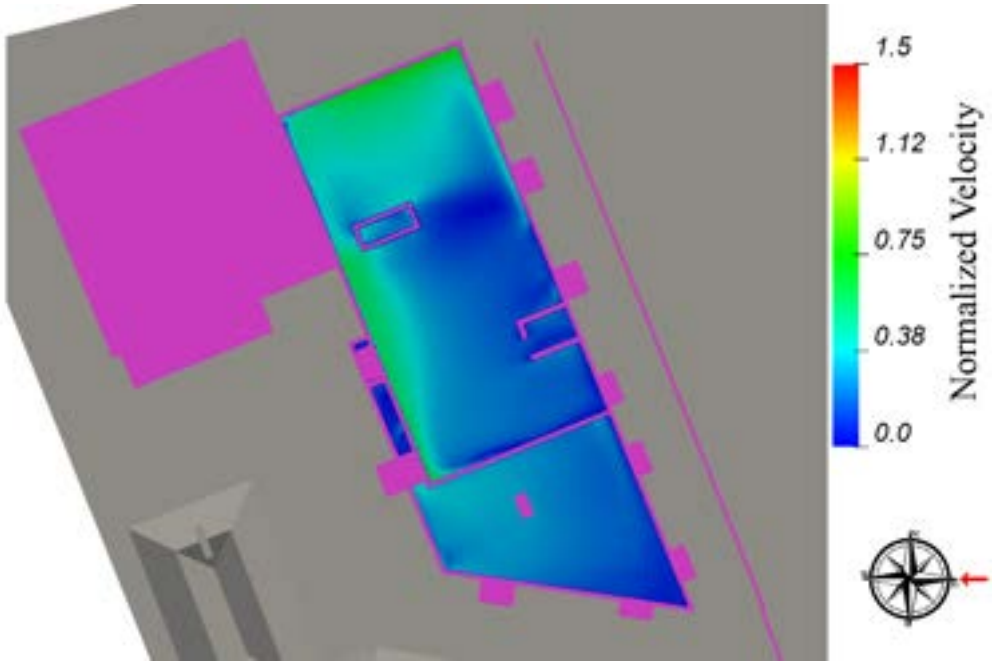



Figure 8.8: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 90°

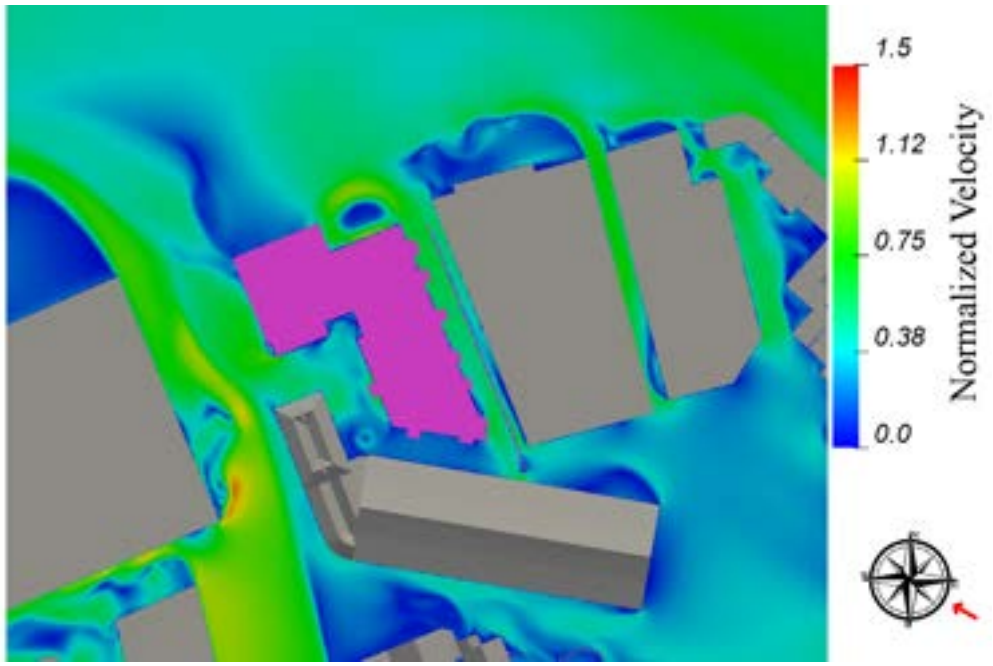



Figure 8.9: Flow Velocity Results at 1.5m above the ground - Wind Direction: 120°

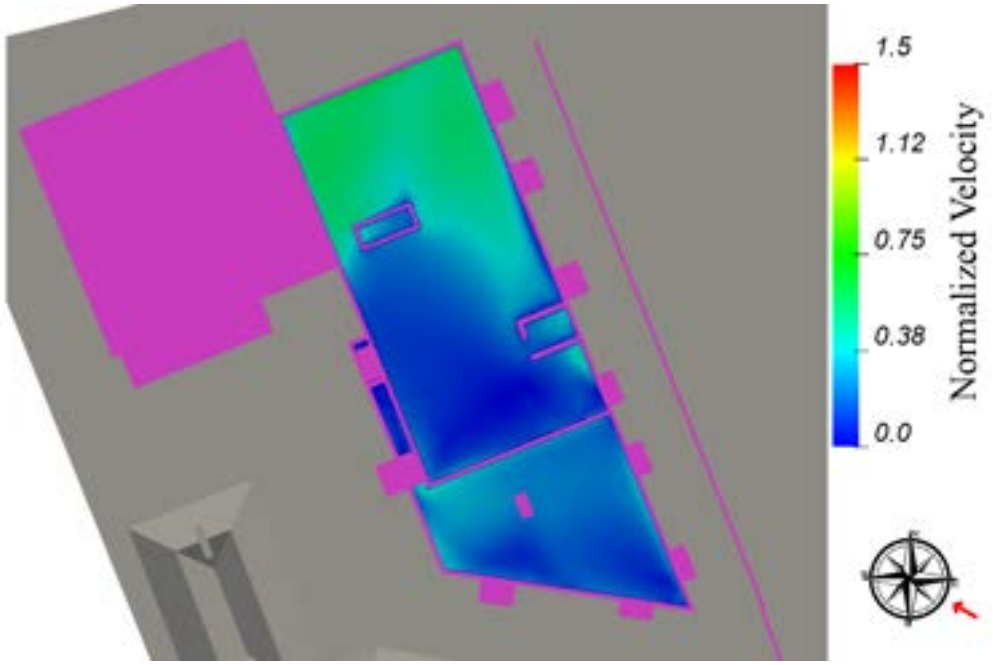



Figure 8.10: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 120°

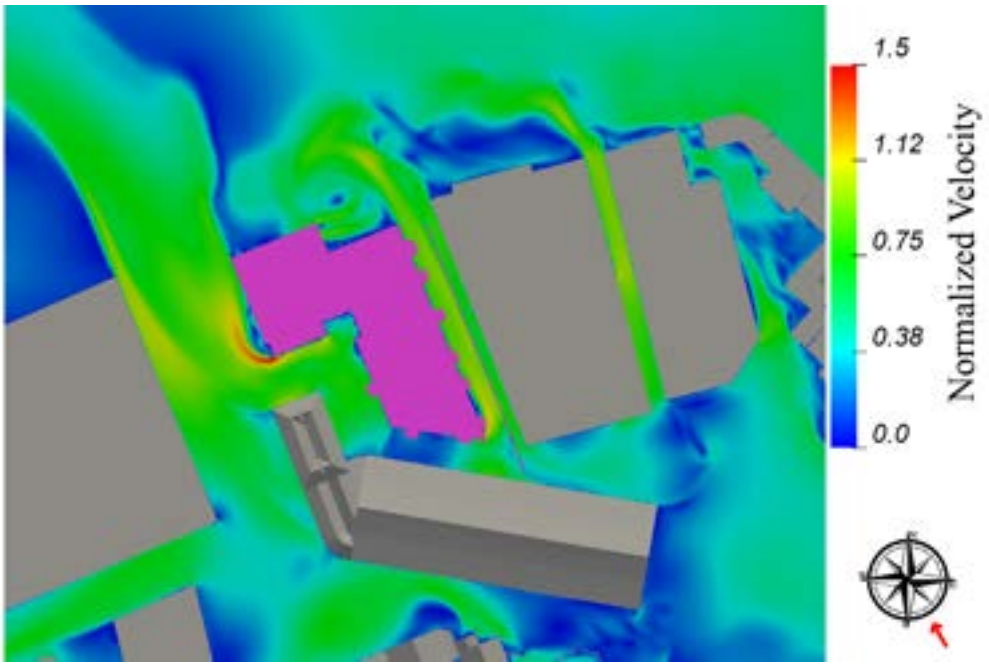



Figure 8.11: Flow Velocity Results at 1.5m above the ground - Wind Direction: 150°

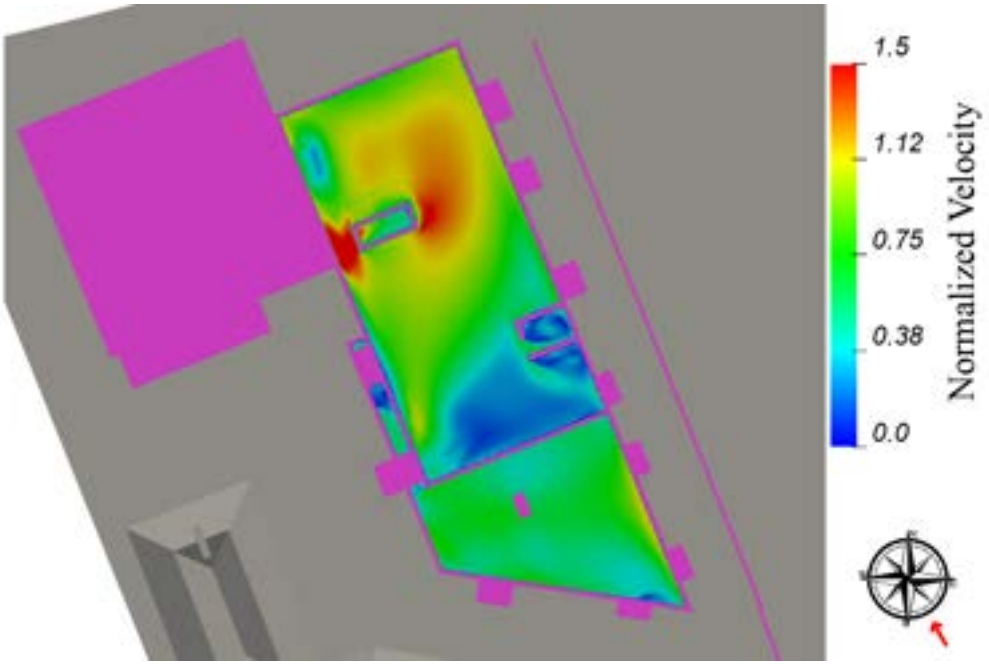



Figure 8.12: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 150°

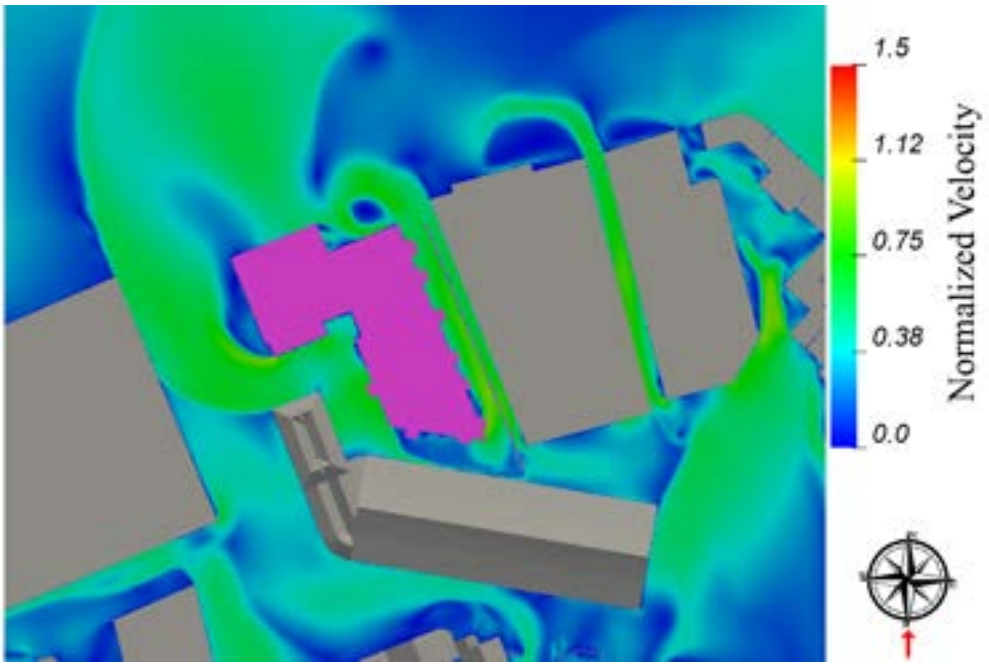



Figure 8.13: Flow Velocity Results at 1.5m above the ground - Wind Direction: 180°

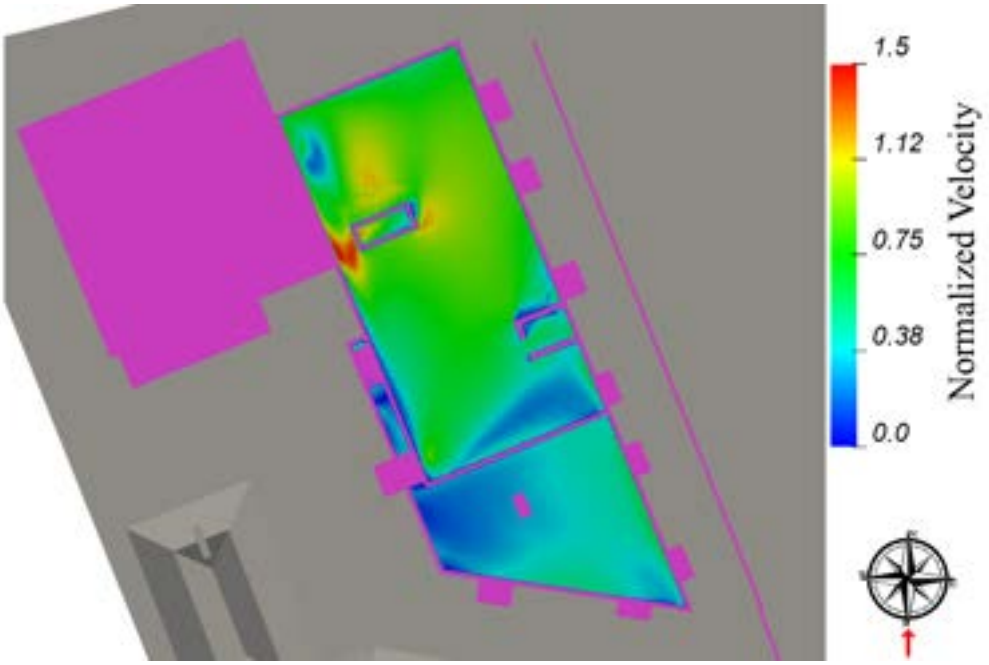



Figure 8.14: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 180°

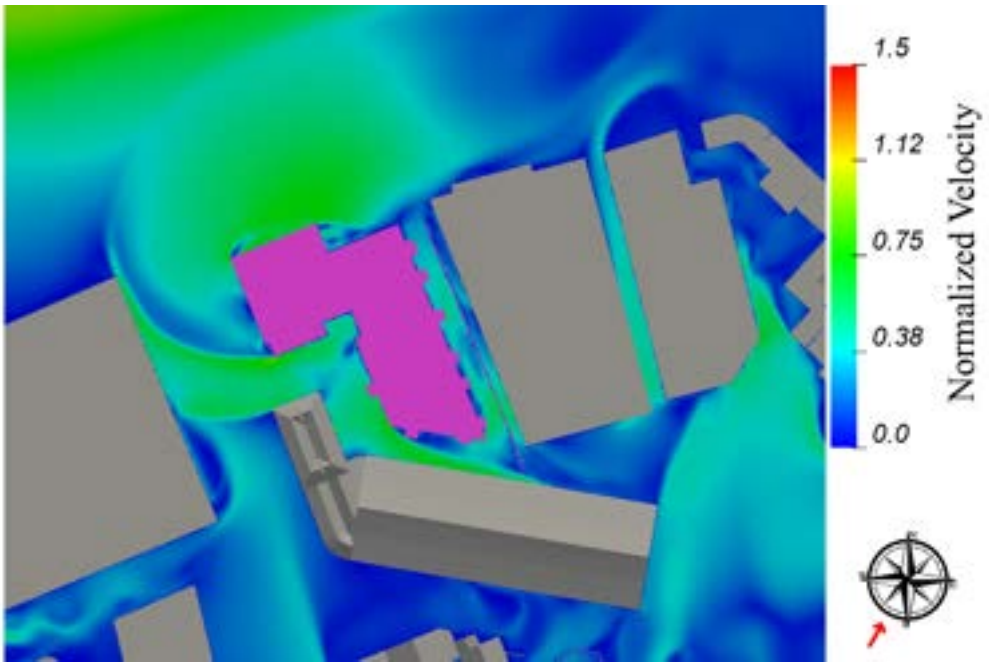



Figure 8.15: Flow Velocity Results at 1.5m above the ground - Wind Direction: 210°

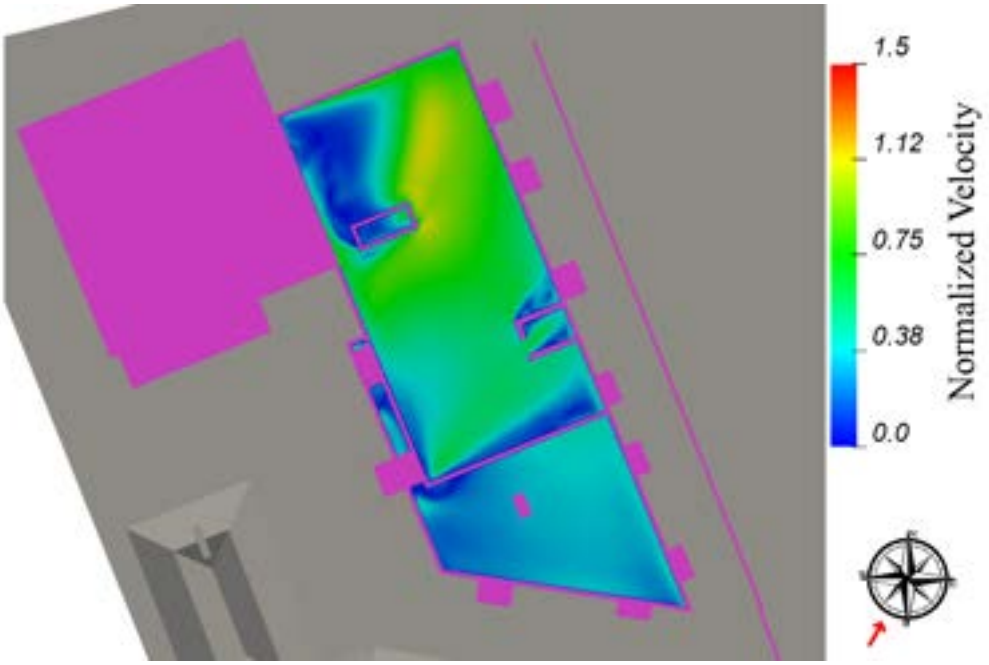



Figure 8.16: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 210°

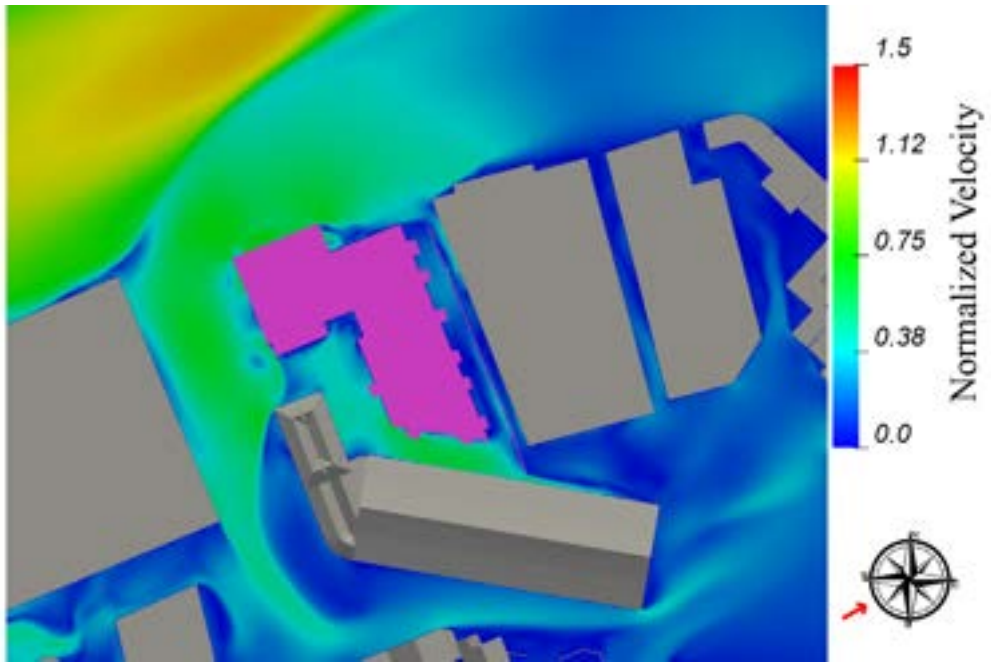



Figure 8.17: Flow Velocity Results at 1.5m above the ground - Wind Direction: 240°

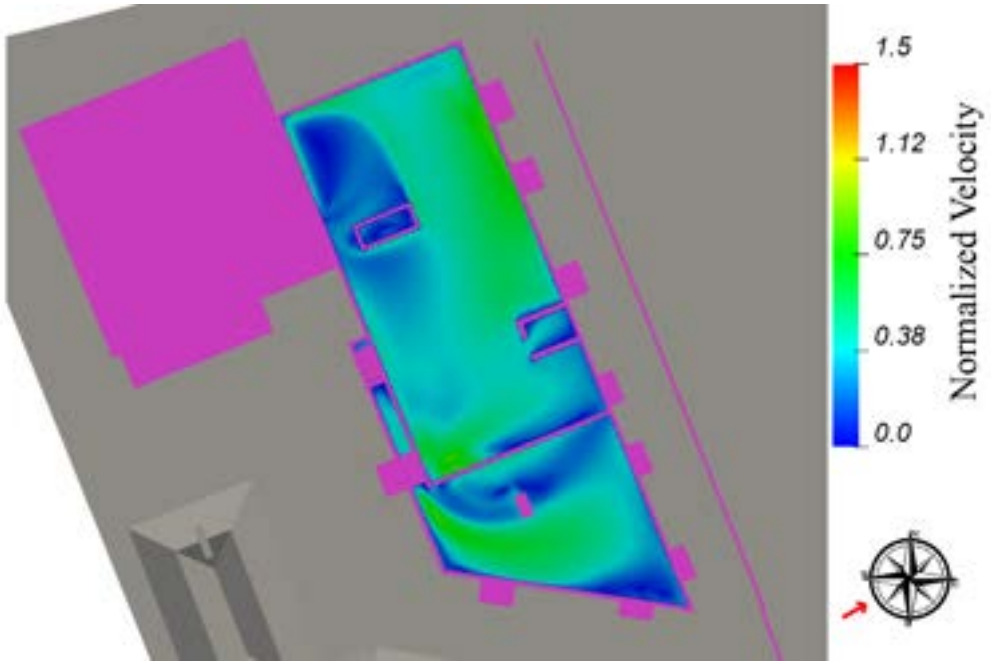



Figure 8.18: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 240°

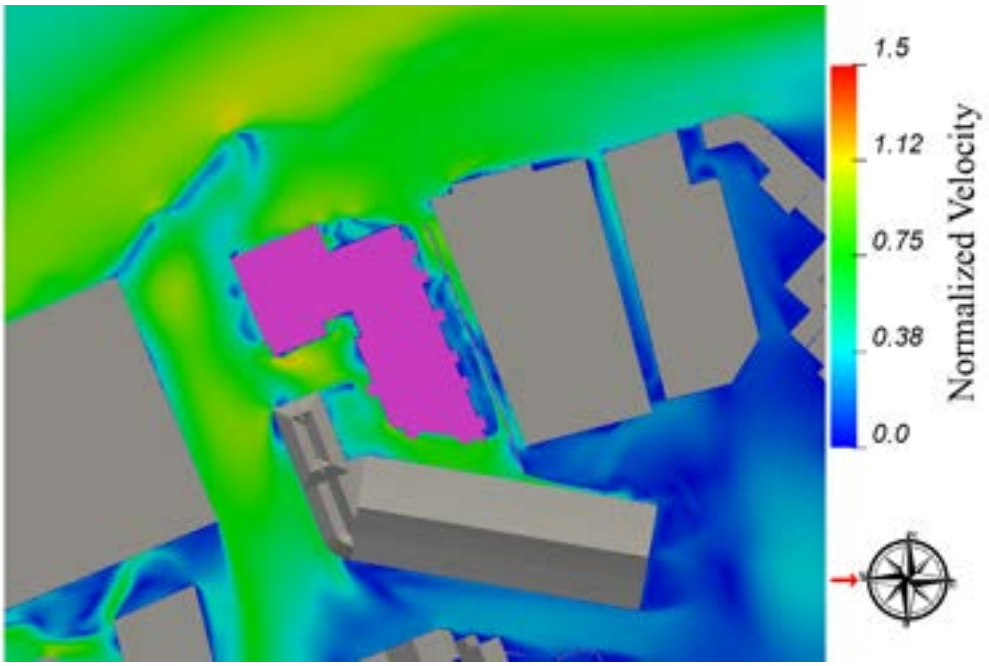



Figure 8.19: Flow Velocity Results at 1.5m above the ground - Wind Direction: 270°

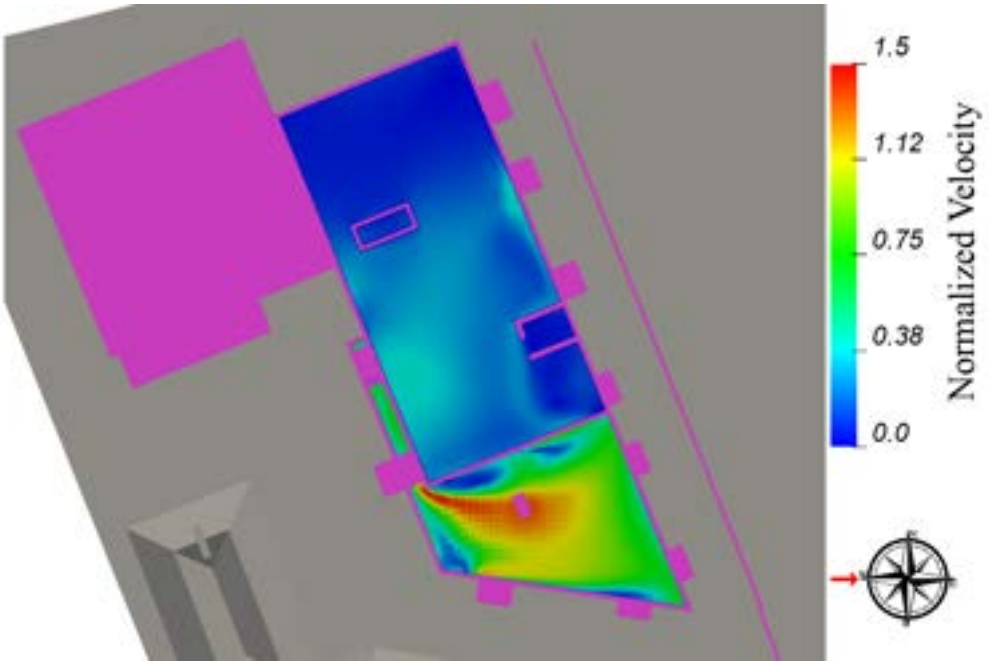



Figure 8.20: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 270°

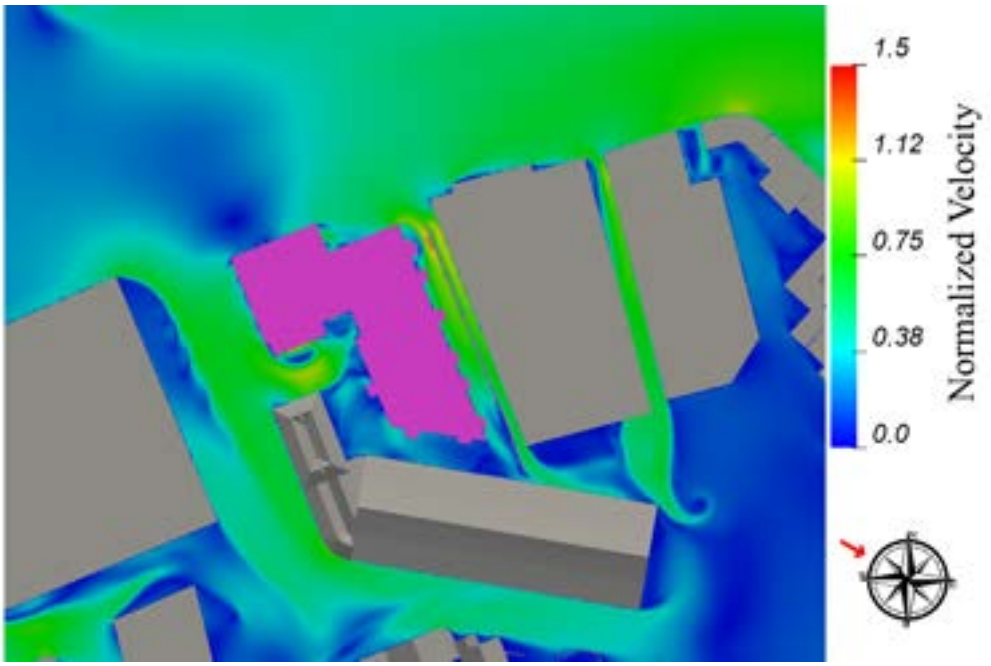



Figure 8.21: Flow Velocity Results at 1.5m above the ground - Wind Direction: 300°

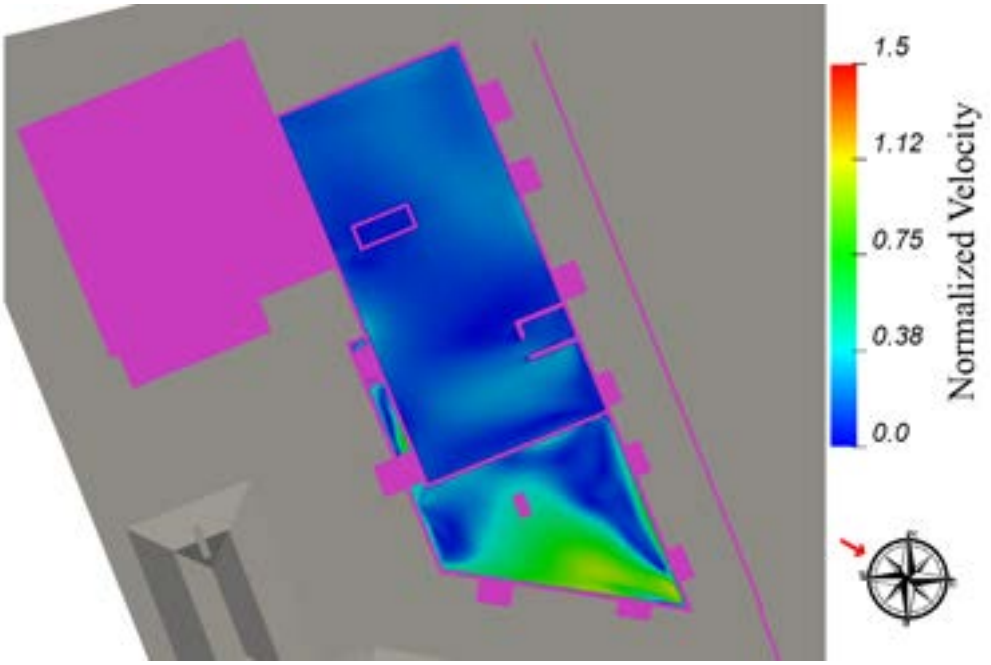



Figure 8.22: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 300°

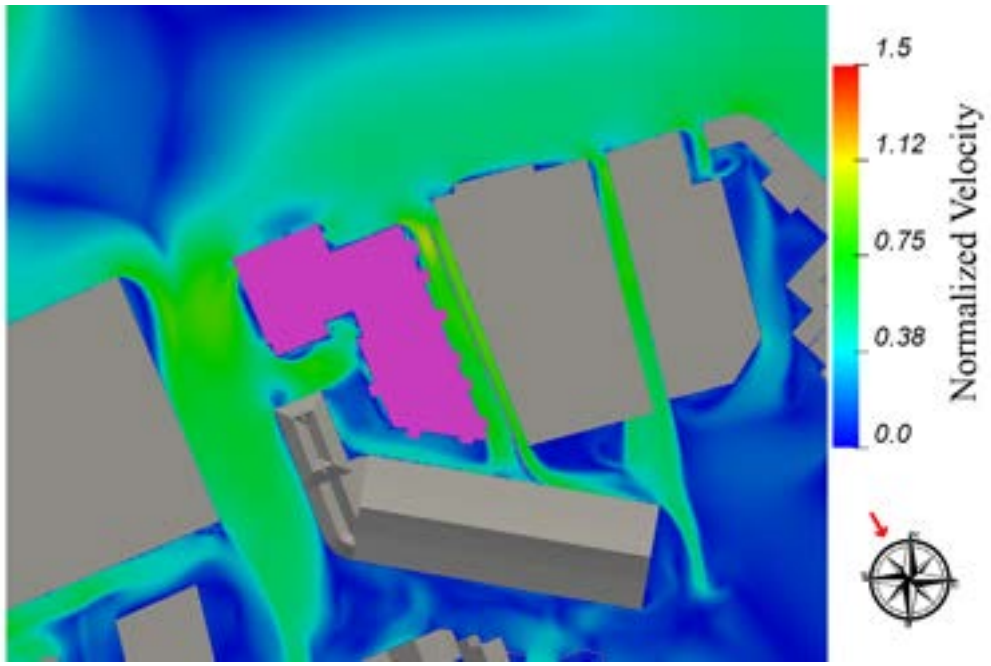



Figure 8.23: Flow Velocity Results at 1.5m above the ground - Wind Direction: 330°

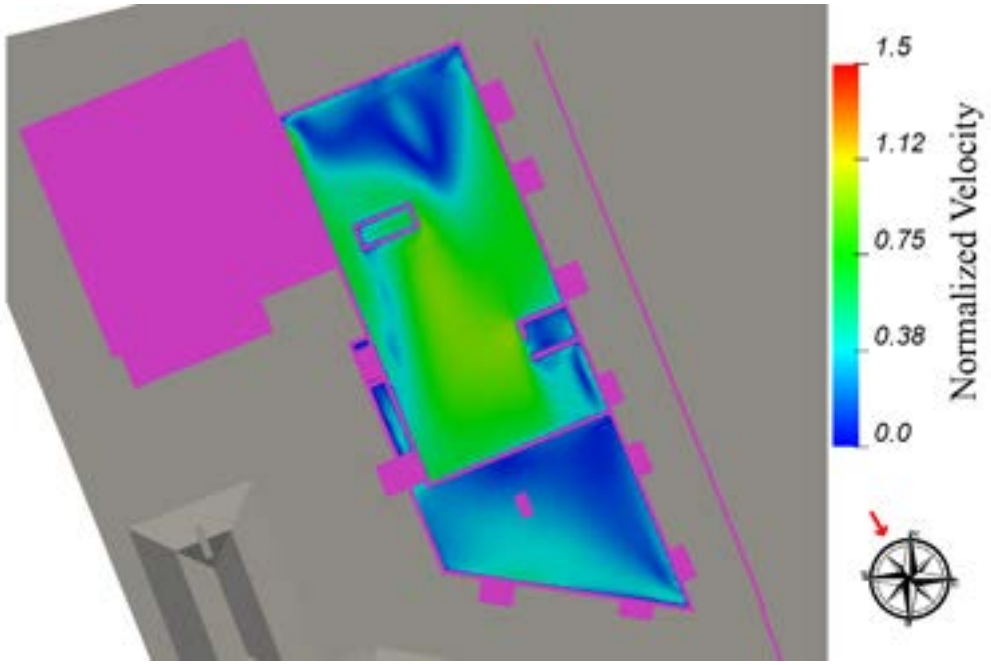



Figure 8.24: Flow Velocity Results at 1.5m above the roof terraces - Wind Direction: 330°

### 8.2.2 DOWNWASH EFFECT ANALYSIS

Results of wind speeds and their circulations around The Railyard along its height are presented in Figures 8.25 to 8.28 for four selected wind directions (60°, 180°, 270° and 330°) in order to assess influence of downwash effect.

As mentioned before the downwash effects can happen when the air stream strikes a tall building and a part of it is deflected towards the ground. This downward component is called downwash effect and its intensity depends on the pressure difference driving the wind. The higher the building, the higher this pressure difference can be.

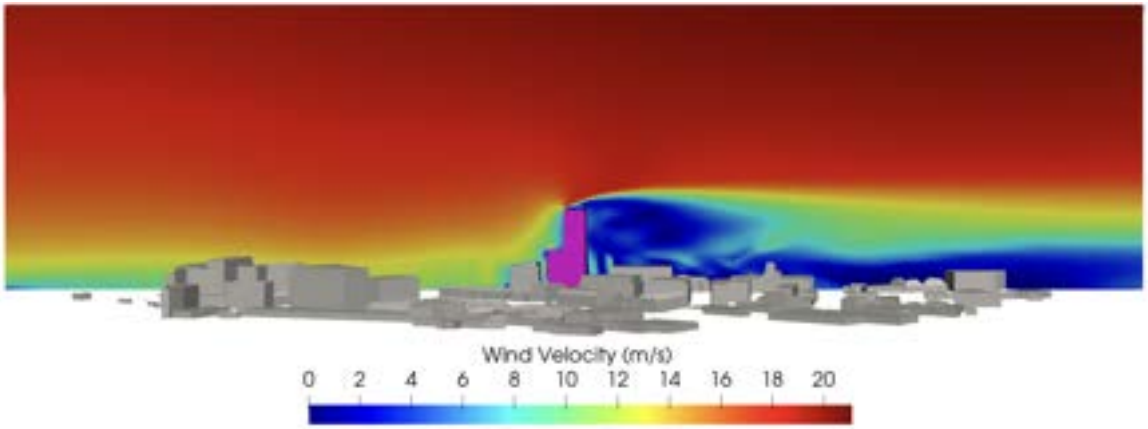



Figure 8.25: Vertical Slice of Flow Velocity Results - Wind Direction: 60°

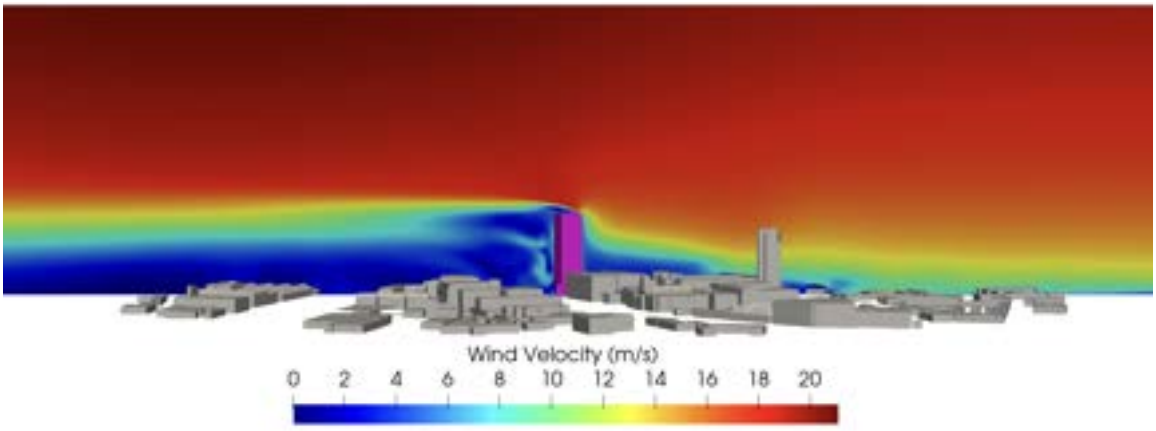



Figure 8.26: Vertical Slice of Flow Velocity Results - Wind Direction: 180°

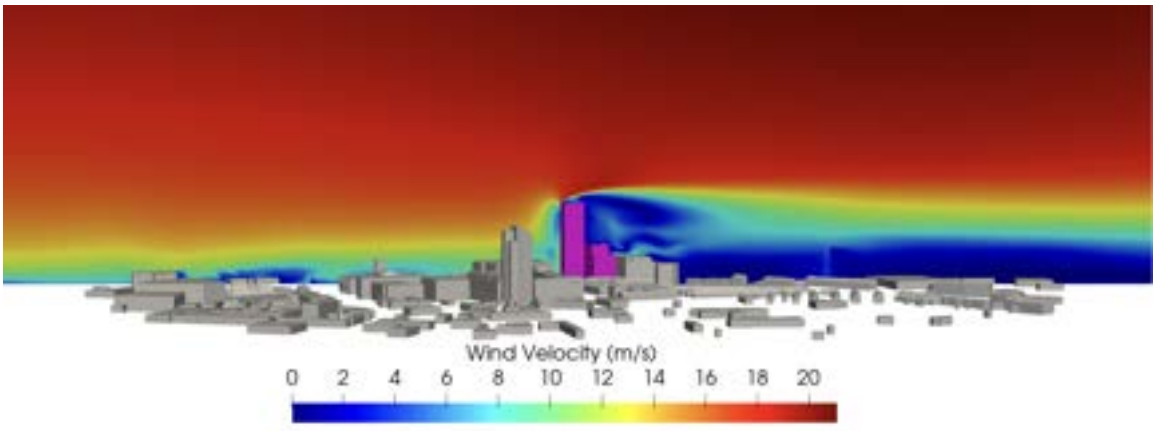



Figure 8.27: Vertical Slice of Flow Velocity Results - Wind Direction: 270°

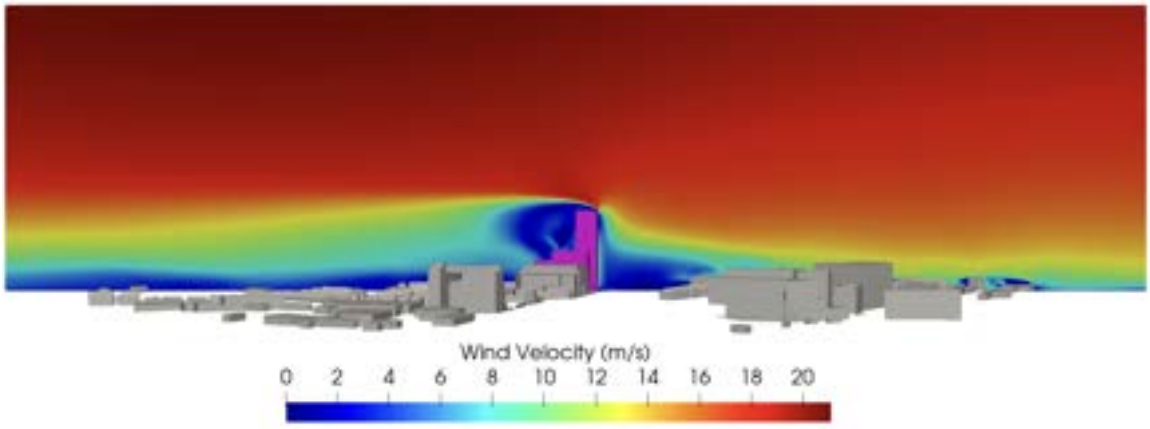



Figure 8.28: Vertical Slice of Flow Velocity Results - Wind Direction: 330°

Analyzing figures above it can be observed that there are no significant downward velocity in the wake of development. Figures 8.29 to 8.32 further prove this point by showing close up view of the wind circulation streamlines around the tower.

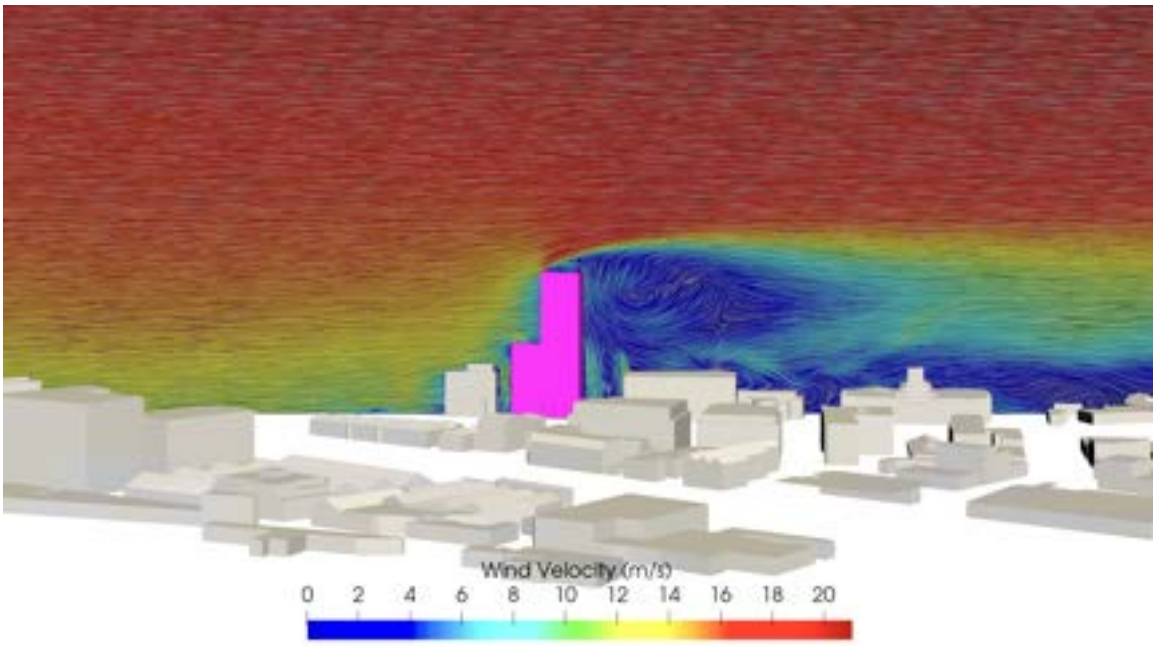



Figure 8.29: Vertical Slice of Flow Velocity Results - close up view - Wind Direction: 60°

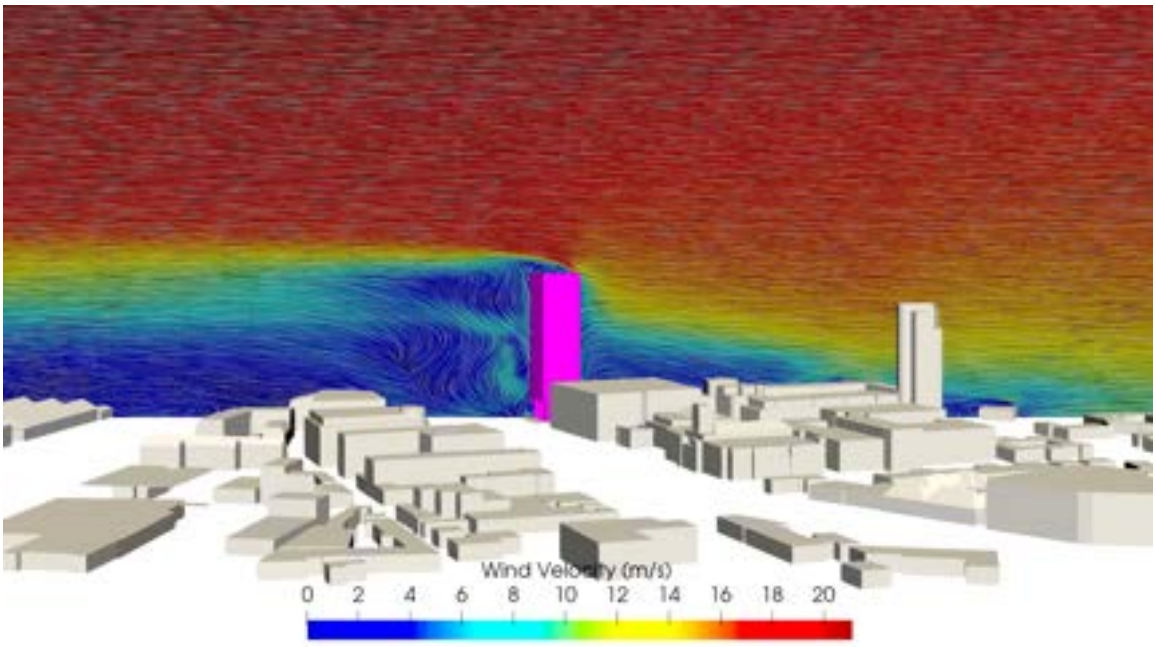



Figure 8.30: Vertical Slice of Flow Velocity Results - close up view - Wind Direction: 180°

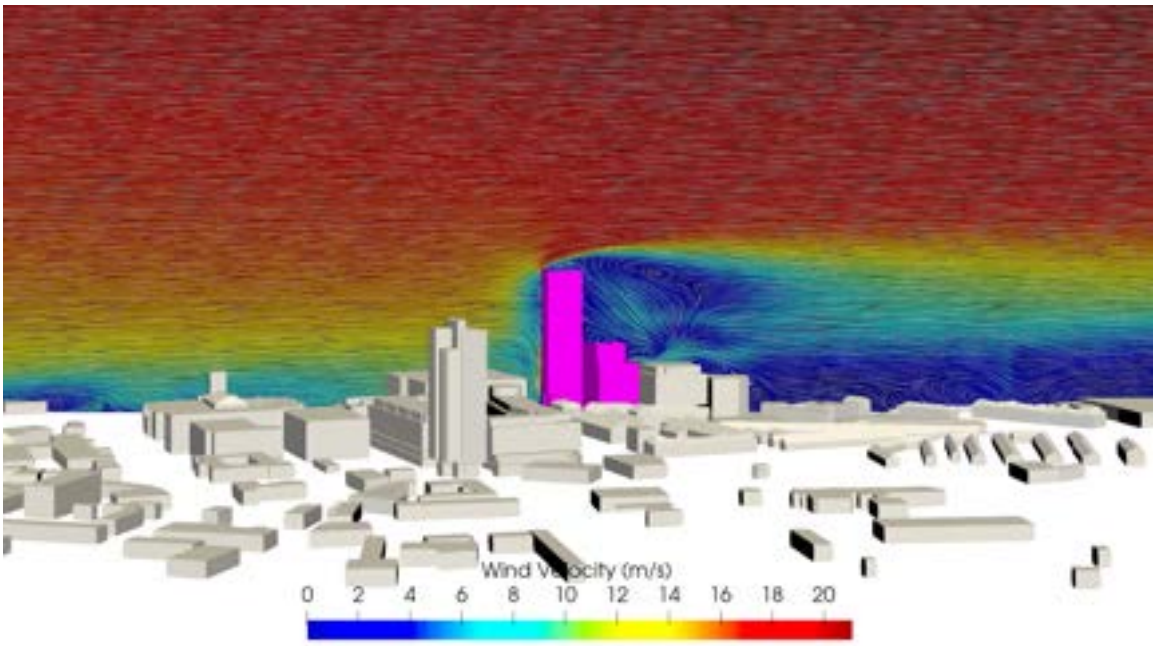



Figure 8.31: Vertical Slice of Flow Velocity Results - close up view - Wind Direction: 270°

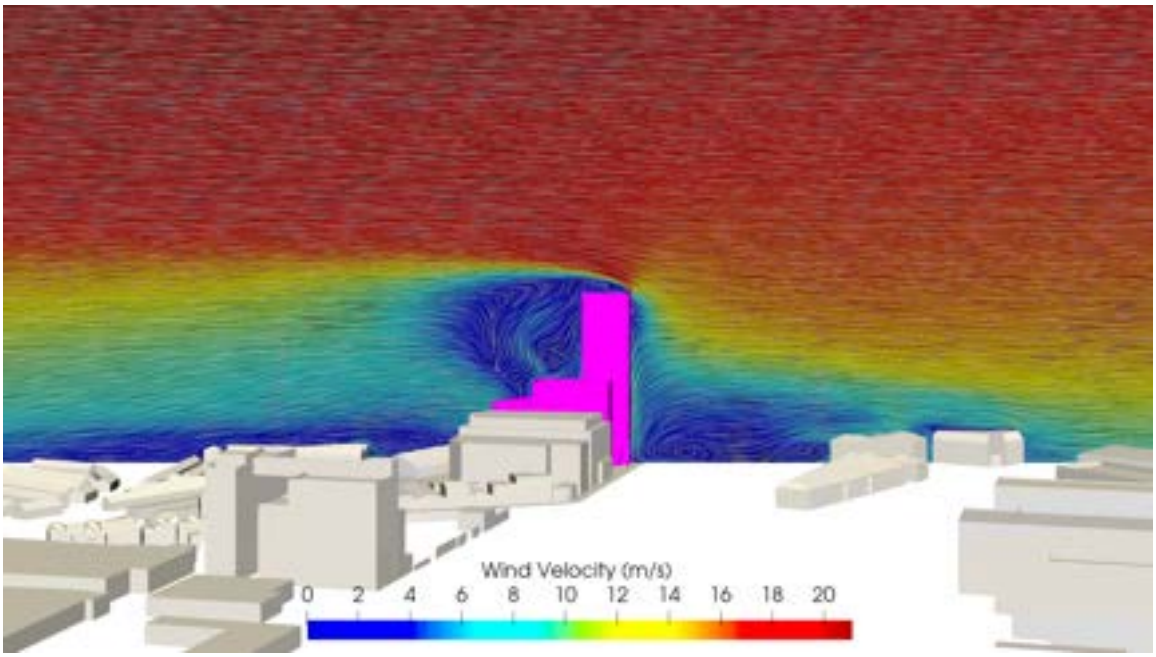



Figure 8.32: Vertical Slice of Flow Velocity Results - close up view - Wind Direction: 330°

### 8.2.3 PROPOSED DEVELOPMENT WIND MICROCLIMATE - Lawson Criteria

The wind flow results obtained simulating the different direction and wind speeds, are combined with wind frequencies of occurrence to obtain comfort ratings at pedestrian level in all areas included within the model. The comparison of comfort ratings with intended pedestrian activities is shown in the Lawson Comfort and Distress Map that follows.

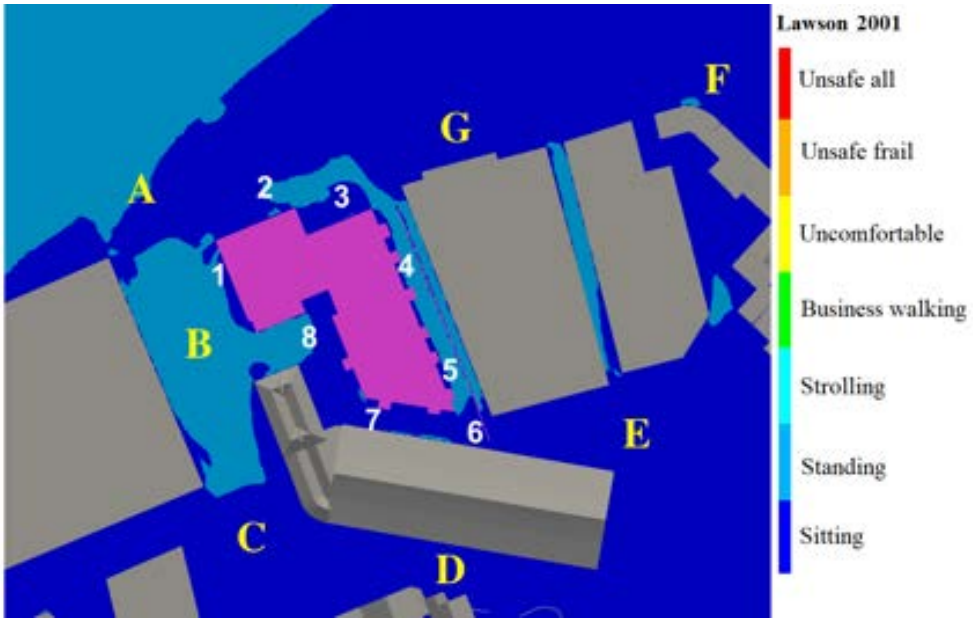



Figure 8.33: Ground Floor - Lawson Discomfort Map - Top View

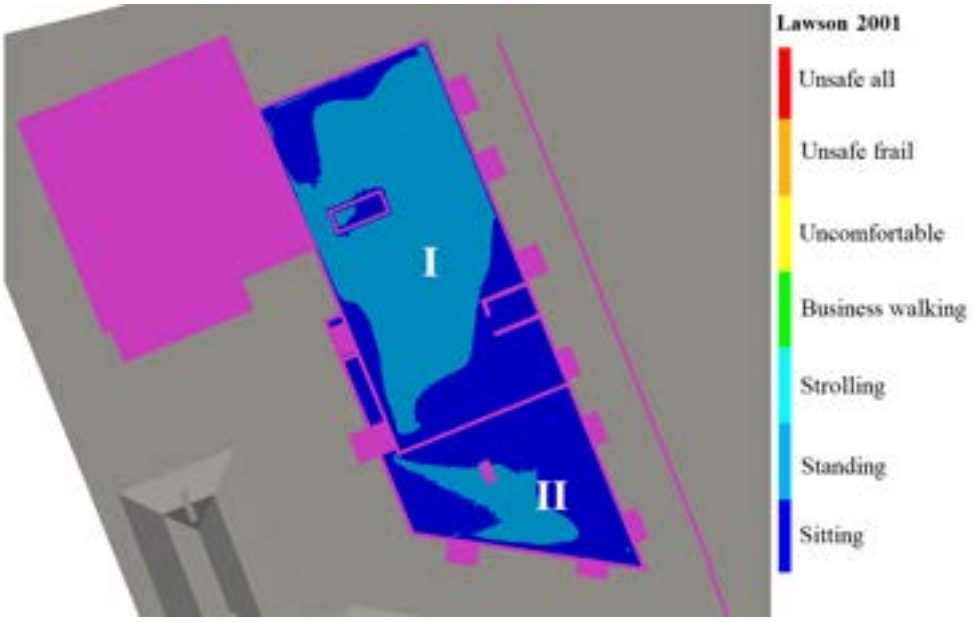



Figure 8.34: Roof Terraces - Lawson Discomfort Map

### 8.2.4 BALCONIES

The comparison of comfort ratings with the intended pedestrian activities is depicted in the Lawson Comfort and Distress Map on the 1.5m balcony floor, as illustrated in Figures 8.35 and 8.36. It is evident that all the balconies are deemed safe for occupants, with no distress areas identified.

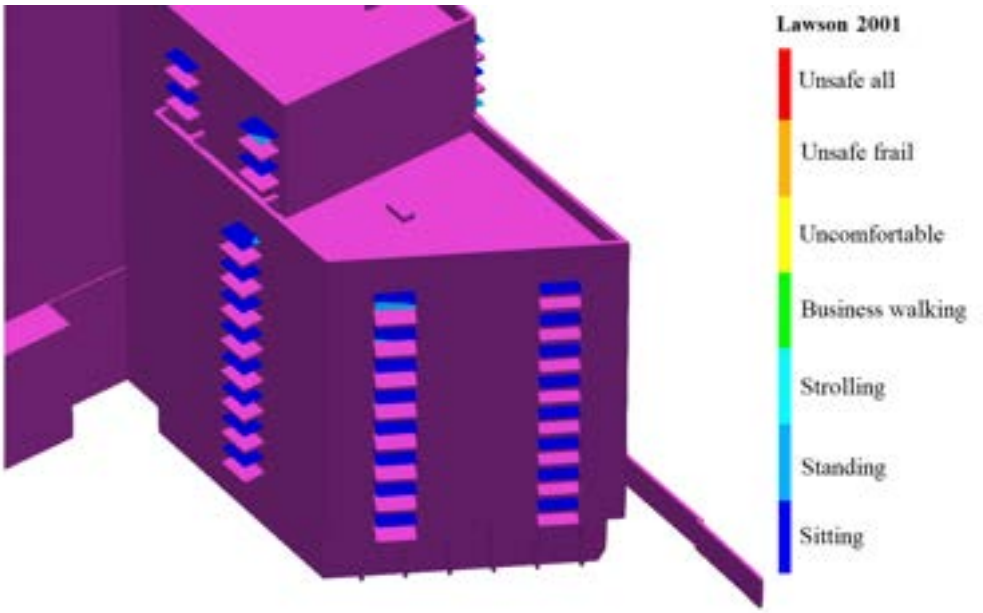



Figure 8.35: Balconies - Lawson Discomfort Map - South West View

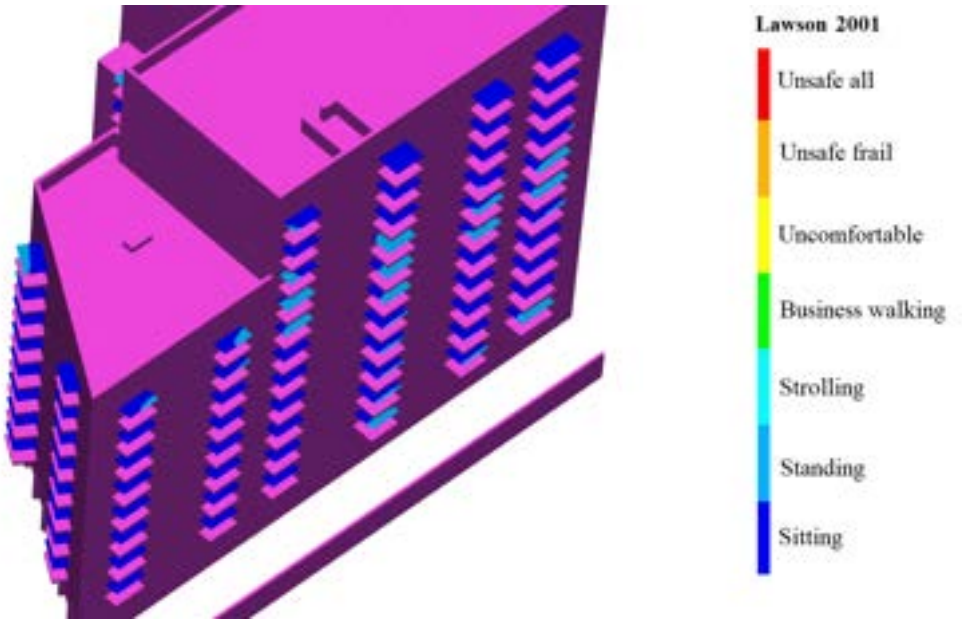



Figure 8.36: Balconies - Lawson Discomfort Map - South East View

### 8.2.5 PLANNED MITIGATION

As mentioned in the previous section, there are several wind effects that can occur at the development site, such as downwash, downdraft, and funneling. These phenomena can cause accelerated wind speeds at pedestrian level, leading to potential pedestrian discomfort. In order to address these issues, several mitigation options were evaluated. The chosen options were implemented with the aim of reducing the impact of these wind effects and enhancing pedestrian comfort around the development.

To address these wind impacts, architectural and structural modifications were implemented in the form of balconies on the East, West, and South sides of the development, with a particular focus on corners and higher elevations away from pedestrian zones. These adjustments can alter the path of the wind before it reaches ground level. To further improve pedestrian comfort at ground amenities of the development, existing trees along the walkway on the western side have been preserved, trees and other plants such as pollinator shrubs, grasses and herbaceous perennials have been introduced within ground amenities of the development. Additionally, to improve the pedestrian comfort level at the terraces of the development, terrace gardens are implemented which contain various of plants. These measures collectively contribute to mitigating wind impacts at ground floor and roof terraces of the development as shown in Figures 8.38 to 8.37.

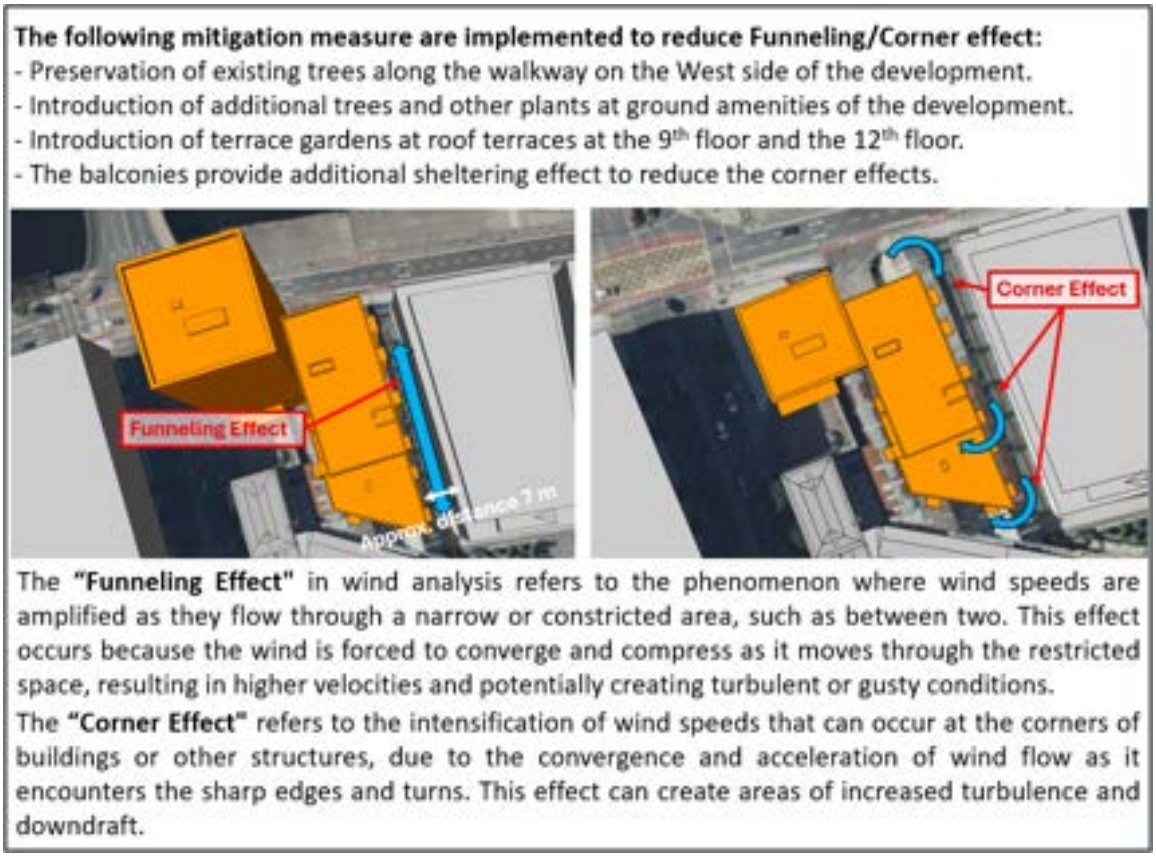



Figure 8.37: Mitigation Measures for Funneling and Corner Effects

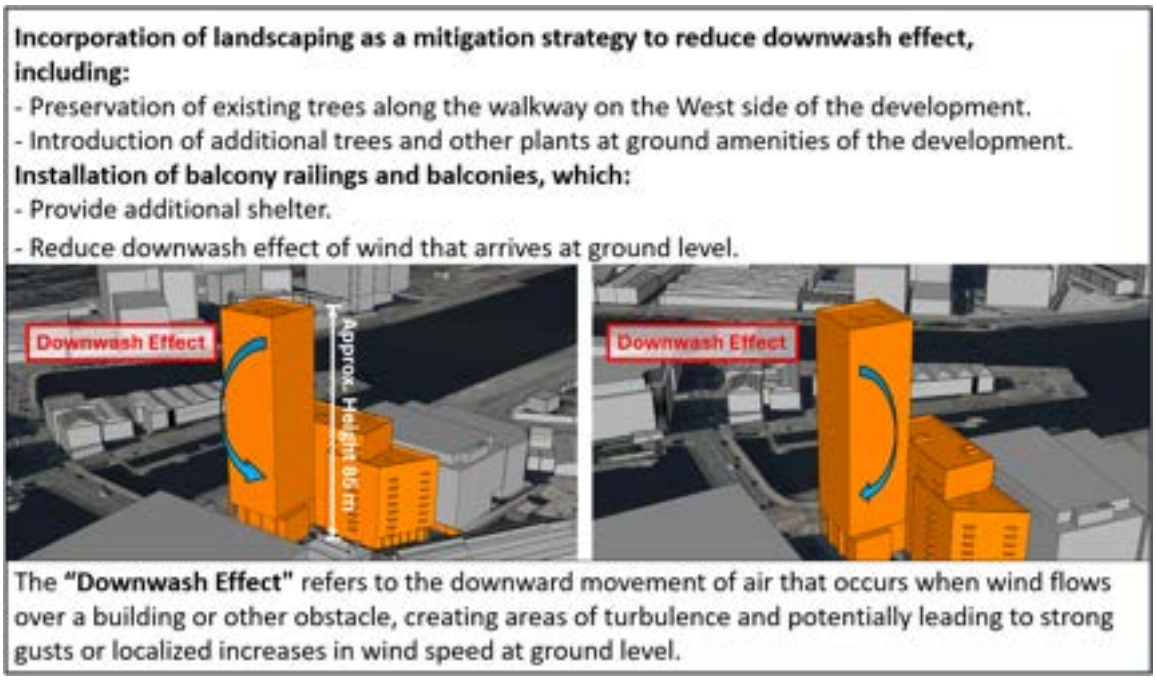



Figure 8.38: Mitigation Measures for Downwash Effect

According to the Lawson Map, the receptor area around the development is safe for pedestrians and provides suitable comfort levels for activities such as sitting and standing. It is important to note that the Lawson Map was calculated based on worst-case scenarios without considering trees planting. The addition of trees and plants can help mitigate wind impact and enhance pedestrian comfort levels. As shown in Figure 8.39, the following mitigation measures are implemented to improve pedestrian comfort around the development:

- *Preserving the existing trees along the walkway on the west side of the development:* The presence of these existing trees along the walkway enhances the comfort for pedestrians.

- *Introducing additional trees and other plants on ground amenities of the development:* These additional plants will help reduce wind speed, increasing comfort levels in all ground amenities of the development.

- *Introducing terrace gardens on terraces at the 9th and the 12th floors:* The introduction of terrace gardens will further improve the wind comfort level on the terraces and also help reduce corner effects.

- The balcony railings are acting as wind deflectors, helping to reduce the impact of wind. This shows that the balconies are designed with considerations for prevailing wind directions.

- The balconies also function as windbreaks, providing additional shelter to pedestrians by blocking or reducing the downwash or corner effects of wind that arrives at ground level.


Figure 8.39: Mitigation plans on ground level and rooftop terraces

It is worth noting that no further mitigation measures are required as all amenities area already comfortable for the intended use such as sitting/standing comfort level as it can be seen in Figures 8.40 and 8.41.

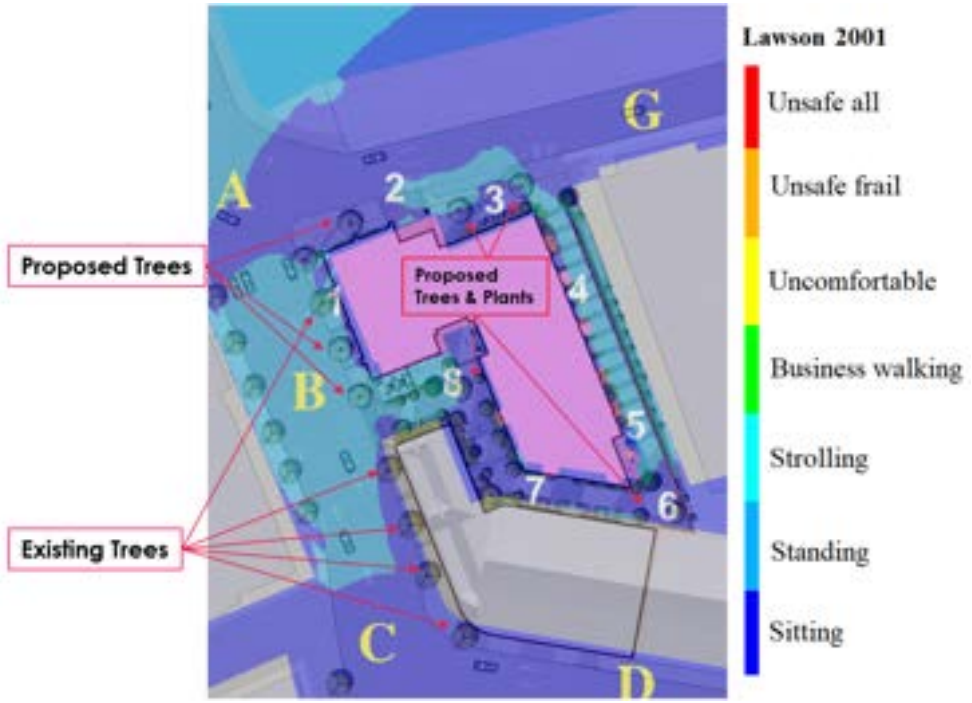



Figure 8.40: Lawson Discomfort Map and Mitigation at Ground Level of the Development

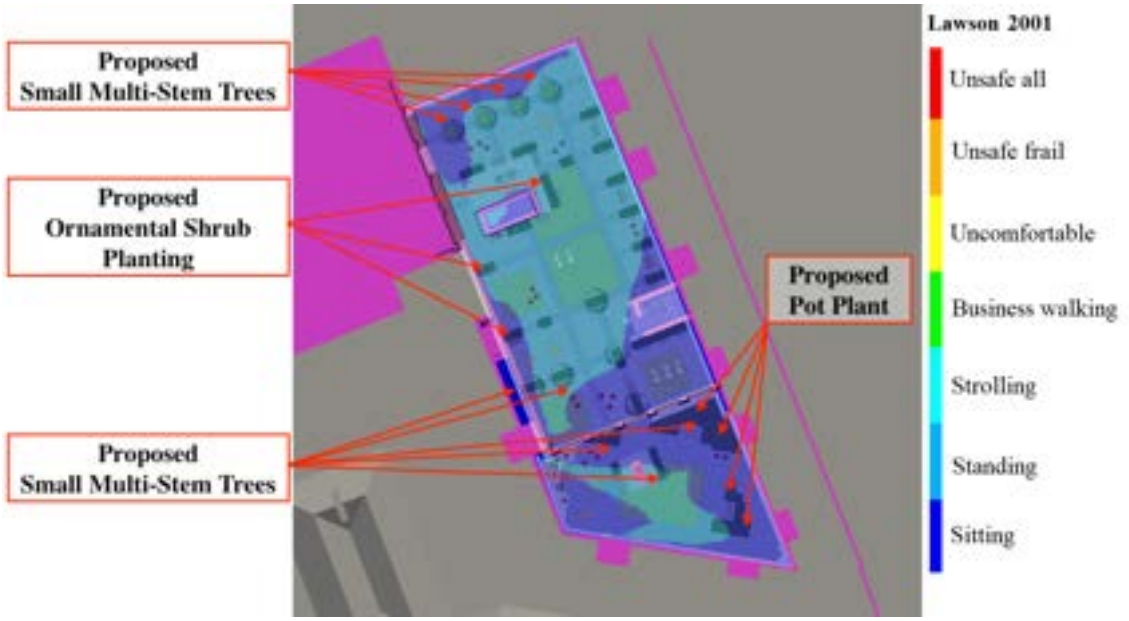



Figure 8.41: Lawson Discomfort Map and Mitigation at Terraces of the Development

In summary, the following conclusions can be made observing the results of the wind microclimate analysis and comparing the results obtained, under the same wind conditions for the baseline scenario versus the proposed development scenario:

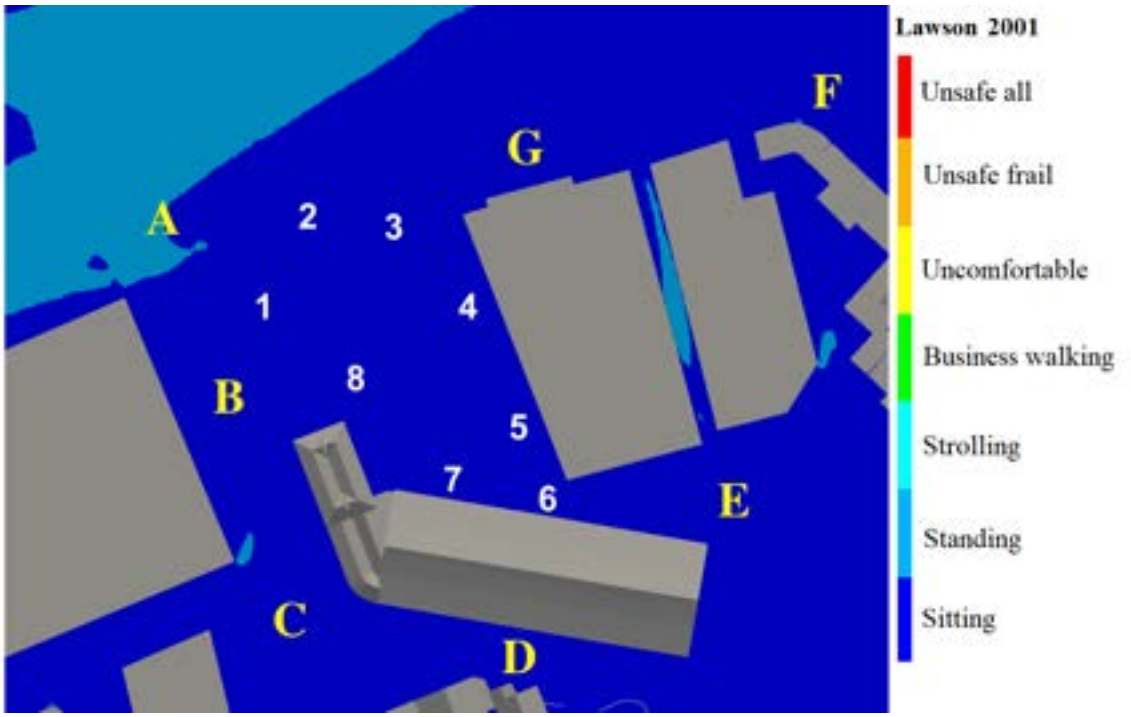
- The assessment of the proposed scenario has shown that no area is unsafe, and no conditions of distress are created by the proposed development.

- All the roads proposed can be used for their intended scope.

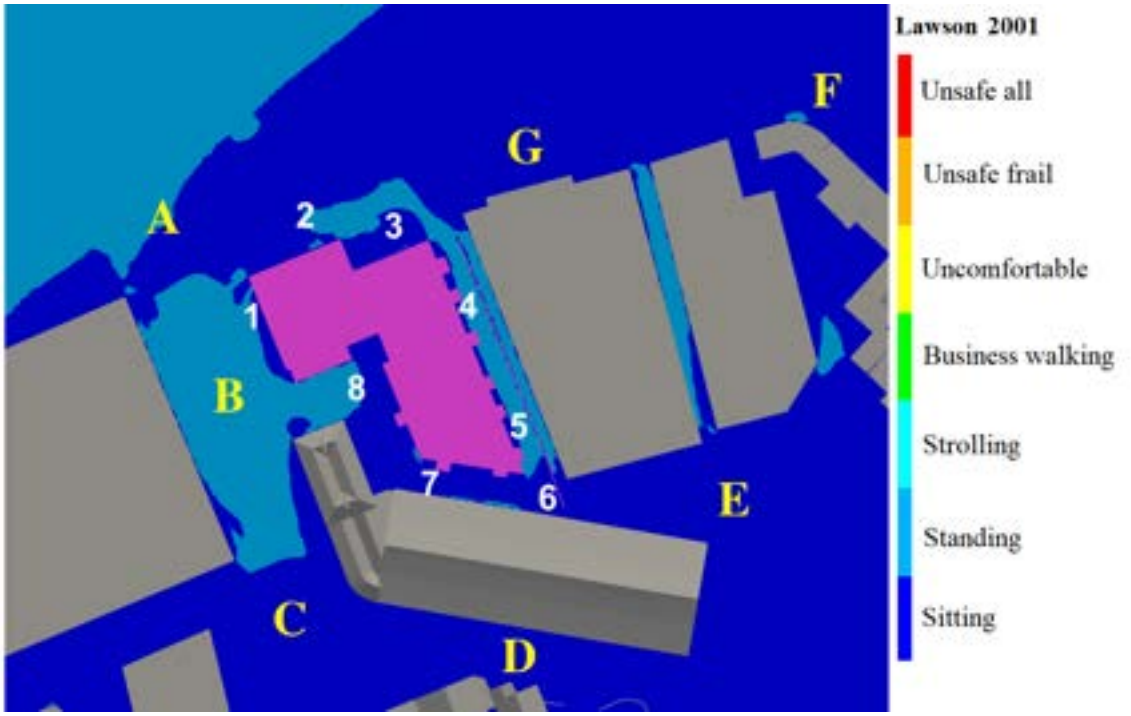
- Both terraces (Terraces I and II) are suitable for sitting/standing. It is important to note that fluctuations in velocity on rooftop terraces may lead to door slamming issues. Therefore, it is recommended to consider such conditions in terrace design. Possible means of reducing the risk of door slamming include installing door actuators, using automatic or sliding doors, etc.

- The wind microclimate of the proposed development is comfortable and usable for pedestrians.

As a result of the proposed development construction, the wind on the surrounding urban context maintains the suitability of the surrounding urban environment for its intended purpose.




Baseline Scenario




Proposed Development Scenario

Figure 8.42: Comparison Wind Microclimate Conditions (Lawson Comfort/Distress Map)

Table 8.1 presents the pedestrian comfort levels for various on-site and off-site locations. As shown in the table, none of the areas are deemed unsafe, and all on-site receptors around the development are suitable for at least standing comfort level.

Table 8.1: Pedestrian Comfort Levels versus Proposed pedestrian activities

| Reference point | Description | Sitting | Standing | Strolling | Business walking | | Distress and Safety |
|---|---|---|---|---|---|---|---|
| 1. | Pedestrian Footpath | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| 2. | Cycle and Pedestrian Connection. | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| 3. | Cycle and Pedestrian Connection. | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| 4. | Cycle and Pedestrian Connection. | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| 5. | Creche Outdoor Space | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| 6. | Garden | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| 7. | Pedetrian Footpath | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| 8. | West Entrance | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| I | Terrace at 12th Floor | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| II | Terrace at 9th Floor | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| A. | Custom House Street | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| B. | Albert Street | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| C. | Crossing of Albert Street and Albert Road | Tolerable | Acceptable | Acceptable | Acceptable | | Safe. |
| D. | Albert Road | Acceptable | Acceptable | Acceptable | Acceptable | | Safe. |
| E. | Parking Lot | Acceptable | Acceptable | Acceptable | Acceptable | | Safe. |
| F. | Victoria Road | Acceptable | Acceptable | Acceptable | Acceptable | | Safe. |
| G. | Albert Quay East | Acceptable | Acceptable | Acceptable | Acceptable | | Safe. |

Tables 8.2 and 8.3 show the intended baseline and proposed wind conditions on-site as well as some potential off-site receptors around the development. Locations of the ground amenity, the courtyards areas listed in these Tables are indicated in Figure 8.43

Table 8.2: Significance Impact of the Proposed Development Versus Baseline Conditions for Comfort - On Site Receptors

| On-Site Potential Receptors | Baseline Conditions | Proposed Development Conditions | Impact Significance |
|---|---|---|---|
| 1. Pedestrian Footpath | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| 2. Cycle and Pedestrian Connection. | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| 3. Cycle and Pedestrian Connection. | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| 4. Cycle and Pedestrian Connection. | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| 5. Creche Outdoor Space | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| 6. Garden | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| 7. Pedetrian Footpath | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| 8. West Entrance | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| Terrace I (12th floor) | - | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| Terrace II (9th floor) | - | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |

Table 8.3: Significance Impact of the Proposed Development Versus Baseline Conditions for Comfort - Off Site Receptros

| Off-Site Potential Receptors | Baseline Conditions | Proposed Development Conditions | Impact Significance |
|---|---|---|---|
| A. Custom House Street | Suitable for Sitting/Standing. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| B. Albert Street | Suitable for Sitting. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| C. Crossing of Albert Street and Albert Road | Suitable for Sitting/Standing. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| D. Albert Road | Suitable for Sitting. | Suitable for Sitting. (Safe/No distress) | Negligible |
| E. Parking Lot | Suitable for Sitting. | Suitable for Sitting. (Safe/No distress) | Negligible |
| F. Victoria Road | Suitable for Sitting/Standing. | Suitable for Sitting/Standing. (Safe/No distress) | Negligible |
| G. Albert Quay East | Suitable for Sitting. | Suitable for Sitting. (Safe/No distress) | Negligible |


Figure 8.43: Locations of the Receptors on the Ground and Terraces

As shown in Tables 8.2 and 8.3, there are no distress area for pedestrians including frail users and cyclists. Furthermore, the site and surrounding urban areas are safe for all users.

# 9. CONCLUSIONS

## CONCLUSIONS and COMMENTS ON MICROCLIMATE STUDY

This report presents the CFD modelling assumptions and results of Wind and Microclimate Modelling of The Railyard, Albert Street, Ballintemple, Cork.

This study has been carried out to identify the possible wind patterns around the area proposed, under mean and peak wind conditions typically occurring in Cork, and also to assess impacts of the wind on pedestrian levels of comfort/distress.

The results of this wind microclimate study are utilized by Progressive Commercial Construction Ltd to configure the optimal layout for The Railyard for the aim of achieving a high-quality environment for the scope of use intended of each areas/building (i.e. comfortable and pleasant for potential pedestrian) and not to introduce any critical wind impact on the surrounding areas and on the existing buildings.

- The wind profile was built using the annual average of meteorology data collected at Cork Airport Weather Station purchased from Meteoblue. The local wind speed was determined from CFD simulations with combination of the parameters inside Weibull probability distribution function, which obtained form historical meteorological data recorded 10m above ground level at Cork Airport.
- A 12-discrete set of wind direction is used in order to evaluate the probability of exceedance at any given threshold velocity. It is found that the prevailing wind direction in the south-west has the largest contribution of the discomfort exceedance probability.
- Microclimate Assessment of The Railyard and its surrounding environment was performed utilizing a CFD (Computational Fluid Dynamics) methodology.
- The evaluation of the proposed scenario indicates that the planned development aligns with the Lawson Comfort Criteria, confirming that no areas are unsafe and the proposed development does not create conditions of distress. All the ground amenities outlined in the report can be utilized according to their intended scope.
- The analysis of wind speed results and Lawson map at a height of 1.5 meters above the terrace reveals that both terraces (Terraces I and II) are suitable for sitting/standing. It is important to note that fluctuations in velocity on rooftop terraces may lead to door slamming issues. Therefore, it is recommended to consider such conditions in terrace design. Possible means of reducing the risk of door slamming include installing door actuators, using automatic or sliding doors, etc.
- The Lawson Comfort and Distress Map on the 1.5m above balconies indicates that all balconies are safe for occupants with no identified distress areas.
- The following mitigation measures will be implemented to further improve pedestrian comfort around the development:
    - *Preserving the existing trees along the walkway on the west side of the development:* The presence of these existing trees along the walkway enhances the comfort for pedestrians.
    - *Introducing additional trees and other plants on ground amenities of the develop-*

*ment:*
These additional plants will help reduce wind speed, increasing comfort levels in all ground amenities of the development.

- *Introducing terrace gardens on terraces at the 9th and the 12th floors:*
The introduction of terrace gardens will further improve the wind comfort level on the terraces and also help reduce corner effects.
- The balcony railings are acting as wind deflectors, helping to reduce the impact of wind. This shows that the balconies are designed with considerations for prevailing wind directions.
- The balconies also function as windbreaks, providing additional shelter to pedestrians by blocking or reducing the downwash or corner effects of wind that arrives at ground level.

- As a result of the proposed development construction, the wind on the surrounding urban context remains suitable for the intended use when compared with the baseline situation.
- The proposed development does not impact or give rise to negative or critical wind speed profiles at the nearby adjacent roads, or nearby buildings. Moreover, in terms of distress, no critical conditions were found for “Frail persons or cyclists” and for members of the ”General Public” in the surrounding of the development.

Therefore, the CFD study carried out has shown that under the assumed wind conditions typically occurring within Cork for the past 15 years:

- **The development is designed to be a high-quality environment for the scope of use intended of each areas/building (i.e. comfortable and pleasant for potential pedestrian).**
- **The development does not introduce any critical impact on the surrounding buildings, or nearby adjacent roads.**

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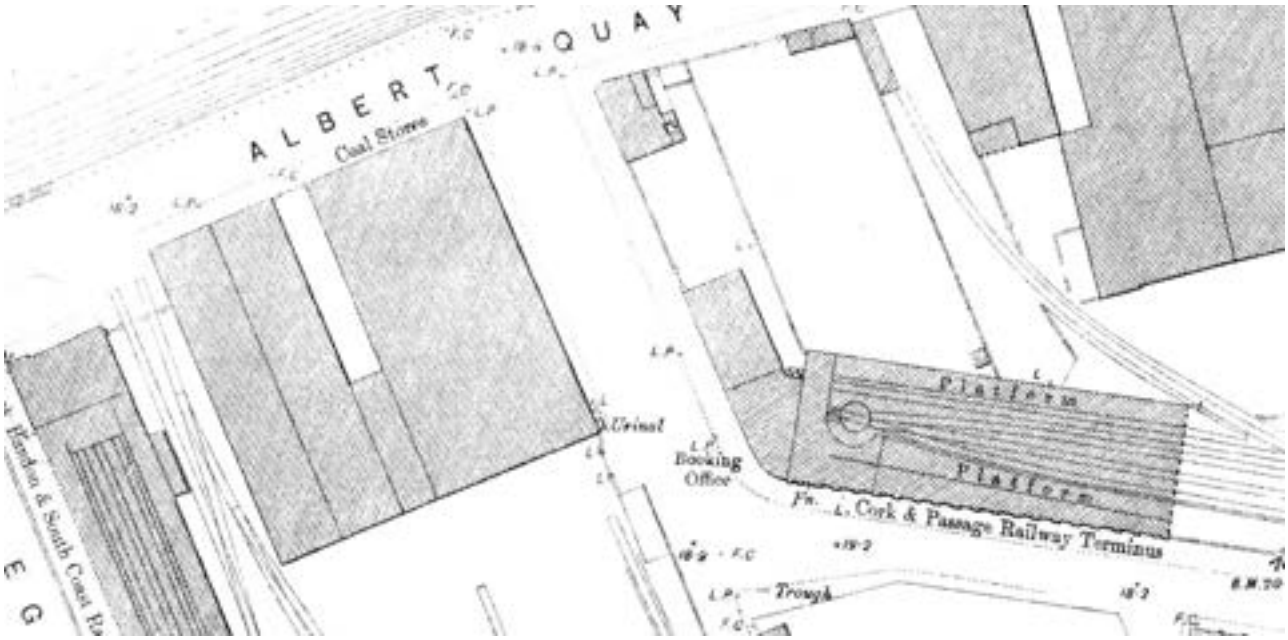
APPENDIX 3 – JCA ARCHITECTURAL HERITAGE STATEMENT

JCA Architects

**With Fred Hamond, Industrial Archaeologist**




# THE RAILYARD, ALBERT QUAY, CORK

# ARCHITECTURAL HERITAGE STATEMENT

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06 August 2024

RIAI Registered Architect 2024 Conservation Architect G1

| | | | |
|---|---|---|---|
| Project Name: | The Railyard | Project No: | 24054 |
| Document Title: | Architectural Heritage Statement | Revision: | 3.0 |

| Revision | Date | | Prepared | Checked | Approved |
|---|---|---|---|---|---|
| 1.0 | 31/05/2024 | | KMc/GOC | KMC | GOC |
| 2.0 | 05/08/2024 | | KMc/GOC | KMc | GOC |
| 3.0 | 06/08/2024 | | KMc/GOC | KMc | GOC |
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| | | | | | |

Contents

# 1.0 Introduction

This report provides background architectural heritage information to accompany The Railyard Apartments proposed development comprising the construction of 217 no. apartments comprising 25 no. studio units; 92 no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units apartments in a building that ranges in height from 8 to 11 to 24 storeys over ground floor at the former Carey Tool Hire site, currently principally occupied by Park Facilities Management Ltd, Albert Quay, Cork City.

The development site, measuring approximately 0.2744 hectares, is bounded by Albert Quay East to the north, Albert Street to the west, the former Blackrock and Passage Railway Terminus – Ticket Office, a Protected Structure, Ref. No. PS 1138, and which is also a Recorded Monument, CO074-119002, the two-storey former Cork, Blackrock and Passage Railway Offices, Protected Structure, Ref. No. PS 1137, and the Albert Road Post Box, which is also a Protected Structure Ref. No. PS942 and Albert Road to the south, and Navigation Square to the east. The site is accessed by Albert Quay East and Albert Street.

The development area adjoins the former Cork, Blackrock & Passage Railway Terminus and Offices, which date from the 1870s. The line closed in 1932. Although now defunct, the two station buildings survive. Given the site's wholly industrial nature since its inception, the terms 'architectural heritage' and 'industrial heritage' are synonymous for the purposes of this report.

The following report has been prepared by JCA Architects, RIAI Conservation Grade 1 Architects'. It was written by Katherine McClatchie BA, MUBC, and Gareth O'Callaghan, BArch, MRIAI, RIAI Grade 1 Conservation Architect, both of JCA Architects, with input by Dr. Fred Hamond, Industrial Archaeologist.


*Figure 1: Architectural Heritage Map of site & surrounding area*

## 1.1 Scope of Assessment

The following study provides information on the site context in relation to the adjoining existing historic buildings forming the former CBPR railway Terminus: The former Cork, Blackrock and Passage Railway Office (Carey House), Ref. No. PS 1137, which is also a Recorded Monument, CO074-119002, and the former Cork, Blackrock and Passage Railway Terminus and Ticket Office, Ref. No. PS 1138, and the Albert Road Post Box, which is of a rare and important type, and is a Protected Structure (Ref. No. PS942).

*Figure 2: View of site from north-west*

# 2.0 Methodology

Desktop Study

The historical aspects of the site's development were ascertained using a range of primary documentary sources such as original architects' drawings, Ordnance Survey maps, valuation books, photographs and newspapers, as well as publications on the architectural history of Ireland in general and Cork in particular. Contemporary newspaper articles dating to the time of the construction of the complex were sourced, providing detailed information on the construction, materials, design and individual use of the original buildings. These sources are fully itemised in the Bibliography section.

Field Survey

An initial full survey of the site was carried out by JCA and Fred Hammond in February 2019, with later surveys by JCA in 2020-2023. This entailed the examination, description and photographing of all buildings within the development site for three reasons: (1) to verify what was already known about its built heritage, (2) to update this information to take account of any physical alterations to the site's buildings, and (3) to fill in any gaps in our knowledge of the site, such as previously unrecorded features.

## 2.1 Legislation & Guidelines

The site proposed for development is located within the Albert Quay, Albert Road and Victoria Road Architectural Conservation Area in the Cork City Development Plan 2022-2028.

The Statement of Character for the Albert Quay, Albert Road and Victoria Road ACA notes:
*The area is located within the South Docks immediately to the east of the city centre. It contains extensive areas of both undeveloped lands and under-used low-rise buildings, mainly single storey, and is likely to be redeveloped during the life of the present Development Plan. It is part of an area identified in "Cork City Harbour – Unlocking Cork Docklands" and the City Centre Strategy as an appropriate location for large floor plate offices, which are of strategic importance for Cork. This strategic need will be taken into account in assessing development proposals. The aim should not be to retain all existing buildings and features but to encourage appropriate development of vacant land and under-used buildings by retaining the most significant elements of heritage interest as an integral part of the evolving character of the area.*

The site does not contain any Protected Structures or NIAH buildings. The site is bounded by three protected structures included in the 2022-2028 Development Plan for Cork City:

| | |
|---|---|
| PS 1137 | Two-storey former Cork, Blackrock and Passage Railway Offices |
| PS 1138 | Single-storey former Blackrock and Passage Railway Terminus – Ticket Office |
| PS 942 | Albert Road Post Box |

The former CBPR Railway Terminus is also a Recorded Monument, CO074-119002

The three Protected Structures are also included on the National Inventory of Architectural Heritage:

| | |
|---|---|
| 20508016 | Two-storey former Cork, Blackrock and Passage Railway Offices |
| 20508018 | Single-storey former Blackrock and Passage Railway Terminus – Ticket Office |
| 20508017 | Albert Road Post Box |

There are also a number of other Protected Structures and NIAH sites in the immediate vicinity.

The Protected Structures to the south and west of the present site are subject to a current permission for use as offices and a bar/restaurant, which the applicant is committed to implementing.

**Cork City Development Plan 2022-2028**

The following sections of the Cork City Development Plan 2022-2028 are relevant:

***Development in Architectural Conservation Areas***

*8.35*

*The designation of Architectural Conservation Areas is intended to encourage development in historic areas that promotes a high standard of design and detail, enhancing Cork City's existing historic morphology, varied architectural styles and use of materials, but which adds new qualities from our own time, making its own contribution to the city's evolving identity.*

*8.36*

*New development in Architectural Conservation Areas should have regard to existing patterns of development, the city's characteristic architectural forms and distinctive use of materials. However, it is expected that new development should generally reflect contemporary architectural practice, and not aim to mimic historic building styles.*

***Tall Building Locations***

*11.49*

*Cork City Council has identified the City Docks as the strategic area for tall buildings in Cork. Four zones appropriate for tall buildings have been outlined. These zones will be the focus for tall buildings in the City Docks which will provide landmarks for the area.*

*11.50*

*The four City Docks zones are as follows (west-to-east):*

| Tall Building Zone / City Docks Character Area | Description |
|---|---|
| Tip of the Island / Warehouse Quarter | This is an existing cluster of tall buildings comprising The Elysian and several planning commitments. |

# 3.0 Baseline Conditions

## Historical Context of the Protected Structures adjoining the Site

**Inception of line**

The Cork, Blackrock & Passage Railway Company was incorporated by Act of Parliament on 16 July 1846 for the purpose of constructing a 6½ mile long line between Cork and Passage West (fig.3 ). The latter town had deepwater berthing facilities and was the main transhipment point for cross-channel vessels to and from Cork. The journey took upwards of an hour by horse- drawn carriage, one-and-a-half hours by paddle steamer, and anything from four hours to five days by sail depending on the winds and tides. The creation of a reliable railway service would obviously speed up the transfer of passengers, livestock and goods, particularly if, as anticipated, Passage became a transatlantic port. A similar proposal some ten years previously had come to nothing as sufficient capital could not be raised. It is of note, therefore, that having started in the midst of the Great Famine, this new scheme actually succeeded. The Consulting Engineer was Sir John Macneill. He had already worked on railway projects for the Dublin & Drogheda Railway and Great Southern & Western Railway companies.

*Figure 3: Map of the Proposed Railway from the City of Cork to the Town of Passage (1836), with site indicated in blue*

Work began with the cutting of the first sod by the wife of Sir Thomas Deane at his Dundanion estate near Blackrock on 15 June 1847[1].1 Most of the line was built by Patrick Moore, a Dublin-based contractor, but the final stretch from Horsehead to Passage was the work of William Dargan, the 'Father of Irish railways'. Although only a single 5ft 3in gauge track was laid, the bridges, embankments etc were built wide enough to accommodate a second track if operations proved successful.

In May 1850, just under three years after the start of the project, the line was successfully tested. A transit of the entire route took under 20 minutes, less than one-third of the journey time by horse-drawn carriage[2]. Unfortunately, Queenstown (now Cobh), on the east side of Cork Harbour, had since become the transatlantic port, not Passage, so it was necessary to take an onward ferry across Cork Harbour.

The Cork terminus of the line was at Victoria Road, on land reclaimed on the South Channel of the River Lee. It has the distinction of being the first railway station in Cork[3]. Its architect was Joshua Hargrave, one of the CB&PR's directors since 1848, and it was built by Mr Moore, the line's contractor[4]. Services on the new line began on Saturday 8 June 1850[5].

[1] Illustrated London News, no.269, p.5 (26 June 1847).
[2] Cork Examiner, 15 May 1850, p.3 and 22 May 1850, p.4; Illustrated London News, no.428, p.12 (25 May 1850).
[3] 1869-70 OS 1:1056 map, Cork City sheets 74-47, -48, -56, -57 and -58.
[4] 1848 Post Office Railway Directory, p.288; Cork Examiner, 31 August 1849, p.2; The Builder, 15 June 1850, p.284; Cork Examiner, 17 June 1850, p.2. Hargrave subsequently designed the nearby terminus of the Cork & Bandon Railway (1851) and a carriage shed for the Great Southern & Western Railway at Penrose Quay (1856).
[5] Cork Examiner, 7 June 1850, p.2 and 10 June 1850

**Rerouting the line**

Before the line was even finished, it was mooted that it should be realigned at its Cork end to facilitate the construction of two wet docks at the west end of City Park, in the vicinity of Victoria Road[6]. John Benson, Consulting Engineer to the Cork Harbour Board, suggested that the terminus at Victoria Road could be retained if the track was rerouted to enter the building from the south rather than from the east as was then the case[7]. The docks were never built so the realignment proposal was shelved, only to resurface in the late 1860s[8].

Under the provisions of the 1868 Cork Improvement Act, the Corporation was empowered to upgrade the City's infrastructure, including its quays. The only stretch of the river not yet fully developed by that time was in the vicinity of the CB&PR's terminus and the Corporation now proposed to build a new wall along the riverbank to create additional wharfage behind it.

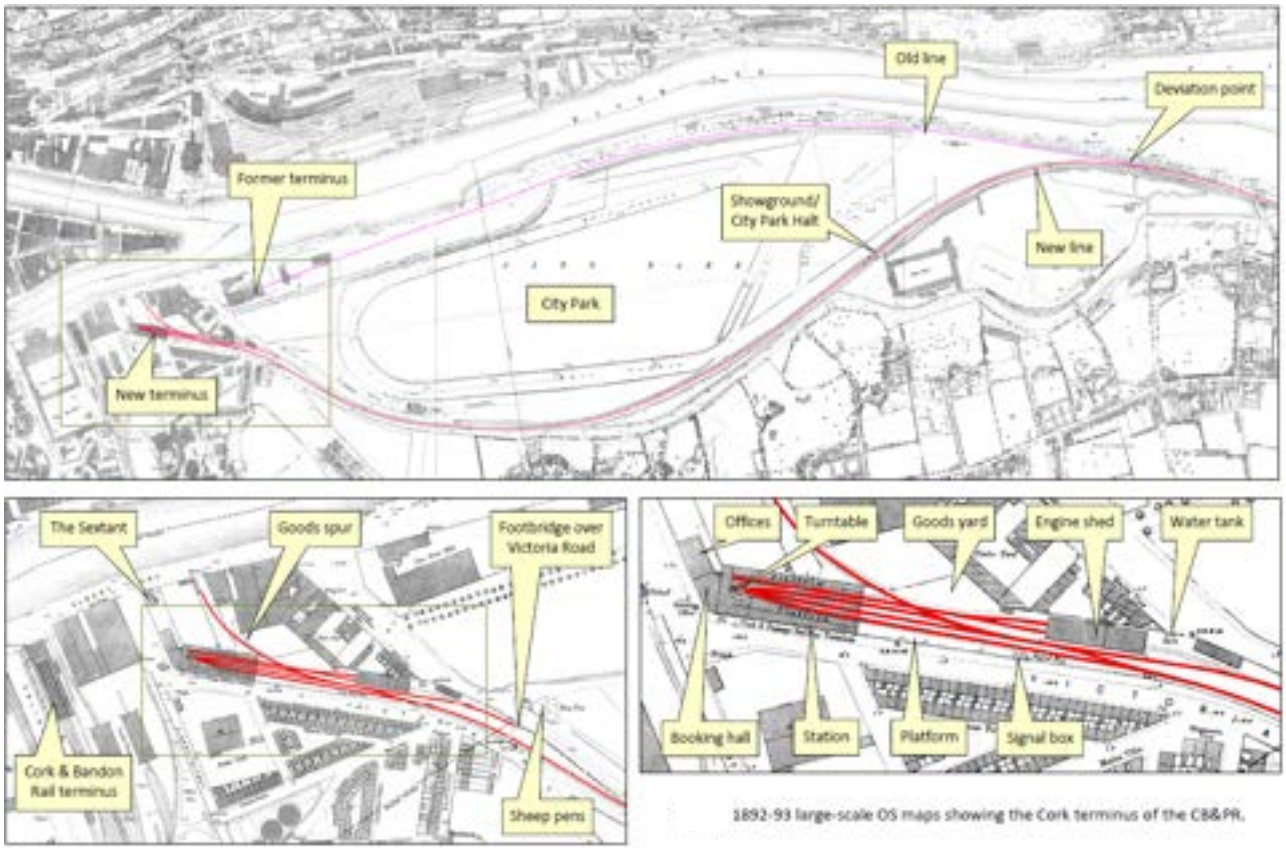



*Figure 4: OS maps indicating sites and station layouts of CBPR line and termini*

[6] Cork Examiner, 15 May 1850, p.4. For maps of the proposed docks and realignment of the track, see Cork City Archives, CP/OS/1845/74/Docks: Proposed improvements to Cork Docks, 1849-50

[7] As reported in the Cork Constitution, 24 Nov 1871, p.2. For further details of Benson, see Dictionary of Irish Architects 1720-1940, <www.dia.ie/architects>.

[8] Cork Examiner, 30 Nov 1869, p.3.

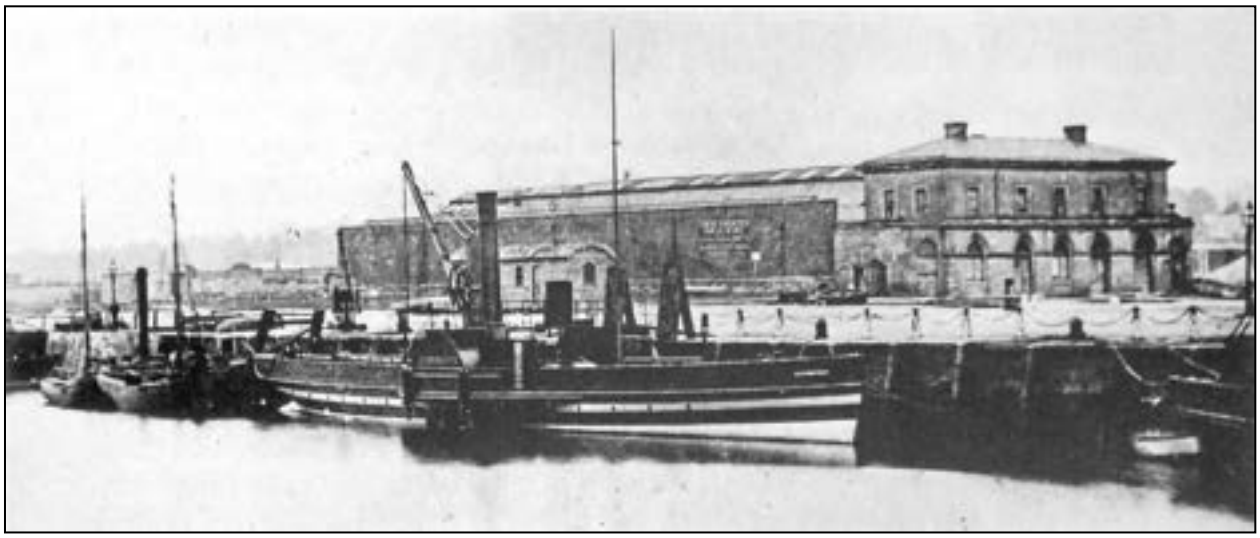


*Figure 5: A view of the Victoria Road terminus from Lapps Island, circa 1882 (Jenkins 1993).*

To fully unlock the development potential of the proposed new wharf, the Corporation deemed it necessary to shift the railway line southwards to avoid the new quay altogether, as had been previously mooted with the docks. However Benson's proposal to retain the existing terminus was not taken up and it was instead decided to build a new terminus a short distance to the west and further from the quays.

Because it was the Corporation which was driving this proposal, almost all the costs would be borne by the City's ratepayers rather than the CB&PR's shareholders[9]. These included the purchase of the land along the new route, laying a 2.25km long stretch of new track around the south side of the City Park (350m longer than the existing track), and erecting a new terminus and road alongside it (fig. 4)[10]. Although this proposal would cause some short-term inconvenience to the CB&PR, it was advantageous in the long-term as it brought the station c.200 metres closer to the city centre. As it was at least ten minutes at a brisk pace from the centre, the Company found it necessary to lay on a horse-drawn car service for its passengers from its offices at Cook Street (between St Patrick's St and South Mall). Moving the terminus closer would shave several minutes off the walking time and also obviate the need for a horse car. It would also be much closer to the Cork & Bandon Railway terminus, opened in 1851 at the corner of Albert Quay and Eglinton Street, and so facilitate passengers transferring between the lines[11].

**Albert Street terminus**

Work on the realignment began in 1872 and was carried out by Joshua Hargrave, this time in his capacity as a contractor rather than as an architect as he had been before[12]. Because the new track cut across the existing Victoria Road, it was necessary to reroute the road along the south side of the rail- way as far as Albert Street so that vehicles could continue to use it. This new street was initially also called Victoria Road

[9] Southern Reporter & Cork Commercial Courier, 8 Feb 1870, p.3.

[10] The base map is made up of 1892-93 OS 1:1056 maps, Cork City sheets 74-46, -47, -48, -56, -57 and -58.

[11] Southern Reporter & Cork Commercial Courier, 31 May 1870, p.2.

[12] A payment of £300 was made to Mr Hargrave in September 1872 (Cork Constitution, 21 Sept 1872, p.3). His contract stipulated that he would be penalised £100 a month if he failed to complete the deviation on time (Cork Constitution, 8 Oct 1872, p.3). He was paid a further £1000 in February 1873, with more to follow once the final account had been agreed (Cork Constitution, 15 Feb 1873, p.3 and 31 March 1873, p.2).

but had been renamed Albert Road by 1900. A footbridge was also erected over the line so that pedestrians could proceed along the previous line of Victoria Road as previously.

The new terminus was built at Albert Street, near its junction with Albert Quay. It was designed by Sir John Benson, knighted since 1853 and now City Engineer to the Corporation. It was built by the line's contractor Joshua Hargrave, with Peter Roddy C.E. acting as the Corporation's Clerk of Works[13].

As will become evident in the description of the offices associated with the new terminus, Benson's design shares a remarkable number of architectural similarities with Hargrave's Victoria Road terminus, including its shallow pitched roof, round-headed ground-floor opes and square-headed first-floor ones. His design probably influenced Benson and, as its builder, he may also have had a direct involvement in its design.

Train services commenced from the new station on 6 February 1873. The following day, the Cork Examiner reported:

*Without any pretension to architectural beauty, the building presents a respectable appearance and is substantially erected, while it affords abundant accommodation corresponding generally in those respects to the old terminus at the Victoria Road. …*

*The new piece of railway appears well laid. It crosses the Victoria Road on the level (an iron foot- bridge spanning the line, for the use of pedestrians, and then runs between the walls behind the new stand houses of the Park racecourse without invading any portion of the latter. It passes through what is called the Lower Park, and joins the original line opposite Tivoli.*

*All the trains ran with perfect smoothness and success yesterday, and the greater proximity of the new terminus to the city renders it more convenient for the public.*

The above report[14] also describes the station's layout in detail, the interpretation of which the reader is referred to Appendix 1. The 1892 OS map of the station clearly shows the turntable which had been brought from Victoria Road and installed inside the building. The water tank for filling the engines' steam boilers was also salvaged. There was also a small goods yard on the north side of the track, from which a short spur for goods wagons ran north-westwards towards Albert Quay. This may well have been Sir John's last major commission, as he retired from Cork Corporation on health grounds in April 1873.

Even though services had begun, there was still some outstanding work at Albert Street, with workshops, stores, and a goods platform still in progress[15]. Moreover, the offices were not quite finished so Victoria Road continued to be used for this purpose for a short time thereafter[16]. It was subsequently used as a goods depot and then became part of John Furlong's Marina Mills before being demolished c.1930 to make way for new mill buildings. Despite it being just around the corner from the Cork & Bandon terminus, or perhaps because of it, there was no railway link between the two stations.

**Regauging and extending the line**

In 1900, the line was re-laid to 3ft gauge and also doubled between Cork and Blackrock. Narrow-gauge services began on 29 October of that year. The reason for this change was that the CB&PR now wished to extend the line by 9½ miles to Crosshaven via Monkstown and Carrigaline and it was cheaper to lay a

[13] Payments amounting to almost £250 were made by the Corporation to Sir John Benson for architectural services (Cork Constitution on 12 Dec 1871, p.3 and 30 April 1872, p.2).
[14] Cork Examiner, 7 Feb 1873
[15] Cork Constitution, 1 Feb 1873, p.2.
[16] Irish Builder, vol.15, p.99 (1 April 1873).

narrow-gauge line along the entire line than to continue using broad-gauge (fig. 6, overleaf, shows route of Cork, Blackrock & Passage Railway showing principal stations).

By now, the CB&PR was under pressure on two fronts. Since 1862, there had been a direct train service from Cork to Queenstown and, from 1898, also a tram service from the City Centre to Blackrock. With the inevitable loss of passenger revenue, the railway extension had therefore to be built as economically as possible, especially as the extension entailed a 1600ft long rock-cut tunnel at Passage and 140ft viaduct over the Owenboy River at Carrigaline.

As far back as 1847, the Company had secured Parliamentary approval for an extension beyond Passage but had allowed its entitlement to lapse. In 1896, approval was once again obtained and although work started the following year, it was not until 1902 that the line reached Monkstown, and 1904 before it finally arrived in Crosshaven.

The re-gauging of the line provided the opportunity to reconfigure platforms at the Albert Street terminus. The turntable inside the station building was removed and the concourse enlarged. As the 1899- 1900 OS map overleaf shows (fig. 7), the platform along the Albert Road side of the station was also extended eastwards and an island platform of similar length added along the opposite side of the track[17]. The goods' spur towards Albert Quay was abandoned and original engine shed was demolished to make way for the new island platform[18].

The map overleaf (Fig. 7) appears to depict a work in progress rather than the finished scheme. Other tasks included the refurbishment of the booking hall, a new signal box at the east of the main platform, and a new engine shed at the turnout for the former goods' spur. This shed is shown on the 1906 Goad fire insurance plan of the station and it is probable that all these changes were completed before the First World War. Many of these features are depicted on the 1926 OS map (fig 2.9) and in early 1930s photographs[19].

[17] 1899-1900 OS 1:2500 map, Co Cork sheet 74-11.

[18] 20th century photographs clearly show these two platforms to be higher than the tracks, as one would normally expect. However, the 1873 description of the premises (Appendix 1) states that the original platform was at the same level as the street. This implies that the new platforms were raised above the original ones.

[19] 1926 OS 1:1056 map, Cork City sheet 74-56. The Goad plans from 1897 to 1961 are viewable on the Cork Past & Present website.

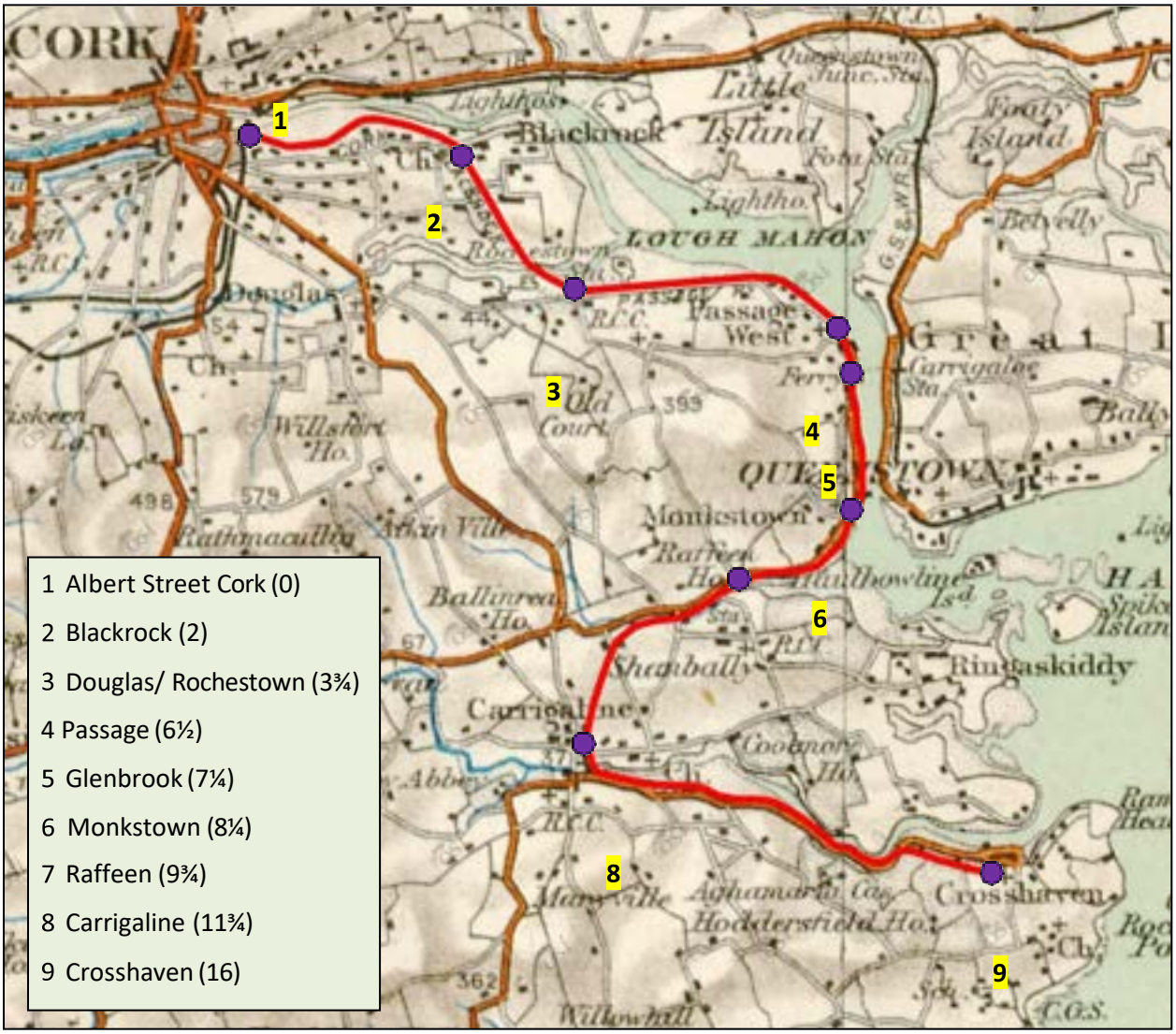
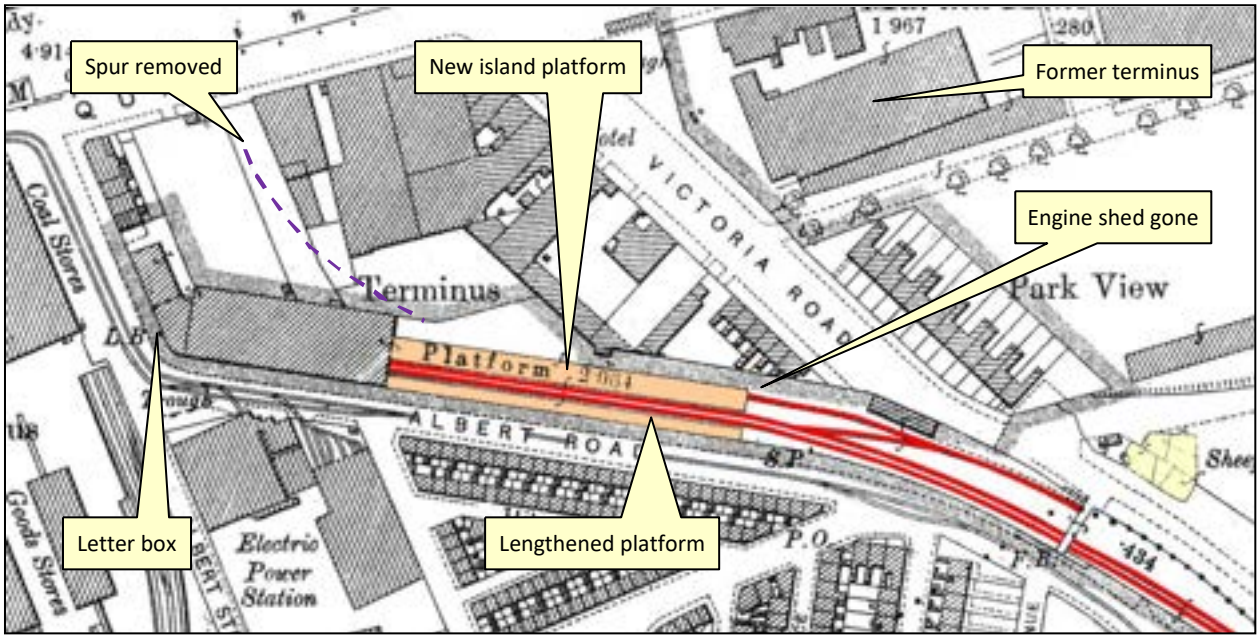



*Figure 6: route of Cork, Blackrock & Passage Railway showing principal stations. Figures in brackets are mileages (rounded to nearest quarter-mile) from Albert Street terminus. Figure 7, below, 1899-1900 OS map showing changes to station complex since 1869 map*



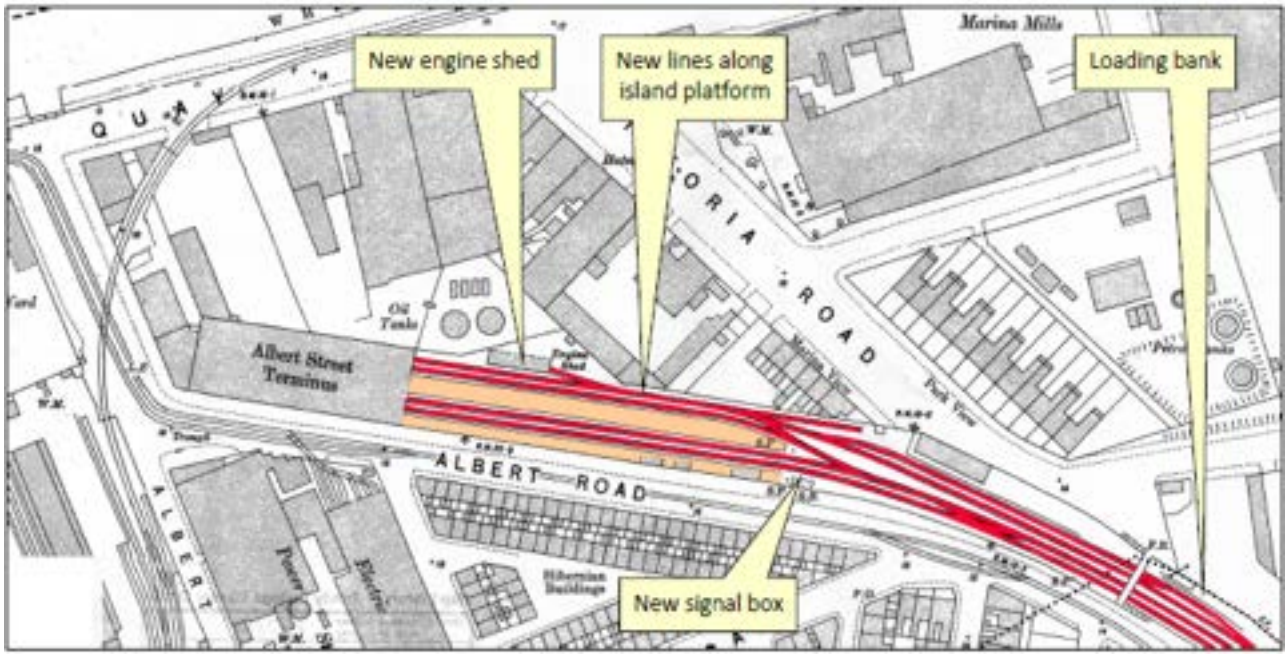



*Figure 8: 1926 OS map showing changes to station complex since 1900 map.*

*Figure 9: Albert Street Station just before closure. Top: View looking west from just beyond the end of the platforms, 1931 (C.P. Friel Collection: Loco and General 6825). Above left: Looking west towards the station building from the end of the island platform, The metal roof framing of the station buildings is clearly shown. At right is the engine shed and behind it are the Irish-American Oil Company's two large oil storage tanks (J.D.C. Prideau 1981).*

**Demise and aftermath**

The curtailment of civilian movements in and around Cork Harbour during the First World War and the civil unrest which followed into the 1920s all had a detrimental effect on the CB&PR's revenues. On 1 April 1925, the Cork, Blackrock & Passage Railway was amalgamated into Great Southern Railways.

In 1927, the Cork - Blackrock section of the line was singled once again as an economy measure. Although the Cork Electric Tramway's services had ceased in 1931, the ever-increasing use of motor vehicles did nothing to stem the irreversible decline in passenger and goods revenue. Closure became inevitable and the last train departed from Albert Street on 10 September in 1932.

*Figure 10: Views of the Albert Street terminus shortly after closure. Top: Track lifting in progress at Albert St as seen from the footbridge, 4 July 1934 (S.C. Jenkins, 1993/ H.C. Casserley). Above left: The administration building from NW. Note the small shop at its left end, built just inside the former pedestrian entrance to the yard (C.P. Friel Collection/ W .A. Camwell). Above right: View of the booking hall from west, 10 July 1934. The name board and signage is still in place. Note the letterbox and entrance door to its left (S.C. Jenkins, 1993/ H.C. Casserley).*

Sometime between 1929 and 1932, a small shop had been added to the north gable of the office building. After closure, the offices were let to the National Army Men's Club. In February 1933, track lifting commenced at Crosshaven and was completed at the Cork end the following year.

In 1934, Great Southern Railways placed the entire complex on the market and it was bought in 1936 for the sum of £4450 by Metal Products Ltd[20]. They took over the offices (the Men's Club moved out, but the shop, now run by Nellie Herbert continued), and converted the station building into a factory for the

[20] Cork Examiner, 11 Oct 1934, p.1; 11 Sept 1935; 13 Sept 1935; and 30 July 1936. These sale notices are reproduced in Colm Creedon's notebook.

production of nuts, bolts and other metal products. The open platform area was also covered over, thus almost doubling the size of the factory floor.

*Figure 11: Albert Street after closure. Top: This view looking west from the footbridge on 25 Aug 1938 shows that the open platform area was now covered by Metal Product's large shed (top left). The shed along the right-hand side of the track has been demolished so that the original line of Victoria Road (top right) could be reinstated (C.P. Friel Collection).*

*Figure 12: Below: This image taken on 6 May 1955 shows Metal Product Ltd's offices in the former CB&PR offices. Note also the window bay at the left end of the booking hall; it has since been made into a doorway (C.P. Friel Collection/ G.F. Douglas GFD16J).*

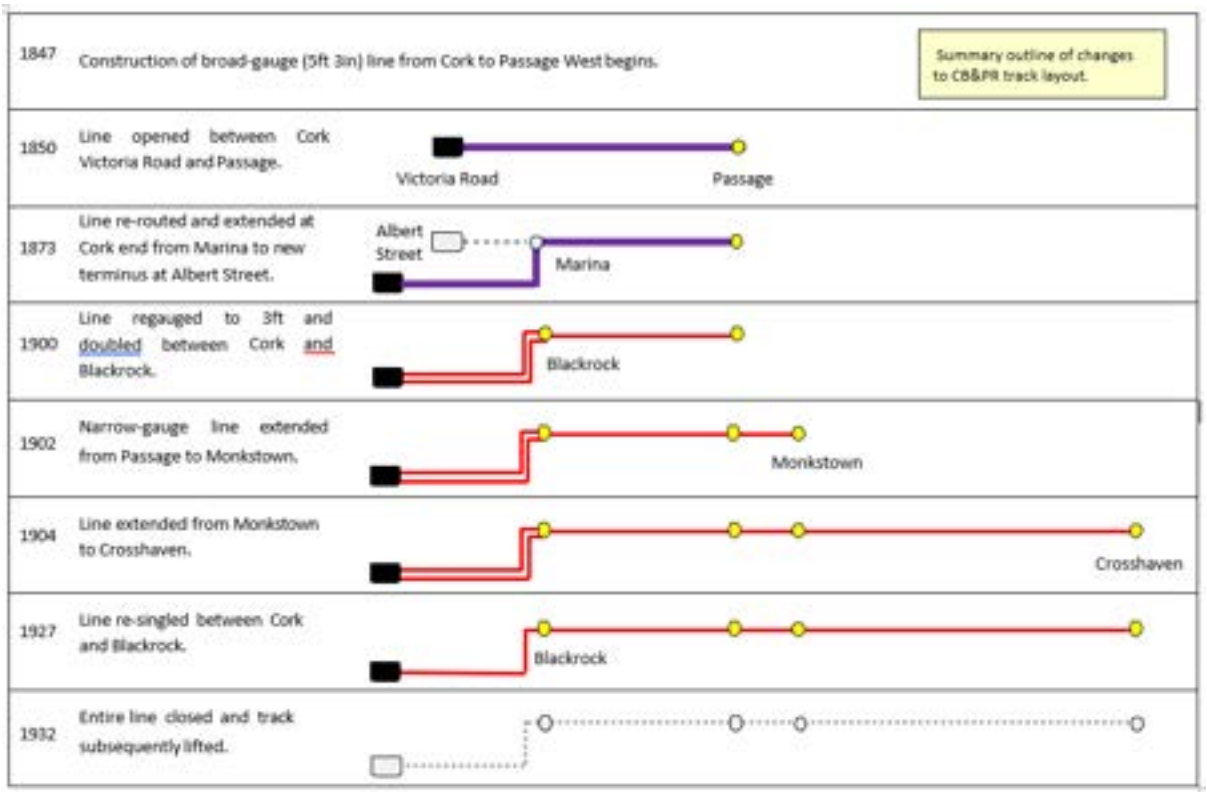



*Figure 13: Summary outline of changes to CB&PR track layout.*

By 1929, all that remained of the terminus were the offices, booking hall and station building at the west end of the complex[21]. In the late 1900s, much of the abandoned line was refurbished as a public footpath. The surviving buildings are now in two separate ownerships, and the station itself internally partitioned as a consequence.

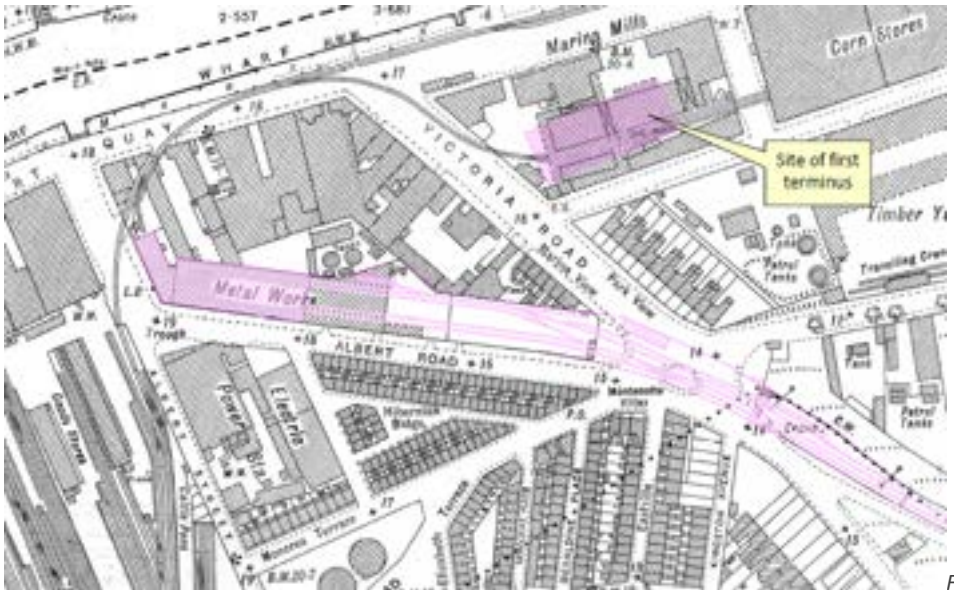



*Figure 14 1949 OS map of former station complex with 1926 layout superimposed in purple. The site of the engine shed had been subsumed into Metal Products Ltd's extension to the former station building, and a roundabout (said to be the first in Cork) has been built in the middle of the former track just west of the demolished footbridge. The former Victoria Road terminus had been cleared to make way for ex tensions to the Marina Mills.*

[21] *1949 OS 1:1250 map, Cork City sheet 74-11A.*

## 3.1 Site Description

**Yard**

The yard behind the station has been concreted over and most of it has been built over in the relatively recent past with flat-roofed, steel-framed showrooms.

*Figure15: Yard to south from Albert Quay end*

Four features of heritage interest survive:

1. Albert Street entrance

Abutting the NW corner of the office buildings is a pair of square ashlar limestone piers which frame a former pedestrian entrance into the yard (fig 17). The piers are shown on the 1892 OS map and are original features of the station complex (i.e. dating to the 1870s). Both have been raised in brick and concrete blocks and finished with oversailing concrete caps. A modern steel fence now fills the gap between them. In later years, the space directly behind this entrance contained the window front of a small shop which abutted the north end of the office block.

To the left of the left pier (as seen from the street) is a 9m (30ft) gap which marks the route of the former goods line opened in 1912 by Cork City Railways from the Albert Quay terminus of the Cork & Bandon line to Victoria Quay and Messrs Furlongs Marina Mills. Beside the pier is a single wrought-iron gate. It is one of a pair shown on an old photograph and may be original.

2. Albert Quay entrance

Adjoining the line is a tall ashlar limestone gate pier (fig 18). It is one of two which are shown on the 1892 OS map. The other one was doubtless demolished along with part of the boundary wall to make way for the railway. To the west of the gatepost there is a short length of former railway line remaining, surrounded by stone setts.

3. Boundary wall

The rubble masonry wall along the east side of the proposed development site is shown on the 1892 OS map as running between the station building and Albert Quay (fig 19). It previously formed the east side of the City of Cork Steam Packet Company's yard. This yard and the one behind the station offices on Albert Street were subsequently amalgamated and are now owned by Carey Tools. The top of the wall has been heightened in mass concrete to form the eaves of a modern pitched roof store used by Careys.

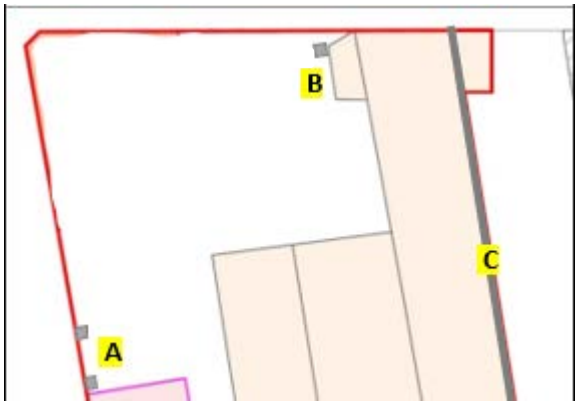



*Figure16: Surviving heritage features in yard: A - Albert Street entrance, B - Albert Quay entrance, and C - Boundary wall.*

*Figure 17: Albert Street Gate Posts*

*Figure 18: Remains of tracks and setts at Albert Quay entrance*

*Figure 19: Gatepost at Albert Quay end*

*Figure 20: Boundary Wall along left side of store*

A Streetscape/Landscape Masterplan has been prepared by Cunnane Stratton Reynolds Landscape Architects which identifies the proposed treatment of these heritage features as part of this proposal. This should be viewed in conjunction with the assessment below.

**Albert Street Gate Piers:** Of the pair of gate piers identified as 'A' on Fig. 16 and shown on Fig. 17, it is proposed to retain in situ the gate pier engaged to the northern gable wall of Carey House. The impact of this will be positive.

The other standalone gate pier here, along with the remaining gate, are also to be retained but relocated to the eastern end of the gable of Carey House. While this relocation will have a slight negative impact on the legibility of the historic entrance arrangement here, the context of gates and railings has already undergone significant change. As the pier fabric is to be fully retained, the gate pier could be reinstated in its original location at a later time if the context changes. The purpose of this relocation is to enable the integration of the new development more fully into the wider urban setting, with visual permeability between the public realm and the new development. This consideration of wider streetscape design quality provides some mitgation against the impact of the relocation of one of the piers.

**Albert Quay Gate Pier:** The single remaining gate pier identified as 'B' on Fig. 16 and shown in Fig. 19 is to be retained and relocated to a position at the eastern boundary of the site, adjoining the retained historic boundary wall. The existing recent structure adjoining the gate pier is to be removed, and in order to maximise integration between the new development and the wider public realm and urban context, it will be necessary to relocate this pier. Again, this relocation will have a slight negative impact on the legibility of what remains of the historic former entrance arrangement here, but in this case the pier has lost the other pier of the former gateway here, and again the context of gates and railings here has already undergone significant change. As the pier fabric is to be fully retained, the gate pier could be reinstated in its original location at a later time if the context changes.

**Boundary Wall:** The majority of the existing boundary wall identified as 'C' on Fig. 16 is to be retained in situ. The removal of part of this wall is necessary to enable the functionality of servicing the proposed development. The loss of this part of the wall will have a slight negative impact but majority of the wall is to be retained in situ and the proposed design treatment of the landscape at this point will utilise high quality materials, which will provide some mitigation.

Agreement may be reached with Cork City Council on an appropriate record of the architectural heritage of the site prior to the commencement of construction.

## 4.0 Conclusion

Although located within an Architectural Conservation Area, the new buildings are proposed in the context of the 2022-2028 Cork City Development Plan, which notes of this ACA that:

*The aim should not be to retain all existing buildings and features but to encourage appropriate development of vacant land and under-used buildings by retaining the most significant elements of heritage interest as an integral part of the evolving character of the area.*

The Development Plan also states that new development should generally reflect contemporary architectural practice, and not aim to mimic historic building styles, identifying the City Docks as the strategic area for tall buildings in Cork, providing landmark buildings for the area.

APPENDIX 4 – JOHN CRONIN & ASSOCIATES ARCHAEOLOGICAL IMPACT ASSESSMENT

JOHN CRONIN & ASSOCIATES
ARCHAEOLOGY | CONSERVATION | HERITAGE | PLANNING

# Archaeological Impact Assessment

# The Railyard Apartments, Albert Quay East/Albert Street, Cork


*Prepared by:*
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Link Road
Ballincollig
Cork

*On behalf of:*
**Progressive Commercial Construction Ltd.**
c/o Coakley O'Neill Town Planning Ltd
N.S.C. Campus
Loughmahon Technology Park
Cork


**June 2024**

# Contents

# 1. Introduction

John Cronin & Associates have been commissioned by Progressive Commercial Construction Ltd to prepare an archaeological assessment of a proposed residential development situated at the corner of Albert Quay East and Alfred Street in Cork City (**Figure 1**).


***Figure 1:*** *Location of proposed development site (red outline)*

The proposed development consists of the following:

> *Progressive Commercial Construction Limited intends to apply for development of The Railyard Apartments which will comprise of the construction of 217 no. apartments comprising 25 no. studio units; 92 no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units apartments in a building that ranges in height from 8 to 11 to 24 storeys over ground floor at the former Carey Tool Hire site, currently principally occupied by Park Facilities Management Ltd, Albert Quay, Cork City. The development site, measuring approximately 0.2744 hectares, is bounded by Albert Quay East to the north, Albert Street to the west, the former Blackrock and Passage Railway Terminus – Ticket Office, a Protected Structure, Ref. No. PS 1138, and which is also a Recorded Monument, CO074-119002, the two-storey former Cork, Blackrock and Passage Railway Offices, Protected Structure, Ref. No. PS 1137, and the Albert Road Post Box, which is also a Protected Structure Ref. No. PS942 and Albert Road to the south, and Navigation Square to the east. The site is accessed by Albert Quay East and Albert Street.*
>
> *The proposed works include:*

*- The construction of 217no. apartments [25no. studio units; 92no. 1-bed units; 88no. 2-bed units; and 12no. 3-bed units] in a building that ranges in height from 8 to 11 to 24 storeys over ground floor.*
*-The provision of external balconies on the east, west and south elevations to the 12th floor on the east and west elevation, and to the 9th floor on the southern elevation.*
*- The provision of an external public realm area at ground level, an eastern laneway for servicing of the proposed development, in addition to its use as a pedestrian link.*
*- The provision of internal communal space areas at ground floor, 1st floor, and 2nd floor, and 2no. external rooftop terraces on the 9th floor and the 12th floor.*
*- The provision of a ground floor community/arts use, with external seating area and a ground floor creche with external covered play area.*
*- The provision of ground level plant, ancillary uses, and bin store.*
*- Bicycle spaces at lower ground floor and ground floor level; additional visitor bicycle spaces; and a set down delivery area at ground floor level on Albert Street.*
*- Set back of the eastern boundary wall to the north and south.*
*- All site development, public realm and landscaping works.*
*- The proposed development also involves the demolition of the existing two-storey Carey Tool Hire building, currently principally occupied by Park Facilities Management Ltd.*

This report assesses the potential impacts of the proposed development on the known and potential archaeological resource from prehistory until the compilation of the first edition 1:10,560 Ordnance Survey (OS) map in 1845. As detailed in Section 3 of this report there are a number of nineteenth-century structures listed as recorded archaeological sites located within a study area encompassing the proposed development site and lands extending for 300m in all directions from its boundary. These structures are also variously listed in the Cork City Council's Record of Protected Structures (as detailed in the *Cork City Development Plan 2022-2028*) and/or are included in the National Inventory of Architectural Heritage.

A separate assessment report on the architectural and industrial heritage resource has been prepared by Jack Coughlan Architects. The report by Jack Coughlan Architects includes information on the historic development of the proposed development site from the 1840's onwards and presents an assessment of potential impacts on the architectural and industrial heritage constraints within the site and its environs.

The structure of this archaeological impact assessment report is designed to, firstly, outline the methodology adopted in its compilation (**Section 2**) and it then provides a description of the locational, historical, legal and archaeological context for the study area (**Section 3**). A brief description of the existing environment within the proposed development site is then provided (**Section 4**) and this is followed by a summary of potential archaeological impacts (**Section 5**). Conclusions and proposed recommendations relating to archaeological mitigation measures are presented in **Section 6**.

# 2. Methodology

## Relevant Guidelines

This archaeological impact assessment was informed by the following published guidelines:

- Department of Arts, Heritage, Gaeltacht and the Islands (1999) *Framework and Principles for the Protection of Archaeological Heritage*;
- Office of the Public Regulator (2022) *Archaeology in the Planning Process;* and
- International Council on Monuments and Sites (ICOMOS 2011) *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*.

## Desktop study

The assessment commenced with a programme of desktop research to establish a baseline for the archaeological context of the location of the proposed development site from prehistory until the 1840s. The principal sources reviewed for this assessment of the known archaeological resource were the Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP). Between 1984 and 1992, the Archaeological Survey of Ireland (ASI) issued a series of county SMRs which lists known archaeological sites and places and this record formed the basis for the statutory RMP established under Section 12 of the National Monuments (Amendment) Act 1994. Similar in format to the SMRs (comprising a list and set of maps), the RMPs were issued for each county in the State between 1995 and 1998. Archaeological monuments included in the statutory RMP are legally protected and are generally referred to as 'Recorded Monuments'. The ASI has continued to record and add entries to the SMR and has developed an online database and mapping service known as the 'Historic Environment Viewer' (source: www.archaeology.ie).

In addition, the following sources and guidelines were consulted as part of the desktop study:

- *Archaeological Inventory of County Cork, Volume II:* This publication presents summary descriptions of many of the recorded archaeological sites within the city.
- *Cartographic Sources*: The cartographic sources examined for the study area include various historic maps which chart the development of Cork City (sourced from the *Cork Past and Present*[1] online resource), as well as the first edition of the 6-inch Ordnance Survey (OS) map (published 1845). Extracts from the consulted maps are presented in **Section 3** of this report.
- *Development Plans* - The local authority development plans relevant to the study area were consulted as part of this assessment. These plans outline Local Authority policies and objectives for the protection and promotion of the archaeological resource. The relevant development plan for the study area is the *Cork City Development Plan (2022-2028)*. The Cork City Council *South Docks Local Area Plan 2008* was also consulted as part of the desktop study.

[1] https://digital.corkpastandpresent.com/browse-by-collection

— *Database of Irish Excavation Reports*[2]: This database contains summary accounts of archaeological excavations carried out in Ireland from 1969 to present.

— *Irish Heritage Council: Heritage Map Viewer*[3] : This online mapping source collates various cultural heritage datasets and includes extracts from the National Museum of Ireland's records of artefact discovery locations as well as datasets provided by, among others, the National Monuments Service, local authorities and the Office of Public Works.

— *UNESCO World Heritage Sites and Tentative List:* UNESCO seeks to encourage the identification and protection of cultural and natural heritage assets considered to be of outstanding value to humanity. There are two world heritage sites in Ireland (Brú na Bóinne and Sceilg Mhichíl) and a number of other significant sites are included in a Tentative List (2022) that has been put forward by Ireland for inclusion. None are located within the environs of the proposed development.

— Department of Arts, Heritage, Gaeltacht and the Islands (1999) *Framework and Principles for the Protection of Archaeological Heritage*;

— Office of the Public Regulator (2022) *Archaeology in the Planning Process;* and

— International Council on Monuments and Sites (ICOMOS 2011) *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*.

## Assessment of impacts

The criteria used for determining the nature of impacts are based on the following:

— *Direct Impact*: where an archaeological site is physically located within the footprint of a proposed development, which will result in its complete or partial removal.

— *Indirect Impact*: where an archaeological site or its setting is located in close proximity to the footprint of a proposed development.

— *No predicted impact*: where a proposed development will not adversely or positively affect an archaeological site.

A significance rating for these impacts is then applied; whether *profound*, *significant*, *moderate*, *slight*, or *imperceptible* (**Table 1**).

***Table 1:*** *Description of Significance of Effects (based on EPA EIAR Guidelines 2022)*

| ***Significance*** | ***Description*** |
|---|---|
| Imperceptible | An effect capable of measurement but without significant consequences |
| Not Significant | An effect which causes noticeable changes in the character of a cultural heritage constraint but without significant consequences |

[2] https://excavations.ie/
[3] www.heritagemaps.ie

| ***Significance*** | ***Description*** |
|---|---|
| Slight | An effect which causes noticeable changes in the character of a cultural heritage constraint but without affecting its sensitivities |
| Moderate | An effect that alters the character of a cultural heritage constraint in a manner that is consistent with existing and emerging baseline trends |
| Significant | An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of a cultural heritage constraint |
| Very Significant | An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of a cultural heritage constraint |
| Profound | An effect which obliterates sensitive characteristics of a cultural heritage constraint |

# 3. Context

## Summary of location and archaeological context

The proposed development site fronts onto the eastern end of Albert Quay, close to the south bank of the south channel of the River Lee. It is bound to the west by Albert Street, to the south by Albert Road, and abuts the neighbouring Navigation Square development to the east. The site is located *c.*850m to the east of the medieval historic core of Cork (CO074-034001-), and is *c.*800m outside its surrounding Zone of Archaeological Potential (see **Figure 2** below). Up until the post-medieval period, the areas to the east of the medieval walled city consisted of unreclaimed marshland, much of which was subject to tidal flooding. While areas such as the Grand Parade and South Mall were reclaimed during the first half of the 18th-century, the reclamation and development of the area containing the proposed development site did not commence until the early decades of the 19th-century. From the middle of the 19th-century this area developed as a transport and storage hub in the expanding city docks.

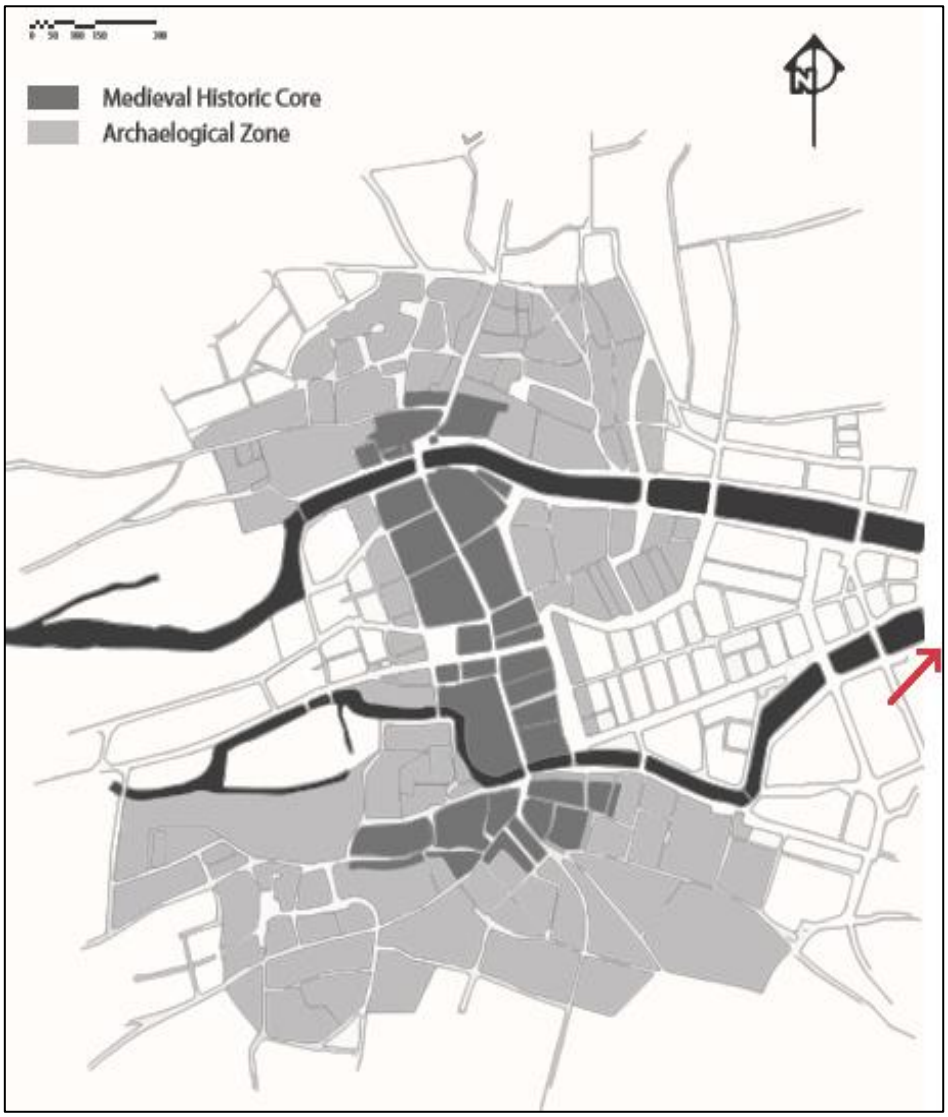


***Figure 2:*** *Zones of archaeological potential for Cork City with approximate location of proposed development indicated by red arrow (source www.corkcity.ie)*

## Legal & Planning Policy Framework

The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the *European Convention on the Protection of the Archaeological Heritage, 1992*) ratified by Ireland in 1997; the *European Convention on the Protection of Architectural Heritage* (Granada Convention, 1985), ratified by Ireland in 1997; and the *UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003*, ratified by Ireland in 2015.

The administration of national policy in relation to archaeological heritage management is the responsibility of the National Monuments Service (NMS) which is currently based in the Department of Housing, Local Government and Heritage.

The Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was signed into law on October 13th, 2023[4]. This Act repeals the National Monuments Acts 1930 to 2014 and replaces those Acts with provisions for the protection of protection of archaeological and historical heritage. Amongst other measures, this Act gives the Minister (currently the Minister of Housing, Local Government and Heritage) the power to prescribe classes of relevant things of archaeological interest to be known as prescribed monuments and includes requirements for the reporting of the finds of such prescribed monuments to the Minister. The Act also establishes a Register of Monuments and procedures for the Minister to enter certain prescribed monuments and relevant things of relevant interest into this register which provides a legal mechanism for the formal designation of monuments under the Act. The Act also includes transitional provisions applicable to the "Record of Monuments and Places" established and maintained under Section 12 of the National Monuments Act of 1994 and the "Register of Historic Monuments" established and maintained under Section 5 of the National Monuments Act of 1987. The Minister may by notice published in *Iris Oifigiúil*, specify a date on and from which the Register of Monuments will supersede the Register of Historic Monuments and the Record of Monuments and Places and following that date those relevant enactments shall cease to apply.

The archaeological baseline environment appraised as part of this assessment is based on current Sites and Monuments Record archaeological datasets published on the NMS Historic Environment Viewer at the time of writing in December 2023. One recorded archaeological site abuts the proposed development site, and this comprises the former terminus building of the Cork, Blackrock and Passage Railway (CO074-011902-). There are an additional four archaeological sites within 300m of the boundary of the proposed development and these are listed in **Table 2** and mapped in **Figure 3** below.

***Table 2**: List of recorded archaeological monuments in vicinity of the proposed development site*

| ***Monument No.*** | ***Classification*** | ***Distance*** |
|---|---|---|
| CO074-119002- | Railway station | Immediately to south |
| CO074-119003- | Tram depot | 50m to south |
| CO074-119004- | Electricity generating station | 100m to south |
| CO074-119001- | Railway station | 90m to west |
| CO074-118---- | Custom house | 100m to north |

[4] https://data.oireachtas.ie/ie/oireachtas/act/2023/26/eng/enacted/a2623.pdf

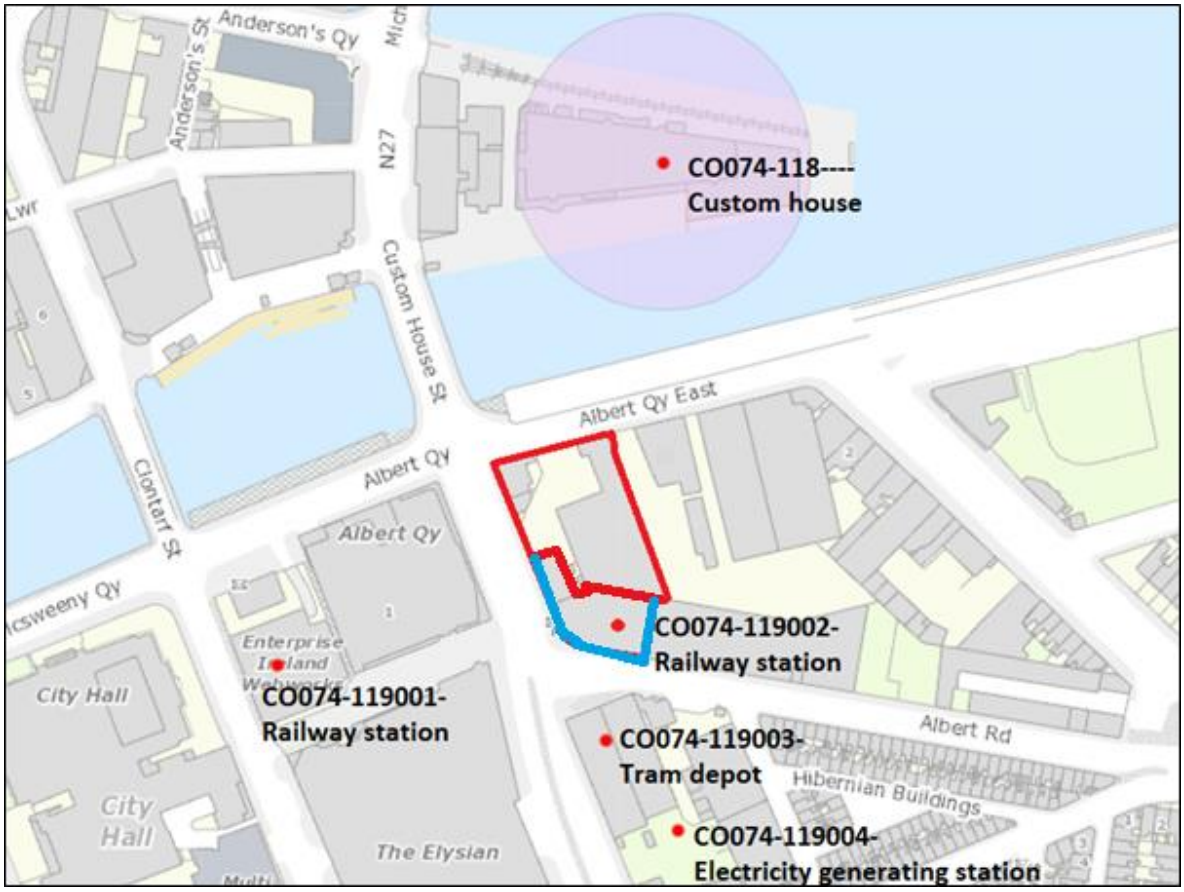


***Figure 3:*** *Recorded archaeological sites (as recorded by the ASI) located within the study area*

The Cork City Development Plan 2022-2028[5] includes a range of objectives in relation to the protection of the archaeological resource within the city and these comprise: Objective 8.1 (Strategic Archaeology Objective), Objective 8.2 (Protection of the Archaeological Resource), Objective 8.3 (The Value of Archaeological Knowledge), Objective 8.4 (Protection of the Medieval Historic Core), Objective 8.5 (Protection of Cork's Medieval City Wall and Defences), Objective 8.6 ( Objective 8.6 (Protection of Burial Grounds), Objective 8.7 (Industrial Archaeology) Objective 8.8 (Underwater Archaeology), Objective 8.9 (Preservation of Archaeology within Open Space in Developments), Objective 8.10 (Archaeological Management Strategy for the City) and Strategic Objective 7 (Heritage, Arts & Culture).

In addition, the Cork City Council's *South Docks Local Area Plan 2008* includes the following section in relation to the mitigation measures for potential unrecorded elements of the archaeological resource within this area of the city:

> *Section 4.7.2.3 Archaeological Monitoring: The possibility that there was earlier human settlement within the South Docks area cannot be discounted. Archaeological monitoring is therefore required in areas where potential for impacts on archaeological deposits or material exists (particularly where development requires bulk excavation or dredging works at rivers edge). Monitoring activities shall be carried out by a licensed archaeologist and method statements for archaeological evaluation must be agreed with the City Council in advance of development.*

[5] https://www.corkcity.ie/en/cork-city-development-plan/

## Archaeological Context

The proposed development site is located *c*.850m to the east of the medieval historic core of Cork (CO074-034001-), and *c*.800m east of the surrounding secondary *Zone of Archaeological Potential* (see **Figure 2**). Up until the post-medieval period, the areas to the east of the medieval walled city consisted of unreclaimed marshland, much of which was subject to tidal flooding. While areas such as the Grand Parade and South Mall were reclaimed during the first half of the 18th-century, reclamation of the area surrounding the subject site did not commence until the early decades of the 19th-century. From the middle of the 19th-century this area developed as a transport and storage hub in the expanding city docks. There is one recorded archaeological site (as recorded by the ASI), that of the terminus building of the Cork, Blackrock and Passage Railway (CO074-011902-), located within the subject site. This building remains extant, although partitioned, in the southern portion of the site and is described and assessed in the . There are four additional recorded archaeological sites located within 300m of the development site (as recorded by the ASI, see **Table 2** above). All four sites comprise extant 19th and early 20th-century buildings relating to the industrial, infrastructural and maritime heritage of the city.

The proposed development was within area identified as "Tooker Marsh" on John Rocque's 1773 map of the city (see **Figure 4** below). The marshy slob-lands in this area would not have presented conditions amenable to long-term settlement until the completion of reclamation works in the 19th century. However, the possibility for evidence of ancient activity of a more short-term nature on such riverside sites cannot be discounted as such locations were highly attractive since the early prehistoric period as both a food and transport resource. The archaeological potential of such environments has been evidenced by the results of the monitoring of bulk soil removal at a development site in the Academy St/Emmet Place area of Cork city centre, where a worked timber (dendrochronologically dated to the 8th century AD) and struck flint were uncovered at a depth of –1.928m OD (Sutton 2008).

Archaeological monitoring close to the banks of the River Liffey has uncovered the remains of Mesolithic fish traps, while other prehistoric sites have been uncovered beneath post-medieval reclamation levels along the Dublin quays (e.g. McQuade 2007 and Lohan 2007). During the Bronze and Iron Ages riverine and marsh environments were occasionally the sites of ritual deposition, and of particular note, are the famous Cork Horns which were discovered in 1909 near the south jetties in the Victoria Road area, to the east of Albert Quay. The horns bear ornament in the La Tène style which is typical of the later Iron Age period and it is thought that they were probably once attached to a leather helmet which did not survive (O' Kelly 1961).

A number of programmes of archaeological investigations have been undertaken during the within nearby development sites in recent years, including the Elysian development to the southwest, the One Albert Quay development to the west and 'Block B' of the Navigation Square development to the east (see the **Appendix** to this report for the Excavations Database summaries). No archaeological artefacts, features or deposits were uncovered during these site investigations. The stratigraphy observed during archaeological monitoring of bulk excavations at the Elysian and One Albert Quay developments generally consisted of modern layers sealing 19th-century reclamation deposits directly overlay sterile reed marsh clays. As an example, monitoring at the One Albert Quay office development site revealed that between 1m and 1.5m of dredged riverine mud had been deposited on top of the estuarine reed marsh clays, which were up to 2.5m thick at the north end of the site. The estuarine clays overlay natural alluvial gravels which were revealed at a depth of c.4.7m below modern ground level at the north end of the site. The stratigraphic sequence observed as the excavations extended to the south (landward) edge of the site indicated that the original terrain rose gradually upwards from the river edge. The

thickness of uppermost reclamation deposits gradually decreased as the underlying reed marsh layer and glacial gravels sloped upwards to the south. The basal glacial gravels were encountered at a depth of 3m– 3.5m beneath modern ground level at the southern site boundary (Murphy 2015).

## Cartographic review

The detail on historic cartographic sources demonstrates the nature of past settlements and land use patterns in recent centuries and can also highlight the impacts of modern developments and agricultural practices. This information can aid in the identification of the location and extent of unrecorded or partially levelled features of archaeological or architectural heritage interest. Historic cartographic sources examined for the study areas include John Rocque's 1773 map (**Figure 4**), John Connor's 1774 map (**Figure 5**), William Beauford's 1801 map (**Figure 6**), Chalmer's 1832 map (**Figure 7**) and the first edition 6-inch OS map of 1845 (**Figure 8**).

Rocque's 1773 map depicts the subject site as an area of unreclaimed tidal marshland, located to the east of the developing city, which was known as Tooker Marsh at that time. From the 1760s onwards, concerted efforts were made to reclaim the marshlands outside the medieval city core. These reclamation efforts were supplemented with concurrent works to rationalise and define the river channel so as to allow improved navigational access to the city by ship traffic. Much of the focus of these works was the construction of a "navigation wall" (also known as "the New Wall") along the south bank of the river channel initially extending eastward for some 800 yards from the present Albert Quay. The wall was intended to regularise the current in the river channel and it also allowed vessels to be pulled up-stream by horses (Rynne, 1999, 197). As indicated on John Connor's map of 1774 the area which now comprises the subject site was located near the western end of the wall. A gap was left its western end to allow an extension of the southern channel of the Lee to flow southwards at this point, this channel flowed south-eastwards through the eastern portion of what is now the Navigation Square development site. The consulted 18th-century cartographic sources show no other built structures in this area at the time. The landward area adjacent to the south end of the Navigation Wall remained as undeveloped marshy ground for decades after it was completed, as depictedon Beauford's 1801 map.

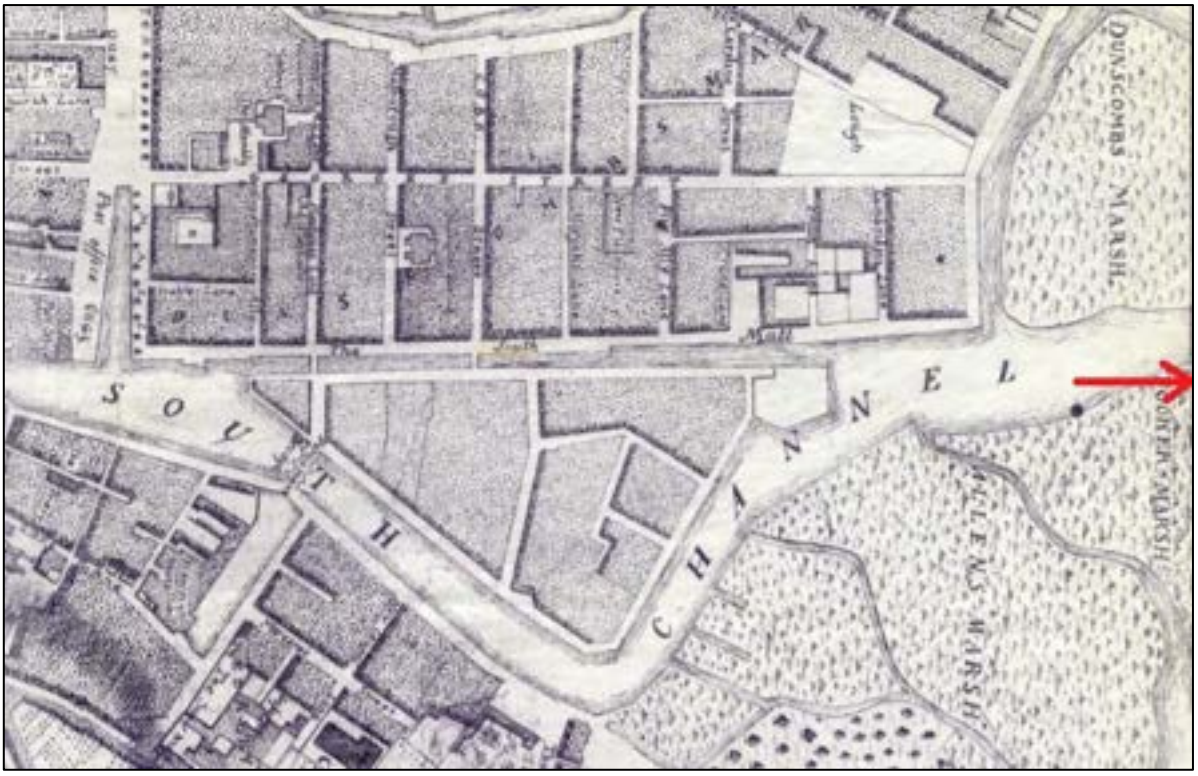


***Figure 4:*** *An extract from John Rocque's map of Cork, 1773. The approximate location of the site, which is at edge of map, is indicated by the red arrow*


***Figure 5:*** *Extract from John Connor's map of Cork, 1774, showing the "new wall" and the marshy nature of the proposed development site*

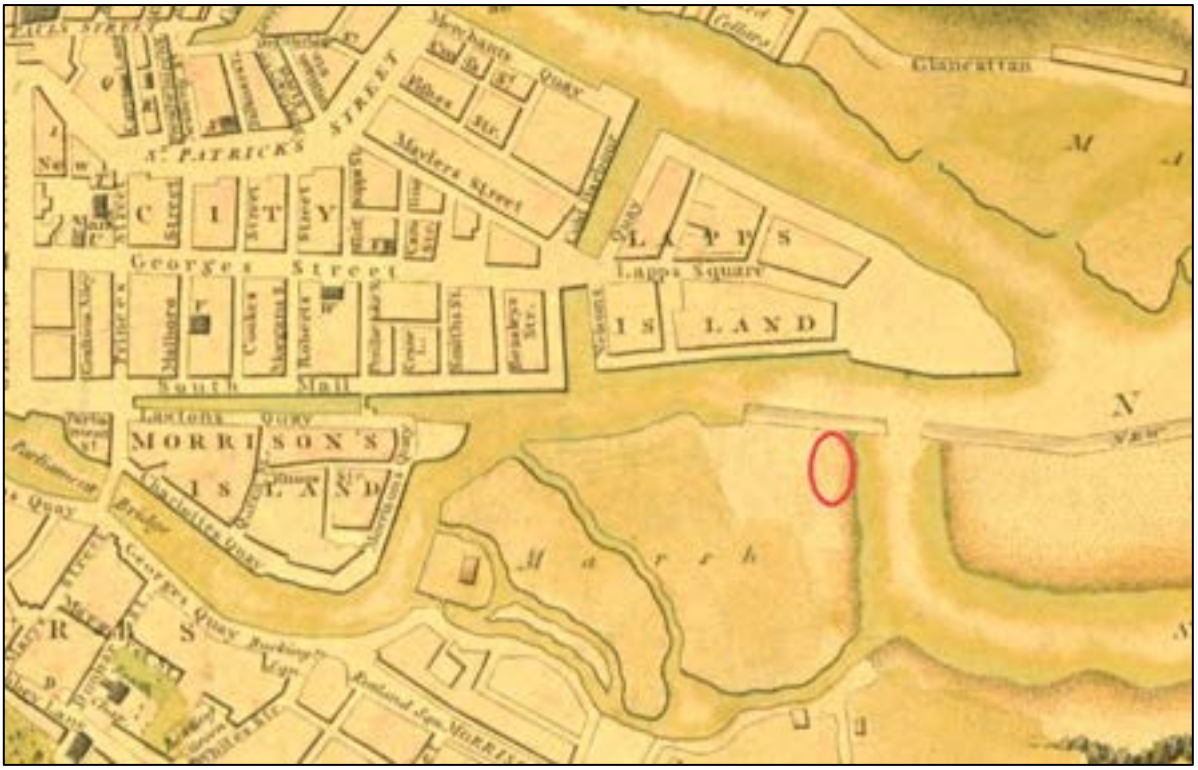


***Figure 6:*** *Extract from Beauford's 1801 map of Cork, with approximate location of subject site indicated*

While much reclamation and development occurred elsewhere in the city during the late 18th and early 19th-century (as outlined above), the easternmost area of the south bank of the south channel of the Lee (present-day Union Quay, Terence McSweeney Quay, Albert Quay area) remained largely unreclaimed and undeveloped during the first decades of the 19th-century. Although the quay walls were constructed in this area from the 1820's onwards, it was not until the construction of the corn market on Albert Quay (West) in the area now occupied by City Hall in the early 1830s that the development of this area commenced in earnest. The area to the east of the corn market still lay largely unreclaimed at this time, as depicted by Chalmer's 1832 map. Chalmer's map also shows that 'Cold Harbour' and Nelson's Quay had been infilled to create Warren's Place (present-day Parnell Place) and the Custom House and bonded warehouses had been constructed on the opposite side of the river channel. From 1822 onwards dredging of the river channel from in order to deepen the channel which was only three feet deep in places and much of the material dredged from the riverbed was deposited behind (south of) the Navigation Wall (Rynne, 1999, 198-201). The detail on the first edition 1:10,560 (known as the "6-inch") Ordnance Survey (OS) map published in 1845 indicates that Albert Quay and its associated roadway had been constructed by this date, with the land to its south being largely reclaimed. The deposition of large amounts of rubble and coarse sands on top of the deposits of dredged riverine mud would have created ground which was more suitable for further development. While the subject site remains undeveloped at this point, the first edition OS map depicts a number of new buildings as having been constructed on Albert Quay east of the 'Corn Exchange'.

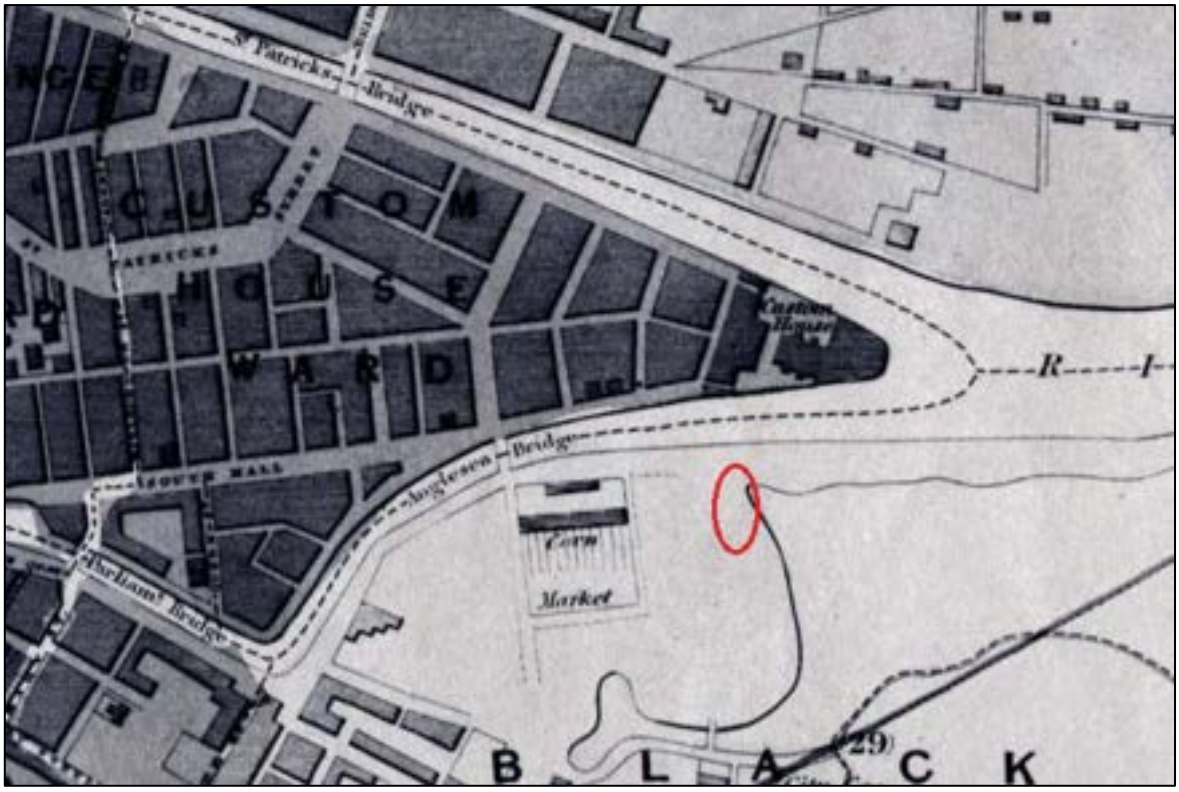


***Figure 7:*** *Extract from Chalmer's 1832 map, subject site remains undeveloped, tentative development has begun in this area to the west of the site*

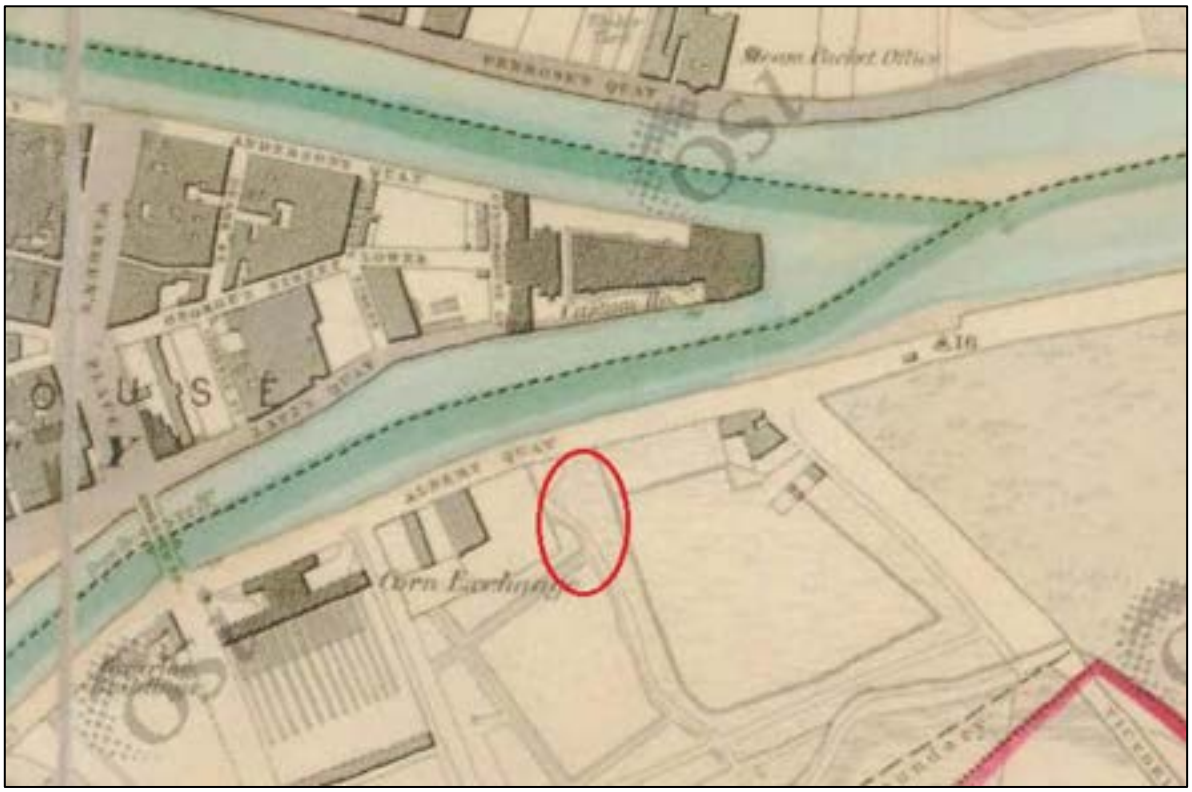

***Figure 8:*** *Extract from 1st edition OS map, surveyed 1841-2, published 1843. Area surrounding site has been reclaimed, further development of Albert Quay evident*

# 4. Description of site

The development site, measuring approximately 0.2744 hectares, is bounded by Albert Quay East to the north, Albert Street to the west, the former Blackrock and Passage Railway Terminus – Ticket Office, a Protected Structure, Ref. No. PS 1138, and which is also a Recorded Monument, CO074-119002, the two-storey former Cork, Blackrock and Passage Railway Offices, Protected Structure, Ref. No. PS 1137, and the Albert Road Post Box, which is also a Protected Structure Ref. No. PS942 and Albert Road to the south, and Navigation Square to the east. The site is accessed by Albert Quay East and Albert Street.

***Figure 11:*** *Aerial view of the proposed development site*

The development site is occupied by 20th century warehouse-type structures and a yard/car parking area. Until recent times the north-western corner of the site was occupied by the Sextant Bar which has since been demolished.

# 5. Assessment of impact

This archaeological assessment was compiled to assess the potential impacts on both the recorded and unrecorded ***pre-1840s*** archaeological heritage resource should the proposed development proceed at the subject site at Albert Quay, Cork. As previously noted, the assessment of the post-1840s built environment, including architectural and industrial heritage, within the proposed development site and its environs has been appraised in a separate Architectural Heritage Impact Assessment.

The proposed development site is located *c.*800m outside the *Zone of Archaeological Potential* surrounding the medieval historic core of Cork (CO074-034001-) in an area that was reclaimed and developed during the 19th-century.

Based on the available evidence garnered from the relevant datasets as well as documentary, historic and cartographic sources it is considered that the proposed development will result in no predicted impacts on any recorded elements of the pre-1840s archaeological resource within the subject site should the proposed development proceed.

It is further concluded that there will be no direct impacts on the pre-1840s archaeological resource within the vicinity of the subject site should the proposed development proceed.

Finally, the potential for impacts on unrecorded subsurface archaeological features arising during any ground works undertaken as part of the proposed development is adjudged to be ***negligible***.

As regards unrecorded subsurface archaeological potential, all literary and cartographic sources demonstrate that development of the area surrounding the subject site did not commence until the middle of the 19th century. Furthermore, nothing of archaeological significance was uncovered during recent archaeological supervision of bulk soil removal during the construction of the Navigation Square development to the east, the One Albert Quay building to the west, and the Elysian Tower to the southwest. As archaeological features have been uncovered beneath reclamation deposits elsewhere in the city (in closer proximity to the medieval historic core, e.g. Academy St/Emmet Place), the potential for the survival of sub-surface archaeological features and/or artefacts within the proposed development site is recognised. On balance, however, the potential for impacts on unrecorded subsurface archaeological features arising during any groundworks undertaken as part of the proposed development is adjudged to be ***negligible***.

# 6. Recommendations

It is noted that a Cork City Council grant of permission issued in 2022 for a proposed office development (Council ref. 2140237), which included basement levels, within the subject site included the following planning condition (No. 15) in relation to archaeological mitigation measures:

1. *No construction or site preparation work may be carried out on the site until all requirements of the City Archaeologist are compiled with.*
2. *The development shall retain a suitably qualified archaeologist to carry out regular site inspections during all groundworks relating to the proposed development, including diversion of utilities, levelling of ground, etc.*
3. *In the event of archaeological features being located during construction, the archaeologist will immediately contact the City Archaeologist who shall determine the further archaeological resolution of the site. Further, it is obligatory under the National Monuments Amendment Act 2004 that such is brought to the attention of the National Monuments Service and the National Museum of Ireland.*
4. *The City Archaeologist and the National Monuments Service shall be furnished with a report describing the results of site inspections.*

However, the current development will not include basement levels. The level of bulk of ground reduction will not be greater than 1 metre deep as the finish ground floor level must be raised above the existing street level. The building will be constructed on piles. The potential for any sub-surface archaeological artefacts, features or deposits being encountered will be minimal.

It is, therefore, recommended that a watching brief of construction phase groundworks should be undertaken by a suitably qualified archaeologist and will be based on regular inspections of the subject site. In the unlikely event that archaeological remains are encountered, groundworks halted in that area while consultation and agreement with Cork City Council and the National Monuments Service on the appropriate further mitigation strategy. A report detailing the results of the archaeological watching brief of the construction phase of the proposed development will be complied and submitted to Cork City Council and the National Monuments Service.

# 7. References/sources

## Published sources


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## Internet resources


Cork Past and Present – historic maps and sources: http://www.corkpastandpresent.ie/

Database of Irish Excavation Reports: http://www.excavations.ie/

Department of Housing, Local Government and Heritage: Historic Environment Viewer: http://webgis.archaeology.ie/historicenvironment/

Google Earth: https://earth.google.com

Heritage Map Viewer - various interactive heritage maps: https://heritagemaps.ie/WebApps/HeritageMaps/index.html

# Appendix: Relevant Excavations Database entries

| *Site Name* | *Licence and Author* | *Summary* |
|---|---|---|
| Liberty Street to Marina, Cork | 96E0163<br>Sheila Lane | During the laying of cables by the ESB from the Marina to Liberty Street, Cork, all trenches were monitored. No archaeological remains were disturbed. |
| Blackrock/ Marina/ Summerhill North, Cork | 99E0212<br>Máire Ní Loingsigh | Excavation of service trenches for this phase of the Cork Main Drainage Scheme began on 5 May 1999 and is ongoing. Monitoring under this licence ended on 2 June 2000. The areas excavated between January and June 2000 included the Marina, Monahan's Road, Victoria Road, Castle Road, Lower Glanmire Road, Summerhill North and Atlantic Pond. The work involved the laying of sewer pipes (maximum diameter 1.05m) and storm drain pipes (diameter 1.35m) in trenches varying in depth from 2m to 5m, the construction of associated chambers, and the construction of the main pump-house for the Cork Main Drainage Scheme at Atlantic Pond. The areas where the scheme is taking place were largely settled by the wealthy upper classes in the 18th and 19th centuries. Atlantic Pond and the Marina were reclaimed from the tidal reaches of the River Lee during that time. Monitoring of excavation along the Marina, in Monahan's Road, Victoria Road and Castle Road recorded no features. No archaeology was recorded in Summerhill North or Lower Glanmire Road, where the new pipes followed the route of existing culverts. At Atlantic Pond, stratigraphy consisted of wet peaty material over a natural gravelly silt containing cobbles. The works in the above areas did not directly impinge on any recorded monuments, and nothing of archaeological significance was noted. |
| Eglinton Street, Cork | 06E0840<br>Deborah Sutton | The development site, a large city-centre site in Cork, stands within the zone of potential for several 19th-century sites, including the terminus of the Cork, Bandon and South Coast Railway, a railway station at Victoria Road, a tram yard on Albert Road and an electricity generating station adjacent to the tram depot. Monitoring of the bulk removal of subsurface deposits to a depth of 5m below existing ground levels took place between May and October 2006. The stratigraphy was fairly uniform over the total area of the site. Grey estuarine muds overlay the glacial gravels at the lowest levels of the site. The muds were interbedded and layered with gravels to within c. 2.7m of the existing ground levels on the site. These muds were sterile, except for occasional branches or trunks of trees washed downriver and embedded in the low-lying mud flats. A slight downslope of the muds and gravels to the south, west and north was noted. This may suggest that a high point in the original marsh which underlies Cork city centre was roughly in the centre of the development site. The upper levels of this natural material comprised a more peaty mud (c. 0.7m thick) with a high concentration of decaying reeds; these represent the reed marshes typical of the estuarine environment in the upper harbour. Narrow (0.2m thick) discrete layers of crushed sandstone, probably the tailings from local stone quarrying, were noted, particularly along the western perimeter of the site |

| *Site Name* | *Licence and Author* | *Summary* |
|---|---|---|
| | | overlying the upper levels of the reed-rich estuarine muds. The upper 2m of the site comprised dumps of rubble and degraded building debris, including slate, brick, burnt soils and a dump of clay pipes. The centre of the site was largely disturbed in the upper levels, where the An Post sorting office had been constructed in 1980. |
| One Albert Quay, Cork | 14E0323<br>David Murphy | The development site is located on the western part of Albert Quay, on the south bank of the south channel of the River Lee and is to the east of the city centre. The site was previously occupied by two 19th-century coal warehouses and lies adjacent to the east side of the former site of a 19th-century railway station (CO074-119001). Previous to this the site was undeveloped marshland subject to tidal flooding until the construction of the Navigation Wall and extensive land reclamation works during the 18th century. Monitoring of the bulk excavation of sub-surface deposits to a depth of over 5m below existing ground level took place between October and December 2014. At the north end of the site the uppermost made ground under the warehouse floors comprised of lenses of concrete slab, rubble, coarse gravels and other residues that comprised a band measuring 1.2m in thickness. This overlay a dark grey clay which contained occasional 19th-century inclusions. The dark grey clay overlay a sterile mid grey clay layer which contained frequent inclusions of reed stalks and appeared to be the buried remains of the riverside marsh which made up the site prior to its reclamation. It measured 2.5m thick at the north end of the site and overlay glacial gravels which were encountered at 4.7m beneath existing ground level in this area. The dark grey clay has been interpreted as a reclamation deposit of dredged riverine material which was deposited to an increasing depth on top of the natural reed marsh surface as it sloped gradually down towards the river's edge to the north, thereby removing the natural gradient. The reclamation clay was relatively homogenous in composition with no obvious silt lens and this indicated that it was introduced in a single operation undertaken over a relatively short period of time. The presence of occasional 19th-century inclusions noted in the reclamation material supports the cartographic sources which indicate that the area was still occupied by a riverside marsh at the beginning of that century. The stratigraphic sequence as the excavation extended to the south (landward) edge of the site indicated that the original terrain rose gradually upward from the river's edge. The thickness of the uppermost reclamation deposits gradually decreased as the underlying reed marsh layer and glacial gravels slope upwards to the south. The glacial gravels were encountered at a depth of 3-3.5m beneath modern ground level at the southern site boundary. There were no traces of cultural inclusions noted in the underlying reed marsh layer. The ground works were monitored into the natural glacial gravels and nothing of archaeological significance was encountered. |