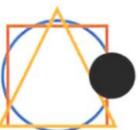


PROPOSED  
DEVELOPMENT



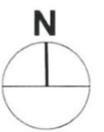
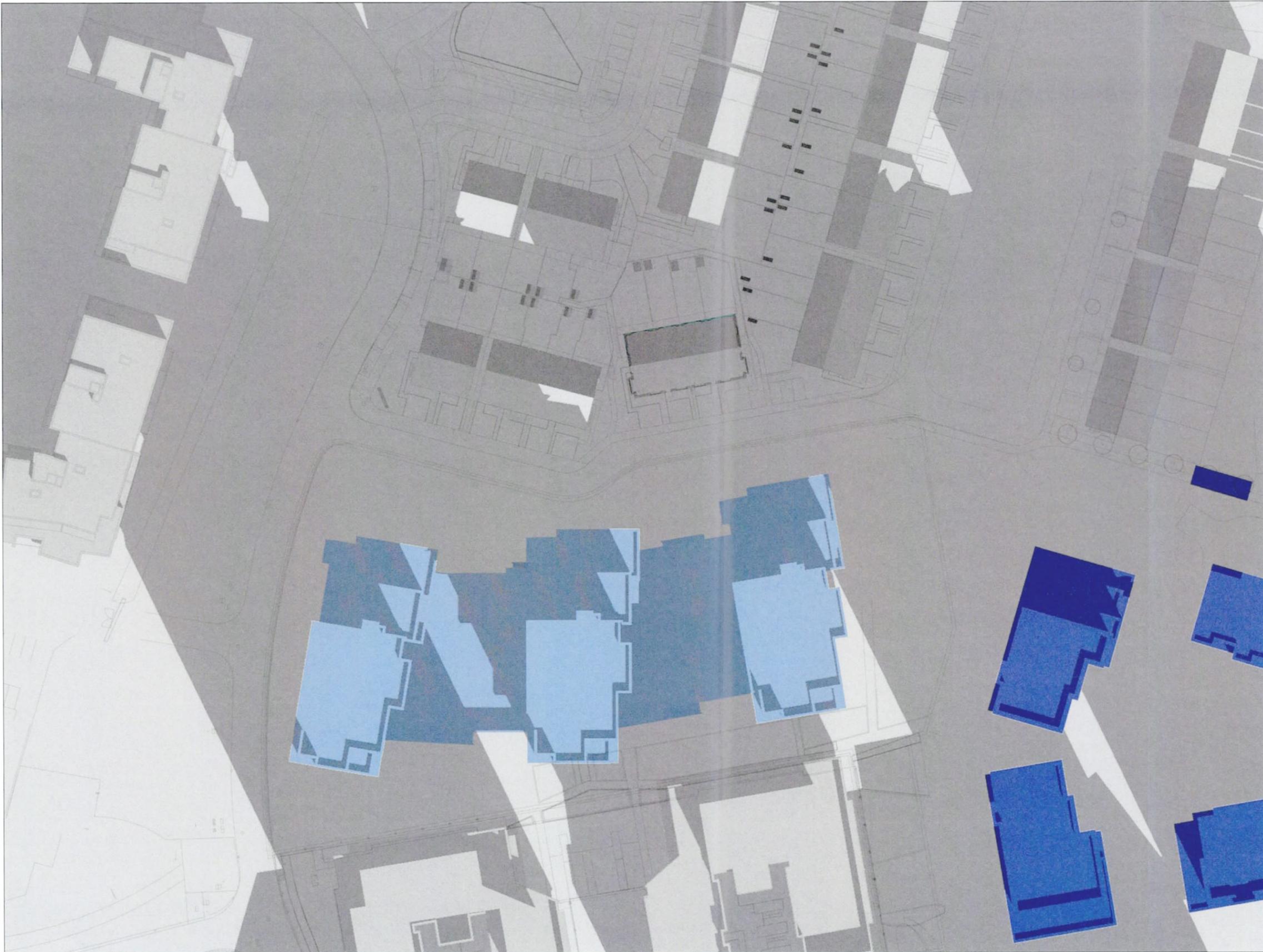
OSI LICENCE No. CYAL50284305  
© ORDNANCE SURVEY IRELAND  
/GOVERNMENT OF IRELAND.



APPENDIX 10.1: SHADOW STUDY DIAGRAMS  
 SWIFT SQUARE APARTMENTS • LANDS LOCATED TO THE NORTH OF SWIFT SQUARE OFFICE  
 PARK AND NORTHWOOD AVENUE, SANTRY, DUBLIN 9  
 MARCH 2023

DATE : DECEMBER 21ST - WINTER SOLSTICE  
 SUNRISE : 8.38 AM  
 SUNSET : 4.07 PM

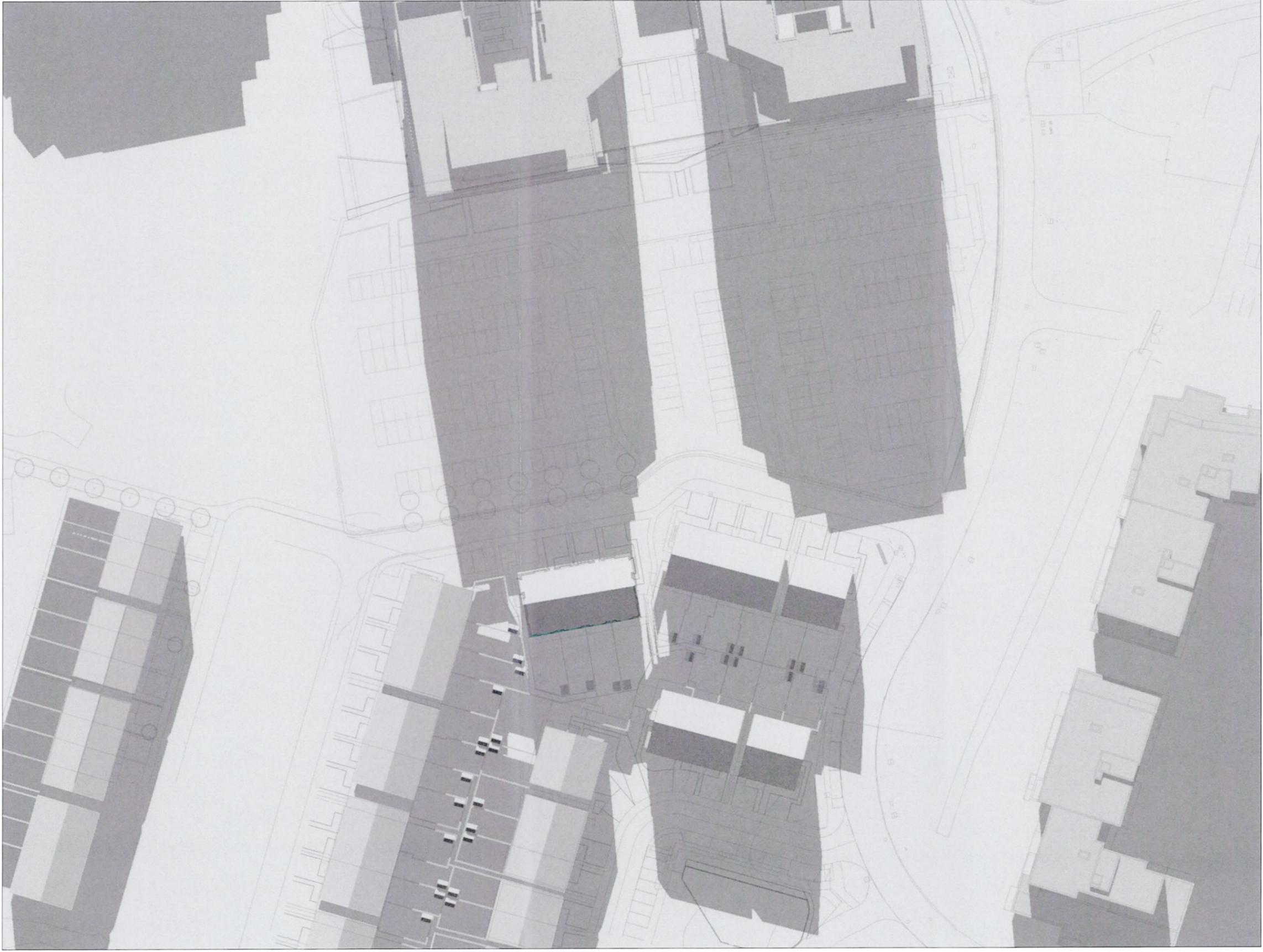
TIME :  
 10.30 AM



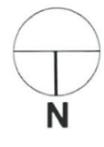
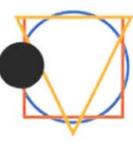
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PARK AND NORTHWOOD AVENUE, SANTRY, DUBLIN 9  
MARCH 2023

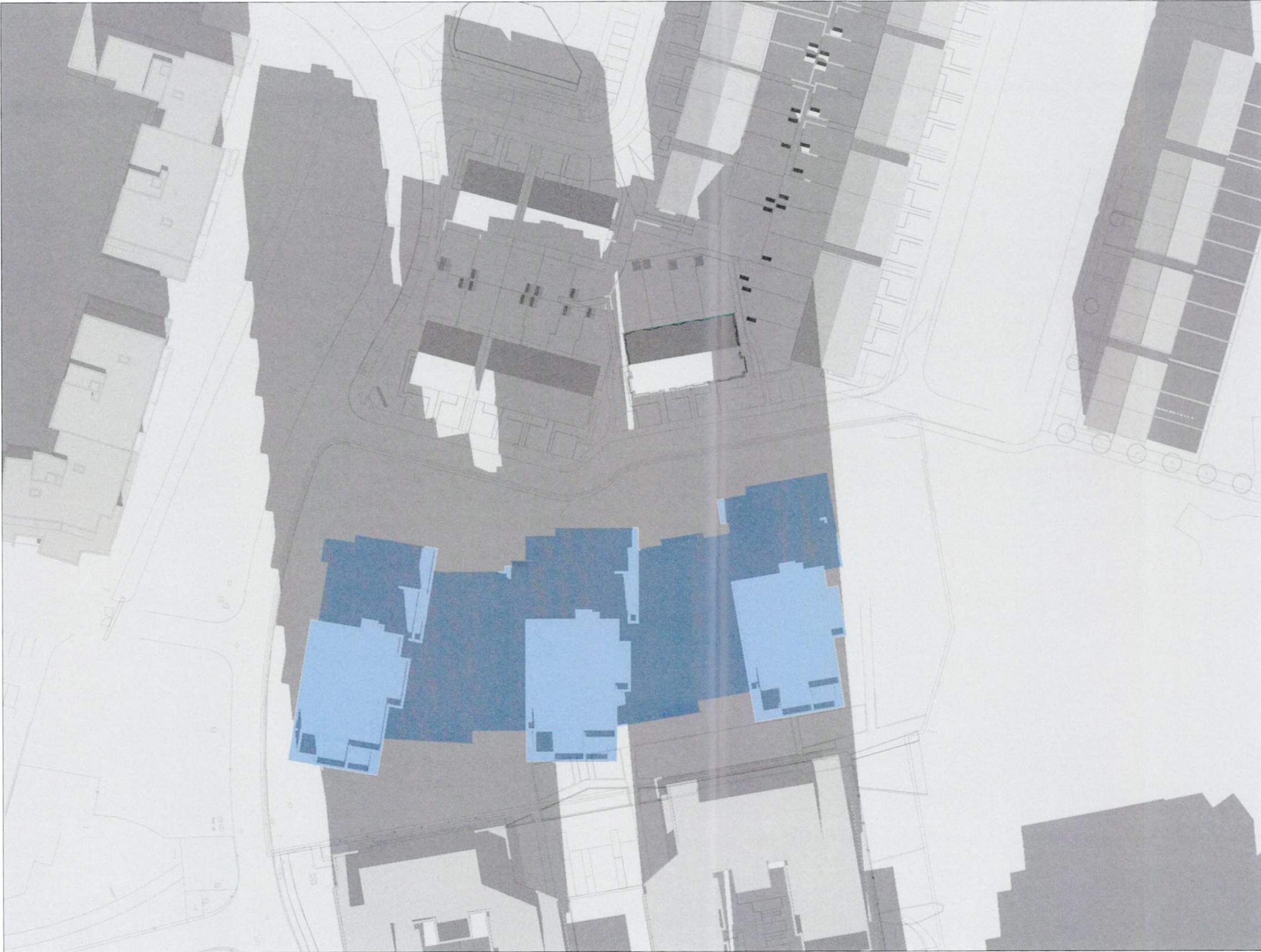
DATE : DECEMBER 21ST - WINTER SOLSTICE  
SUNRISE : 8.38 AM  
SUNSET : 4.07 PM

TIME :  
10.30 AM



DATE : DECEMBER 21ST - WINTER SOLSTICE  
 SUNRISE : 8.38 AM  
 SUNSET : 4.07 PM  
 TIME : 12.00 PM





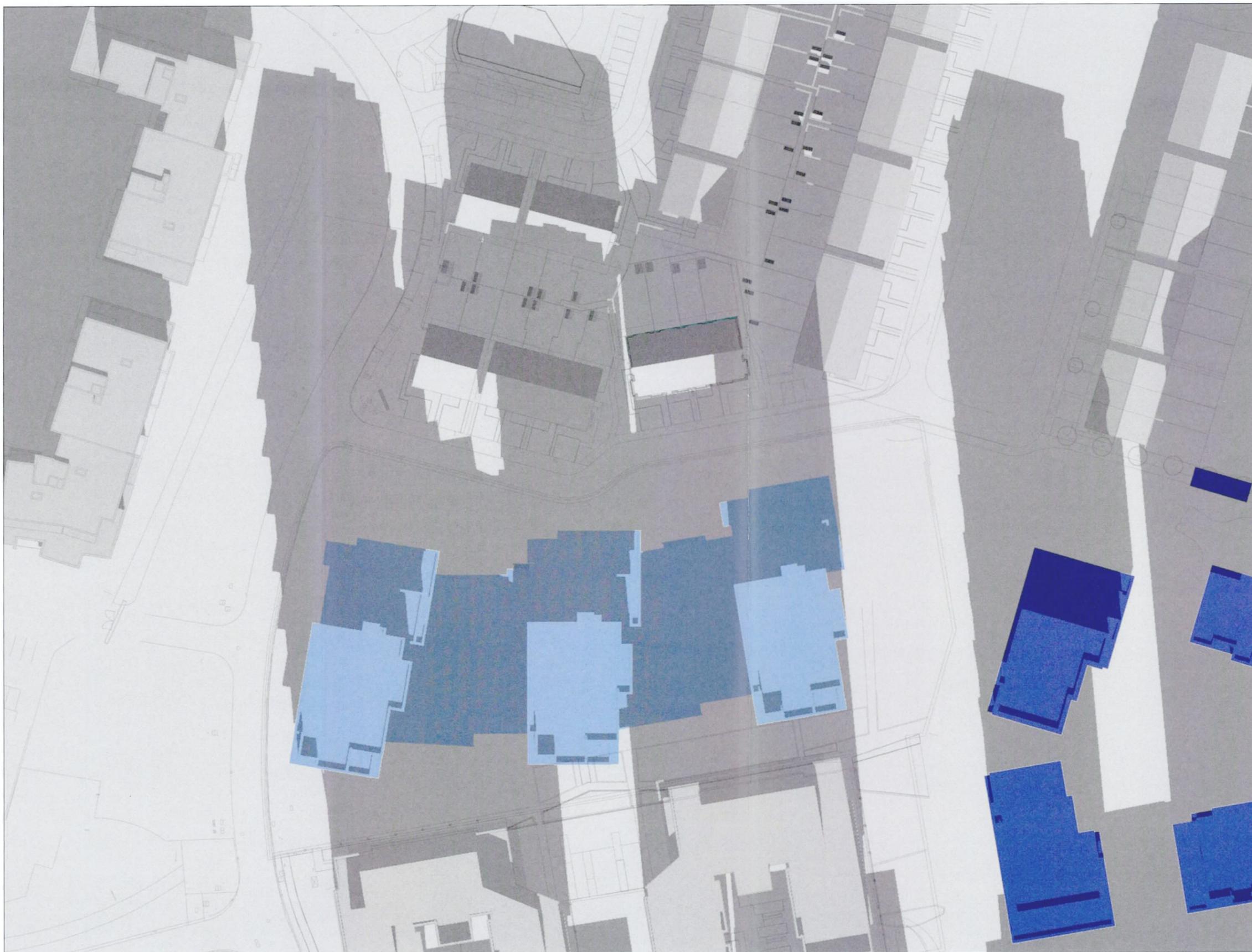
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MARCH 2023

DATE : DECEMBER 21ST - WINTER SOLSTICE  
SUNRISE : 8.38 AM  
SUNSET : 4.07 PM

TIME :  
12.00 PM

CUMULATIVE

OSI LICENCE No. CYAL50284305  
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/GOVERNMENT OF IRELAND.

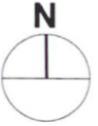
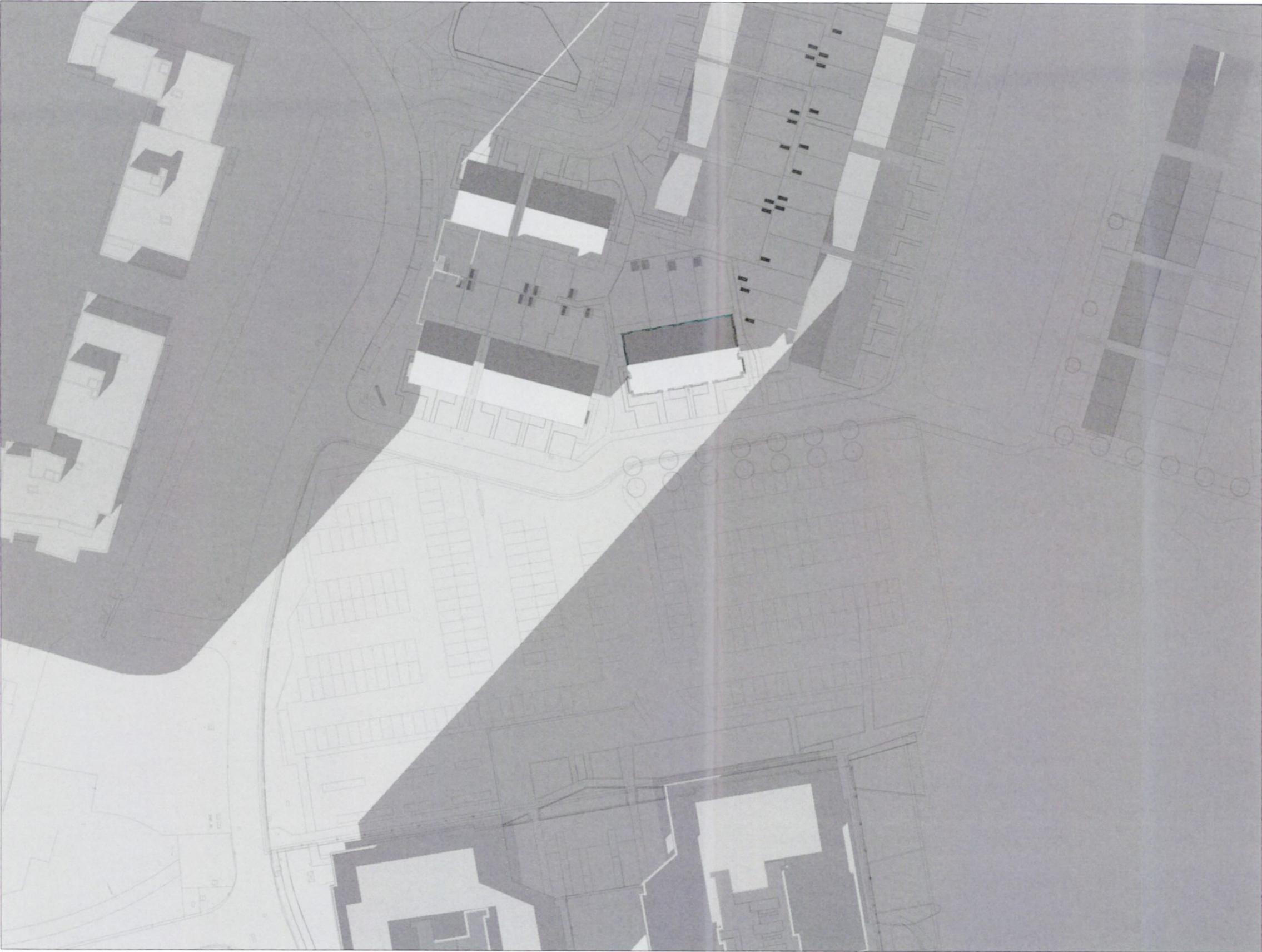


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MARCH 2023

DATE : DECEMBER 21ST - WINTER SOLSTICE  
SUNRISE : 8.38 AM  
SUNSET : 4.07 PM

TIME :  
12.00 PM

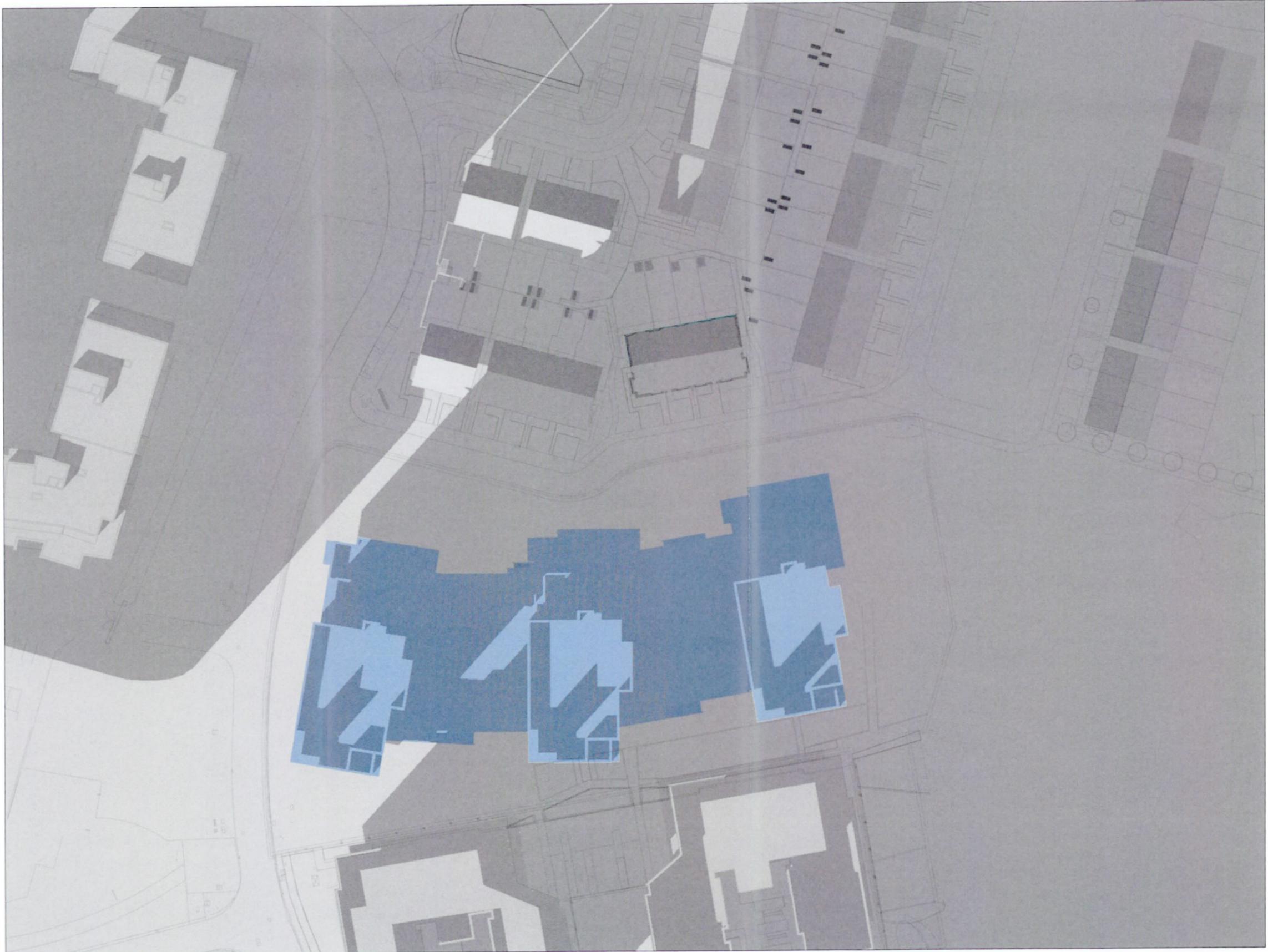




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DATE : DECEMBER 21ST - WINTER SOLSTICE  
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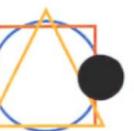
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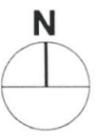
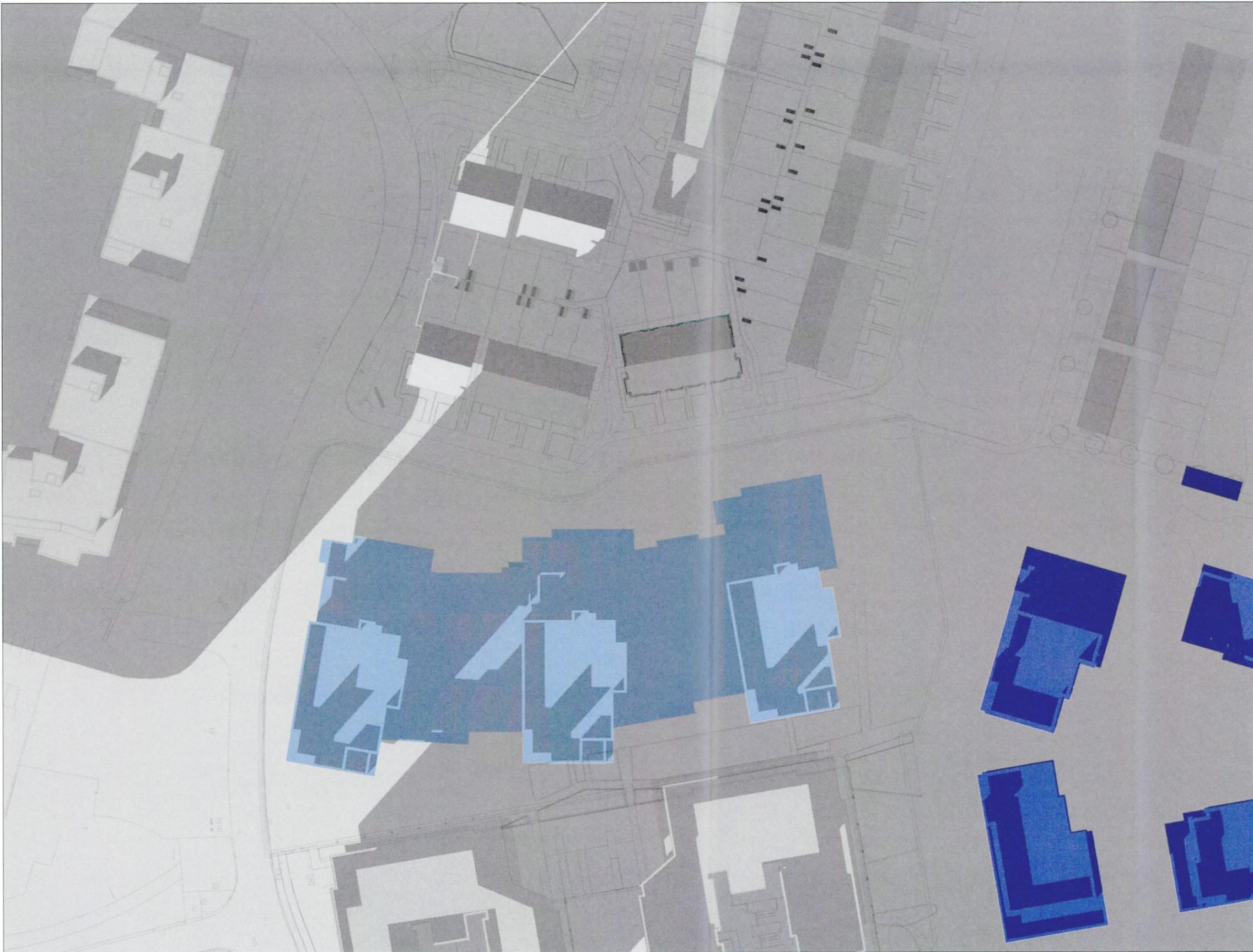


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3.30 PM

## APPENDIX 11.1

### CDF Model Details

## APPENDIX 11.1

### CFD Model Details

#### A.11.1 CFD Modelling Method

As explained previously, the wind study is conducted through Computational Fluid Dynamics (CFD). This 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 stages: pre-processing, simulation, and post-processing as described in **Figure 1.1**.

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.

**PRE-PROCESSING**

This is the construction of a representative geometric model to be utilized within a flow domain of interest and the subsequent division of this domain into small control volumes (cells), a process often called "meshing." After setting up the model and mesh, the model is completed by setting appropriate boundary and initial conditions.



**SIMULATION**

The equations governing the behaviour of fluid particles (Navier-Stokes equations) are solved iteratively over each control volume within the computational domain, until the results change no more; i.e. a converged solution is reached. In a transient simulation this process is repeated and convergence verified at each time step, whereas in a steady-state simulation, this is only done at one time step, since it is assumed conditions do not vary over time. The field solutions of pressure, velocity, air temperature, and other properties are obtained for each control volume, at cell centre, nodal point, or face centre in order to render the flow field.



**POST-PROCESSING**

This is the plotting and viewing of the predicted flow field from the CFD model simulations of selected locations, surfaces, or planes of interest.

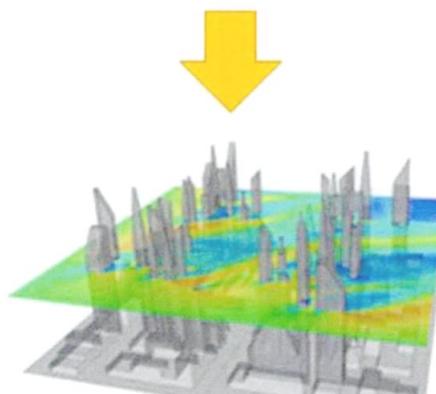


Figure A.11.1.1: CFD Modelling Process Explanation

## A.11.2 OpenFOAM Numerical Solver Details

This report employs OpenFoam Code, which is based on a volume averaging method of discretization and uses the post-processing visualisation toolkit Paraview version 5.5. OpenFoam is a CFD software code 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 CFD code has capabilities of utilizing a Reynolds Averaged Navier-Stokes (RANS) approach, Unsteady Reynolds Averaged Navier-Stokes (URANS) approach, Detached Eddy Simulation (DES) approach, Large Eddy Simulation (LES) approach or the Direct Numerical Simulation (DNS) approach, which are all used to solve anything from complex fluid flows involving chemical reactions, turbulence, and heat transfer, to acoustics, solid mechanics and electromagnetics. Quality assurance is based on rigorous testing. The process of code evaluation, verification, and validation includes several hundred daily unit tests, a medium-sized test battery run weekly, and a large industry-based test battery run before the new version is released. Tests are designed to assess regression behavior, memory usage, code performance, and scalability.

The OpenFOAM solver algorithm directly solves the mass and momentum equations for the large eddies that comprise most of the fluid’s energy. By solving the large eddies directly no error is introduced into the calculation.

To reduce computational time and associated costs the small eddies within the flow have been solved using the widely used and recognised Smagorinsky Sub-Grid Scale (SGS) model. The small eddies only comprise a small proportion of the fluid’s energy therefore the errors introduced through the modeling of this component are minimal.

The error introduced by modeling the small eddies can be considered of an acceptable level. Computational time will be reduced by modeling the small eddies (compared to directly solving).

### A.11.2.1 CFD Model Details

This subsection describes all features included in the geometrical and physical representation of Swift Square development CFD model. Any object which may have significant impact on wind movement and circulation are represented within the model. To be accurate, the structural layout of the building being modelled should include only the obstacles, blockages, openings, and closures which can impact the wind around the building. It is important to remember that a CFD simulation approximates reality, so providing more details of the geometry within the model will not necessarily increase the understanding of the bulk flows in the real environment.

#### A.11.2.1.1 Modelled Geometry

A 3D view of the proposed development massing model is presented in the images that follow. The modelled layout and dimensions of the surrounding environment are outlined in the table below.

To represent reality and consider the actual wind impacting on the site, the modelled area for the wind modelling study comprises a wider urban area of over 1.5km<sup>2</sup> around the development, this to include the recommended dimensions as outlined in **section 11.1.2**.

**Table A.1: Modelled Environment Dimensions**

MODELLED CFD ENVIRONMENT DIMENSIONS			
	Width	Length	Height
CFD Mesh Domain	1600m approx.	1600 approx.	160m approx.

**Figure A.2: View of the development CFD model - Top View**

**Figure A.3: 3D View of the development CFD model - Isometric View**

### A.11.2.1.2 Boundary Conditions for The CFD Model

A rectangular computational domain was used for the analysis. The wind directions were altered without changing the computational mesh. For each simulation scenario, an initial wind velocity was set according to the statistical weather data collected to consider the worst-case scenario. Building surfaces within the model are specified as 'no slip' boundary conditions. This condition ensures that flow moving parallel to a surface is brought to rest at the point where it meets the surface. Airflow inlet boundaries possess the 'Inlet' wind profile velocity patch boundary condition with its appropriate inflow turbulence intensity and dissipation rates. Air exits the domain at the 'pressure outlet' boundary condition.

Due to aerodynamic drag, there is a wind gradient in the wind flow just a few hundred meters above the Earth's surface – "the surface layer of the planetary boundary layer".

Wind speed increases with increasing height above the ground, starting from zero, due to the no-slip condition. In particular, the wind velocity profile used for the analysis is parabolic. Flow near the surface encounters obstacles 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 velocity profile is given by a fluctuating velocity along a mean velocity value which is both numerically simulated by the mean of inlet velocity profile and turbulence intensity values assigned to the model.

The equation used for the wind velocity profile within the model, as described above is shown below.

where:

- $v_1$  = wind speed measured at the reference height  $h_1$
- $h_1$  = reference height to measure  $v_1$
- $h_2$  = height of the wind speed  $v_2$  calculated for the wind profile
- $z_0 = 0.4$  [m] roughness length selected

### A.11.2.1.3 Computational Mesh

The level of accuracy of the CFD results are determined by the level of refinement of the computational mesh. Details of parameters used to calculate the computational mesh are presented in Error! Reference source not found.. **Figure 11-4** shows the mesh utilised in the simulations.

The grid follows the principles of the 'Finite Volume Method', which implies that the solution of the model equations is calculated at discrete points (nodes) on a three-dimensional grid, which includes all the flow volume of interest. The mathematical solution for the flow is calculated at the centre of each of these cells and then an interpolation function is used by the software to provide the results in the entire domain.

**Table A.11.2: Parameter to Calculate Computational Mesh**

$$v_2 = v_1 \cdot \frac{\ln \frac{h_2}{z_0}}{\ln \frac{h_1}{z_0}}$$

#### PARAMETERS TO CALCULATE COMPUTATIONAL MESH

Air Density $\rho$	1.2kg/m <sup>3</sup>
Ambient Temperature (T)	288K( <i>approx. 15C</i> )
Gravity Acceleration (g)	9.8m/s <sup>2</sup>

$dx$	0.3 m at the building 1m in the surroundings 2m elsewhere
Mesh cells size	0.1 m (ratio 1:1)
Total mesh size	Approx. cells number = 10 million

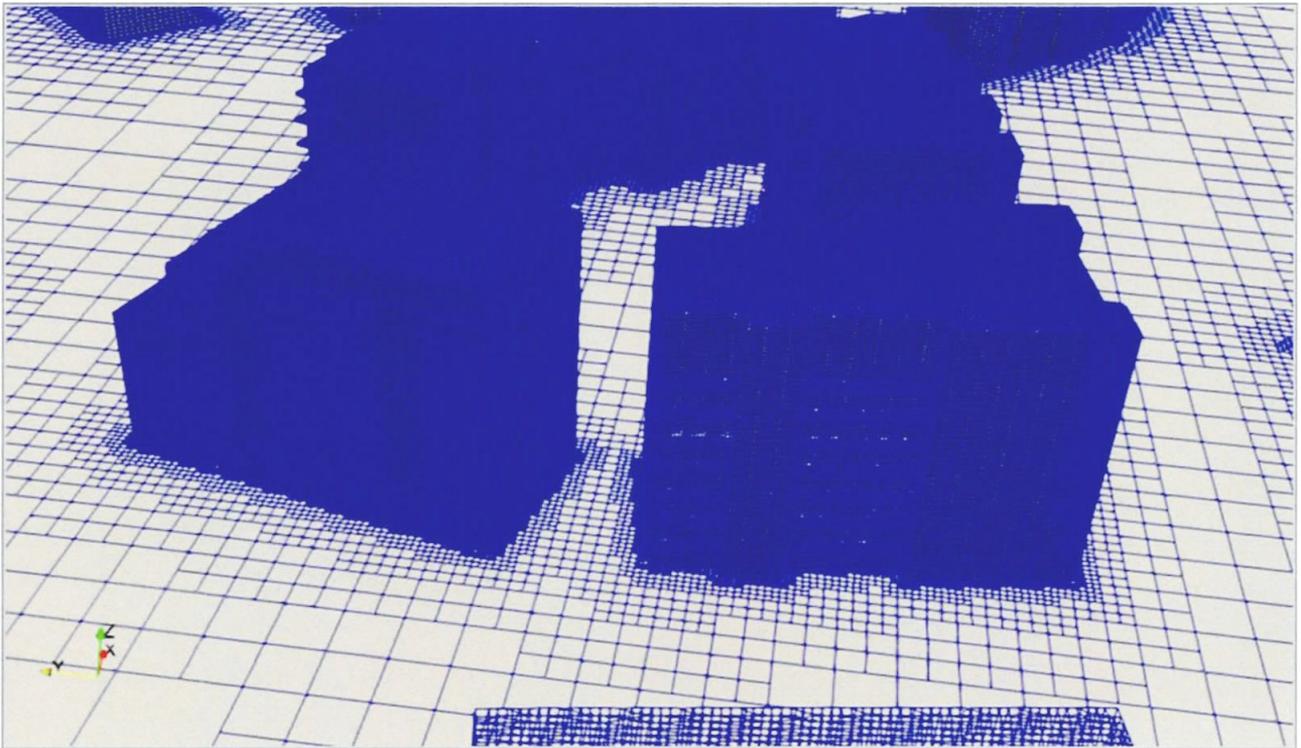
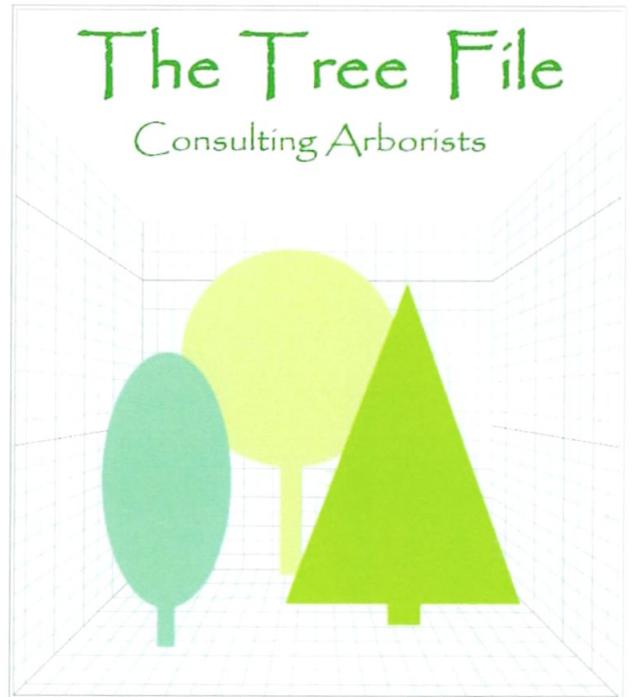


Figure A.4: Computational Mesh Utilized for the CFD Model



## APPENDIX 14.1

### Arboricultural Report



**Arboricultural Report**  
**Proposed Development at**  
**Swift Square**  
**Northwood**  
**Santry**  
**Dublin 9**  
**May 2023**

**The Tree File Ltd**  
**Consulting Arborists**  
**4 Mulberry Court**  
**Castleknock**  
**Dublin 15**  
  
**086-3819011**



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<u>Section</u>	<u>Subject</u>
1	Report Summary
2	Introduction
3	Site Description
4	Pre-Development Arboricultural Scenario
5	Planning Scenario in Respect of Tree
6	Other Legislative and Legal Constraints
7	Construction Activities and their Effect on Trees
8	Nature of Project Works
9	Development Related Impacts and Concerns
10	Design Iteration and Arboricultural Considerations
11	Identification of Arboricultural Impacts on Trees
12	Tree Retention and Loss
13	Tree Protection Within the Scope of a Development
14	Preliminary Management Recommendations
15	Bibliography
A1	<u>Appendix A1 – Arboricultural Method Statement</u>
A2	<u>Appendix A2 - Tree Survey</u> Table 1 – Tree Survey Data

### Associated Drawings

This report is for reading in conjunction with the drawings noted below

<u>Drawing Title</u>	<u>Drawing Subject</u>
1) <b>Swift Square Tree Constraints Plan (Main Site and North)</b>	<b>Tree Constraints Plan</b> A plan depicting the predevelopment location, size, calculated constraints, and simplified tree quality category system
2) <b>Swift Square Tree Impacts Plan (Main Site and North)</b>	<b>Tree Impacts Plan</b> This plan represents the effects of the proposed development works on the above tree population and depicts trees to be retained and removed.
3) <b>Swift Square Tree Protection Plan (Main Site and North)</b>	<b>Tree Protection Plan</b> This plan represents the location and extent of tree protection measures required during the construction phase of works.

# **1 Report Summary**

- 1.1 The tree population associated with the site is predominantly young. A clear majority are less than 20 years old, with planting periods ranging from circa 2008 for the largest specimens, through to circa 2019 for the smallest.
- 1.2 While most of the trees associated with the site are in broadly good condition, some are not. This is particularly the case regarding the remnant of an earlier planting associated with the proposed temporary parking area to the northwest of the main site. Here, many trees are damaged and all have been extensively disturbed by prior attenuation works.
- 1.3 The broader site area is the subject of a tree preservation order, enacted in 1987. All trees in the proposed development area are of age which means they were planted substantially after the order was raised.
- 1.4 Because of the nature and scale of the proposed development and its inclusion of substantial excavations to facilitate a large basement structure it will not be possible to retain the majority of the site's existing vegetation or trees. Only "Tree Group H" will be retained.
- 1.5 Tree Group H exist in raised planters, in a broader paved area. Construction phase tree protection will comprise simple hoarding-off of the trees to prevent inadvertent damage. This will be accomplished in line with the "Arboricultural Method Statement" at "Appendix 1" of this report, and the accompanying "Tree Protection Plan".
- 1.6 Considering the small stature of the material encountered on the site, there is some potential for uplifting and relocation. Equally, it should be appreciated that the material existing today can be easily replaced with readily available new tree stock, thereby making replacement and the creation of a no-loss scenario within the broader area, a feasible proposition.
- 1.7 Ultimately, the proposed development will see the interim loss of nearly all existing vegetation from the site area.

## 2 Introduction

2.1 This report was commissioned by-  
**Cosgrave Property Developments Ltd.**

This report was prepared by-  
Andy Worsnop B.Sc. Env Mngt, Tech Arbor A, NCH Arb (PTI LANTRA)  
**The Tree File Ltd**  
Ashgrove House  
26 Foxrock Court  
Dublin 18  
D18 R2K1

### Report Brief

2.2 An Arboricultural report has been requested in respect of the proposed development. As "BS5837: 2012 Trees in Relation to Design, Demolition and Construction – Recommendations" is the accepted framework for such reports, its composition, inclusions and recommendations are followed as a general basis for such reporting.

### Report Context

2.3 This report includes an Arboricultural review of the proposed development project. The report includes an assessment of the sites existing tree population within its current context. The report assesses their potential for sustainable retention in the post-development scenario. The report also describes the likely effects and repercussions of the development and construction process upon those trees. It also provides information regarding the necessary tree protection and the avoidance of damage to trees during the construction process, necessary to achieve sustainable tree retention.

2.4 This assessment summarises the Arborist's findings and recommendations. These findings were developed after reviewing the proposed project details provided by the design team, and after an evaluation of trees as defined and described in the tree survey at "Appendix 1". This report is not intended as a critique of the proposed development but is an impartial assessment of the development implications relating to the sustainable retention of trees, whether that be any, some, or all trees. This report is for planning purposes only and may be deficient for construction phase use.

## **Report Limitations**

- 2.5 This report relates to the Arborist's interpretation of information provided to him before the report compilation and gained by him during the undertaking of the site review and tree survey. The site review data is subject to the limitations set out under "Inspection and Evaluation Limitations and Disclaimers" in "Appendix 1" of this report. The findings and recommendations made within this report are compiled based on the knowledge and expertise of the inspecting Arborist.
- 2.6 The "Implication Assessment" element of the report builds on assumptions and estimates, particularly in respect of how construction works might proceed on a day-to-day basis and appreciates the "design" stage of the project, as opposed to "detail design" or "construction" detail.
- 2.7 Accordingly, this assessment is premised on all its elements/recommendations, and the omission or alteration of any part of it, particularly the application of tree protection methodologies, can radically alter outcomes regarding sustainable tree retention.

### **3 Site Description**

- 3.1 The site area makes up part of the broader Northwood development area, located within the original Santry Demesne.
- 3.2 The site area includes areas of existing car park, areas of paving, areas of prior construction activity and associated landscapes.
- 3.3 The site area is of irregular shape but is broadly level. At the time of surveying, the site area showed no evidence of drainage issues.

### **4 Pre-Development Arboricultural Scenario**

- 4.1 The main site area supports numerous young trees, none exceeding 6.00 metres in height and a majority being in the order of 4.50 to 5.00 metres. Review of Google Earth imagery shows that some trees were in situ in 2008, other trees had been installed as late as 2019.
- 4.2 The species encountered include Oak, Horse Chestnut, Lime, Beech, and Himalayan Birch, together with significant plantings of Hornbeam. While many trees are planted within an open landscape context, others, particularly in relation to the Hornbeams to the south of the site, are associated with raised planters.
- 4.3 A clear majority of the trees reviewed were found to be in good condition. In respect of the Hornbeams to the south of the site, not was made of some variability in growth rates and vigour levels.
- 4.4 The specimens encountered included no rare or unusual species. Many of the trees offered the potential to develop into significant trees over time.
- 4.5 While generally healthy and offering potential for the future, the current visual significance of the trees is limited to their local environs in line with their small stature.
- 4.6 To the north-west of the site and in the area of the proposed temporary car park, we find a limited tree population. The area comprises raised ground circa 300 – 400 mm above the wooded area outside (north of) the plinth-railed boundary. The area has been used as storage facilities there is much evidence of widespread disturbance and construction-related activity, presumed to be associated with the recently installed attenuation facilities. A clear majority of the area is heavily disturbed with large areas filled with drainage-related sludge. The trees associated with this area offer little sustainability and should be considered for replacement rather than retention.

### **5 Planning Scenario in Respect of Trees**

- 5.1 Planning guidance has been gained from two principal documents including “Fingal Development Plan 2023-2029” and “The Forest of Fingal - A Tree Strategy for Fingal”
- 5.2 Trees, hedges, and woodlands are often included in development plans as important elements of green infrastructure, which provide a range of environmental, social, and

economic benefits. Trees, for instance, help improve air and water quality, mitigate climate change, and provide habitat for wildlife. Hedges also provide a habitat for wildlife and help prevent soil erosion. Woodlands, on the other hand, provide recreational opportunities, help maintain biodiversity, and contribute to carbon sequestration. In the context of development plans, the protection, preservation, and enhancement of trees, hedges, and woodlands are often addressed through specific policies and guidelines.

- 5.3 Trees beautify and shelter wildlife. They improve air quality in cities and provide wildlife homes while beautifying a region. The Forest of Fingal - A Tree Strategy for Fingal outlines the Council's street tree planting, management, and maintenance policies. Trees are increasingly valued as green infrastructure as well as aesthetics and placemaking. Trees improve air quality and surface water management in metropolitan areas by up to 60%. Trees mitigate climate change and decarbonise cities. The Tree Strategy aims to “protect and enhance Fingal’s trees to maximise both the benefits they offer and the character they bring to the County to ensure a greener, healthier Fingal for now and future generations”. The strategy outlines policies, goals, and activities to achieve this vision.
- 5.4 Within the “Tree Strategy” document, particular protection is drawn to section 4.8 which discusses tree protection and, with particular regard to planning applications for new construction projects, to section 4.9, planning and design guidelines for trees and woodlands. Within this section, particular note is made of section 4.9.2, protection of existing trees on development site which stipulates the application of “BS 5837 – 2012, Trees in Relation to Design, Demolition and Construction – Recommendations” for the effective preservation of trees within the development context. Also, section 4.9.3 goes on to stipulate that a “Tree bond” may be placed on trees intended for protection to act as a guarantee of successful and ongoing protection throughout the development process. The above issues are highlighted again in “Section 5” and particularly under section 5.2, which describes an objective of – “protection and retention of existing trees”.
- 5.5 While trees are mentioned widely throughout the development plan, the emphasis is particularly broad in respect of Sections 9 “Green Infrastructure and Natural Heritage” and Section 14, “Development Management Standards”
- 5.6 Within Section 9, “Green Infrastructure and Natural Heritage”, trees, hedges and woodlands gain extensive mentioned in this particular section. Objective GIN/AH023 – policies relates the objective to implement the Forest of Fingal – a tree's strategy for Fingal, keeping it green.
- 5.7 Throughout this section, great emphasis is placed on the value of trees, woodlands and hedgerows both in their individual right but also in respect of the provision of green and ecological corridors.

- 5.8 Section 9.6.9, protection of trees and hedgerows in this section, a number of specific policies and objectives are outlined including policies GINHP 21 protection of trees and hedgerows, GINHP 22 – tree planting and objectives GINH045 hedgerow categorisation, objective GI NHO46 tree removal, Objective GI NHO47 woodland development schemes, objective GI NH048 – wildlife act and roads act
- 5.9 Section 9.6.10, protected trees (Tree Preservation Orders) stipulates the ability to apply as well as existing tree preservation orders within the county area. Specific objectives include GINH049 – tree preservation order review outlining the desire to review existing tree preservation orders within the county. GINH050 – tree preservation orders outlines the possible future use of tree preservation orders to protect other important trees or groups of trees or woodlands.
- 5.10 Within Section 14, “Development Management Standards”. This section deals with the protection of trees during construction, attention is drawn to section 14.9.7, bonds relating to the provision of a bond or cash lodgement to be used by way of guarantee of the satisfactory completion and protection of trees during construction.
- 5.11 Objective DMS031 – infill development also specifically mention trees and landscaping with regard to the retention of the physical character within such developments. In respect of private open space (14.13.3.3) note is made of objective DMS070 – replacement of trees outlining the requirement for replacing trees removed from residential areas where appropriate and as soon as resources allow.
- 5.12 Section 14.18.1, “Tree Policy” acknowledges the importance and value of trees to the landscape. Section references the Forest of Fingal – Tree strategy for Fingal which sets out the councils policies in respect of trees and woodlands. The section supports a number of tree related objectives including DMSO125 – management of trees and hedgerows, DMSO126 – protection of trees and hedgerows during development, DMSO128 – demarcation of town land boundaries, DMSO129 – tree selection, DMSO130 – planting of large canopy trees, DMSO131 – street tree planting plans, DMSO132 – planting along distributor roads, DMSO133 location of new trees, DMSO134 – site summary of specimen removal retention and planting, DMSO135 tree planting and subsurface archaeology, DMSO136 tree selection within developments and DMSO137 – replacement and removal of trees. Of the above, particular attention is made of DMSO126 – protection of trees and hedgerows during development that stipulates tree protection in accordance with BS 5837 – 2012, trees in relation to design, Demolition and Construction – Recommendations.
- 5.13 In respect of natural heritage and particularly biodiversity, note is made of objective DMSO140 – protection of existing landscape that includes the retention of large trees and hedgerows. Section 14.18.2.4 ecological corridors and steppingstones including trees and hedgerows also make specific mention of trees hedges and woodlands the importance of trees is also noted with regard to any proposals relating to designed

landscapes – historic gardens, domains knees and country stage as defined under section 14.19.4.

5.14 Elsewhere in the development plan, various mentions are made of trees, woodlands and hedges. Examples of these include:-

- Under section 2, planning for growth, core strategy, settlement strategy, note is made of numerous references to trees, hedges and woodlands. These include core strategies CS 010, CS 054 and CS 061 orientated toward the conservation of boundary feature hedges and tree lines, including the effect of new entrances. There are also numerous objectives orientated toward the retention and conservation of trees and hedges including objectives GI 9, GI 18, GI 19, GI 20, GI 21, SW 6, GI 3, GI 4, and GI 29.
- In Section 3 -Sustainable Place Making and Quality Homes, note is made of Objective SPQH039 notes the retention of features within infill development including landscape features such as trees. Objective SPQH055 requires that the design of new house access be such as to avoid the need for the removal of longer significant stretches of roadside hedging and trees. Similar relates to objective SPQH069 that stipulates the new vehicular entrances must limit the loss of hedgerows and trees and that such losses must be replaced with the same type of boundary, specifically using native species for replacement.
- In Section 4, “Community Infrastructure and Open Space”, particular attention is drawn to Objective CI OS 052 – Trees to protect and preserve and ensure the effective management of trees in groups of trees.
- Under section 5, “Climate Action”, sub-section 5.5.8, “Nature-based Solutions and Green Infrastructure”, trees, the planting of trees and the value of trees with regard to carbon capture are specifically noted.
- In Section 6, “Connectivity and Movement”, Objective CMO48 – roads and streets and green infrastructure outlines a desire for the planting of native trees hedgerows and pollinator species in medians and on roadside verges where appropriate.
- In Section 10, “Heritage, Culture and Arts”, trees, groups of trees and woodlands are mentioned concerning their value in respect of historic designed landscapes as well as how climate change may affect the retention of older, mature planting schemes.
- Trees get minor mention in Section 11, Infrastructure and Utilities, normally concerning design detail for new plantings in respect of sustainable urban drainage systems.

5.15 Note is made that the site area is within the Northwood masterplan Area. The site area is adjoined by map-based tree symbols, representing a local objective to protect and preserve trees and woodland. Additionally, the Santry Demesne area is the subject of the “Dublin County Council Tree Preservation (Santry Demesne, Santry) Order 1987”. This tree preservation order can only apply to trees existing at the time of its writing, and therefore would not apply to any of the young trees tat are the subject of this review.

## **6 Other Legislative and Legal Constraints**

- 6.1 Under the Forestry Act 2014, the felling of a tree standing in a county area requires a felling license unless the trees are exempted under Section 19 of the Act. An exemption applies where trees are being felled in line with a specific detail of a grant of planning permission.
- 6.2 Some "Section 19" exemptions are not applicable to the development scenario, for example, those applying to fire control, forest survey or gene pool protection relating to horticultural use or Christmas tree production.
- 6.3 Some exemptions are pertinent to the development scenario, particularly Section 19(1)(M)(ii), where "the removal of which is specified in a grant of planning permission".
- 6.4 Other non-specific exemptions may also be applicable, including-
- Trees standing in an urban area.
  - Trees within 30 metres of a building (other than a wall or temporary structure), but excluding any building built after the trees were planted.
  - Trees removed by a public authority in the performance of its statutory functions.
  - A tree that is, in the opinion of the planning authority, dangerous on account of its age, condition or location.
  - A tree within 10 metres of a public road and which, in the opinion of the owner (being an opinion formed on reasonable grounds), is dangerous to persons using the public road on account of its age or condition.
- 6.5 The above derogations do not apply where-
- The tree is within the curtilage or attendant grounds of a protected structure under Chapter 1 of Part IV of the Act of 2000.
  - The tree is within an area subject to a special amenity area order
  - The tree is within a landscape conservation area under section 204 of the Act of 2000.
  - The tree is within a monument or place recorded under section 12 of the National Monuments (Amendment) Act 1994, a historic monument or archaeological area entered in the Register of Historic Monuments under section 5 of the National Monuments (Amendment) Act 1987, or a national monument in the ownership or guardianship of the Minister for the Arts, Heritage and the Gaeltacht under the National Monuments Acts 1930 to 1994 or is within a European Site or a natural heritage area within the meaning of Regulation 2(1) of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)
- 6.6 For further clarification, contact should be made with Forest Service (Department of Agriculture, Fisheries and Food). The Felling Section of the Forest Service is based in Johnstown Castle, Co. Wexford

6.7 Other legislation may affect tree cutting and felling. Particular note should be made of the "Wildlife Act 1976 (as amended), as well as the EU Habitats Directive. These offer protection to animals, including Bats that often roost or even breed in trees. The protection afforded by the above legislation means that particular care must be taken in the pruning or felling of trees that may contain Bats. For this reason, specific specialist advice should be sought.

## **7 Construction Activities and their Effect on Trees**

7.1 Retaining trees takes up space. There is a big difference between physically preserving a tree and ensuring its future survival. Sustainable tree retention often depends on the extent and nature of any possible protection from construction activity.

7.2 Like all living things, trees are highly dependent on their environment in which they exist. A tree's continuity in supplies of water and nutrients from the soil. Any long-term change in ground conditions can easily affect a tree's metabolism, health, and sustainability.

7.3 Particularly, development and construction activities can easily damage the soil environment. Removing, disturbing or denaturing soil can irreparably damage tree roots and can render the soil incapable of supporting plant root function. Most modern construction requires large plants, equipment, and vehicles. Such machinery causes soil profile destruction and compaction that denatures the soil.

7.4 Where the above issues occur within the minimum "root protection area" as defined by "BS5837-2012", the tree's sustainability and safety may be compromised.

7.5 Sustainable tree retention must accept changing contexts and increased management in the future. Where rates of occupation and use increase, then any retained trees have a potential to cause harm or damage. This issue may be exacerbated where shelter-loss and exposure occur regarding the retention of individual trees.

7.6 Retained trees should be considered in respect of shadow-cast, light admission, and view-blocking. Wind patterns can affect leaf shedding, causing drifts and accumulations creating management issues around drains and gullies, or the creation of slippery surfaces.

## **8 Nature of Project Works**

8.1 The proposed development comprises a large-scale residential (LRD) development on a site off Northwood Avenue, Santry, Dublin 9, generally incorporating the existing surface car parking area associated with Swift Square Office Park and adjacent lands.

In summary, the proposed development will consist of the following:

- Site clearance, including the removal of all structures on site part of existing surface car parking;

- Relocation of existing surface car parking spaces catering for Swift Square Office Park personnel to the new basement accessible via a new ramp off the local road from Northwood Avenue, and the new undercroft parking area with access at street level off the local road to the north of the site;
- Construction of 3 no. apartment blocks (1, 2 and 3) over a partially shared podium structure, with heights ranging from 4 to 9 storeys, comprising 192 no. apartment units (4 no. 1-bedroom units and 188 no. 2-bedroom units), ancillary residential uses and associated car and bicycle parking; and,
- Provision of public and communal open spaces, public realm, boundary treatments, landscaping and lighting; refuse storage, associated drainage, attenuation and services; temporary car parking area, construction access, and basement access route and ramp; and all associated site development works.

8.2 Considering the scope and scale of the proposed development, then many of the issues dealt with at "Construction Works and Trees" above could apply if trees are not protected during construction works, including-

- a) Direct conflict with proposed structures, thus requiring tree removal.
- b) A partial conflict where the "Root Protection Area" is encroached upon by works or ground amendments and cannot be preserved/protected in full.
- c) Environmental damage e.g. compaction, capping, sealing – changing the existing ground environment to one that can no longer support tree root function.
- d) Construction activity and the use of large plant and machinery that can denature the ground.
- e) A change in site context or a change in occupation or use which makes a tree unsuitable for retention.

8.3 Considering the scale of the development and the issues outlined in 8.2 above, then it is obvious that many trees cannot be retained.

## **9 Development Related Issues and Arboricultural Concerns**

9.1 In line with the young age of many of the trees associated with the site have substantial potential for growth and size increase over time. Accordingly, their suitability for retention and sustainability over time will be dependent on the context within which they might be retained. Note is made that the proposals will see a significant change to that context.

9.2 In respect of the proposed development works, the greatest issues affecting trees has been the necessary extent of excavation, the consumption of site space and encroachment on trees. This will inevitably require the loss of all trees.

## **10 Design Iterations and Arboricultural Considerations**

10.1 This report relates to clause 4.4.2.1 of BS5837-2012 in that its finding relate to a predefined concept that was issued for review. Accordingly, the report assesses

Arboricultural implications and impacts of the proposals, making recommendations in respect of tree protection relating to those trees that might be retained and as outlined below.

## **11 Identification of Development Impacts to Trees**

- 11.1 The expected tree impacts have been represented graphically on the tree impacts drawing "**Swift Square Tree Impacts Plan**" (Main Site and North) and within the narrative of this report. This drawing combines the tree constraints plan information with the current stage development details, including the architectural and services layouts below, thereby allowing for simple direct comparisons between the existing site context and the development proposals regarding new structures.
- 11.2 In this drawing, trees denoted with "Broken Pink" crown outlines are to be removed, and those denoted with "Continuous Green" crown outlines are to be retained.
- 11.3 Detail of the development proposals were gained from drawings provided by-
- McCrossan O'Rourke Manning Architects - Architectural Design
  - Kevin Fitzpatrick landscape Architecture – Landscape Plans
- 11.4 The evaluation is primarily based on minimum protection ranges as defined in paragraphs 4.6.1, 4.6.2 and 4.6.3 of BS5837:2012. Any structure, action or apparent need to enter or otherwise disturb/convert the "root protection area" of a site tree has been considered likely to have a negative impact, with the potential to render a tree wholly unsuitable for retention, unsafe or unsustainable.
- 11.5 Where applicable, this assessment attempts to consider both direct and indirect implications. The assessment is based on perceived construction requirements and how a tree will likely interact with the development. The assessment appreciates issues including growth, hazard development, light blockage and other social concerns regarding the changing context, including its effect on tree amenity value.

## **12 Tree Retention and Loss**

- 12.1 The drawing "Swift Square Tree Impacts Plan" comprises the tree survey drawings overlaid by the development drawings, thus providing a graphic representation of the relationship between tree constraints and the development elements. In this drawing, the trees that will be removed, are highlighted in "pink dashed" outlines.
- 12.2 As can be seen from the tree impacts plan, the proposed development will, with the exception of "Tree Group H", result in the loss of all other trees and associated vegetation from the site.

### **13 Tree Protection within the Scope of a Development**

- 13.1 Tree retention on the development will be limited to “Tree Group H”. These trees will be hoarded-off for the duration of works, in line with the “Arboricultural Method Statement” at “Appendix 1” to this report, and in accordance with the “Tree Protection Plan”.

### **14 Preliminary Management Recommendations**

- 14.1 As tree retention is limited to “Tree Group H”, then tree management measures will be limited to the maintenance of these three trees.

### **15 Bibliography**

- 15.1 British Standards Institution (2010) BS 3998:2010: Tree Work - Recommendations. London: British Standards Institution.
- 15.2 British Standards Institution (2012) BS 5837:2012: Trees in Relation to Design, Demolition and Construction - Recommendations. London: British Standards Institution.
- 15.3 Jackson, R.B et al (1996) A Global Analysis for Root Distribution in Terrestrial Biomes *Oecologica*, 108 (1996) pp389-411, Springer Verlag
- 15.4 Lonsdale, D. (2005) Principals of Tree Hazard Assessment and Management, London, TSO
- 15.5 Mattheck, C. and Breloer, H. (1994) The Body Language of Trees, London, TSO
- 15.6 Roberts, J. and Jackson, N. and Smith, M. (2006) Tree Roots in the Built Environment, London, TSO
- 15.7 Strouts, R.G. and Winter, T.G. (1994) Diagnosis of Ill-Health in Trees, London, HMSO
- 15.8 Teagasc (2021) Development of ash tree genetic resources, <https://www.teagasc.ie/crops/forestry/research/ash-resistance-to-ash-dieback/>
- 15.9 Woodland Trust (2021) Ash Dieback, <https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/tree-pests-and-diseases/key-tree-pests-and-diseases/ash-dieback/>

## **A1 Appendix 1 - Arboricultural Method Statement (and Tree Protection Plan)**

### **Method Statement Outline**

- A1.1 Only three trees are to be retained across the site. The tree protection of these trees will comprise simple hoarding-off to prevent inadvertent damage during the construction period.
- A1.2 This method statement intends to provide guidance in respect of tree protection on a development site. This is a broad and prescriptive method statement, intended to provide general advice and guidance in respect of trees and tree protection on a typical development site, dealing with issues known at the planning stage.
- A1.3 Any inability to conform to the recommendations of this method statement or the associated tree protection plan could readily change the sustainability of trees and/or their suitability for retention.

### **Drawings**

- A1.5 This Arboricultural Method Statement must be read with the associated "Tree Protection Plan" drawing, "Swift Square Tree Protection Plan". The "planning stage" drawing must be updated for "Construction" stage purposes, to include tree protection ranges/dimensions as defined for that tree within the tree survey table or unless otherwise defined by the project Arborist.

### **Method Statement Use**

- A1.6 This Method Statement should be used under the direct guidance of the project Arborist. As limited "construction stage" detail was available at planning stage, it may require amendment and adjustment to address construction stage issues.

### **Amendments and Modifications to Tree Protection Plan**

- A1.7 Any amendment to the tree protection plan must be agreed with the project Arborist, including the adoption of specific methodologies and/or procedures and structures for access into/use of certain parts of the above defined "Construction Exclusion Zones". Such procedures, including the provision of suitable ground protection may allow for the relocation of the "Construction Exclusion Fencing" to provide access to and across the previously protected areas.

### **Works Related Impacts**

- A1.8 In respect of any necessary and unavoidable structures/works required within or entry into the "RPA" zone, all efforts must be made to minimise impacts. Aerial issues may

require "access facilitation pruning" or clearance pruning. Subterranean works that require excavation must, by design, location, and action, minimise impacts on trees.

### **Tree Works Specification Updates**

A1.9 Many of the tree management recommendations stipulated within the "Preliminary Management Recommendation" section of the primary tree survey, relate to the "as was" site scenario. Because of changing site contexts, these may no longer apply and may require modification to account for the changes that the built project will cause.

## **General Method Statement**

### **1.0) Overview and Implementation**

- 1.1 **Prior to any site works or construction/demolition-related works or access, this method statement will be addressed and discussed by all members of the construction team management.**
- 1.2 The project Arborist or another suitably qualified person will oversee the application of all tree protection measures and any necessary modifications to this Method Statement (any issues as may have arisen in respect of planning conditions or details as may have changed between the design stage) to provide a basis upon which tree protection will be managed on the construction site.
- 1.3 Any situation that requires entry into the "root protection zones" of a tree intended for retention must be brought to the attention of the Project Arborist regarding the adoption/amendment of suitable tree protection measures.
- 1.4 As unforeseen tree losses may compromise project planning permissions, it is imperative that issues relating to tree protection and/or tree damage be brought to the immediate attention of the project Arborist for review and possible discussion with the relevant planning authority.

### **2.0) Works Sequence**

- 2.1 No construction related works or mechanised site access will occur until the agreed level of tree protection, in accordance with the "Tree Protection Plan", is completed.
- 2.2 Prior to the commencement of construction works, all "Construction Exclusion" and "Protective" fencing must be erected and "signed-off" as complete, by the Project Arborist.
- 2.3 Only on completion of all construction works will any/all tree protective measures be removed, and only then in a manner, that does not compromise the "Protection Zones". Such works must be agreed and overseen by Project Arborist.

- 2.4 At construction works completion stage, all retained trees will be reviewed regarding their condition and longer-term management recommendations and regarding site hand-over.

### **3.0) Tree Protection**

- 3.1 All tree protection measures and locations must be agreed, overseen, and verified by the Project Arborist prior to works commencement.
- 3.2 All construction, works or access areas must be enclosed and defined by protective fencing, this comprising the "Construction Exclusion Zone" based upon drawings "Swift Square Tree Protection Plan" (Construction Stage version). Such a fence must be fit for purpose and commensurate with the nature of activity expected upon the site and should comply with "Section 6.2" of BS5837: 2012. The fence should be affixed with notification signs such as "TREE PROTECTION AREA - KEEP OUT"
- 3.3 Unless specifically stipulated by the project Arborist, the default minimum range of the protective fencing from a tree is the range stipulated for that tree within the "RPA" (root protection area) column of the original survey.
- 3.4 Structures such as "lock-ups", offices or other temporary site building, not requiring excavation or underground ducting, might be positioned such as to comprise part of the "Construction Exclusion Zone" fencing. All remaining fencing must be continuous with such features and effectively prevents access to protected ground.
- 3.5 No amendment, alteration, relocation, or removal of the tree protection fencing shall occur without prior liaison and approval from the Project Arborist.

### **4.0) Works within "RPA" Zone**

- 4.1 Only works and construction practices, agreed with the Project Arborist prior to commencement, will be allowed in the "RPA" area.
- 4.2 All works will be undertaken under the supervision and guidance of the Project Arborist who will have the authority to stop works if activities are considered such as to have the potential to damage trees.
- 4.3 Preference must be given to manual labour and techniques within the fenced "RPA" zone.
- 4.4 On completion of the required works, the area will be inspected by the Project Arborist regarding the reinstatement of the original protection and the relocation of the protective fencing to a position relating to the original "RPA" area.

### **5.0) Tree Management and Works**

- 5.1 All tree works should be undertaken under the guidance of the project Arborist

- 5.2 The primary site clearance and felling should be undertaken at the earliest stage of the overall development works, to enable the re-assessment of all ostensibly retainable trees and the updating of the "Preliminary Management Recommendations" to account for context changes and construction access and/or other issues coming to light.
- 5.3 All Tree Works must adopt safe work procedures and must be undertaken by staff suitably trained for the purpose at hand and compliant with all legislative, safety and insurance requirements.
- 5.5 All additional works will be agreed with the local authority and/or other stakeholders and applied at the earliest possible opportunity.
- 5.6 On completion of site works, the retained tree population will be reviewed and re-evaluated regarding its ongoing condition and the likely requirements of any ongoing or future monitoring or management needs.

## **6.0) Ancillary Precautions**

- 6.1 The methodologies as set out in this document apply to all undertakers of work upon or adjoining the site as may require access to the "Construction Exclusion Zone" or the "RPA" area of any tree.
- 6.2 This document will be disseminated to all persons requiring access to the work site, with all persons undertaking works either before or after the principal development (site investigation works, Landscape Contractors) are subject to the above requirements
- 6.3 Works outside the "Construction Exclusion Zone" must be controlled to create no potential secondary hazard to tree health. Large loads accessing the site must be reviewed regarding clearance and potential tree damage. Care must be taken regarding materials that may contaminate the ground. No concrete mixings, diesel or fuel, washings or any other liquid material may be discharged within 10 metres of a tree. No fires can be lit within 5 metres of any tree canopy extent. No tree will be used for support regarding cables, signs etc.
- 6.4 Any circumstances that become known whilst the development project is ongoing that either involves trees or access to/works within the construction exclusion zone must be brought to the attention of the Project Arborist for evaluation and advice regarding approach and methodology. The trees should be reviewed on a regular basis throughout the development process and on completion. At that time, additional recommendations regarding tree management may be required. Any issue that has the potential to affect site trees must be brought to the attention of the Project Arborist for review and comment.
- 6.5 It is possible that liaison/agreement will be required with the Local Planning Authority regarding compliance with, as well as the verification of the required tree protection measures.

## **A2 Appendix 2 - Tree Survey**

### **Nature of Survey**

- A2.1 The criteria put forward in "BS5837:2012 – Trees in Relation to Design, Demolition and Construction – Recommendations" have provided a basis for this report.
- A2.2 The data collected has been represented in table form as "Table 1" within "Appendix 1" of this report. This appendix includes a Survey Methodology, Survey Key, Survey Abbreviations, Condition Category Definitions and a brief resume of the typical application of Tree Protection measures as defined within the above standard and as relates to the "RPA" zones defined both within the survey table and on the "TCP" drawing.
- A2.3 The survey, its findings and management recommendations relate to the site and the conditions thereon at the time of the survey. It relates to a "do nothing" or "as is" scenario and intends to provide an impartial representation of the site's tree population, regardless of any possible development works. It is likely that changes in site usage, development or other environmental changes will require an amendment of any tree's potential retention status and its preliminary management recommendations, and in some instances, may require the re-classification of a tree's suitability for retention.

### **Drawing References**

- A2.4 The survey must be read with the "Tree Constraints Plan" drawing "1 Swift Square Tree Constraints Plan" regarding the representation of tree positions, crown forms, "RPA" extents and colour reference to category systems. Trees omitted from the supplied drawing may be "sketched in" to "1 Swift Square Tree Constraints Plan". Any such trees should be located and plotted by professional means to identify the constraints such trees have upon the site.
- A2.5 A green coloured outline represents each tree crown. It is scaled to represent the north, east, south, and west crown radii as denoted in the survey table. Each tree (categories A-green, B-blue, and C-grey only) have been apportioned a "Root Protection Area" (RPA see below) denoted as a dashed orange circle.
- A2.6 The development of a Tree Constraints Plan (TCP) provides a design tool regarding tree retention. Such a plan combines the topographical land survey drawing with additional information as provided by the tree survey. The aspects of the tree's existence recorded on the "TCP" are, firstly, the tree canopies, represented by the four cardinal compass point radii (Sp: R in survey Table 1). Secondly, and following paragraphs 4.6.1, 4.6.2 and 4.6.3 of BS5837: 2012, we represent each tree's "Root Protection Area" (RPA). For design purposes, it approximates the position of the tree protection fencing to be erected before the commencement of any site works, thus excluding all site

activities other than those dealt with by way of the "Arboricultural Implication Assessment" and "Arboricultural Method Statement".

A2.7 The "Tree Constraints Plan" (TCP) depicts the extent and location of constraints, placed upon the site by the trees. The "TCP" represents both the true canopy form (north, east, south, and west radii) but also the "RPA" as defined above. These constraints are provided to advise regarding the design and layout of a proposed development.

### **Survey Intent and Context**

A2.8 This document intends to highlight the extent and nature of the material of Arboricultural interest on the site in question.

### **Survey Data Collection and Methodology**

#### **The Survey**

A2.9 An earlier survey was updated in March 2021. This survey portion of the overall report is not an Implication Assessment though but provided some of the basic information regarding its compilation. The compilation of this survey was guided by the recommendations of BS 5837: 2012. This survey typically includes trees of stem diameters exceeding 150mm at approximately 1.50 metres from ground level. The survey relates to current site conditions, setting and context.

A2.10 Each tree in the survey has a consecutive number that relates directly to the survey text. Measurements are metric and defined in metres and millimetres. All trees referred to in the survey text have been measured to provide information regarding canopy height and canopy spread (north, east, south, and west radii), level of canopy base and stem diameter at 1.50 meters from ground level. The dimensions provided are intended to provide a reasonable representation of a tree's size and form. While efforts are made to maintain accuracy, visual obstruction, especially regarding trees in groups, requires that some tree dimensions be estimated only.

#### **Inspection and Evaluation Limitations and Disclaimers**

A2.11 The information set out in this report relates to the review of a tree population on the site in question. As such, the information provided is based on a general review of trees and does not constitute a detailed review of any one of the individual specimens. Such an evaluation (tree report) would require the gathering of substantially more information than that dealt with in this survey.

A2.12 The survey is not a safety assessment and the parameters reviewed within this survey context would be substantially deficient in extent to provide for a reliable safety assessment. The survey is intended to provide a general and qualitative review to assist in gauging the suitability of an individual tree for retention within a development context. All trees are subject to impromptu failure and damage. The assessment of risk

as may be presented by a tree requires the review of numerous factors more than those noted herein and as such, remains outside the scope of this document and any attempt to use the information herein for such purposes will render the information invalid.

A2.13 A competent and experienced Arborist has completed all inspection and tree assessment. The inspection involves visual tree assessment (Mattheck and Breloer 1994) only, which has been carried out from ground level. No below ground, internal, invasive, or aerial (climbing) inspection has been carried out.

A2.14 Trees are living organisms whose health, condition and safety can change rapidly. All trees should be re-evaluated regarding their condition on an annual basis or after substantial trauma such a storm event, other damage, or injury. The results and recommendations of this survey will require review and reassessment after one year from the date of execution. This survey does not constitute a review of tree or site safety. Attempts to use the contents herein for such purposes will render the contents invalid.

A2.15 Throughout the undertaking of the survey, several factors acted against the inspectors, contriving to reduce the accuracy of the survey.

### **Seasonality**

A1.16 Various surveys have been completed during different seasons. Some of the signs, typically symptomatic of ill-health or defect within a tree, may not have been available to view at the time of the survey or may have been obscured by seasonality related factors. Some of the fruiting bodies of various fungi, parasitic upon or causing decay or disease in trees, may have been out of season and unavailable to view. This survey can only comment upon symptoms of ill-health or defects visible at the time of the inspection.

### **Survey Key**

<b>Species</b>	Refers to the specific tree species
<b>Age</b>	Referred to in generalised categories including: -
Y - Young	A young and typically small tree specimen.
S/M - Semi-Mature	A young tree, having attained dimensions that allow it to be regarded independently of its neighbours but typically, would be less than 50% of its ultimate size.
E/M - Early-Mature	A specimen, typically 50% - 100% of ultimate dimensions but with substantial capacity for mass and dimensional increase remaining.
M - Mature	A specimen of dimensions typical of a full-grown specimen of its species. Future growth would tend to be extremely slow with little if any dimensional increase.
O/M - Over-Mature	An old specimen of a species having already attained or exceeded its naturally expected longevity.

V - Veteran An extremely old, veteran specimen of a species, usually of low vigour and typically subject to rapid decline and deterioration or of very limited future longevity.

**Tree Dimensions** All dimensions are in meters. See notes regarding limitation of accuracy.

**Ht.** Tree Height

**CH** Lowest canopy height

**N, E, S, W** Tree Canopy Spread measured by radii at north, east, south, and west

**Dia.** Stem diameter at approx. 1.50m from ground level.

**RPA** Root Protection Area, as a radius measured from the tree's stem centre.

**Con** Physical Condition

G Good A specimen of generally good form and health

G/F Good/Fair

F Fair A specimen with defects or ill health that can be either rectified or managed typically allowing for retention

F/P Fair/Poor

P Poor A specimen whom through defect, disease attack or reduced vigour has limited longevity or maybe un-safe

D Dead A dead tree

**Structural Condition** Information on structural form, defects, damage, injury, or disease supported by the tree

**PMR – Preliminary Management Recommendations** Recommendation for Arboricultural actions or works considered necessary at the time of the inspection and relating to the existing site context and tree condition. Works considered as urgent will be noted.

**Retention Period**

S – Short Typically, 0 -10 years

M – Medium Typically, 10 -20 years

L – Long Typically, 20 – 40 years

L+ Typically, more than 40 years

**Category System**

The Category System is intended to quantify a tree regarding its Arboricultural value as well as a combination of its structural and physical health.

Category U Particularly poor quality, dangerous or diseased trees that offer no realistic sustainability

Category A A typically a good quality specimen, which is considered to make a substantial Arboricultural contribution

Category B Typically including trees regarded as being of moderate quality

Category C Typically including generally poor-quality trees that may be of only limited value.

The above categories are further subdivided regarding the nature of their values or qualities.

Sub-Category 1 Values such as species interest, species context, landscape design or prominent aspect.