

High-Level Daylight, Sunlight and Overshadowing Statement

Etihad Campus

Manchester City Football Club

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ADMINISTRATION PAGE

Job Reference:	15366A1
Author:	Phillip Charhill
Email:	phillip@pagerpower.com
Telephone:	01787 319001

Reviewed By:	Cameron Sabouni; James Plumb
Email:	cameron@pagerpower.com; james@pagerpower.com

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Stour Valley Business Centre, Brundon Lane, Sudbury, CO10 7GB

T: +44 (0)1787 319001 E: info@pagerpower.com W: www.pagerpower.com

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EXECUTIVE SUMMARY

Report Purpose

Pager Power has been retained to assess the potential impact upon daylighting as a result of a proposed development located at the Etihad Stadium, off Alan Turing Way. This report explores the requirement for a detailed geometric assessment of daylight impacts with consideration of the assessment criteria as presented within the associated guidance. A concluding recommendation is made as to whether further assessment is recommended.

Assessment Conclusions

There is formal guidance produced by Building Research Establishment with regard to the maximum distance at which overshadowing impacts should be assessed. This is stated to be three times the height of the proposed development relative to the lowest window.

The maximum height of the proposed development is 16m above ground level. The assessment area is therefore 48m from the development footprint.

The assessment area has been mapped and examined for buildings for which an assessment of daylight impacts may be required.

Aerial imagery has been reviewed for existing buildings in addition to planning records for consented buildings.

No existing buildings for which daylight is a consideration have been identified within the assessment area.

Considering consented buildings, no significant impacts upon daylight received by the Stadium Hotel are predicted as a result of the proposed development considering the relative angles and heights of the buildings, see Section 3.3.3 for more detail.

No further assessment is recommended.

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ABOUT PAGER POWER

Pager Power is a specialist technical consultancy based in the United Kingdom and has been providing independent expertise on planning issues for solar, wind, and building developments for over 20 years.

Established in 1997, the company initially specialised in assessing the impact of wind turbines on radar systems. Pager Power has since expanded into a multidisciplinary technical planning consultancy that offers a comprehensive range of services and has supported renewable and building projects in more than 60 countries.

Pager Power's core competencies now include:

- Aviation and Radar;
- Daylight, Sunlight and Overshadowing;
- Glint and Glare;
- Shadow Flicker;
- Telecommunications.

Using proprietary modelling software, each study is tailored to the individual project, ensuring that results are relevant, defensible, and aligned with current national and international standards. The company also provides planning support and stakeholder consultation across all service areas, helping clients to understand constraints, explore potential mitigation options, and forge a path forward for their projects.

Pager Power's work helps our clients identify potential risks, inform project design, and support the decision-making process, and can provide support at any stage of a project, from initial feasibility through to completion. Pager Power's assessments – recognised for their objectivity, accuracy, and technical integrity – are designed to withstand legal scrutiny and trusted by developers and stakeholders alike.

1 INTRODUCTION

1.1 Introduction

Pager Power has been retained to assess the potential impact upon daylighting as a result of a proposed development located at the Etihad Stadium, off Alan Turing Way. This report explores the requirement for a detailed geometric assessment of daylight impacts with consideration of the assessment criteria as presented within the associated guidance. A concluding recommendation is made as to whether further assessment is recommended.

This report contains the following:

- Proposed building details;
- Explanation of daylight, sunlight, and overshadowing;
- Overview of relevant guidance;
- Assessment criteria;
- Conclusions and recommendations regarding further assessment.

1.2 Pager Power's Experience

Pager Power has undertaken technical assessments for solar, wind and building developments in the UK and internationally. Pager Power is experienced in assisting developers with the planning process and working with stakeholders to minimise the technical impact of developments.

1.3 Daylight, Sunlight, and Overshadowing Definitions

The definitions¹ of skylight, sunlight, and overshadowing are as follows:

- Skylight – the part of sky radiation capable of causing a visual sensation;
- Sunlight – the part of direct solar radiation capable of causing a visual sensation.
- Overshadowing – the effect upon skylight and sunlight at an observer's location, from neighbouring buildings or obstructions.

The term 'daylight' is used to refer to all visible parts of global solar radiation i.e. skylight and sunlight.

¹ These definitions are aligned with those used in BS EN 17037:2018 and BRE 209 (Site layout planning for daylight and sunlight).



2 PROPOSED DEVELOPMENT DETAILS

2.1 Site Details

A new theatre building is proposed for commercial purposes. The maximum height of the proposed development is to be no more than 16m above ground level. For the purposes of this assessment, it has been assumed the entire building footprint will be developed to the maximum height to provide a worst-case assessment of potential effects.

The site layout plan² is shown in Figure 1 below.

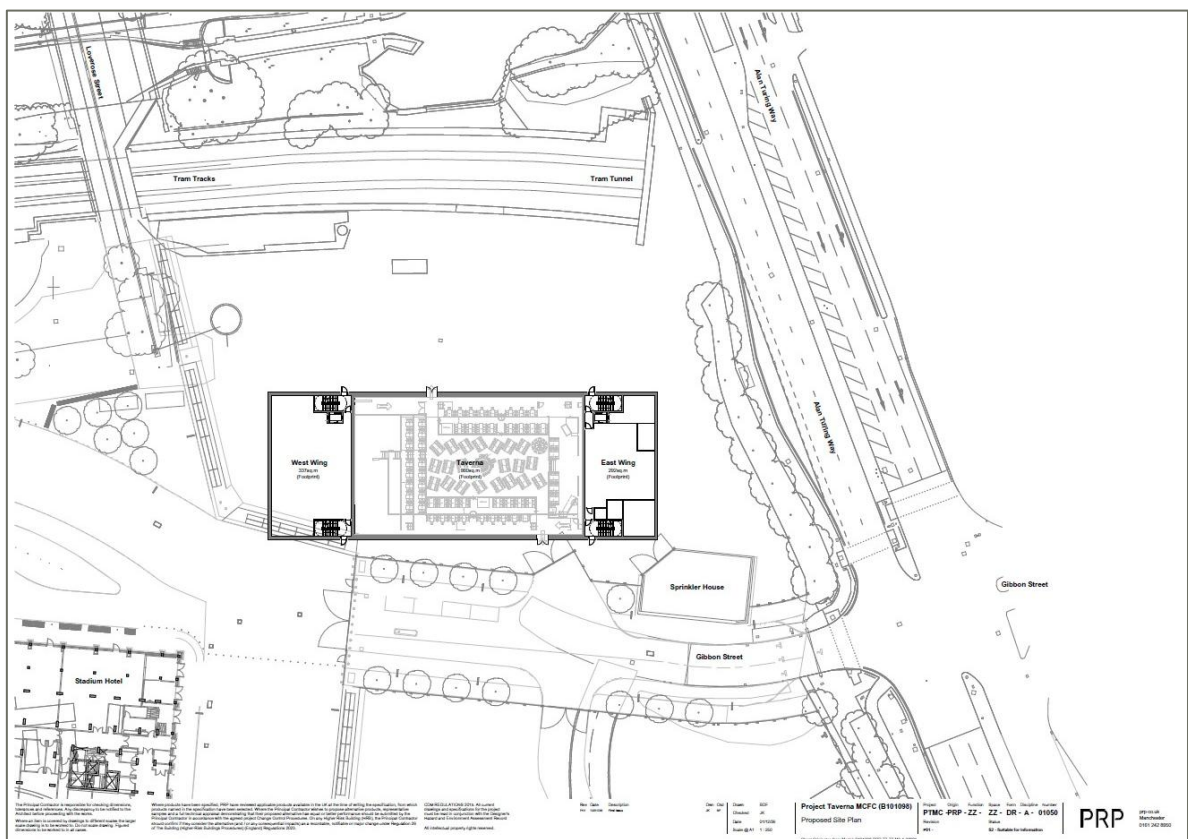


Figure 1 Site layout plan

² Source: PTMC-PRP-ZZ-ZZ-DR-A-01050 P01 Proposed Site Plan.pdf

2.2 Site Location

Figure 2 below shows the footprint (blue) of the proposed development overlaid upon aerial imagery.



Figure 2 Development footprint

2.3 3D Visualisation

Figure 3 below shows a 3D representation of the considered development in the context of the existing urban environment.



Figure 3 3D development representation

3 IDENTIFICATION AND ANALYSIS OF RECEPTORS

3.1 Guidance

The daylight, sunlight assessment methodology has been based on BRE 209³ and BS EN 17037:2018⁴. The methodology outlined in these documents is an industry standard and is widely accepted as the most relevant method of assessing overshadowing considerations in the UK.

Appendix A presents a review of relevant guidance with regard to daylight and sunlight overshadowing issues.

3.2 Assessment Areas

There is formal guidance produced by BRE with regard to the maximum distance at which overshadowing impacts upon skylight and sunlight should be assessed. This is stated to be three times the height of the proposed development relative to the lowest window.

The maximum height of the proposed development is 16m above ground level. The assessment area is therefore 48m from the development footprint.

This assessment area has been mapped and is shown by the yellow boundary in Figure 4 below.



Figure 4 Assessment area

³ Littlefair P.J. et al, 'Sun layout planning for daylight and sunlight', BRE BR209, (1991, Third edition 2022).

⁴ British Standards Institution, 'Daylight in buildings'.

3.3 Identification of Receptors

3.3.1 Approach

The surrounding area is reviewed to identify potential buildings and windows for assessment of daylight effects. This is carried out via an examination of the following resources:

- Aerial imagery and available 3D imagery;
- Google Streetview imagery;
- Local planning records⁵ for consented but non-constructed buildings.

3.3.2 Identified Buildings

The land bounded by the assessment area primarily consists of the stadium carpark to the south and west, Alan Turing Way to the east, and the tramline to the north.

Temporay construction buildings and tents have been identified on-site. These are not deemed to be permanent structures with a significant requirement for daylighting, and therefore do not merit assessment.

The closest existing building for which daylight is a consideration is the Serenity Stays rented accommodation building to the northeast. This building is approximately 64.9m at its closest point from the development footprint. The building is therefore outside the assessment area and no further assessment is recommended.

One consented building has been identified within the assessment area, the Staduim Hotel⁶, located to the southwest of the proposed development.

3.3.3 High-Level Assessment of Identified Buildings

From reviewing floor plans, the ground level and first floor of the hotel are for commercial purposes and therefore daylight effects are not applicable.

Hotel rooms are present on the second floor, located at a height of approximately 10.5m above ground level. An observer height above finished floor level of 1.5m has also been considered.

The proposed development is located wholly north of the portion of the hotel's footprint which sits within the assessment area, therefore no sunlight effects are predicted. Due to separation distance, the relative angles of an observer from the second floor, and the height of the proposed development, no significant effects upon skylight are expected.

Overall, no significant daylight effects upon the hotel are predicted as a result of the proposed development.

3.4 Conclusion

No significant impacts upon daylight are predicted as a result of the proposed development and no further assessment is recommended.

⁵ <https://pa.manchester.gov.uk/online-applications/>

⁶ Planning reference: 136763/FO/2023



APPENDIX A – OVERVIEW OF DAYLIGHT, SUNLIGHT AND OVERSHADOWING GUIDANCE

Overview

The most relevant guidance and regulations relating to Daylight, Sunlight, and Overshadowing are BRE 209 and BS 17037:2018.

An overview of this guidance is presented below. This is not a comprehensive review of the sources, rather it is intended to give an overview of the important parameters and considerations that have informed this assessment.

BRE 209

The third edition of BRE 209 was issued in 2022, updating the guidance to better follow the requirements of BS 17037. The document contains guidance regarding the provision of daylight within proposed developments, existing buildings nearby, and nearby development land. It is an advisory document, rather than formal policy, and there is recognition within the guidance that target values may be altered to meet the requirements of individual developments and surrounding environments. There is also recognition that for large developments in urban areas, it is infeasible to expect full compliance with the guidance in all situations. The document states⁷:

The guide is intended for building designers and their clients, consultants, and planning officials. The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design. In special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre, or in an area with modern high-rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings. Alternatively, where natural light is of special importance, less obstruction and hence more sunlight and daylight may be deemed necessary.

This guidance document, whilst not policy, is considered an industry standard and has been heavily relied upon to influence Pager Power's approach to daylight and sunlight assessment, as shown in Section 6 of this report.

⁷ BRE 209, 1.6

Assessment of Skylight

BRE 209 recommends assessment of windows for skylight which are part of the proposed development, and those which are part of nearby existing buildings. For windows in new developments, the guidance recommends an initial assessment of Vertical Sky Component (VSC) in order to determine the likelihood of adequate daylighting⁸:

Obstructions can limit access to light from the sky. This can be checked at an early design stage by measuring or calculating the angle of visible sky θ , angle of obstruction or vertical sky component (VSC) at the centre of the lowest window where daylight is required. If VSC is:

- at least 27% (θ is greater than 65° , obstruction angle less than 25°) conventional window design will usually give reasonable results.*
- between 15% and 27% (θ is between 45° and 65° , obstruction angle between 25° and 45°) special measures (larger windows, changes to room layout) are usually needed to provide adequate daylight.*
- between 5% and 15% (θ is between 25° and 45° , obstruction angle between 45° and 65°) it is very difficult to provide adequate daylight unless very large windows are used.*
- less than 5% (θ less than 25° , obstruction angle more than 65°) it is often impossible to achieve reasonable daylight, even if the whole window wall is glazed.*

BRE further recommends that daylight factor or interior illuminance can be calculated to ensure that new rooms comply with BS EN 17037.⁹

Regarding existing buildings, it is recommended that windows should be assessed where the horizontal distance to the new development is no more than three times the height of the development above the relevant window. Furthermore, windows may be assumed not to be significantly impacted if no part of the proposed development subtends more than 25° vertically from the window (relative to the horizontal). If a window falls within this range, the VSC can be calculated in order to give an indication of the likely effect of the proposed development upon skylight at the neighbouring window. In addition to the thresholds presented for proposed development windows, effects upon existing buildings can be considered with reference to the baseline scenario, with significant effects predicted where the post-construction VSC is less than 0.80 the baseline value (a 20% reduction).

The BRE guidance also recommends that the 'no sky line' is assessed where room dimensions are available for existing buildings.¹⁰ This quantifies the proportion of the working plane within a room (considered to be 0.85m in residential rooms and 0.7m in offices) which has direct sight of the unobstructed sky. It is not recommended that these calculations are undertaken where room and window dimensions are unknown or estimated.

⁸ BRE 209, 2.1.21

⁹ BRE 209, 2.1.22

¹⁰ BRE 209, 2.2.10



Assessment of Sunlight

Similarly to skylight considerations, BRE 209 recommends that sunlight is assessed for windows which make up proposed new buildings along with surrounding existing buildings. For new developments it is considered that the most important factor affecting the provision of sunlight is site layout, and it is preferable to site as many rooms as possible to contain south-facing windows.¹¹ It will not always be possible to avoid residences with predominantly north-facing windows, especially in large developments, but it is important to minimise the proportion of residences without south-facing windows.

Overshadowing can also have a significant effect upon the sunlight received by new developments, both from the proposed development upon itself and from surrounding buildings. It is recommended that windows should receive a minimum of 1.5 hours of sunlight on the equinox.¹² This applies equally to all windows but is less likely to be achievable for north-facing windows.¹³

Another measure which can provide a more comprehensive assessment of sunlight across the year (rather than just on the equinox) is to measure annual probable sunlight hours (APSH). This is the recommended method to assess the effect upon existing buildings, with windows requiring assessment where¹⁴:

- *Some part of a new development is situated within 90° of due south of a main window wall of an existing building.*
- *In the section drawn perpendicular to this existing window wall, the new development subtends an angle greater than 25° to the horizontal measured from the centre of the lowest window to a main living room).*

Windows must also face within 90° of south in order to be assessed¹⁵, and full assessment is not required where a window has an azimuth between 160° and 200° and has a VSC greater than 27%¹⁶.

Windows are considered to receive adequate sunlight where the APSH is greater than 25% and a window receives greater than 5% of APSH between the autumn and spring equinoxes.¹⁷ As with skylight considerations, effects upon existing buildings can be considered with reference to the baseline scenario, with significant effects predicted where the post-construction APSH is less than 0.80 the baseline value (a 20% reduction).

¹¹ BRE 209, 3.1.5

¹² BRE 209, 3.1.10

¹³ BRE 209, 3.1.11

¹⁴ BRE 209, 3.2.2

¹⁵ BRE 209, 3.2.3

¹⁶ BRE 209, 3.2.9

¹⁷ BRE 209, 3.2.6



British Standard 17037:2018

BS EN 17037 replaced the previous standard relating to daylighting (BS 8206-2) in 2019, introducing a more complex modelling requirement for daylighting in new developments. This British Standard is considered in the third edition of BRE 209, and the updated BRE guidance adopts the new requirements in this publication.

This document provides reference tables for daylight factors in different UK and international locations, which correspond to the target illuminance values for rooms in new buildings. This has been incorporated into the BRE Guidance and is included in the previous section.

APPENDIX B – OVERSHADOWING IMPACT SIGNIFICANCE

Overview

The significance of overshadowing will vary for different receptors. The following section presents a general overview of the significance criteria with respect to experiencing overshadowing.

Impact Significance Definition

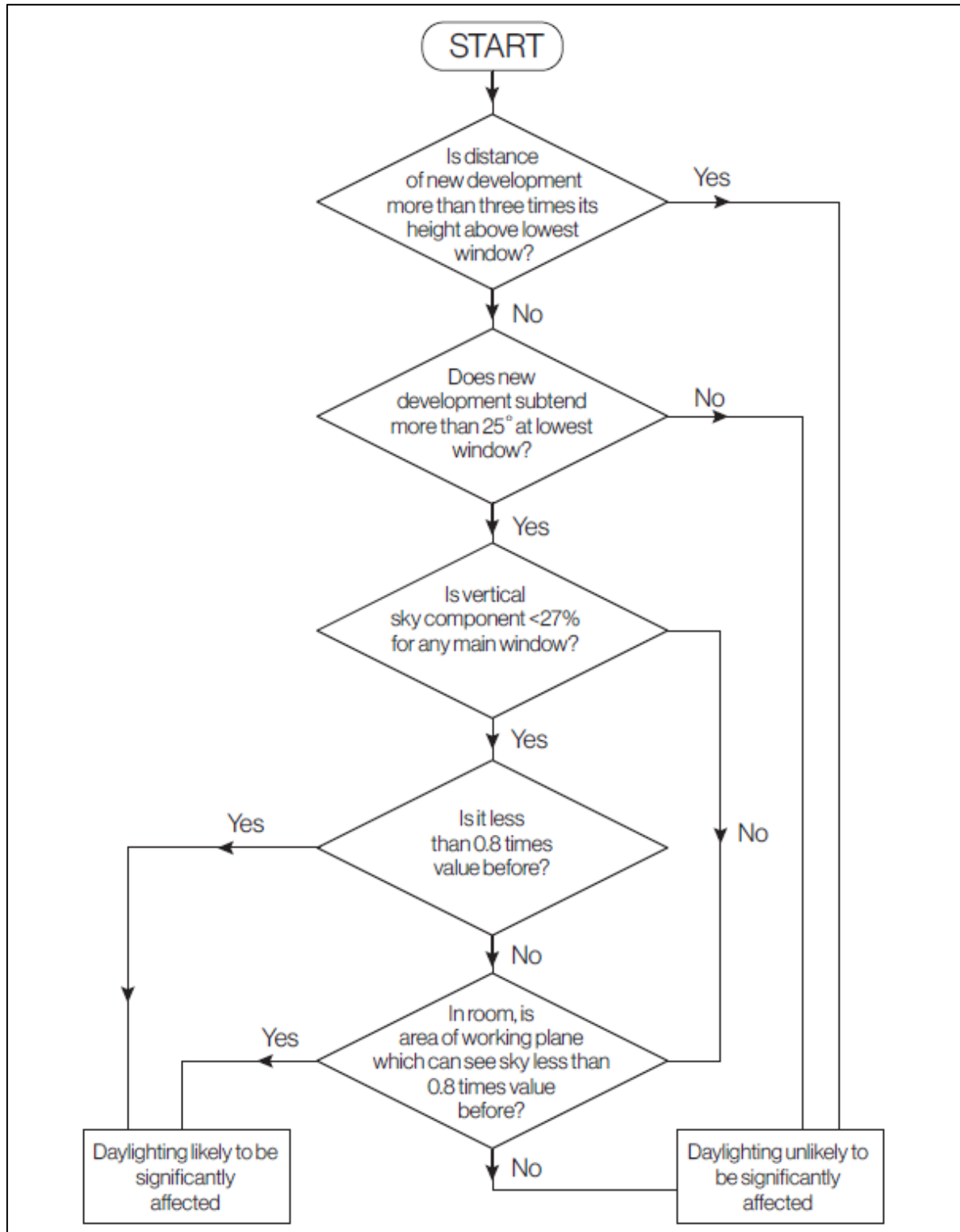
The table below presents the recommended definition of ‘impact significance’ in overshadowing terms and the requirement for mitigation under each.

Impact Significance	Definition	Mitigation
No Impact	Overshadowing is not geometrically possible or will not be visible from the assessed receptor.	No mitigation required
Low	Overshadowing is geometrically possible however any impact is considered to be small such that mitigation is not required i.e. the effects are small and would not reduce conditions at the receptor beneath recommended threshold levels.	No mitigation recommended
Moderate	Overshadowing is geometrically possible however it occurs under conditions that do not represent a worst-case given individual receptor criteria.	Mitigation recommended
High	Overshadowing is geometrically possible under worst-case conditions that will produce a significant impact given individual receptor criteria.	Mitigation required

Impact significance definition

Impact Significance Determination for Daylight Overshadowing of Windows

The flow chart shows BRE's recommended methodology for determining the impact significance for daylight overshadowing of windows. Pager Power's process is based on this guidance, and is further explained in Section 6 of this report.



Assessment process for daylight considerations for external receptors

APPENDIX C – PROPOSED DEVELOPMENT DETAILS

Proposed Development Data

Coordinates of the proposed development were extrapolated from site plans. The boundary coordinates for the building can be found in the table below.

No.	Longitude (°)	Latitude (°)	No.	Longitude (°)	Latitude (°)
1	-2.19912	53.48493	3	-2.19805	53.48516
2	-2.19805	53.48493	4	-2.19912	53.48516

Coordinate data



Pager Power Limited
Stour Valley Business Centre
Sudbury | Suffolk | CO10 7GB
T +44 (0)1787 319001 | E info@pagerpower.com
www.pagerpower.com

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