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THAMES QUARTER, KINGS

MEADOW, READING

Daylight and Sunlight Report

Overshadowing

• *Daylight & Sunlight* • *Light Pollution* •

Solar Glare • *Daylight Design*

DIRECTOR:	LIAM DUNFORD
CLIENT:	LOCHAILORT READING LIMITED
DATE:	NOVEMBER 2018
VERSION:	V2
PROJECT:	P1507

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1 Introduction

- 1.1 This report relates to the Callison RTKL Architects Proposed Scheme for the redevelopment of the Thames Quarter, Kings Meadow, Reading insofar as it affects the daylight and sunlight amenity to the surrounding residential properties.
- 1.2 The Local Authority will be informed in this by the BRE document entitled *Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice 2011* (the BRE guidelines). This document is the principal guidance in this area and sets out the methodology for measuring light and recommends what it considers to be permitted or unobtrusive levels of change.
- 1.3 The BRE guidelines are not mandatory, though local planning authorities and planning inspectors will consider the suitability of a proposed scheme for a site within the context of BRE guidance. Consideration will be given to the urban context within which a scheme is located and the daylight and sunlight will be one of a number of planning considerations which the local authority will weigh.

2 Methodology

- 2.1 It is usual to assess daylight and sunlight in relation to the guidelines set out in the 2011 Building Research Establishment (BRE) Report 'Site layout planning for daylight and sunlight - A guide to good practice' by Paul Littlefair. This document is most widely accepted by planning authorities as the means by which to judge the acceptability of a scheme. One of the primary sources for the BRE Report is the more detailed guidance contained within 'British Standard 8206 Part 2:2008'.
- 2.2 In relation to the properties surrounding a site, usually the local planning authority will only be concerned with the impact to main habitable accommodation (i.e. living rooms, bedrooms and kitchens) within residential properties.
- 2.3 To determine whether a neighbouring existing building may be adversely affected, the initial test provided by the BRE is to establish if any part of the proposal subtends an angle of more than 25° from the lowest window serving the existing building. If this is the case then there may be an adverse effect, and more detailed calculations are required to quantify the extent of any impact.
- 2.4 The BRE guidelines provide two principal measures of daylight for assessing the impact on properties neighbouring a site, namely Vertical Sky Component (VSC) and No-Sky Line (NSL). They also detail a third measure of daylight which is primarily used for assessing amenity within proposed accommodation, namely Average Daylight Factor (ADF).
- 2.5 In terms of sunlight we examine the BRE Annual Probable Sunlight Hours (APSH); and in relation to sunlight amenity to gardens and amenity spaces, we apply the quantitative BRE overshadowing guidance.
- 2.6 These measures of daylight and sunlight are discussed in the following paragraphs -



Diffuse Daylight

- 2.7 **Vertical Sky Component (VSC)** – VSC is a measure of the direct skylight reaching a point from an overcast sky. It is the ratio of the illuminance at a point on a given vertical plane to the illuminance at a point on a horizontal plane due to an unobstructed sky.
- 2.8 For existing buildings, the BRE guideline is based on the loss of VSC at a point at the centre of a window, on the outer plane of the wall.
- 2.9 The BRE guidelines state that if the VSC at the centre of a window is less than 27%, and it is less than 0.8 times its former value (i.e. the proportional reduction is greater than 20%), then the reduction in skylight will be noticeable, and the existing building may be adversely affected.
- 2.10 **No-Sky Line (NSL)** - NSL is a measure of the distribution of daylight within a room. It maps out the region within a room where light can penetrate directly from the sky, and therefore accounts for the size of and number of windows by simple geometry.
- 2.11 The BRE suggest that the area of the working plane within a room that can receive direct skylight should not be reduced to less than 0.8 times its former value (i.e. the proportional reduction in area should not be greater than 20%).
- 2.12 **Average Daylight Factor (ADF)** - ADF is a measure of the overall amount of diffuse daylight within a room. It is the average of the daylight factors across the working plane within a room. This equates to the ratio of the average illuminance across the working plane, to the illuminance due to an unobstructed sky.
- 2.13 In addition to accounting for external obstructions, the ADF accounts for the number of windows and their size in relation to the size of the room, the window transmittance and the reflectance of the internal walls, floor and ceiling.
- 2.14 While the ADF can be calculated from first principles using a lighting simulation software suite such as Radiance, in simple situations it can be approximated using the empirical formula detailed in both British Standard 8206 Part 2:2008 and Appendix C of the BRE Report.
- 2.15 Both the BRE Report and BS 8206 Part 2:2008 provide guidance for acceptable ADF values in the presence of supplementary electric lighting, depending on the room use. These are 1.0% for a bedroom, 1.5% for a living room and 2.0% for a kitchen.

Sunlight

- 2.16 **Annual Probable Sunlight Hours (APSH)** - In relation to sunlight, the BRE recommends that the APSH received at a given window in the proposed case should be at least 25% of the total available, including at least 5% in winter.
- 2.17 Where the proposed values fall short of these, and the absolute loss is greater than 4%, then the proposed values should not be less than 0.8 times their previous value in each period (i.e. the proportional reductions should not be greater than 20%).
- 2.18 The BRE guidelines state that ‘...all main living rooms of dwellings, and conservatories, should be checked if they have a window facing within 90 degrees of due south. Kitchens and bedrooms are less important, although care should be taken not to block out too much sun’.

- 2.19 The APSH figures are calculated for each window, and where a room is served by more than one window the contribution of each is accounted for in the overall figures for the room. The acceptability criteria are applied to overall room based figures.

3 Sources of Information

Point 2 Surveyors	-	Site Photos
Ordnance Survey Limited	-	Digital O/S Extract
Zmapping Ltd	-	3D Context Model (dated August 2016) Reading_230816_Solids.dwg
CallisonRTKL	-	Proposed 3D Model (received 30/04/18) 180425 - 152067-STL-00-M3-A-ZZZZ-M0004- Thames Quarter-338 Bed Model.rvt

4 Standard Survey Limitations

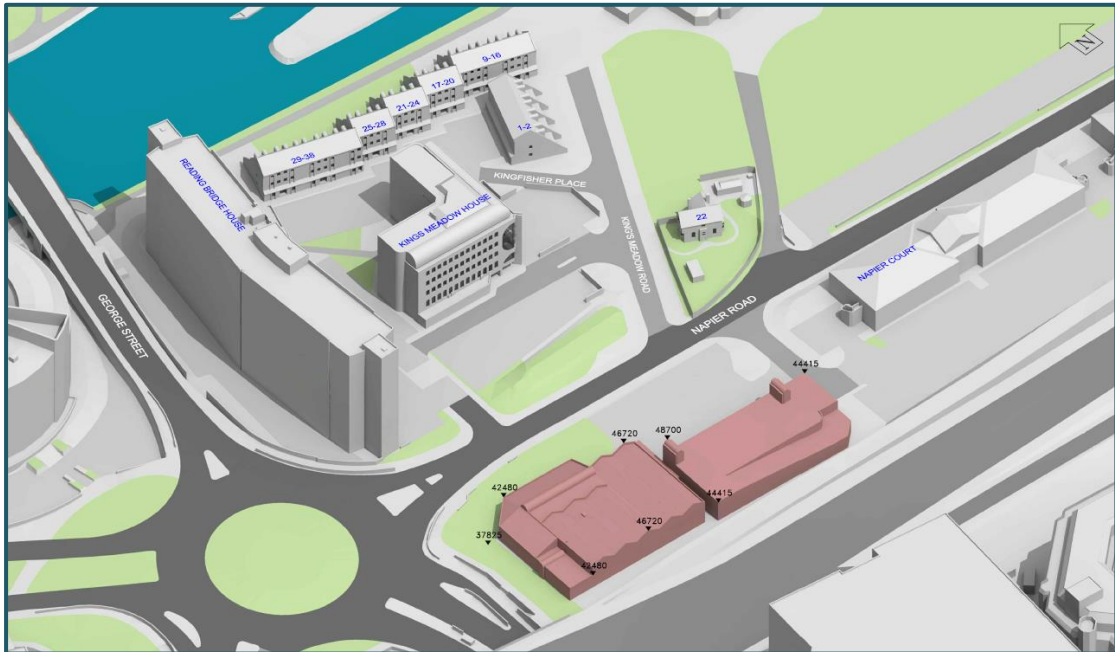
Although we have undertaken as detailed an inspection as possible, we are required by our professional indemnity insurers to notify you that our report is based upon the Standard Terms and Conditions provided along with our fee proposal. Our understanding of the existing massing, including the surrounding context was established from a site visit and aerial photography.

- 4.1 In addition to our standard limitations the following limitations and assumptions also apply.
- Best estimates were made in establishing building use (residential or commercial) and room uses; generally, these were made from external observations and recourse to planning records where available.
 - When floor plans of surrounding properties were not available, room depths have been assumed from external observations. Where no indicators of room depth were available a standard of 4m, 6m or 8m depths have been used.
 - In accordance with BRE Guidelines¹ balconies, where present have been removed from calculations.

¹ BRE Guideline 209 Site Layout & Planning A Guide to Good Practice (2011) Paragraph 2.2.11

5 The Site

5.1 The site is located in the Borough of Reading.



Drawing Number: P1507/02 – 3D View – Existing Building

5.2 Our understanding of the site location and existing building that occupies the site can be seen within drawings P1507/01-03 and can be found within Appendix A.

6 The Proposed Scheme



Drawing Number: P1507/23 – 3D View – Proposed Scheme 30/04/18 338 Option

6.1 Our understanding of the proposed scheme is illustrated in drawings P1507/22-24 located within Appendix A.

7 The Surrounding Properties

7.1 The following surrounding properties contain residential accommodation and, due to their proximity to the development site, have been assessed in terms of the effects of the proposed development upon their daylight and sunlight amenity:

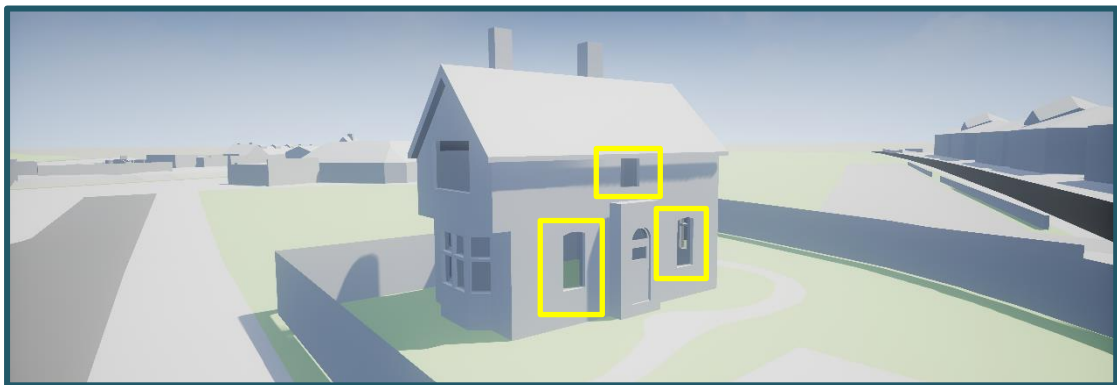
- 22 Kings Meadow Road
- 1-2 Kingfisher Place
- 9-16 Kingfisher Place
- 17-20 Kingfisher Place
- 21-24 Kingfisher Place
- 25-28 Kingfisher Place
- 29-38 Kingfisher Place

7.2 The location of these properties can be seen in the drawings within Appendix A.

7.3 Detailed results for each window/room assessed can be found in Appendix B and are summarised below.

22 Kings Meadow Road

7.4 This is a detached residential dwelling located to the north of the development site at the junction of Napier Road and Kings Meadow Road. We are not in receipt of layouts for the building thus room dimensions have been assumed from external observation. There are 14 windows which we have assumed to serve 5 habitable rooms.



Extract 01 – Window Arrangement, 22 Kings Meadow Road

Daylight

7.5 The windows bordered yellow experience 25%-28.5% reductions in VSC, which are minor derogations from BRE Guidance. It is assumed that the rooms served by these ground floor windows are additionally served by a bay window on the flank elevations. The bay windows experience unnoticeable changes in VSC and subsequently the rooms also experience no change in daylight distribution (NSL).

- 7.6 It is not clear what type of room the highlighted window on the top floor actually serves, but it is suffice to say it is more likely to be a bedroom, bathroom or stairwell. Assuming it serves a bathroom or stairwell then it would not material for assessment. Assuming it is a bedroom, this still needs to be assessed but is considered by the BRE Guide as less important (para 2.2.8, BRE Guide 209). Under the circumstances we consider this minor derogation to be acceptable.

Sunlight

- 7.7 All site facing rooms which have a window orientated within 90 degrees due south experience fully BRE compliant changes in Annual Probable Sunlight Hours

1-38 Kingfisher Place

- 7.8 This collection of residential properties is located to the north of the site along Kingfisher Place. We do not have complete layouts for the properties but implemented some estate agency floor plans within the model. There are 65 windows assumed to serve 47 habitable rooms.



Extract 02 – Window Arrangement, 1-38 Kingfisher Place

Daylight

- 7.9 All windows experience BRE compliant, unnoticeable changes in VSC criteria; the greatest change being 14.3%. There are two incidences where ground floor rooms experience a 21% change in daylight distribution (NSL), which very marginally exceeds the 20% recommended by the BRE Guide. With reference to the compliant changes in VSC, the change is unlikely to be noticeable in reality.

Sunlight

- 7.10 All site facing rooms which have a window orientated within 90 degrees due south experience fully BRE compliant changes in Annual Probable Sunlight Hours

8 Conclusion

Daylight to Surrounding Residential Properties

- 8.1 The proposed scheme has been carefully designed to safeguard daylight amenity to the surrounding residential properties. Predominantly the reductions do not exceed 20%, which the BRE Guide states will be unnoticeable. The small handful of windows which experience reductions greater than this only do so by 25-28%, which are minor derogations from BRE Guidance and certainly not uncommon within urban areas. On planning balance these minor derogations from the BRE Guide are considered acceptable under the circumstances.

Sunlight to Surrounding Residential Properties

- 8.2 All residential properties experience alterations in APSH well-within keeping of the BRE recommendations, meaning the occupants will not notice a change in their existing levels of sunlight.
- 8.3 We fully support this planning application in terms of daylight and sunlight amenity.



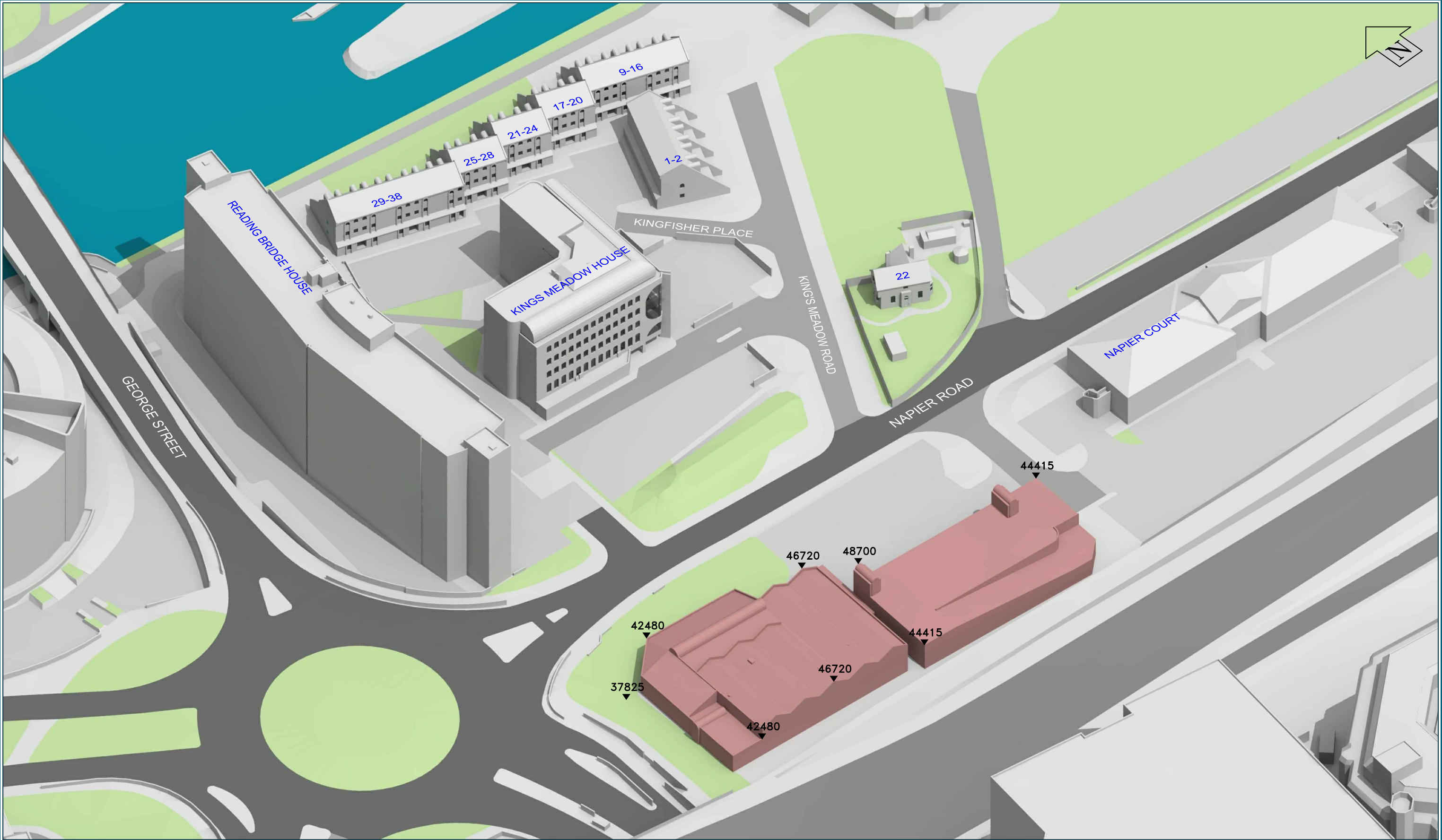
Appendix A – Drawings





Sources: Zmapping Ltd. 3D Context Model (dated August 2016) Reading_230816_Solids.dwg CallisonRTKL Proposed 3D Model (received 31/10/17) 20147-1005 KM 3D View.dwg		Key: — Existing Buildings — Proposed Scheme		Project: Kings Meadow Reading		Title: Site Plan Existing Building		Point 2 Surveyors Ltd, 3rd Floor, 17 Slingsby Place, London WC2E 9AB 0207 836 5828 www.point2surveyors.com	
Scheme Confirmed: -		Date : -		Drawn By: OM		Scale: 1:900 @ A3		Date: Nov 17	
						Dwg No: P1507/01		Rel: 2	





Sources: Zmapping Ltd.
3D Context Model (dated August 2016)
Reading_230816_Solids.dwg
CallisonRTKL
Proposed 3D Model (received 31/10/17)
20147-1005 KM 3D View.dwg

Key: — Existing Buildings
— Proposed Scheme
All Heights in mm AOD

Project: Kings Meadow
Reading

Title: 3D View
Existing Building

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Scheme Confirmed: -

Date : -

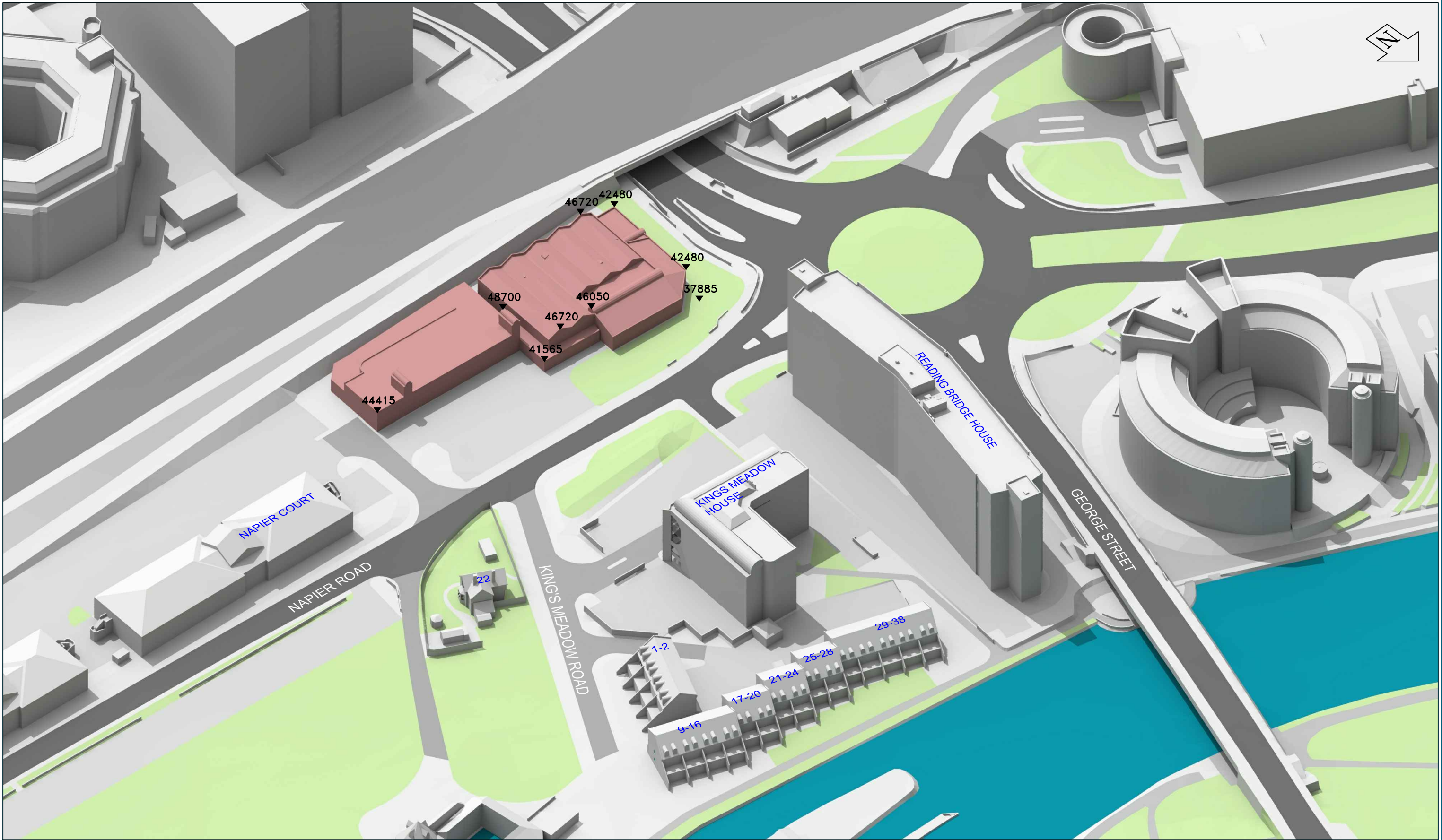
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Date: Nov 17

Dwg No: **P1507/02**

Rel: 2



Sources: Zmapping Ltd.
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CallisonRTKL
Proposed 3D Model (received 31/10/17)
20147-1005 KM 3D View.dwg

Key: — Existing Buildings
— Proposed Scheme
All Heights in mm AOD

Project: Kings Meadow
Reading

Title: 3D View
Existing Building

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Scheme Confirmed: -

Date : -

Drawn By: OM

Scale: NTS @ A3

Date: Nov 17

Dwg No: **P1507/03**

Rel: 2



Sources: Zmapping Ltd.
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CallisonRTKL
Proposed 3D Model (received 30/04/18)
180425 - 152067-STL-00-M3-A-ZZZZ-M0004-
Thames Quarter-338 Bed Model.rvt

Key: — Existing Buildings
— Proposed Scheme

Project: Kings Meadow
Reading

Title: Site Plan
Proposed Scheme 30/04/18
338 Option

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Date : -

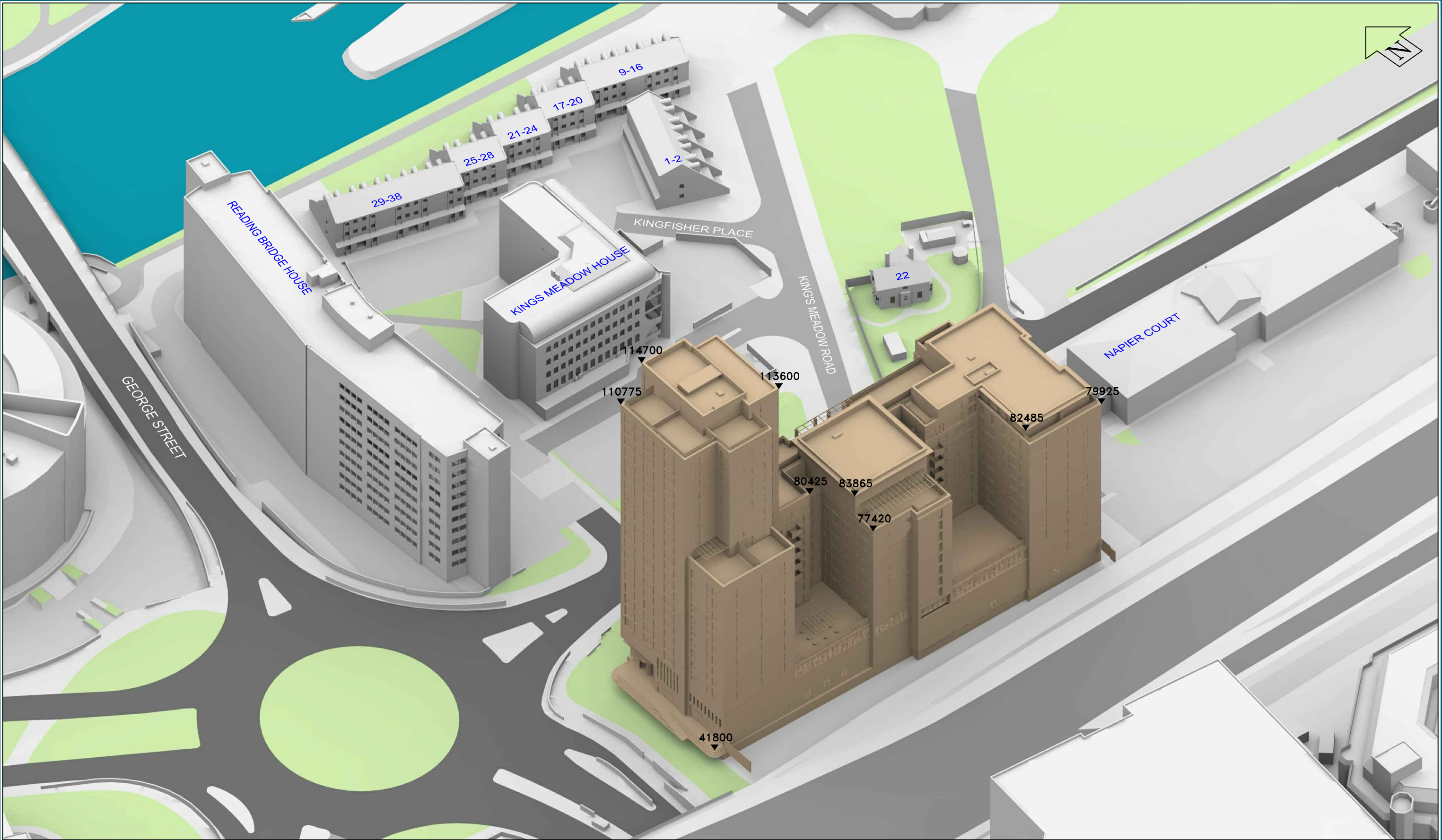
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Scale: 1:900 @ A3

Date: May 18

Dwg No: **P1507/22**

Rel: 7



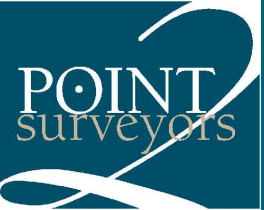
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Key: — Existing Buildings
— Proposed Scheme
All Heights in mm AOD

Project: Kings Meadow
Reading

Title: 3D View
Proposed Scheme 30/04/18
338 Option

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Scheme Confirmed: -

Date : -

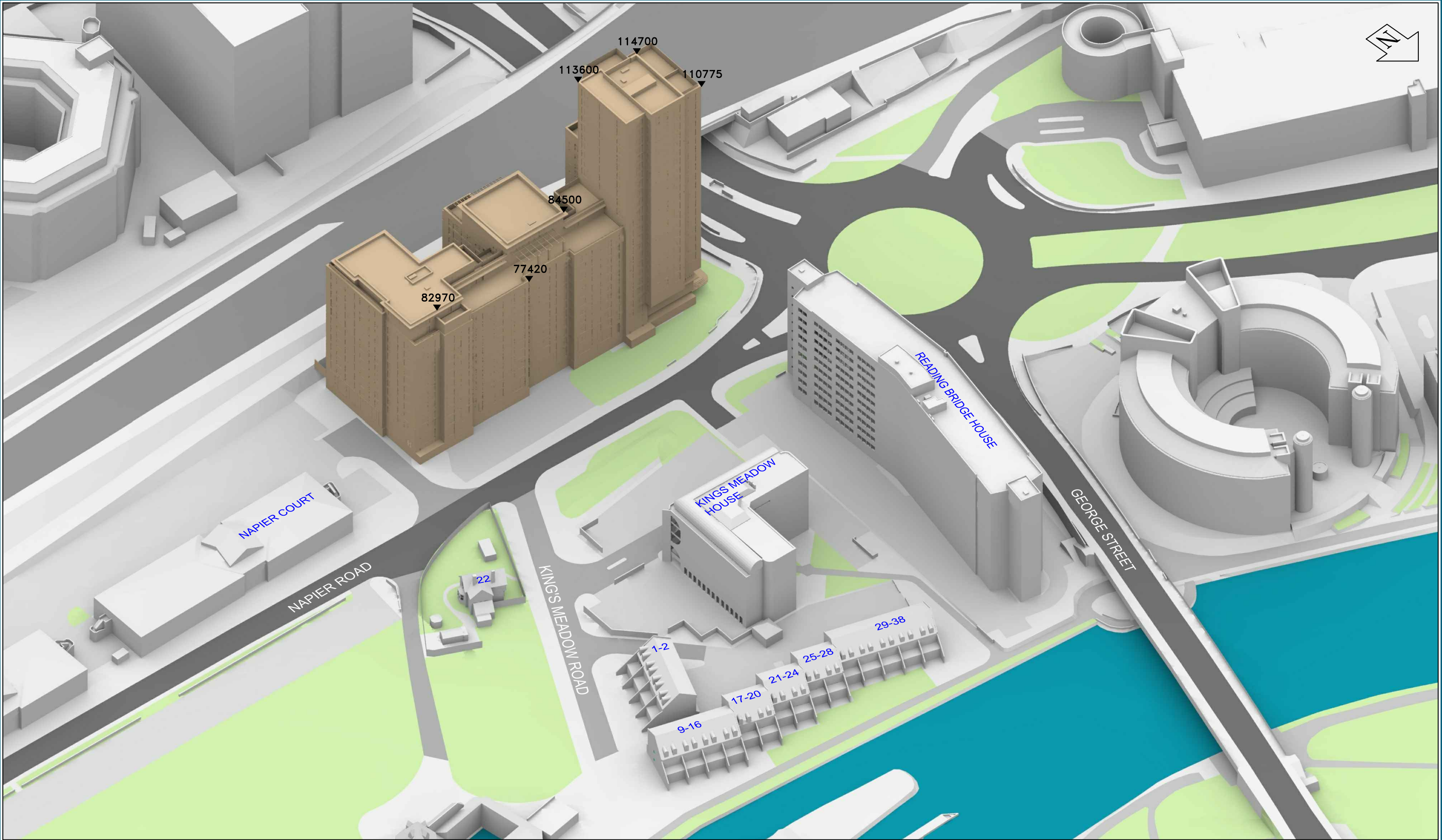
Drawn By: JB

Scale: NTS @ A3

Date: May 18

Dwg No: **P1507/23**

Rel: 7



Sources: Zmapping Ltd.
3D Context Model (dated August 2016)
Reading_230816_Solids.dwg
CallisonRTKL
Proposed 3D Model (received 30/04/18)
180425 - 152067-STL-00-M3-A-ZZZZ-M0004-
Thames Quarter-338 Bed Model.rvt

Key: — Existing Buildings
— Proposed Scheme
All Heights in mm AOD

Project: Kings Meadow
Reading

Title: 3D View
Proposed Scheme 30/04/18
338 Option

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Scheme Confirmed: -

Date : -

Drawn By: JB

Scale: NTS @ A3

Date: May 18

Dwg No: **P1507/24**

Rel: 7

Appendix B – Technical Analysis



Room	Room Use	Window	EXISTING VSC	PROPOSED VSC	LOSS VSC	%LOSS VSC
22, King's Meadow Road						
R1/30	ASSUMED	W3/30	32.21	29.96	2.25	6.99
R1/30	ASSUMED	W4/30	31.64	29.38	2.26	7.14
R1/30	ASSUMED	W5/30	32.23	29.85	2.38	7.38
R1/30	ASSUMED	W6/30	31.67	29.29	2.38	7.51
R1/30	ASSUMED	W9/30	33.40	24.54	8.86	26.53
R3/30	ASSUMED	W12/30	33.80	25.39	8.41	24.88
R3/30	ASSUMED	W15/30	36.89	36.84	0.05	0.14
R3/30	ASSUMED	W16/30	36.04	35.99	0.05	0.14
R3/30	ASSUMED	W17/30	36.93	36.88	0.05	0.14
R3/30	ASSUMED	W18/30	36.05	36.00	0.05	0.14
R1/31	ASSUMED	W1/31	32.79	30.54	2.25	6.86
R2/31	ASSUMED	W3/31	37.01	36.97	0.04	0.11
R2/31	ASSUMED	W4/31	37.05	36.99	0.06	0.16
R3/31	ASSUMED	W2/31	29.31	20.94	8.37	28.56
1-2, Kingfisher Place						
R1/10	ASSUMED	W1/10	30.68	26.29	4.39	14.31
R1/11	DINING	W1/11	31.91	27.67	4.24	13.29
R1/11	DINING	W2/11	31.61	31.61	0.00	0.00
R1/11	DINING	W3/11	33.97	33.97	0.00	0.00
R1/11	DINING	W4/11	31.28	31.26	0.02	0.06
9-16, Kingfisher Place						
R23/20	ASSUMED	W56/20	15.25	13.86	1.39	9.11
R26/20	ASSUMED	W65/20	12.32	12.11	0.21	1.70
R27/20	ASSUMED	W66/20	14.70	14.70	0.00	0.00
R30/20	ASSUMED	W75/20	24.95	23.72	1.23	4.93
R12/21	KITCHEN	W23/21	20.15	18.47	1.68	8.34
R12/21	KITCHEN	W24/21	24.18	22.67	1.51	6.24
R13/21	KITCHEN	W25/21	24.04	22.73	1.31	5.45
R13/21	KITCHEN	W26/21	20.44	19.99	0.45	2.20
R14/21	KITCHEN	W27/21	24.09	24.05	0.04	0.17
R14/21	KITCHEN	W28/21	29.75	28.98	0.77	2.59
R15/21	KITCHEN	W29/21	31.33	30.07	1.26	4.02
R15/21	KITCHEN	W30/21	29.49	27.54	1.95	6.61
R23/22	BEDROOM	W23/22	23.33	21.29	2.04	8.74

Room	Room Use	Window	EXISTING VSC	PROPOSED VSC	LOSS VSC	%LOSS VSC
R26/22	BEDROOM	W26/22	23.64	22.88	0.76	3.21
R27/22	BEDROOM	W27/22	26.39	25.25	1.14	4.32
R30/22	BEDROOM	W30/22	28.52	26.12	2.40	8.42
17-20, Kingfisher Place						
R19/20	ASSUMED	W46/20	20.47	18.94	1.53	7.47
R22/20	ASSUMED	W55/20	21.67	19.91	1.76	8.12
R10/21	KITCHEN	W19/21	23.04	21.40	1.64	7.12
R10/21	KITCHEN	W20/21	27.40	25.66	1.74	6.35
R11/21	KITCHEN	W21/21	28.15	26.30	1.85	6.57
R11/21	KITCHEN	W22/21	26.24	24.30	1.94	7.39
R19/22	BEDROOM	W19/22	23.73	21.95	1.78	7.50
R22/22	BEDROOM	W22/22	25.34	23.25	2.09	8.25
21-24, Kingfisher Place						
R15/20	ASSUMED	W36/20	19.58	18.65	0.93	4.75
R18/20	ASSUMED	W45/20	22.48	21.31	1.17	5.20
R8/21	KITCHEN	W15/21	21.73	20.82	0.91	4.19
R8/21	KITCHEN	W16/21	26.36	25.37	0.99	3.76
R9/21	KITCHEN	W17/21	27.36	26.29	1.07	3.91
R9/21	KITCHEN	W18/21	25.60	24.37	1.23	4.80
R15/22	BEDROOM	W15/22	22.17	21.28	0.89	4.01
R18/22	BEDROOM	W18/22	23.94	22.56	1.38	5.76
25-28, Kingfisher Place						
R11/20	ASSUMED	W26/20	16.04	15.91	0.13	0.81
R14/20	ASSUMED	W35/20	19.51	18.83	0.68	3.49
R6/21	KITCHEN	W11/21	18.38	18.20	0.18	0.98
R6/21	KITCHEN	W12/21	23.17	22.94	0.23	0.99
R7/21	KITCHEN	W13/21	24.28	23.85	0.43	1.77
R7/21	KITCHEN	W14/21	22.62	21.91	0.71	3.14
R11/22	BEDROOM	W11/22	19.03	18.79	0.24	1.26

Room	Room Use	Window	EXISTING VSC	PROPOSED VSC	LOSS VSC	%LOSS VSC
R14/22	BEDROOM	W14/22	20.92	20.26	0.66	3.15
29-38, Kingfisher Place						
R1/20	ASSUMED	W1/20	17.29	15.64	1.65	9.54
R4/20	ASSUMED	W10/20	17.53	16.14	1.39	7.93
R5/20	ASSUMED	W11/20	17.38	16.59	0.79	4.55
R8/20	ASSUMED	W20/20	16.78	16.36	0.42	2.50
R9/20	ASSUMED	W21/20	16.11	15.76	0.35	2.17
R1/21	KITCHEN	W1/21	19.91	18.35	1.56	7.84
R1/21	KITCHEN	W2/21	22.39	20.79	1.60	7.15
R2/21	KITCHEN	W3/21	22.43	20.86	1.57	7.00
R2/21	KITCHEN	W4/21	20.46	19.05	1.41	6.89
R3/21	KITCHEN	W5/21	20.47	19.55	0.92	4.49
R3/21	KITCHEN	W6/21	22.87	22.14	0.73	3.19
R4/21	KITCHEN	W7/21	22.65	22.02	0.63	2.78
R4/21	KITCHEN	W8/21	20.26	19.61	0.65	3.21
R5/21	KITCHEN	W9/21	19.61	19.04	0.57	2.91
R5/21	KITCHEN	W10/21	22.17	21.65	0.52	2.35
R1/22	BEDROOM	W1/22	18.33	16.81	1.52	8.29
R4/22	BEDROOM	W4/22	18.92	17.49	1.43	7.56
R5/22	BEDROOM	W5/22	19.01	17.96	1.05	5.52
R8/22	BEDROOM	W8/22	18.83	17.99	0.84	4.46
R9/22	BEDROOM	W9/22	18.22	17.47	0.75	4.12

Room/ Floor	Room Use	Whole Room	Prev sq ft	New sq ft	Loss sq ft	%Loss
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22, King's Meadow Road

R1/30	ASSUMED	209.2	208.6	208.6	0.0	0.0
R3/30	ASSUMED	221.3	220.5	219.1	1.4	0.6
R1/31	ASSUMED	187.8	186.2	185.6	0.6	0.3
R2/31	ASSUMED	156.9	146.3	146.3	0.0	0.0
R3/31	ASSUMED	128.6	118.9	68.7	50.2	42.2

1-2, Kingfisher Place

R1/10	ASSUMED	101.8	98.5	82.6	15.9	16.1
R1/11	DINING	240.0	237.6	237.6	0.0	0.0

9-16, Kingfisher Place

R23/20	ASSUMED	154.1	96.2	75.1	21.1	21.9
R26/20	ASSUMED	182.6	62.2	50.2	12.0	19.3
R27/20	ASSUMED	182.6	79.9	79.9	0.0	0.0
R30/20	ASSUMED	184.0	120.0	100.9	19.1	15.9
R12/21	KITCHEN	118.9	108.0	108.0	0.0	0.0
R13/21	KITCHEN	131.5	113.1	111.3	1.8	1.6
R14/21	KITCHEN	131.5	114.8	114.8	0.0	0.0
R15/21	KITCHEN	132.2	107.2	107.2	0.0	0.0
R23/22	BEDROOM	76.4	65.4	65.4	0.0	0.0
R26/22	BEDROOM	94.3	70.8	70.6	0.2	0.3
R27/22	BEDROOM	94.3	79.1	79.1	0.0	0.0
R30/22	BEDROOM	95.5	78.5	78.5	0.0	0.0

17-20, Kingfisher Place

R19/20	ASSUMED	168.6	131.0	110.0	21.0	16.0
R22/20	ASSUMED	184.1	118.5	93.4	25.1	21.2
R10/21	KITCHEN	126.9	112.2	112.1	0.1	0.1
R11/21	KITCHEN	132.2	107.3	107.3	0.0	0.0
R19/22	BEDROOM	86.3	72.3	72.3	0.0	0.0
R22/22	BEDROOM	95.4	59.9	57.9	2.0	3.3

21-24, Kingfisher Place

R15/20	ASSUMED	175.7	120.7	105.2	15.5	12.8
R18/20	ASSUMED	184.2	99.5	81.2	18.3	18.4
R8/21	KITCHEN	131.1	112.5	112.5	0.0	0.0
R9/21	KITCHEN	132.3	105.6	104.8	0.8	0.8
R15/22	BEDROOM	91.1	70.1	69.6	0.6	0.9
R18/22	BEDROOM	95.5	48.5	48.2	0.4	0.8

25-28, Kingfisher Place

R11/20	ASSUMED	155.6	71.3	69.6	1.6	2.2
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Room/ Floor	Room Use	Whole Room	Prev sq ft	New sq ft	Loss sq ft	%Loss
R14/20	ASSUMED	184.1	73.1	65.1	8.0	10.9
R6/21	KITCHEN	120.8	109.3	109.3	0.0	0.0
R7/21	KITCHEN	132.3	102.7	102.7	0.0	0.0
R11/22	BEDROOM	77.0	47.8	43.5	4.3	9.0
R14/22	BEDROOM	95.6	43.9	43.6	0.2	0.5

29-38, Kingfisher Place

R1/20	ASSUMED	158.9	93.1	83.1	10.0	10.7
R4/20	ASSUMED	182.6	86.6	74.2	12.4	14.3
R5/20	ASSUMED	182.6	79.3	74.4	4.9	6.2
R8/20	ASSUMED	174.0	73.8	73.2	0.6	0.8
R9/20	ASSUMED	174.0	99.4	99.4	0.0	0.0
R1/21	KITCHEN	118.4	107.3	107.3	0.0	0.0
R2/21	KITCHEN	131.5	90.2	90.2	0.0	0.0
R3/21	KITCHEN	131.5	112.3	112.3	0.0	0.0
R4/21	KITCHEN	126.7	97.3	97.3	0.0	0.0
R5/21	KITCHEN	132.3	112.7	111.8	0.9	0.8
R1/22	BEDROOM	78.1	64.1	63.8	0.3	0.5
R4/22	BEDROOM	94.3	39.8	39.7	0.2	0.5
R5/22	BEDROOM	94.3	50.2	49.8	0.4	0.8
R8/22	BEDROOM	88.4	47.6	46.9	0.7	1.5
R9/22	BEDROOM	100.2	49.7	48.5	1.2	2.4

Room	Window	Room Use	Window		Room		Winter %Loss	Annual %Loss	Winter APSH	Annual APSH	Winter %Loss	Annual %Loss	Winter APSH	Annual APSH
			Existing	Proposed	Existing	Proposed								
			Winter APSH	Annual APSH	Winter APSH	Annual APSH								
22, King's Meadow Road														
R1/30	W1/30	ASSUMED	0	3	0	3	-	0.0						
R1/30	W2/30	ASSUMED	0	3	0	3	-	0.0						
R1/30	W3/30	ASSUMED	5	25	1	19	80.0	24.0						
R1/30	W4/30	ASSUMED	5	25	1	19	80.0	24.0						
R1/30	W5/30	ASSUMED	5	25	0	17	100.0	32.0						
R1/30	W6/30	ASSUMED	5	25	0	16	100.0	36.0						
R1/30	W7/30	ASSUMED	6	18	0	9	100.0	50.0						
R1/30	W8/30	ASSUMED	8	29	0	16	100.0	44.8						
R1/30	W9/30	ASSUMED	23	64	15	50	34.8	21.9	23	64	16	54	30.4	15.6
R3/30	W12/30	ASSUMED	25	73	17	59	32.0	19.2						
R3/30	W13/30	ASSUMED	26	72	20	65	23.1	9.7						
R3/30	W14/30	ASSUMED	25	71	19	64	24.0	9.9						
R3/30	W15/30	ASSUMED	23	68	20	65	13.0	4.4						
R3/30	W16/30	ASSUMED	22	67	19	64	13.6	4.5						
R3/30	W17/30	ASSUMED	23	68	20	65	13.0	4.4						
R3/30	W18/30	ASSUMED	22	67	19	64	13.6	4.5						
R3/30	W19/30	ASSUMED	9	40	9	40	0.0	0.0						
R3/30	W20/30	ASSUMED	9	40	9	40	0.0	0.0	28	94	20	81	28.6	13.8
R2/31	W3/31	ASSUMED	21	61	20	60	4.8	1.6						
R2/31	W4/31	ASSUMED	21	62	20	61	4.8	1.6	21	62	20	61	4.8	1.6
R3/31	W2/31	ASSUMED	25	60	17	47	32.0	21.7	25	60	17	47	32.0	21.7

Room	Window	Room Use	Window						Room					
			Existing		Proposed		Winter %Loss	Annual %Loss	Existing		Proposed		Winter %Loss	Annual %Loss
			Winter APSH	Annual APSH	Winter APSH	Annual APSH			Winter APSH	Annual APSH	Winter APSH	Annual APSH		
1-2. Kingfisher Place														
R1/10	W1/10	ASSUMED	25	66	17	58	32.0	12.1	25	66	17	58	32.0	12.1
R1/11	W1/11	DINING	25	68	18	61	28.0	10.3						
R1/11	W2/11	DINING	9	45	9	45	0.0	0.0						
R1/11	W3/11	DINING	16	54	16	54	0.0	0.0						
R1/11	W4/11	DINING	18	53	18	53	0.0	0.0	27	87	21	81	22.2	6.9
9-16, Kingfisher Place														
R23/20	W56/20	ASSUMED	7	32	6	31	14.3	3.1						
R23/20	W57/20	ASSUMED	0	0	0	0	-	-						
R23/20	W59/20	ASSUMED	0	0	0	0	-	-	7	32	6	31	14.3	3.1
R26/20	W63/20	ASSUMED	2	2	2	2	0.0	0.0						
R26/20	W64/20	ASSUMED	0	0	0	0	-	-						
R26/20	W65/20	ASSUMED	4	28	4	28	0.0	0.0	5	29	5	29	0.0	0.0
R27/20	W66/20	ASSUMED	10	30	10	30	0.0	0.0						
R27/20	W67/20	ASSUMED	6	6	6	6	0.0	0.0						
R27/20	W69/20	ASSUMED	0	0	0	0	-	-	13	33	13	33	0.0	0.0
R30/20	W73/20	ASSUMED	1	1	1	1	0.0	0.0						
R30/20	W74/20	ASSUMED	0	0	0	0	-	-						
R30/20	W75/20	ASSUMED	18	47	16	45	11.1	4.3	18	47	16	45	11.1	4.3
R12/21	W23/21	KITCHEN	12	37	11	36	8.3	2.7						
R12/21	W24/21	KITCHEN	13	55	13	55	0.0	0.0	15	57	14	56	6.7	1.8
R13/21	W25/21	KITCHEN	12	51	11	50	8.3	2.0						

Room	Window	Room Use	Window						Room					
			Existing		Proposed		Winter %Loss	Annual %Loss	Existing		Proposed		Winter %Loss	Annual %Loss
			Winter APSH	Annual APSH	Winter APSH	Annual APSH			Winter APSH	Annual APSH	Winter APSH	Annual APSH		
R13/21	W26/21	KITCHEN	8	42	7	41	12.5	2.4	13	54	12	53	7.7	1.9
R14/21	W27/21	KITCHEN	15	46	15	46	0.0	0.0						
R14/21	W28/21	KITCHEN	21	66	20	65	4.8	1.5	21	67	20	66	4.8	1.5
R15/21	W29/21	KITCHEN	22	66	21	65	4.5	1.5						
R15/21	W30/21	KITCHEN	22	57	18	53	18.2	7.0	25	70	21	66	16.0	5.7
R23/22	W23/22	BEDROOM	19	48	16	45	15.8	6.3	19	48	16	45	15.8	6.3
R26/22	W26/22	BEDROOM	17	51	16	50	5.9	2.0	17	51	16	50	5.9	2.0
R27/22	W27/22	BEDROOM	19	53	18	52	5.3	1.9	19	53	18	52	5.3	1.9
R30/22	W30/22	BEDROOM	22	56	18	52	18.2	7.1	22	56	18	52	18.2	7.1
17-20, Kingfisher Place														
R19/20	W46/20	ASSUMED	14	42	11	39	21.4	7.1						
R19/20	W47/20	ASSUMED	6	6	4	4	33.3	33.3						
R19/20	W49/20	ASSUMED	0	0	0	0	-	-	14	42	11	39	21.4	7.1
R22/20	W53/20	ASSUMED	2	2	1	1	50.0	50.0						
R22/20	W54/20	ASSUMED	0	0	0	0	-	-						
R22/20	W55/20	ASSUMED	10	43	7	40	30.0	7.0	10	43	7	40	30.0	7.0
R10/21	W19/21	KITCHEN	18	45	15	42	16.7	6.7						
R10/21	W20/21	KITCHEN	20	62	17	59	15.0	4.8	20	62	17	59	15.0	4.8
R11/21	W21/21	KITCHEN	18	58	15	55	16.7	5.2						
R11/21	W22/21	KITCHEN	15	50	12	47	20.0	6.0	19	60	16	57	15.8	5.0

Room	Window	Room Use	Window						Room					
			Existing		Proposed		Winter %Loss	Annual %Loss	Existing		Proposed		Winter %Loss	Annual %Loss
			Winter APSH	Annual APSH	Winter APSH	Annual APSH			Winter APSH	Annual APSH	Winter APSH	Annual APSH		
R19/22	W19/22	BEDROOM	19	49	17	47	10.5	4.1	19	49	17	47	10.5	4.1
R22/22	W22/22	BEDROOM	20	54	18	52	10.0	3.7	20	54	18	52	10.0	3.7
21-24, Kingfisher Place														
R15/20	W36/20	ASSUMED	13	39	12	38	7.7	2.6						
R15/20	W37/20	ASSUMED	7	7	6	6	14.3	14.3						
R15/20	W39/20	ASSUMED	0	0	0	0	-	-	14	40	13	39	7.1	2.5
R18/20	W43/20	ASSUMED	0	0	0	0	-	-						
R18/20	W44/20	ASSUMED	0	0	0	0	-	-						
R18/20	W45/20	ASSUMED	15	47	13	45	13.3	4.3	15	47	13	45	13.3	4.3
R8/21	W15/21	KITCHEN	14	42	13	41	7.1	2.4						
R8/21	W16/21	KITCHEN	17	59	15	57	11.8	3.4	17	60	15	58	11.8	3.3
R9/21	W17/21	KITCHEN	19	59	17	57	10.5	3.4						
R9/21	W18/21	KITCHEN	17	51	15	49	11.8	3.9	19	59	17	57	10.5	3.4
R15/22	W15/22	BEDROOM	16	46	14	44	12.5	4.3	16	46	14	44	12.5	4.3
R18/22	W18/22	BEDROOM	18	51	16	49	11.1	3.9	18	51	16	49	11.1	3.9
25-28, Kingfisher Place														
R11/20	W26/20	ASSUMED	8	35	8	35	0.0	0.0						
R11/20	W27/20	ASSUMED	3	3	3	3	0.0	0.0						
R11/20	W29/20	ASSUMED	0	0	0	0	-	-	8	35	8	35	0.0	0.0

Room	Window	Room Use	Window						Room					
			Existing		Proposed		Winter %Loss	Annual %Loss	Existing		Proposed		Winter %Loss	Annual %Loss
			Winter APSH	Annual APSH	Winter APSH	Annual APSH			Winter APSH	Annual APSH	Winter APSH	Annual APSH		
R14/20	W33/20	ASSUMED	1	1	1	1	0.0	0.0						
R14/20	W34/20	ASSUMED	0	0	0	0	-	-						
R14/20	W35/20	ASSUMED	11	40	11	40	0.0	0.0	11	40	11	40	0.0	0.0
R6/21	W11/21	KITCHEN	10	35	10	35	0.0	0.0						
R6/21	W12/21	KITCHEN	13	54	13	54	0.0	0.0	13	54	13	54	0.0	0.0
R7/21	W13/21	KITCHEN	14	51	14	51	0.0	0.0						
R7/21	W14/21	KITCHEN	12	45	12	45	0.0	0.0	14	54	14	54	0.0	0.0
R11/22	W11/22	BEDROOM	11	40	11	40	0.0	0.0	11	40	11	40	0.0	0.0
R14/22	W14/22	BEDROOM	13	46	13	46	0.0	0.0	13	46	13	46	0.0	0.0
29-38, Kingfisher Place														
R1/20	W1/20	ASSUMED	12	36	10	34	16.7	5.6						
R1/20	W2/20	ASSUMED	4	4	2	2	50.0	50.0						
R1/20	W4/20	ASSUMED	0	0	0	0	-	-	12	36	10	34	16.7	5.6
R4/20	W8/20	ASSUMED	2	2	2	2	0.0	0.0						
R4/20	W9/20	ASSUMED	0	0	0	0	-	-						
R4/20	W10/20	ASSUMED	7	33	6	32	14.3	3.0	7	33	7	33	0.0	0.0
R5/20	W11/20	ASSUMED	7	35	6	34	14.3	2.9						
R5/20	W12/20	ASSUMED	1	1	1	1	0.0	0.0						
R5/20	W14/20	ASSUMED	0	0	0	0	-	-	7	35	6	34	14.3	2.9
R8/20	W18/20	ASSUMED	1	1	0	0	100.0	100.0						
R8/20	W19/20	ASSUMED	0	0	0	0	-	-						
R8/20	W20/20	ASSUMED	5	34	4	33	20.0	2.9	5	34	4	33	20.0	2.9

Room	Window	Room Use	Window						Room					
			Existing		Proposed		Winter %Loss	Annual %Loss	Existing		Proposed		Winter %Loss	Annual %Loss
			Winter APSH	Annual APSH	Winter APSH	Annual APSH			Winter APSH	Annual APSH	Winter APSH	Annual APSH		
R9/20	W21/20	ASSUMED	5	34	4	33	20.0	2.9						
R9/20	W22/20	ASSUMED	3	13	3	13	0.0	0.0						
R9/20	W24/20	ASSUMED	1	1	1	1	0.0	0.0	8	47	7	46	12.5	2.1
R1/21	W1/21	KITCHEN	13	38	11	36	15.4	5.3						
R1/21	W2/21	KITCHEN	15	51	13	49	13.3	3.9	16	52	14	50	12.5	3.8
R2/21	W3/21	KITCHEN	14	47	12	45	14.3	4.3						
R2/21	W4/21	KITCHEN	10	37	8	35	20.0	5.4	14	47	12	45	14.3	4.3
R3/21	W5/21	KITCHEN	9	39	7	37	22.2	5.1						
R3/21	W6/21	KITCHEN	9	49	8	48	11.1	2.0	12	52	10	50	16.7	3.8
R4/21	W7/21	KITCHEN	9	46	8	45	11.1	2.2						
R4/21	W8/21	KITCHEN	7	38	6	37	14.3	2.6	9	46	8	45	11.1	2.2
R5/21	W9/21	KITCHEN	8	39	7	38	12.5	2.6						
R5/21	W10/21	KITCHEN	11	54	10	53	9.1	1.9	12	55	11	54	8.3	1.8
R1/22	W1/22	BEDROOM	13	37	11	35	15.4	5.4	13	37	11	35	15.4	5.4
R4/22	W4/22	BEDROOM	12	39	10	37	16.7	5.1	12	39	10	37	16.7	5.1
R5/22	W5/22	BEDROOM	11	40	9	38	18.2	5.0	11	40	9	38	18.2	5.0
R8/22	W8/22	BEDROOM	8	38	8	38	0.0	0.0	8	38	8	38	0.0	0.0
R9/22	W9/22	BEDROOM	9	39	8	38	11.1	2.6	9	39	8	38	11.1	2.6