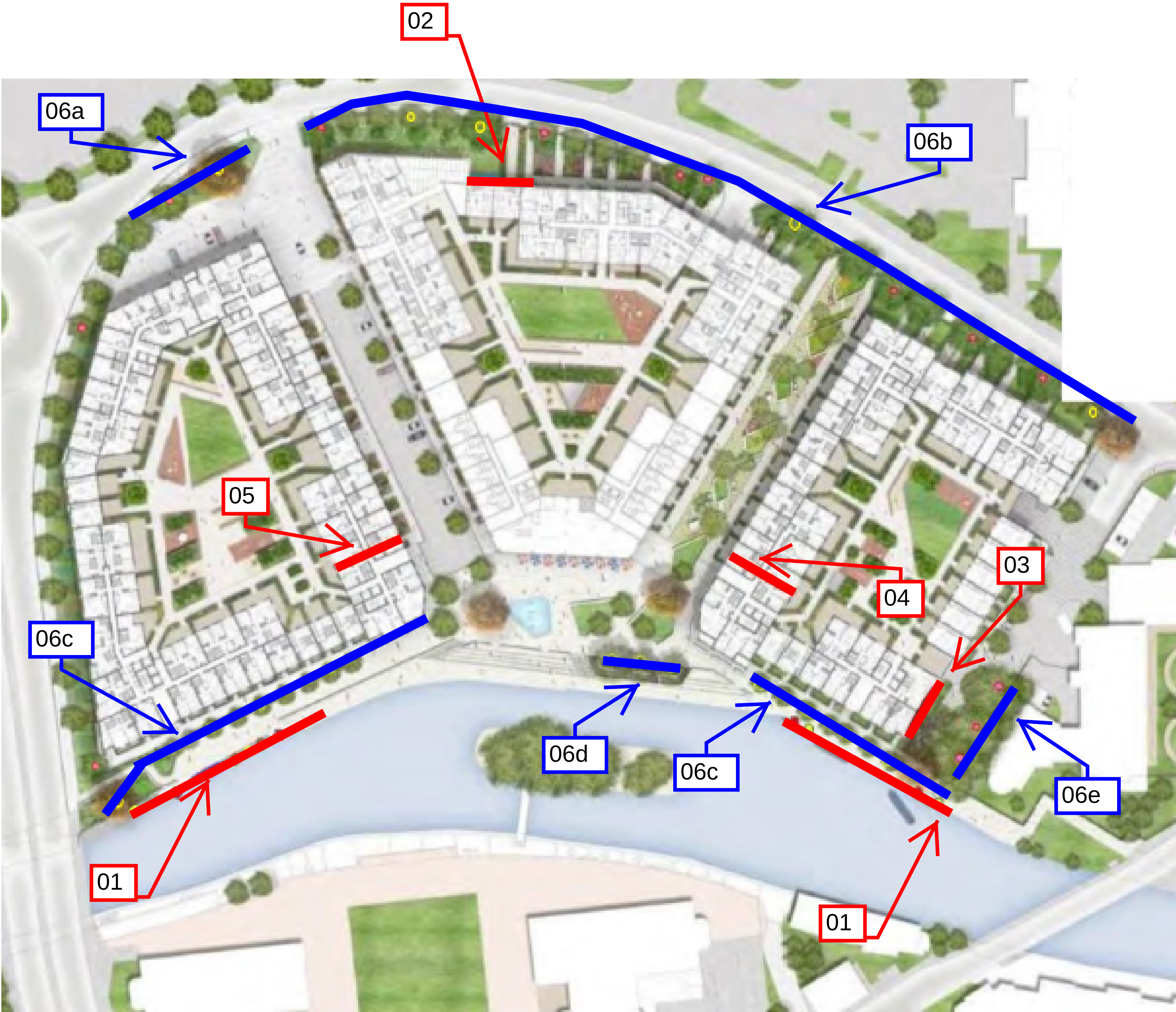


KENAVON DRIVE LIGHTING. VERTICAL ILLUMINANCE LEVELS.
LIGHTING CALCULATION RESULTS



Summary:

The following pages demonstrate accidental vertical illuminance on the key elevations relevant to locations of bird and bat boxes.

The calculations show average illuminance levels for these surfaces below 0.4lux which are assumed 'complete darkness' as per ILP Guidance Note 08/18 "Bats and artificial lighting in the UK" quoting Stone, 2012.

01. River wall
- 15 x Schwegler Sand Martin Nesting Tubes
- 2 x Schwegler 2HW bird nest box
- 4 x Schwegler No. 19 nest box
- 4 x Schwegler Clay and Reed Insect Block

02. Middle Block M3 North
- 10 x Ecosurv Sparrow Nest Box

03. East Block E5 East
- 6 x EcoSurv Habitat 001 bat Box

04. East Block E1 North
- 5 x Schwegler Type 16S Swift Box

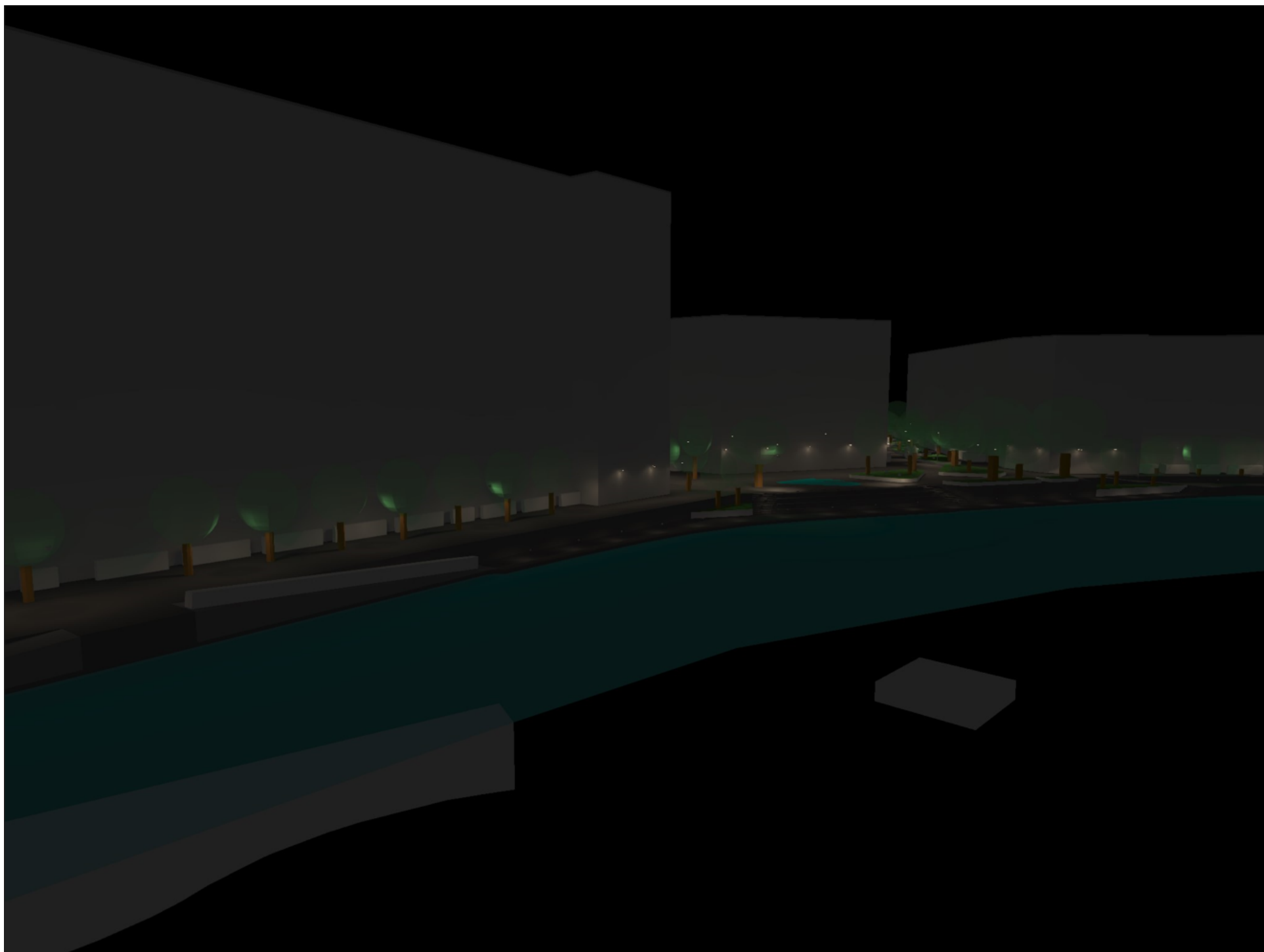
05. West Block W4 North
- 5 x Schwegler Type 16S Swift Box

Treeline Vertical Lighting Lighting in the area of key tree lines consists of shielded post top luminaires that emit no lighting above the horizontal plane. Therefore it is advised to install bird boxes above the installation heights of the pole top luminaires as follows:

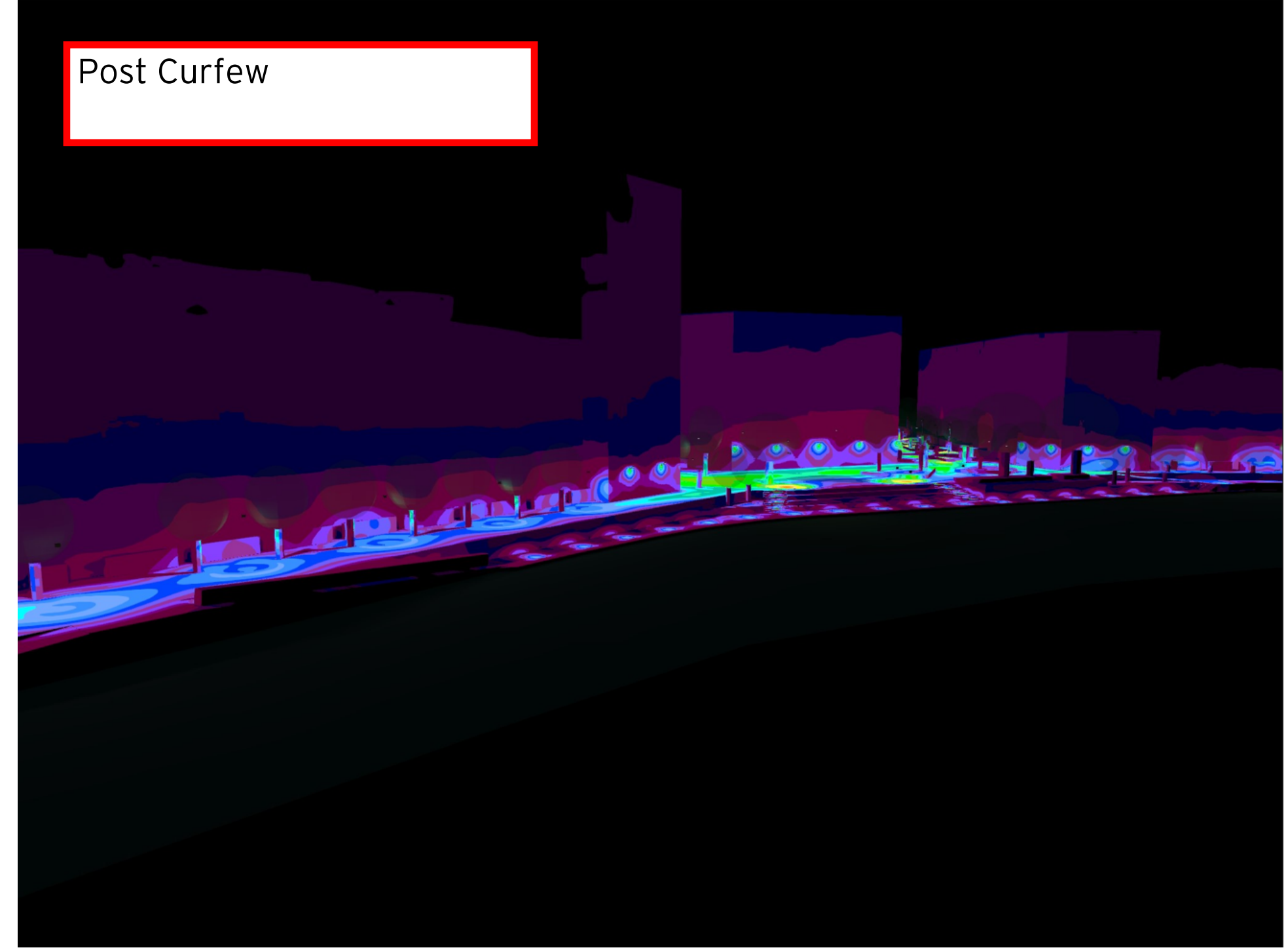
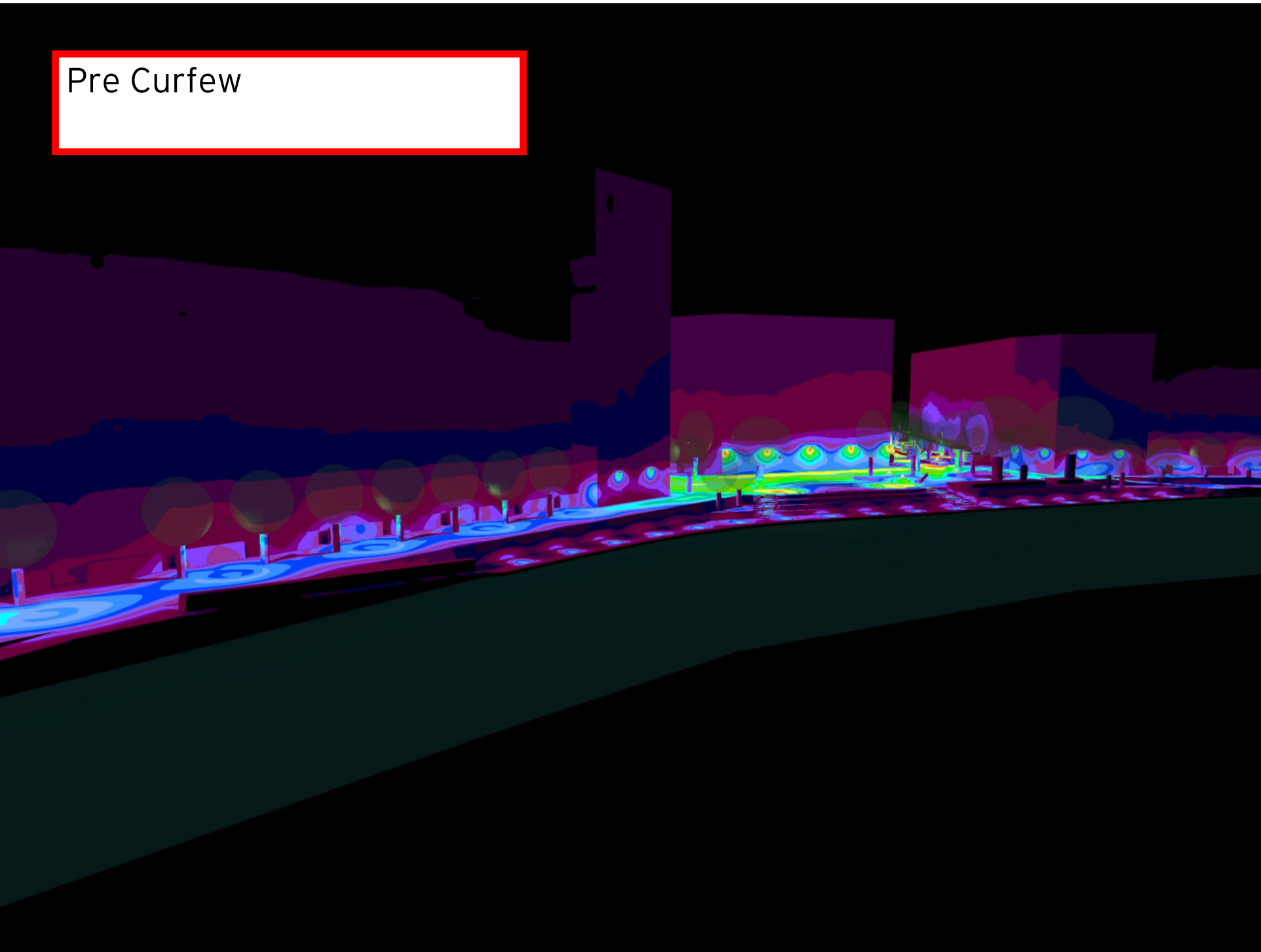
06a. Treeline 1 Arrival Square - 6m
06b. Treeline 2 Kenavon Drive - 4m
06c. Treeline 3 Riverside - 4m
06d. Treeline 4 Riverside Square - 6m
*Please note that the trees in the middle of the Riverside square sit lower than the square floor.
06e. Treeline 4 Joplin Mews - 4m.

Additionally due to the unpredictability of tree growth and canopy density it is recommended that bird boxes are installed facing away from lighting posts to further ensure shielding from any incidental light.

*Please note the lighting scheme does not include lighting to the west site border, therefore this elevation is not included in the current document.
Existing street lighting is not part of this calculation.



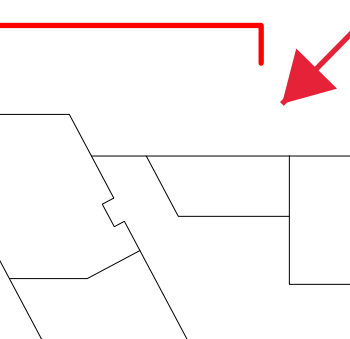
01. River Wall.
 Lighting along the river consist of shielded bollards with good optical control which are set back from the edge of the towpath.
 Therefore we do not expect light spill onto the vertical river wall surfaces caused by the proposed scheme.
 Please note existing lighting from neighbour developments is not part of this report.
 For horizontal illuminance levels refer to LB_0956_LS_02_Lighting Strategy Report



02. Middle Block M3 North

02. Middle Block M3 North

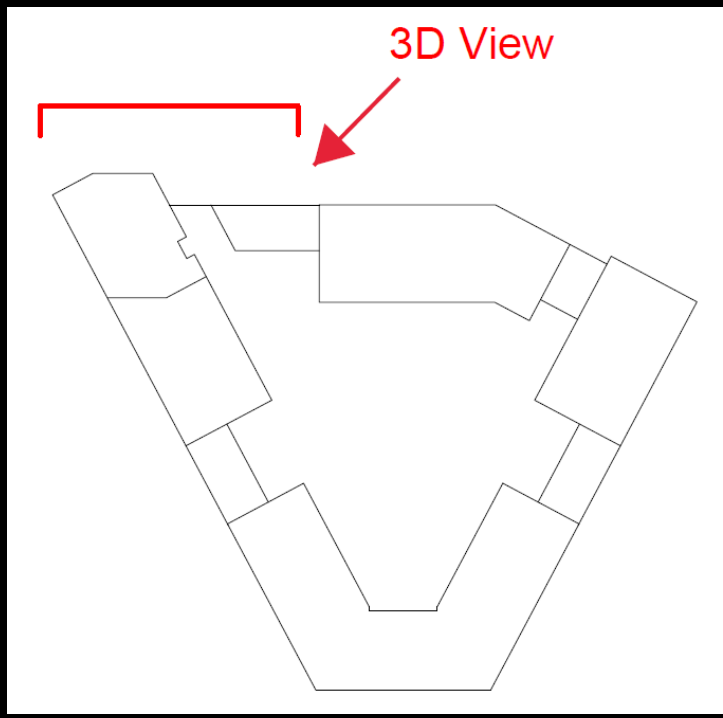
M-BA-01	PPC Metal balustrade (typical); 50 x 10mm flats
M-BA-05	Cantilevered glass balustrade to install balcony
M-C-01	Brick / mortar colour A (Dark)
M-C-02	Brick / mortar colour A Alternating 25mm projecting (Dark)
M-C-05	Brick / mortar colour B soldier course (Medium)
M-C-11	Brick / mortar colour D (Light)
M-C-12	Brick / mortar colour D soldier course (Light)
M-C-13	Brick recessed course above & below soldier course
M-C-16	Metal panel cladding colour A (Dark)
M-C-23	Signage to facing brick with matt pigment finish
M-C-24	Stainless steel clad energy centre flues
M-C-25	Glass panels with glass clay frame
M-WD-01	Dark grey coloured frame double glazed window / door assembly
M-WD-03	Shophront curtain wall assembly
M-WD-05	PPC Metal Louvre panel
BB	Brd Box - See Brd/Brd Box Specification for details

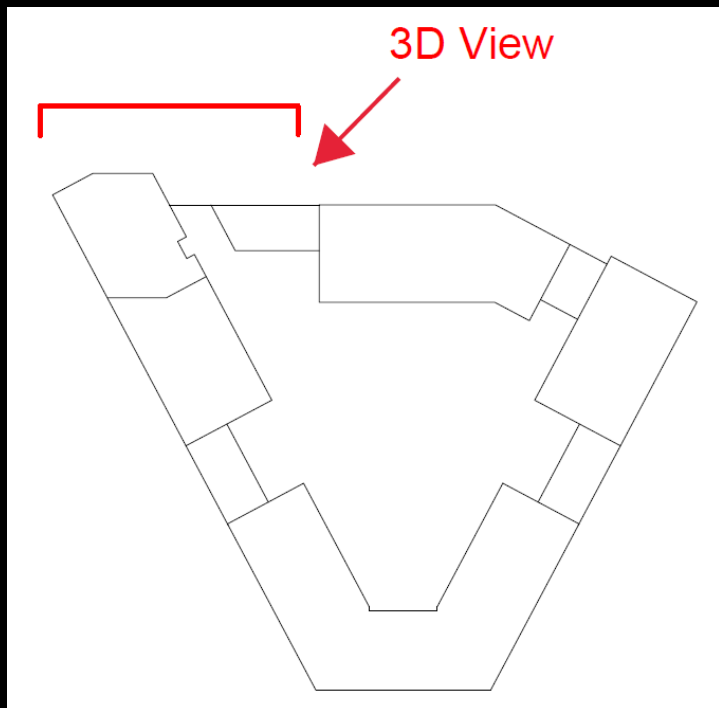


3D View

A red arrow points from the text "3D View" to the building footprint diagram. A red bracket is positioned above the left side of the footprint.

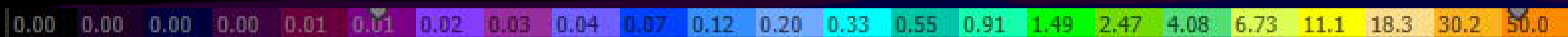
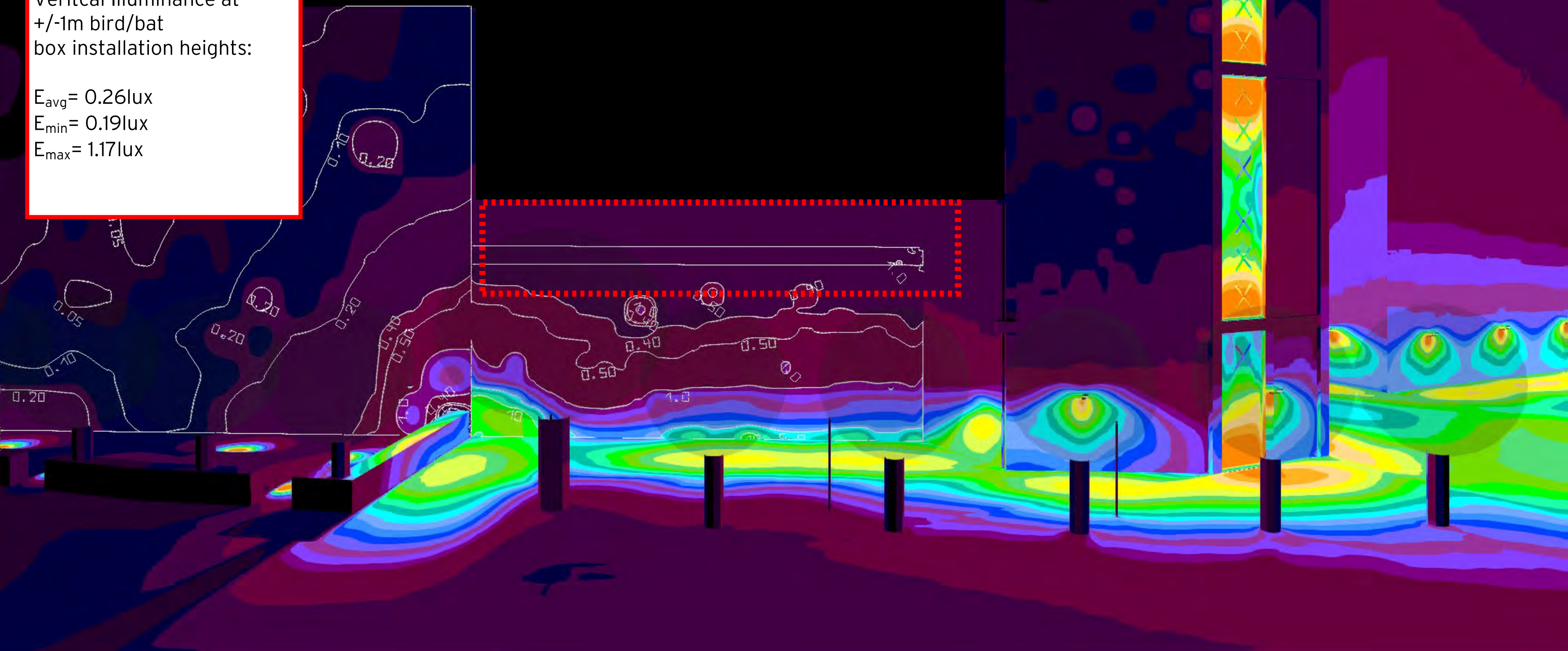




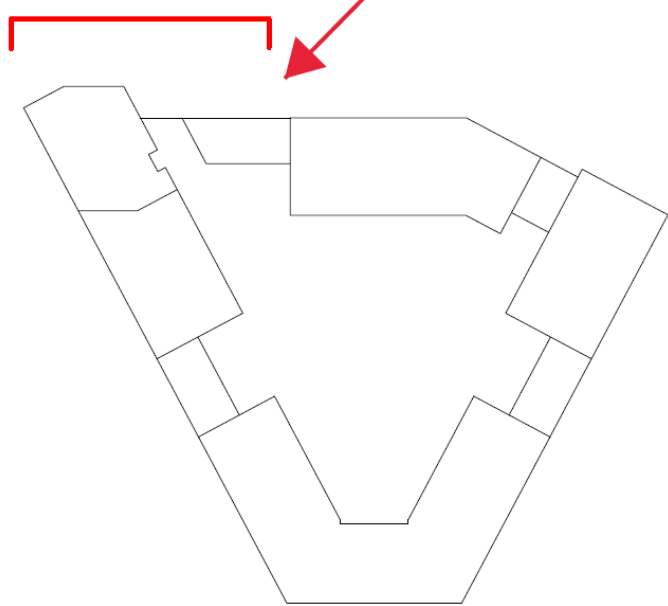


Middle Block M3 North
Elevation (Pre Curfew)
Veritcal Illuminance at
+/-1m bird/bat
box installation heights:

$E_{avg} = 0.26 \text{ lux}$
 $E_{min} = 0.19 \text{ lux}$
 $E_{max} = 1.17 \text{ lux}$

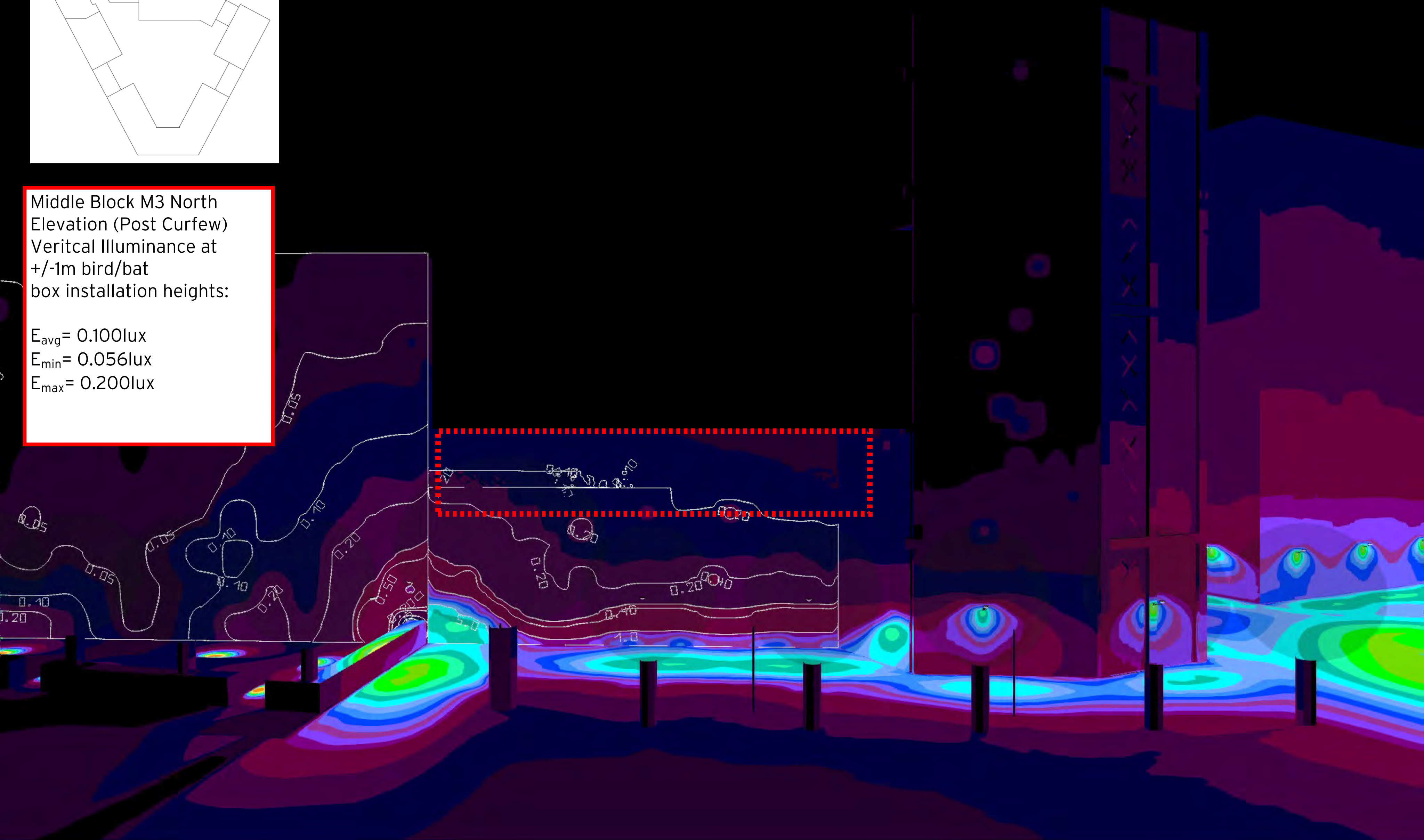


3D View



Middle Block M3 North
Elevation (Post Curfew)
Veritcal Illuminance at
+/-1m bird/bat
box installation heights:

$E_{avg} = 0.100\text{lux}$
 $E_{min} = 0.056\text{lux}$
 $E_{max} = 0.200\text{lux}$



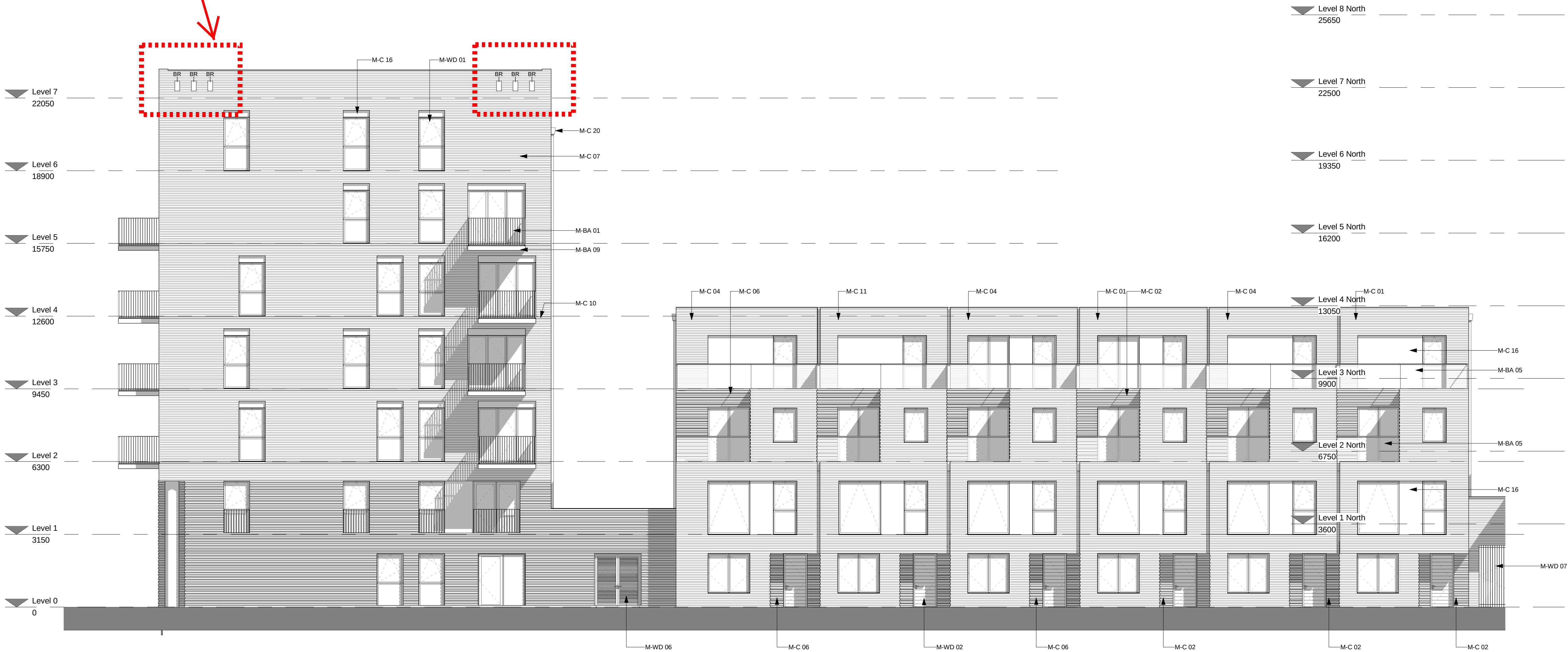
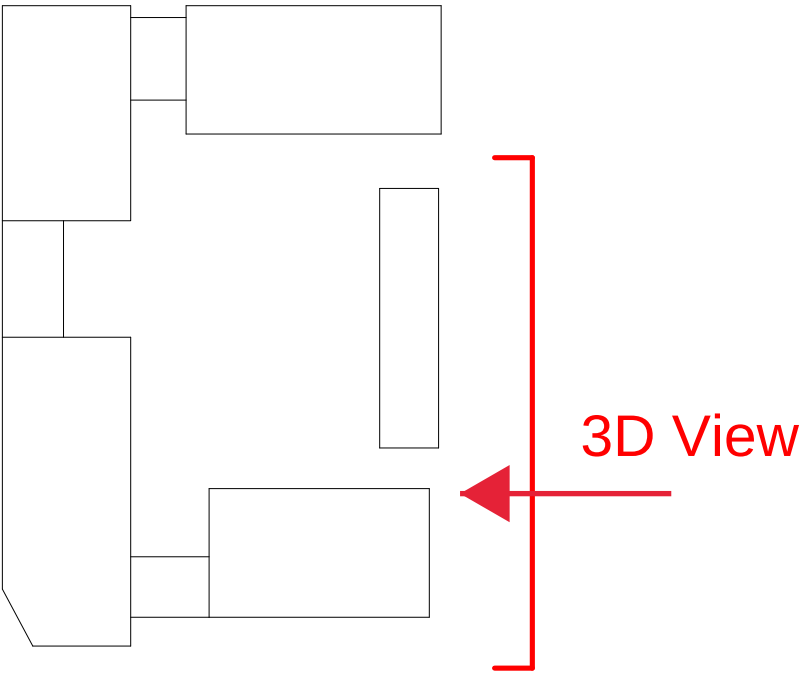
0.00 0.00 0.00 0.00 0.01 0.01 0.02 0.03 0.04 0.07 0.12 0.20 0.33 0.55 0.91 1.49 2.47 4.08 6.73 11.1 18.3 30.2 50.0

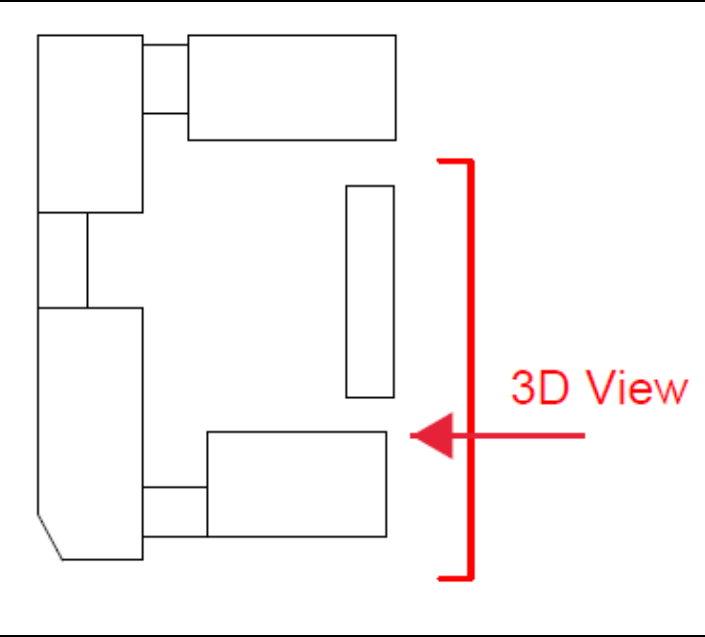
Figure 5 : Location of bat boxes (BR) on E5 Block.

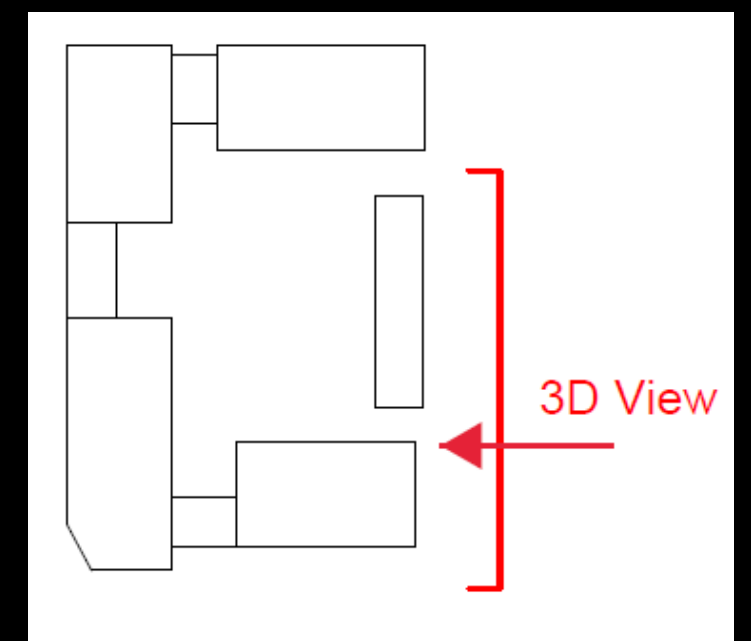
03. East Block E5 East

6no. bat boxes located
above Level 7 (>22.05m
above ground)

Materials Legend	
M-BA 01	PPC Metal balustrade typical; 50 x 10mm flats
M-BA 05	Cantilevered glass balustrade to inset balcony
M-BA 09	Fair faced pre-cast concrete fascia & soffit to projected balcony
M-C 01	Brick / mortar colour A (Dark)
M-C 02	Brick / mortar colour A alternating 25mm projecting (Dark)
M-C 04	Brick / mortar colour B (Medium)
M-C 06	Brick / mortar colour B alternating 25mm projecting (Medium)
M-C 07	Brick / mortar colour C (Light)
M-C 10	Brick / mortar colour C recessed band single course (Light)
M-C 11	Brick / mortar colour D (Light)
M-C 16	Metal panel cladding colour A (Dark)
M-C 20	PPC Rainwater goods
M-WD 01	Dark grey coloured frame double glazed window / door assembly
M-WD 02	Dark grey coloured frame solid timber door assembly
M-WD 06	PPC Metal Louvre doors
M-WD 07	PPC Metal gate
BR	Bat Roost - See Bird/Bat Box Specification for details







East Block E5 East Elevation
Veritcal Illuminance at +/-1m
bird/bat
box installation heights:

$$E_{avg} = 0.022\text{lux}$$

$$E_{min} = 0.015\text{lux}$$

$$E_{max} = 0.092\text{lux}$$

*Due to the significance of
this area to bat commutes
lighting is kept at Post
Curfew level at all times.

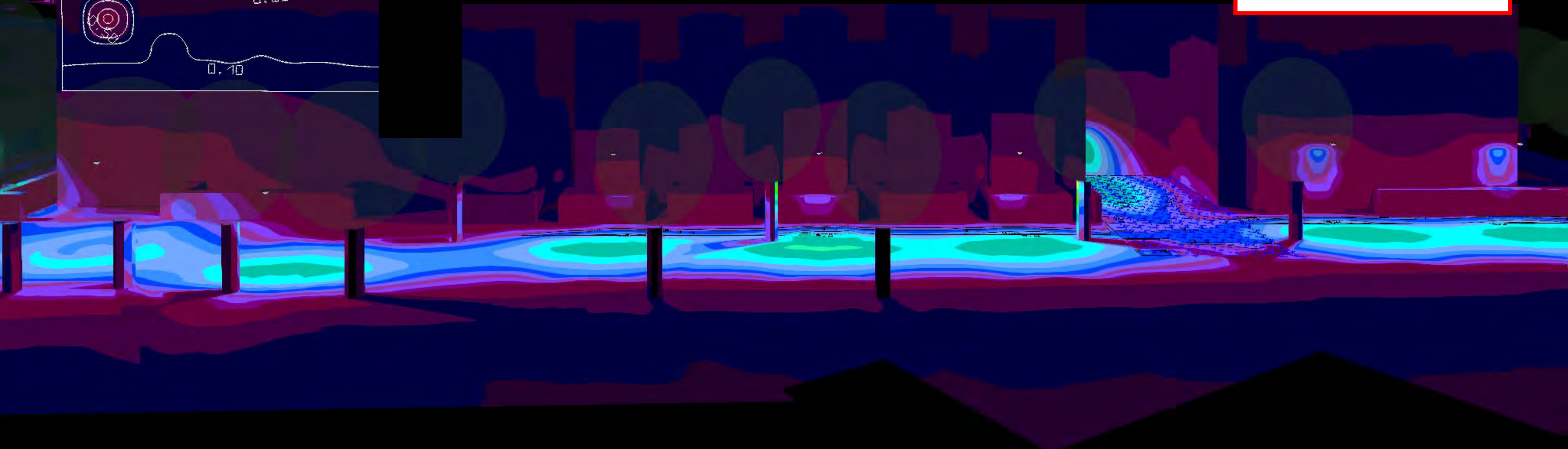
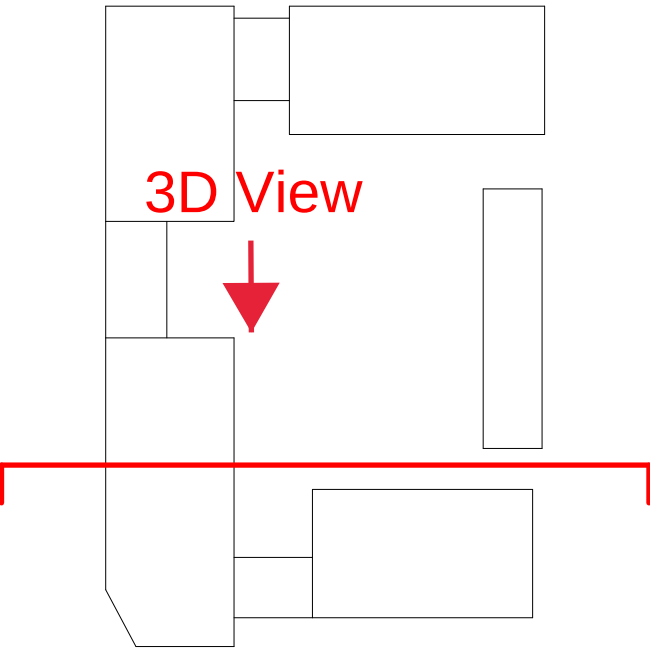


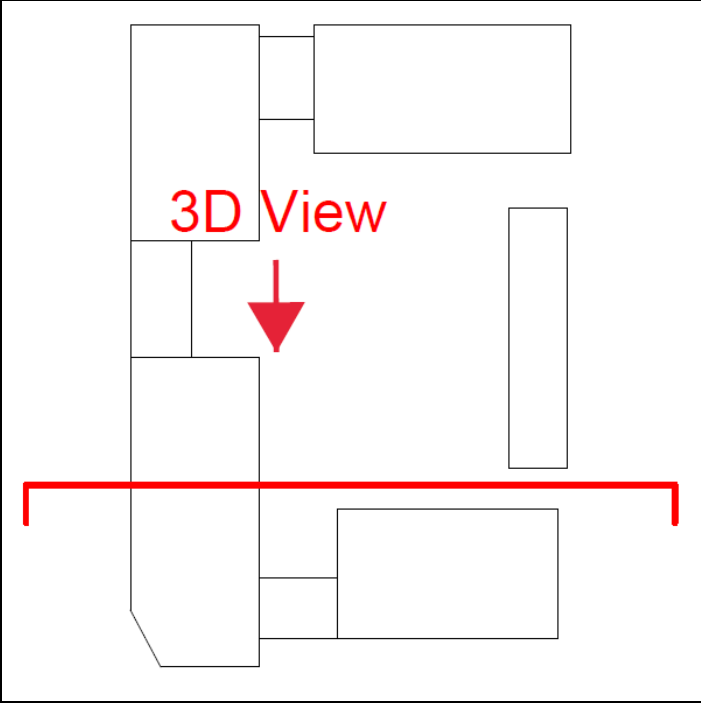
Figure 2 : Location of swift boxes (BB) on E1 Block.

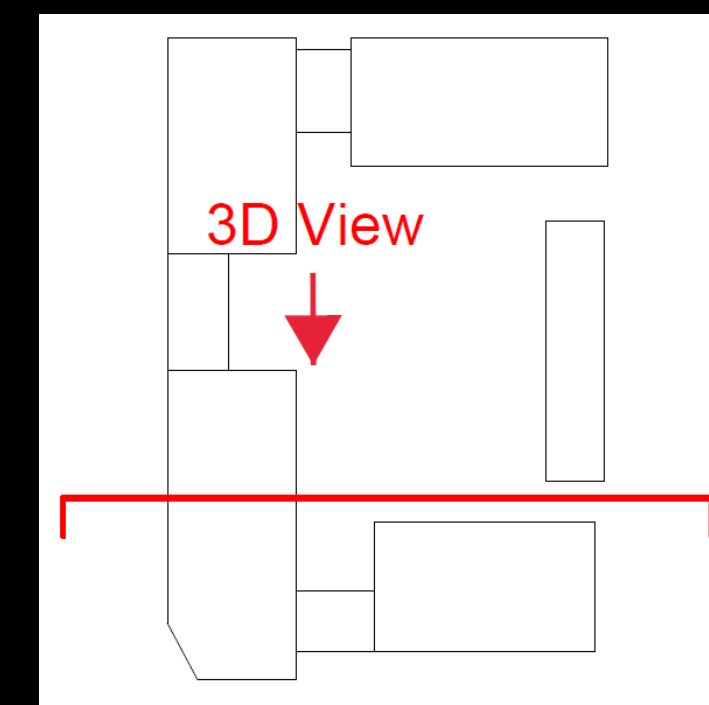
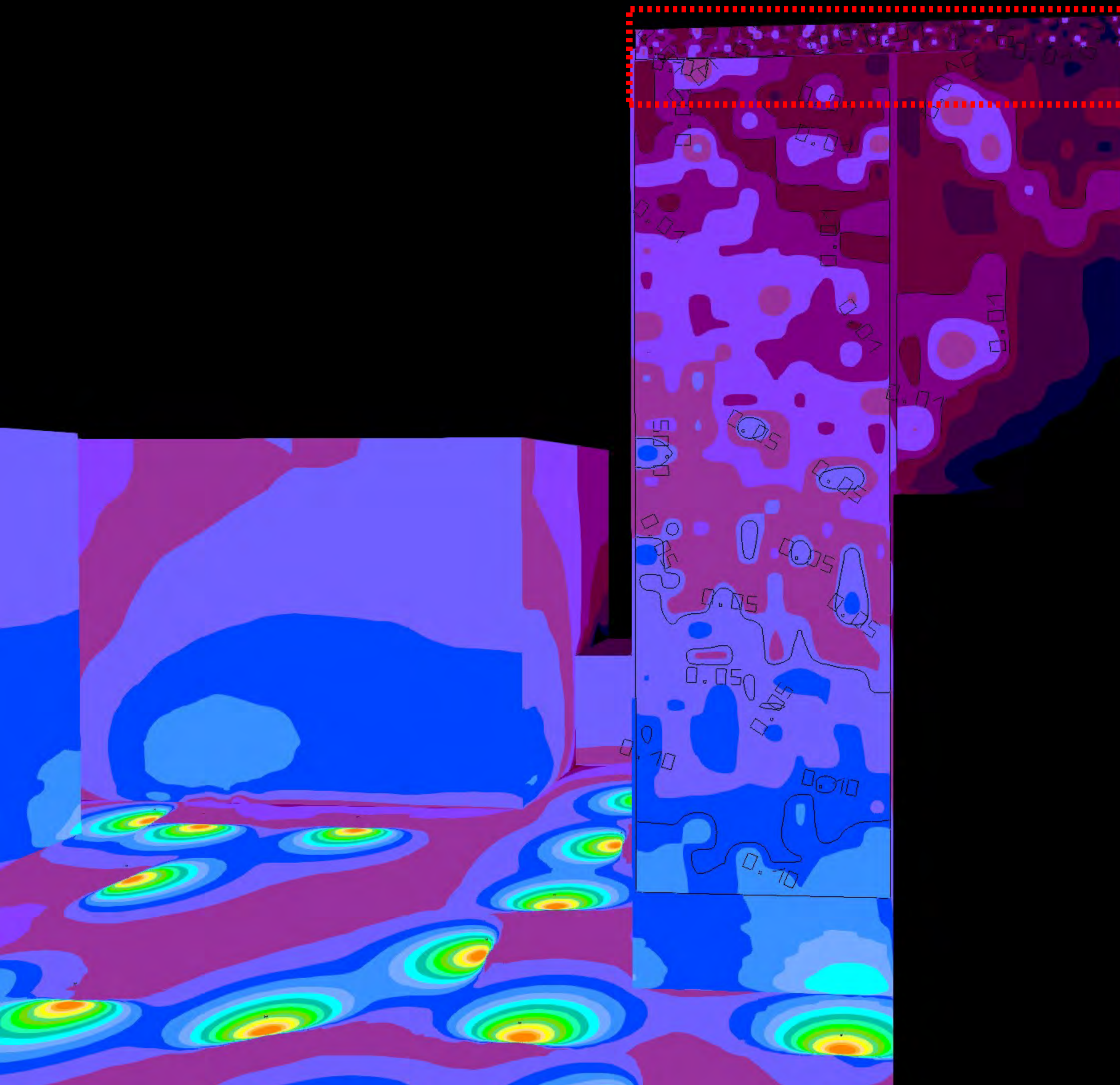
04. East Block E1 North

5no. swift boxes located
above Level 11
(>34.65m above ground)

Materials Legend	
M-BA 01	PPC Metal balustrade typical: 50 x 10mm flats
M-BA 09	Fair faced pre-cast concrete fascia & soffit to projected balcony
M-BA 10	Precast concrete balcony fascia
M-C 01	Brick / mortar colour A (Dark)
M-C 03	Brick / mortar colour A soldier course (Dark)
M-C 04	Brick / mortar colour B (Medium)
M-C 07	Brick / mortar colour C (Light)
M-C 10	Brick / mortar colour C recessed band single course (Light)
M-C 14	Precast concrete band course
M-C 16	Metal panel cladding colour A (Dark)
M-C 20	PPC Rainwater goods
M-WD 01	Dark grey coloured frame double glazed window / door assembly
BB	Bird Box - See Bird/Bat Box Specification for details





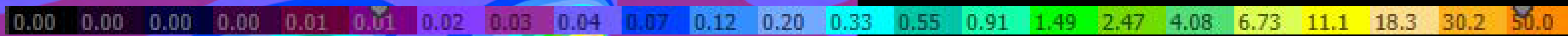


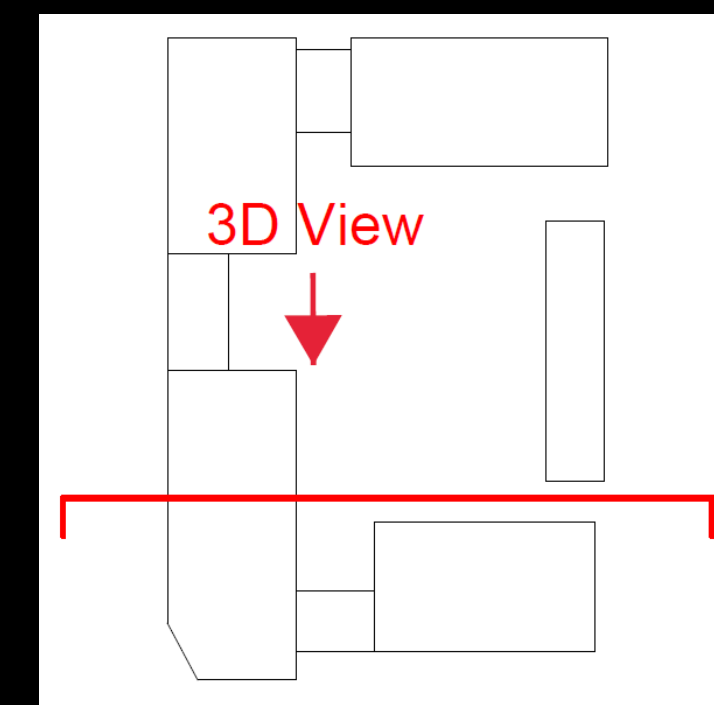
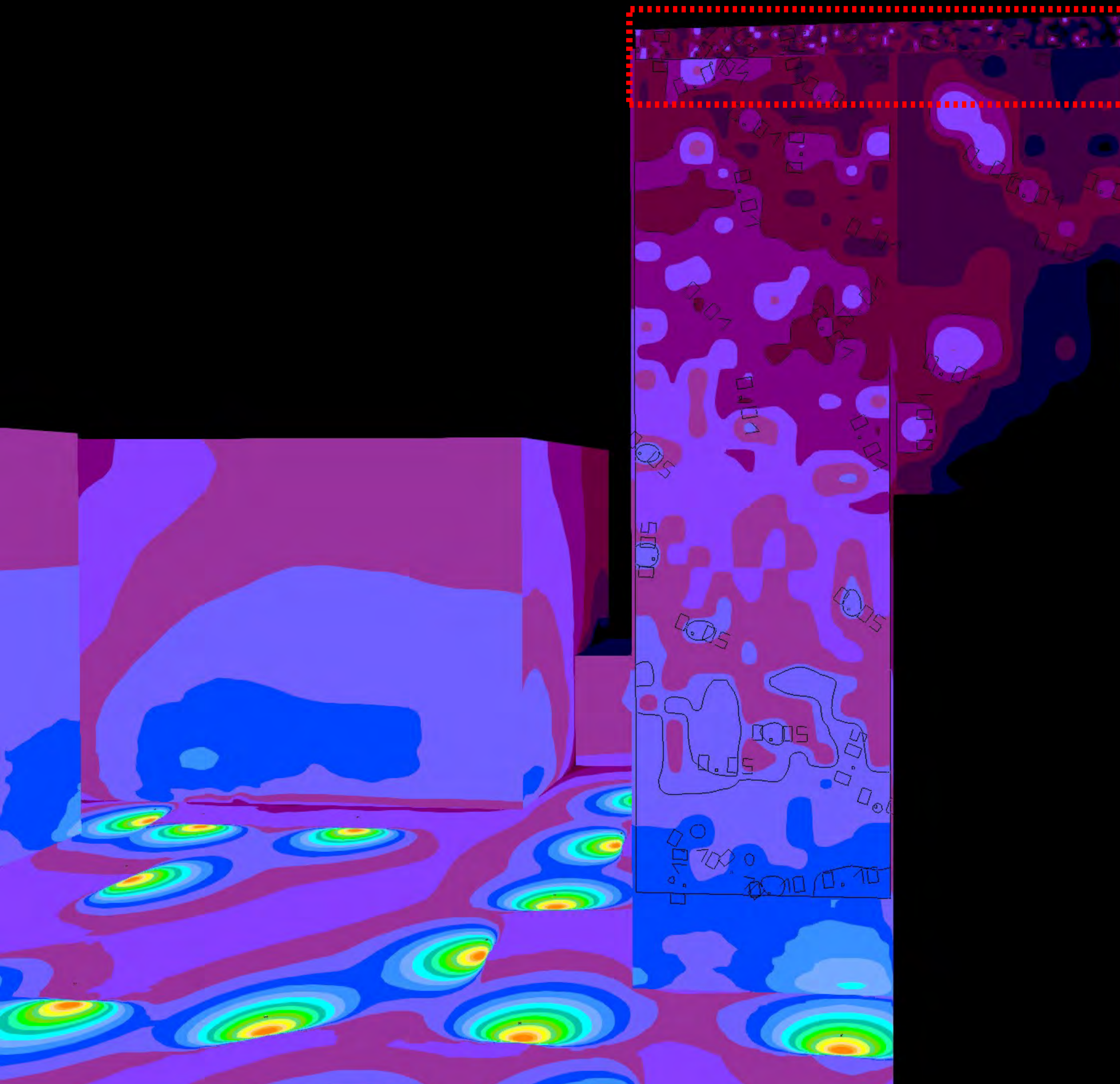
E1 Block North Elevation
(Pre Curfew)
Vertical Illuminance at
+/-1m bird/bat
box installation heights:

$E_{avg} = 0.010\text{lux}$

$E_{min} = 0.002\text{lux}$

$E_{max} = 0.040\text{lux}$





E1 Block North Elevation
(Post Curfew)
Vertical Illuminance at
+/-1m bird/bat
box installation heights:

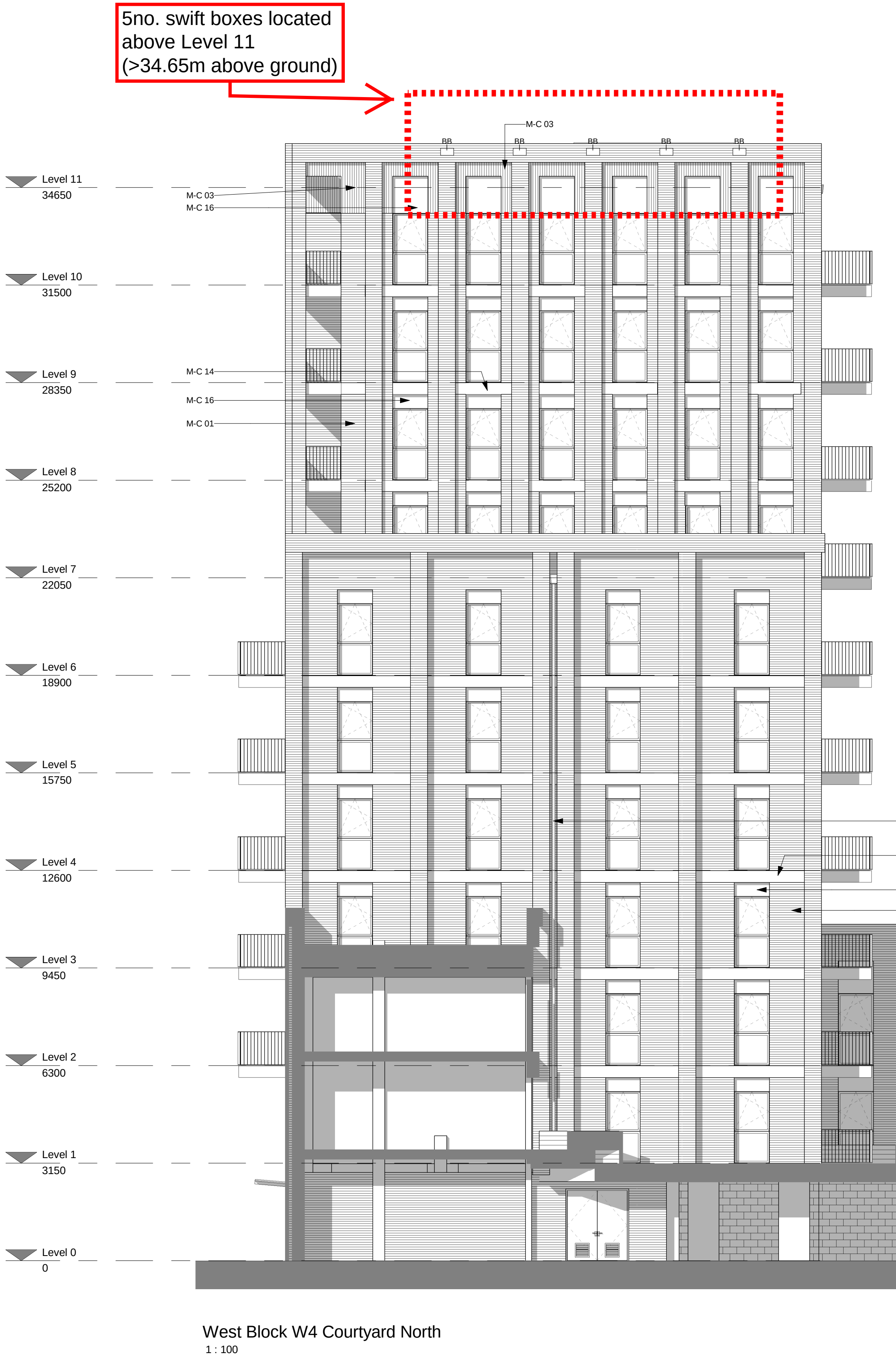
$E_{avg} = 0.007\text{lux}$

$E_{min} = 0.001\text{lux}$

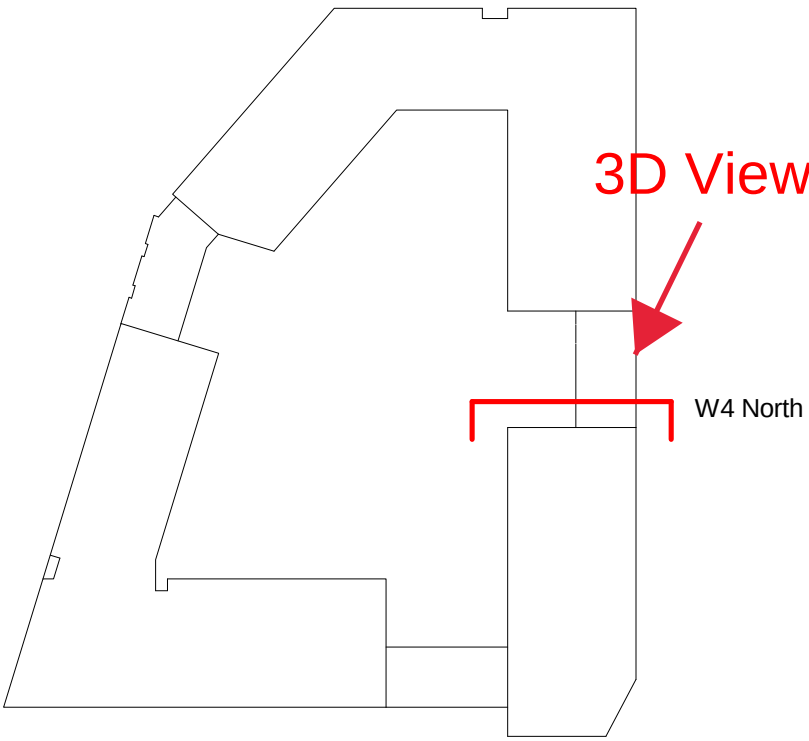
$E_{max} = 0.028\text{lux}$

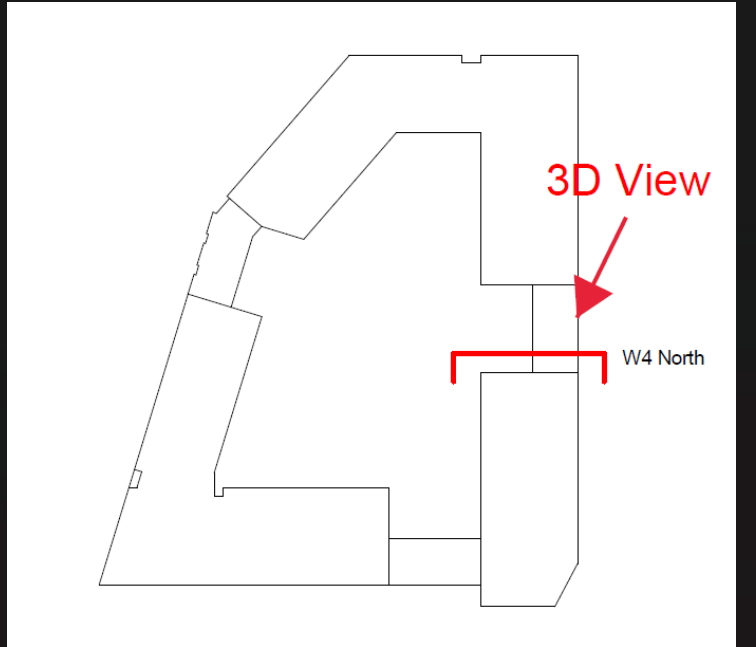
Figure 3 : Location of swift boxes (BB) on W4 Block.

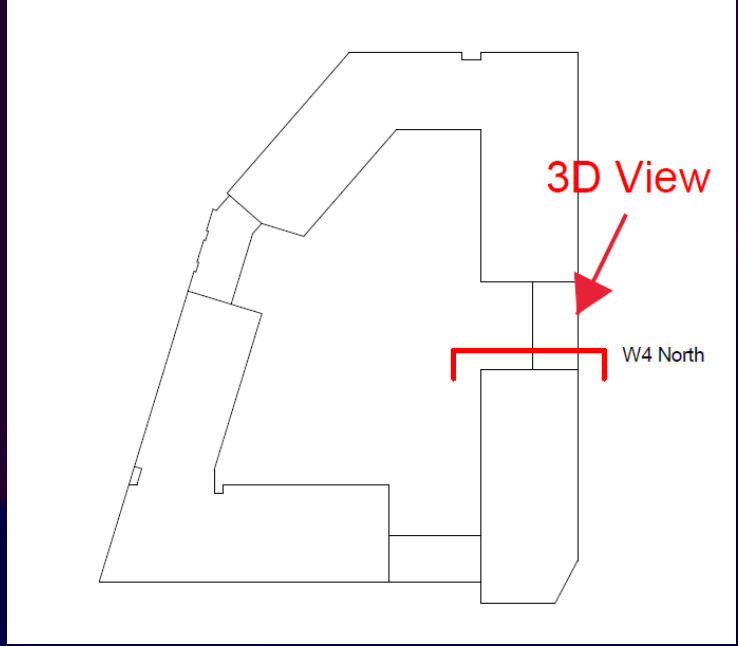
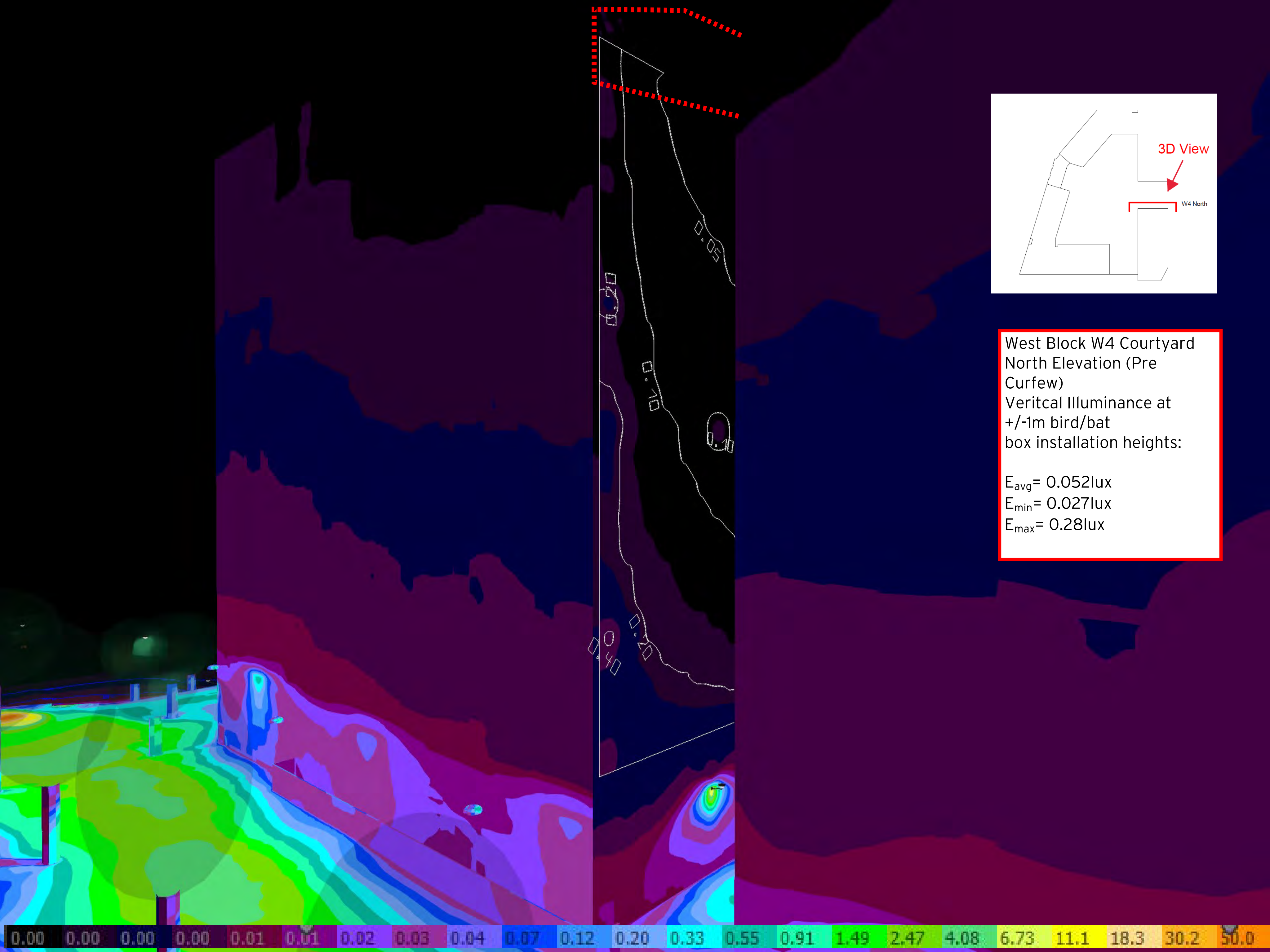
05. West Block W4 North



Materials Legend	
F10	
M-BA 02	PPC Metal balustrade front, balusters turned 45 deg
M-C 01	Brick / mortar colour A (Dark)
M-C 03	Brick / mortar colour A soldier course (Dark)
M-C 04	Brick / mortar colour B (Medium)
M-C 14	Precast concrete band course
M-C 16	Metal panel cladding colour A (Dark)
M-C 20	PPC Rainwater goods
M-WD 01	Dark grey coloured frame double glazed window / door assembly
BB	Bird Box - See Bird/Bat Box Specification for details

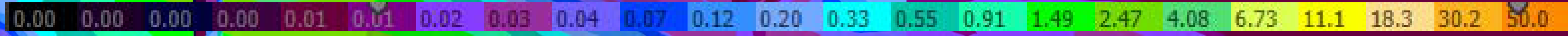


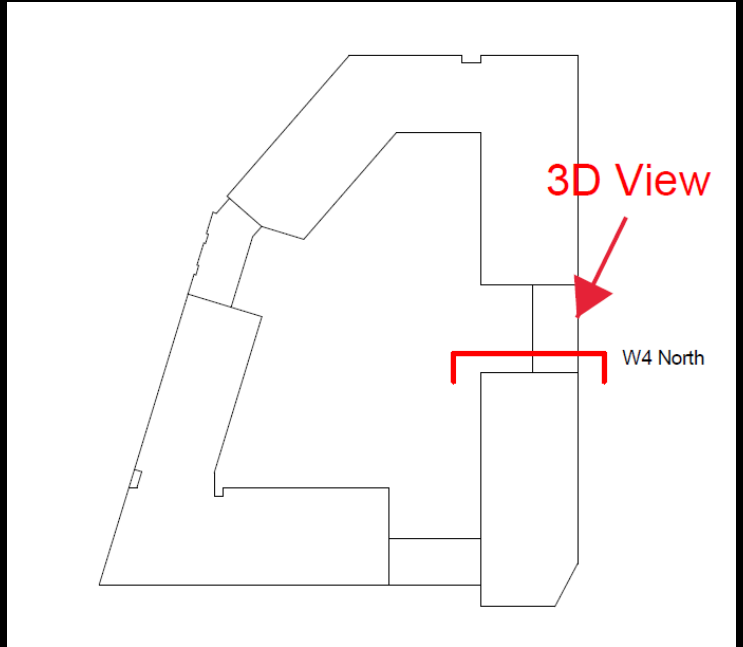
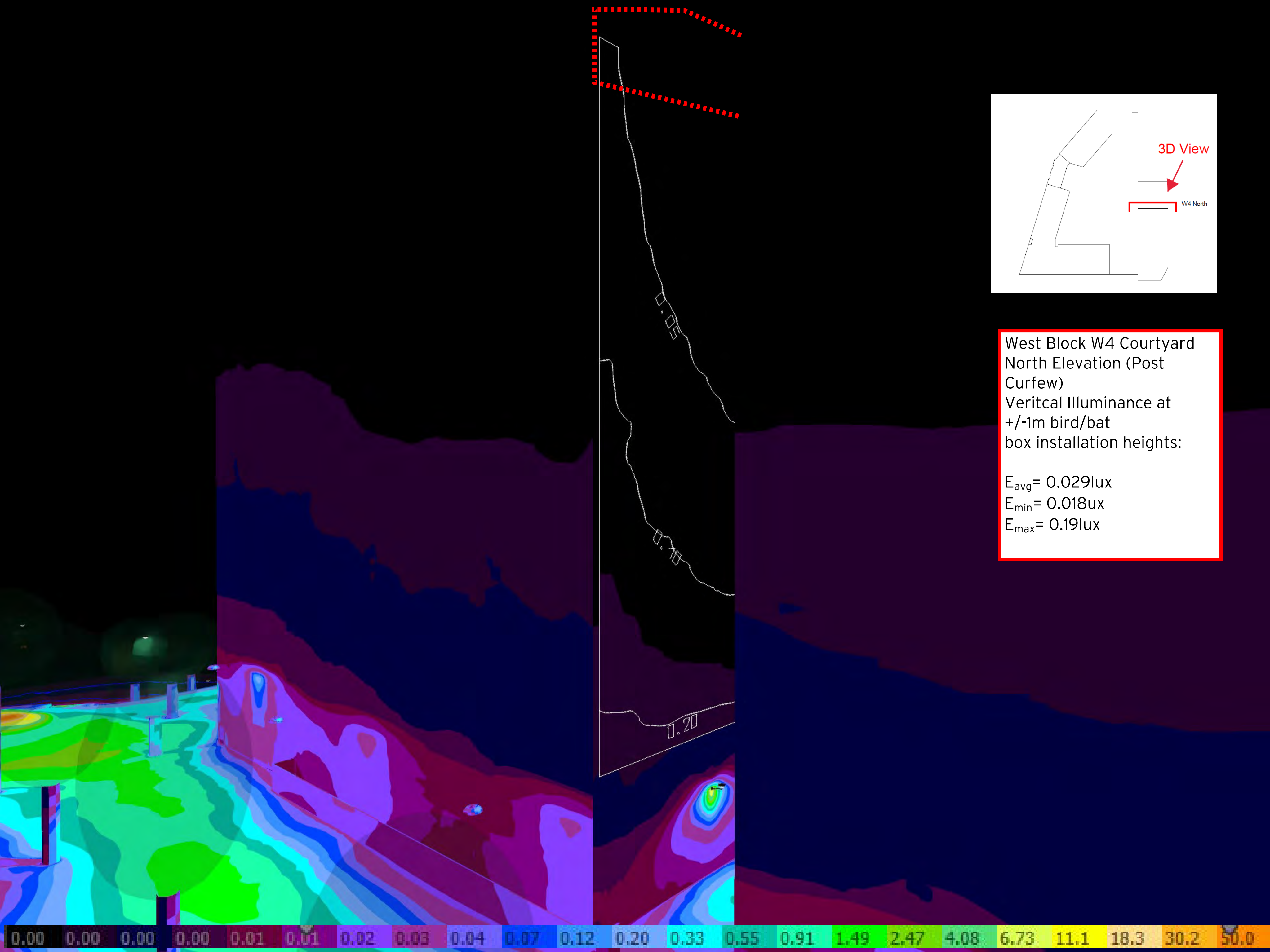




West Block W4 Courtyard
North Elevation (Pre
Curfew)
Veritcal Illuminance at
+/-1m bird/bat
box installation heights:

E_{avg} = 0.052lux
 E_{min} = 0.027lux
 E_{max} = 0.28lux





West Block W4 Courtyard
North Elevation (Post
Curfew)
Veritcal Illuminance at
+/-1m bird/bat
box installation heights:

E_{avg} = 0.029lux
 E_{min} = 0.018ux
 E_{max} = 0.19lux

