

15.02.2023

Station Hill Reading (Phase 1)

Document Reference: RP03-19194-R3 - Midgard - Block E and F, Station Hill - Planning Conditions 48.

The document referenced above is submitted to Reading Borough Council for approval to

Discharge planning condition Block E OPP 48 & Block F OPP 48 (Noise Generating Plant) prior to relevant works.

Planning condition 48 requires the following:

Block E & F

No mechanical plant, including kitchen extraction plant, shall be installed at any time until a noise assessment of the proposed mechanical plant has been submitted to and approved in writing by the Local Planning Authority. The assessment shall be carried out in accordance with BS4142:2014 methodology. The predicted specific sound level (LAeq,TR) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10dB below the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The predicted rating level, LAr,Tr (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive facade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard.

The following report has been prepared to satisfy Plot E Condition 48 and Plot F Condition 48

RP03-19194-R3 - Midgard - Block E and F, Station Hill –prepared by Cass Allen.

This document outlines the assessment has been carried out in accordance with the requirements of noise-related mechanical plant equipment of Station Hill, Phase 1 Development.





Architectural & Environmental Acousticians

Noise & Vibration Engineers

Discharge of Planning Condition 48

Block E and F, Station Hill

Discharge of Planning Condition 48

Project: BLOCK E AND F, STATION HILL

Report reference: RP03-19194-R3

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REVISION	ISSUE DATE	REPORT BY	CHECKED BY	NOTES
0	08 December 2022	Fabio Lassandro, MSc BEng MIOA, Associate	Chris McNeillie, MSc CEng MIOA, Director	Initial issue
1	09 January 2023	Fabio Lassandro, MSc BEng MIOA, Associate	Chris McNeillie, MSc CEng MIOA, Director	Minor amendments
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3	15 February 2023	Fabio Lassandro, MSc BEng MIOA, Associate	Chris McNeillie, MSc CEng MIOA, Director	Minor amendments

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1. EXECUTIVE SUMMARY

- 1.1 Cass Allen has been instructed by Midgard Ltd to assess the acoustic design of the mechanical plant associated with Block E and F, Station Hill.
- 1.2 The assessment has been carried out in accordance with the requirements of noise-related Planning Condition 48.
- 1.3 Background noise levels that were measured at the site by Hoare Lea and Cass Allen have been used to determine the plant noise limits in line with Planning Condition 48 requirements.
- 1.4 A 3D noise model of the development was constructed based on the development design and layout. The noise model was used to calculate plant noise levels at the nearest noise-sensitive receptors. Two scenarios were assessed:
- all mechanical plant operating simultaneously with the induction fans serving the car parking area operating at 20% duty, and,
 - all mechanical plant operating simultaneously with the induction fans serving the car parking area operating at 50% duty.
- 1.5 The 3D noise model results show that the resultant noise levels for both scenarios generally comply with the requirements of Planning Condition 48. Minor exceedances of the assessment criteria are considered acceptable as explained within the report.
- 1.6 Kitchen extract systems serving any commercial areas will be the responsibility of the future retail tenants and therefore have not been assessed as part of this report. An acoustic assessment will need to be carried out prior to the installation of any kitchen extract system to ensure compliance with Planning Condition 48 requirements. This will be controlled via clauses in the tenancy agreements for the commercial units.
- 1.7 It is our view that this report contains the information required to discharge Planning Conditions 48.

2. INTRODUCTION

- 2.1 The assessment has been carried out in accordance with the requirements of noise-related Planning Condition 48, which states:

Condition 48

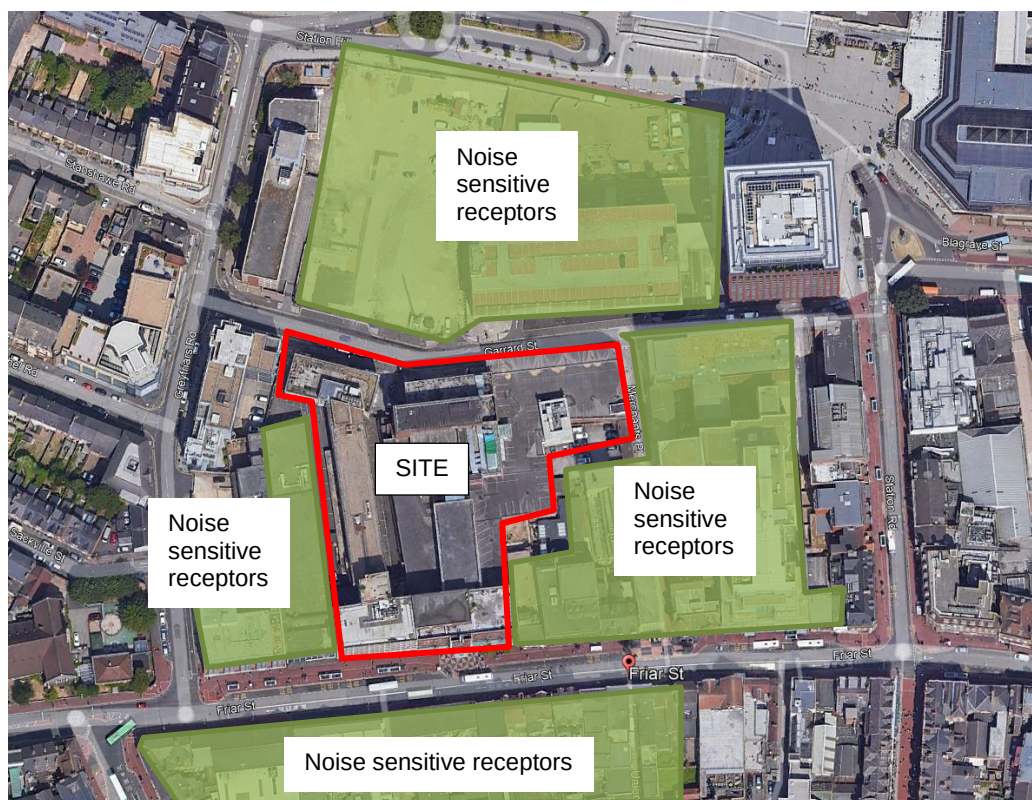
No mechanical plant, including kitchen extraction plant, shall be installed at any time until a noise assessment of the proposed mechanical plant has been submitted to and approved in writing by the Local Planning Authority. The Assessment shall be carried out in accordance with BS4142:2014 methodology. The predicted specific sound level (LAeq,T) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive façade shall be at least 10dB below the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The predicted rating level, LAr,Tr (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard.

- 2.2 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

3. DEVELOPMENT DESCRIPTION

- 3.1 Phase 1 of the Station Hill Development consists of two residential blocks (Block E and F). The residential blocks are up to 12-storey in height and are connected by a two-storey basement below ground level. A drawing of the development layout is shown Appendix 1.
- 3.2 The site is located in a mixed-use area with the noise environment largely dictated by transportation noise (i.e., road traffic). The site is bounded to the north and south by Gerrard Street and Friar Street respectively. To the west of the site is Greyfriars Road and to the east is Station Road. There are also commercial premises along the main roads. Reading Train Station is approximately 140m to the north of the site.
- 3.3 There are a number of mixed-use noise sensitive receptors around the site (e.g. dwellings, hotel, etc.). The site location and surrounding nearest noise sensitive receptors (in green) are shown in Figure 1 below.

Figure 1 Site Location and Surrounding Area



- 3.4 To address the requirements of the noise related Planning Condition 48, noise emissions from mechanical plant associated with the development at the position of noise sensitive receptors has been assessed in the following sections of this report.

4. PLANT NOISE IMPACT ASSESSMENT

Design criteria – Mechanical plant noise

- 4.1 Planning Condition 48 requires that the mechanical plant noise assessment is carried out in accordance with BS4142:2014 – *Methods for rating and assessing industrial and commercial sound* (BS4142).
- 4.2 BS4142:2014 can be used to assess the impact of noise from external industrial and/or commercial noise sources on nearby sensitive receptors.
- 4.3 The BS4142 assessment methodology can be summarised as follows:
1. Measure the existing background noise levels (LA90,T dB) at the locations of nearby noise sensitive receptors during the quietest periods when the new mechanical plant will operate;
 2. Predict or measure the noise emissions (LAeq,T dB) from the new mechanical plant at the location(s) of the nearby sensitive receptors, and add corrections for any distinguishable acoustic features (e.g. tones, whines, screeches, hisses etc);
 3. Subtract the measured background noise levels (item 1 above) with the measured or predicted rating noise levels (item 2 above) at each sensitive receptor. BS4142 states that:
 - a) *Typically, the greater this difference, the greater the magnitude of the impact.*
 - b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
 - c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
 - d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*
- NOTE Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.*
- 4.4 Planning Condition 48 requires that the predicted rating plant noise level, LAr,Tr (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive facade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, LA90,T. Planning Condition 48 also requires that the specific plant noise levels LAeq,T as measured at a point of 1 metre external to the nearest noise sensitive facade shall not exceed 10dB below existing background sound level, LA90,T.

- 4.5 The above criteria have been adopted for the assessment of noise emissions from the development.
- 4.6 Background noise levels (LA90) at the site were measured as part of the site noise surveys carried out by Hoare Lea (HL) and Cass Allen outlined in Appendix 2 and Appendix 3. The measured background noise levels have been used to develop limits for plant noise emissions from the new development at the positions of the surrounding residential properties in accordance with the BS4142 assessment methodology and the criteria in Planning Condition 48. The limits are shown in Table 1 below.

Table 1 BS4142 Noise Limits - Free-field Levels

Location	Period	
	Day-time/Evening (0700-2300hrs)	Night-time (2300-0700hrs)
Nearest noise sensitive receptors (rated levels – equal to background)	43 dB LAr,Tr	36 dB LAr,Tr
Nearest noise sensitive receptors (specific levels – 10dB below background)	33 dB LAeq	26 dB LAeq ²

Note 1 The above limits are 'rated' noise levels. Any mechanical plant noise emissions should have appropriate corrections for the character of the noise applied and still meet these limits.

Note 2 The calculated criteria for night time specific level is 26dB LAeq is considered to be extremely low and therefore unpracticable (as stated in BS4142:1999 – “for the purpose of this standard, background noise levels below 30dB ... are considered to be very low”).

Proposed mechanical plant design

- 4.7 Mechanical plant associated with the new building will comprise:
- Extract and supply car park fans
 - Induction fans within the car park (ventilated with a combination of mechanical fan system and louvres)
 - Extract fans serving lower floor non-residential areas
 - Building services at the amenities (MVHR and extract fans)
 - MVHR units serving the dwellings
 - Fan discharge serving the refuse chutes in residential corridors
 - Substations
 - Environmental roof fans to provide mechanical ventilation to communal areas
- 4.8 It is also important to note that kitchen extract systems serving any commercial areas will be the responsibility of the future retail tenants and therefore have not been assessed as part of this report. An acoustic assessment will need to be carried out prior to the installation of any kitchen extract

system to ensure compliance with Planning Condition 48 requirements. This will be controlled via clauses in the tenancy agreements for the commercial units.

- 4.9 Details of the mechanical plant including noise data provided by the M&E team are presented in Appendix 4.
- 4.10 All of the selected mechanical plant items are modern units featuring inverter drives and quieter systems where possible. Therefore, it is our expectation that the resultant noise will be fairly broadband in nature and therefore corrections for acoustic features (tonality, intermittency and impulsivity) are not required. However, as a conservative and worst case approach, in order to calculate the rated plant noise levels we have accounted for a 6dB correction for any minor acoustic features to the carpark and roof fans.
- 4.11 All the louvres serving the car park are acoustically upgraded. The minimum acoustic performance for the louvres is shown in Table 2 below. The final product to be adopted for the louvres will be specified in due course.

Table 2 Minimum sound reduction performance for the louvres

	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
Acoustic louvre serving carpark (except above carpark entrance)	4	7	10	12	15	16	13
Acoustic louvre above carpark entrance	5	8	14	27	38	40	33

- 4.12 The carpark entrance originally featured a bi-fold gates system which offered no acoustic mitigation against noise from the car park ventilation system. This design would have had a major impact on the external noise levels at the facade of nearest noise sensitive receptors.
- 4.13 The currently proposed carpark entrance will feature overhead roller shutter gate that will be closed other than when vehicles enter or leave the carpark. The acoustic performance for the currently proposed overhead roller shutter gate is also included in Appendix 4. Noise breakout via the overhead roller shutter gate is expected to be negligible when compared with noise breakout via the acoustic louvres serving the carpark.
- 4.14 Noise from MVHR intake and exhaust serving dwellings when working at typical duties are predicted to be negligible when compared with other mechanical plant items serving the development and therefore are not considered further.
- 4.15 A 3D noise model developed with Cadna A v.2023 software was used to predict noise emissions from the mechanical plant items at the locations of surrounding noise sensitive positions (new and existing). The predictions assumed that all plant items will be running simultaneously at typical duties.

- 4.16 The car park induction fans have been assessed on the basis that they will typically run at background mode at ~20% duty with peaks of ~50% duty during typical higher vehicles flows only in the event of higher carbon monoxide levels within the carpark (e.g. morning and afternoon rush hours). The M&E consultants for the project (ARK) confirmed that it is unlikely that the induction fans will work at higher duties because modern vehicles have lower carbon monoxide emissions and it is unlikely that enough vehicles will move in and out of the car park at the same time to trigger the carbon monoxide sensors.
- 4.17 The car park induction fans have been also designed to work for emergency smoke extracts purposes at 100% duty. Smoke/fire emergency plant has not been assessed against the criteria set in Planning Condition 48 as this plant will only operate in case of emergency and for short periods for maintenance testing which will be during core work hours only and for approximately 1 hour every 3 months.
- 4.18 The results of the 3D noise predictions are shown in Appendix 5. The 3D noise results show the two different scenarios with all plant running simultaneously, but the induction fans running at 20% and 50% duty. Table 3 below shows the resultant noise levels compared with the relevant day and night time noise criteria set in Table 1.

Table 3 Predicted Plant Noise Emissions from New Building - Free-field Levels

Location	Worst Case Predicted Plant Noise Levels	BS4142 Criteria	
		Daytime/ Evening	Night Time
Rated Levels (dB LAr,Tr)			
All plant running simultaneously and induction fans running at 20% duty	34	43	36
All plant running simultaneously and induction fans running at 50% duty	38	43	36
Specific Levels (dB LAeq,T)			
All plant running simultaneously and induction fans running at 20% duty	28	33	26
All plant running simultaneously and induction fans running at 50% duty	32	33	26

- 4.19 It can be seen from Table 3 that the predicted plant noise rated levels at the nearest noise sensitive receptors are lower than the day and night-time noise criteria when the induction fans are running at 20% duty. When the induction fans are running at 50% duty, the daytime rated levels comply with Planning Condition 48 requirements but the night-time rated levels are predicted to exceed the night-time criterion by 2dB.
- 4.20 Table 3 also show that the predicted daytime plant noise specific levels at the nearest noise sensitive receptors are compliant with the Planning Condition 48 requirements. The night time results are predicted to exceed the criteria by 2dB when the induction fans are working at 20% duty and 6dB when the fans are working at 50% duty.

4.21 The exceedances are considered to be acceptable for the following reasons:

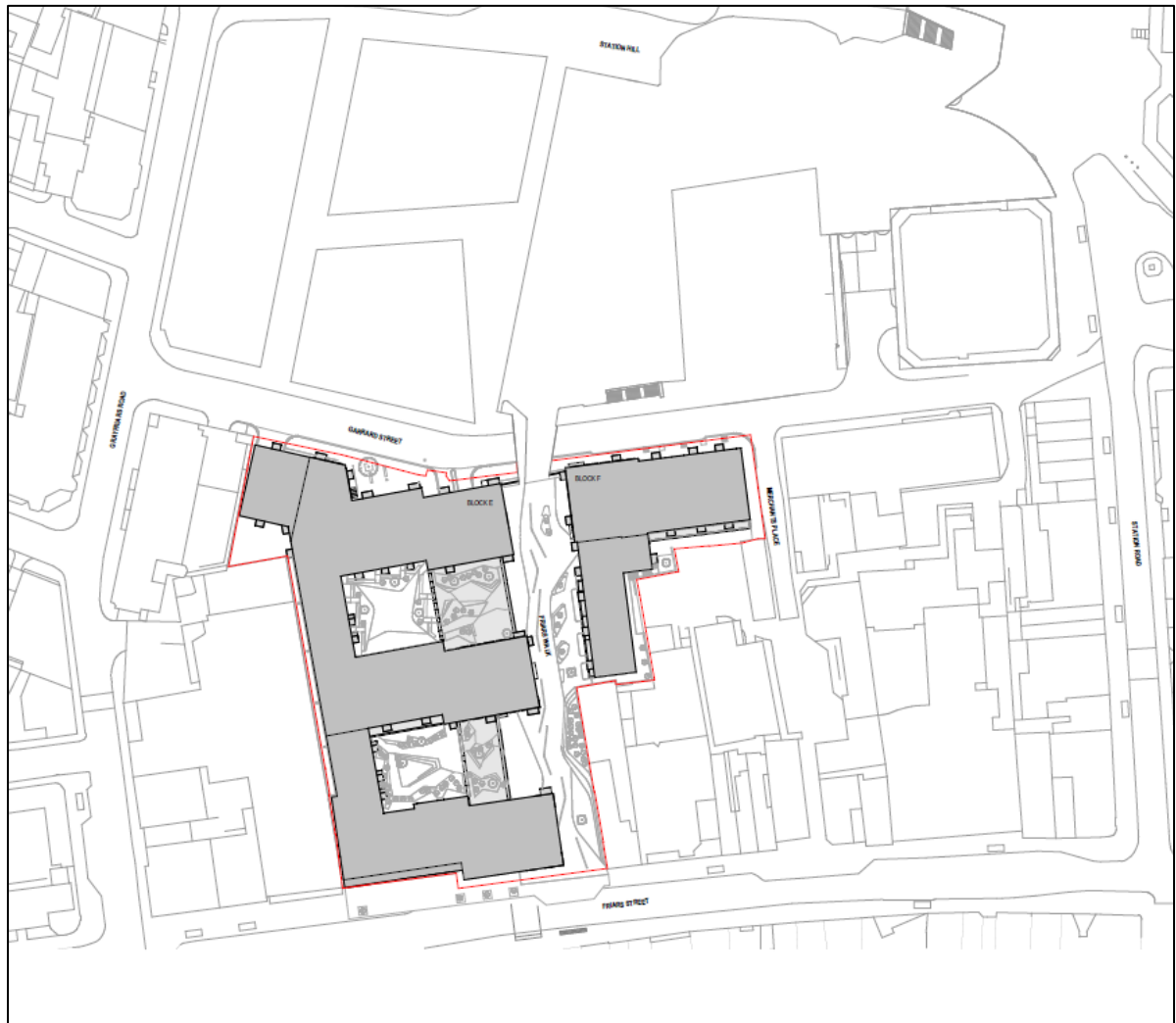
- The M&E team have confirmed that it is very unlikely that the induction fans will need to operate at 50% duty during night time periods (as discussed in Paragraph 4.16).
- The results presented in Table 3 only represent the very worst-case locations closest to louvres or fan discharges. The majority of the development will comply in full with the Planning Condition 48 requirements.
- The background noise levels are very low at night and the resultant criteria, particularly for the specific noise levels, are extremely low.

4.22 Based on the information above, the mechanical plant associated with the development is considered to be compliant with the spirit of Planning Condition 48 and it is our view therefore that the condition can be discharged.

5. CONCLUSIONS

- 5.1 Noise from new mechanical plant associated with Block E and F of the Station Hill development has been assessed against the requirements of Planning Condition 48.
- 5.2 Noise limits for the plant have been calculated based on the measured background noise levels at the site and the requirements of Planning Condition 48.
- 5.3 A 3D noise model of the development has been used to predict the plant noise levels at the nearest sensitive receptors and the results comply with the relevant noise limits other than minor exceedances under 'worst case' conditions which are considered to be very unlikely to occur in practice.
- 5.4 Kitchen extract systems serving any commercial areas will be the responsibility of the future retail tenants and therefore have not been assessed as part of this report. An acoustic assessment will need to be carried out prior to the installation of any kitchen extract system to ensure compliance with Planning Condition 48 requirements. This will be controlled via clauses in the tenancy agreements for the commercial units.
- 5.5 It is our view that this report contains the information required to discharge Planning Condition 48.

Appendix 1 Site Layout



Appendix 2 Hoare Lea Noise Survey Results

4. Baseline noise & vibration conditions.

This section sets out the acoustic data to be used for the assessment of potential noise impacts in relation to current development proposals. It presents a summary of the environmental noise levels measured at the site and surrounding area for use in assessing and determining the sound insulation requirements of the building envelope, and the control of noise emissions from building services plant and equipment.

4.1 Local noise conditions.

Environmental noise conditions at the site are predominantly formed of road traffic noise from the immediate road network around the Site, in particular buses on Friar Street, but also vehicles (including taxis) using Greyfriars Road, Garrard Street and Station Hill.

Daytime noise activities within the vicinity of the proposed development were observed to include the following:

- Idling buses (with engines running) serving bus stops immediately to the front of the proposed development along Friar Street;
- Idling taxis (with engines running) queuing along Garrard Street as they approach the Reading Station taxi rank on Station Road;
- Trains serving Reading Station to the north of the site. Train movements were observed to be frequent, although slow moving as trains approached / left Reading Station; and
- PA announcements associated with trains serving Reading Station.

Night-time noise activities are predominantly formed of pedestrian activity and noise break-out from the nearby clubs *Papward* and *Lola La*, which are located immediately opposite the site on Friar Street. *Papward's* typical opening hours are understood to be 2200 to 0200 on Thursdays, 2100 to 0400 on Fridays and 2000 to 0400 on Saturdays, whilst opening hours at *Lola La* are understood to be 2000 to 0300 on Tuesdays and Thursdays and 2100 to 0400 on Fridays and Saturdays.

Night-time noise activities within the vicinity of the proposed development were observed to include the following:

- Buses and taxis travelling along Friar Street;
- Music break-out from *Papward* and *Lola La*;
- Pedestrian activity associated with the neighbouring clubs, including use of the smoking and queuing area located to the front of *Papward*;
- Taxis were observed to travel a circular route from Friar Street, to Station Hill before returning to Station Road via Garrard Street; and
- Trains serving Reading Station to the north of the site, including PA announcements.

4.2 Baseline noise survey.

An acoustic survey has been carried out at the proposed development site to establish the prevailing noise conditions local to the site. The survey included the installation of three noise monitors across a fourteen-day period, in addition to attended noise measurements during the daytime and night-time.

An indicative site layout identifying the measurement positions is provided in Figure 1 below.

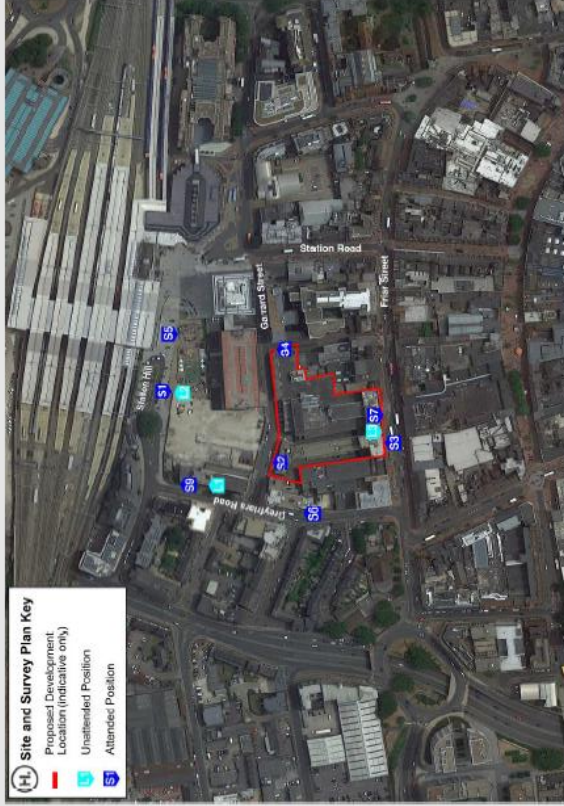


Figure 1: Site layout (indicative only).

4.2.1 Results summary.

A summary of the results from the unattended measurements taken over the fourteen-day period at positions L1, L2 and L3 (see Figure 1) are provided below.

Time period	Ambient $L_{eq,T}$ dB	Minimum $L_{eq,T}$ dB	Typical 90 th Percentile $L_{A,max}$ dB
Position L1			
Daytime (0700 to 2300)	69	44 (see Note 14.1)	85
Night-Time (2300 to 0700)	63	36 (see Note 14.2)	82
Position L2			
Daytime (0700 to 2300)	59	43 (see Note 14.1)	82
Night-Time (2300 to 0700)	56	37 (see Note 14.2)	77
Position L3			
Daytime (0700 to 2300)	67	47 (see Note 14.1)	88
Night-Time (2300 to 0700)	69	43 (see Note 14.2)	91

Table 14: Typical levels at measurement positions.

Note 14.1: Time period during the daytime is 1 hour ($L_{Aeq,1hr}$).

Note 14.2: Time period during the night-time is 15 minutes ($L_{Aeq,15min}$).

A summary of the attended measurements conducted at positions S1, S2 and S3 is provided below in Table 15.

Measurement position	Typical $L_{Aeq,T}$ dB	Ninetieth Percentile $L_{Amax,T}$ dB
Daytime		
S1	58	71
S2	60	76
S3	65	77
S4	62	78
S5	56	74
S6	63	76
Night-time		
S1	58	67
S2	63	81
S7	71	81
S9	65	77

Table 15: Measured noise levels at attended positions.

4.2.2 Nearest noise sensitive receptor.

A noise sensitive area is defined as landscapes or buildings where the occupiers are likely to be sensitive to noise created by new plant installed in the proposed development, including residential areas. Noise sensitive receptors around the Site have been identified and are shown in Figure 2 below.

Of the noise sensitive receptors identified in Figure 2, the nearest noise sensitive receptors to the proposed development have been identified as the proposed development itself, existing residential dwellings along Merchant Place to the east including the Novotel and Ibis Hotel and student residences within Central Studios to the west. In addition, future residential dwellings should be considered as noise sensitive as part of the Phase 2 and 3 proposals for the Station Hill site.



Figure 2: Nearest noise sensitive receptors.

4.2.3 Noise prediction model.

In order to predict the external noise levels present at each façade of the proposed development, a noise map has been created using CADNA environmental noise prediction and mapping software.

A baseline noise map was generated of the existing site using the results of the environmental noise survey and calibrated for daytime equivalent noise levels ($L_{Aeq,16hr}$), night-time equivalent noise levels ($L_{Aeq,8hr}$) and the maximum ninetieth percentile night-time $L_{Amax,T}$. The noise map was calibrated each of the noise sources discussed in Section 4.1.

Subsequently, a noise map was generated of the site with the proposed development in-situ. Figures 3 to 6 below display a three-dimensional representation of the noise map prediction for each of the proposed development façades. It should be noted that the noise mapping exercise takes into consideration all noise reflections that may occur off the proposed development and adjacent buildings.

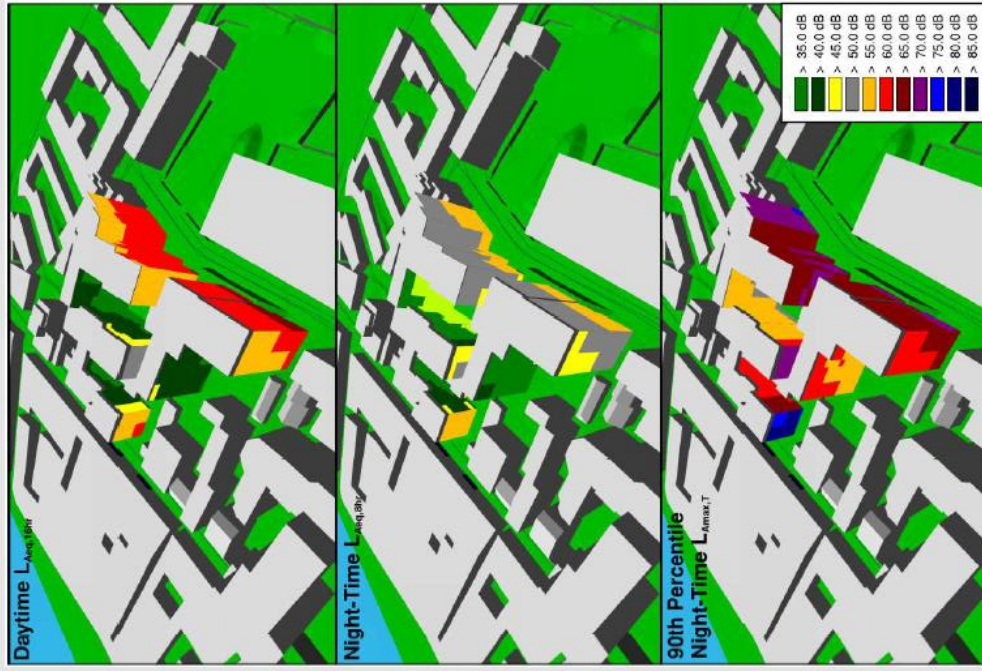


Figure 3: 3D noise map of proposed development from the north east.

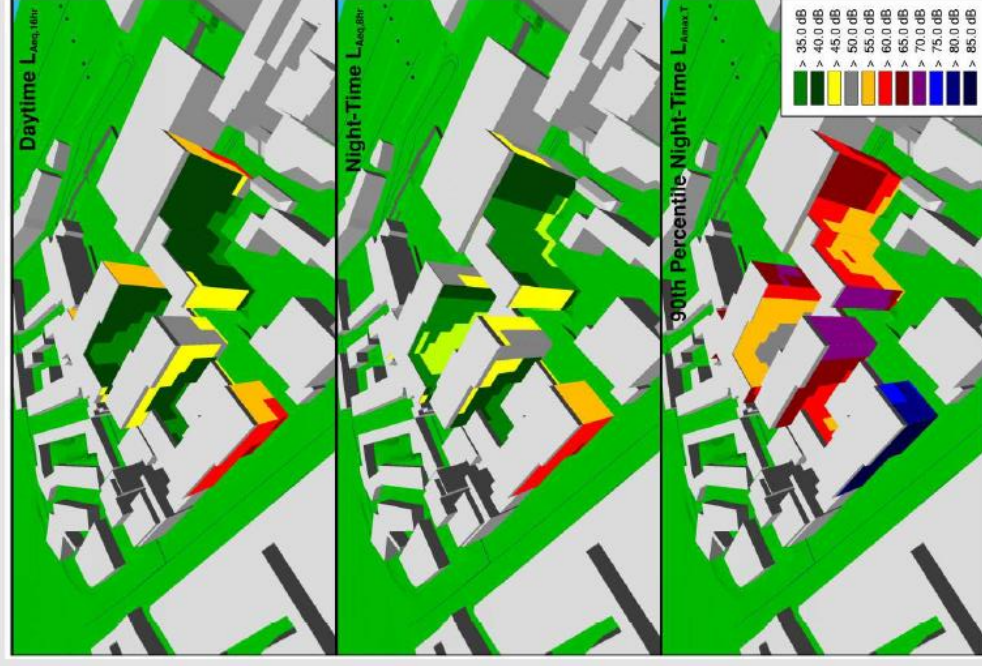


Figure 4: 3D noise map of proposed development from the south east.

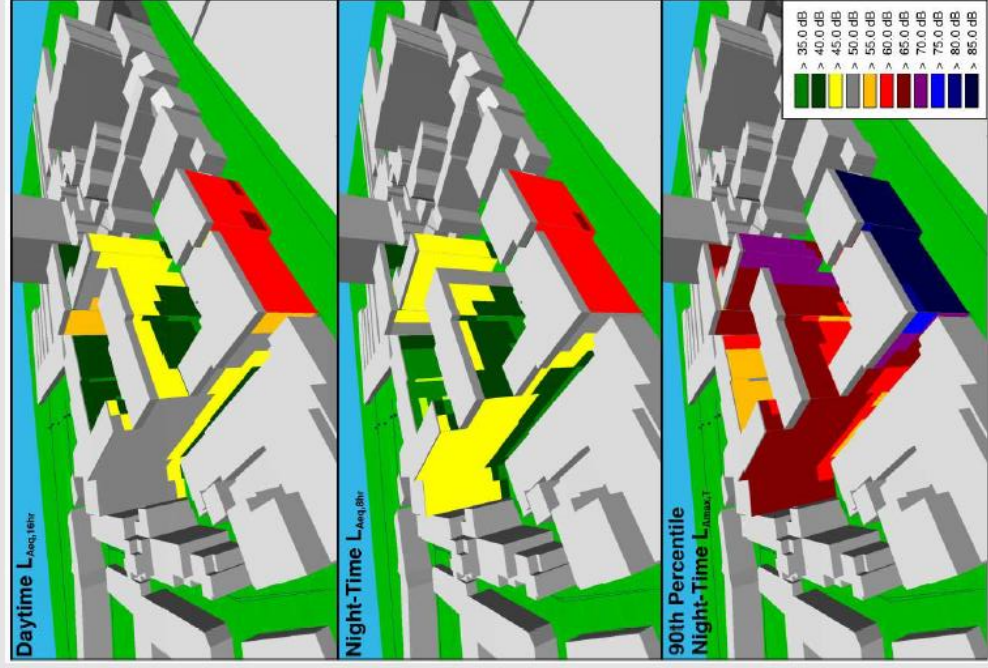


Figure 5: 3D noise map of proposed development from the south west.

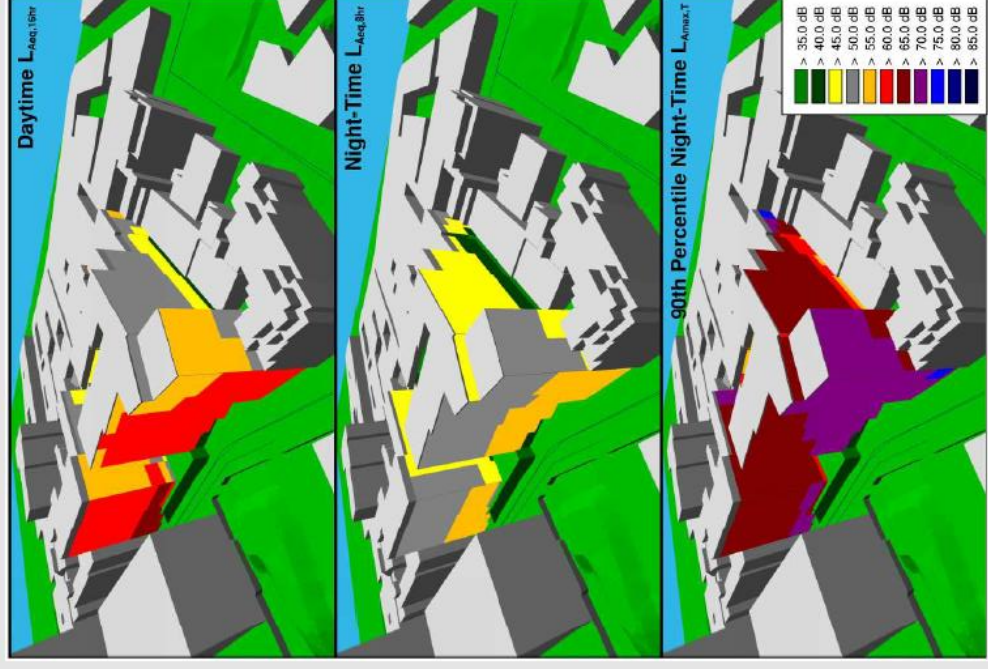


Figure 6: 3D noise map of proposed development from the north west.

Appendix 3 Cass Allen Validation Noise Survey

Survey Summary:

The survey comprised short-term operator attended noise measurements. Noise levels at the site were generally dictated by road traffic on surrounding roads and noise from train passes on the adjacent railway.

Survey Period:

22/08/2019

Survey Objectives:

- To identify noise sources that contribute to ambient noise levels at the site;
- To measure noise levels around the site over a typical day and night-time period.

Equipment Used (Appendix 2, Table 1):

Type	Manufacturer	Model	Serial Number
Sound Level Meter	Rion	NL-52 SLM	00965090

Note 1: All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

Weather Conditions:

The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain).

Measurement Positions (Appendix 2, Table 2):

Position (refer plan below)	Description
N1	Attended noise monitoring position. 1.5m above ground and directly in front of train station. Direct line of site to Station Hill.
N2	Attended noise monitoring position. Attended noise monitoring position. 1.5m above ground and 1m away from nearby road/ taxi rank. Railway within direct line of site.
N3	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to construction site, 1m from road side. Direct line of site to Grayfriars Road
N4	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Gerrard Street
N5	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Grayfriars Road
N6	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Friar Street. 1m from road side.

Measurement Positions (Appendix 2, Table 2):

Position (refer plan below)	Description
N7	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Friar Street. 1m from road side.
N8	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to nearby roads.

Site Plan showing Measurement Positions (Appendix 2, Figure 2):



Attended Noise Monitoring Results (Appendix 2, Table 3):

Date	Position	Time	Meas. Length	LAeq, dB	LAmix, dB	LA90, dB	Observations
22/08/2019	1	13:28:35	5mins	65	78	62	Noise levels dictated by pedestrians passing by.
22/08/2019	1	14:34:19	5mins	64	77	60	
22/08/2019	2	12:00:44	5mins	62	70	59	Noise levels dictated by pedestrians passing and road traffic noise from the nearby road and trains passing.
22/08/2019	2	13:37:23	5mins	64	73	60	

Attended Noise Monitoring Results (Appendix 2, Table 3):

Date	Position	Time	Meas. Length	LAeq, dB	LAmx, dB	LA90, dB	Observations
22/08/2019	3	12:12:39	5mins	69	77	62	Noise levels dictated by construction noise and road traffic long the surrounding roads.
22/08/2019	3	13:44:33	5mins	70	78	62	
22/08/2019	4	12:25:42	5mins	67	92	59	Noise levels dictated by road traffic and noise from the nearby construction site.
22/08/2019	4	13:52:26	5mins	67	78	62	
22/08/2019	5	12:37:40	5mins	63	88	57	Noise levels generally dictated by road traffic. Plane was noted passing by during measurement taken at 12:27.
22/08/2019	5	12:53:05	5mins	63	77	57	
22/08/2019	5	13:59:37	5mins	64	83	58	
22/08/2019	6	13:01:40	5mins	68	77	63	Noise levels generally dictated by road traffic. Vehicles were mainly busses as the measurement position was adjacent to a bus stop.
22/08/2019	6	14:07:14	5mins	70	81	62	
22/08/2019	7	13:09:49	5mins	70	86	64	Noise levels dictated by road traffic and pedestrian flow.
22/08/2019	7	14:16:42	5mins	69	80	62	
22/08/2019	8	13:18:34	5mins	59	70	55	Very quiet side street. Construction site opposite however no notable noise from site. Very little in terms of road traffic. NB close to entrance site of multi-story car park.
22/08/2019	8	14:24:04	5mins	59	70	56	

Appendix 4 Mechanical Plant Design and Data



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DECLARATION

TO WHOM IT MAY CONCERN

SUBJECT: SOUND-PROOFING PROPERTIES OF TECSEDO®SANDWICH PANELS:

We hereby declare that panels Types

TECSEDO®BASE - TECSEDO®SAFE

produced at San Vittore (Switzerland) plant by TECSEDO S.A.,

insulated with polyurethane foam 40 mm thick injected between two prepainted galvanized steel sheets thick have a soundproof evaluation index (ISO 717 norm)

$I_a = 25$ dB

and

that values for **R (dB)** are the following:

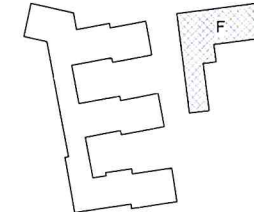
F (Hz) =	125	250	500	1000	2000	4000
R (dB) =	14	18	22	24	24	35

SPP/E 06/22
San Vittore, 07.06.2022

tecseido
TECSEDO SA
Zona Industriale - Campo de Niscio
CH-6534 S. Vittore



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C01	MP	01.10.21	SB	ISSUED FOR CONSTRUCTION
P02	IM	30.06.21	SB	ELEVATIONS DRAWING NUMBERS
P01	MP	14.06.21	SB	ADDED
P01	MP	14.06.21	SB	FIRST ISSUE

REV	BY	DATE	CHK	DESCRIPTION

STATUS

FOR CONSTRUCTION

CONTRACTOR

MIDGARD LTD

PROJECT

Station Hill, Reading

CLIENT

SH Reading (phase 1) Limited

DRAWING TITLE

Block F
Elevations
General Key Plan

DATE CREATED	DATE AMENDED	SCALE
14.06.21	01.10.21	1 : 250 @A1
DRAWN BY	AMENDED BY	CHECKED
MP	MP	SB

DRAWING NO & REVISION
SHR-MDS-BF-ZZ-DR-A-11-0000 - C01

- LEGEND**
- BRICKWORK**
- TYPE 1. KARMA WHITE BRICK
 - TYPE 2. KARMA WHITE BRICK SLIP
 - TYPE 3. PAGUS GREY BRICK
 - TYPE 4. PAGUS GREY BRICK SLIP
 - TYPE 5. LEICESTER RED BRICK
 - TYPE 6. LEICESTER RED BRICK SLIP
 - TYPE 7. HIT AND MISS BRICKWORK
 - TYPE 8. SOLDIER COURSING BRICK SLIP
 - TYPE 9. LEICESTER RED BRICKWORK. PRECAST PANEL
- RAINSCREEN**
- TYPE 10. ALUMINIUM RAL 7035 LIGHT GREY TEXTURED MATT/FINISH
TIGER PRODUCT CODE: 02972111
 - TYPE 11. ALUMINIUM RAL 9010 PURE WHITE TEXTURED MATT/FINISH
TIGER PRODUCT CODE: 02910674
- BALCONY FASCIA**
- TYPE 20. ALUMINIUM RAL 7022 UMBRA GREY
 - TYPE 21. ALUMINIUM RAL 7006 BEIGE GREY
- GLASS**
- TYPE 22. BACK PAINTED GLASS RAL 7006 BEIGE GREY
 - TYPE 23. CLEAR GLASS BALUSTRADE - ROOF LEVEL
 - TYPE 25. BACK PAINTED GLASS RAL 7022 UMBRA GREY
- FOR WINDOWS DOORS AND LOUVRES SPECIFICATIONS PLEASE REFER TO FACADE SPECIFICATIONS AND MDS SERIES 17 DRAWINGS.

C02	MP	19.07.22	SB	ELEVATION DRAWING, CURTAIN WALL, TRANSOM, VERTICAL JOINT, LOUVRE AND BALCONIES ADDED / JOINTS, TOP OF COPINGS, CURTAIN WALL, WINDOW SILLS AND LEGEND UPDATED / BIRD BOXES MOVED
C01	MP	01.10.21	SB	MATERIALS, LEGEND AND BIRD & BAT BOXES UPDATED / WINDOWS AND PORTAL FRAMES GENERALLY UPDATED
P04	IM	30.06.21	SB	BIRD & BAT BOXES ADDED, PANELISATION UPDATED, DEFLECTION JOINTS UPDATED, LOUVRE ADDED
P03	MP	14.06.21	SB	SECTIONS NUMBERS AND LEGENDS GENERALLY UPDATED / BALCONIES UPDATED / METAL CLADDING PANELS AND VERTICAL JOINTS ADDED / CURTAIN WALL UPDATED
P02	MP	07.05.21	SB	WINDOWS AND MATERIALS TAGS GENERALLY UPDATED
P01	MP	04.05.21	SB	FIRST ISSUE

REV BY DATE CHK DESCRIPTION

STATUS

FOR CONSTRUCTION

CONTRACTOR

MIDGARD LTD

PROJECT

Station Hill, Reading

CLIENT

SH Reading (phase 1) Limited

DRAWING TITLE
Block F
Elevations
Garrard Street Elevation

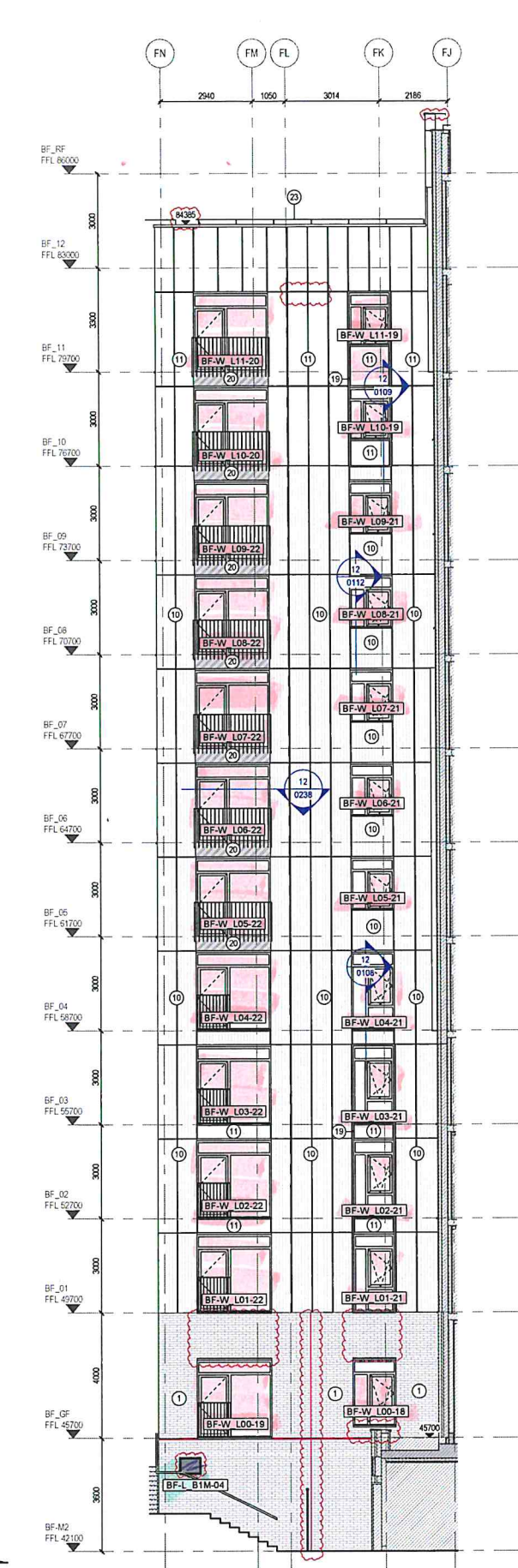
DATE CREATED 04.05.21	DATE AMENDED 19.07.22	SCALE 1 : 100 @A1
DRAWN BY MP	AMENDED BY MP	CHECKED SB
DRAWING NO & REVISION SHR-MDS-BF-ZZ-DR-A-11-0001 - C02		



- LEGEND**
- 10MM VERTICAL MOVEMENT JOINT
 - 20MM HORIZONTAL MOVEMENT JOINT
 - 2 MM BUTT STRAP INVISIBLE JOINT
 - FOR JOINTS IN METAL CLADDING REFER TO SERIES 12 DRAWINGS
 - SWIFT BIRD BOX - 16S SCHWEGLER 430 mm(W)x240 mm (H)x220 mm (D)
 - BIRD BOX - 1HE SCHWEGLER BRICK BOX 280 mm(L)x150 mm (H)x150 mm (D)
 - BAT BOX - 1 FR SCHWEGLER BAT TUBE 200 mm(L)x475 mm (H)x125 mm (D)



3 Elevation 3 - South Rear



4 Elevation 4 - South Rear

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- LEGEND**
- BRICKWORK**
- TYPE 1. KARMA WHITE BRICK
 - TYPE 2. KARMA WHITE BRICK SLIP
 - TYPE 3. PAGUS GREY BRICK
 - TYPE 4. PAGUS GREY BRICK SLIP
 - TYPE 5. LEICESTER RED BRICK
 - TYPE 6. LEICESTER RED BRICK SLIP
 - TYPE 7. HIT AND MISS BRICKWORK
 - TYPE 8. SOLDIER COURSING BRICK SLIP
 - TYPE 9. LEICESTER RED BRICKWORK. PRECAST PANEL
- RAINSCREEN**
- TYPE 10. ALUMINIUM RAL 7035 LIGHT GREY TEXTURED MATT/FS
TIGER PRODUCT CODE: 029/72111
 - TYPE 11. ALUMINIUM RAL 9010 PURE WHITE TEXTURED MATT/FS
TIGER PRODUCT CODE: 029/10674
 - TYPE 12. ALUMINIUM RAL 9010 PURE WHITE
 - TYPE 13. ALUMINIUM RAL 7031 BLUE GREY
 - TYPE 14. ALUMINIUM PORTAL FRAMES RAL 7006 BEIGE GREY PPC
 - TYPE 15. ALUMINIUM PIGMENTO ROUGE /RED
 - TYPE 16. ALUMINIUM RAL 7006 BEIGE GREY
 - TYPE 17. ALUMINIUM RAL 7006 BEIGE GREY
 - TYPE 18. ALUMINIUM RAL 7022 UMBRA GREY
 - TYPE 19. ALUMINIUM PORTAL FRAMES RAL 7022 UMBRA GREY PPC
 - TYPE 24. ALUMINIUM FLAT MATT RAL 9010 PURE WHITE
- BALCONY FASCIA**
- TYPE 20. ALUMINIUM RAL 7022 UMBRA GREY
 - TYPE 21. ALUMINIUM RAL 7006 BEIGE GREY
- GLASS**
- TYPE 22. BACK PAINTED GLASS RAL 7006 BEIGE GREY
 - TYPE 23. CLEAR GLASS BALUSTRADE - ROOF LEVEL
 - TYPE 25. BACK PAINTED GLASS RAL 7022 UMBRA GREY
- FOR WINDOWS DOORS AND LOUVRES SPECIFICATIONS PLEASE REFER TO FACADE SPECIFICATIONS AND MDS SERIES 17 DRAWINGS.

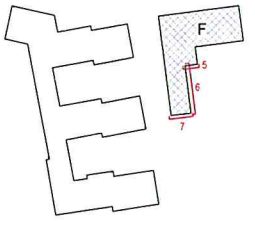
- C02 MP 19.07.22 SB LOUVRES ADDED / BAT AND BIRD BOXES RELOCATED TO BE / JOINTS. MATERIAL, WINDOWS, WINDOWS SILLS, TOP OF COPINGS, FFL LEVEL 12 ROOF AND LEGEND UPDATED
- C01 MP 01.10.21 SB MATERIALS AND LEGEND UPDATED / WINDOWS AND PORTAL FRAMES GENERALLY UPDATED
- P05 SH 02.08.21 SB BIRD&BAT BOXES AND VERTICAL JOINTS UPDATED
- P04 IM 30.06.21 SB BIRD&BAT BOXES ADDED, PANELISATION UPDATED, DEFLECTION JOINTS UPDATED
- P03 MP 14.06.21 SB SECTIONS NUMBERS AND LEGENDS GENERALLY UPDATED / BALCONIES UPDATED / METAL CLADDING PANELS AND VERTICAL JOINTS ADDED
- P02 MP 07.05.21 SB WINDOWS AND MATERIALS TAGS GENERALLY UPDATED
- P01 MP 04.05.21 SB FIRST ISSUE

REV	BY	DATE	CHK	DESCRIPTION
STATUS				
FOR CONSTRUCTION				
CONTRACTOR				
MIDGARD LTD				
PROJECT				
Station Hill, Reading				
CLIENT				
SH Reading (phase 1) Limited				
DRAWING TITLE				
Block F				
Elevations				
South Rear Elevations 1/2				
DATE CREATED		DATE AMENDED		SCALE
04.05.21		19.07.22		1 : 100 @A1
DRAWN BY		AMENDED BY		CHECKED
MP		MP		SB
DRAWING NO & REVISION				
SHR-MDS-BF-ZZ-DR-A-11-0003 - C02				

- LEGEND**
- 10MM VERTICAL MOVEMENT JOINT
 - 20MM HORIZONTAL MOVEMENT JOINT
 - 2 MM BUTT STRAP INVISIBLE JOINT
 - FOR JOINTS IN METAL CLADDING REFER TO SERIES 12 DRAWINGS
 - SWIFT BIRD BOX - 16S SCHWEGLER 430 mm(W)x240 mm (H)x220 mm (D)
 - BIRD BOX - 1HE SCHWEGLER BRICK BOX 280 mm(L)x150 mm (H)x150 mm (D)
 - BAT BOX - 1FR SCHWEGLER BAT TUBE 200 mm(L)x475 mm (H)x125 mm (D)



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- LEGEND**
- BRICKWORK**
- TYPE 1. KARMA WHITE BRICK
 - TYPE 2. KARMA WHITE BRICK SLIP
 - TYPE 3. PAGUS GREY BRICK
 - TYPE 4. PAGUS GREY BRICK SLIP
 - TYPE 5. LEICESTER RED BRICK
 - TYPE 6. LEICESTER RED BRICK SLIP
 - TYPE 7. HIT AND MISS BRICKWORK
 - TYPE 8. SOLDIER COURSING BRICK SLIP
 - TYPE 9. LEICESTER RED BRICKWORK, PRECAST PANEL
- RAINSCREEN**
- TYPE 10. ALUMINIUM RAL 7035 LIGHT GREY TEXTURED MATT/FS
TIGER PRODUCT CODE: 02972111
 - TYPE 11. ALUMINIUM RAL 9010 PURE WHITE TEXTURED MATT/FS
TIGER PRODUCT CODE: 02910674
- BALCONY FASCIA**
- TYPE 20. ALUMINIUM RAL 7022 UMBRA GREY
 - TYPE 21. ALUMINIUM RAL 7006 BEIGE GREY
- GLASS**
- TYPE 22. BACK PAINTED GLASS RAL 7006 BEIGE GREY
 - TYPE 23. CLEAR GLASS BALUSTRADE - ROOF LEVEL
 - TYPE 25. BACK PAINTED GLASS RAL 7022 UMBRA GREY
- FOR WINDOWS DOORS AND LOUVRES SPECIFICATIONS PLEASE REFER TO FACADE SPECIFICATIONS AND MDS SERIES 17 DRAWINGS.

C03	CG	29.07.22	AV	CW TAGS UPDATED
C02	MP	19.07.22	SB	LOUVRES ADDED / JOINTS, MATERIAL, TOP OF COPINGS, CURTAIN WALL, WINDOWS SILLS AND LEGEND UPDATED
C01	MP	01.10.21	SB	MATERIALS AND LEGEND UPDATED / WINDOWS AND PORTAL FRAMES GENERALLY UPDATED
P04	IM	30.06.21	SB	BIRD/BAT BOXES ADDED, PANELISATION UPDATED, DEFLECTION JOINTS UPDATED
P03	MP	14.06.21	SB	SECTIONS NUMBERS AND LEGENDS GENERALLY UPDATED / BALCONIES UPDATED / METAL CLADDING PANELS AND VERTICAL JOINTS ADDED
P02	MP	07.05.21	SB	WINDOWS AND MATERIALS TAGS GENERALLY UPDATED
P01	MP	04.05.21	SB	FIRST ISSUE

REV BY DATE CHK DESCRIPTION

STATUS

FOR CONSTRUCTION

CONTRACTOR

MIDGARD LTD

PROJECT

Station Hill, Reading

CLIENT

SH Reading (phase 1) Limited

DRAWING TITLE

Block F

Elevations

South Rear Elevations 2/2

DATE CREATED

04.05.21

DATE AMENDED

29.07.22

SCALE

1 : 100 @A1

DRAWN BY

MP

AMENDED BY

CG

CHECKED

AV

DRAWING NO & REVISION

SHR-MDS-BF-ZZ-DR-A-11-0004

- C03

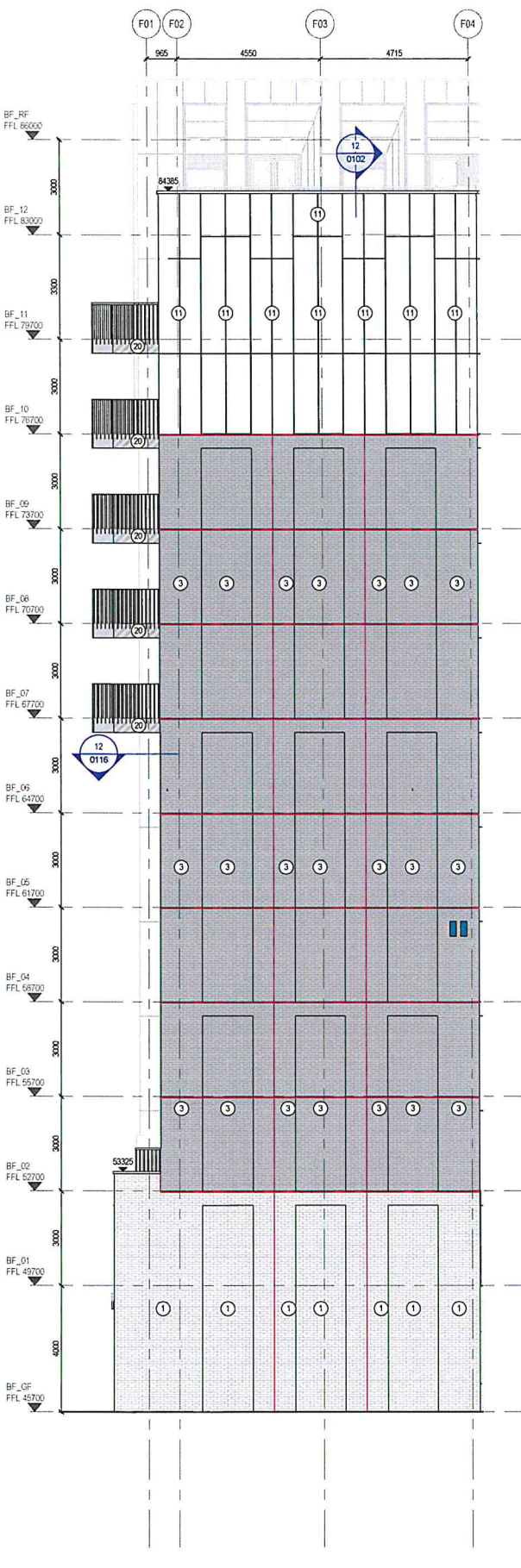
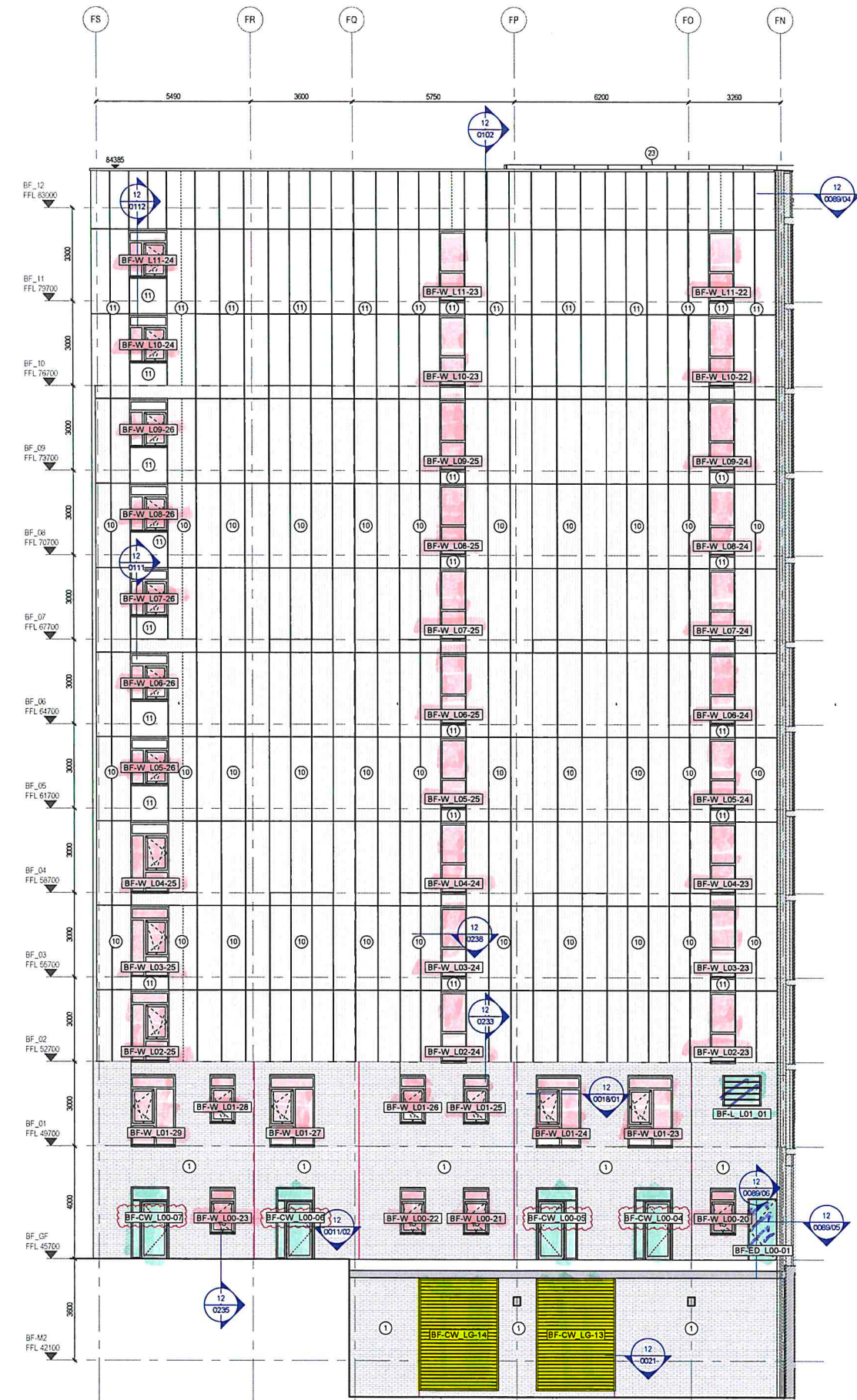
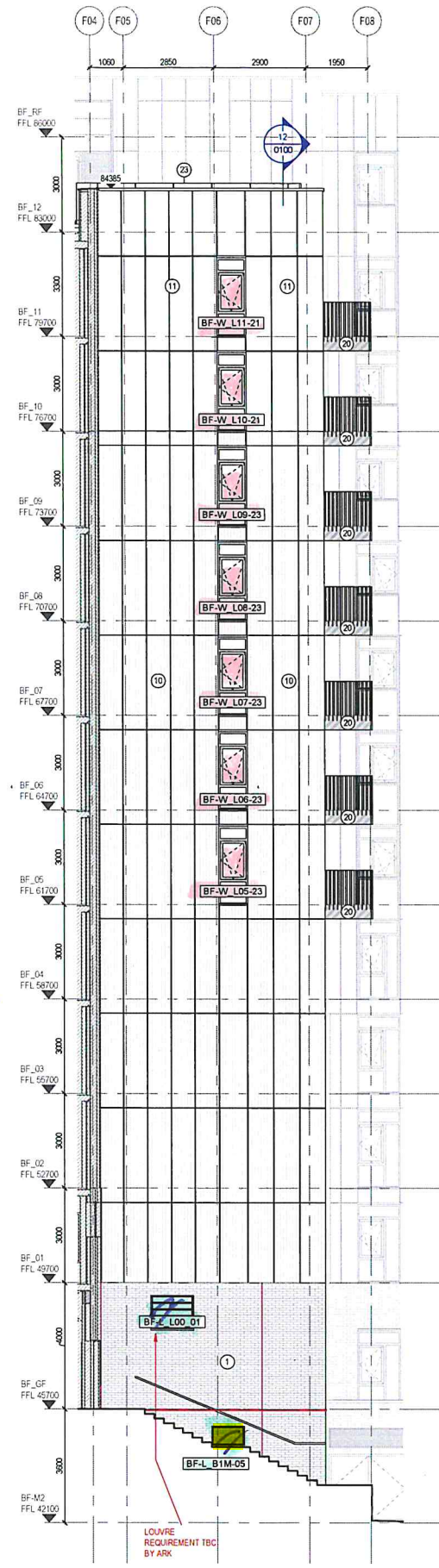


- LEGEND**
- 10MM VERTICAL MOVEMENT JOINT
 - 20MM HORIZONTAL MOVEMENT JOINT
 - 2 MM BUTT STRAP INVISIBLE JOINT
 - FOR JOINTS IN METAL CLADDING REFER TO SERIES 12 DRAWINGS
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 - BAT BOX - 1 FR SCHWEGLER BAT TUBE 200 mm(L)x475 mm (H)x125 mm (D)

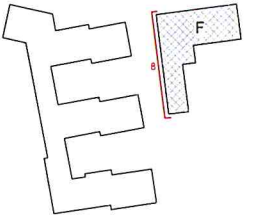
7 Elevation 7 -South Rear

6 Elevation 6 -South Rear

5 Elevation 5 -South Rear



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 - TYPE 4. PAGUS GREY BRICK SLIP
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 - TYPE 6. LEICESTER RED BRICK SLIP
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 - TYPE 8. SOLDIER COURSING BRICK SLIP
 - TYPE 9. LEICESTER RED BRICKWORK, PRECAST PANEL
- RAINSCREEN**
- TYPE 10. ALUMINIUM RAL 7035 LIGHT GREY TEXTURED MATT/FS
TIGER PRODUCT CODE: 029/72111
 - TYPE 11. ALUMINIUM RAL 9010 PURE WHITE TEXTURED MATT/FS
TIGER PRODUCT CODE: 029/10674
 - TYPE 12. ALUMINIUM RAL 9010 PURE WHITE
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- GLASS**
- TYPE 22. BACK PAINTED GLASS RAL 7006 BEIGE GREY
 - TYPE 23. CLEAR GLASS BALUSTRADE - ROOF LEVEL
 - TYPE 25. BACK PAINTED GLASS RAL 7022 UMBRA GREY

FOR WINDOWS DOORS AND LOUVRES SPECIFICATIONS PLEASE REFER TO FACADE SPECIFICATIONS AND MDS SERIES 17 DRAWINGS.

C02	MP	21.07.22	SB	LOUVER, CW AND MULLION REMOVED / LOUVER AND CURTAIN WALL TRANSOM & MULLION ADDED / WINDOWS AND WALL AREA EXCHANGED / JOINTS, MATERIAL, TOP OF CORNICES, WINDOW TYPE, WINDOWS SILLS AND LEGEND UPDATED / CHAMFER EXTENDED
C01	MP	01.10.21	SB	MATERIALS AND LEGEND UPDATED / WINDOWS AND PORTAL FRAMES GENERALLY UPDATED
P05	IM	30.06.21	SB	BIRDABAT BOXES ADDED, PANELISATION UPDATED, DEFLECTION JOINTS UPDATED
P04	MP	14.06.21	SB	VERTICAL JOINTS ADDED
P03	MP	27.05.21	SB	SECTIONS NUMBERS AND LEGENDS GENERALLY UPDATED / BALCONIES UPDATED / METAL CLADDING PANELS ADDED / MATERIALS & CURTAIN WALLS UPDATED
P02	MP	07.05.21	SB	WINDOWS AND MATERIALS TAGS GENERALLY UPDATED
P01	MP	04.05.21	SB	FIRST ISSUE

REV BY DATE CHK DESCRIPTION

STATUS

FOR CONSTRUCTION

CONTRACTOR

MIDGARD LTD

PROJECT

Station Hill, Reading

CLIENT

SH Reading (phase 1) Limited

DRAWING TITLE

Block F

Elevations

Frirs Walk Elevation

DATE CREATED

04.05.21

DATE AMENDED

21.07.22

SCALE

1 : 100 @A1

DRAWN BY

MP

AMENDED BY

MP

CHECKED

SB

DRAWING NO & REVISION

SHR-MDS-BF-ZZ-DR-A-11-0005

- C02



LEGEND

- 10MM VERTICAL MOVEMENT JOINT
- 20MM HORIZONTAL MOVEMENT JOINT
- 2 MM BUTT STRAP INVISIBLE JOINT
- FOR JOINTS IN METAL CLADDING REFER TO SERIES 12 DRAWINGS
- SWIFT BIRD BOX - 16S SCHWEGLER 430 mm(W)x240 mm (H)x220 mm (D)
- BIRD BOX - 1HE SCHWEGLER BRICK BOX 280 mm(L)x150 mm (H)x150 mm (D)
- BAT BOX - 1 FR SCHWEGLER BAT TUBE 200 mm(L)x475 mm (H)x125 mm (D)



8 Elevation 8 -Frirs Walk