

**Our ref: 210505 L JER8709 JL**

Julien Diaz  
Environmental Health Team  
London Borough of Camden  
5 Pancras Square  
London  
N1C 4AG

20 Farringdon Street  
London, EC4A 4AB  
T +44 20 3691 0500

Date: 12 May 2021

Dear Julien,

## **CONSIDERATION OF RADON RISK TO THE PROPOSED REDEVELOPMENT AT 7ABC BAYHAM STREET, CAMDEN, LONDON**

Further to the Council's request for consideration of the impact from radon to the above redevelopment (under Condition 17 of planning permission reference 2018/3647/P), please find our response set out below.

### **BACKGROUND**

It is proposed to redevelop the site with a five storey (plus two storey basement) building comprising mixed office use (B1) and hotel (C1) use.

Following submission of a Phase 1 Preliminary Risk Assessment and Phase 2 Environmental and Geotechnical Site Investigation (RPS reference 200817 R JER8709 JG, dated September 2020) under Condition 17, the Council included the following concern as part of its response.

*It is noted that radon was scoped out of the CSM, basis the comments in Paragraph 2.5.10 i.e. based on the Radon Atlas for England the site is not located in an area at risk from radon gas. This is considered questionable, based on Radon Guidance BR 211 (2015) which mentions that all basements are at increased risk of elevated levels of radon regardless of geographic location, because more walls are in contact with the ground as well as the floor, and reduced natural ventilation below ground level increases the risk of elevated radon levels. In addition, the Management of Health and Safety at Work Regulations (1999) require the assessment of health and safety risks and both the Health and Safety Executive (HSE) and Public Health England (PHE) state that this should include the measurement of radon for occupied below ground workplaces (occupied for more than 1 hour per week/52 hours of the year), irrespective of whether a site is situated in a radon affected area. This is the responsibility of the Employer. For residential developments Public Health England advise that consideration should be given to testing for radon if the basement includes rooms regularly used.*

Current proposal are for the basement to comprise the following:

- Lower Ground Floor Level – Covering the entire building footprint to be occupied by office accommodation, including a kitchen and corporate dining;
- Basement Level One – Covering the entire building footprint to be occupied by guest rooms, guest lounge, staff rooms, stores and services; and
- Basement Level Two – Covering only part of the building footprint to be occupied by plant and tanks.

The basement plans are included within Enclosure A.

## RADON OCCURRENCE

BRE Report BR 211, *Radon: guidance on protective measures for new buildings* (2015 edition) states that, in most cases, it is impractical to assess the severity of a radon problem on a particular site accurately until the building has been constructed and occupied. Protective measures should therefore be provided in areas with an identified high radon potential.

According to the *Indicative atlas of radon in England and Wales*, presented as Appendix A of the guidance, the site is located within an unshaded square with the guidance indicating that, if this is the case, then no radon protection is needed (Section 4.2).

**Figure 1 – Excerpt from *Indicative atlas of radon in England and Wales***



Further to this RPS has obtained a British Geological Society (BGS) site-specific Radon Report for the site (see Enclosure B). The report states that “the property is in an area where less than 1% of homes are estimated to be at or above the action level. The property is not in a radon affected area”.

## ENVIRONMENTAL SETTING

The site is directly underlain by the London Clay Formation, with its depth unproven to 25m below ground level (bgl) as part of the RPS Phase 2 Site Investigation. The proposed depth of the basement is to be approximately 12m bgl.

Radon is formed by the radioactive decay of the small amounts of uranium that occur naturally in all rocks and soils. The *Earth in Our Hands - Issue 5: Radon* produced by the Geological Society of London (July 2001) states that the uranium content of a soil will frequently be related to that of the uranium-bearing rock from which it is derived. Rocks that may have higher than average uranium content include some:

- Acid igneous rocks, such as granites and some volcanic rocks (e.g. parts of Scotland and Cornwall);
- Rocks intruded by acid igneous rocks (e.g. Cornwall);
- Dark, organic-rich shales;
- Limestones and other sedimentary rocks containing phosphate minerals (e.g. phosphate in the Northampton Sand Ironstone); and

- Rocks derived from those mentioned above by changes in heat and pressure (metamorphic rocks).

On the basis of the above the London Clay Formation is not recognised as a potentially significant source of radon gas.

Radon gas moves through rocks and soil and because of pressure differences and differences in gas concentration. Radon will move from regions of higher concentration (from soil and rock where it is formed) to where the concentration is lower. The higher the radon level in underlying rocks and soil, the higher the possible level in buildings can be. Radon moves rapidly through rocks and soils that, for whatever reason, are permeable (have many connecting pores). Whilst therefore radon may move well through sand and gravel, it will migrate more slowly through clay.

In addition to the above, Document RCE-11 *Report of the Independent Advisory Group on Ionising Radiation*, published by the Health Protection Agency (2009) states that in most cases, the radon entering a building from the ground has originated within a few metres and that if the underlying rock were covered with clay then radon is unlikely to be able to escape to the surface as it could if it were covered in a more porous material.

This would suggest that, even if radon gas was to be present at any significant concentration, the low permeability of the clay would likely provide an effective barrier to limit its migration into the proposed structure.

## PROPOSED STRUCTURE

There are structural and mechanical elements proposed for the basement that will act to both prevent and mitigate the impact of any radon, where present.

### Radon Proof Membrane

Although a radon proof membrane is not to be installed across the slab of the basement, it is proposed to install a lapped and sealed Delta MS20 membrane as part of the cavity drain down the walls of the basement. This membrane has been certified as carbon dioxide, methane and radon resistant and would prevent the ingress of radon across the majority of the basement surface.

In keeping with recommendations within BRE Report BR 211 (2015), the basement wall membrane will fully close the cavity at its head where it meets the external cavity wall above ground.

The proposed installation details and the test certificate for radon resistance are provided in Enclosure C.

### Basement Ventilation

Due to the basement being below ground, a mechanical ventilated system will be used, this systems will be compliant with Building Regulation Approved Document Part F – ventilation - with a supply and extract system connected to the external atmosphere via louvres.

A maintenance plan will be put in place post construction, with dedicated O&M manuals confirming maintenance procedures.

The proposed design criteria for the mechanical ventilated system for each type of space proposed within the basement (including ventilation rate) is provided in Enclosure D.

Guidance from Public Health England states that the installation of such a system will reduce radon concentrations (if present) in two ways:

- By diluting radon in the property with fresh air •
- By slightly increasing the indoor pressure which reduces radon entering the property

## CONCLUSIONS

Although Radon Guidance BR 211 (2015) states that all basements are at increased risk of elevated levels of radon regardless of geographic location, consideration of radon occurrence, the environmental setting and

**OUR REF: 210505 L JER8709 JL**

mitigation measures to be incorporated as part of the proposed structure, the potential risk to future occupants from radon is considered to be negligible.

No further assessment of the proposed development with regards to radon is therefore considered necessary.

Yours sincerely,  
for RPS Consulting Services Ltd

**Jim Lightbown**

Technical Director - Geo-environmental

[jim.lightbown@rpsgroup.com](mailto:jim.lightbown@rpsgroup.com)

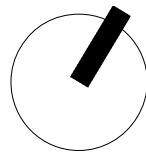
+44 20 7280 3353

## **ENCLOSURES**

<b>Enclosure A</b>	Basement Plans
<b>Enclosure B</b>	BGS Site-Specific Radon Report
<b>Enclosure C</b>	Details of Radon Proof Membrane
<b>Enclosure D</b>	Design Criteria for Mechanical Ventilation System

## Enclosure A

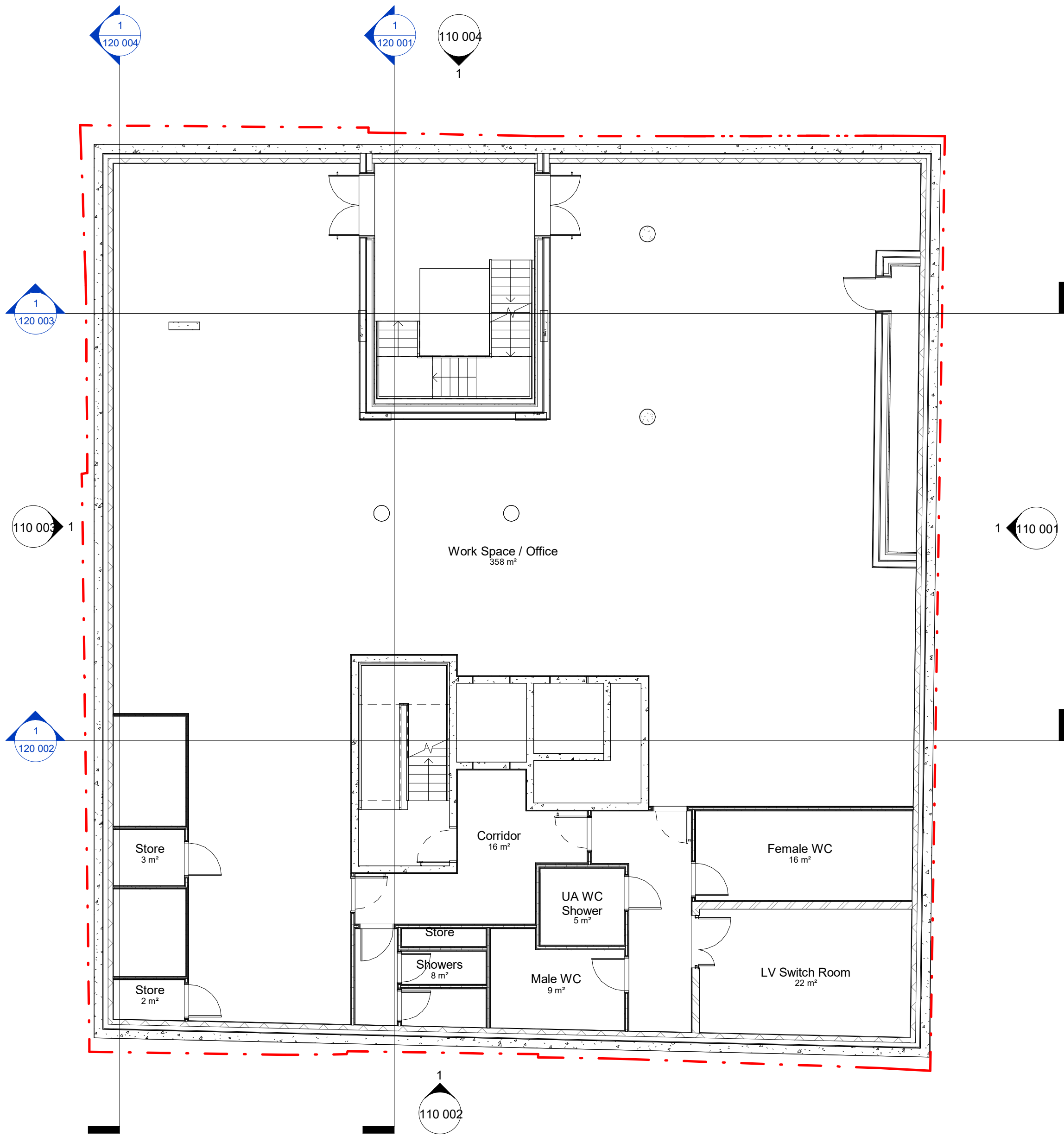
### Basement Plans



Copyright: All rights reserved. This drawing must not be reproduced without permission.  
Only the original drawing should be relied upon. Contractors, subcontractors and suppliers must verify all dimensions on site before commencing any work or making any shop drawings.  
All shop drawings to be submitted to the architect / interior designer for comment prior to fabrication.  
This drawing is to be read in conjunction with the architect's / interior designer's specification, bills of quantities / schedules, structural, mechanical & electrical drawings and all discrepancies are to be reported to the architect.  
Do not scale from this drawing. Dimensions are in millimetres unless otherwise stated.

NOTES

Existing building information taken from Point 2 survey 469-POINT2-01-ZZ-M3-G-0001-S1-PS0, dated July 20  
Drawing to be read in conjunction with Interior Designer, MEP and Structural Engineer's drawings and Fire Strategy report. Any discrepancies to be reported back to the Architect and Project/Design Manager.



**100 099 - Basement**  
1 : 100



1	WIP GAs ISSUED FOR INFORMATION	30/04/21	FJ	PW
rev	amendments	date	by	chk

**dexter  
moren  
associates**  
architecture urban design interior  
design creative media  
www.dextermoren.com  
dma@dextermoren.com

57d  
jamestown road  
london nw1 7db  
UK

t: 020 7267 4440  
f: 020 7267 6044

**architecture**

project  
**Bayham Street**

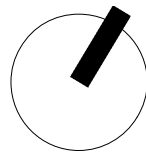
client  
**Camden Lifestyle (UK) Ltd**

drawing title  
**Basement GA Plan**

drawing status  
**FOR INFORMATION**

scale	date	drawn by
As indicated@A1	30/04/21	FJ
job no.	drawing no.	revision
1783	A-100 099	<b>F 1</b>

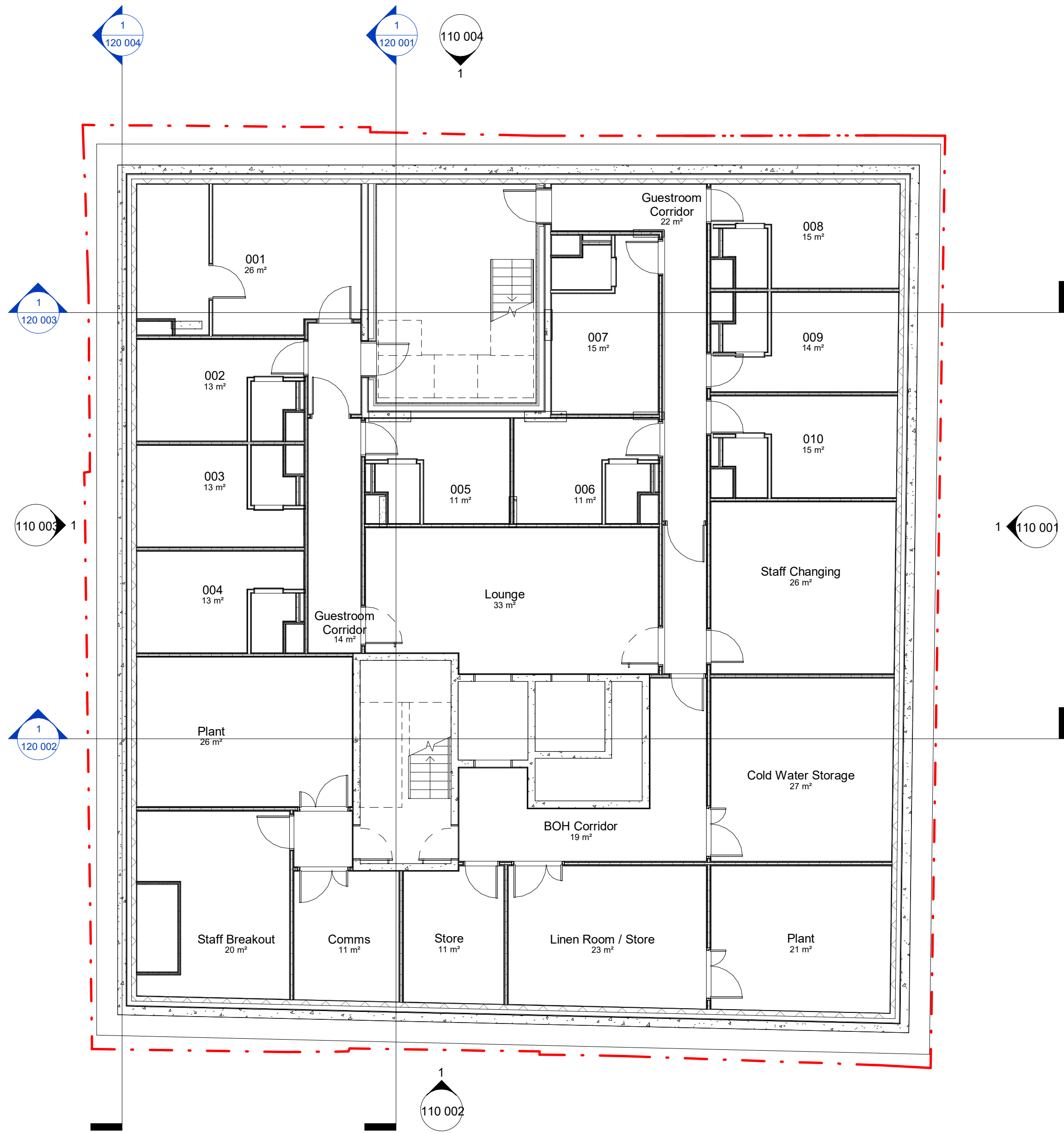




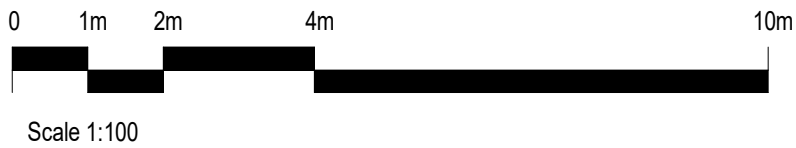
Copyright: All rights reserved. This drawing must not be reproduced without permission.  
Only the original drawing should be relied upon. Contractors, subcontractors and suppliers must verify all dimensions on site before commencing any work or making any shop drawings.  
All shop drawings to be submitted to the architect / interior designer for comment prior to fabrication.  
This drawing is to be read in conjunction with the architect's / interior designer's specification, bills of quantities / schedules, structural, mechanical & electrical drawings and all discrepancies are to be reported to the architect.  
Do not scale from this drawing. Dimensions are in millimetres unless otherwise stated.

NOTES

Existing building information taken from Point 2 survey 469-POINT2-01-ZZ-M3-G-0001-S1-PS3, dated July 20  
Drawing to be read in conjunction with Interior Designer, MEP and Structural Engineer's drawings and Fire Strategy report. Any discrepancies to be reported back to the Architect and Project/Design Manager.



100 098 - Basement -1  
1 : 100



1	WIP GAs ISSUED FOR INFORMATION	30/04/21	FJ	PW
rev	amendments	date	by	chk

**dexter  
moren  
associates**  
architecture urban design interior  
design creative media  
www.dextermoren.com  
dma@dextermoren.com

57d  
jamestown road  
london nw1 7db  
UK

t: 020 7267 4440  
f: 020 7267 6044

architecture

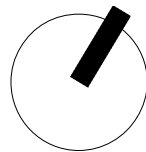
project  
Bayham Street

client  
Camden Lifestyle (UK) Ltd

drawing title  
Basement -1 GA Plan

drawing status  
FOR INFORMATION

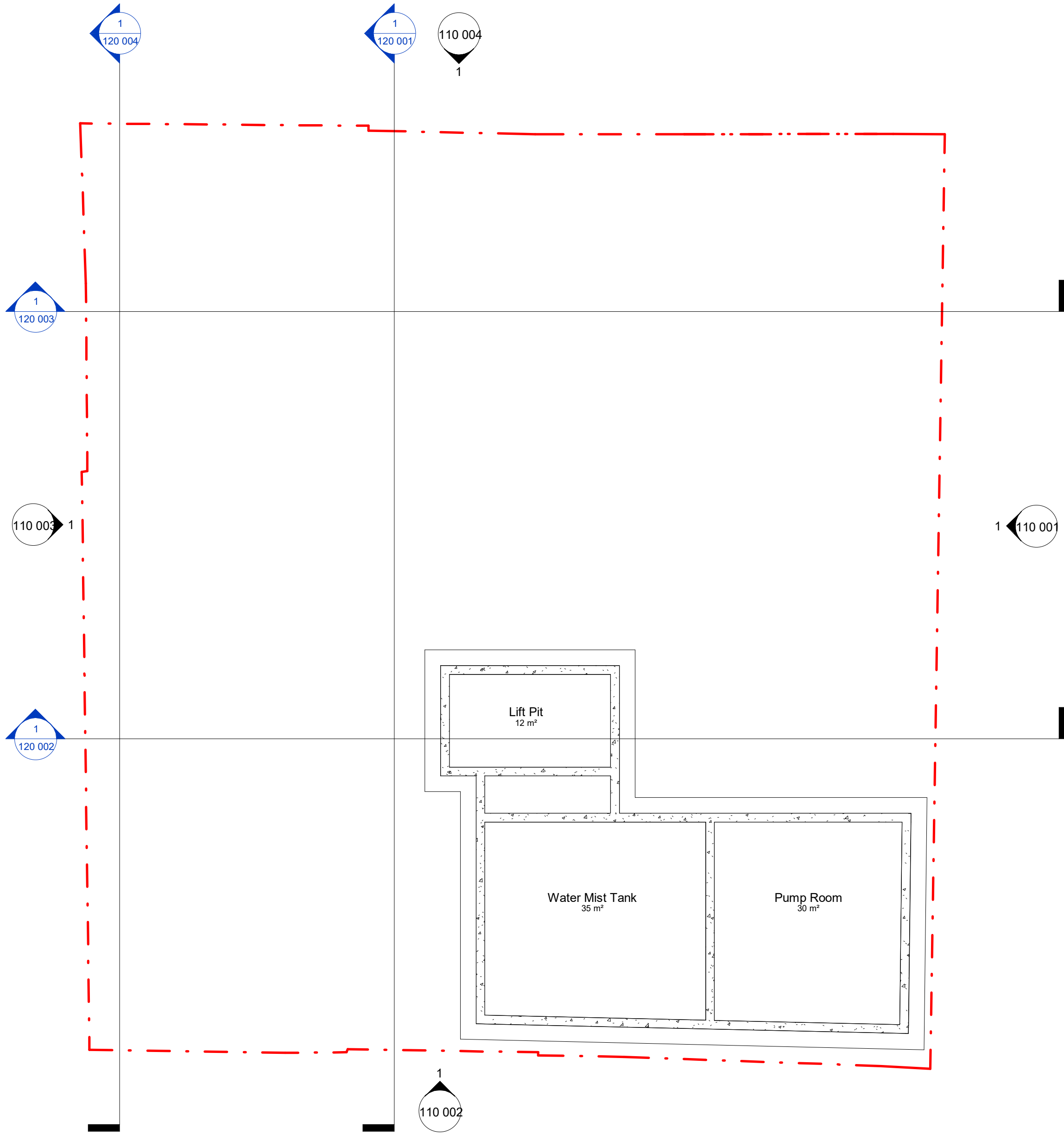
scale	date	drawn by
As indicated@A1	30/04/21	FJ
job no.	drawing no.	revision
1783	A-100 098	F 1



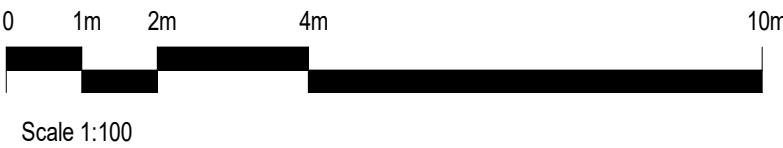
Copyright: All rights reserved. This drawing must not be reproduced without permission.  
Only the original drawing should be relied upon. Contractors, subcontractors and suppliers must verify all dimensions on site before commencing any work or making any shop drawings.  
All shop drawings to be submitted to the architect / interior designer for comment prior to fabrication.  
This drawing is to be read in conjunction with the architect's / interior designer's specification, bills of quantities / schedules, structural, mechanical & electrical drawings and all discrepancies are to be reported to the architect.  
Do not scale from this drawing. Dimensions are in millimetres unless otherwise stated.

NOTES

Existing building information taken from Point 2 survey 469-POINT2-01-ZZ-M3-G-0001-S1-PS0, dated July 20  
Drawing to be read in conjunction with Interior Designer, MEP and Structural Engineer's drawings and Fire Strategy report. Any discrepancies to be reported back to the Architect and Project/Design Manager.



**100 097 - Basement -2**  
1 : 100



1	WIP GAs ISSUED FOR INFORMATION	30/04/21	FJ	PW
rev	amendments	date	by	chk

**dexter  
moren  
associates**  
architecture urban design interior  
design creative media  
www.dextermoren.com  
dma@dextermoren.com

57d  
jamestown road  
london nw1 7db  
UK  
  
t: 020 7267 4440  
f: 020 7267 6044

architecture

project  
Bayham Street

client  
Camden Lifestyle (UK) Ltd

drawing title  
Basement -2 GA Plan

drawing status  
FOR INFORMATION

scale	date	drawn by
As indicated@A1	30/04/21	FJ
job no.	drawing no.	revision
1783	A-100 097	F 1



## Enclosure B

### BGS Site-Specific Radon Report

**Matthew Hemus**  
**RPS Consulting Ltd**  
**20 Western Avenue**  
**Milton Park**  
**Milton**  
**Abingdon**  
**OX14 4SH**

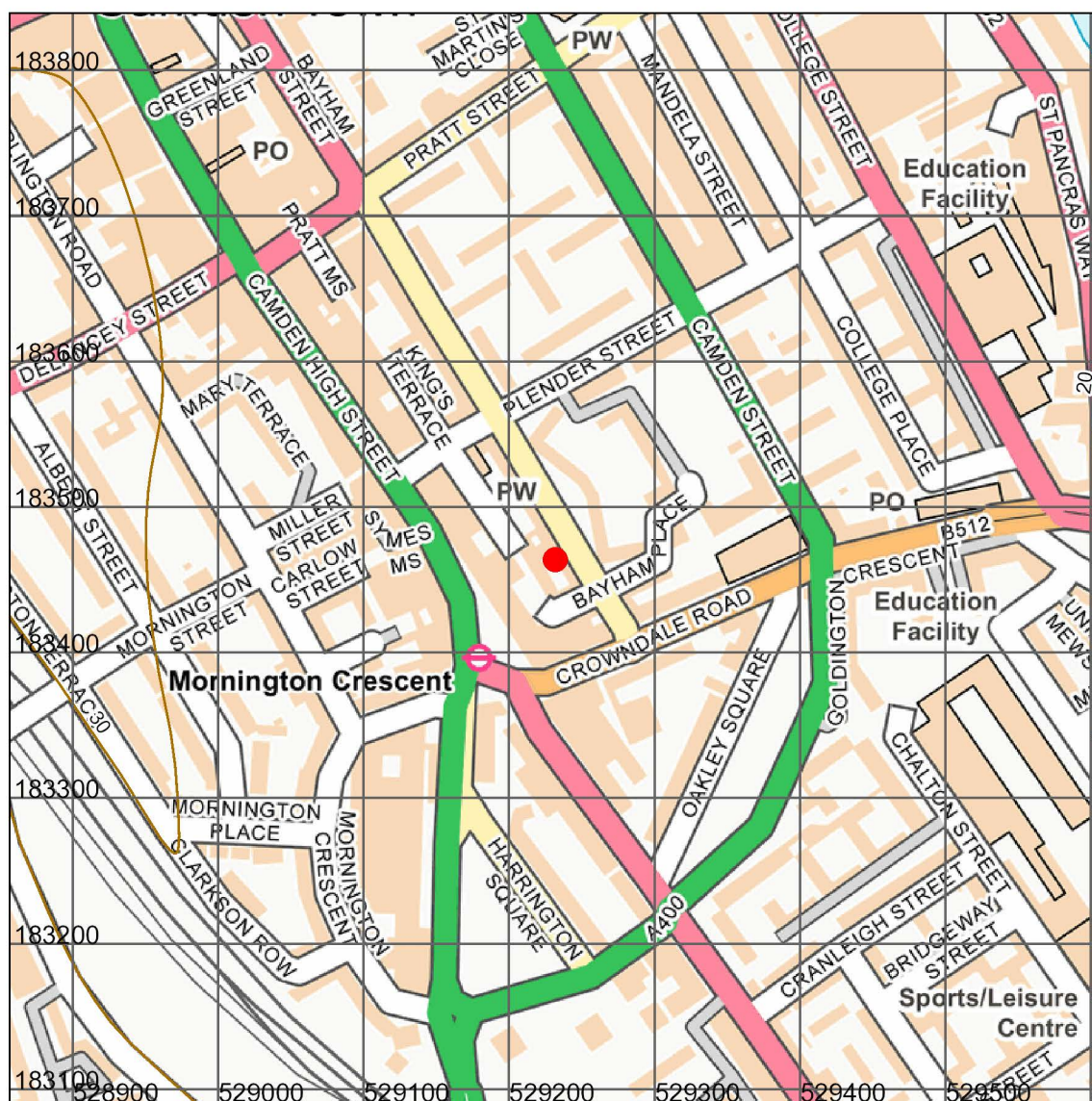
## Radon Report

Advisory report on the requirement for radon protective measures in new buildings, conversions and extensions to existing buildings. The report also indicates whether a site is located within a radon Affected Area

**Report Id: *BGS\_316806/21567***

**Client reference: JER8709**

## Search location



Contains OS data © Crown Copyright and database right 2021. OS OpenMap Local: Scale: 1:5 000 (1cm = 50 m)

Search location indicated in red

Point centred at: 529232, 183464

## Radon Report: UK

When extensions are made to existing buildings in high radon areas, or new buildings are constructed in these areas, the Building Regulations for England, Wales, Scotland and Northern Ireland require that protective measures are taken against radon entering the building.

This report provides information on whether radon protective measures are required. Depending on the probability of buildings having high radon levels, the Regulations may require either:

1. No protective measures
2. Basic protective measures
3. Full protective measures

This is an advisory report on the requirement for radon protective measures in new buildings, conversions and extensions. The report also indicates whether a site is located within a radon Affected Area

### **Requirement for radon protective measures**

The determination below follows advice in *BR211 Radon: Guidance on protective measures for new buildings (2015 edition)*, which also provides guidance on what to do if the result indicates that protective measures are required.

**Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2015 edition) Radon: Guidance on protective measures for new buildings?**

**NO RADON PROTECTIVE MEASURES ARE REQUIRED FOR THE REPORT AREA.**

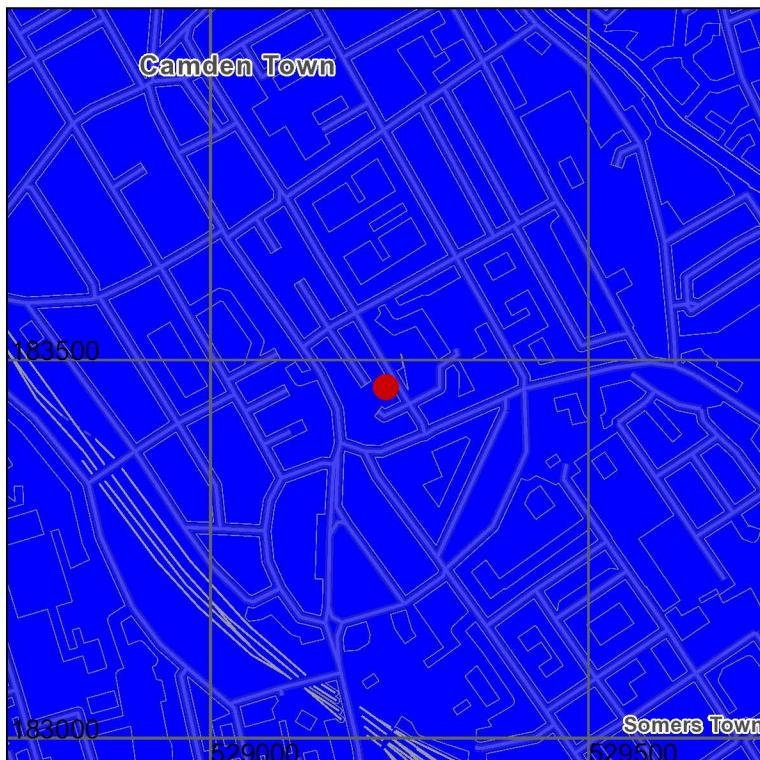
More details of the protective measures required are available in *BR211 Radon: Guidance on protective measures for new buildings (2015 Edition)*. Additional information and guidance is available from the Building Research Establishment website (<http://www.bre.co.uk/radon/>).

Whether or not the radon level in a building is above or below the radon Action Level can only be established by having the building tested. The PHE provides a radon testing service which can be accessed at [www.ukradon.org](http://www.ukradon.org) or by telephone (01235 822622).

If you require further information or guidance, you should contact your local authority building control officer or approved inspector.



## Radon Affected Area



	% Homes estimated to be at or above the action level
0-1%	
1-3%	
3-5%	
5-10%	
10-30%	
30-100%	

Contains OS data © Crown Copyright and database right 2021

Scale: 1:10 000 (1cm = 100 m)

Search area indicated in red

Is the property in a radon Affected Area as defined by Public Health England (PHE) and if so what percentage of homes are estimated to be above the Action Level? **NO**

### Additional Information

**THE PROPERTY IS IN AN AREA WHERE LESS THAN 1% OF HOMES ARE ESTIMATED TO BE AT OR ABOVE THE ACTION LEVEL. THE PROPERTY IS NOT IN A RADON AFFECTED AREA.**

PHE recommends a radon 'Action Level' of 200 Becquerels per cubic metre of air ( $\text{Bq m}^{-3}$ ) for the annual average of the radon gas concentration in a home. Where 1% or more of homes are estimated to exceed the Action Level the area should be regarded as a radon Affected Area.

This report informs you whether the property is in a radon Affected Area and the percentage of homes that are estimated to be at or above the radon Action Level at this location. Being in an Affected Area does not necessarily mean there is a radon problem in the property; the only way to find out whether the radon level is above or below the Action Level is to carry out a radon measurement.

PHE advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels above the Action Level ( $200 \text{ Bq m}^{-3}$ ) should be remediated. Householders with levels between the Target Level ( $100 \text{ Bq m}^{-3}$ ) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. PHE provides a validated radon testing service which can be accessed at [www.ukradon.org](http://www.ukradon.org).

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by PHE. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from PHE at [www.ukradon.org](http://www.ukradon.org).



PHE advises that radon gas should be measured in all properties within radon Affected Areas and that homes with radon levels above the Action Level ( $200 \text{ Bq m}^{-3}$ ) should be remediated. Householders with levels between the Target Level ( $100 \text{ Bq m}^{-3}$ ) and Action Level should seriously consider reducing their radon level, especially if they are at greater risk, such as if they are current or ex smokers. Whether or not a home is in fact above or below the Action Level or Target Level can only be established by having the building tested. PHE provides a validated radon testing service which can be accessed at [www.ukradon.org](http://www.ukradon.org).

The information in this report provides an answer to one of the standard legal enquiries on house purchase in England and Wales, known as Law Society CON29 Enquiries of the Local Authority (2016); 3.14 Radon Gas: Do records indicate that the property is in a “Radon Affected Area” as identified by PHE. The data can also be used to advise house buyers and sellers in Scotland and Northern Ireland.

If you are buying a new build property in a Radon Affected Area, you should ask the builder whether radon protective measures were incorporated in the construction of the property.

If you are buying a currently occupied property in a radon Affected Area, you should ask the present owner whether radon levels have been measured in the property. If they have, ask whether the results were above the radon Action Level and if so, whether remedial measures were installed, radon levels were re-tested, and if the results of re-testing confirmed the effectiveness of the measures.

Further information on radon is available from PHE at [www.ukradon.org](http://www.ukradon.org).

## What is radon?

Radon is a naturally occurring radioactive gas, which is produced by the radioactive decay of radium which, in turn, is derived from the radioactive decay of uranium. Uranium is found in small quantities in all soils and rocks, although the amount varies from place to place. Radon released from rocks and soils is quickly diluted in the atmosphere. Concentrations in the open air are normally very low and do not present a hazard. Radon that enters enclosed spaces such as some buildings (particularly basements), caves, mines, and tunnels may reach high concentrations in some circumstances. The construction method and degree of ventilation will influence radon levels in individual buildings. A person's exposure to radon will also vary according to how particular buildings and spaces are used.

Inhalation of the radioactive decay products of radon gas increases the chance of developing lung cancer. If individuals are exposed to high concentrations for significant periods of time, there may be cause for concern. In order to limit the risk to individuals, the Government has adopted an Action Level for radon in homes of 200 becquerels per cubic metre ( $\text{Bq m}^{-3}$ ). The Government advises householders that, where the radon level exceeds the Action Level, measures should be taken to reduce the concentration.

## Radon in workplaces

The Ionising Radiation Regulations, 1999, require employers to take action when radon is present above a defined level in the workplace. Advice may be obtained from your local Health and Safety Executive Area Office or the Environmental Health Department of your local authority. The BRE publishes a guide (BR293): **Radon in the workplace**. BRE publications may be obtained from the BRE Bookshop, Tel: 01923 664262, email: [bookshop@bre.co.uk](mailto:bookshop@bre.co.uk) website: [www.brebookshop.com](http://www.brebookshop.com)

## Contact Details

### ***Keyworth Office***

British Geological Survey  
Environmental Science Centre  
Nicker Hill  
Keyworth  
Nottingham  
NG12 5GG  
Tel: 0115 9363143  
Email: [enquiries@bgs.ac.uk](mailto:enquiries@bgs.ac.uk)

### ***Wallingford Office***

British Geological Survey  
Maclean Building  
Wallingford  
Oxford  
OX10 8BB  
Tel: 01491 838800  
Email: [hydroenq@bgs.ac.uk](mailto:hydroenq@bgs.ac.uk)

### ***Edinburgh Office***

British Geological Survey  
Lyell Centre  
Research Avenue South  
Edinburgh  
EH14 4AP  
Tel: 0131 6671000  
Email: [enquiry@bgs.ac.uk](mailto:enquiry@bgs.ac.uk)

## Terms and Conditions

### General Terms & Conditions

This Report is supplied in accordance with the GeoReports Terms & Conditions available on the BGS website at <https://shop.bgs.ac.uk/georeports> and also available from the BGS Enquiry Service at the above address.

### Important notes about this Report

- The data, information and related records supplied in this Report by BGS can only be indicative and should not be taken as a substitute for specialist interpretations, professional advice and/or detailed site investigations. You must seek professional advice before making technical interpretations on the basis of the materials provided.
- Geological observations and interpretations are made according to the prevailing understanding of the subject at the time. The quality of such observations and interpretations may be affected by the availability of new data, by subsequent advances in knowledge, improved methods of interpretation, and better access to sampling locations.
- Raw data may have been transcribed from analogue to digital format, or may have been acquired by means of automated measuring techniques. Although such processes are subjected to quality control to ensure reliability where possible, some raw data may have been processed without human intervention and may in consequence contain undetected errors.
- Detail, which is clearly defined and accurately depicted on large-scale maps, may be lost when small-scale maps are derived from them.
- Although samples and records are maintained with all reasonable care, there may be some deterioration in the long term.
- The most appropriate techniques for copying original records are used, but there may be some loss of detail and dimensional distortion when such records are copied.
- Data may be compiled from the disparate sources of information at BGS's disposal, including material donated to BGS by third parties, and may not originally have been subject to any verification or other quality control process.
- Data, information and related records, which have been donated to BGS, have been produced for a specific purpose, and that may affect the type and completeness of the data recorded and any interpretation. The nature and purpose of data collection, and the age of the resultant material may render it unsuitable for certain applications/uses. You must verify the suitability of the material for your intended usage.
- If a report or other output is produced for you on the basis of data you have provided to BGS, or your own data input into a BGS system, please do not rely on it as a source of information about other areas or geological features, as the report may omit important details.
- The topography shown on any map extracts is based on the latest OS mapping and is not necessarily the same as that used in the original compilation of the BGS geological map, and to which the geological linework available at that time was fitted.
- Note that for some sites, the latest available records may be historical in nature, and while every effort is made to place the analysis in a modern geological context, it is possible in some cases that the detailed geology at a site may differ from that described.

### Copyright:

Copyright in materials derived from the British Geological Survey's work, is owned by UK Research and Innovation (UKRI) and/or the authority that commissioned the work. You may not copy or adapt this publication, or provide it to a third party, without first obtaining UKRI's permission, but if you are a consultant purchasing this report solely for the purpose of providing advice to your own individual client you may incorporate it unaltered into your report to that client without further permission, provided you give a full acknowledgement of the source. Please contact the BGS Copyright Manager, British Geological Survey, Environmental Science Centre, Nicker Hill, Keyworth, Nottingham NG12 5GG. Telephone: 0115 936 3100.

© UKRI 2021 All rights reserved.

This product includes mapping data licensed from the Ordnance Survey® with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright 2021. All rights reserved. Licence number 100021290 EUL



Report issued by  
**BGS Enquiry Service**

## Enclosure C

### Details of Radon Proof Membrane







## Enclosure D

### Design Criteria for Mechanical Ventilation System

### 3.2.2 Internal Design Criteria

The following tables set-out the proposed internal design criteria within the buildings.

#### 3.2.2.1 Hotel

Type of Space	Summer Design	Winter Design	Ventilation System	Ventilation rate	Noise Level
Guest Rooms Hybrid System	23°C ± 2°C	22°C ± 2°C	Centralised AHU providing Supply	24 l/s supply	As defined by Acoustician
Guest Bathroom Hybrid System	No direct cooling	22°C ± 2°C	Centralised AHU providing Extract	24 l/s extract	As defined by Acoustician
Guest Rooms Hybrid System	23°C ± 2°C	22°C ± 2°C	MVHR providing Supply	24 l/s supply	As defined by Acoustician
Guest Bathroom Hybrid System	No direct cooling	22°C ± 2°C	MVHR providing Extract	24 l/s extract	As defined by Acoustician
Restaurant/bar	24°C ± 2°C	21°C ± 2°C	Local Heat Recovery units	10l/s per person plus Kitchen make-up air	As defined by Acoustician
Workspace/Office Cafe	23°C ± 2°C	21°C ± 2°C	Local Heat Recovery units	10l/s per person	As defined by Acoustician
Toilet facilities	No cooling	21°C ± 2°C	Mechanical Extract to central system	10 air changes per hour	As defined by Acoustician
Corridors	No cooling	No direct heating	Central AHU with Heat Recovery	To prevent overheating or 2ac/hr whichever is greater	As defined by Acoustician

**Table 1: Internal design criteria - Hotel**

All stated temperatures are Operative (Dry Resultant) Temperatures within each control zone. All temperatures will have a range of +/- 2°C to allow for the natural variation within a zone and the control system tolerance.

No direct humidity control will be provided in any space.

#### 3.2.2.2 BoH Areas

Type of Space	Summer Design	Winter Design	Ventilation System	Ventilation rate	Noise Level
Kitchen	27°C	21°C ± 2°C °C	Dedicated extract system	As per DW172/Defra Guidance & Kitchen Consultant Requirements	As defined by Acoustician

Type of Space	Summer Design	Winter Design	Ventilation System	Ventilation rate	Noise Level
Staircases and circulation spaces	No cooling	16°C	-	To suit requirements of adjoining spaces	As defined by Acoustician
Store Rooms	No cooling	16°C	Extract to central AHU with Heat Recovery	2-6 air changes per hour	As defined by Acoustician
Refuse areas	No cooling	No direct heating	Extract to central AHU with Heat Recovery	6 air changes per hour	As defined by Acoustician
General Plantrooms	30°C	8°C	Ventilation to be selected to achieve maximum summer temperatures requirement		As defined by Acoustician
Electrical Plantrooms	No cooling	No direct heating	To meet ventilation requirements		As defined by Acoustician

**Table 2: Internal design criteria – BoH**

### 3.2.2.3 Office Areas

Type of Space	Summer Design	Winter Design	Ventilation System	Ventilation rate	Noise Level
Offices/ Meeting Rooms	23°C ± 2°C	21°C ± 2°C	Central AHU with Heat Recovery	10l/s per person	As defined by Acoustician
Staircases and circulation spaces	No cooling	16°C	-	To suit requirements of adjoining spaces	As defined by Acoustician
Toilet facilities	No cooling	21°C ± 2°C	Mechanical Extract to central system	10 air changes per hour	As defined by Acoustician

**Table 3.3: Internal design criteria – Office**

### 3.2.2.4 Air Conditioning Loads

Type of Space	Occupancy	Heat per Person	Lighting	Equipment	Allowance
Office	1 person / 10 m2	90W (sensible) 50W (latent)	10 W/m <sup>2</sup>	25 W/m <sup>2</sup>	As per BCO Guidance
Hotel	2 persons per room	90W (sensible) 50W (latent)	FoH: 15 W/m <sup>2</sup> BoH: 8 W/m <sup>2</sup>	10 W/m <sup>2</sup>	

**Table 3.4: Air Conditioning Loads**

## 3.2.3 Air Permeability

The target air permeability for the development is 3 m<sup>3</sup>/h/m<sup>2</sup> at 50Pa.

Refer to Energy Strategy in Appendix G for details.