JDW 2103
Waterhouse
67-71 Princess Street,
Manchester, M2 4EG



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1 Introduction

This report presents the results from the infrastructure and Wireless RF Assessment activities carried out at Waterhouse on the 24/05/2024.

It contains detailed specifications and recommendations for the type and location of Wireless LAN infrastructure equipment (Access Point and Antennas) to provide pervasive wireless coverage.

1.1 Version Control

It is the responsibility of all reading this document to ensure they are reading the latest version of the document. Any information contained within this document is subject to a change control process and may have been altered in a subsequent revision.

Date	Version	Author	Reason for Change
24/05/2024	V1.0	Faith Sear	Review/Release
Click here to enter a date.			

1.1 Contact Details

Please contact one of the following individuals if you have any queries regarding this document.

Name	
Luke Greaves Lead Consultant Specialist	Address: Digital Space, Brunel Drive, Jessop Cl, Newark NG24 2AG Email: luke.greaves@digitalspace.co.uk
Warren Miller Wireless Surveyor	

2 Site Survey

We have completed an infrastructure and wireless LAN site survey of the following location/s:

Waterhouse, 67-71 Princess Street, Manchester, M1 4BH.

2.1 Local Knowledge

SITE NUMBER	2103
SITE ADDRESS	Waterhouse, 67-71 Princess Street, Manchester, M1 4BH
OPERATING HOURS	08:00 - 00:00 Sunday to Thursday 08:00 - 01:00 Friday and Saturday
ACCESS TO SITE TIMES	Opening hours
SITE TYPE	Pub
PARKING AVAILABILITY	Not on the site, local car parks
STORAGE LOCATION FOR EQUIPMENT	Store in training room
STORAGE LOCATION PHOTO 1	
LISTED BUILDING TYPE	Grade 2 listed
LISTED BUILDING TYPE CONFIRMED	Ceiling and architectural parts of the building, Frontage is also believed to be listed.
ASBESTOS REGISTER VIEWED	Viewed and none on site
VDAS IDENTIFIED AND BRIEF DESCRIPTION	Front of bar
SEASONAL AREAS IDENTIFIED AND BRIEF DESCRIPTION	Small garden area at the front
HEAVY TRADING AREAS IDENTIFIED AND BRIEF DESCRIPTION	VDA
STAFF ACCOMADATION ON SITE **EXCLUDE FROM SUREVY**	Yes, the whole second floor is staff accommodation.
NAME OF DUTY MANAGER	Ryan Smith
SIGNATURE	
DATE	24/05/2024

2.2 Site Installation Details

LADDERS/MEWP/ REQUIRED FOR INSTALL	Step ladders to reach 4m will be required
FIRESEALS PRESENT	Not seen, but repair if broken
CAN THE INSTALL BE COMPLETED SAFELY WITHIN OPENING HOURS	Yes

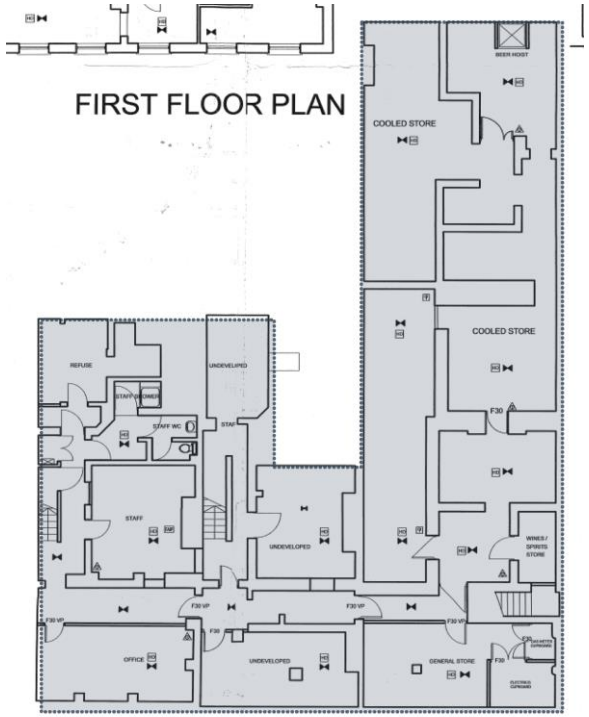
2.3 Notes and Observations

- Grade 2 Listed, all ceilings and historic architectural parts of the building are in scope of the listing, however, CCTV was recently upgraded so those positions and cable routes can be re-used.
- Next to the cab, on a shelf are 2 Avaya PBX units, with cables run into the cab.
- The site reported poor wireless across the site, given the structure and layout, this is understandable.
- AP02-01 is a move, due to the existing device being wall mounted, facing outside of the building, it will be moved to the ceiling further down the corridor.
- Staff accommodation has been identified and excluded from the design on the second floor.
- The site has some upcoming refurbishment works in the basement areas.

3 VDA Details

3.1 Basement

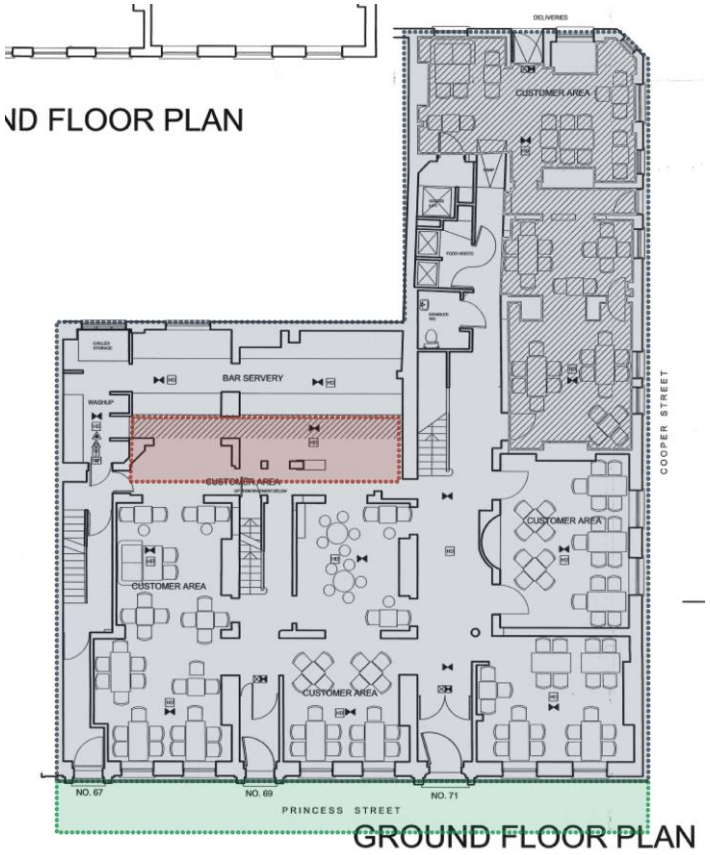
3.1.1 **Basement** - Zone Definitions



Colour coding details – **GREEN** – Garden area. **GREY** – Standard areas. **RED** - VDA Areas

3.2 Ground Floor

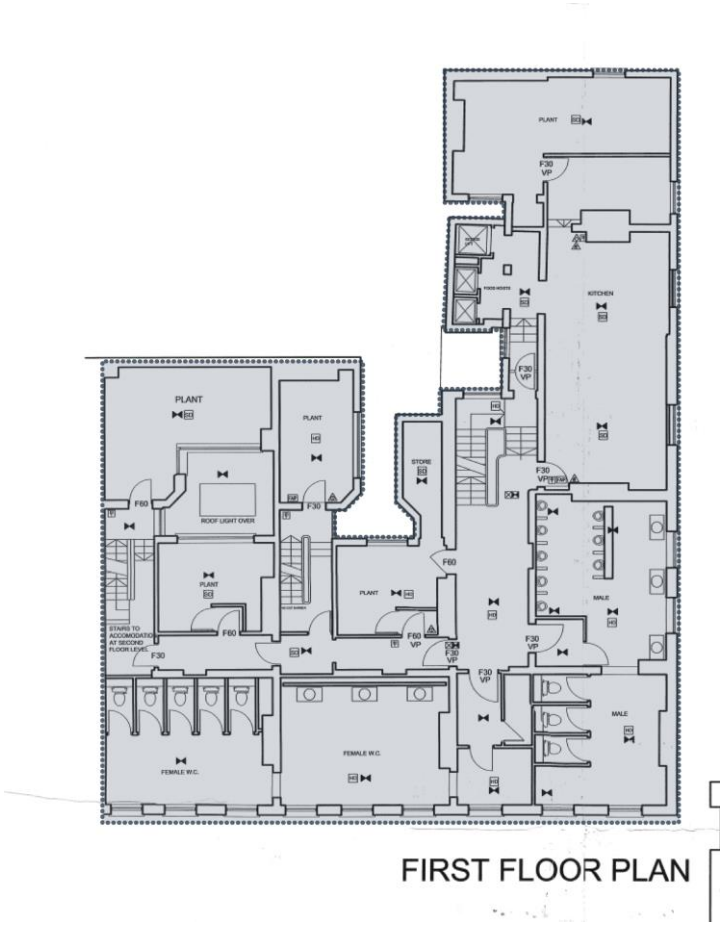
3.2.1 **Ground Floor** - Zone Definitions



Colour coding details – **GREEN** – Garden area. **GREY** – Standard areas. **RED** - VDA Areas

3.3 First Floor

3.3.1 First Floor - Zone Definitions

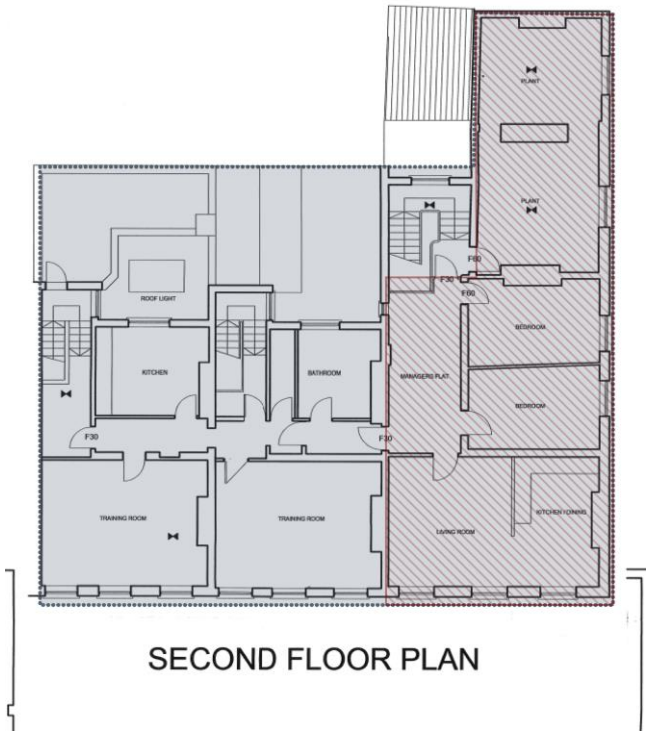


FIRST FLOOR PLAN

Colour coding details – **GREEN** – Garden area. **GREY** – Standard areas. **RED** - VDA Areas

3.4 Second Floor

3.4.1 **Second Floor** - Zone Definitions

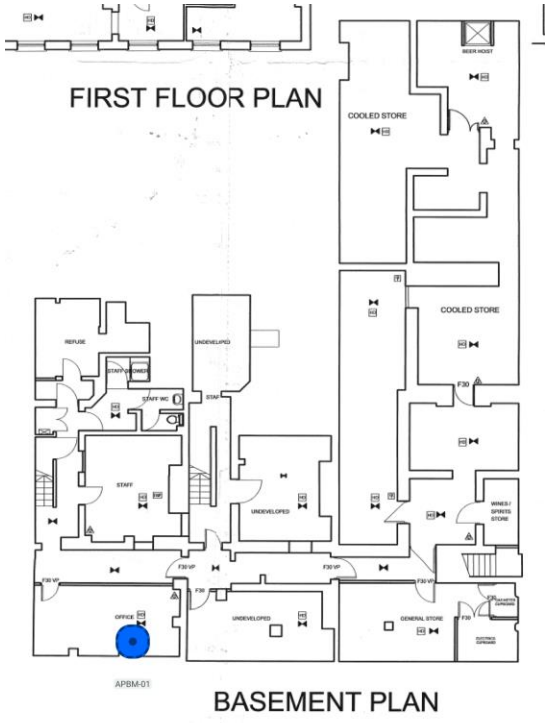


Colour coding details – **GREEN** – Garden area. **GREY** – Standard areas. **RED** - VDA Areas

4 Appendix 1 – Access Point Locations

4.1 Basement

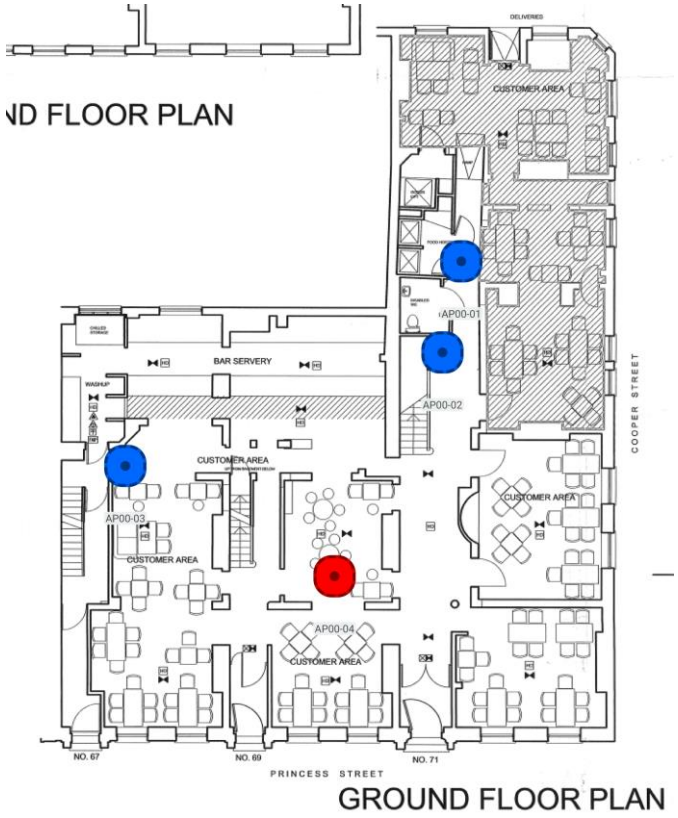
4.1.1 **Basement** - AP Names & Locations



Note: **Red** circles represent locations where additional wireless access points should be deployed. **Blue** circles show where existing wireless access point are deployed. **Yellow** circles show wireless access points which are to be relocated from **violet** location in order to provide more optimal RF propagation throughout surrounding areas. **Grey** circles represent existing wireless access points to be removed. **Pink** circles represent the Fortinet 4G device

4.2 Ground Floor

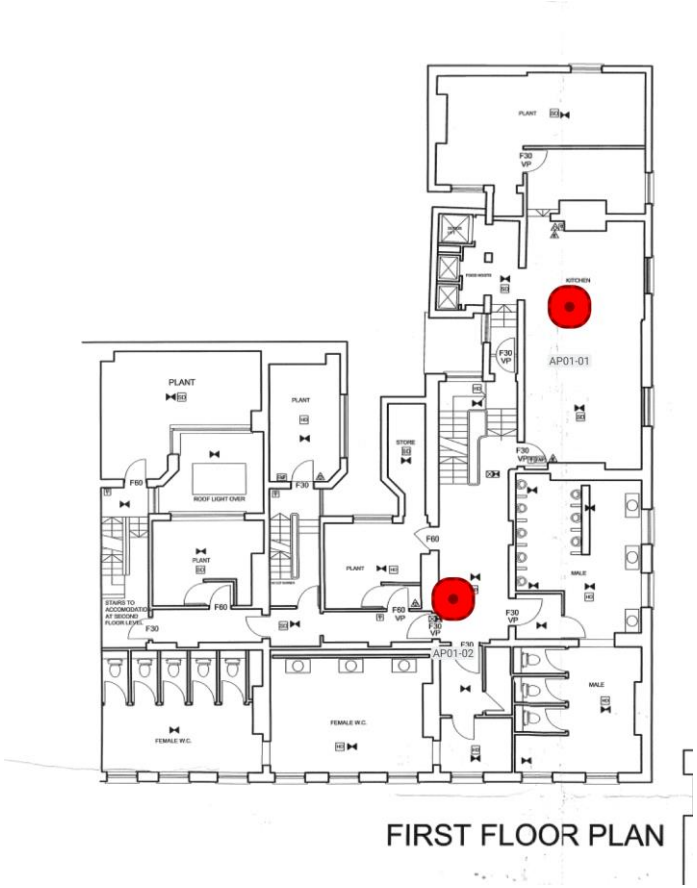
4.2.1 **Ground Floor** - AP Names & Locations



Note: **Red** circles represent locations where additional wireless access points should be deployed. **Blue** circles show where existing wireless access point are deployed. **Yellow** circles show wireless access points which are to be relocated from **violet** location in order to provide more optimal RF propagation throughout surrounding areas. **Grey** circles represent existing wireless access points to be removed. **Pink** circles represent the Fortinet 4G device

4.3 First Floor

4.3.1 First Floor - AP Names & Locations



Note: **Red** circles represent locations where additional wireless access points should be deployed. **Blue** circles show where existing wireless access point are deployed. **Yellow** circles show wireless access points which are to be relocated from **violet** location in order to provide more optimal RF propagation throughout surrounding areas. **Grey** circles represent existing wireless access points to be removed. **Pink** circles represent the Fortinet 4G device

4.4 Second Floor

4.4.1 **Second Floor** - AP Names & Locations



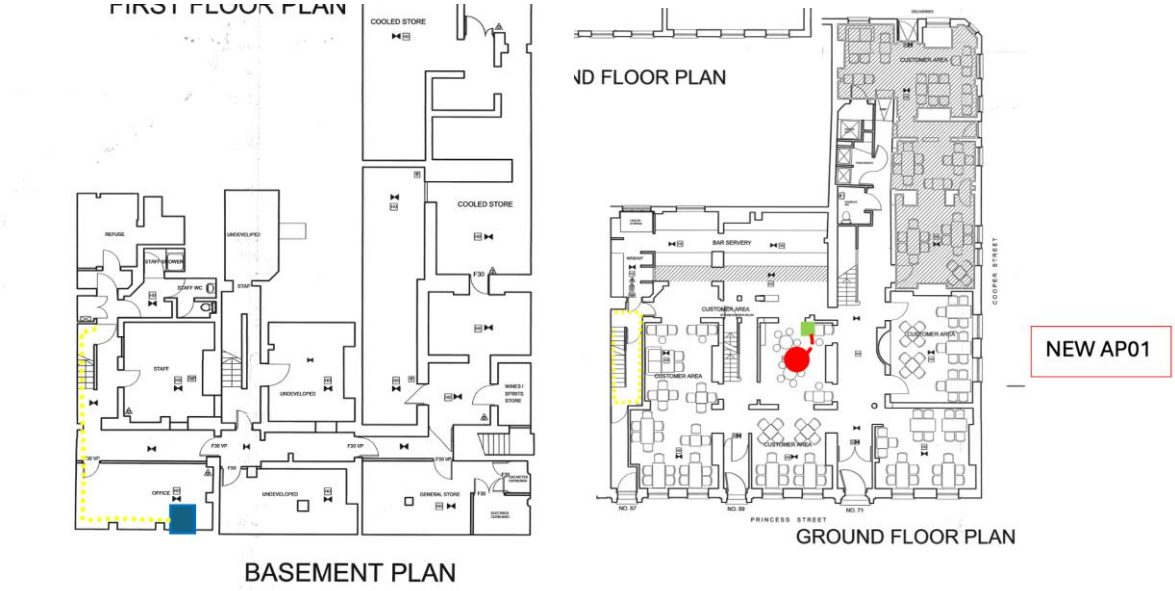
Note: **Red** circles represent locations where additional wireless access points should be deployed. **Blue** circles show where existing wireless access point are deployed. **Yellow** circles show wireless access points which are to be relocated from **violet** location in order to provide more optimal RF propagation throughout surrounding areas. **Grey** circles represent existing wireless access points to be removed. **Pink** circles represent the Fortinet 4G device

5 Details of access point location

Location	AP Name
KITCHEN	AP01-01
TOILETS	N/A
OFFICE	APBM-01
STAFF ROOM	N/A
CELLAR	N/A

6 Cable Routes

6.1 Ground Floor – New AP01



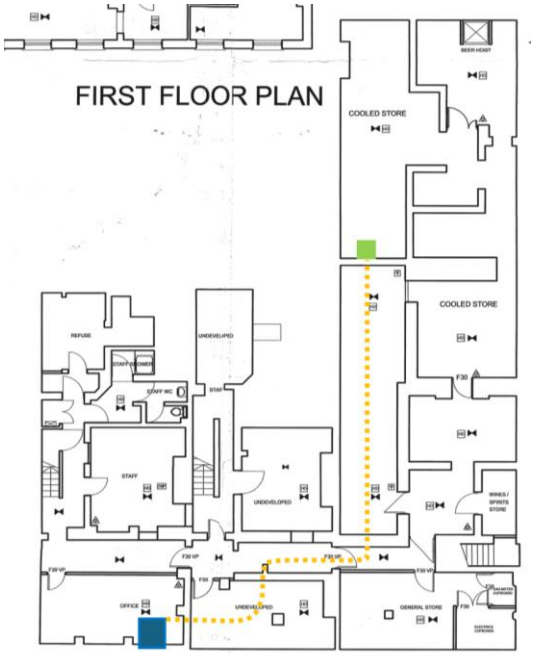
New Cable Run,

AP 1 (Ground Floor) - cable will run following existing green cable around the office to the door where a new hole will need to be drilled to exit into the hallway. It will go in trunking towards the stairs where it will have to be trunked all the way up the stairs to the first floor through back of house. It will then continue in trunking down the corridor parallel with the ladies toilets unit it reaches the second plant room. It will then enter the plant room where it will then go through existing hole in the floor so it can reach ceiling tiles on the ground floor where the AP will be located and mounted on the ceiling tiles. Cable run approx - 50m





6.2 New AP02

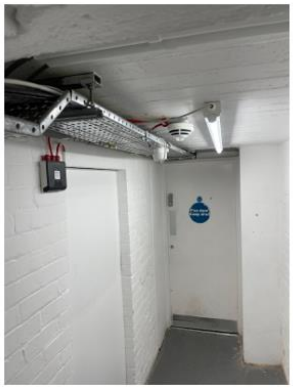




New Cable Run,

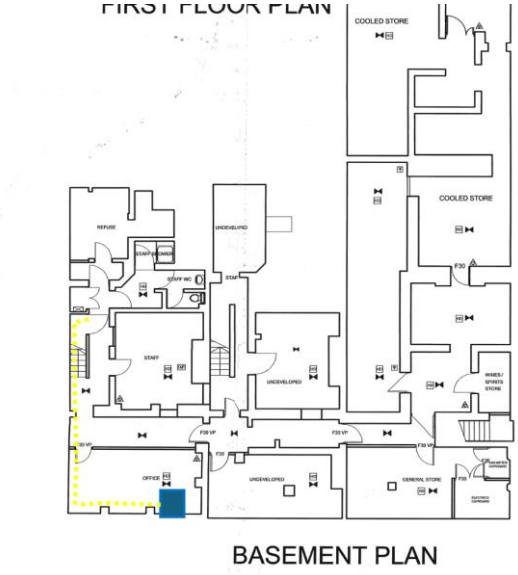
AP2 (First Floor Kitchen) - cable will exit the office on the basement floor through the wall into the undeveloped room next door. In this room it will continue in existing trunking approx 2m where it will turn left and exit through to the hall way. Here it will continue along metal basket through the next set of doors where it will then turn left through the wall, following the green cables into the long rectangular store room. It will continue the full length of the room and go through the wall hatch to the cooled storage room. From here it will go up through the existing hole in the ceiling which will bring it out in the food hoist room on the ground floor. It will continue in trunking up again into the food hoist room above on the first floor. It will then follow the existing green cables into the corridor and through into the kitchen where the new AP will be located and mounted on the ceiling tiles.

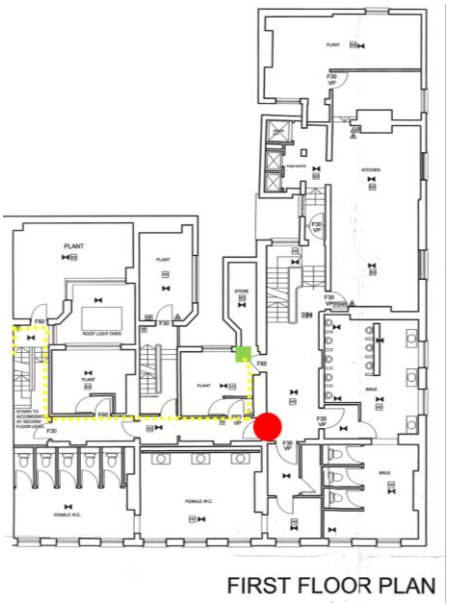
Cable run approx - 50m





6.3 New AP03





AP 3 - First Floor (next to female toilets) - cable will run following existing green cable around the office to the door where a new hole will need to be drilled to exit into the hallway. It will go in trunking towards the stairs where it will have to be trunked all the way up the stairs to the first floor through back of house. It will then continue in trunking down the corridor parallel with the ladies' toilets unit it reaches the door to the customer area. Here a new hole will need to be drilled to AP location which will be mounted on the other side of the wall.

Cable run approx. 50m.



7 Wide Angles

7.1 Frontage



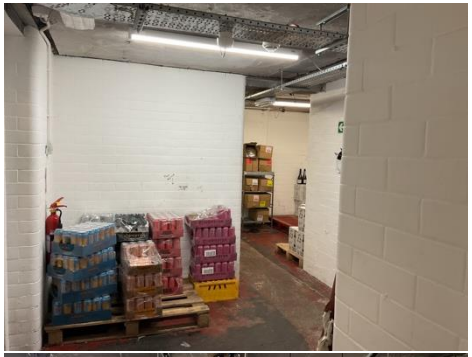
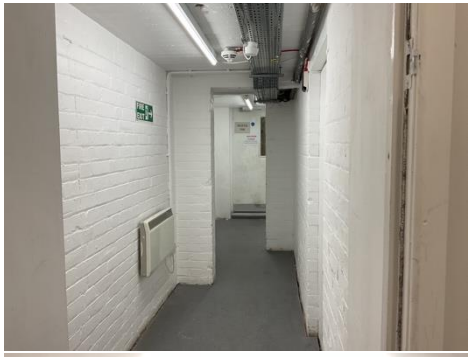
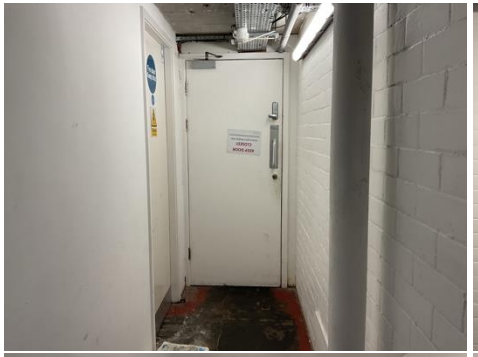




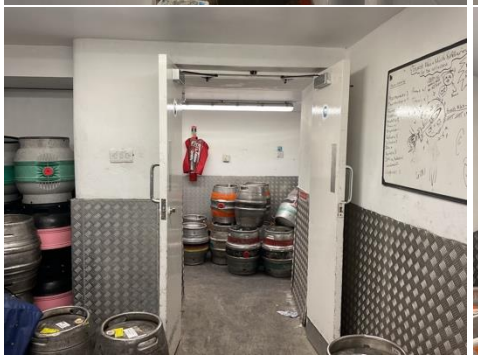




7.2 Basement

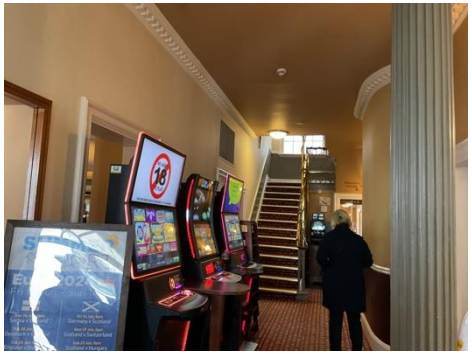











7.3 Ground Floor





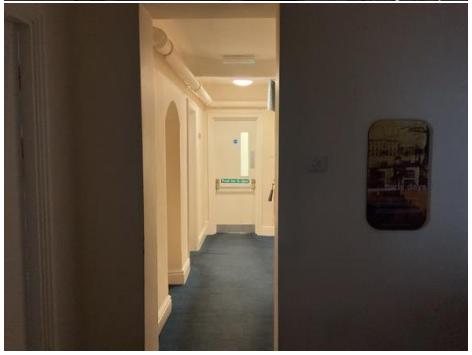
7.4 First Floor



7.5 Second Floor







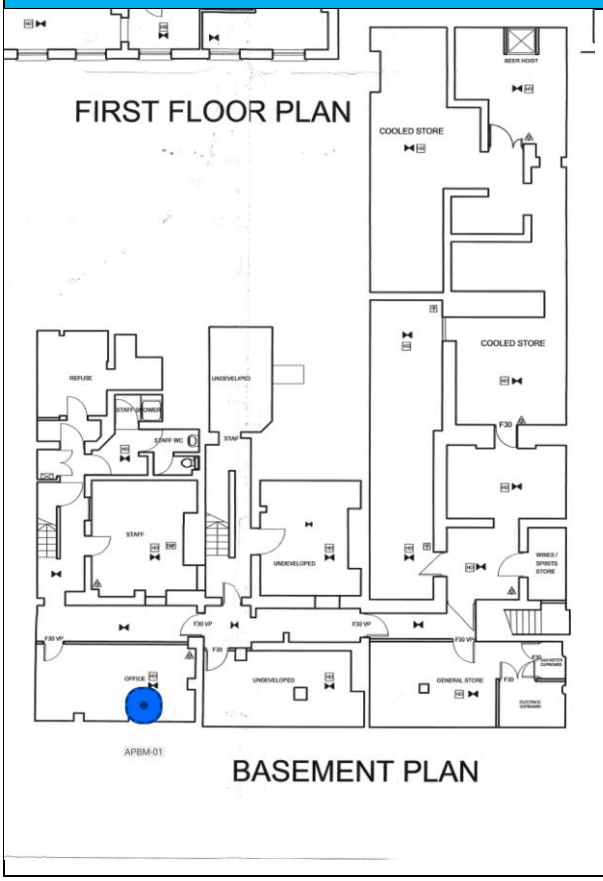

8 Assessment Results

The following section of the report details the location and configuration information for each of the Access Points that are necessary to provide the required 802.11a/g/n/ax Wireless LAN coverage. Antenna orientations are represented on the floor plan diagrams in Appendix 1.

8.1 Basement

8.1.1 APBM-01

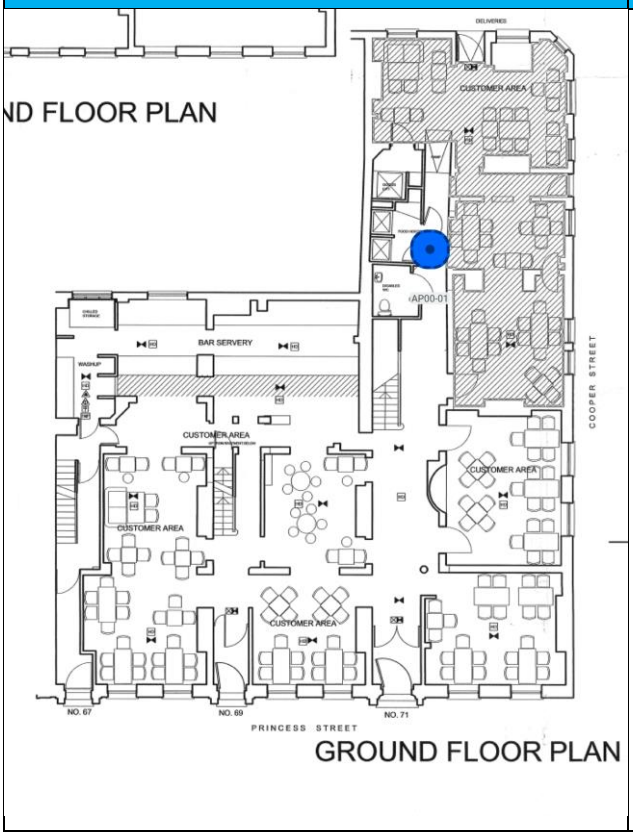
Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Ceiling Mount
Height	2.0 m
Ceiling/Wall material	Plasterboard
Floor	Basement
Additional Comments	Replace the existing AP with a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

8.2 Ground Floor

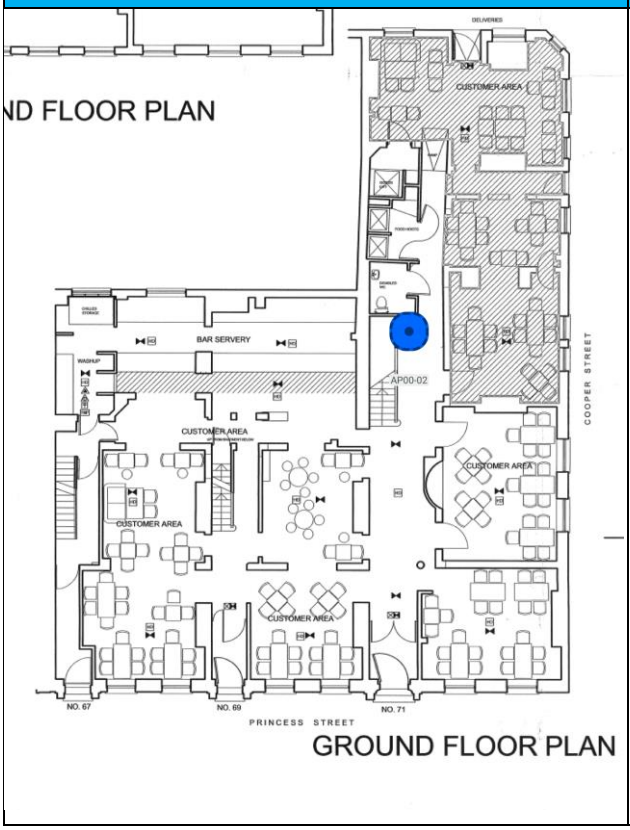
8.2.1 AP00-01

Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Wall Mount
Height	2.0 m
Ceiling/Wall material	Plasterboard
Floor	Ground Floor
Additional Comments	Replace the existing AP with a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

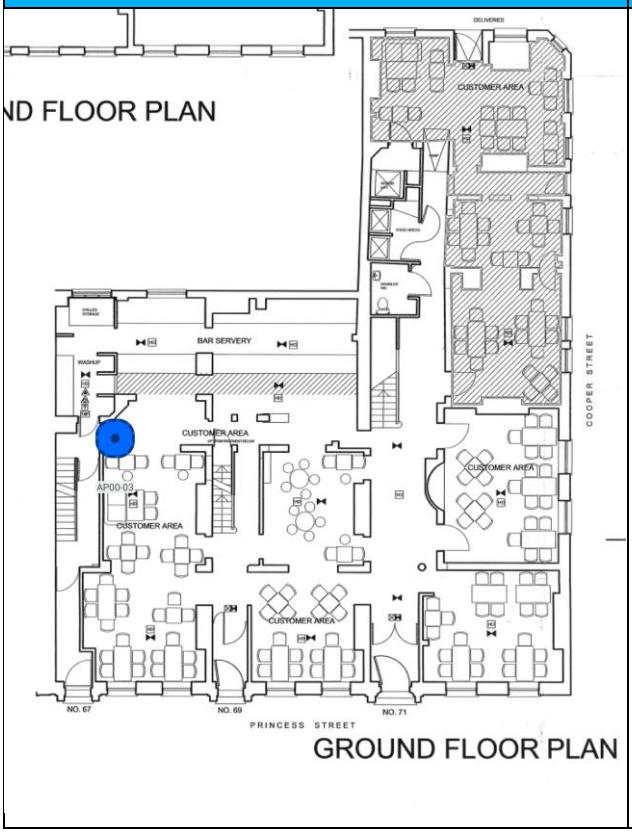
8.2.2 AP00-02

Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Wall Mount
Height	1.6 m
Ceiling/Wall material	Plasterboard
Floor	Ground Floor
Additional Comments	Replace the existing AP with a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

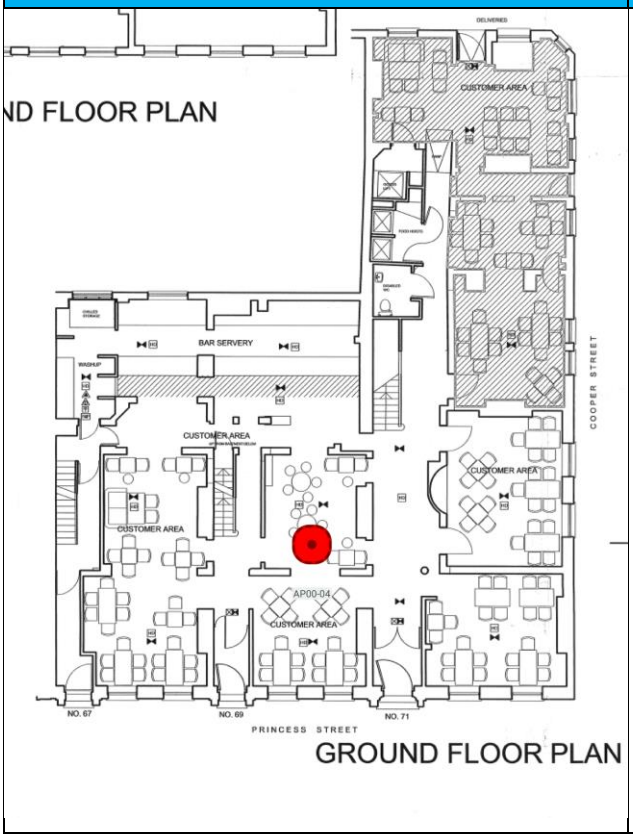
8.2.3 AP00-03

Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Wall Mount
Height	2.0 m
Ceiling/Wall material	Plasterboard
Floor	Ground Floor
Additional Comments	Replace the existing AP with a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

8.2.4 AP00-04

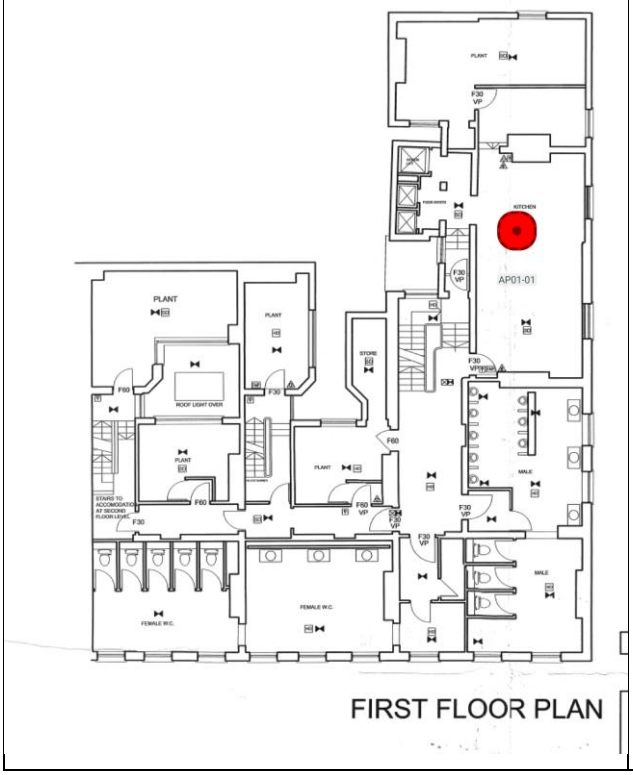
Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Ceiling Mount
Height	2.4 m
Ceiling/Wall material	False Ceiling Tiles
Floor	Ground Floor
Additional Comments	Install a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

8.3 First Floor

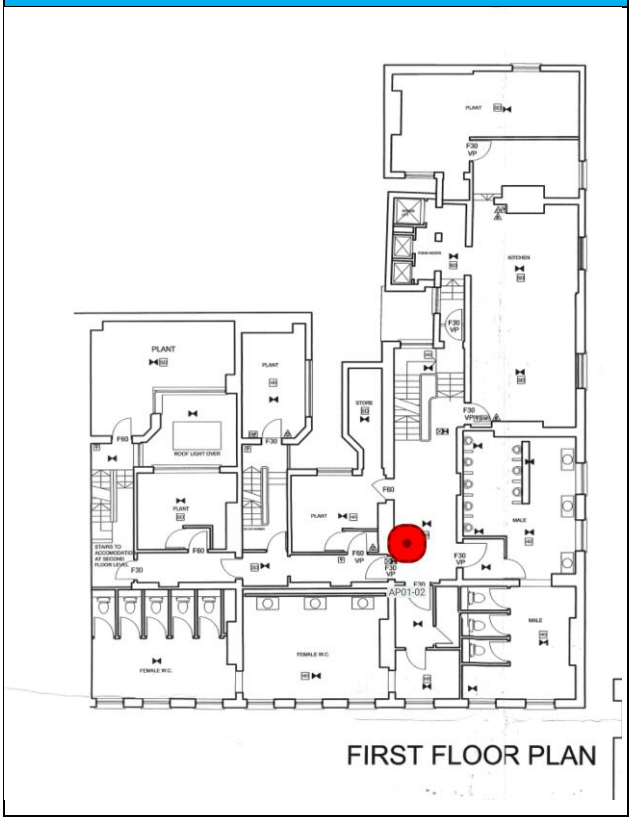
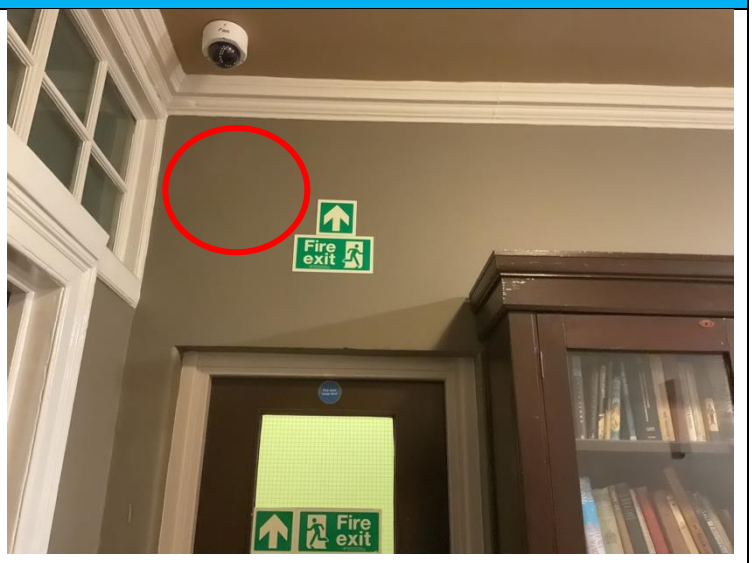
8.3.1 AP01-01

Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Ceiling Mount
Height	2.4 m
Ceiling/Wall material	False Ceiling Tiles
Floor	First Floor
Additional Comments	Install a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

8.3.2 AP01-02

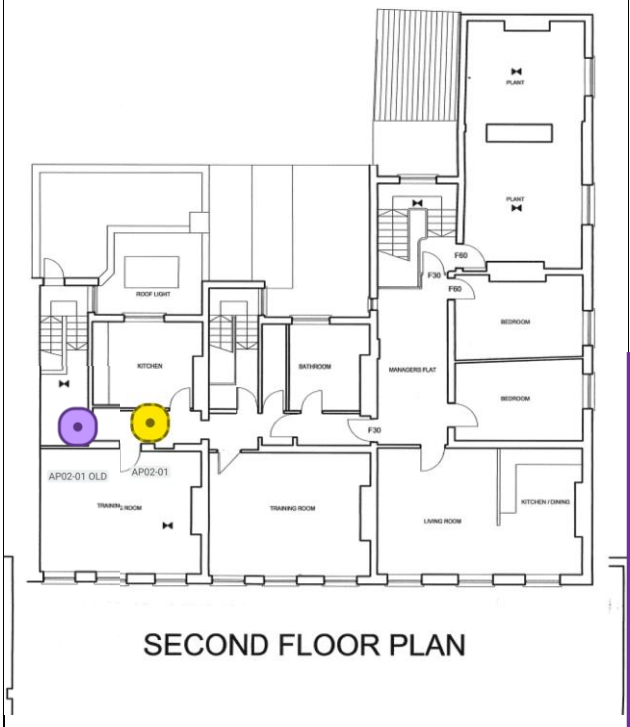
Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Wall Mount
Height	2.0 m
Ceiling/Wall material	Plasterboard
Floor	First Floor
Additional Comments	Install a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

8.4 Second Floor

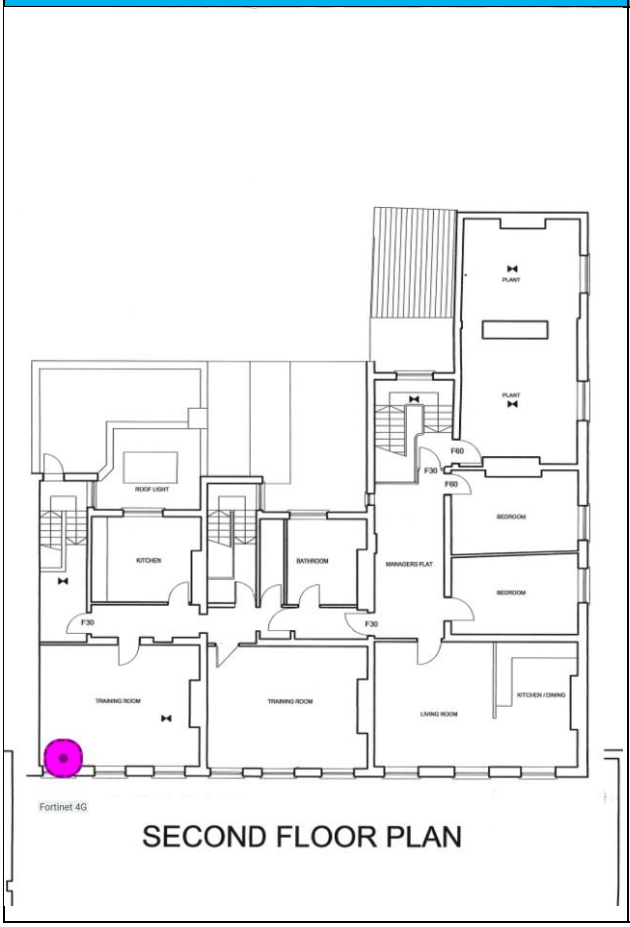
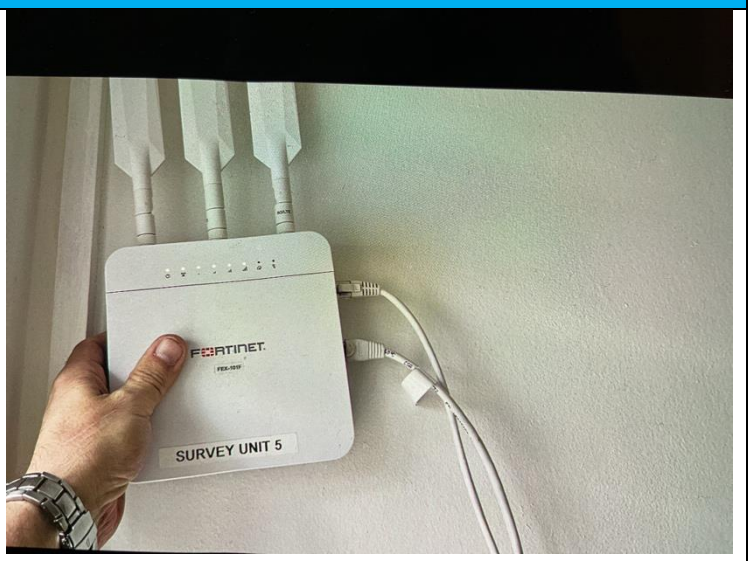
8.4.1 AP02-01

Access Point Make and Model	Fortinet FortiAP-231F
Antenna Type	Internal/Integrated
Mount	Universal Ceiling Mount
Height	2.4 m
Ceiling/Wall material	Plasterboard
Floor	Second Floor
Additional Comments	Relocate and replace the existing AP with a new Fortinet FortiAP-231F.

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	 

8.4.2 Fortinet 4G Device

Make and Model	Fortinet FEX-101F
Mount	Wall Mount
Height	2.4 m
Ceiling/Wall material	Plasterboard
Floor	Second Floor

WIRELESS DEVICE LOCATION	PICTURE OF LOCATION
	

9 Appendix 2 – 2.4Ghz Heat Maps (Signal Strength & SNR) EXISTING

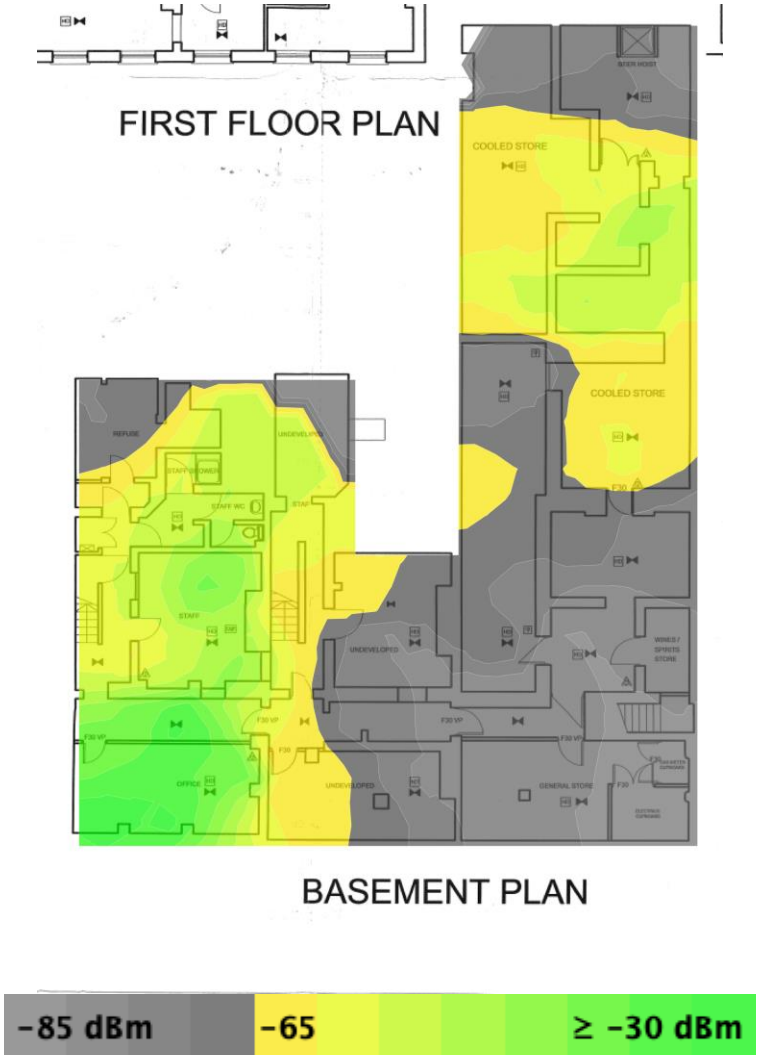
The following heat maps illustrate the Signal Strength and Signal to Noise Ratio (SNR) of the 802.11a radio seen by a measurement of:

1. Signal Strength - sometimes called coverage - is the most basic requirement for a wireless network. As a general guideline, low signal strength means unreliable connections, and low data throughput.

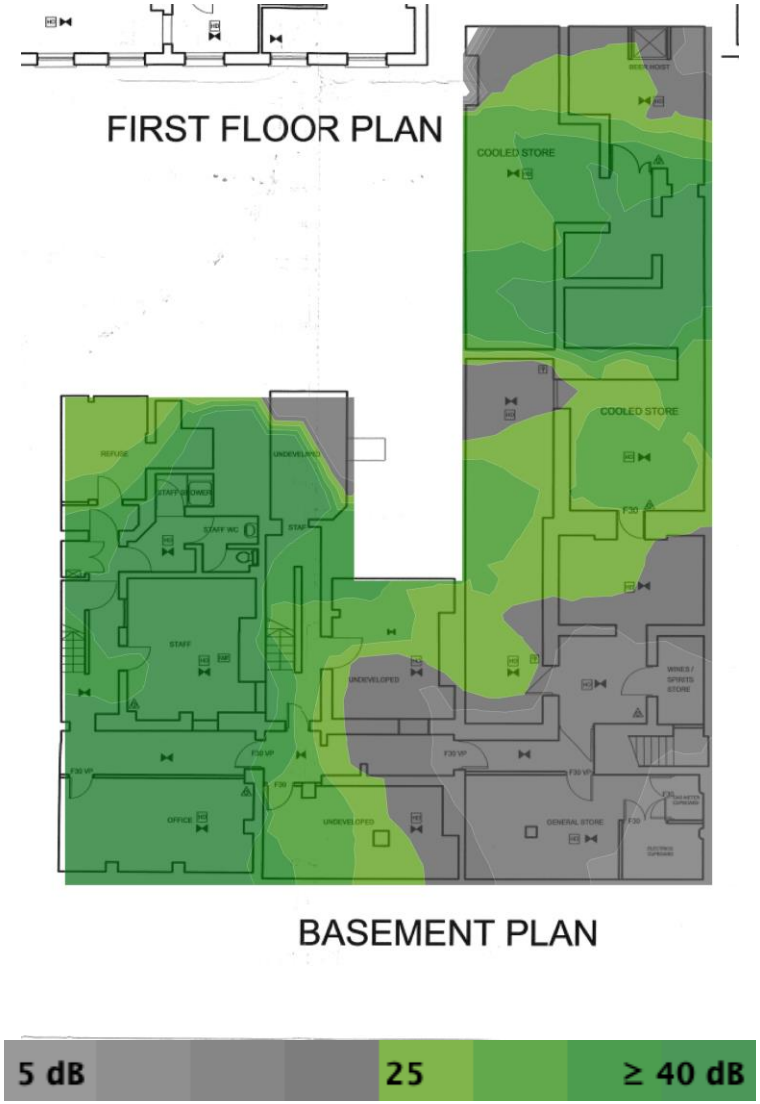
2. Signal-To-Noise Ratio indicates how much the signal strength is stronger than the noise (co-channel interference). Signal must be stronger than noise (SNR greater than zero) for data transfer to be possible. If the signal is only barely stronger than noise, you may encounter occasional connection drop-offs. The heat-maps only show the SNR information based on the detected noise where there is no wireless traffic in the network.

9.1 Basement

9.1.1 Signal Strength



9.1.2 SNR


FIRST FLOOR PLAN
COOLED STORE
COOLED STORE
BASEMENT PLAN
5 dB
25
≥ 40 dB

9.2 Ground Floor

9.2.1 Signal Strength



9.2.2 SNR


ND FLOOR PLAN
DELIVERIES
CUSTOMER AREA
BAR SERVERY
WASHUP
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
COOPER STREET
NO. 67
NO. 69
NO. 71
PRINCESS STREET
GROUND FLOOR PLAN
5 dB
25
≥ 40 dB

9.3 First Floor

9.3.1 Signal Strength

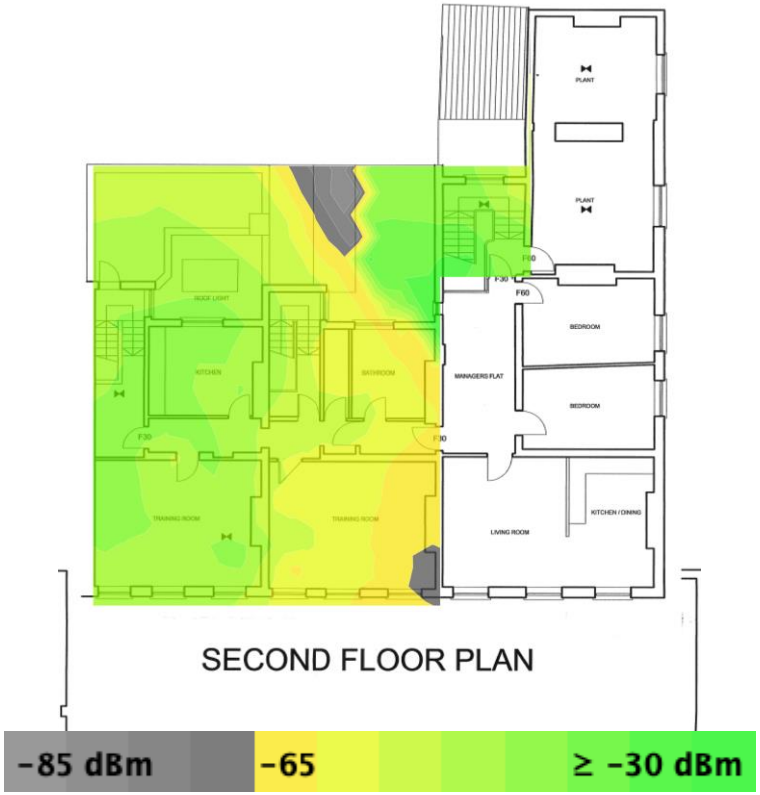


9.3.2 SNR



9.4 Second Floor

9.4.1 Signal Strength



9.4.2 SNR


PLANT
PLANT
F60
F30
F60
BEDROOM
MANAGERS FLAT
BEDROOM
KITCHEN
BATHROOM
F30
F30
TRAINING ROOM
TRAINING ROOM
LIVING ROOM
KITCHEN / DINING
SECOND FLOOR PLAN
5 dB
25
≥ 40 dB

10 Appendix 3 – 5GhZ Heat Maps (Signal Strength & SNR) EXISTING

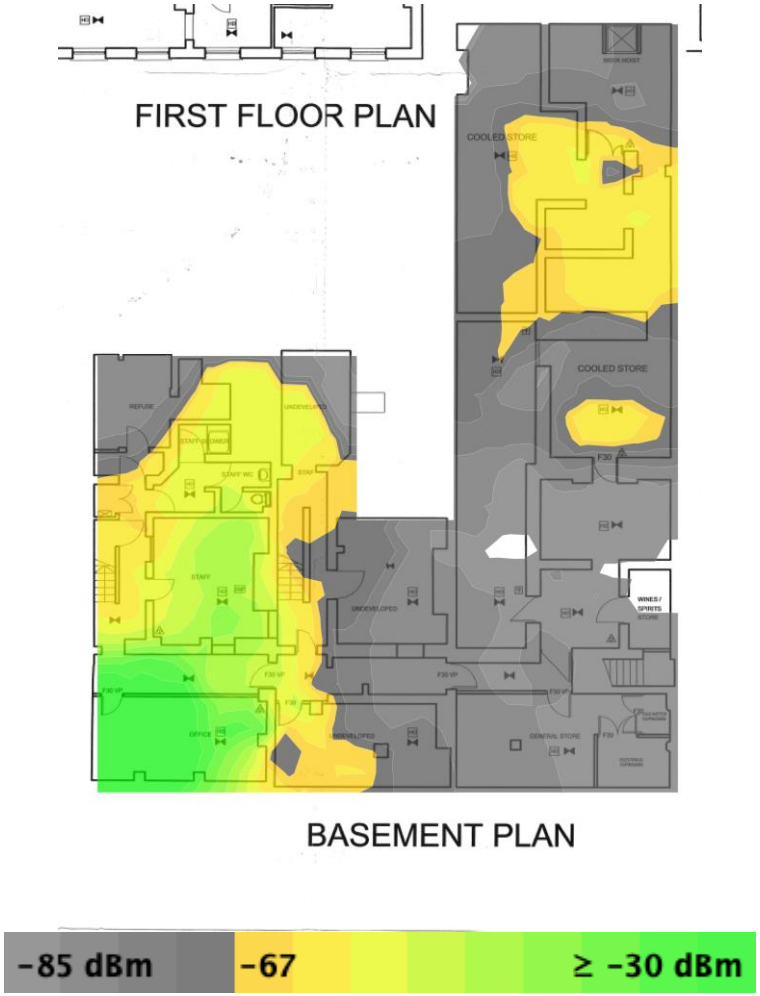
The following heat maps illustrate the Signal Strength and Signal to Noise Ratio (SNR) of the 802.11a radio seen by a measurement of:

1. Signal Strength - sometimes called coverage - is the most basic requirement for a wireless network. As a general guideline, low signal strength means unreliable connections, and low data throughput.

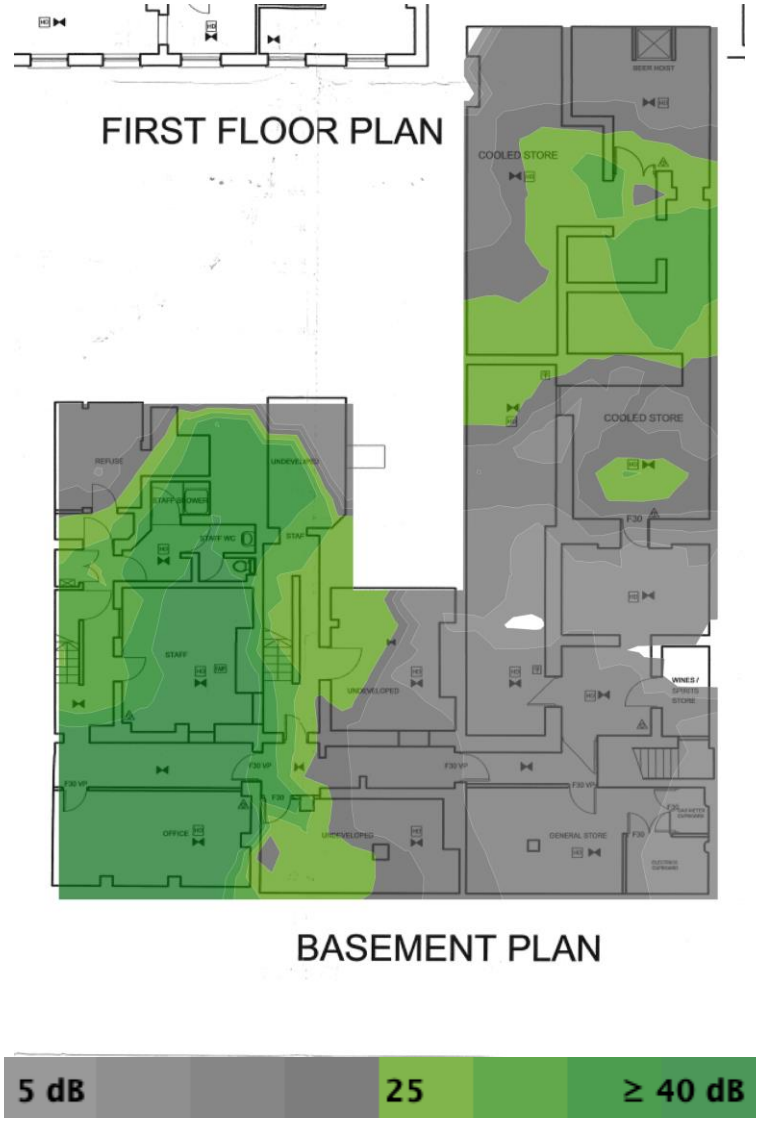
2. Signal-To-Noise Ratio indicates how much the signal strength is stronger than the noise (co-channel interference). Signal must be stronger than noise (SNR greater than zero) for data transfer to be possible. If the signal is only barely stronger than noise, you may encounter occasional connection drop-offs. The heat-maps only show the SNR information based on the detected noise where there is no wireless traffic in the network.

10.1 Basement

10.1.1 Signal Strength

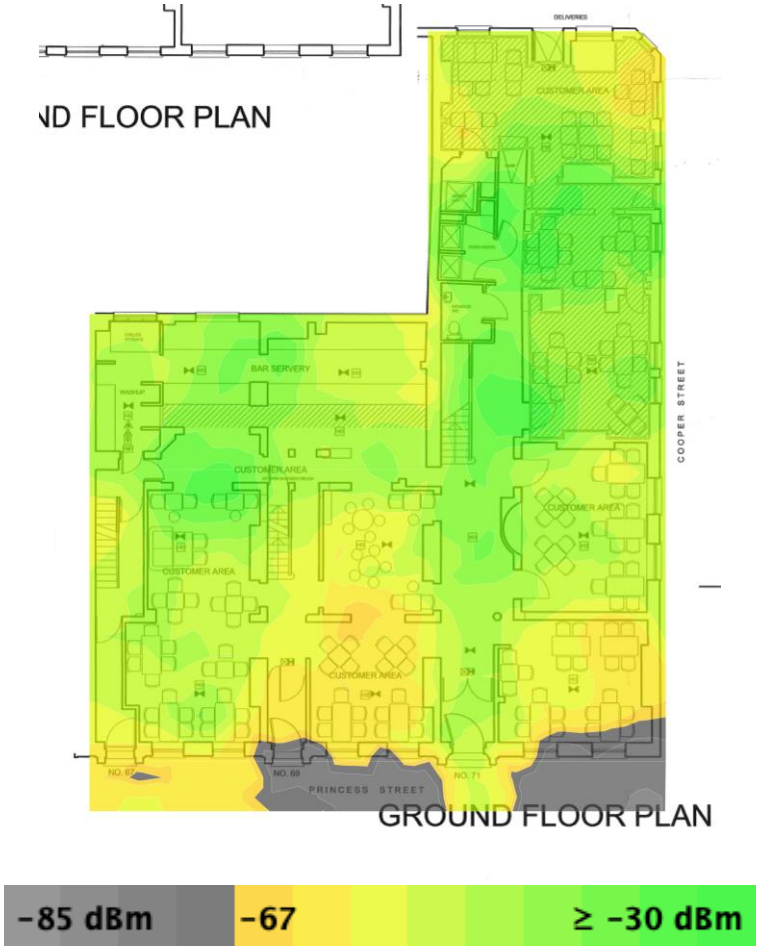


10.1.2 SNR


FIRST FLOOR PLAN
COOLED STORE
COOLED STORE
BASEMENT PLAN
5 dB
25
≥ 40 dB

10.2 Ground Floor

10.2.1 Signal Strength



10.2.2 SNR


ND FLOOR PLAN
DELIVERIES
CUSTOMER AREA
BAR SERVERY
WASHUP
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
COOPER STREET
NO. 67
NO. 69
PRINCESS STREET
NO. 71
GROUND FLOOR PLAN
5 dB
25
≥ 40 dB

10.3 First Floor

10.3.1 Signal Strength



10.3.2 SNR


PLANT
PLANT
F60
F30
F30 VP
F60 VP
MALE
FEMALE W.C.
FIRST FLOOR PLAN
5 dB
25
≥ 40 dB

10.4 Second Floor

10.4.1 Signal Strength



10.4.2 SNR


PLANT
PLANT
F60
F30
F60
BEDROOM
BEDROOM
MANAGERS FLAT
KITCHEN
BATHROOM
F30
F30
TRAINING ROOM
TRAINING ROOM
LIVING ROOM
KITCHEN / DINING
SECOND FLOOR PLAN
5 dB
25
≥ 40 dB

11 Appendix 4 – 2.4GhZ Heat Maps (Signal Strength & SNR) PROPOSED

The following heat maps illustrate the Signal Strength and Signal to Noise Ratio (SNR) of the 802.11a radio seen by a measurement of:

1. Signal Strength - sometimes called coverage - is the most basic requirement for a wireless network. As a general guideline, low signal strength means unreliable connections, and low data throughput.

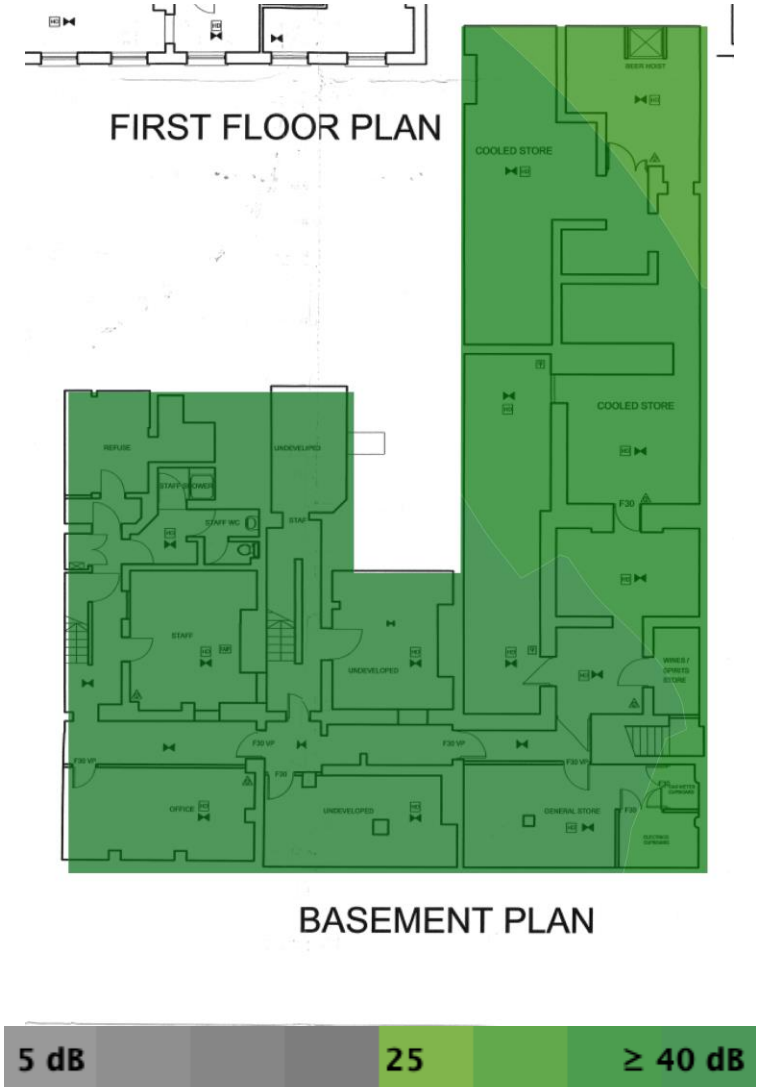
2. Signal-To-Noise Ratio indicates how much the signal strength is stronger than the noise (co-channel interference). Signal must be stronger than noise (SNR greater than zero) for data transfer to be possible. If the signal is only barely stronger than noise, you may encounter occasional connection drop-offs. The heat-maps only show the SNR information based on the detected noise where there is no wireless traffic in the network.

11.1 Basement

11.1.1 Signal Strength

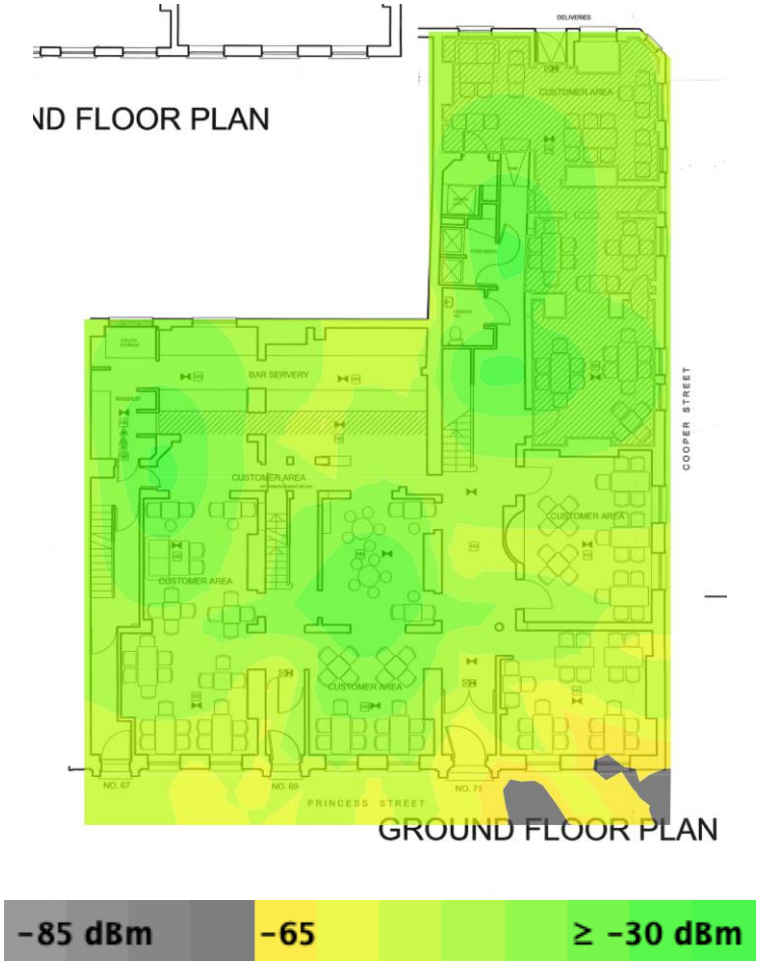


11.1.2 SNR

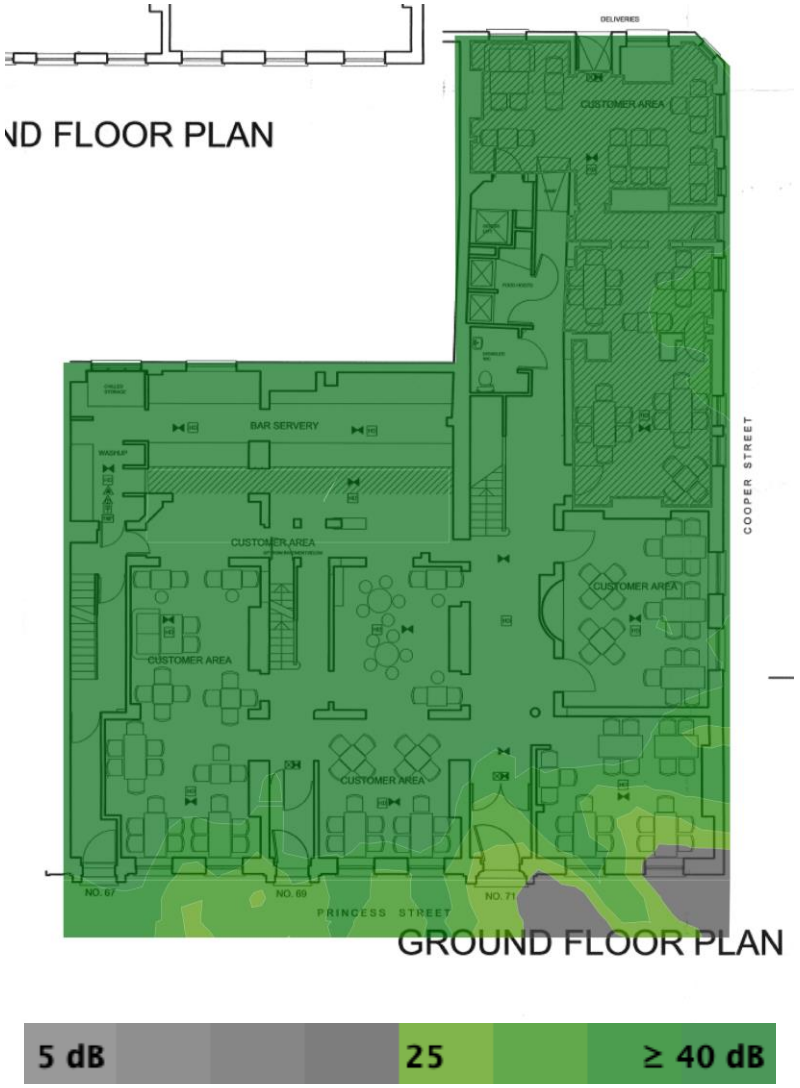

FIRST FLOOR PLAN
COOLED STORE
COOLED STORE
BASEMENT PLAN
5 dB
25
≥ 40 dB

11.2 Ground Floor

11.2.1 Signal Strength

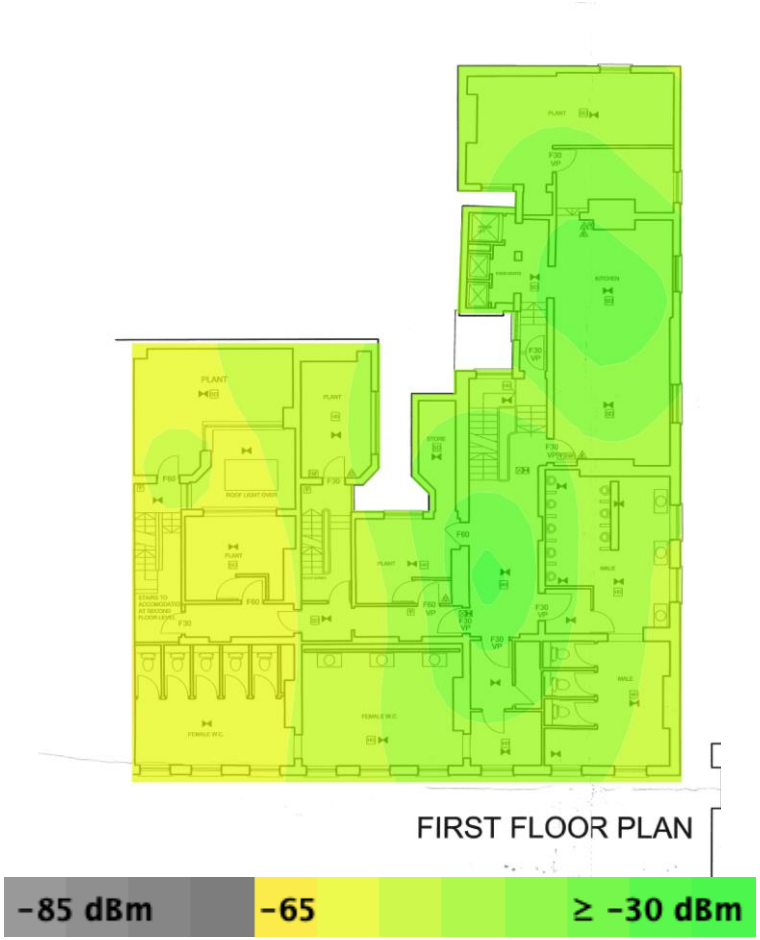


11.2.2 SNR

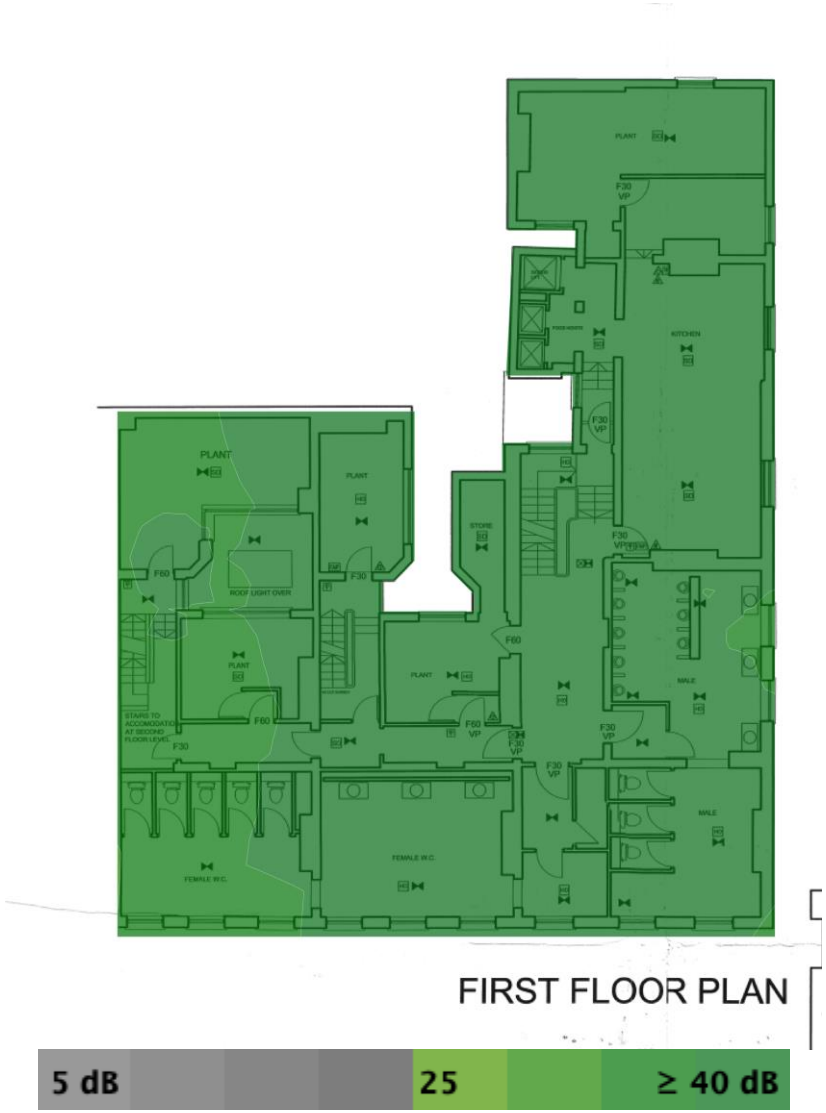

ND FLOOR PLAN
DELIVERIES
CUSTOMER AREA
BAR SERVERY
WASHUP
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
COOPER STREET
NO. 67
NO. 69
NO. 71
PRINCESS STREET
GROUND FLOOR PLAN
5 dB
25
≥ 40 dB

11.3 First Floor

11.3.1 Signal Strength

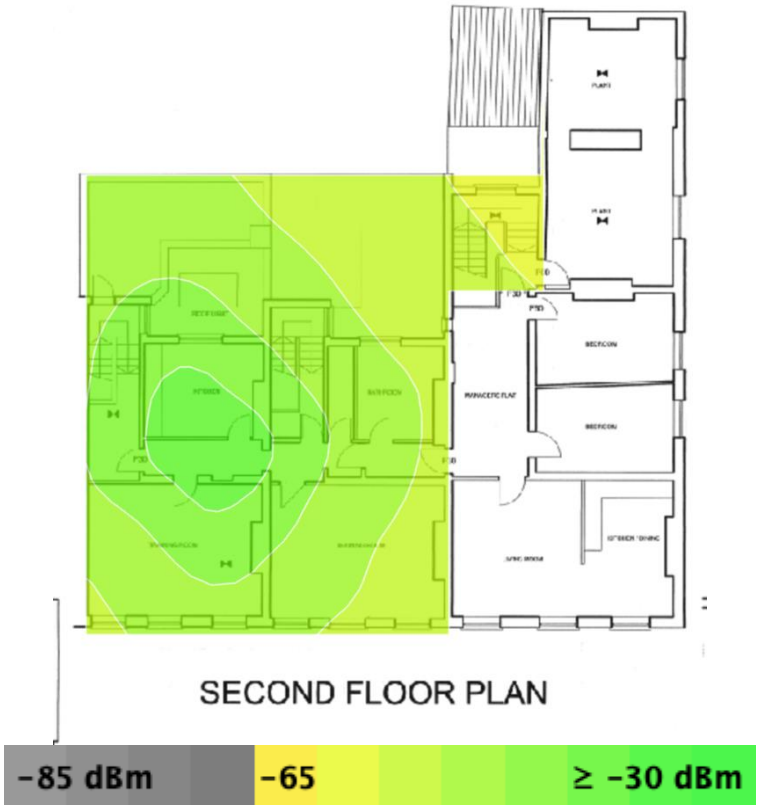


11.3.2 SNR

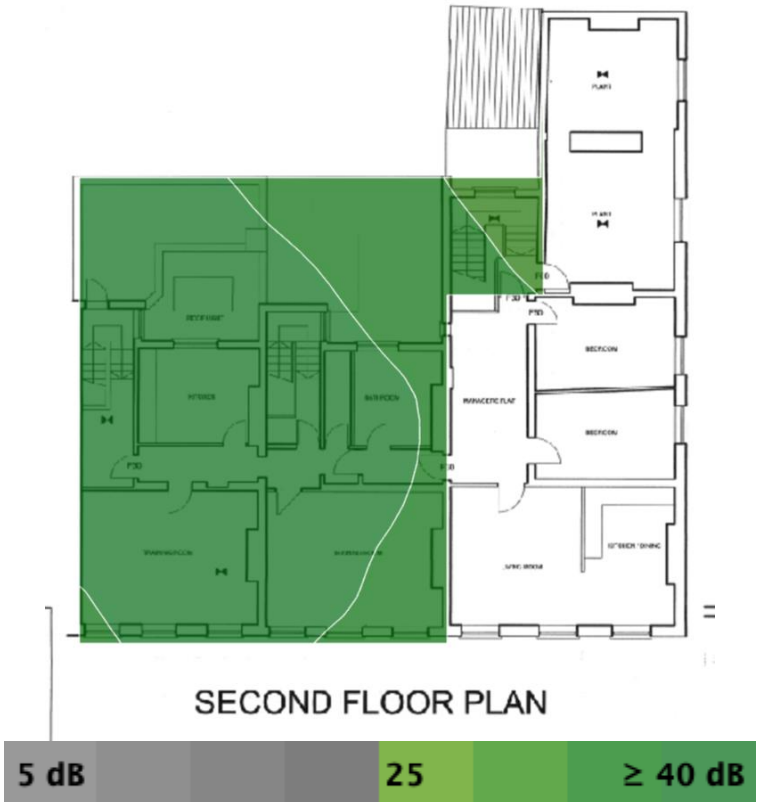

PLANT
PLANT
STORE
KITCHEN
MALE
MALE
FEMALE W.C.
FEMALE W.C.
F60
F30
F30 VP
F60 VP
FIRST FLOOR PLAN
5 dB
25
≥ 40 dB

11.4 Second Floor

11.4.1 Signal Strength



11.4.2 SNR



12 Appendix 5 – 5GhZ Heat Maps (Signal Strength & SNR) PROPOSED

The following heat maps illustrate the Signal Strength and Signal to Noise Ratio (SNR) of the 802.11a radio seen by a measurement of:

1. Signal Strength - sometimes called coverage - is the most basic requirement for a wireless network. As a general guideline, low signal strength means unreliable connections, and low data throughput.

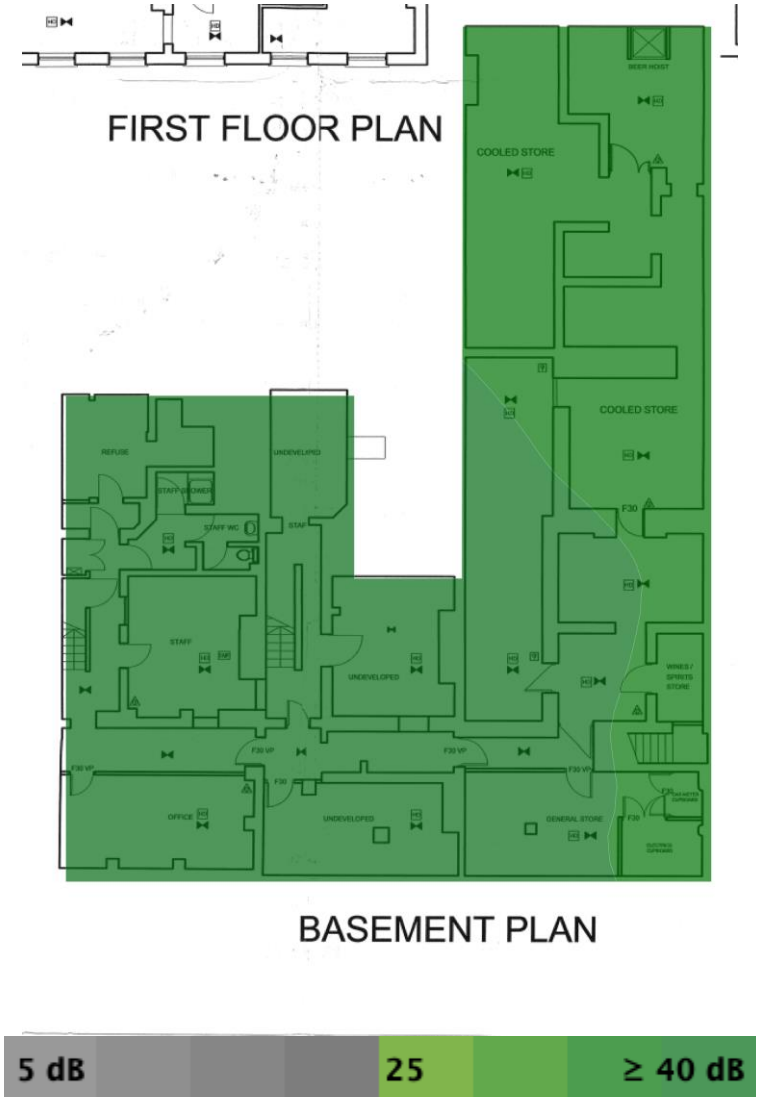
2. Signal-To-Noise Ratio indicates how much the signal strength is stronger than the noise (co-channel interference). Signal must be stronger than noise (SNR greater than zero) for data transfer to be possible. If the signal is only barely stronger than noise, you may encounter occasional connection drop-offs. The heat-maps only show the SNR information based on the detected noise where there is no wireless traffic in the network.

12.1 Basement

12.1.1 Signal Strength

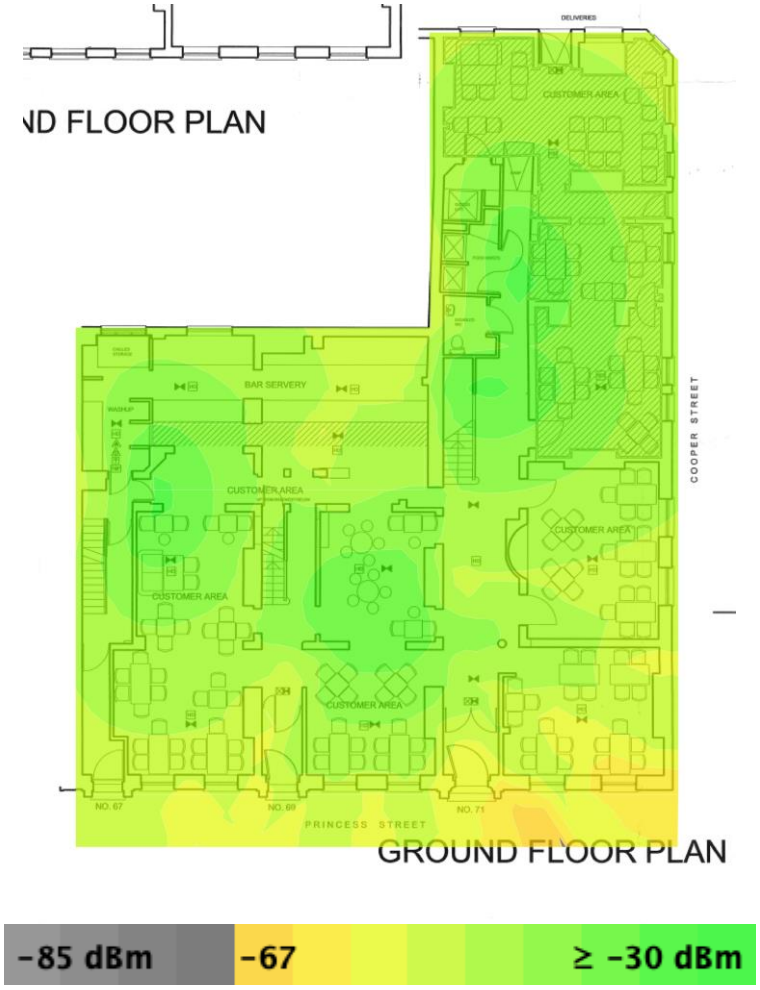


12.1.2 SNR

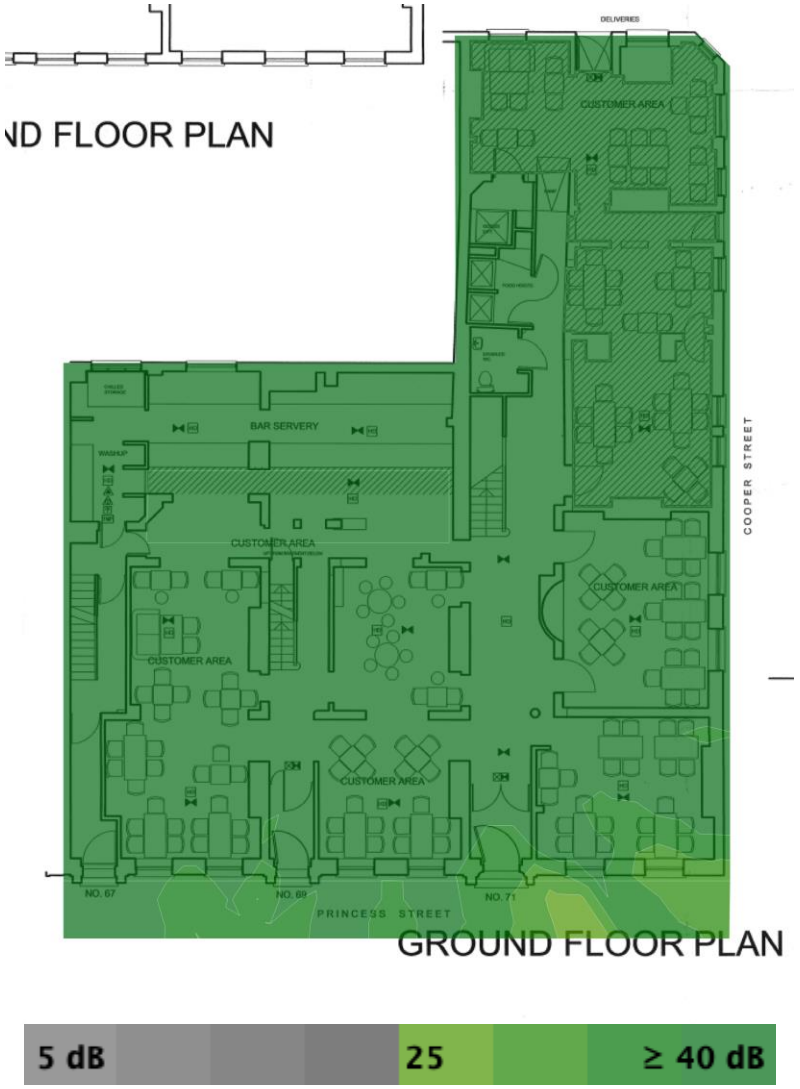

FIRST FLOOR PLAN
COOLED STORE
COOLED STORE
BEER HOIST
REFUSE
UNDEVELOPED
STAFF WC
STAFF
UNDEVELOPED
F30
WINES / SPIRITS STORE
OFFICE
UNDEVELOPED
GENERAL STORE
BASEMENT PLAN
5 dB
25
≥ 40 dB

12.2 Ground Floor

12.2.1 Signal Strength

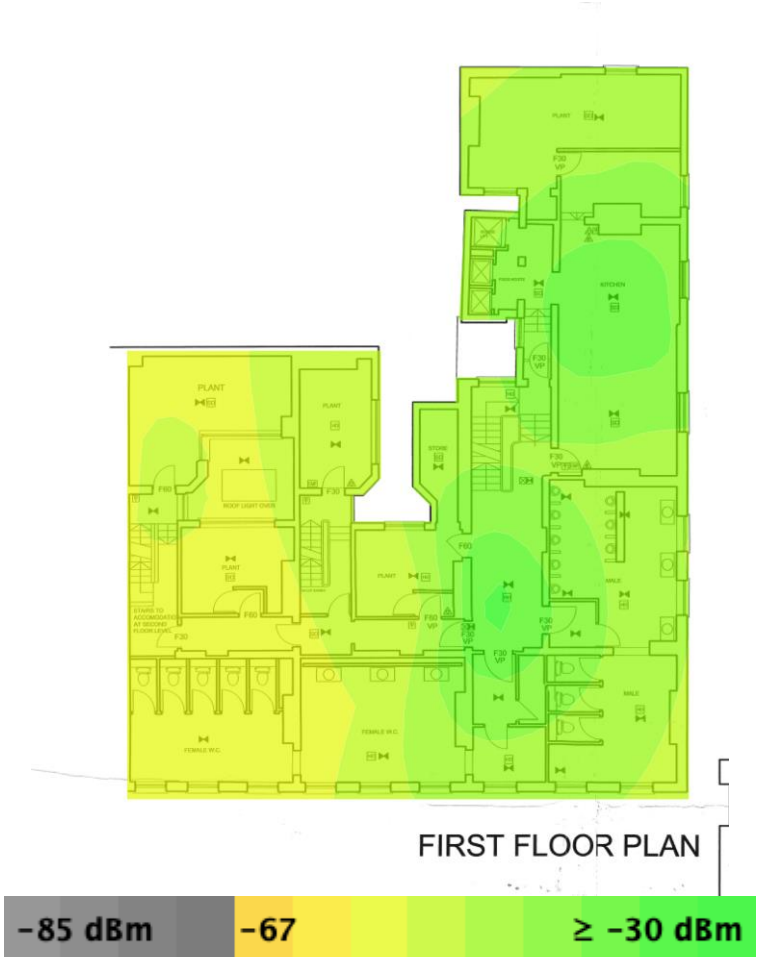


12.2.2 SNR

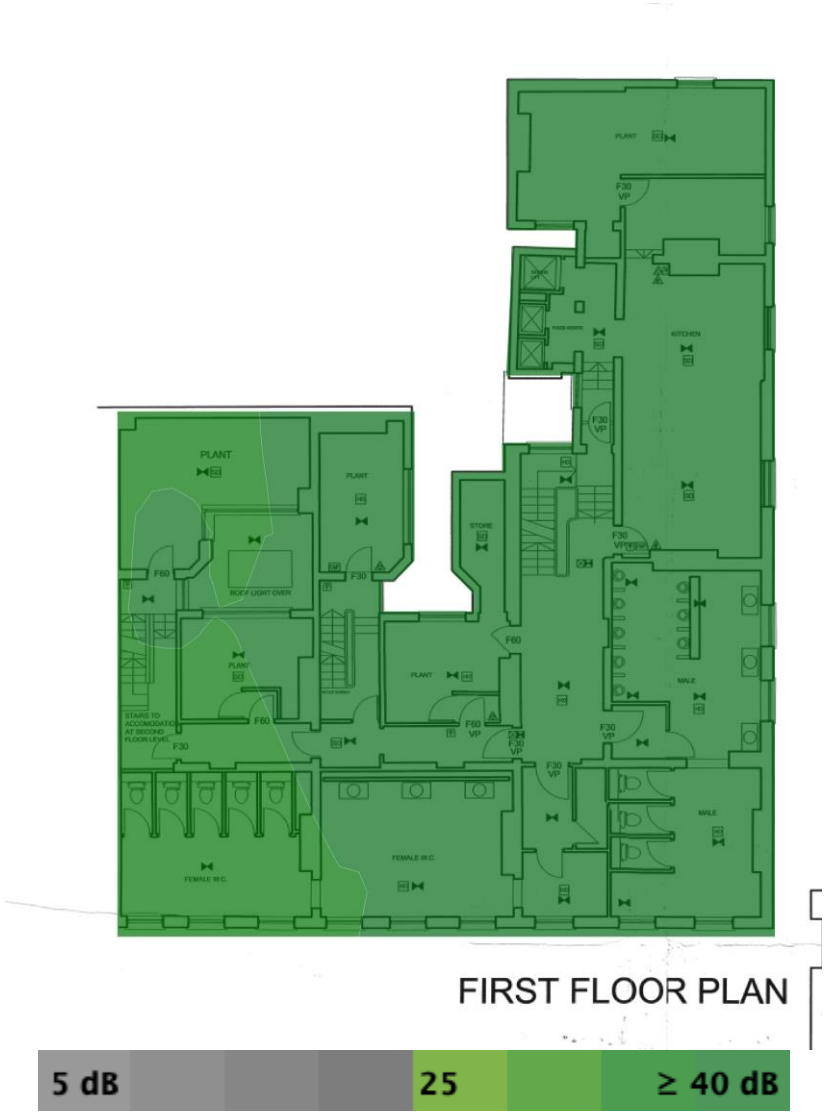

ND FLOOR PLAN
DELIVERIES
CUSTOMER AREA
BAR SERVERY
WASHUP
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
CUSTOMER AREA
COOPER STREET
NO. 67
NO. 69
PRINCESS STREET
NO. 71
GROUND FLOOR PLAN
5 dB
25
≥ 40 dB

12.3 First Floor

12.3.1 Signal Strength



12.3.2 SNR

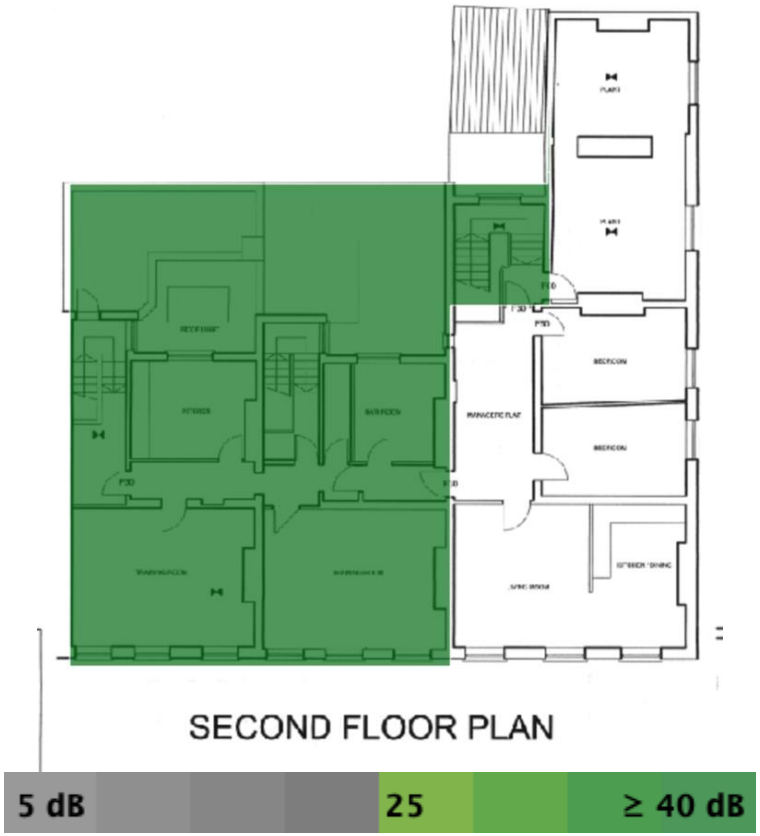

PLANT
PLANT
PLANT
PLANT
PLANT
STORE
KITCHEN
MALE
MALE
FEMALE W.C.
FEMALE W.C.
F60
F30
F60 VP
F30 VP
FIRST FLOOR PLAN
5 dB
25
≥ 40 dB

12.4 Second Floor

12.4.1 Signal Strength



12.4.2 SNR



13 Cabinets Cabling & Connections

This section details the existing cabinet locations and available switch ports.

13.1 Existing cabinet: BM MDF 01

13.1.1 Environment

Cabinet Environmental Details	
Floor (Where is cabinet located)	Basement
Room (Specify room number /Name)	Managers Office
Is the cabinet wall mounted or floor standing	Wall Mounted
Rack / Cabinet ID (if more than one)	BMMDF01
The size and depth of the cabinet / rack	15U 450mm Deep
Port Usage of Current Wi-Fi Switch	5
Power supply within room but separate from the cabinet	Yes, PDU in the cab is full, spare power in dado trunking under the cab
U required for new SDWAN equipment	3-4U
Is a new cabinet required, if so add size details.	No

13.1.2 Devices Details

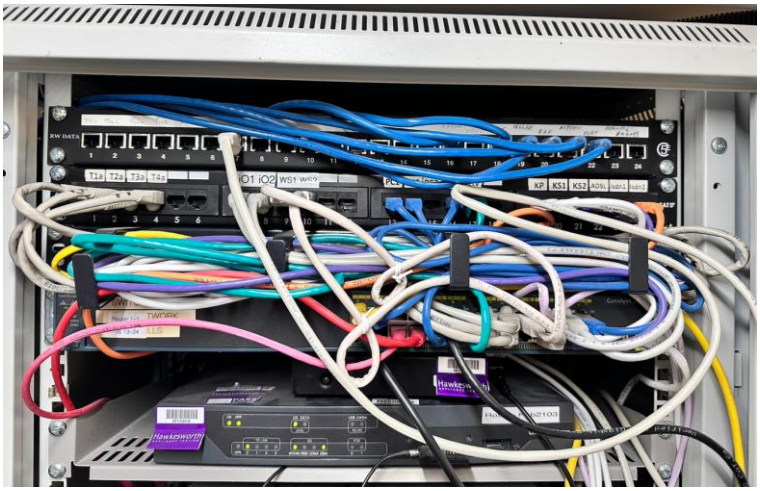
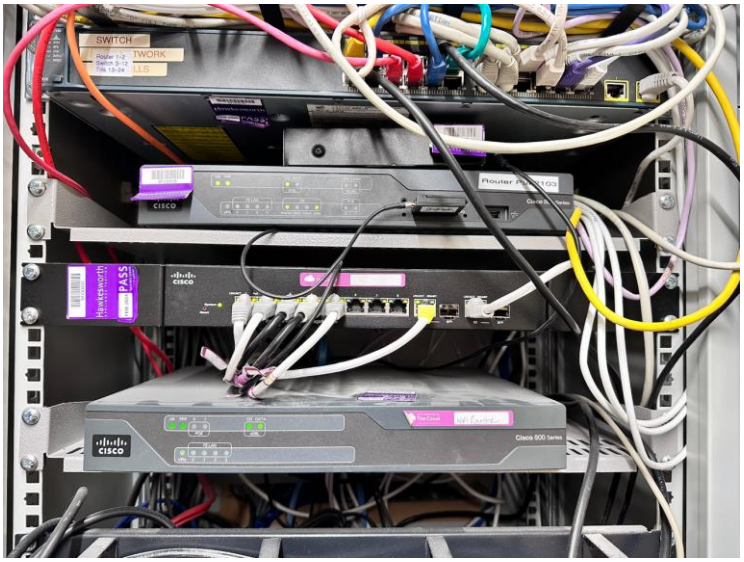
Device Type	Hardware Details		Ports				Comment
Switch	Manufacturer	Model	Total	Used	Free	Lit	
Switch	Cisco	2960 24 Port	24	19	5	15	JDW
Switch	Cisco	302-08MPP	8	5	3	5	SKY
Router	Cisco	877+3G	4	1	3	1	JDW
Router	Cisco	877	4	1	3	1	SKY
							-

13.1.3 Cabinet Physical Layout

Slot	Device	Comment
15	24 Port Patch Panel	Cat5e
14	24 Port Patch Panel	Cat5e
13	Cable Management	
12	Switch	Cisco 2960 24 Port JDW
11	Zonal Z500	
10	Router on Shelf	Cisco 877+3G
9	Empty	
8	Switch	Cisco 302-08MPP SKY
7	Empty	
6	Router on shelf	Cisco 877 SKY
5	Empty	
4	Cable Management	
3	PDU	6 Way UK Plug PDU full
2	Empty	
1	Empty	

13.1.4 Cabinet Photograph

Full Cabinet


Top, middle and bottom
  

Power within cabinet


Cabinet location


Power (external of the cabinet)


13.1.5 New Circuit DP/ONT Location

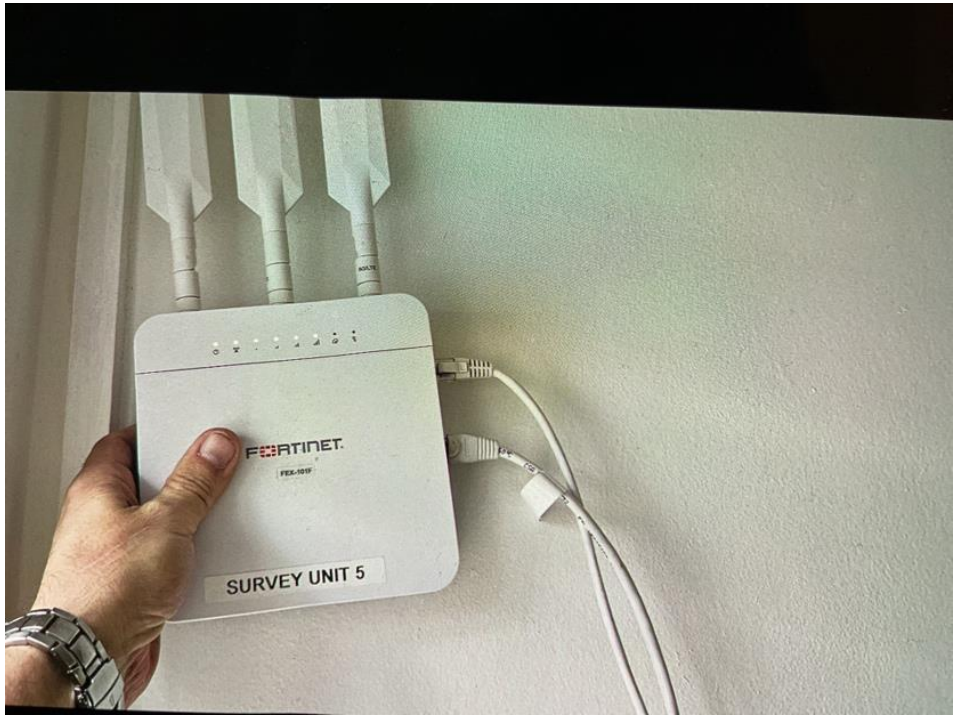
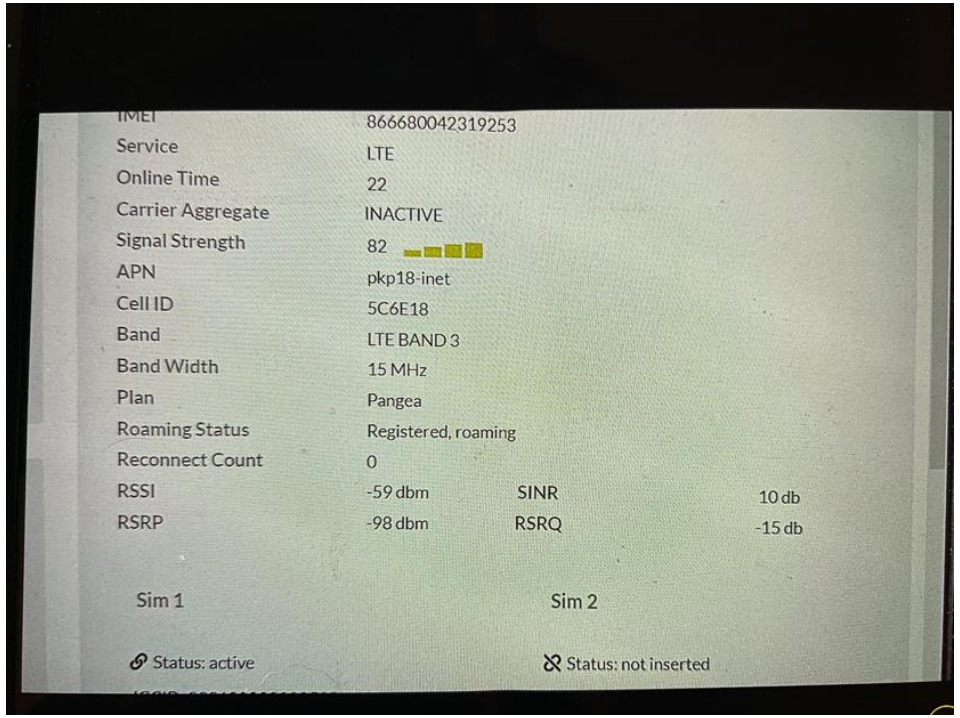
INCOMING TELECOM SERVICES POINT IMAGE	NEW CIRCUIT POINT LOCATION IMAGE
	

13.1.6 NEW Circuit DP/ONT location details

NEW Circuit DP/ONT location	
Type of new Circuit (SOGEA/FTTP)	FTTP with ADSL
Incoming Telecom Services Point	ADSL will be delivered with all existing BT copper services to the left of the cab, FTTP appears to be presented 3 buildings down on the side of another, connected building on the same road, the cable to the office is potentially, the cable will need to be run round to the side where the office is and down to the basement level, potentially 120+m.
Mark and record new circuit location	Position to install in the office have been marked, but please prepare for potential issues with the FTTP route
Is Additional Cable Route required to connect new circuit to Existing comms Cab (YES/NO)	Yes, potentially. 
Details on additional Cable route	Above picture shows the route to the building corner, the route to the office from this point will potentially follow the existing copper route
Power available for new Circuit if Required	Yes

14 4G Signal Strength Test Results

14.1 Second Floor Training Room

LOCATION IMAGES	RESULTS
	

15 Recommendations Empowered

15.1 Bill of Materials

Picture	Description	Quantity
	24 Port Cat6 Patch Panel	1

15.2 Statement of Works

- Works can occur during opening hours with care taken to limit impact to guests.
- AP IMACs to be undertaken as soon as first and second fix cabling for a specific device is completed, replacements and moves can be undertaken during the above working windows.
- Patch all new Aps and go live across the site.
- Kit is to be removed from site and dropped off at designated locations which JDW are going to confirm.
- Complete patching schedule and completion documentation, including serial numbers of all equipment to return to Sky.

16 Recommended Bill of Materials SDWAN

Picture	Part Number	Description	Quantity
	FAP-231-F	2x2 Indoor tri-radio 11ax AP	8
	FAP-400-MNT	FAP-Ceiling and Wall mount kit.	8
	FAP-234-F	2x2 Ruggedized indoor/outdoor tri-radio 11ax AP	0
		6U Wall mounted data Cabinet. 390mm Deep	0
		12 Way 1U PDU	1

16.1 Bill of Materials - Cabling

Picture	Part Number	Description	Quantity
		Cat6 Internal Cable Box 305m	3
		Cat6 External Cable Box 305m	0
		Euro Module	18
		Single backbox	9
		Single face plate	9
		Patch lead (0.3m)	18
		Patch lead (1m)	2
		Patch lead (2m)	0
		Patch lead (3m)	0
		Patch lead (5m)	0
		External Patch lead	0
		IP65 Enclosure	0
		24 Port Cat6 Patch Panel	1
		UPVC Trunking 25mmx16mm BROWN per m	50
		Rigid Black Conduit (Contractor Pack)	0