pioneersolutions
PROACTIVE IT SUPPORT & MANAGED SERVICES

Wireless LAN RF Onsite
Survey Report
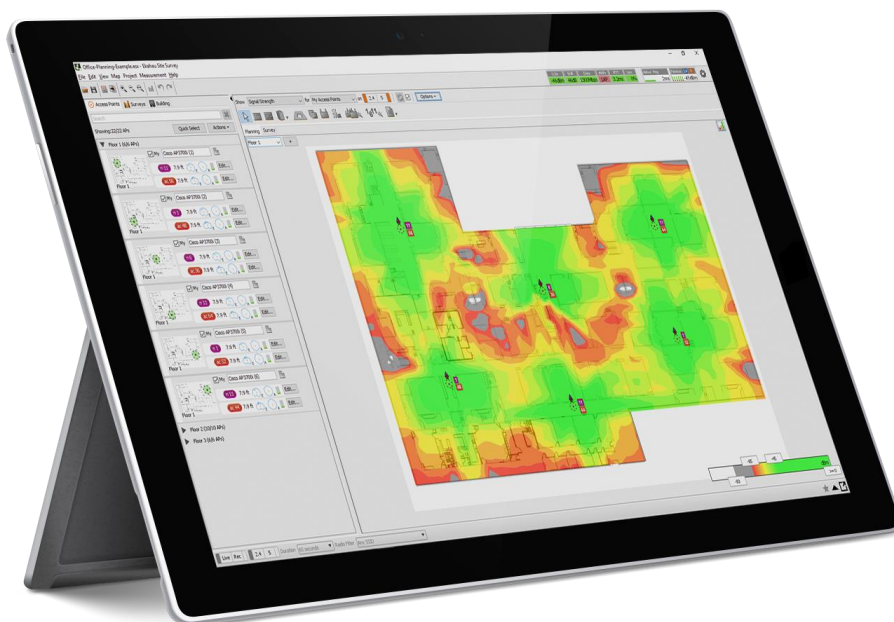
Customer 1

Sample Report

End Client Details

Site Address	Customer 1		
Department	N/A	Email	
Prime Contact	Mr White	Pager Number	+44 (0)
Direct Number	+44 (0)	Fax Number	+44 (0)
Mobile Number	+44 (0)		

Pioneer Solutions Contact Details

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Version History

VER. NO.	VER. DATE	REVISED BY	DESCRIPTION	FILENAME
1.0				

Contents

1.   Introduction

This report presents the results from the Wireless LAN RF Assessment activities carried out for Customer 1, Harlow. The report contains detailed information on the RF characteristics of the proposed Cisco Meraki WLAN solution.

1.1.   Objectives

Customer 1 currently have limited WiFi coverage provided by Belkin and D-Link AP's. A single Meraki AP is also currently installed in the canteen within Building 2 and it is proposed that additional AP's will be added to this Meraki dashboard configuration. The current LAN infrastructure mainly consists of Netgear switches however for completeness Pioneer Solutions have recommended Meraki 8-Port POE switches to enable the provision of a single cloud managed wireless infrastructure.

Please note that RF coverage for AP13 has been estimated as the survey team were unable to gain access to the 1st floor office in 3C. Detailed floor plans of the Soda lime Store Area were not available at the time of survey. A high level site map was used as a substitute and therefore images projected on the plan are of low resolution.

1.2.   Requirements

The required standard is to provide coverage for Data transmission with support for voice for future use.

After consulting with Mr White, the onsite IT Manager, it was agreed that all internal areas were to be surveyed with external coverage limited to loading bay areas. Supported devices to include laptops, tablets and smartphones.

1.3.   Scope

The assessment work was carried out on 9th November 2016. The minimum acceptable signal level of -67dBm was used to provide suitable coverage for data with a Signal to Noise Ratio (SNR) of 20dB or greater.

1.4. Constraints

Due to the propagation characteristics of this radio frequency, transmission performance can be affected by a number of different factors present within the intended environment. Amongst other features, these may typically include the addition, removal or significant movement of:

- Walls and partitions, including a change of material or addition or removal of wall covering
- Adjustment of ceiling height, through false ceilings
- Change of floor material (addition/removal of carpets, wood etc.)
- Changes to lighting systems (especially the introduction of dimmable fluorescent lights)
- Furniture (especially any metal objects – cupboards etc. – close to antennas)
- Individual large plants or large numbers of small plants, both artificial and/or real
- Any object over 1.4M high, especially in close proximity to the wireless antenna
- Other Wireless LAN systems or ISM based wireless devices
- People (in large numbers – i.e. change of over +/- 50% of occupancy during the RF Assessment)

A broad selection of other indirectly linked factors may influence the radio propagation characteristics of the operating environment and the effectiveness of any Wireless LAN coverage over time. The only way to determine if a specific factor, or combination of factors, has influenced the operation of a particular Wireless LAN system is to carry out a repeat RF Assessment in the location concerned. Any repeat RF Assessment should be made with reference to the original RF Assessment "coverage maps" to determine if any significant changes have occurred.

2.   Test Equipment and Method

2.1.   Test Equipment

The assessment was carried out using the following equipment.

- Ekahau NIC-300
- Ekahau Pro 8.6.1
- Lenovo Laptop
- Meraki MR32 Series Access Point

2.2.   Method

The purpose of the survey is to advise on the equipment and antenna positions needed to provide for the required RF wireless connectivity using the following techniques:

- A 'walk around' of the site is performed. This enables the surveyors to gain an understanding of the building's structure, and the locations that need to be covered.
- Existing coverage is identified. This enables the surveyor to identify the location and coverage of the existing Access Points.
- Once the coverage area has been ascertained, wireless Access Points are deployed temporarily to simulate actual installation positions.
- Once Access Points are deployed, the engineers performing the survey walk the area to determine the limits of coverage.
- Using this method the building can be 'mapped' by alternately moving the Access Points to 'step' across the building.

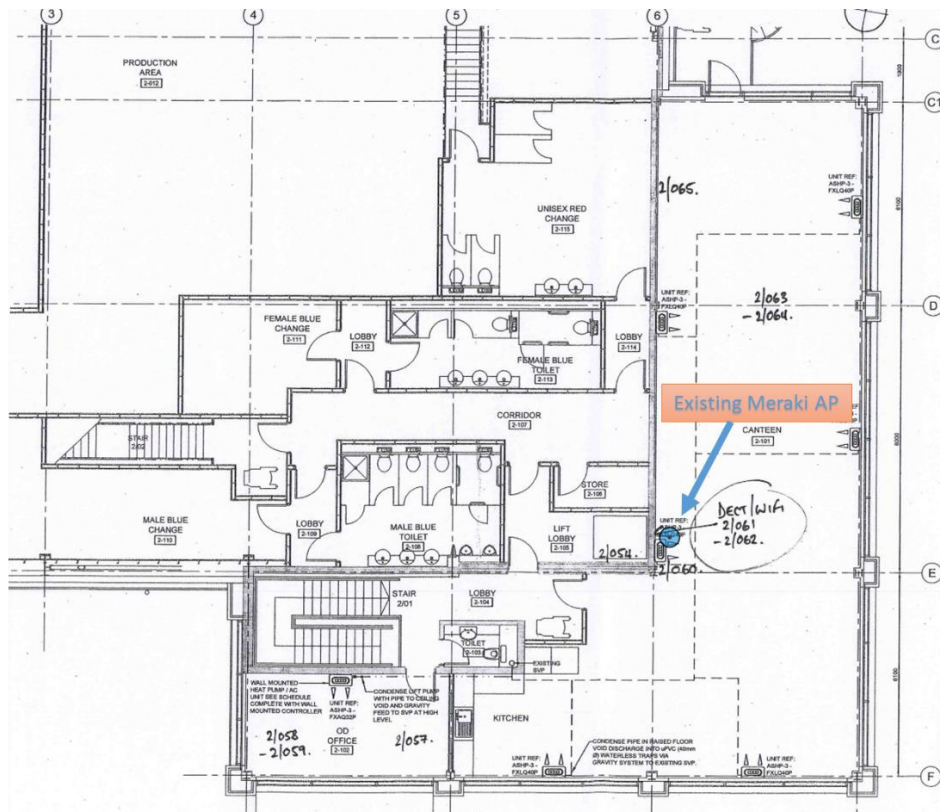# 3. AP Floorplan Locations

3.1. Building 1 – 1st Floor Offices
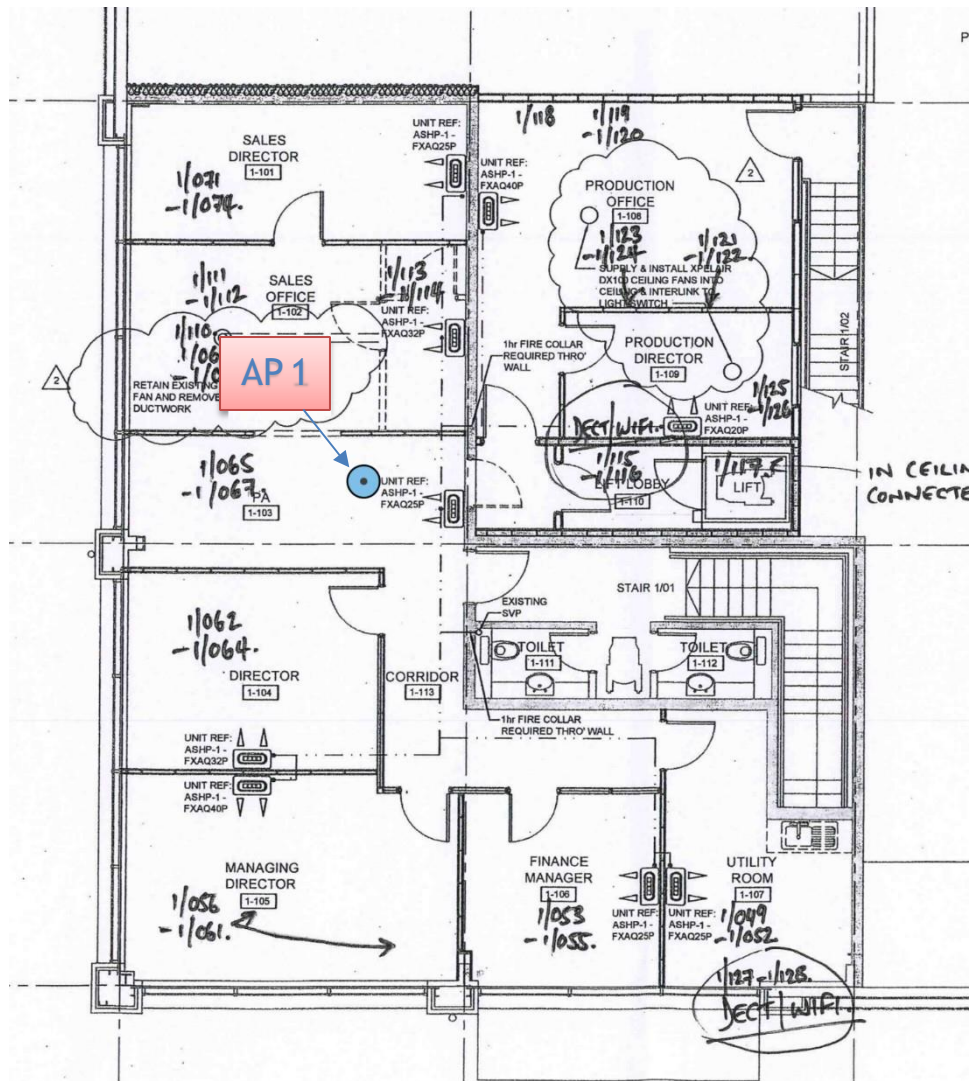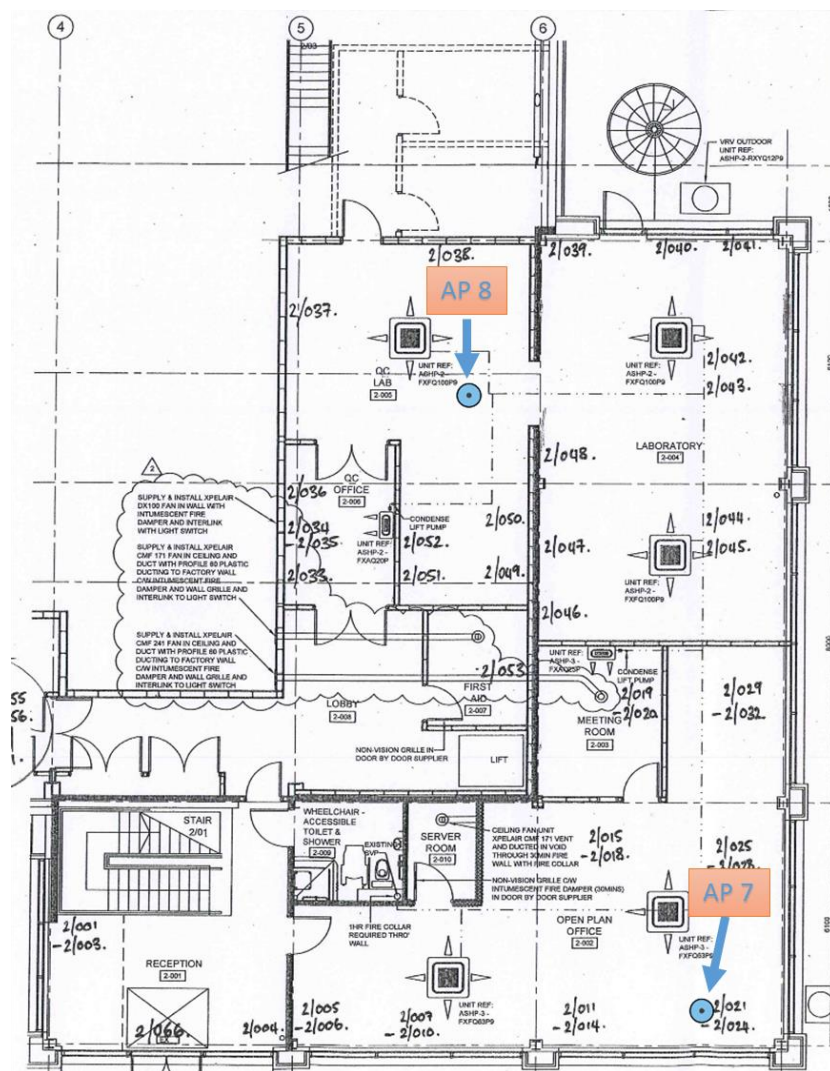
3.2. Building 1 - Ground Floor
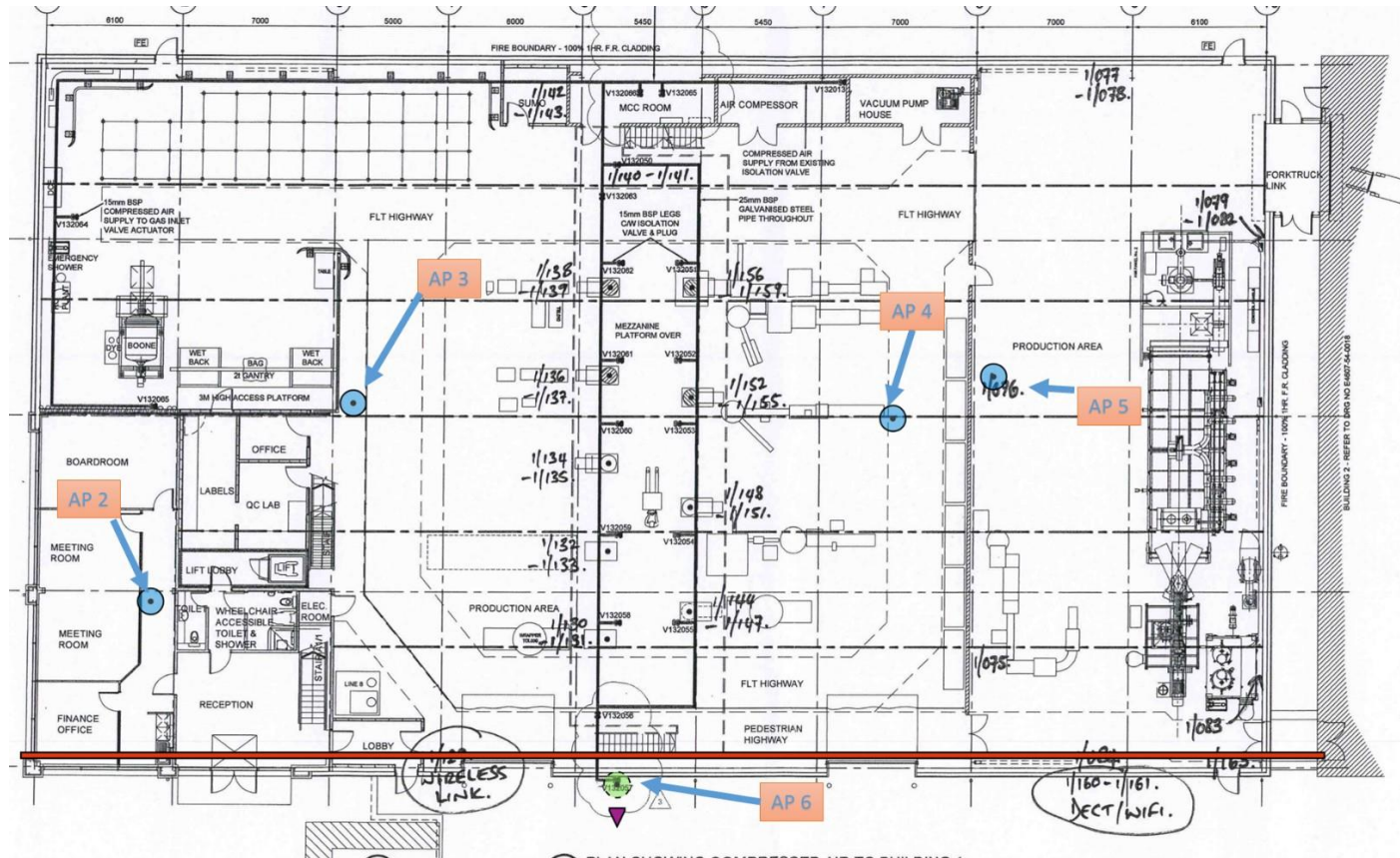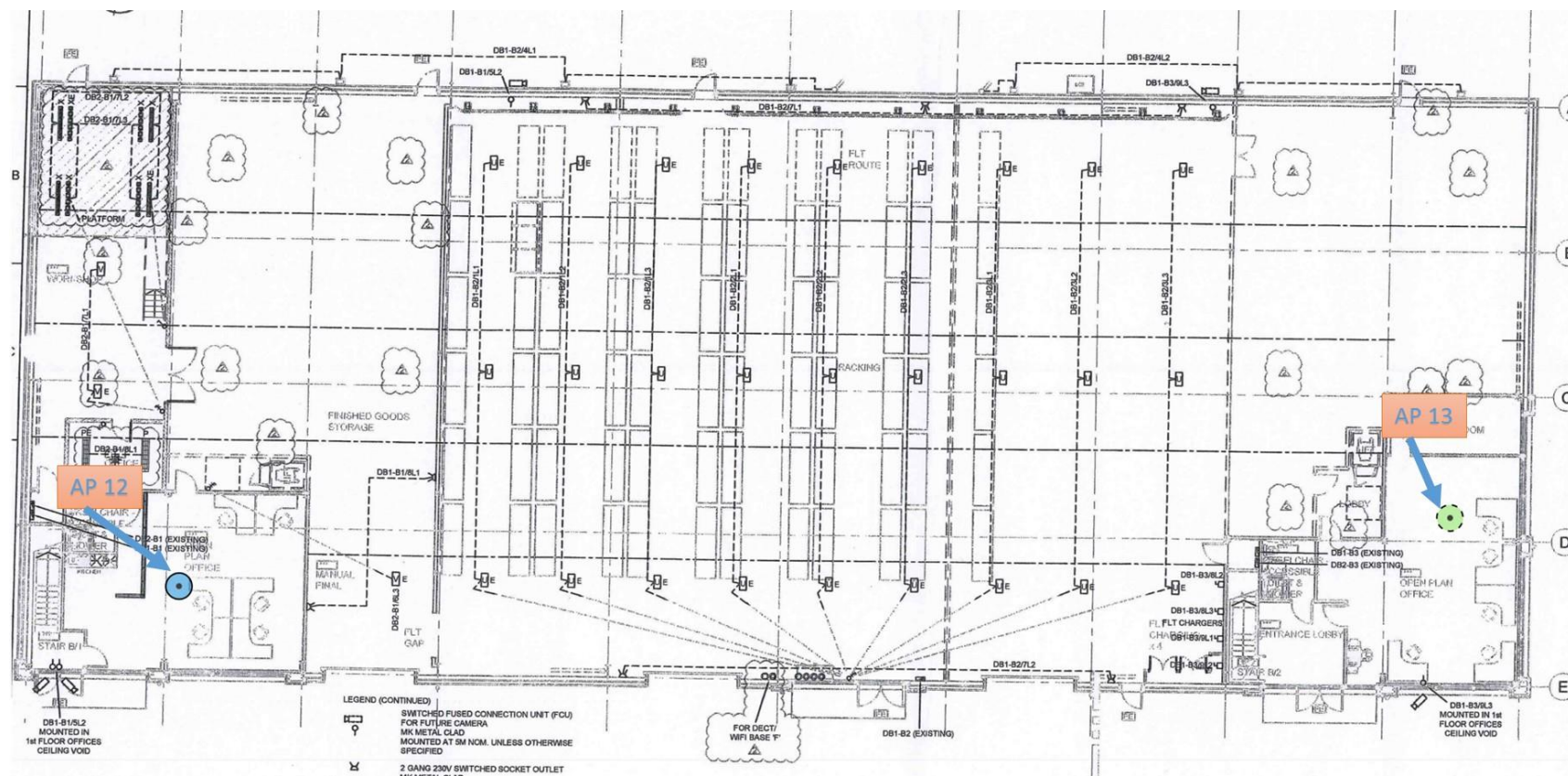
3.3. Building 2 – 1st Floor
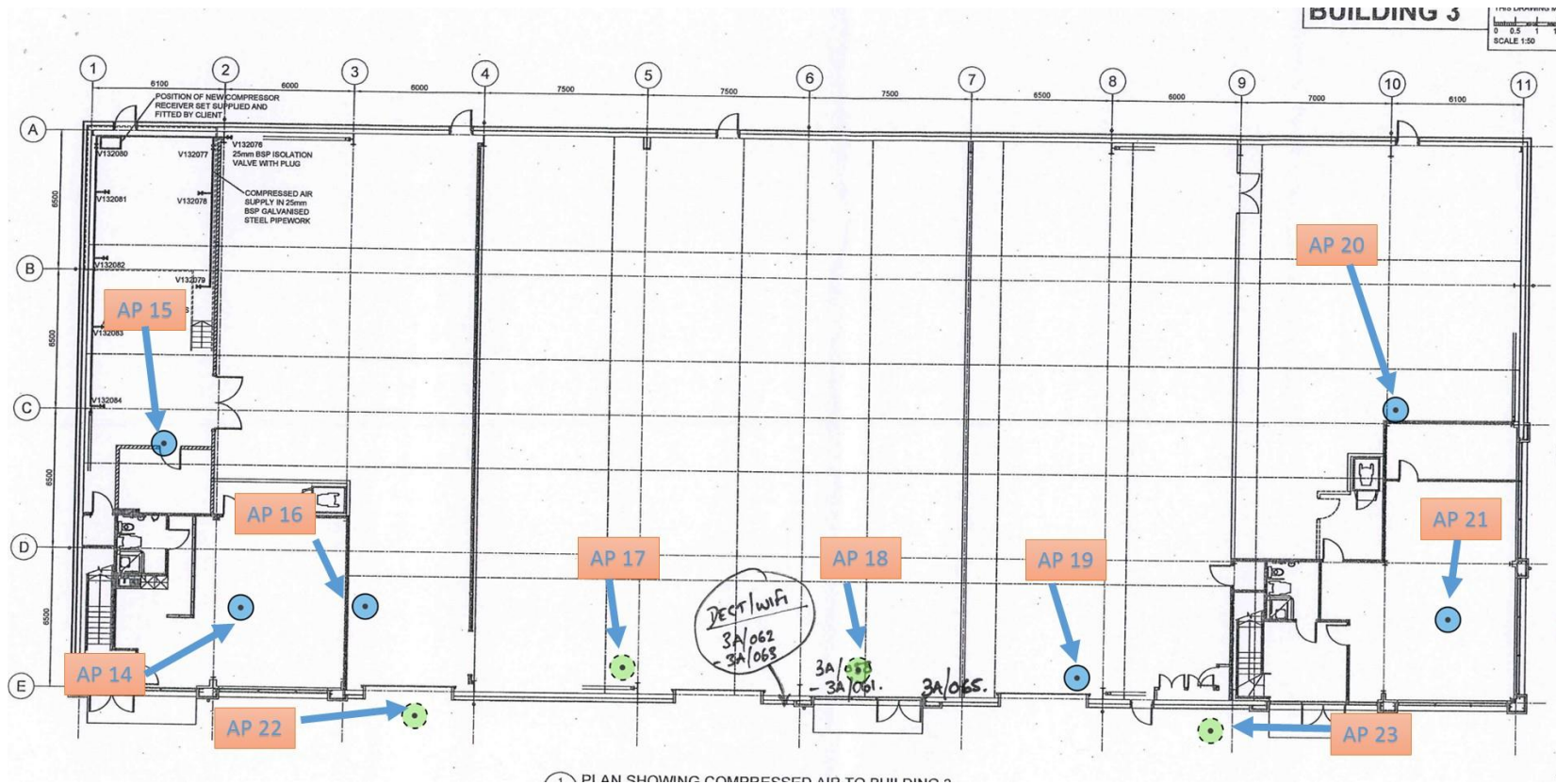
3.4.   Building 2 – Ground Floor

3.5. Building 2 – Ground Floor (Goods In / Soda Lime Store)

3.6. Building 3 – 1ˢᵗ Floor Offices

3.7. Building 3 - Ground Floor

4. AP Locations Details

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/b/g/n/ac Wireless LAN coverage.

4.1. Building 1

1ST FLOOR – AP1	
Device	MR42-HW
Antenna Type	Integrated
Device Location	Access Point to be located in 1st Floor office adjacent to receptionist, ceiling mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 1
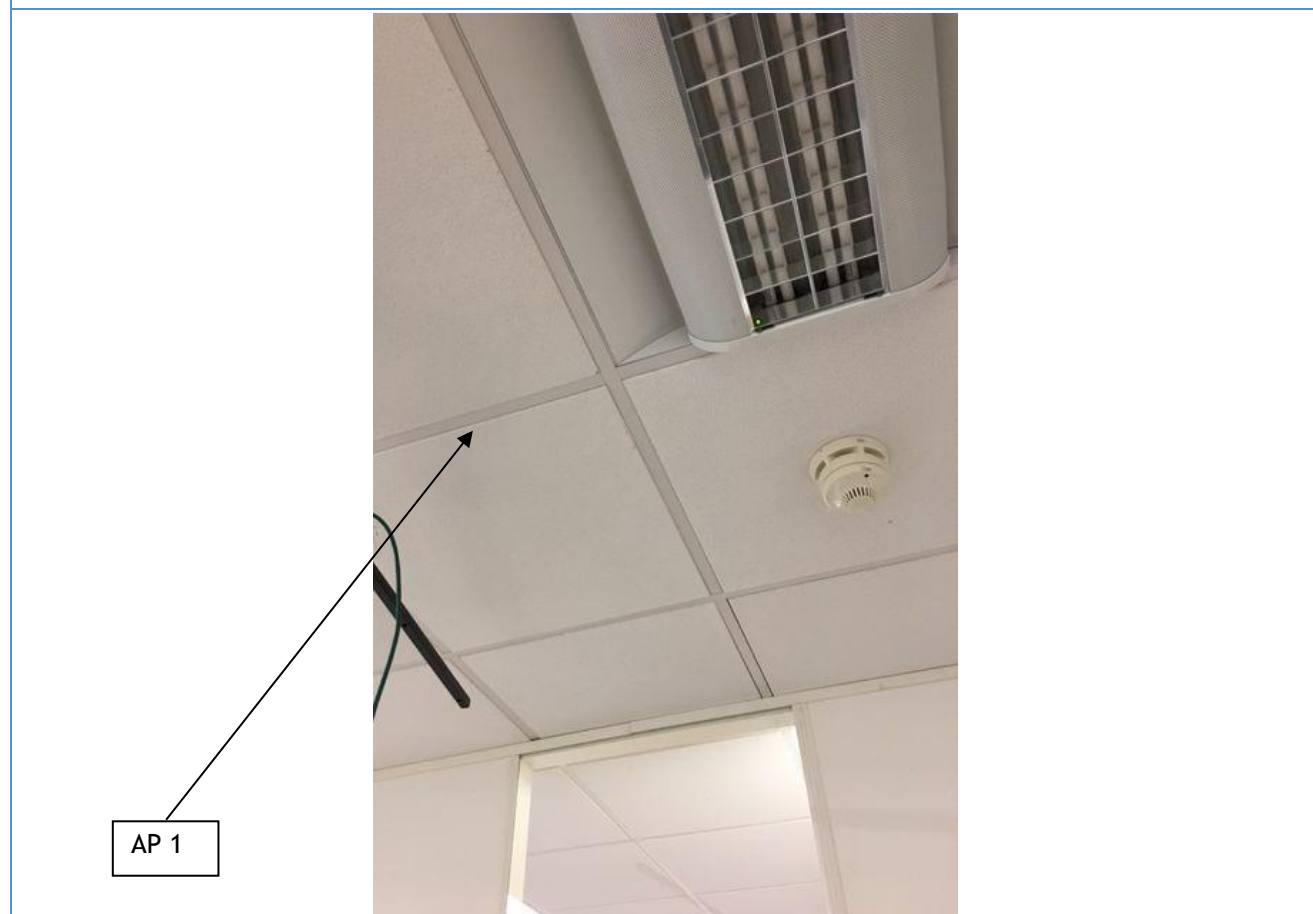
GROUND FLOOR – AP2	
Device	MR42-HW
Antenna Type	Integrated
Device Location	Access Point to be located in corridor adjacent to meeting rooms, ceiling mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 2

PRODUCTION AREA - ROOF – AP3

Device	MR66-HW
Antenna Type	2 x MA-ANT-20
Device Location	Access Point to be located on underside of cable tray above 1st floor staircase. Vertically mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

PRODUCTION AREA ROOF – AP4

Device	MR66-HW
Antenna Type	2 x MA-ANT-20
Device Location	Access Point to be located on underside of cable tray adjacent to the air conditioning units. Vertically mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 4

PRODUCTION AREA WALL – AP5	
Device	MR66-HW

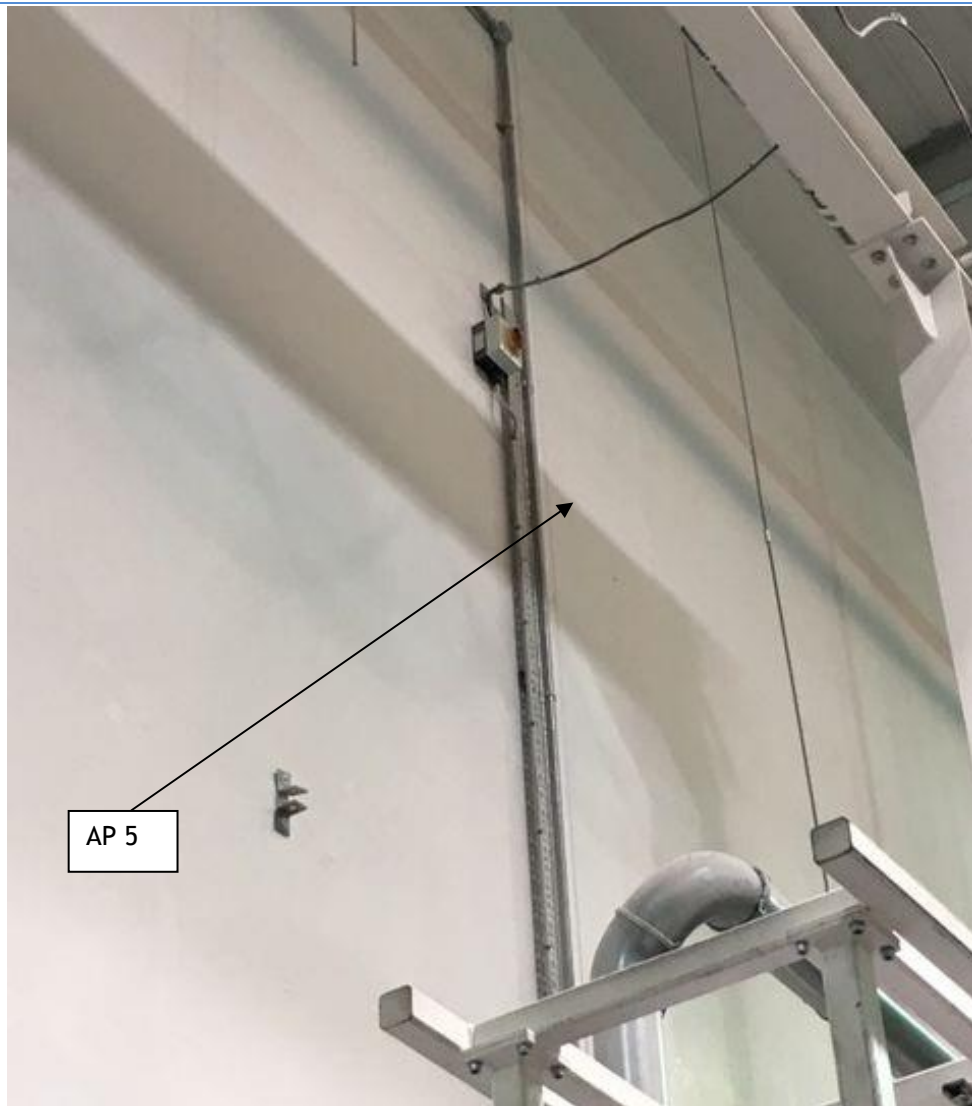| Antenna Type	2 x MA-ANT-20
Device Location	Access Point to be located on wall adjacent to the vertical cable tray. Vertically mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 5

BUILDING 1 EXTERNAL – AP6	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20

Device Location	Access Point to be located on the outside wall adjacent to Loading Bays 1 and 2. Vertically mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 6

4.2 Building 2

GROUND FLOOR OFFICE – AP7

Device	MR42-HW
Antenna Type	Integrated
Device Location	Access Point to be located in centre of office. Ceiling mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

GROUND FLOOR LAB – AP8	
Device	MR42-HW
Antenna Type	Integrated

Device Location	Access Point to be located in centre of lab. Ceiling mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 8

GROUND FLOOR SODA LIME STORE – AP9	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20

Device Location	Access Point to be located in centre of wall in the south aisle of the store. Wall mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 9

GROUND FLOOR PRODUCTION AREA – AP10	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20

Device Location	Access Point to be located in centre of wall adjacent to Soda Lime Store in the production area. Wall mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

BUILDING 2 EXTERNAL AREA – AP11	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20

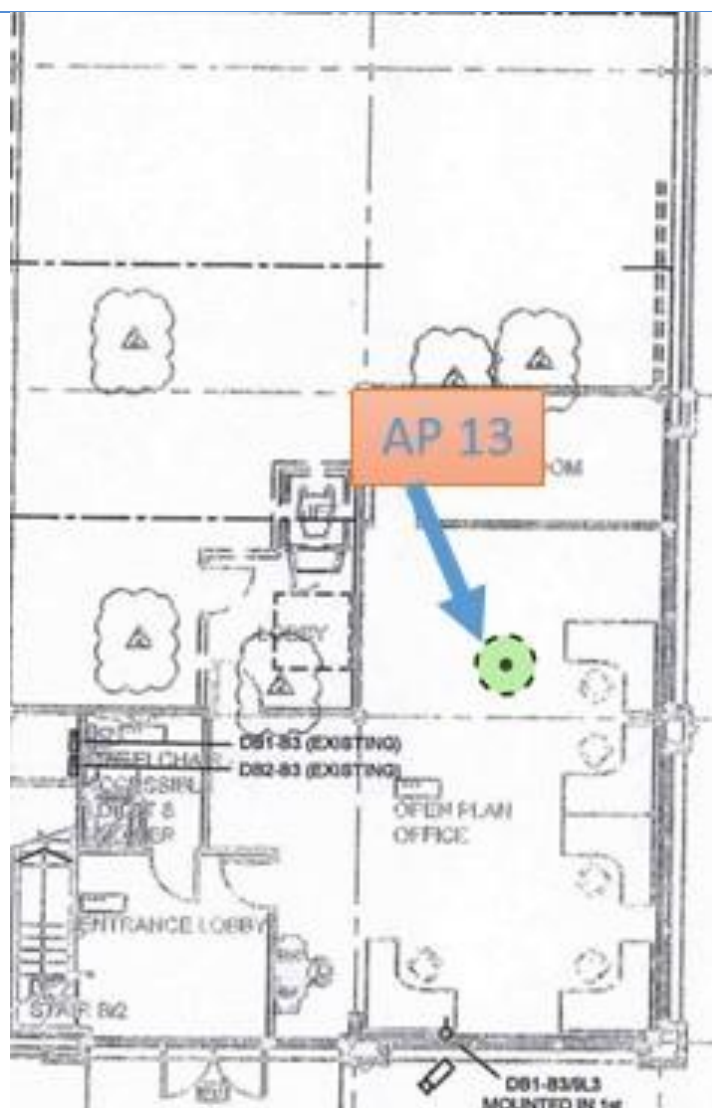| Device Location	Access Point to be located on the outside wall adjacent to Loading Bays 3 and 4. Vertically mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

4.3 Building 3

1ST FLOOR 3A – AP12	
Device	MR42-HW

Antenna Type	Integrated
Device Location	Access Point to be located above printer in centre of office, ceiling mounted
Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 12

1ST FLOOR 3C – AP13	
Device	MR42-HW
Antenna Type	Integrated
Device Location	Access Point in centre of office, ceiling mounted

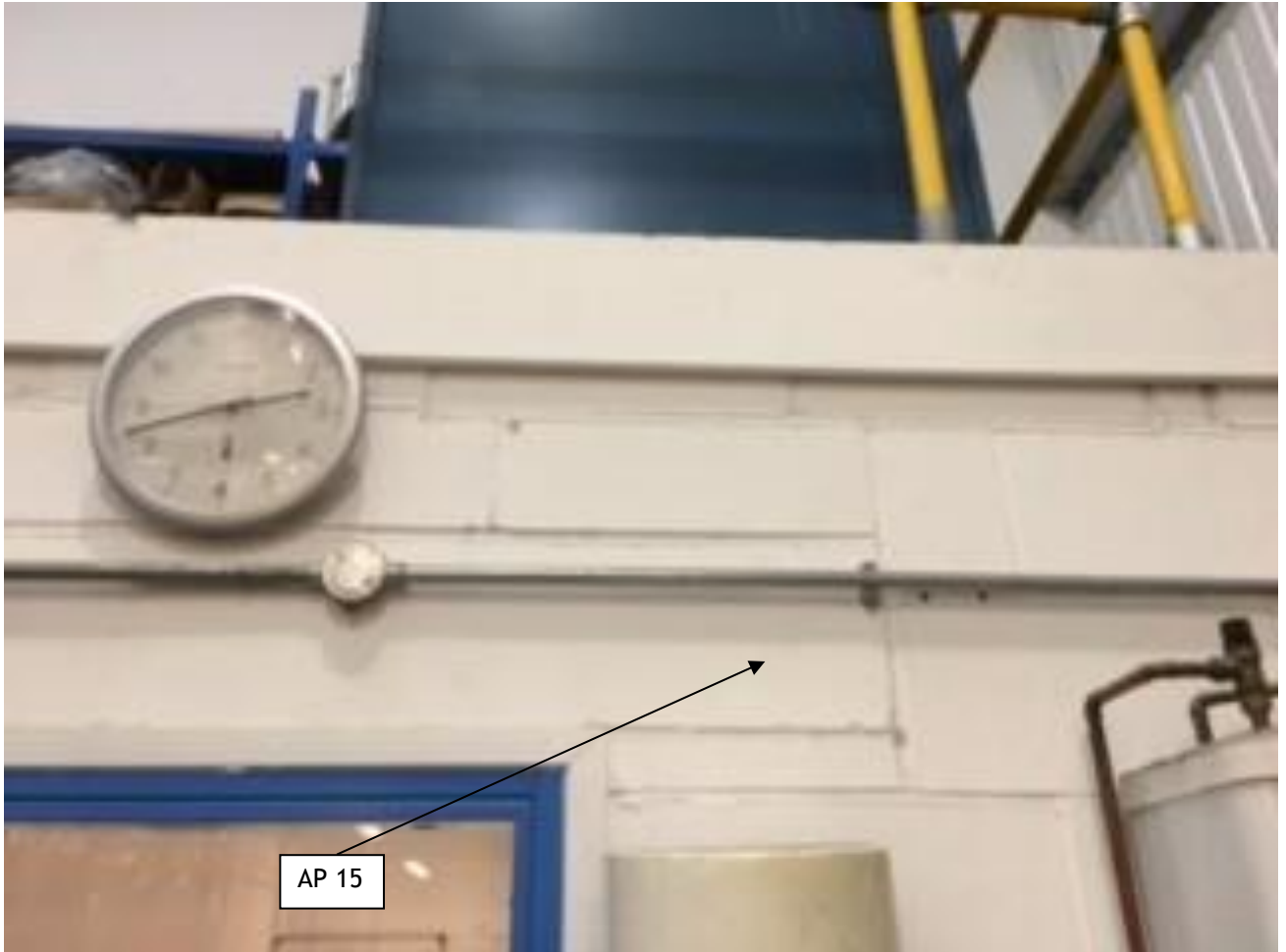| Cabling	New cabling to be installed.
Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

GROUND FLOOR 3A – AP14	
Device	MR42-HW
Antenna Type	Integrated
Device Location	Access Point to be located in centre of office, ceiling mounted
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 14

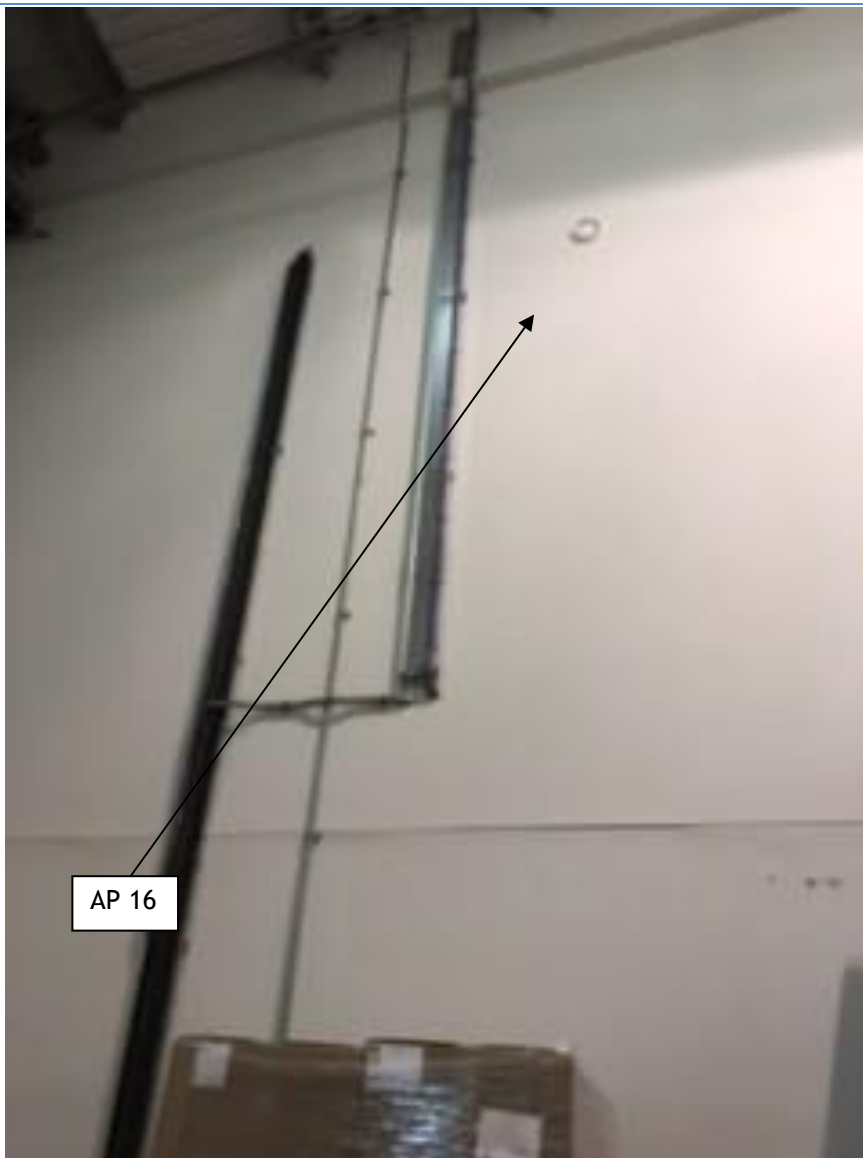| GROUND FLOOR ENGINEERING – AP15	
Device	MR42-HW
Antenna Type	Integrated
Device Location	Access Point to be located on office wall, vertically mounted
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 15

GROUND FLOOR STORAGE AREA – AP16	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20
Device Location	Access Point to be located on wall, vertically mounted
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 16

WAREHOUSE AREA – AP17	
Device	MR66-HW
Antenna Type	2 x MA-ANT-25
Device Location	Access Point & Antenna's to be located on inside wall, opposite aisles A/B
Cabling	New cabling to be installed.

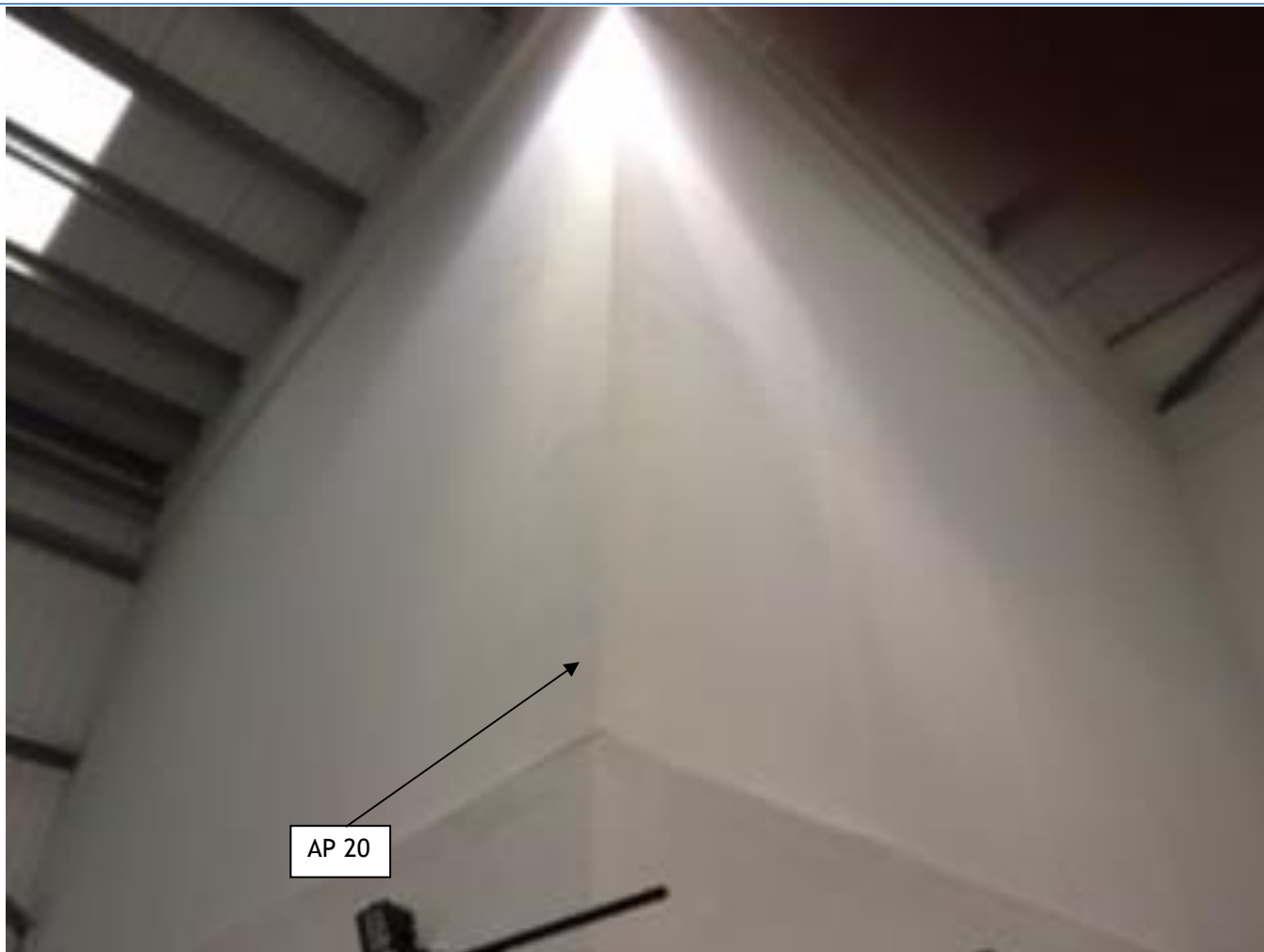| Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 17

WAREHOUSE AREA – AP18	
Device	MR66-HW
Antenna Type	2 x MA-ANT-25
Device Location	Access Point & antenna's to be located on inside wall, below window opposite aisles E/F
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 18

WAREHOUSE AREA – AP19	
Device	MR66-HW
Antenna Type	2 x MA-ANT-25
Device Location	Access Point & antenna's to be located on inside wall, above loading bay door opposite aisles I/J
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 19

WAREHOUSE AREA – ' BARBADOS ' – AP20	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20
Device Location	Access Point to be mounted on the wall adjacent to offices.
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 20

GROUND FL0OR OFFICE 3C –AP21	
Device	MR42-HW
Antenna Type	Integrated
Device Location	Access Point to be located in the middle of the office, ceiling mounted.
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 21

BUILDING 3 EXTERNAL – AP22	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20
Device Location	Access Point to be located on the outside wall adjacent to Loading Bay 7. Vertically mounted
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

BUILDING 3 EXTERNAL – AP23	
Device	MR66-HW
Antenna Type	2 x MA-ANT-20
Device Location	Access Point to be located on the outside wall adjacent to Loading Bay 5. Vertically mounted
Cabling	New cabling to be installed.

Configuration	The Access Point radios and power level will initially be configured dynamically via auto RF settings. Possible further amendments to the channel settings and Tx power for both radios will be required during the implementation phase.

AP 23

5.   Recommended Bill of Materials

5.1.   Cisco Meraki

PART NUMBER	DESCRIPTION	QUANTITY

|	MR42-HW	Dual-band cloud based 802.11a/g/n/ac – internal AP	9
	MR66-HW	Dual-band cloud based 802.11a/g/n – Rugged AP with external Antennas	14
	MA-ANT-25	Dual Band Patch Antenna	6
	MA-ANT-20	Dual Band Omni Antenna (x2)	22
	MS220-8P-HW	Cloud Based 8 Port 10/100/1000 POE Switch	4
Meraki AP Licence	LIC-ENT-3YR	Meraki MR Enterprise License, 3 Years (4th Year Free)	23
Meraki Switch Licence	LIC-MS220-8P-3YR	Meraki MS220-8P Enterprise License and Support, 3 Year (4th Year Free	4

5.2. Access Point Power Options

There are three main ways in which the Access Points can be powered,

- Power over Ethernet (PoE) using a PoE injector,
- PoE from a suitable switch

- Mains power supply.

The recommended way would be to use PoE from the switch that the Access Points connect to (assuming the switch can support PoE). Failing this we would recommend using PoE injectors.
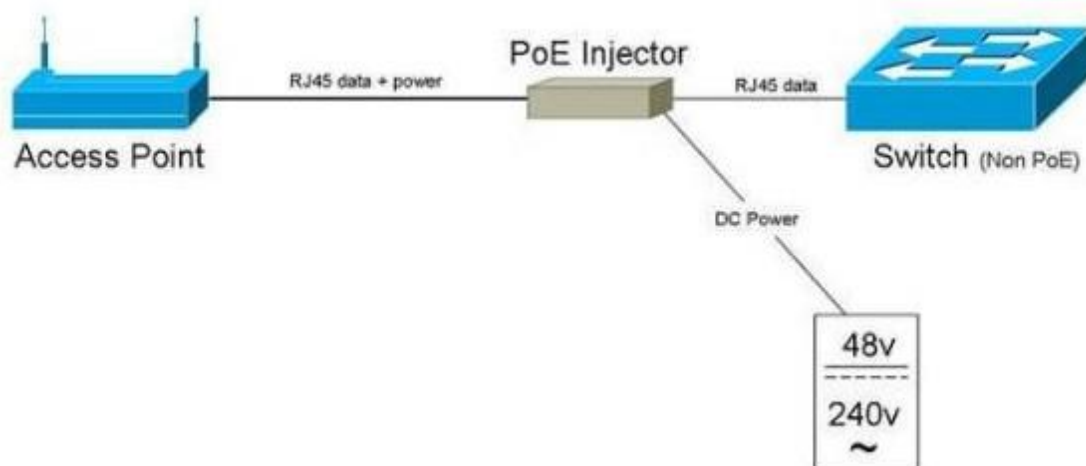
6. Glossary

ADU	Aironet Desktop Utility
AP	Access Point
BoM	Bill of Materials
CCK	Complementary Code Keying
dB	Decibel
dBi	Decibel relative to an isotropic radiator
dBm	Decibel relative to a reference level of 1mW
DFS	Dynamic Frequency Selection
FHSS	Frequency Hopping Spread Spectrum
GHz	Giga Hertz
ISM	Industrial, Scientific and Industrial
LAN	Local Area Network
MHz	Mega Hertz
mW	milliWatt
OFDM	Orthogonal Frequency Division Multiplexing
PoE	Power over Ethernet
RF	Radio Frequency
RTLS	Real Time Location Services
SNR	Signal to Noise Ratio
TPC	Transmit Power Control
UK	United Kingdom
WIDS	Wireless Intrusion Detection System

Data Rate:

Data Rate is the highest possible speed (measured in megabits per second) at which the wireless devices will be transmitting data. Typically the true data throughput is about half of the data rate or less.

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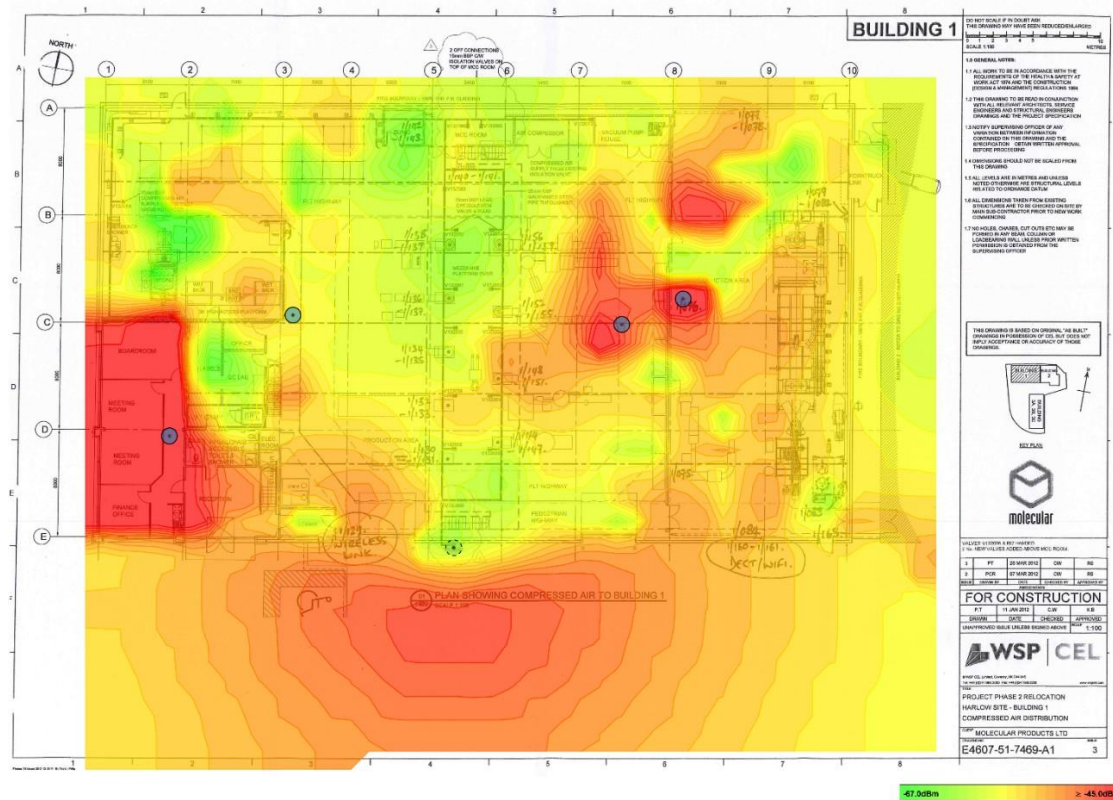
Signal Strength:
Signal Strength - sometimes called coverage - is the most basic requirement for a wireless network. As a general guideline, low signal strength means unreliable connections, and low data throughput.

7. Appendix 1 - 2.4 / 5 GHz Signal Strength
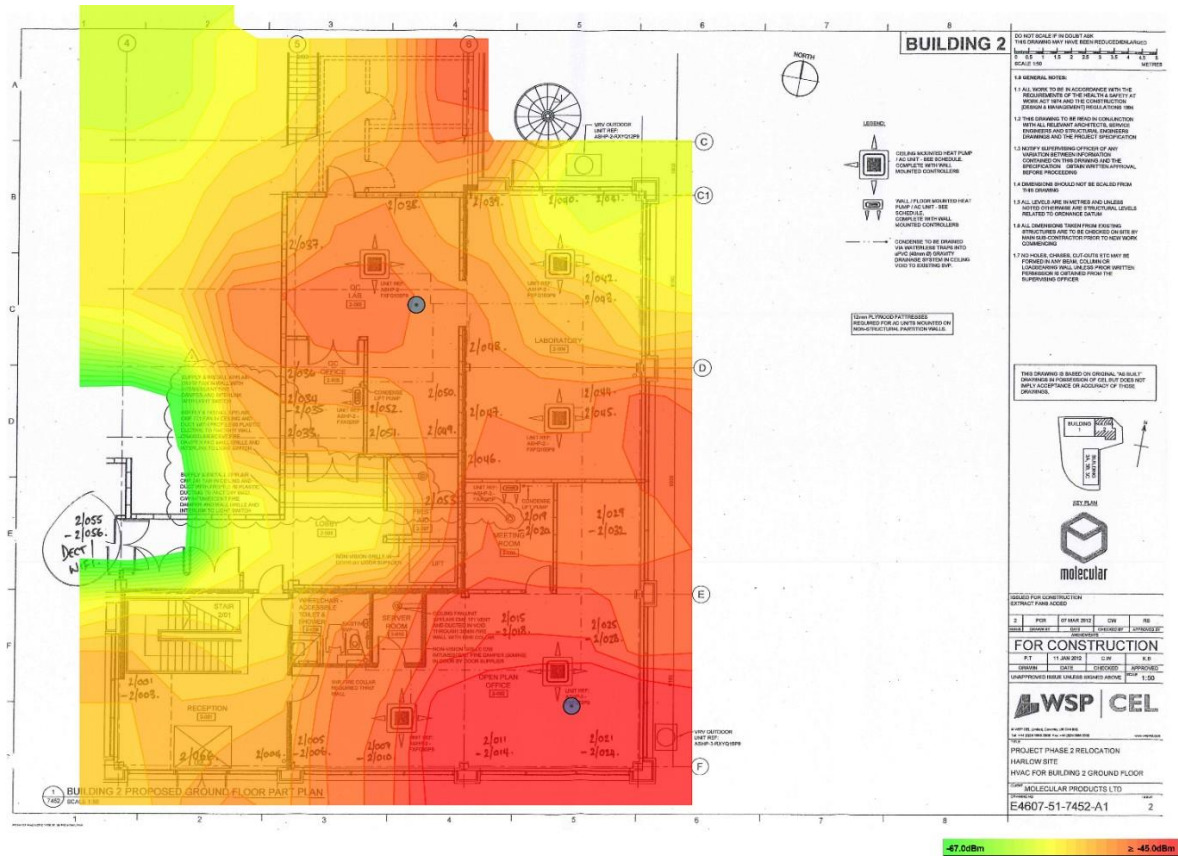
7.1.1. Building 1 - 1st Floor Signal Strength
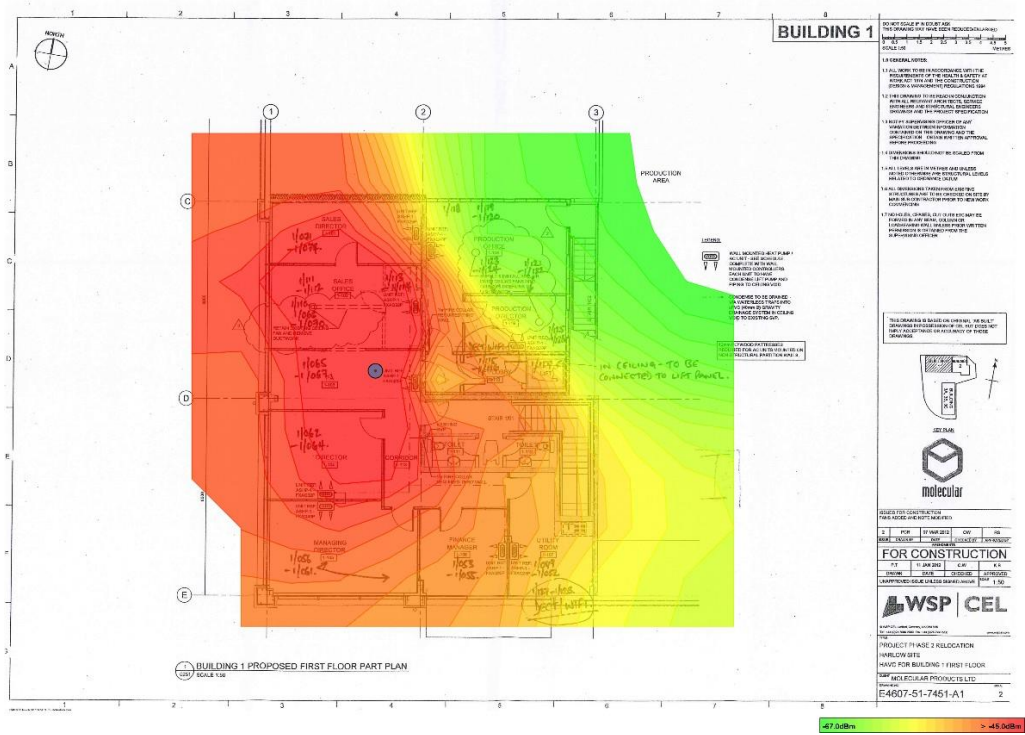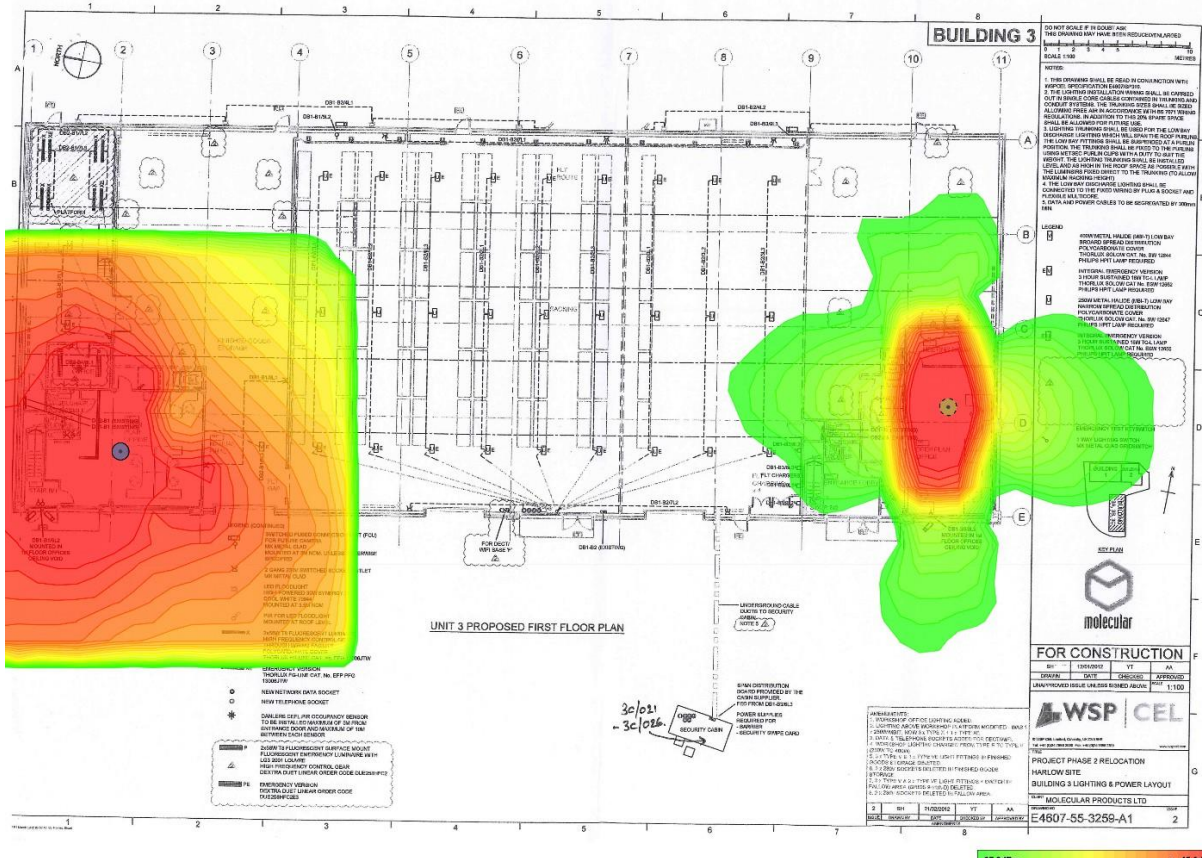
7.1.3. Building 2 – 1st Floor Signal Strength (Existing Meraki AP Coverage)
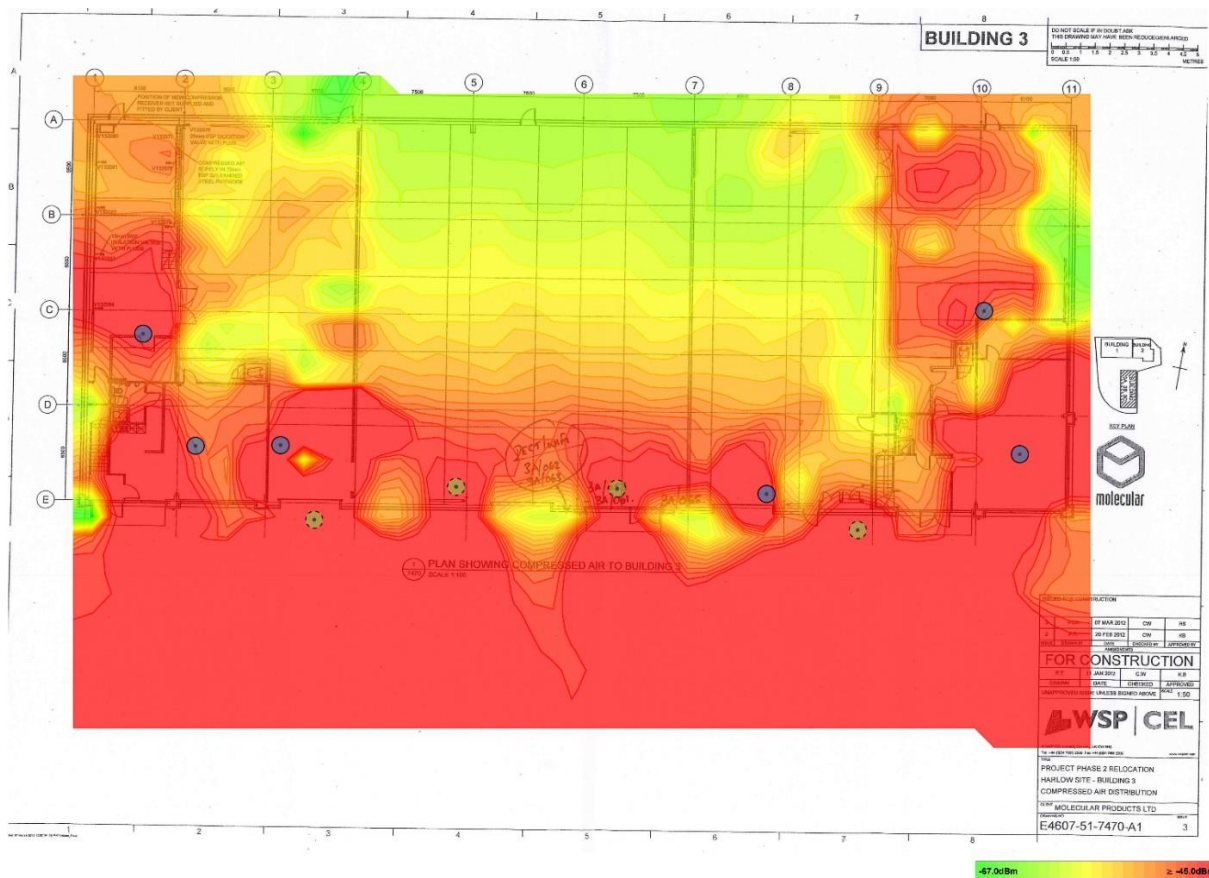
7.1.5. Building 2 – Soda Lime Store Ground Floor Signal Strength

7.1.6. Building 3 – 1st Floor Signal Strength

7.1.7.   Building 3 - Ground Floor Signal Strength

END OF DOCUMENT