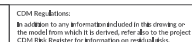


Appendix 5

HV schematics proposed amendments to existing HV network

- 0406044-HLEA-XX-XX-SM-E-701-0001 - HV Ring 1 Proposed Changes
- 0406044-HLEA-XX-XX-SM-E-701-0002 - HV Ring 2 Proposed Changes
- 0406044-HLEA-XX-XX-SM-E-701-0003 - HV Ring 4 Proposed Changes



General Notes:

- General Notes:**
- The drawing does not necessarily show all the information needed to interpret the design intent or the construction details.
 - The drawing contains information from more than one source and must be read in conjunction with all relevant specifications.
 - Any apparent drafting errors and differences between other drawings and specifications shall be brought to our attention.

Project Notes:

1. Proposed changes highlighted in Red. Surveys to be carried out prior to works commencing to confirm supplies and connections of existing infrastructure.

[illegible]

HOARE LEA (H.)

ARCHITECT:
DAY Architecture

CLIENT:
Manchester University NHS Foundation Trust

PROJECT TITLE:
Project RED Electrical Infrastructure

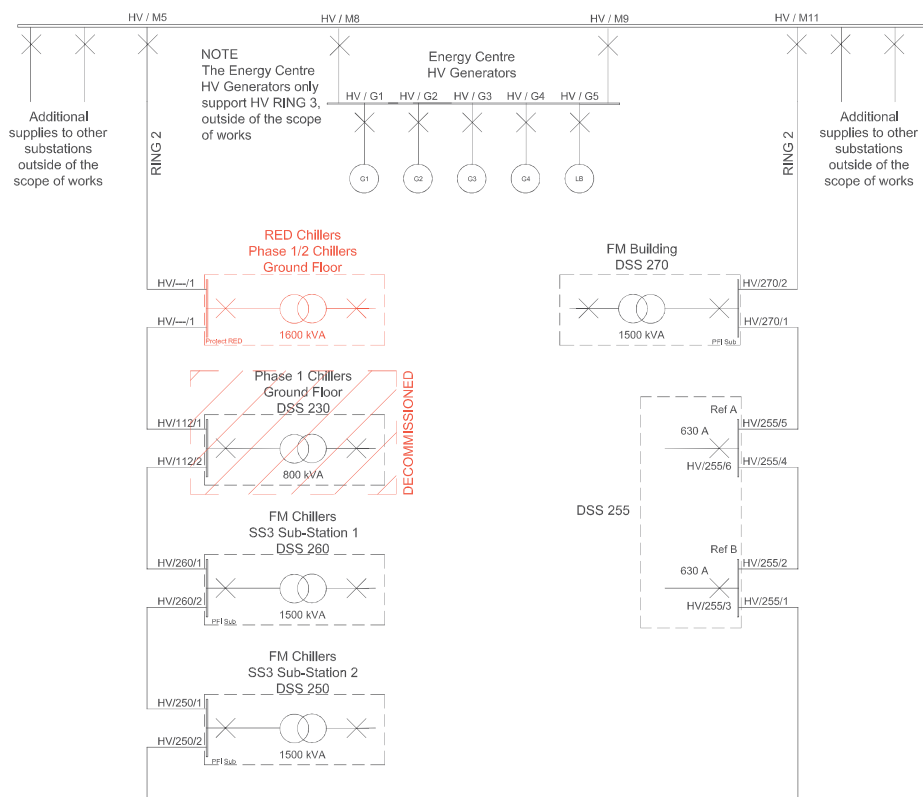
DRAWING TITLE:
HV Ring 1
Proposed Changes

For Information

PERSON RESPONSIBLE FOR:		
Design: NV	Review: SM	Authoring Initials: BH
Project No: 0406044	Date: April 2021	Scale @ A1: NTS
DRAWING NUMBER:		Revised
0406044-11 EA-XX-XX-SM-E-201-0001		

A1

This drawing shall not be scaled.
Work from the drawing should be done
in accordance with the project
CDM Risk Register for information on individual risks.



CDM Regulations:
It is subject to any information included in this drawing or
the model from which it is derived, refer also to the project
CDM Risk Register for information on individual risks.

General Notes:

- The drawing does not necessarily show all the
information needed to interpret the design intent or
the construction details.
- The drawing contains information from more than
one source and must be read in conjunction with all
relevant specifications.
- Any apparent drafting errors and differences
between other drawings and specifications shall be
brought to our attention.

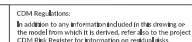
Project Notes:

- Proposed changes highlighted in red. Surveys to be
carried out prior to works commencing to confirm
supplier and connection of existing infrastructure.

Rev	Description	By	Check	Date
REVISIONS				

HOARE LEA 	
ARCHITECT: DAY Architecture	
CLIENT: Manchester University NHS Foundation Trust	
PROJECT TITLE: Project RED Electrical Infrastructure	
DRAWING TITLE: HV Ring 2 Proposed Changes	

For Information			
Person responsible for			
Design NV	Reviewed SM	Authoring Issue JH	
Project No: 040004	Date: April 2021	Scale @ A1: NTS	Rev: A
Drawing Number: 040004-HLEA-000-000-SM-E-701-0002			



General Note:

- The drawing does not necessarily show all the information needed to interpret the design intent or the construction details.
- The drawing contains information from more than one source and must be read in conjunction with all relevant specifications.
- Any apparent drafting errors and differences between other drawings and specifications shall be brought to your attention.

Project Notes:

1. Proposed changes highlighted in Red. Surveys to be carried out prior to works commencing to confirm supplier and connections of existing infrastructure.

Item	Description	Original	Revised	Comments	Date
REVISIONS:					

ARCHITECT:
DAY Architecture

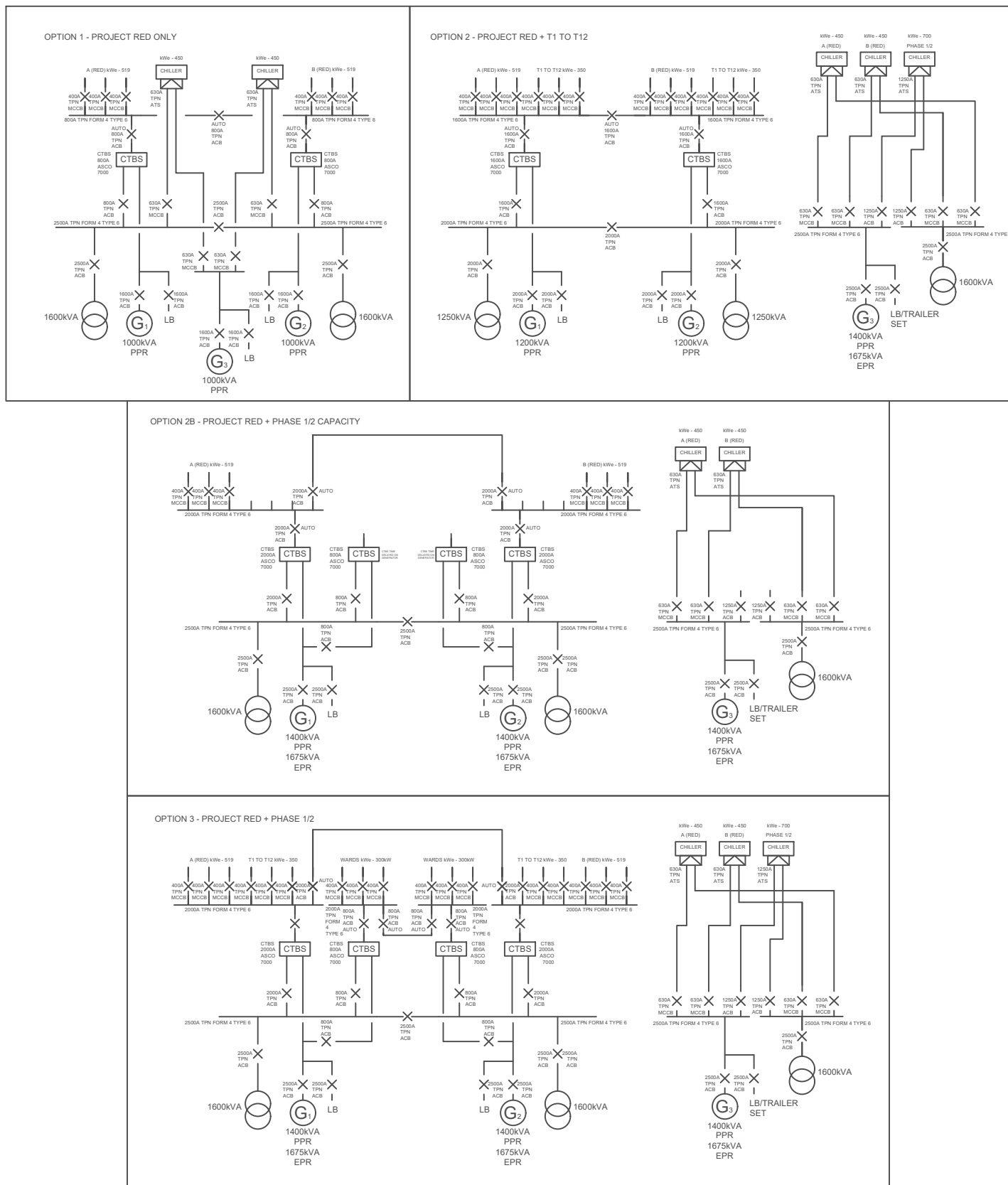
CLIENT:
Manchester University NHS Foundation Trust

PROJECT TITLE:
Project RED Electrical Infrastructure

DRAWING TITLE:
HVRing 4
Proposed Changes

Appendix 6

MFT-PS02 DSS105-DSS170 Power Study



Appendix 7

Brief Options and Electrical loads

Title	DSS105 & DSS170 Power Study
Date	12-11-20
Made by	R James
Reference	MFT-PS02
Distribution	Matthew O Hara – Project Manager – Property and Estates

1.0 Introduction

The purpose of this study is to;

- 1) establish existing electrical loads imposed onto Substation DSS105 (LV supplies to basement supplying phase 1/2 areas and Substation DSS170.
- 2) a review of recorded loads which are to be migrated to DSS170 against existing DSS170 loads and plant ratings.

2.0 Power Study

Advanced Fluke power loggers were installed at the following locations;

Substation – DSS105

- 1) DSS105 - Essential Critical Supply (Basement)
- 2) DSS105 - Essential Non-Critical Supply (Basement)
- 3) DSS105 – Non-Essential Supply (Basement)

Substation – DSS170

- 4) DSS170 - T1-1 Transformer 1 - Incomer
- 5) DSS170 - T1-5 Transformer 1 – Non-Essential Supply to ASCO CTBS 1 - Supplying CCU Switchboard
- 6) DSS170 - T1-6 Transformer 1 – Non-Essential Supply to ASCO CTBS 3 - Supplying Life Cycle Switchboard
- 7) DSS170 - T2-1 Transformer 2 - Incomer
- 8) DSS170 - T2-5 Transformer 2 – Non-Essential Supply to ASCO CTBS 2 - Supplying Life Cycle Switchboard
- 9) DSS170 - T2-6 Transformer 3 – Non-Essential Supply to ASCO CTBS 4 - Supplying Life Cycle Switchboard
- 10) DSS170 - T3-1 Transformer 3 - Incomer
- 11) DSS170 - T3-2 Transformer 3 – Non-Essential Supply to Sub Section Life Cycle Switchboard

Each location was monitored for a duration of 10 days.

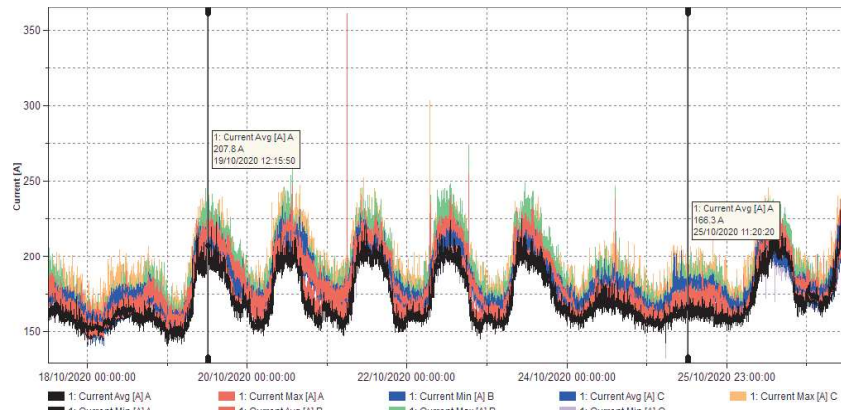
The power sampling interval was every 5 seconds

The above locations were not monitored simultaneous due to the quantity of power loggers required. The power study commenced on the 25/09/20 and concluded on the 27/10/20. Logging sessions are detailed on the collated data table in section 4.

3.0 Recorded Data per location

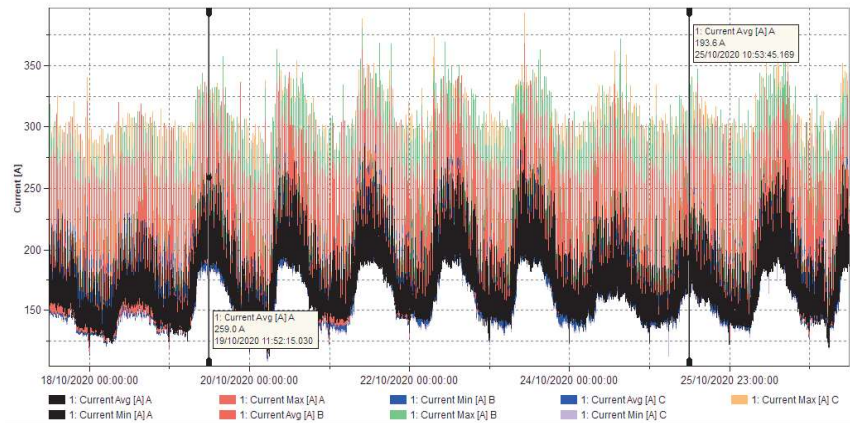
1 DSS105 – ESSENTIAL CRITICAL SUPPLY (BASEMENT)

ESS CRITICAL				Logging Information
Voltage [V]	AN	BN	CN	
Max	249.6 V 22/10/2020 07:17:15	419.5 V 17/10/2020 12:19:15	420.1 V 17/10/2020 12:19:15	Study type: Energy study Topology: 3-ph Wye Start date: 17/10/2020 12:17:59 End date: 27/10/2020 11:17:55 Duration: 9d 23h 59m 56s Averaging interval: 5sec Number of averaging intervals: 172800 (172800)
linear Avg	242.0 V	243.1 V	245.0 V	
Min	3.2 V 17/10/2020 12:19:10	15.8 V 17/10/2020 12:18:55	229.0 V 26/10/2020 10:43:55	
Current [A]	A	B	C	
Max	361.3 A 21/10/2020 05:58:50	274.3 A 22/10/2020 18:29:35	383.8 A 22/10/2020 06:44:30	
linear Avg	172.7 A	182.4 A	182.8 A	
Min	140.6 A 19/10/2020 00:04:35	140.3 A 18/10/2020 00:01:40	132.6 A 25/10/2020 04:41:40	
Frequency [Hz]	AN			
Max	50.76 Hz 17/10/2020 12:19:10			
linear Avg	50.00 Hz			
Min	49.43 Hz 17/10/2020 12:19:10			



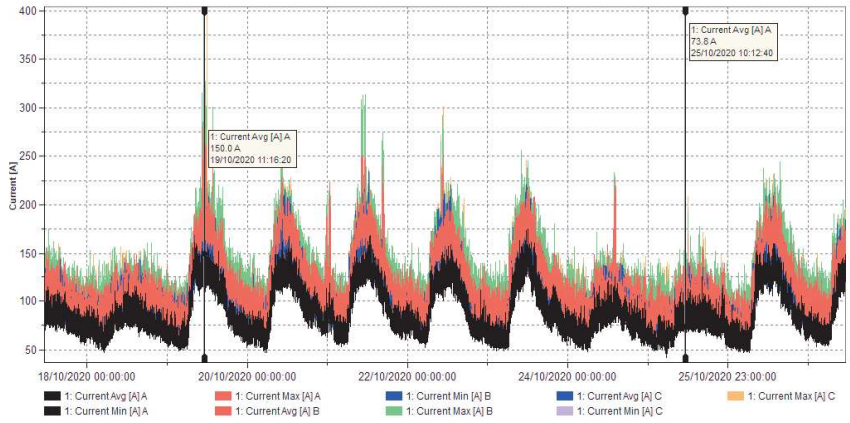
2 DSS105 – ESSENTIAL NON-CRITICAL SUPPLY (BASEMENT)

ESS NON CRITICAL					Logging Information
Voltage [V]	AN	BN	CN	N	
Max	248.3 V 22/10/2020 07:17:25	418.0 V 17/10/2020 11:54:05	419.2 V 17/10/2020 11:54:05		Study type: Energy study Topology: 3-ph Wye Start date: 17/10/2020 11:53:27 End date: 27/10/2020 10:53:27 Duration: 10d 0h 0m 0s Averaging interval: 5sec Number of averaging intervals: 172801 (172801)
linear Avg	241.5 V	242.7 V	244.7 V		
Min	4.3 V 17/10/2020 11:54:05	229.3 V 23/10/2020 14:20:15	18.4 V 17/10/2020 11:53:50		
Current [A]	A	B	C	N	
Max	367.7 A 23/10/2020 10:36:45	380.9 A 21/10/2020 09:47:10	392.4 A 23/10/2020 10:36:50	0.0000 A 17/10/2020 11:53:30	
linear Avg	167.6 A	171.3 A	171.1 A	0.0000 A	
Min	113.2 A 20/10/2020 06:00:45	112.4 A 20/10/2020 05:34:15	109.1 A 20/10/2020 05:30:55	0.0000 A 17/10/2020 11:53:30	
Frequency [Hz]	AN				
Max	50.26 Hz 21/10/2020 21:59:15				
linear Avg	50.00 Hz				
Min	49.71 Hz 25/10/2020 04:41:55				

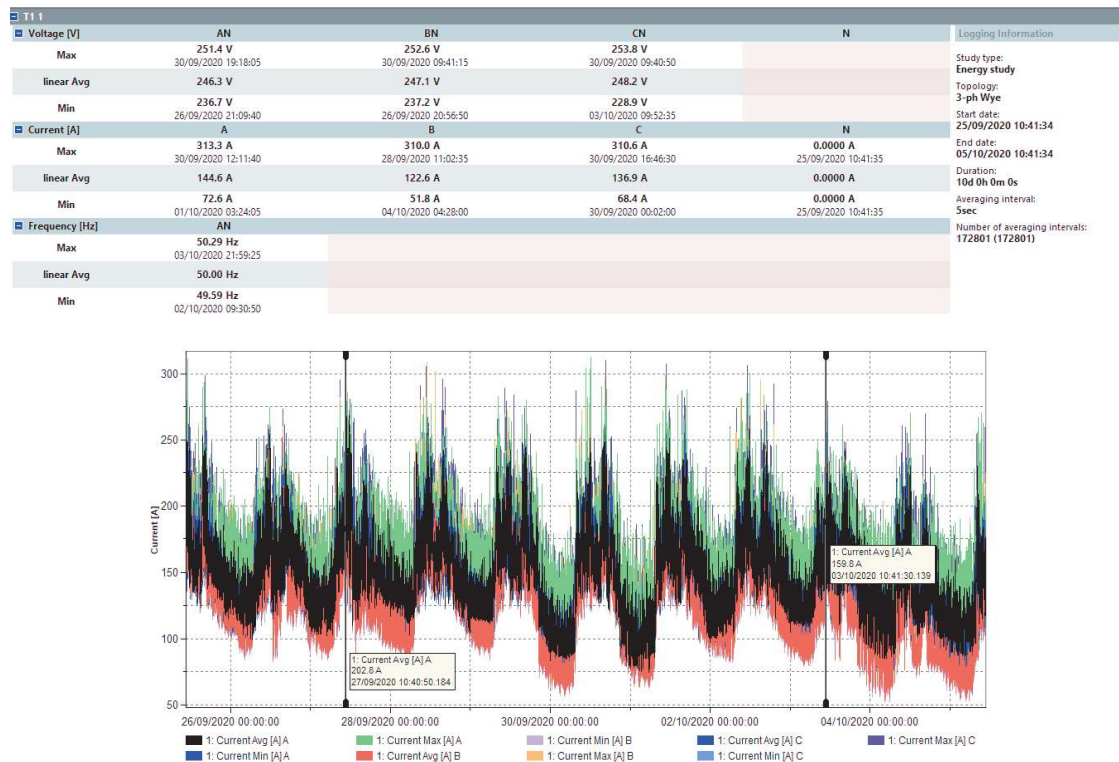


3 DSS105 – NON-ESSENTIAL SUPPLY (BASEMENT)

NE BASE					Logging Information Study type: Energy study Topology: 3-ph Wye Start date: 17/10/2020 11:15:09 End date: 27/10/2020 10:15:05 Duration: 9d 23h 59m 56s Averaging interval: 5sec Number of averaging intervals: 172800 (172800)
Voltage [V]	AN	BN	CN		
	Max	251.5 V 22/10/2020 07:16:10	252.7 V 22/10/2020 07:16:15	254.3 V 22/10/2020 07:16:10	
	linear Avg	244.2 V	244.7 V	246.5 V	
	Min	230.5 V 23/10/2020 20:55:40	173.9 V 17/10/2020 11:54:25	230.2 V 26/10/2020 10:42:45	
Current [A]	A	B	C		
	Max	280.8 A 19/10/2020 10:29:15	328.3 A 19/10/2020 11:27:45	398.6 A 19/10/2020 11:52:20	
	linear Avg	88.3 A	112.4 A	103.4 A	
	Min	42.4 A 25/10/2020 04:40:30	60.0 A 26/10/2020 02:44:25	60.9 A 25/10/2020 04:40:30	
Frequency [Hz]	AN				
	Max	50.26 Hz 21/10/2020 21:58:10			
	linear Avg	50.00 Hz			
	Min	49.72 Hz 25/10/2020 04:40:35			

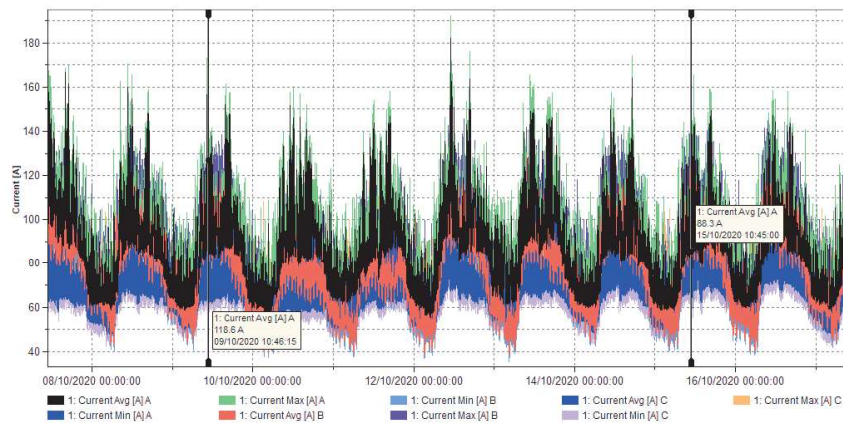


4 DSS170 – T1-1 TRANSFORMER 1 – INCOMER



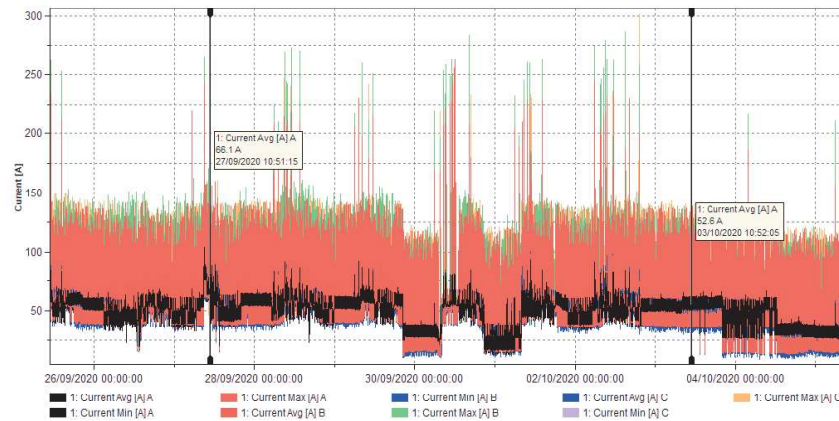
5 DSS170 – T1-5 TRANSFORMER 1 – NON-ESSENTIAL SUPPLY TO ASCO CTBS 1 SUPPLYING CCU SWITCHBOARD

T1 5					Logging Information
Voltage [V]					Study type: Energy study Topology: 3-ph Wye Start date: 07/10/2020 10:45:52 End date: 17/10/2020 10:45:35 Duration: 9d 23h 59m 43s Averaging interval: 5sec Number of averaging intervals: 172797 (172797)
Max	253.2 V	253.7 V	254.4 V		
linear Avg	246.0 V	246.5 V	247.4 V		
Min	234.0 V	233.9 V	233.2 V		
	08/10/2020 08:23:50	08/10/2020 08:23:50	12/10/2020 21:49:35		
Current [A]					
Max	192.5 A	146.1 A	131.1 A		
linear Avg	84.4 A	73.2 A	63.3 A		
Min	52.1 A	35.5 A	42.6 A		
	12/10/2020 04:49:25	13/10/2020 04:28:10	08/10/2020 04:16:00		
Frequency [Hz]					
Max	50.28 Hz				
linear Avg	50.00 Hz				
Min	49.74 Hz				
	12/10/2020 10:50:20				



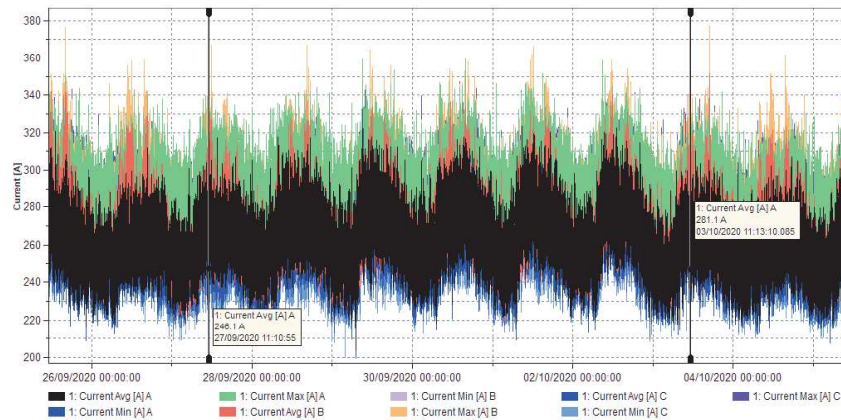
6 DSS170 – T1-6 TRANSFORMER 1 – NON-ESSENTIAL SUPPLY TO ASCO CTBS 3 - SUPPLYING LIFE CYCLE SWITCHBOARD

T1 6				Logging Information
Voltage [V]	AN	BN	CN	Study type: Energy study Topology: 3-ph Wye Start date: 25/09/2020 10:51:19 End date: 05/10/2020 10:51:15 Duration: 9d 23h 59m 56s Averaging interval: 5sec Number of averaging intervals: 172800 (172800)
Max	251.3 V 30/09/2020 19:17:50	252.4 V 30/09/2020 09:41:00	253.7 V 30/09/2020 09:40:35	
linear Avg	246.2 V	247.0 V	248.1 V	
Min	236.6 V 26/09/2020 21:09:25	236.9 V 26/09/2020 20:56:40	228.9 V 03/10/2020 09:52:15	
Current [A]	A	B	C	
Max	263.6 A 30/09/2020 12:11:25	286.4 A 02/10/2020 15:06:15	301.8 A 02/10/2020 19:08:05	
linear Avg	47.7 A	44.9 A	48.2 A	
Min	12.6 A 01/10/2020 03:54:00	8.8 A 04/10/2020 07:22:20	16.1 A 30/09/2020 05:12:05	
Frequency [Hz]	AN			
Max	50.29 Hz 03/10/2020 21:59:05			
linear Avg	50.00 Hz			
Min	49.60 Hz 02/10/2020 09:30:30			



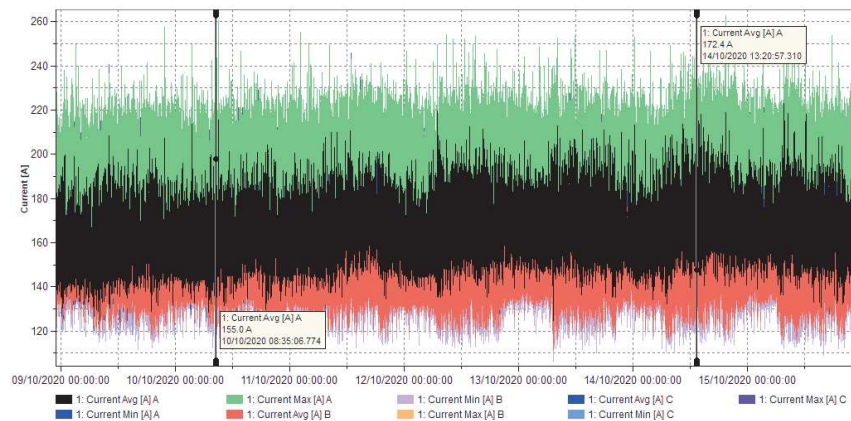
7 DSS170 – T2-1 TRANSFORMER 2 – INCOMER

T2 1					Logging Information
Voltage [V]					Study type: Energy study Topology: 3-ph Wye Start date: 25/09/2020 11:10:13 End date: 05/10/2020 11:10:13 Duration: 10d 0h 0m 0s Averaging interval: 5sec Number of averaging intervals: 172801 (172801)
Max	AN	BN	CN	N	
	251.2 V	252.6 V	253.8 V		
linear Avg	246.2 V	247.1 V	248.2 V		
Min	236.3 V	237.0 V	229.3 V		
	26/09/2020 20:56:40	26/09/2020 21:03:05	03/10/2020 09:51:15		
Current [A]					
Max	A	B	C	N	
	359.8 A	377.7 A	383.7 A	0.0000 A	
linear Avg	260.5 A	265.2 A	255.3 A	0.0000 A	
Min	199.6 A	201.2 A	200.2 A	0.0000 A	
	29/09/2020 07:01:40	29/09/2020 07:01:40	29/09/2020 03:53:20	25/09/2020 11:10:15	
Frequency [Hz]					
Max	AN				
	50.29 Hz				
linear Avg	50.00 Hz				
Min					
	02/10/2020 09:29:25				



8 DSS170 – T2-5 TRANSFORMER 2 – NON-ESSENTIAL SUPPLY TO ASCO CTBS 2 - SUPPLYING LIFE CYCLE SWITCHBOARD

T2 5					Logging Information
Voltage [V]					Study type: Energy study Topology: 3-ph Wye Start date: 07/10/2020 10:58:24 End date: 17/10/2020 10:58:24 Duration: 10d 0h 0m 0s Averaging interval: 5sec Number of averaging intervals: 172801 (172801)
Max	AN	BN	CN	N	
	252.8 V	253.6 V	254.3 V		
linear Avg	245.7 V	246.4 V	247.4 V		
Min	233.9 V	233.9 V	233.5 V		
	08/10/2020 08:23:15	08/10/2020 08:23:15	12/10/2020 21:49:05		
Current [A]					
Max	A	B	C	N	
	263.0 A	235.7 A	246.3 A	0.0000 A	
linear Avg	163.8 A	146.3 A	154.2 A	0.0000 A	
Min	118.7 A	106.5 A	117.6 A	0.0000 A	
	07/10/2020 12:54:35	13/10/2020 07:18:55	09/10/2020 05:10:25	07/10/2020 10:58:25	
Frequency [Hz]					
Max	AN				
	50.28 Hz				
linear Avg	50.00 Hz				
Min					
	12/10/2020 10:49:45				

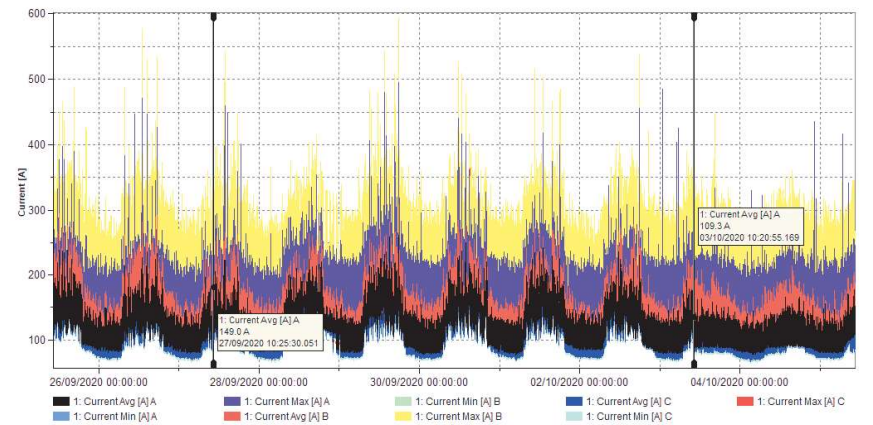


9 DSS170 – T2-6 TRANSFORMER 3 – NON-ESSENTIAL SUPPLY TO ASCO CTBS 4 - SUPPLYING LIFE CYCLE SWITCHBOARD

T2 6					Logging Information Study type: Energy study Topology: 3-ph Wye Start date: 25/09/2020 11:18:18 End date: 05/10/2020 11:18:18 Duration: 10d 0h 0m 0s Averaging interval: 5sec Number of averaging intervals: 172801 (172801)
Voltage [V]					
	AN	BN	CN	N	
Max	250.9 V 30/09/2020 19:17:00	252.3 V 30/09/2020 09:39:15	253.7 V 30/09/2020 09:39:50		
linear Avg	245.9 V	246.8 V	248.1 V		
Min	236.0 V 26/09/2020 20:56:55	236.7 V 26/09/2020 21:03:20	229.1 V 03/10/2020 09:51:35		
Current [A]					
	A	B	C	N	
Max	170.9 A 02/10/2020 09:56:55	208.2 A 29/09/2020 11:57:50	224.3 A 05/10/2020 08:54:15	0.0000 A 25/09/2020 11:18:20	
linear Avg	114.6 A	130.6 A	111.5 A	0.0000 A	
Min	81.4 A 05/10/2020 07:01:05	94.6 A 29/09/2020 07:01:45	81.9 A 05/10/2020 07:01:05	0.0000 A 25/09/2020 11:18:20	
Frequency [Hz]					
	AN				
Max	50.29 Hz 03/10/2020 21:58:20				
linear Avg	50.00 Hz				
Min	49.59 Hz 02/10/2020 09:29:45				

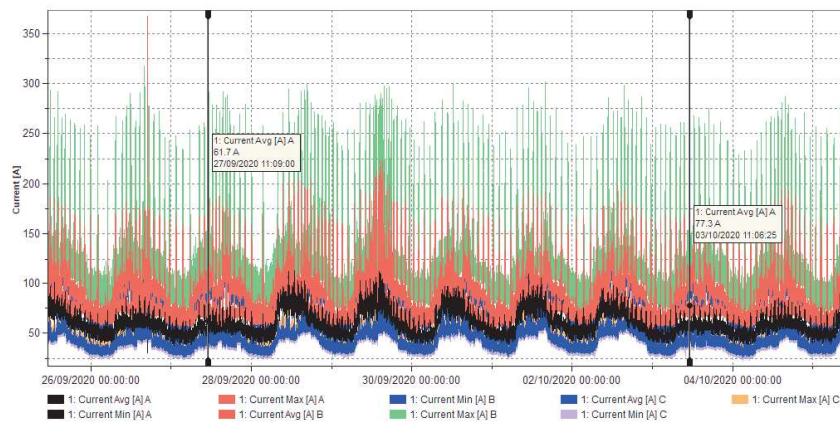
10 DSS170 – T3-1 TRANSFORMER 3 – INCOMER

T3 1					Logging Information Study type: Energy study Topology: 3-ph Wye Start date: 25/09/2020 10:25:56 End date: 05/10/2020 10:25:56 Duration: 10d 0h 0m 0s Averaging interval: 5sec Number of averaging intervals: 172801 (172801)
Voltage [V]					
	AN	BN	CN	N	
Max	33.1 V 04/10/2020 21:25:00	252.2 V 30/09/2020 09:41:15	253.3 V 30/09/2020 09:41:15		
linear Avg	31.6 V	246.8 V	247.8 V		
Min	29.1 V 25/09/2020 10:54:00	236.2 V 26/09/2020 21:02:05	228.7 V 03/10/2020 09:53:35		
Current [A]					
	A	B	C	N	
Max	494.8 A 29/09/2020 17:53:40	593.6 A 29/09/2020 17:53:40	488.4 A 29/09/2020 17:53:40	0.0000 A 25/09/2020 10:26:00	
linear Avg	121.7 A	148.6 A	115.2 A	0.0000 A	
Min	73.8 A 01/10/2020 04:46:10	79.1 A 04/10/2020 04:42:15	64.3 A 04/10/2020 03:08:35	0.0000 A 25/09/2020 10:26:00	
Frequency [Hz]					
	AN				
Max	50.29 Hz 03/10/2020 22:00:20				
linear Avg	50.00 Hz				
Min	49.59 Hz 02/10/2020 09:31:45				



11 DSS170 – T3-2 TRANSFORMER 3 – NON-ESSENTIAL SUPPLY TO SUB-SECTION LIFE CYCLE SWITCHBOARD

T3-2				Logging Information
Voltage [V]	AN	BN	CN	Study type: Energy study Topology: 3-ph Wye Start date: 25/09/2020 11:08:21 End date: 05/10/2020 11:08:21 Duration: 10d 0h 0m 0s Averaging interval: 5sec Number of averaging intervals: 172801 (172801)
Max	251.3 V 30/09/2020 19:17:10	252.3 V 30/09/2020 09:39:15	253.5 V 30/09/2020 09:39:20	
linear Avg	246.1 V	247.0 V	248.1 V	
Min	236.1 V 26/09/2020 21:09:05	236.2 V 26/09/2020 21:00:20	229.0 V 03/10/2020 09:51:30	
Current [A]	A	B	C	
Max	367.6 A 26/09/2020 16:56:35	318.1 A 26/09/2020 15:54:30	171.8 A 29/09/2020 15:45:50	
linear Avg	59.1 A	87.9 A	40.8 A	
Min	30.8 A 26/09/2020 16:56:35	44.2 A 04/10/2020 05:47:00	22.3 A 04/10/2020 03:07:40	
Frequency [Hz]	AN			
Max	50.29 Hz 03/10/2020 21:58:15			
linear Avg	50.00 Hz			
Min	49.60 Hz 02/10/2020 09:29:45			



4.0 Collated Data Table

Maximum and average recorded current has been extracted from the recorded data. These values were individually reviewed along with the graphical data. A 'baseline amps' value was then established from the graph to account for plant/equipment starting current. A 10% margin was then added to this value as a contribution towards any plant/equipment not running at the time of monitoring.

LOCATION	Coupled Load Monitored	Protection Rating	Protection Setting	3Ø Nominal Voltage	Max Amps L1	Max Amps L2	Max Amps L3	Avg Amps L1	Avg Amps L2	Avg Amps L3	Baseline Amps for load analysis	10% Uplift for non active plant	Migration Load to from DSS105 to DSS170	Existing Load DSS170
DSS105 - Essential Critical Supply (Basement)	Start: 17/10/2020 12:17:59 End: 27/10/2020 11:17:55	600	600	400	361.3	274.3 Max kVA 250	303.8	172.7	182.4 Avg kVA 114	182.8	225 BL kVA 156	kVA 171		
DSS105 - Essential Non-Critical Supply (Basement)	Start: 17/10/2020 11:53:27 End: 27/10/2020 10:53:27	600	600	400	367.7	380.9 Max kVA 272	392.4	167.6	171.3 Avg kVA 116	171.1	260 BL kVA 180	kVA 198	ESSENTIAL kVA 370	
DSS105 - Non-Essential Supply (Basement)	Start: 17/10/2020 11:15:09 End: 27/10/2020 10:15:05	800	800	400	280.8	328.3 Max kVA 276	396.6	88.3	112.4 Avg kVA 78	103.4	180 BL kVA 125	kVA 137	NON-ESSENTIAL kVA 137	
DSS170 - T1-1 Transformer 1 - Incomer	Start: 25/09/2020 10:41:34 End: 05/10/2020 10:41:34	2500	2300	400	313.1	310 Max kVA 217	310.6	144.6	122.6 Avg kVA 100	136.9	225 BL kVA 156	kVA 171		Transformer 1 kVA 171
DSS170 - T1-5 Transformer 1 - Non Essential Supply to ASCO CTBS 1 - Supplying CCU Switchboard	Start: 07/10/2020 10:45:52 End: 17/10/2020 10:45:35	630	630	400	192.5	146.1 Max kVA 133	131.1	84.4	73.2 Avg kVA 58	63.3	120 BL kVA 83	kVA 91		
DSS170 - T1-6 Transformer 1 - Non-Essential Supply to ASCO CTBS 3 - Supplying Life Cycle Switchboard	Start: 25/09/2020 10:51:19 End: 05/10/2020 10:51:15	800	800	400	263.6	286.4 Max kVA 209	301.8	47.7	44.9 Avg kVA 33	48.2	125 BL kVA 87	kVA 95		
DSS170 - T2-1 Transformer 2 - Incomer	Start: 25/09/2020 11:10:13 End: 05/10/2020 11:10:13	2500	2300	400	359.8	377.7 Max kVA 266	383.7	260.5	265.2 Avg kVA 184	255.3	320 BL kVA 222	kVA 244		Transformer 2 kVA 244
DSS170 - T2-5 Transformer 2 - Non-Essential Supply to ASCO CTBS 2 - Supplying Life Cycle Switchboard	Start: 07/10/2020 10:58:24 End: 17/10/2020 10:58:24	630	630	400	263	235.7 Max kVA 182	246.3	163.8	146.3 Avg kVA 113	154.2	220 BL kVA 152	kVA 168		
DSS170 - T2-6 Transformer 3 - Non-Essential Supply to ASCO CTBS 4 - Supplying Life Cycle Switchboard	Start: 25/09/2020 11:18:18 End: 05/10/2020 11:18:18	800	800	400	170.9	208.2 Max kVA 155	224.3	114.6	130.6 Avg kVA 51	111.5	160 BL kVA 111	kVA 122		
DSS170 - T3-1 Transformer 3 - Incomer	Start: 25/09/2020 10:25:56 End: 05/10/2020 10:25:56	2500	2300	400	494.8	593.6 Max kVA 411	488.4	121.7	148.6 Avg kVA 103	115.2	325 BL kVA 225	kVA 248		Transformer 3 kVA 248
DSS170 - T3-2 Transformer 3 - Non-Essential Supply to Sub-Section Life Cycle Switchboard	Start: 25/09/2020 11:08:21 End: 05/10/2020 11:08:21	1600	1600	400	367.6	318.1 Max kVA 255	171.8	59.1	87.9 Avg kVA 61	40.8	150 BL kVA 104	kVA 114		DSS170 ESSENTIAL LOAD kVA 591

5.0 Conclusion

DSS105

- 1) The recorded essential load to be migrated onto DSS170 is 370kVA.
- 2) The recorded non-essential load to be migrated onto DSS170 is 137kVA.

DSS170

- 1) The recorded load on Transformer 1 is 171kVA, 11% Utilisation.
- 2) The recorded load on Transformer 2 is 244kVA, 15% Utilisation.
- 3) The recorded load on Transformer 3 is 248kVA, 16% Utilisation.

Transformer 3 is classified as the n+1 transformer so must account for transferred loads from T1 or T2 during maintenance or failure scenarios. Therefore for the purposes of this study the highest load from of 248kVA from T3 is added to T2 giving 492kVA, 31% Utilisation.

The annual location of the load study suggests the CCU Chillers were relatively dormant so to replicate a peak summertime load a manual addition of the Chiller and pumping system is needed.

Chillers 33 and 34 supply the cooling demand of the CCU in a run/standby configuration. Each chiller is rated at 500kW cooling capacity, a conservative COP of 3 gives an input electrical load of 166kW assuming a power of 0.9 equates to 184kVA.

A primary circulation pump of 15kW and secondary pump of 7.5kW is also taken, both are unity power factor as speed control is via a variable frequency drive. The revised total chiller load is 207kVA.

This is added to the 492kVA giving a revised load of 699kVA, 44% Utilisation.

- 4) The recorded essential load on DSS170 is 591kVA.

Displacement Power Factor (DPF)

The DPF ranged from 0.95 to 1 as indicated in three locations shown below; for generator assessment the monitored load will be taken at unity power e.g. 591kVA = 591kW.

The generators supporting CCU and Life Cycle Switchboard are two SDMO 1420 kVA / 1136kW in a n+1 configuration.

Based upon the monitored data the generators utilisation is currently 52%.

Migration of Phase 1 to 2 loads to DSS170

The following loads are to be migrated;

Essential load - 370kVA
Non-essential - 137kVA

Total load on Transformer = 507 kVA + 699kVA = 1206kVA, 75% Utilisation

Total load on Transformer without chiller = 507 kVA + (699 – 207) = 999kVA, 62% Utilisation

Total load on Generator = 370 kVA + 591 kVA = 961 kVA, 85% Utilisation

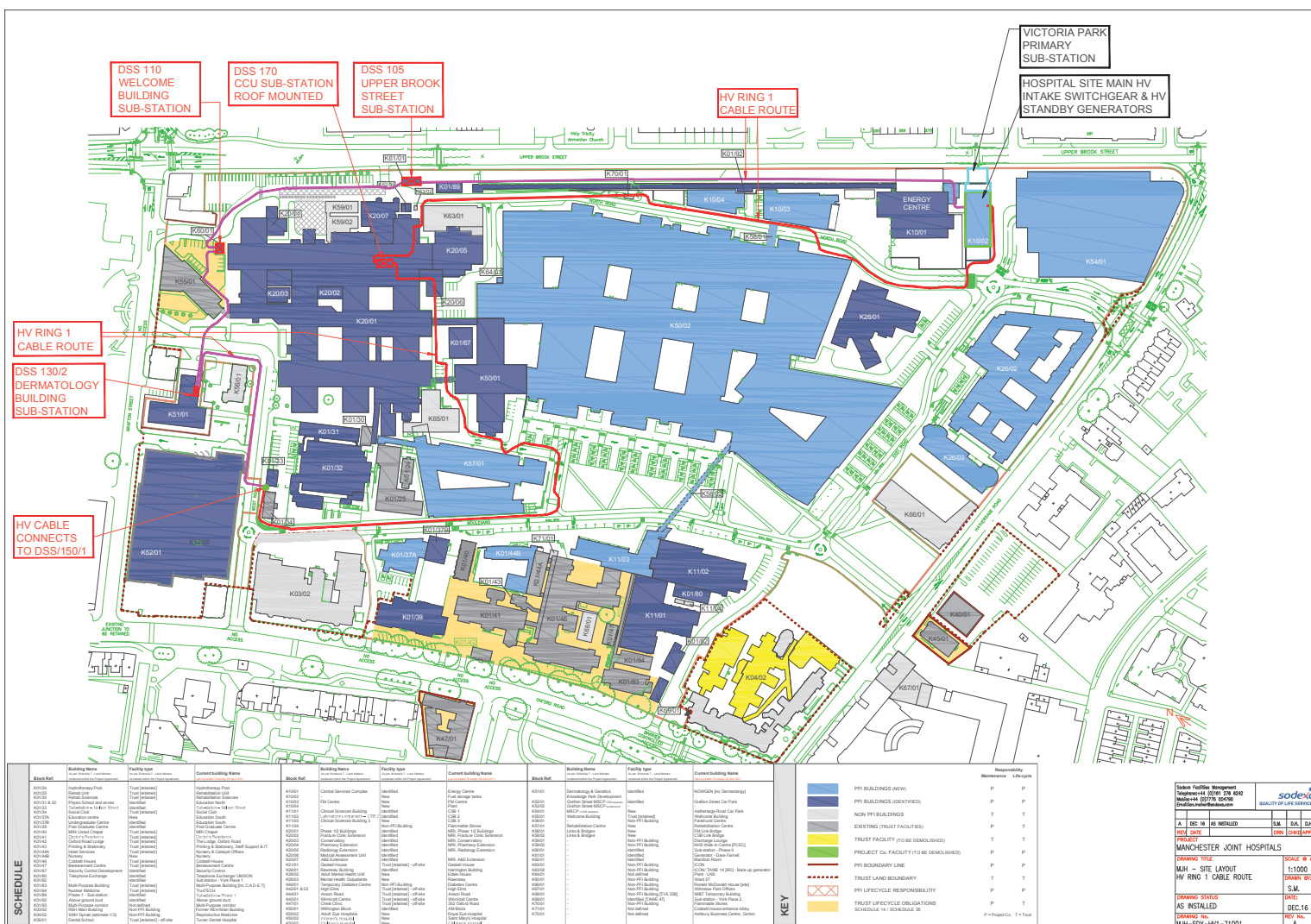
No further load can be added to CCU generators unless n generation is accepted which will require a derogation to HTM 06-01. Manual transfer switches exist on Chillers 33 and 34 which allows both to be switched to the generator should a prolonged utility outage occur at peak summertime temperature taking the revised generator load with one chiller connected to 1168kVA, 103 % utilisation.

Peak summertime load with migrated loads reveals an estimated nominal 15% (240kVA) and 22% (352kVA) spare transformer capacity on T1 and T2 above these values would require a derogation to HTM 06-01.

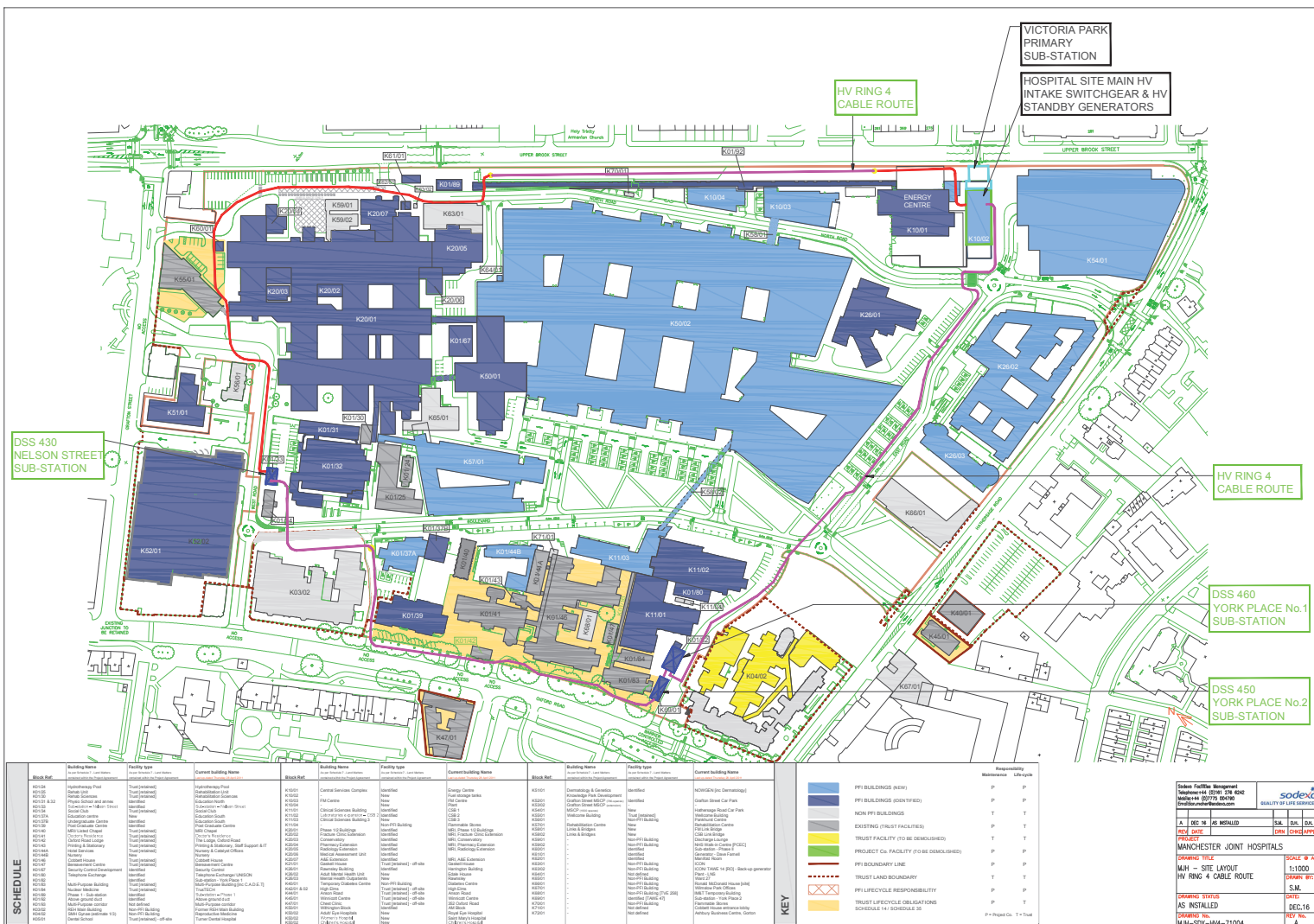
Appendix 8

Existing HV cable routes drawings

- MJH-SDX-HV1-71001 – MJH – Site Layout HV Ring 1 Cable route
- MJH-SDX-HV1-71003 – MJH – Site Layout HV Ring 3 Cable route
- MJH-SDX-HV1-71004 – MJH – Site Layout HV Ring 4 Cable route



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A DEC 16 AS INSTALLED		S.M.	D.L.
REV DATE		DRN	CHG/APP
MANCHESTER JOINT HOSPITALS			
DRAWING TITLE		SCALE	
MJH - SITE LAYOUT HV RHH 1 CABLE ROUTE		1:1000 DRAWING BY: S.M.	
DRAWING STATUS		DATE:	
AS INSTALLED		DEC.16	
M.M. COV. 1474 - 17001		REV. NO.	





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