



UNDERGROUND SAFETY COMMUNICATION SYSTEM

Audit and report of system effectiveness

FEBRUARY 7, 2023
SPRINGVALE COAL
980 Castlereagh Highway, Lidsdale, NSW 2790

WHS Enforceable Undertaking Condition.

Audit and Evaluation of USCS

12 months after the USCS has been established, an audit will be conducted to evaluate and report upon the USCS. This audit will consider the effectiveness of the USCS and, in particular, the safety benefits it has provided (and will continue to provide) to workers. A software system will be used to assess the use of the USCS.

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1. Introduction

Springvale has implemented the Underground Safety Communication System (USCS) based on the proposal previously set forward. This report will detail the effectiveness of the USCS regarding the enforceable terms outlined under the strategy.

The USCS is the system of Wifi access points and cabling that supports the wireless access to the various systems. The system has been installed over 9500m of underground roadway. The system comprised of 16 new MST Axon core network switches and 29 Axon Air wireless access points, these are supplied power and data through a combination of a fibre optic cabling and copper cabling.

Springvale Coal utilises a number of different devices for underground access to the USCS, previously (in the small form factor devices) it used the Ecom Smart Ex 01M and the Ecom Smart Ex 02 devices, all the Ecom Smart Ex 01 devices have been retired and the company has purchased replacement Ecom Smart Ex 02 devices. For the larger form factor Springvale has a number of the Ecom Smart Tab Ex 02 devices and is in the process of rolling out a number of new Becker IS930.M1 devices.

Springvale issues these devices through a Drager Rental Robot vending machine system. This system uses a touch screen display to allow users to select devices that they would like to borrow from the system. They then use a contactless card to identify themselves, this allows tracking of usage and identification of devices that have not been returned in a timely manner.



2. Audit Methodology

2.1 Physical Survey

The audit of the physical system was carried out by travelling to the locations listed (table of locations is shown in [Appendix C](#)) and undertaking the following tests and measurements. A signal strength test was completed using the Ubiquiti Networks Wifiman software application. This reported the signal strength in a dBm format. (“dBm or dBmW (decibel-milliwatts) is a unit of level used to indicate that a power level is expressed in decibels (dB) with reference to one milliwatt (mW).” <https://en.wikipedia.org/wiki/DBm>)

A test to access the Safety Management System was then completed through the downloading and opening of a document to confirm correct functionality was available. The final test conducted was a phone call made to a landline where a voice message was able to be left, this confirmed that 2 way communications were available. This physical audit also confirmed that the required applications were installed on a sample device that was available for service.

By undertaking this testing methodology, it also proved that the applications were available and functional on the device that was used for the testing. This device was issued from the Rental Robot vending machine using a standard user card, thus it is representative of the devices available to any of the users of the system.

2.2 Desktop Audit

A desktop audit was undertaken reviewing the data available from the phone call usage data to and from the devices being used to access the USCS underground, ie Smart Ex 02 devices. Tracking data available via the Mine Site Technologies Minedash system was reviewed against the path of the physical audit that was undertaken underground to confirm it aligned with the expected timings and path taken.

3. Report Findings

3.1 Wifi Coverage

The Springvale Safety Management System documents are available on all the devices when they have access to wifi coverage. A recent internal audit completed tested that wifi coverage and access to these documents was available at each cut through (C/T) in the main travelling road from 1C/T through to 115 C/T.

This audit identified 3 areas where a defect was present that was preventing access to the Safety Management System. These areas were raised as defects for investigation by the site's Control Systems Supervisors. The areas identified were 31C/T to 33C/T, 76C/T-79C/T and 102C/T-105C/T. Wifi coverage is available at these locations but access to the site systems was not functional at the time of the audit. After the audit the repairs were completed by the Control Systems department and the system has been reported as functional in these areas.

[Appendix C](#) contains the raw data for the audit of the underground network.

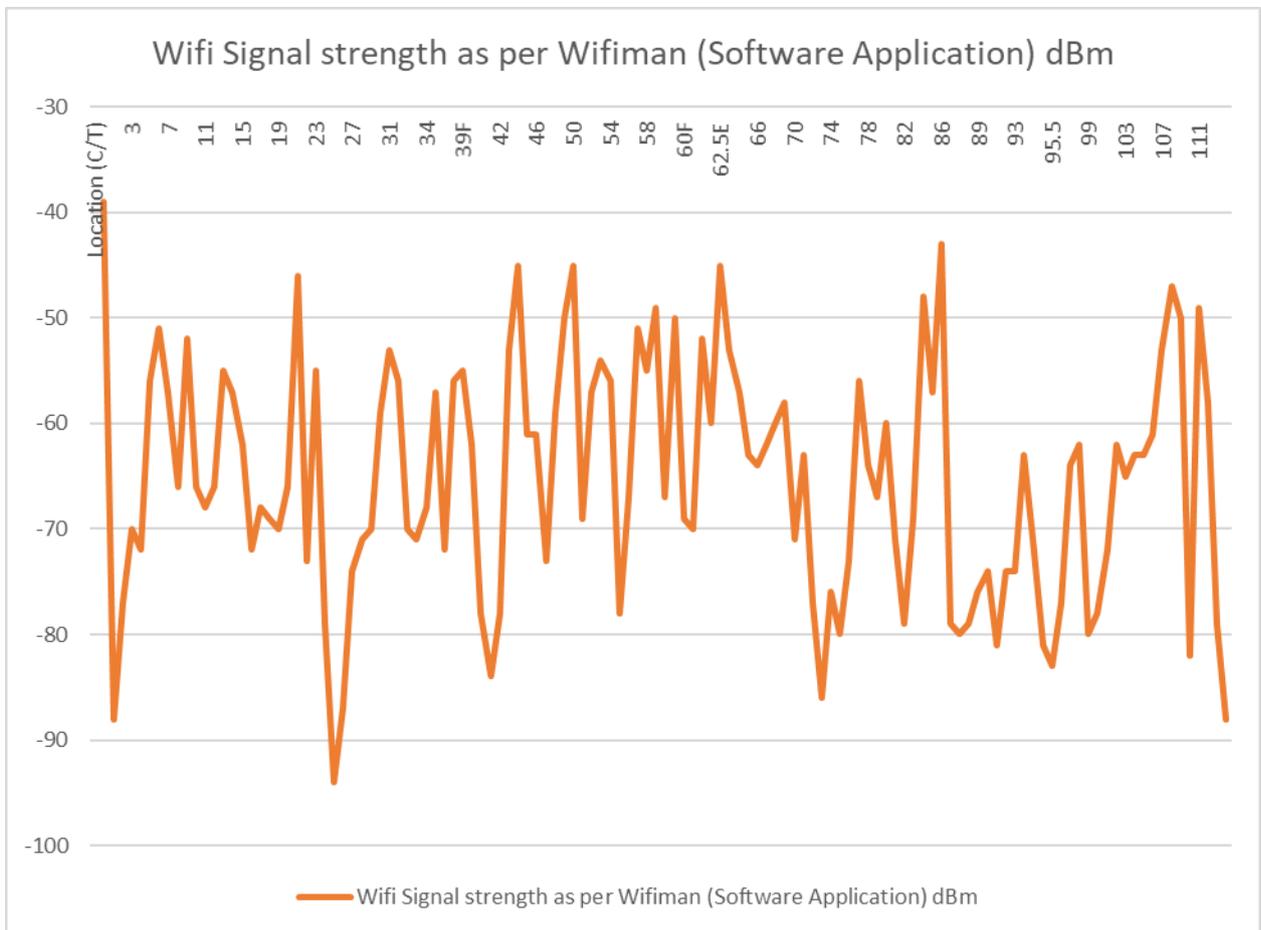


Diagram 1

Mine Site Technologies(MST) were engaged by Springvale in February 2022 to review the overall installation and ensure it was installed to the design. They also reviewed improvements that were identified during the commissioning of the system. Springvale has undertaken five of the six recommendations from the MST report and are in progress for getting the final recommendation (“Additional Access Point required between CT25 / 28.”) completed. Through improved antenna positioning we were able to achieve acceptable signal strength at 25C/T, 27C/T and 28C/T with 26C/T the only location where coverage is inconsistent. MST also identified “UMA Android phone indicated very slow response. This may be inherent to android wifi roaming capability” this impacts when travelling in vehicles that the android phones in use can be slow to “roam” to the next access point, this has caused some reports that the network is not functioning correctly, but on investigation has been found to be related to the roam when vehicles are travelling and is exacerbated by the metallic body of the vehicles reducing the signal strength visible to the devices.

3.2 Provides full access to SMS underground systems, including training packages

The access on the mobile devices allows policies, procedures and other documents are available via a web portal which has a search functionality. This allows the workers to search for safe work procedures on tasks and download a copy for reference onto the mobile device. Training packages are also available via the same system.

3.3 Links all underground work crews

The devices provide the ability for 2 way contact (phone, email or Microsoft Teams) to be made with personnel carrying the devices. Springvale has identified problems with the existing mobile devices when being used in vehicles that the signal is affected by the metallic body of the vehicle. This has made the 2 way nature of the devices less effective than anticipated. Springvale has also found that the devices are slow to switch between nodes underground which causes connectivity problems in moving vehicles. The devices are more useful as a tool for the person carrying it to call others rather than the receiving of calls especially when in a vehicle.

Springvale has made contact with a number of OEM suppliers to determine if a machine mounted wifi repeater is available, at this stage no mobile solution has been found to provide the functionality required.

Mine Site Technology has an underground wifi repeater but it is designed to be mounted in a fixed location and the currently is not suitable for the intended application of vehicle mounted repeating, where it is continually changing nodes connected to. Investigations are still on going for a solution that will improve in vehicle coverage.

3.4 Photographs and videos as a communication tool

The USCS has been successful in the intent to provide a means for transmitting both photographs and videos from underground workers and supervisors to the surface. This has been also included as a requirement of some TARPS to provide photographic evidence to the surface so appropriate decisions can be made. Video calling has been used with OEM providers to advise or work methodology for tasks at the production faces. These devices have been used to take photos for incident investigations, this has allowed photos to be transmitted to personnel on the surface to assess the situation and assist in the determining the next steps to take. These have been an effective tool in ensuring the correct components have been sourced when repairs have been required, this helps to ensure compliance as the personnel accessing the store can ensure the item is a exact match for the component requiring replacement.

3.5 Reduce delays in communication

The phone call usage data shows an increase in usage of approximately 127% from the period 1/1/2021-31/12/2021 when compared to compared to the period 8/12/2021-8/12/2022. Refer to [Appendix A](#) for further usage data tables. There has been an increase in call times from 42 hours in 2021 to 103 hours in 2022. This is a significant increase in usage of the system.

3.6 Enhanced Supervision and Governance Arrangements

Springvale is currently undertaking a trial of the use of a Electronic Planned Task Observation(PTO). This is implemented using the companies Enterprise Resource Planning tool (ERP), Pulse. The tool prompts the user and does not allow the user to submit an incomplete PTO. Text data can be entered using voice dictation to reduce the burden of typing on the devices.

There is development being undertaken on an electronic Job Safety Environmental Analysis and a Generic Lifting Plan and Permit. These utilise the same system at the electronic Planned Task Observation. They are at the proof of concept stage (samples are provided in [Appendix E](#)) which is to be viewed by relevant management to accept that they meet the minimum requirements to roll out for a workforce trial.

When these are completed they are then available to be viewed by supervisors on the ERP, this will allow a review of these items in short order in comparison to the paper based system where the supervisor would either need to get to the location to view the permit or wait until the permit is returned to the surface at the conclusion of the shift. They also allow for the attachment photos to the inspection during the process.

3.7 Reduces Administrative burden for workers

Springvale's Work Management System (WMS) is able to be updated from the mobile devices, the larger tablet style devices provide the best user experience but both can be used. The devices have the Microsoft Office suite of programs installed hence Microsoft Excel is available for Technical Services to record their data as required.

A further way that we have reduced the burden on our workforce was to combine the gas detectors and the phone style devices for issuing in the vending machine. Whereas previously the Mining Officials that required a Gas Detector would also have to separately issue their mobile device, we have now made this a one step process where they issue a Set of items which includes their gas detector and the phone device.

3.8 Provides for enhanced emergency management

Personnel and Vehicle tracking data is readily available from the USCS. Through the increased coverage it has provided significantly increased resolution to the locations of personnel and equipment. The tags are tracked when a person passes a node. Previously Springvale only had limited nodes in the outbye areas, typically in the cut throughs with belt starters in them, this provided limited coverage that spilled out to the travel road. The new system provides regular nodes that allow the location of tags to be narrowed to a much smaller area. A sample data set is provided in [Appendix B](#).

Previous nodes map

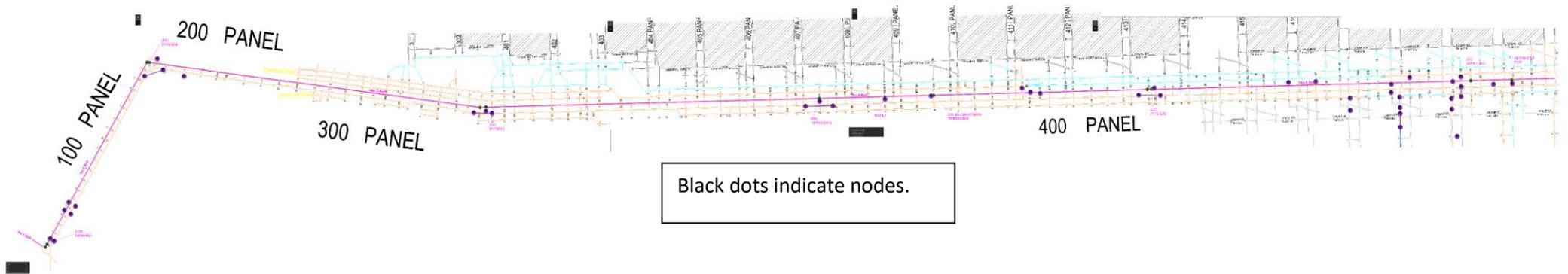


Diagram 2

Current nodes map

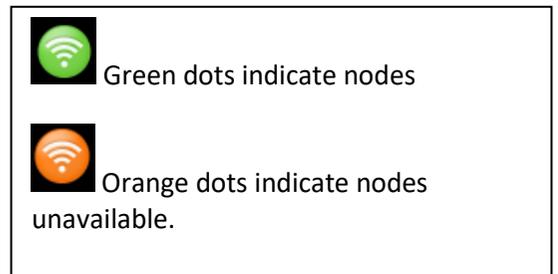
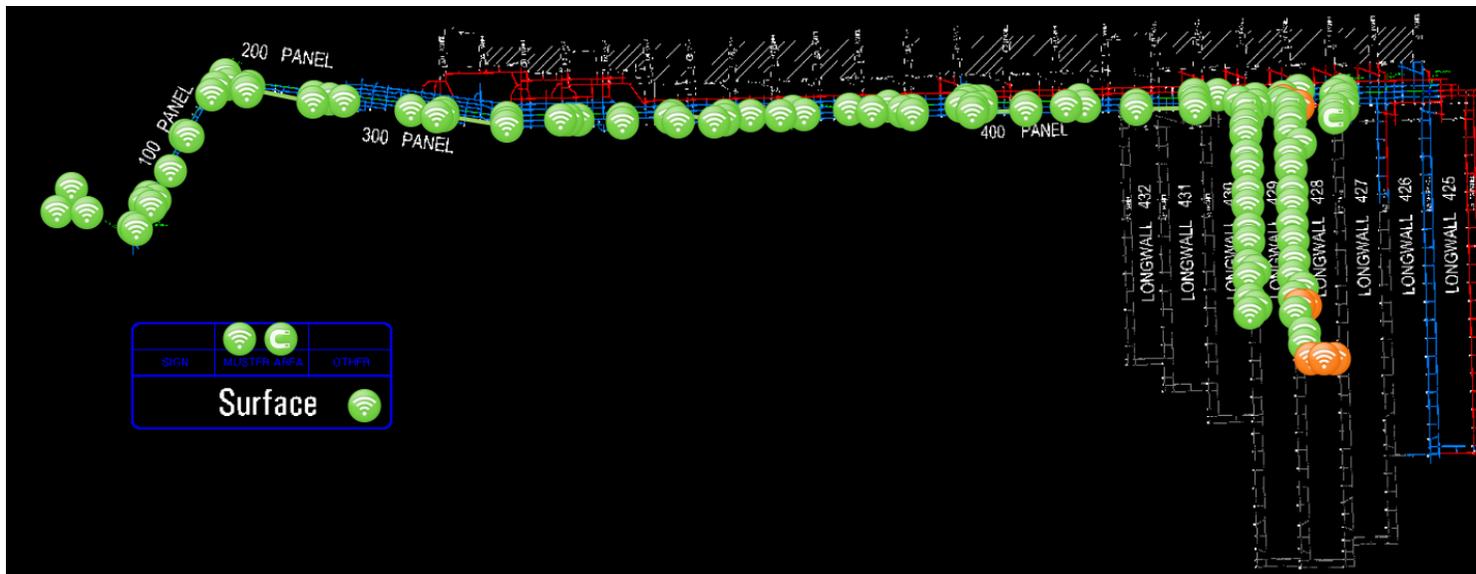


Diagram 3

4. Discussion

Springvale has provided significantly improved access to the network. This can be seen from the audit where networks access was available from 88.7% of Cut Throughs in the main travelling road of the mine. The repairs that have since taken place of the defects should have increased this to 99.1% of Cut Throughs in the main travelling road having network access available.

We have found we have increased the volume of calls from the 2586 calls in 2021 to 5872 calls in 2022 an increase of 127%. The total call duration has had a corresponding similar increase from 42 hours and 20 minutes up to 103 hours and 18 minutes.

We have seen increasing acceptance of the technology as time has progressed, as is typical across general populations we have a spread of user acceptance. This is expected to continue as further technologies that utilise the USCS are rolled out. Examples of one of these technologies are electronic work order inspections. It is intended that these will help to prompt the users on specific requirements and allow for integration of photo taking at particular stages to provide condition of the equipment after servicing.

Items that we have found that require further investigation and work are there is limited coverage in vehicles, user competence varies and device reliability.

Limited coverage in vehicles appears to have a number of factors that affects it. The metallic body of the vehicles reduces the signal strength that the devices receive from the typically roof mounted nodes. This is exacerbated by the fact that devices are typical worn belt mounted so are generally low down in the cabin of the vehicle and thus further shielded. For this item we are discussing with a number of OEM manufacturers about options to improve coverage in vehicles, one option being considered is a on vehicle repeater but this adds complexity to achieve with existing vehicles relating to mounting locations, power supply availability and suitability of repeaters for the mining environment including use in hazardous zones. Repeaters for fixed applications are available but they have as yet been unsuccessful for use in moving vehicles.

User competence varies when using the portable devices. These devices are an android device and whilst training has been provided to provide basic usage instructions, some users still have challenges with the interface especially as the operation varies from iOS devices. The applications operate slightly differently to standard through the use of Voice over Internet Protocol (VOIP), this requires the user to open the VOIP application when they get the phone from the vending machine to ensure it is available to receive calls. This is a pain point for the users and at this point we have been unable to find a reliable way to automate this process with the devices.

The device reliability has been mixed, the physical robustness of the devices has been excellent with minimal cases of physical damage occurring. The batteries in the devices have proven to be a weak point requiring periodic replacement a rapid decline in holding charge. The chargers for the devices have shown to be a weakness point in the device issuing process, if the prior user does not correctly put the device on charge (this can be from a failure of the charging contacts in the charger) then the subsequent user may have to issue any additional device and return the uncharged device. We have also found the VOIP application to have sporadic reliability issues that causes the application to crash and require it to be restarted. When undertaking the underground audit this occurred once during the approximately 120 phone calls that were made, this is significantly more calls than a typical user would make during an average shift.

5. Conclusion

The system has provided significantly improved access to Safety Management System documents through out the mine, in particular in the outbye districts of the mine. The usage of the system is continuing to grow as users become more familiar with the capabilities.

There are varying degrees of acceptance of the system through the workforce from high level understanding and use of the system through to users who have challenges with the applications and devices.

The portable devices available have some current issues relating to reliability of operation due to the small number of suitable devices available for use in an underground coal mine for purchase.

Other benefits that have been introduced because of this role out is the Digital Planned Task Observation and the future role out of the Digital work orders. Another idea that is being assessed for the future is a digital incident investigation form.

Overall the system provides a significantly improved access to data, in particular the Safety Management System, communications, both verbal and video, and an increased resolution of tracking data in case of an emergency situation.

6. Appendix

6.1 Appendix A

USCS Call usage data 1/1/21-31/12/21

Activity period	ACD calls handled	Non ACD calls handled	Total Inbound calls	Calls outbound	Outbound handling time (hh:mm:ss)
00:00	0	7	7	24	00:20:40
00:15	0	5	5	22	00:16:10
00:30	0	6	6	21	00:19:17
00:45	0	1	1	16	00:18:33
01:00	0	6	6	27	00:22:46
01:15	0	5	5	17	00:14:35
01:30	0	6	6	24	00:30:02
01:45	0	7	7	28	00:19:23
02:00	0	5	5	13	00:13:38
02:15	0	5	5	14	00:09:17
02:30	0	7	7	5	00:03:40
02:45	0	8	8	18	00:12:57
03:00	0	5	5	12	00:12:49
03:15	0	3	3	11	00:16:27
03:30	0	8	8	14	00:20:45
03:45	2	10	12	18	00:20:29
04:00	1	7	8	8	00:10:10
04:15	0	12	12	9	00:15:48
04:30	0	5	5	8	00:11:26
04:45	0	8	8	19	00:15:52
05:00	0	11	11	12	00:18:56
05:15	0	13	13	22	00:27:02
05:30	2	3	5	19	00:22:37
05:45	5	8	13	33	00:29:47
06:00	2	7	9	23	00:39:02
06:15	1	4	5	52	00:38:41
06:30	3	5	8	21	00:26:48
06:45	5	5	10	36	00:23:38
07:00	3	2	5	15	00:10:17
07:15	6	2	8	17	00:11:58
07:30	9	1	10	29	00:50:55
07:45	8	5	13	36	00:41:53
08:00	2	5	7	35	00:38:25
08:15	10	2	12	23	00:17:33
08:30	4	2	6	24	00:21:44
08:45	6	5	11	30	00:31:01
09:00	9	5	14	41	00:38:39
09:15	4	7	11	18	00:24:03
09:30	6	6	12	19	00:14:41
09:45	8	3	11	21	00:16:13
10:00	5	6	11	21	00:28:33
10:15	4	8	12	31	00:23:32
10:30	6	4	10	27	00:30:16

10:45	7	5	12	19	00:14:04
11:00	5	4	9	14	00:21:42
11:15	2	5	7	29	00:33:38
11:30	7	8	15	33	00:31:31
11:45	9	4	13	23	00:27:32
12:00	5	3	8	32	00:39:21
12:15	6	3	9	36	00:36:06
12:30	7	8	15	43	01:06:04
12:45	9	9	18	41	00:32:10
13:00	10	5	15	51	01:06:17
13:15	9	7	16	46	00:33:49
13:30	10	6	16	34	00:38:49
13:45	9	8	17	45	00:57:06
14:00	5	5	10	48	00:33:43
14:15	6	6	12	38	00:31:43
14:30	5	4	9	47	00:36:13
14:45	4	17	21	43	00:46:41
15:00	9	15	24	48	00:33:50
15:15	17	2	19	48	00:42:48
15:30	10	9	19	34	00:38:39
15:45	7	6	13	40	00:25:00
16:00	5	4	9	32	00:25:31
16:15	6	7	13	39	00:24:10
16:30	4	7	11	37	00:37:24
16:45	4	9	13	20	00:13:09
17:00	3	3	6	24	00:24:35
17:15	1	3	4	13	00:11:14
17:30	1	3	4	12	00:16:57
17:45	1	4	5	15	00:19:49
18:00	1	3	4	22	00:23:59
18:15	3	3	6	30	00:35:40
18:30	2	4	6	21	00:18:31
18:45	3	3	6	21	00:19:21
19:00	1	3	4	12	00:13:26
19:15	3	0	3	29	00:19:14
19:30	2	2	4	44	00:54:42
19:45	3	3	6	33	00:29:52
20:00	2	3	5	25	00:36:30
20:15	1	7	8	48	00:39:36
20:30	7	6	13	40	00:50:08
20:45	3	9	12	26	00:26:50
21:00	3	18	21	39	00:35:09
21:15	3	16	19	40	00:42:26
21:30	8	9	17	27	00:26:13
21:45	0	11	11	19	00:12:18
22:00	1	4	5	28	00:22:43
22:15	0	6	6	20	00:10:53
22:30	1	5	6	18	00:19:54
22:45	1	6	7	17	00:18:57
23:00	1	8	9	32	00:15:15
23:15	2	3	5	33	00:26:30
23:30	0	8	8	23	00:20:25
23:45	4	3	7	22	00:11:13
Totals	349	567	916	2586	42:20:18

USCS Call usage data 8/12/21-8/12/22

Extension Group Performance by Period

1400 - Springvale

08/12/2021 - 08/12/2022 - 00:00 - 24:00

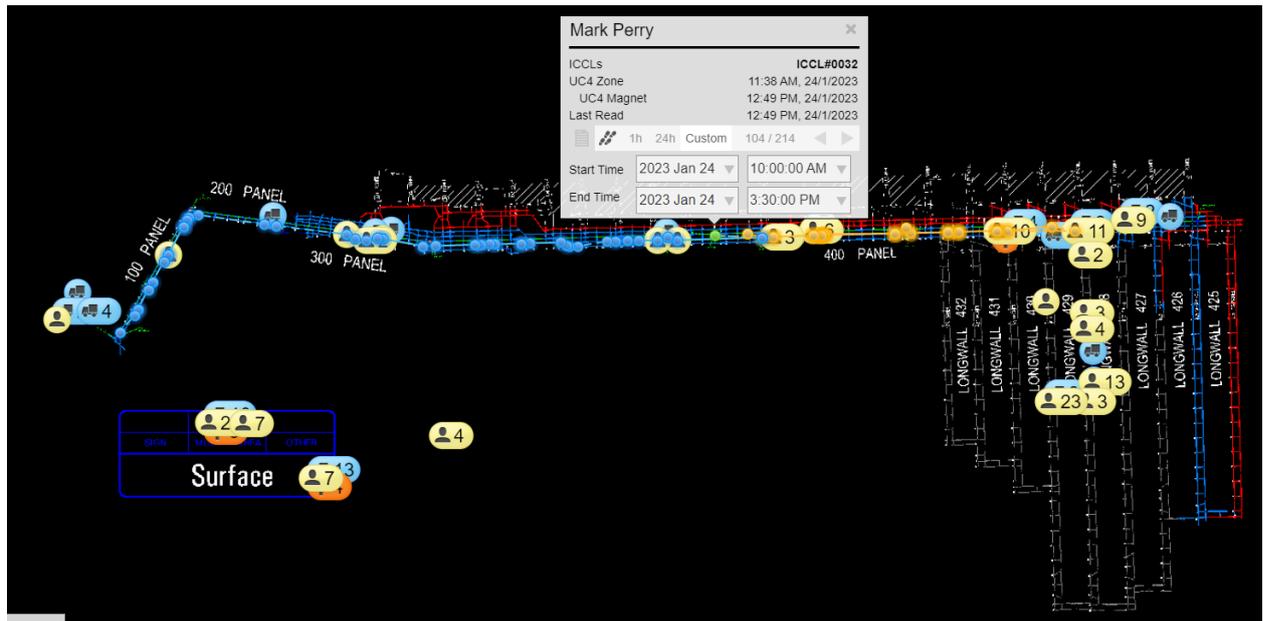
Created on 23/01/2023 11:26:16 by mick.hurst

Activity period	ACD calls handled	Non ACD alls handled	Incoming calls Handled	Calls abandoned	Calls outbound	Outbound handling time (hh:mm:ss)
00:00	1	17	18	18	50	00:37:24
00:15	1	11	12	21	78	01:16:16
00:30	1	20	21	27	66	00:58:08
00:45	0	12	12	18	69	01:03:00
01:00	0	16	16	29	38	00:29:43
01:15	3	15	18	26	62	01:03:32
01:30	2	13	15	19	72	00:54:25
01:45	0	16	16	21	62	00:46:50
02:00	1	10	11	23	62	00:52:00
02:15	7	12	19	19	56	02:06:54
02:30	0	17	17	23	46	00:39:33
02:45	0	11	11	21	51	00:38:46
03:00	2	10	12	17	46	00:37:07
03:15	1	22	23	27	49	00:50:49
03:30	1	11	12	16	42	00:45:14
03:45	1	21	22	15	39	00:42:18
04:00	1	15	16	26	40	00:37:57
04:15	0	26	26	30	48	00:54:26
04:30	1	17	18	24	49	00:54:15
04:45	2	10	12	17	44	00:51:47
05:00	0	15	15	31	31	00:35:05
05:15	1	16	17	32	50	01:21:28
05:30	1	9	10	20	38	00:38:02
05:45	2	14	16	26	51	00:53:35
06:00	4	11	15	27	48	01:12:33
06:15	2	11	13	29	60	01:26:41
06:30	5	7	12	11	34	00:47:46
06:45	7	7	14	15	22	00:29:07
07:00	7	3	10	6	41	00:32:08
07:15	14	6	20	27	76	00:42:44
07:30	11	3	14	28	58	00:28:14
07:45	8	9	17	21	69	00:32:39
08:00	17	11	28	31	64	00:59:51
08:15	16	10	26	29	85	01:10:50
08:30	16	9	25	34	84	01:15:38
08:45	15	13	28	24	64	01:11:55
09:00	18	14	32	31	74	01:15:02
09:15	12	6	18	26	79	01:49:47
09:30	22	15	37	30	82	01:26:27
09:45	17	19	36	34	69	01:09:17
10:00	24	17	41	25	71	01:13:50
10:15	13	15	28	30	87	01:21:18
10:30	21	10	31	33	92	01:32:14
10:45	28	20	48	29	94	01:23:20
11:00	17	12	29	26	86	01:23:43

11:15	13	17	30	33	104	01:43:00
11:30	16	20	36	37	97	02:11:05
11:45	16	15	31	27	74	01:36:49
12:00	14	10	24	31	83	01:28:52
12:15	19	11	30	30	77	01:35:01
12:30	17	19	36	32	90	01:19:47
12:45	21	12	33	23	72	01:20:02
13:00	28	22	50	29	102	01:35:02
13:15	22	15	37	32	81	02:03:26
13:30	19	11	30	28	78	01:30:57
13:45	28	6	34	26	91	02:10:27
14:00	18	13	31	45	99	01:44:00
14:15	22	14	36	33	74	00:49:45
14:30	18	7	25	24	54	01:09:45
14:45	15	7	22	28	60	01:00:12
15:00	18	10	28	25	90	01:21:58
15:15	14	14	28	21	70	01:00:47
15:30	21	13	34	28	77	01:02:23
15:45	11	13	24	21	55	00:55:47
16:00	11	19	30	20	78	01:23:10
16:15	18	11	29	26	62	00:59:53
16:30	10	11	21	24	64	01:26:30
16:45	14	18	32	34	69	01:16:40
17:00	11	9	20	31	48	01:10:15
17:15	12	18	30	21	52	00:51:48
17:30	10	10	20	21	60	01:11:47
17:45	10	9	19	23	44	00:48:57
18:00	11	12	23	16	65	00:50:10
18:15	4	5	9	13	39	00:36:31
18:30	7	4	11	10	39	00:31:33
18:45	4	6	10	9	52	00:38:36
19:00	2	5	7	15	31	00:24:53
19:15	0	2	2	5	40	00:37:55
19:30	0	2	2	5	28	00:26:21
19:45	5	5	10	17	46	01:10:59
20:00	3	3	6	11	52	02:01:02
20:15	3	7	10	17	53	00:59:01
20:30	3	15	18	34	53	00:52:28
20:45	7	12	19	14	56	01:09:13
21:00	4	11	15	21	62	01:12:52
21:15	1	11	12	19	54	01:04:48
21:30	2	9	11	22	52	00:48:02
21:45	0	13	13	24	55	00:45:18
22:00	0	13	13	25	59	00:53:10
22:15	2	8	10	21	33	00:22:12
22:30	0	11	11	16	48	01:16:17
22:45	1	10	11	14	46	02:00:57
23:00	2	16	18	14	55	00:47:30
23:15	2	12	14	28	62	00:58:58
23:30	0	9	9	14	61	00:50:05
23:45	3	5	8	30	48	00:38:25
Totals	835	1144	1979	2259	5872	103:18:59

6.2 Appendix B

Sample personnel tracking



Sample data file for tracking details

Entity Type	Entity Name	Area	Zone	Time
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 9:58
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 10:00
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 10:03
PERSONNEL	Mark Perry	UC5 Zone	Inbye UC5	24/01/2023 10:03
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 10:04
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 10:05
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 10:06
PERSONNEL	Mark Perry	UC5 Zone	Inbye 104 C/T	24/01/2023 10:06
PERSONNEL	Mark Perry	UC5 Zone	UC429 Drivehead	24/01/2023 10:09
PERSONNEL	Mark Perry	UC5 Zone	Inbye 104 C/T	24/01/2023 10:09
PERSONNEL	Mark Perry	UC5 Zone	113 C/T	24/01/2023 10:11
PERSONNEL	Mark Perry	UC5 Zone	Inbye 104 C/T	24/01/2023 10:26
PERSONNEL	Mark Perry	UC5 Zone	113 C/T	24/01/2023 10:30
PERSONNEL	Mark Perry	UC5 Zone	UC429 Drivehead	24/01/2023 10:30
PERSONNEL	Mark Perry	UC5 Zone	Inbye 104 C/T	24/01/2023 10:33
PERSONNEL	Mark Perry	UC5 Zone	UC429 Drivehead	24/01/2023 10:35
PERSONNEL	Mark Perry	UC5 Zone	Inbye 104 C/T	24/01/2023 10:35
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 10:55
PERSONNEL	Mark Perry	UC5 Zone	Inbye 104 C/T	24/01/2023 10:55
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 10:59
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:03
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 11:03
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:03

Entity Type	Entity Name	Area	Zone	Time
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 11:04
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:05
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 11:05
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:07
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 11:07
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:08
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 11:11
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:11
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 11:12
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:12
PERSONNEL	Mark Perry	UC5 Zone	Outbye 104 C/T	24/01/2023 11:12
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:12
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:15
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:15
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:16
PERSONNEL	Mark Perry	UC5 Zone	Inbye 99 C/T	24/01/2023 11:16
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:16
PERSONNEL	Mark Perry	UC5 Zone	Inbye UC5	24/01/2023 11:22
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:23
PERSONNEL	Mark Perry	UC5 Zone	Inbye UC5	24/01/2023 11:23
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:24
PERSONNEL	Mark Perry	UC5 Zone	Inbye UC5	24/01/2023 11:25
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:25
PERSONNEL	Mark Perry	UC5 Zone	Inbye UC5	24/01/2023 11:26
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:26
PERSONNEL	Mark Perry	UC5 Zone	Inbye UC5	24/01/2023 11:30
PERSONNEL	Mark Perry	UC5 Zone	Outbye 99 C/T	24/01/2023 11:34
PERSONNEL	Mark Perry	UC5 Zone	Inbye UC5	24/01/2023 11:34
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:36
PERSONNEL	Mark Perry	UC5 Zone	UC5 Drivehead	24/01/2023 11:37
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:37
PERSONNEL	Mark Perry	UC5 Zone	UC5 Drivehead	24/01/2023 11:38
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:38
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 11:44
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:45
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 11:45
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:46
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:47
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 11:48
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:48
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:48
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 11:49
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:51
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:53

Entity Type	Entity Name	Area	Zone	Time
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 11:53
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:54
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:54
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:54
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:56
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:57
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 11:57
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:57
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC5	24/01/2023 11:58
PERSONNEL	Mark Perry	UC4 Zone	86 CT Stopover	24/01/2023 11:58
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 12:04
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:05
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 12:05
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:05
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 12:06
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:06
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 12:06
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:06
PERSONNEL	Mark Perry	UC4 Zone	Inbye 86 C/T	24/01/2023 12:07
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:19
PERSONNEL	Mark Perry	UC4 Zone	Inbye 81 C/T	24/01/2023 12:23
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:24
PERSONNEL	Mark Perry	UC4 Zone	Inbye 81 C/T	24/01/2023 12:25
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:26
PERSONNEL	Mark Perry	UC4 Zone	Inbye 81 C/T	24/01/2023 12:27
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:31
PERSONNEL	Mark Perry	UC4 Zone	Inbye 81 C/T	24/01/2023 12:32
PERSONNEL	Mark Perry	UC4 Zone	Outbye 86 C/T	24/01/2023 12:33
PERSONNEL	Mark Perry	UC4 Zone	Inbye 81 C/T	24/01/2023 12:34
PERSONNEL	Mark Perry	UC4 Zone	Outbye 81 C/T	24/01/2023 12:35
PERSONNEL	Mark Perry	UC4 Zone	79 C/T Dewater	24/01/2023 12:38
PERSONNEL	Mark Perry	UC4 Zone	Outbye 81 C/T	24/01/2023 12:39
PERSONNEL	Mark Perry	UC4 Zone	Inbye 81 C/T	24/01/2023 12:46
PERSONNEL	Mark Perry	UC4 Zone	Outbye 81 C/T	24/01/2023 12:47
PERSONNEL	Mark Perry	UC4 Zone	Inbye 81 C/T	24/01/2023 12:47
PERSONNEL	Mark Perry	UC4 Zone	Outbye 81 C/T	24/01/2023 12:47
PERSONNEL	Mark Perry	UC4 Zone	UC4 Magnet	24/01/2023 12:49
PERSONNEL	Mark Perry	UC4 Zone	Outbye 81 C/T	24/01/2023 12:50
PERSONNEL	Mark Perry	UC4 Zone	Inbye UC4 Tripper	24/01/2023 12:51
PERSONNEL	Mark Perry	UC4 Zone	Outbye 81 C/T	24/01/2023 12:55
PERSONNEL	Mark Perry	UC4 Zone	Inbye UC4 Tripper	24/01/2023 12:55
PERSONNEL	Mark Perry	UC4 Zone	Outbye 81 C/T	24/01/2023 12:55
PERSONNEL	Mark Perry	UC4 Zone	Inbye UC4 Tripper	24/01/2023 12:56
PERSONNEL	Mark Perry	UC4 Zone	UC4 Tripper	24/01/2023 13:02

Entity Type	Entity Name	Area	Zone	Time
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC4 Tripper	24/01/2023 13:04
PERSONNEL	Mark Perry	UC4 Zone	UC4 Tripper	24/01/2023 13:04
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC4 Tripper	24/01/2023 13:06
PERSONNEL	Mark Perry	UC4 Zone	UC4 Tripper	24/01/2023 13:07
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC4 Tripper	24/01/2023 13:07
PERSONNEL	Mark Perry	UC4 Zone	Inbye 66 C/T	24/01/2023 13:08
PERSONNEL	Mark Perry	UC4 Zone	Outbye UC4 Tripper	24/01/2023 13:09
PERSONNEL	Mark Perry	UC4 Zone	Inbye 66 C/T	24/01/2023 13:10
PERSONNEL	Mark Perry	UC4 Zone	Outbye 66 C/T	24/01/2023 13:12
PERSONNEL	Mark Perry	UC4 Zone	Inbye 63 C/T	24/01/2023 13:14
PERSONNEL	Mark Perry	UC4 Zone	Outbye 66 C/T	24/01/2023 13:16
PERSONNEL	Mark Perry	UC4 Zone	Inbye 63 C/T	24/01/2023 13:17
PERSONNEL	Mark Perry	UC4 Zone	Outbye 66 C/T	24/01/2023 13:18
PERSONNEL	Mark Perry	UC4 Zone	Inbye 63 C/T	24/01/2023 13:18
PERSONNEL	Mark Perry	UC4 Zone	Inbye 62 C/T	24/01/2023 13:23
PERSONNEL	Mark Perry	UC4 Zone	Inbye 59 CT	24/01/2023 13:25
PERSONNEL	Mark Perry	UC4 Zone	Inbye 58 C/T	24/01/2023 13:37
PERSONNEL	Mark Perry	UC4 Zone	Outbye 58 C/T	24/01/2023 13:39
PERSONNEL	Mark Perry	UC4 Zone	Inbye 58 C/T	24/01/2023 13:40
PERSONNEL	Mark Perry	UC4 Zone	Outbye 58 C/T	24/01/2023 13:40
PERSONNEL	Mark Perry	UC4 Zone	Inbye 54 C/T	24/01/2023 13:42
PERSONNEL	Mark Perry	UC4 Zone	Outbye 58 C/T	24/01/2023 13:42
PERSONNEL	Mark Perry	UC4 Zone	Inbye 54 C/T	24/01/2023 13:43
PERSONNEL	Mark Perry	UC4 Zone	Outbye 58 C/T	24/01/2023 13:43
PERSONNEL	Mark Perry	UC4 Zone	Inbye 54 C/T	24/01/2023 13:44
PERSONNEL	Mark Perry	UC4 Zone	Outbye 54 C/T	24/01/2023 13:46
PERSONNEL	Mark Perry	UC4 Zone	Inbye 50 C/T	24/01/2023 13:46
PERSONNEL	Mark Perry	UC4 Zone	Outbye 54 C/T	24/01/2023 13:46
PERSONNEL	Mark Perry	UC4 Zone	Inbye 50 C/T	24/01/2023 13:48
PERSONNEL	Mark Perry	UC4 Zone	Outbye 54 C/T	24/01/2023 13:48
PERSONNEL	Mark Perry	UC4 Zone	Inbye 49 C/T	24/01/2023 13:49
PERSONNEL	Mark Perry	UC4 Zone	Outbye 54 C/T	24/01/2023 13:50
PERSONNEL	Mark Perry	UC4 Zone	Inbye 50 C/T	24/01/2023 13:50
PERSONNEL	Mark Perry	UC4 Zone	Outbye 54 C/T	24/01/2023 13:50
PERSONNEL	Mark Perry	UC4 Zone	Inbye 50 C/T	24/01/2023 13:50
PERSONNEL	Mark Perry	UC4 Zone	Outbye 54 C/T	24/01/2023 13:50
PERSONNEL	Mark Perry	UC4 Zone	Inbye 50 C/T	24/01/2023 13:50
PERSONNEL	Mark Perry	UC4 Zone	Outbye 54 C/T	24/01/2023 13:52
PERSONNEL	Mark Perry	UC4 Zone	-	24/01/2023 13:52
PERSONNEL	Mark Perry	UC4 Zone	Inbye 49 C/T	24/01/2023 13:53
PERSONNEL	Mark Perry	UC4 Zone	Outbye 49 C/T	24/01/2023 13:54
PERSONNEL	Mark Perry	UC4 Zone	Inbye 49 C/T	24/01/2023 13:54
PERSONNEL	Mark Perry	UC4 Zone	Outbye 49 C/T	24/01/2023 13:54
PERSONNEL	Mark Perry	UC4 Zone	Inbye UC4	24/01/2023 13:58

Entity Type	Entity Name	Area	Zone	Time
PERSONNEL	Mark Perry	UC4 Zone	Outbye 49 C/T	24/01/2023 13:58
PERSONNEL	Mark Perry	UC4 Zone	Inbye UC4	24/01/2023 13:59
PERSONNEL	Mark Perry	UC4 Zone	Outbye 49 C/T	24/01/2023 13:59
PERSONNEL	Mark Perry	UC4 Zone	Inbye UC4	24/01/2023 14:00
PERSONNEL	Mark Perry	UC3 Zone	Ouybye UC4	24/01/2023 14:01
PERSONNEL	Mark Perry	UC3 Zone	Inbye 39 C/T	24/01/2023 14:05
PERSONNEL	Mark Perry	UC3 Zone	Ouybye UC4	24/01/2023 14:06
PERSONNEL	Mark Perry	UC3 Zone	Inbye 39 C/T	24/01/2023 14:06
PERSONNEL	Mark Perry	UC3 Zone	Ouybye UC4	24/01/2023 14:06
PERSONNEL	Mark Perry	UC3 Zone	Inbye 39 C/T	24/01/2023 14:06
PERSONNEL	Mark Perry	UC3 Zone	-	24/01/2023 14:11
PERSONNEL	Mark Perry	UC3 Zone	Inbye 39 C/T	24/01/2023 14:11
PERSONNEL	Mark Perry	UC3 Zone	-	24/01/2023 14:13
PERSONNEL	Mark Perry	UC3 Zone	Inbye 39 C/T	24/01/2023 14:13
PERSONNEL	Mark Perry	UC3 Zone	-	24/01/2023 14:13
PERSONNEL	Mark Perry	UC3 Zone	Outbye 39 C/T	24/01/2023 14:14
PERSONNEL	Mark Perry	UC3 Zone	Inbye 36 C/T	24/01/2023 14:17
PERSONNEL	Mark Perry	UC3 Zone	Outbye 36 C/T	24/01/2023 14:18
PERSONNEL	Mark Perry	UC3 Zone	Inbye 36 C/T	24/01/2023 14:18
PERSONNEL	Mark Perry	UC3 Zone	Outbye 36 C/T	24/01/2023 14:19
PERSONNEL	Mark Perry	UC3 Zone	Inbye 29 C/T	24/01/2023 14:33
PERSONNEL	Mark Perry	UC3 Zone	Outbye 29 C/T	24/01/2023 14:37
PERSONNEL	Mark Perry	UC3 Zone	Inbye 29 C/T	24/01/2023 14:37
PERSONNEL	Mark Perry	UC3 Zone	Outbye 29 C/T	24/01/2023 14:37
PERSONNEL	Mark Perry	UC3 Zone	Inbye 29 C/T	24/01/2023 14:43
PERSONNEL	Mark Perry	UC3 Zone	Inbye UC3	24/01/2023 14:52
PERSONNEL	Mark Perry	UC2 Zone	Outbye UC3	24/01/2023 14:54
PERSONNEL	Mark Perry	UC2 Zone	Inbye 19 C/T	24/01/2023 14:56
PERSONNEL	Mark Perry	UC2 Zone	Outbye UC3	24/01/2023 14:56
PERSONNEL	Mark Perry	UC2 Zone	Inbye 19 C/T	24/01/2023 14:57
PERSONNEL	Mark Perry	UC2 Zone	Outbye UC3	24/01/2023 14:57
PERSONNEL	Mark Perry	UC2 Zone	Inbye 19 C/T	24/01/2023 14:57
PERSONNEL	Mark Perry	UC2 Zone	Outbye 19 C/T	24/01/2023 14:58
PERSONNEL	Mark Perry	UC2 Zone	Inbye 14 C/T	24/01/2023 15:02
PERSONNEL	Mark Perry	UC2 Zone	Outbye 19 C/T	24/01/2023 15:02
PERSONNEL	Mark Perry	UC2 Zone	Inbye 14 C/T	24/01/2023 15:03
PERSONNEL	Mark Perry	UC2 Zone	Outbye 19 C/T	24/01/2023 15:04
PERSONNEL	Mark Perry	UC2 Zone	Inbye 14 C/T	24/01/2023 15:04
PERSONNEL	Mark Perry	UC2 Zone	Outbye 19 C/T	24/01/2023 15:05
PERSONNEL	Mark Perry	UC2 Zone	Inbye 14 C/T	24/01/2023 15:05
PERSONNEL	Mark Perry	UC2 Zone	Outbye 19 C/T	24/01/2023 15:05
PERSONNEL	Mark Perry	UC2 Zone	Inbye 14 C/T	24/01/2023 15:05
PERSONNEL	Mark Perry	UC2 Zone	Outbye 19 C/T	24/01/2023 15:07
PERSONNEL	Mark Perry	UC2 Zone	Outbye 14 C/T	24/01/2023 15:07

Entity Type	Entity Name	Area	Zone	Time
PERSONNEL	Mark Perry	UC2 Zone	Inbye 10 C/T	24/01/2023 15:09
PERSONNEL	Mark Perry	UC2 Zone	Outbye 19 C/T	24/01/2023 15:10
PERSONNEL	Mark Perry	UC2 Zone	Outbye 14 C/T	24/01/2023 15:10
PERSONNEL	Mark Perry	UC2 Zone	Inbye 10 C/T	24/01/2023 15:11
PERSONNEL	Mark Perry	UC2 Zone	Outbye 10 C/T	24/01/2023 15:16
PERSONNEL	Mark Perry	UC2 Zone	Inbye 6 C/T	24/01/2023 15:18
PERSONNEL	Mark Perry	UC2 Zone	Outbye 10 C/T	24/01/2023 15:18
PERSONNEL	Mark Perry	UC2 Zone	Inbye 6 C/T	24/01/2023 15:18
PERSONNEL	Mark Perry	UC2 Zone	Outbye 10 C/T	24/01/2023 15:18
PERSONNEL	Mark Perry	UC2 Zone	Inbye 6 C/T	24/01/2023 15:19
PERSONNEL	Mark Perry	UC2 Zone	Outbye 6 C/T	24/01/2023 15:21
PERSONNEL	Mark Perry	UC2 Zone	Inbye 6 C/T	24/01/2023 15:23
PERSONNEL	Mark Perry	UC2 Zone	Outbye 6 C/T	24/01/2023 15:23
PERSONNEL	Mark Perry	UC2 Zone	UC2 Drivehead	24/01/2023 15:27

6.3 Appendix C

Wifi Testing using Ecom Smart Ex 02 device, with Wifiman software – Device PAS154.

Location (C/T)	Phone Call successful	Safety Management System accessed and document downloaded	Wifi Signal strength as per Wifiman (Software Application)
Main Travel Road			
1	√	√	-39 dBm
2	√	√	-88 dBm
3	√	√	-77 dBm
4	√	√	-70 dBm
5	√	√	-72 dBm
6	√	√	-56 dBm
7	√	√	-51 dBm
8	√	√	-57 dBm
9	√	√	-66 dBm
10	√	√	-52 dBm
11	√	√	-66 dBm
12	√	√	-68 dBm
13	√	√	-66 dBm
14	√	√	-55 dBm
15	√	√	-57 dBm
16	√	√	-62 dBm
17	√	√	-72 dBm
18	√	√	-68 dBm
19	√	√	-69 dBm
20	√	√	-70 dBm
21	√	√	-66 dBm
22	√	√	-46 dBm

Location (C/T)	Phone Call successful	Safety Management System accessed and document downloaded	Wifi Signal strength as per Wifiman (Software Application)
Main Travel Road			
23	√	√	-73 dBm
24	√	√	-55 dBm
25	√	√	-79 dBm
26			-94 dBm
27	√	√	-87 dBm
28	√	√	-74 dBm
29	√	√	-71 dBm
30	√	√	-70 dBm
31			-59 dBm
32			-53 dBm
32.5			-56 dBm
33			-70 dBm
34	√	√	-71 dBm
35	√	√	-68 dBm
36E	√	√	-57 dBm
36F	√	√	-72 dBm
39F	√	√	-56 dBm
39E	√	√	-55 dBm
40	√	√	-62 dBm
41	√	√	-78 dBm
42	√	√	-84 dBm
43	√	√	-78 dBm
44	√	√	-53 dBm
45	√	√	-45 dBm

Location (C/T)	Phone Call successful	Safety Management System accessed and document downloaded	Wifi Signal strength as per Wifiman (Software Application)
Main Travel Road			
46	√	√	-61 dBm
47	√	√	-61 dBm
48	√	√	-73 dBm
49	√	√	-59 dBm
50	√	√	-50 dBm
51	√	√	-45 dBm
52	√	√	-69 dBm
53	√	√	-57 dBm
54	√	√	-54 dBm
55	√	√	-56 dBm
56	√	√	-78 dBm
57	√	√	-67 dBm
58	√	√	-51 dBm
58.5E	√	√	-55 dBm
58.5F	√	√	-49 dBm
59F	√	√	-67 dBm
60F	√	√	-50 dBm
61F	√	√	-69 dBm
62F	√	√	-70 dBm
62.5F	√	√	-52 dBm
62.5E	√	√	-60 dBm
63	√	√	-45 dBm
64	√	√	-53 dBm
65	√	√	-57 dBm

Location (C/T) Main Travel Road	Phone Call successful	Safety Management System accessed and document downloaded	Wifi Signal strength as per Wifiman (Software Application)
66	√	√	-63 dBm
67	√	√	-64 dBm
68	√	√	-62 dBm
69	√	√	-60 dBm
70	√	√	-58 dBm
71	√	√	-71 dBm
72	√	√	-63 dBm
73	√	√	-77 dBm
74	√	√	-86 dBm
75	√	√	-76 dBm
76			-80 dBm
77			-73 dBm
78			-56 dBm
79			-64 dBm
80	√	√	-67 dBm
81	√	√	-60 dBm
82	√	√	-71 dBm
83	√	√	-79 dBm
84	√	√	-69 dBm
85.5	√	√	-48 dBm
86	√	√	-57 dBm
86.5	√	√	-43 dBm
87	√	√	-79 dBm
88	√	√	-80 dBm

Location (C/T) Main Travel Road	Phone Call successful	Safety Management System accessed and document downloaded	Wifi Signal strength as per Wifiman (Software Application)
89	√	√	-79 dBm
90	√	√	-76 dBm
91	√	√	-74 dBm
92	√	√	-81 dBm
93	√	√	-74 dBm
94	√	√	-74 dBm
94.5	√	√	-63 dBm
95	√	√	-71 dBm
95.5	√	√	-81 dBm
96	√	√	-83 dBm
97	√	√	-77 dBm
98	√	√	-64 dBm
99	√	√	-62 dBm
100	√	√	-80 dBm
101	√	√	-78 dBm
102			-72 dBm
103			-62 dBm
104			-65 dBm
105			-63 dBm
106	√	√	-63 dBm
107	√	√	-61 dBm
108	√	√	-53 dBm
109	√	√	-47 dBm
110	√	√	-50 dBm

Location (C/T) Main Travel Road	Phone Call successful	Safety Management System accessed and document downloaded	Wifi Signal strength as per Wifiman (Software Application)
111	√	√	-82 dBm
112	√	√	-49 dBm
113	√	√	-58 dBm
114	√	√	-79 dBm
115	√	√	-88 dBm

Power Level	Power	Notes
-10 dBm	100 μW	Maximal received signal power of wireless network (802.11 variants)
-100 dBm	0.1 pW	Minimal received signal power of wireless network (802.11 variants)

Ref: <https://en.wikipedia.org/wiki/DBm>, Orders of magnitude (Power)

6.4 Appendix D

Mine Site Technologies Installation system review

MST SITE VISIT REPORT

2nd February 2022



CENTENNIAL - SPRINGVALE

Introduction

MST Attended site to provide a follow up review of the Travel Road wireless network. The review was to assess the improvements completed which were identified during the commissioning of the system (19th November 21).

Description

2nd February

- > Measure Signal Strength.
- > Inspect antenna positioning of antennas inbye CT88
- > Replace omnidirectional antenna positioning CT88
- > Remove SSID's not required.

Outcomes

2nd February

- > Travel underground in transport to visually inspect antenna re-positioning inbye CT88.
 - Antenna positioning improved.
- > Adjusted omnidirectional antenna orientation on Access Points at CT88.
- > Stopped at regular intervals to check wifi signal strength
 - Signal strength measured with UMA phone
 - Signal measured in dBm, ideal crossover ideal @ -75dBm. (Note a level of attenuation is apparent from with vehicle).
 - Note UMA Android phone indicated very slow response. This may be inherent to android wifi roaming capability.
- > Modified device configuration, ie Removed unused SSID's.
 - Wireless SSID's even when not directly being used periodically transmit 'beacons'. This results in unnecessary use of available 'air-time'. May result in instances of contention.

Conclusions

Antenna positioning has been improved.

Overall signal coverage has been improved.

Small areas of poor coverage remain, that may be improved with minor addition of access points.

Couple Access Points require further attention.

Recommendation

- > CT6 – Repair replace coax cable / antenna.
(Coverage in area appears to be from other sources).
- > Additional Access Point required between CT25 / 28.
- > Additional Access Point required CT58.
- > Additional Access Point optional CT74.
- > Check coax / antenna - inbye / outbye CT90
- > Check coax / antenna – inbye CT94 ½

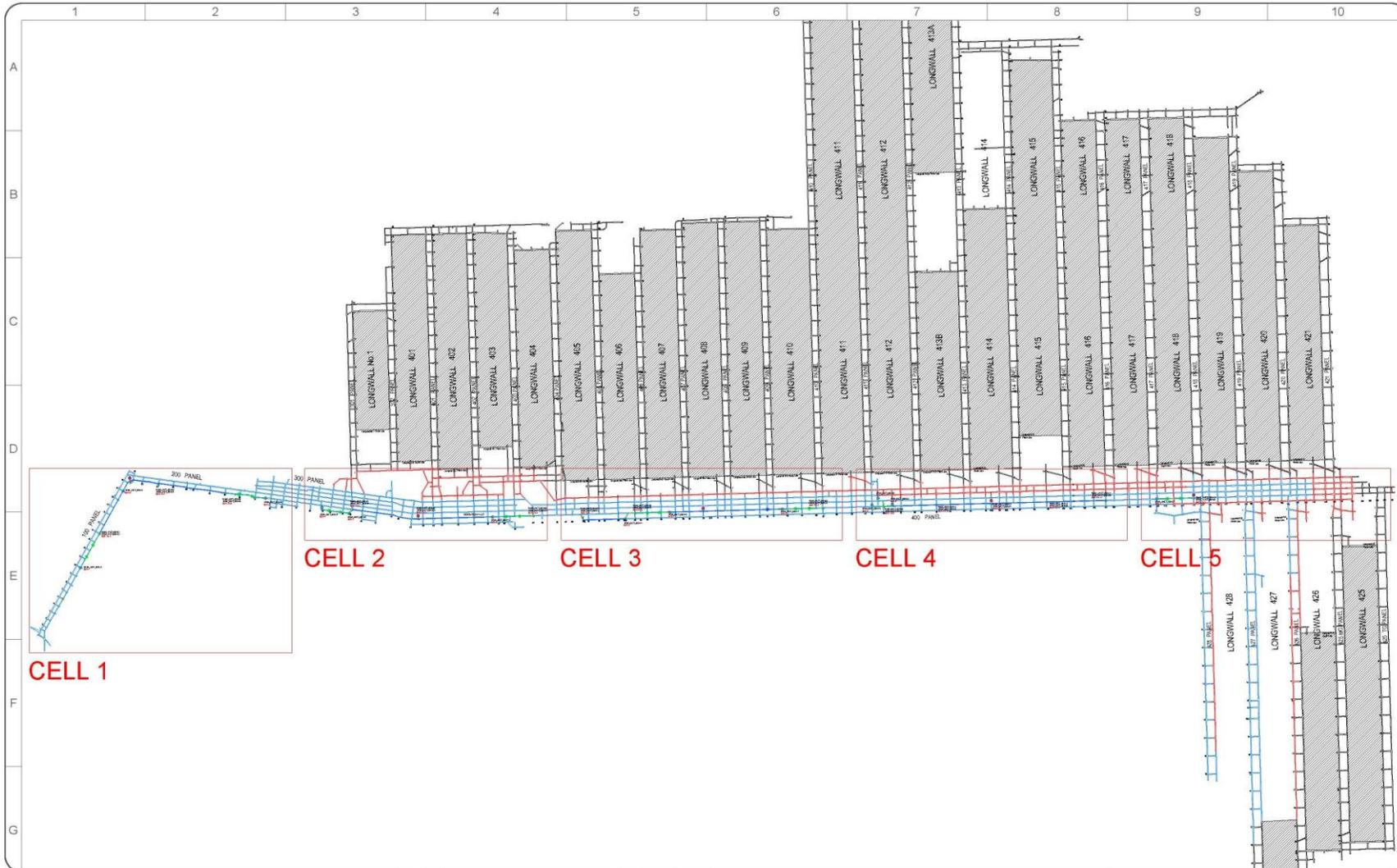


Check Antenna

Equipment:

- > UMA Phone to measure RSSI.
- > New coax antenna cable.
- > New Access Point (configured).

1. Measure an RSSI level from a set location from the antenna (eg for Access Point 94½ perhaps measure @ 95½).
2. Take a new coax cable / antenna and replace (no requirement to install initially, just leave old in situ and temporarily add new antenna).
3. Re-measure RSSI.
4. If same, temporarily replace Access Point & re-measure RSSI.
5. Replace Antenna / Coax / Access Point if improvement identified.



- LEGEND**
- AXON Core Network Switch
 - AXON Air Wi-Fi Access Point
 - Composite Cable Junction Box
 - PoE Extender
 - Existing Power Supply
 - Existing NS50

REV	ECO	REVISION NOTE	DRN	APP	DATE
A		ORIGINAL	CN	DK	22/03/21
B		DESIGN ADJUSTED	CN	DK	06/05/21
C		ADDED MP MARKUP	CN	DK	25/05/21
D		ADDED DEVICE NAMES	CN	DK	20/08/21



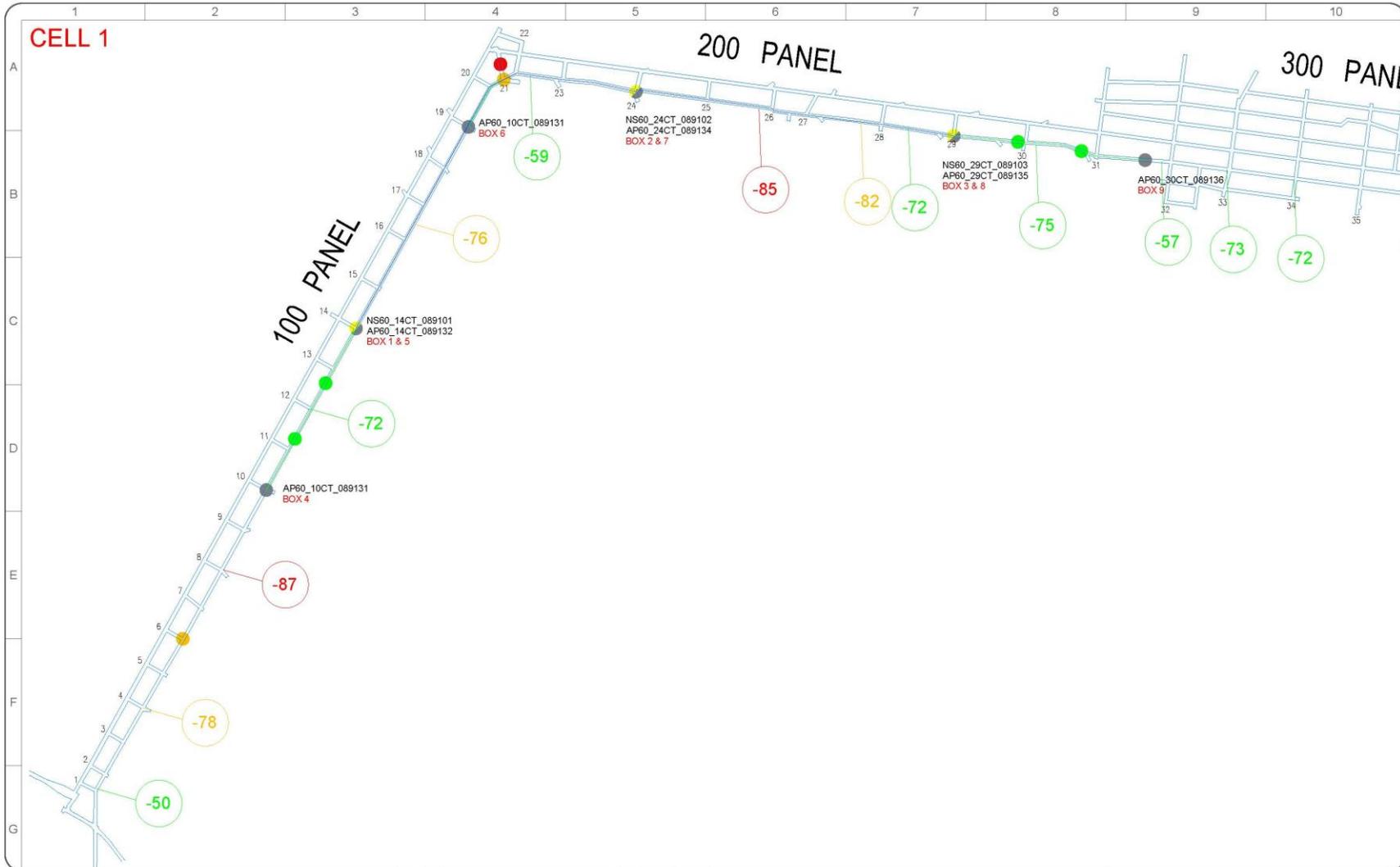
MST GLOBAL
 66 MONTPELIER ROAD
 BOWEN HILLS QLD 4006
 +61 2 9491 6500
 enquiries@mstglobal.com

PRODUCT: AXON DIGITAL PLATFORM
 ASPECT: LAYOUT
 SHOWING: MAINS WI-FI OVERVIEW

DRAWING/CAD REFERENCE	REV	DATE
	D	20/08/2021

DATE: 20/08/2021
 SHEET 1 of 11

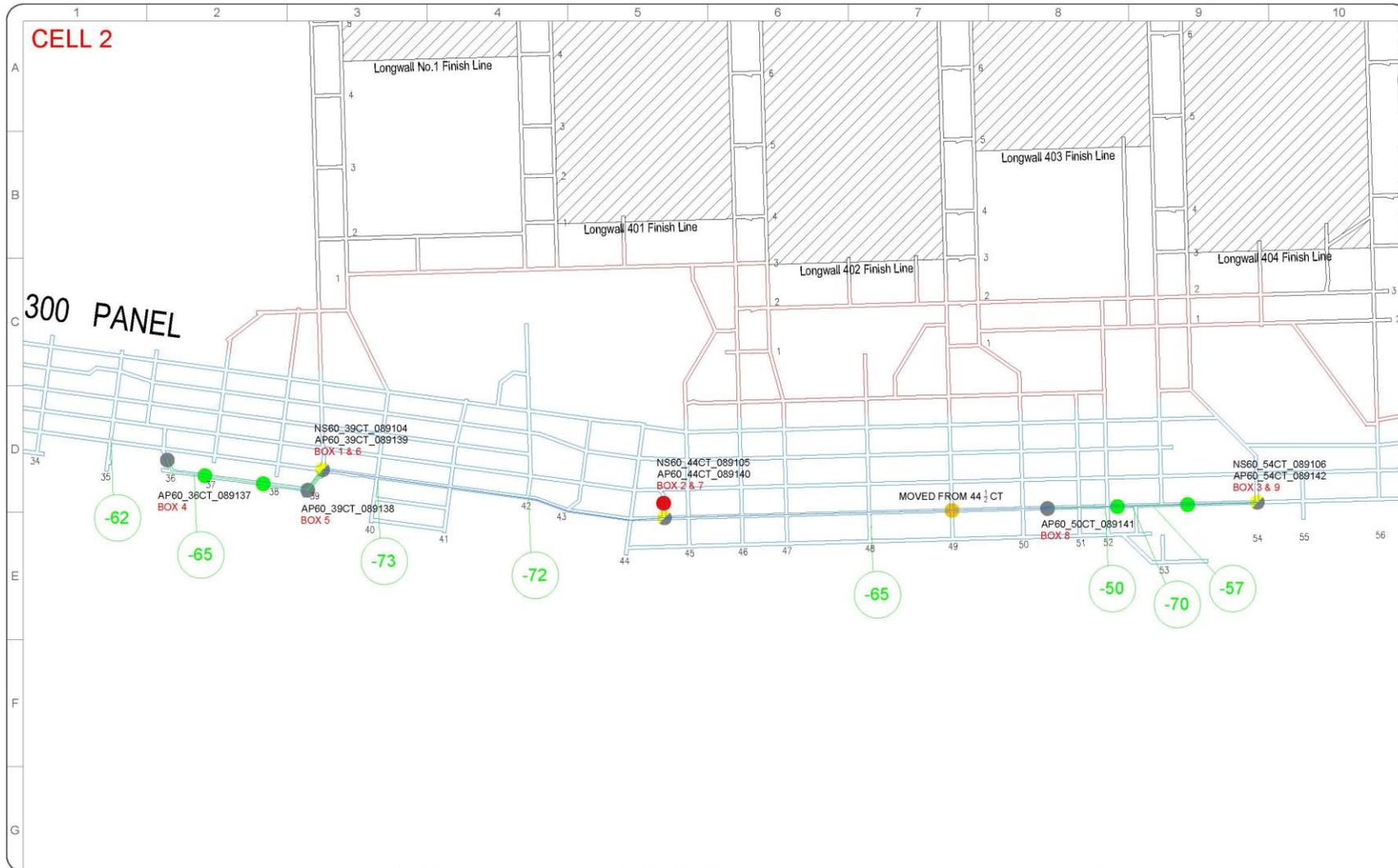
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C			ADDED MP MARKUP	CN	DK	25/05/21
D			ADDED DEVICE NAMES	CN	DK	20/08/21
E						
F						
G						

LEGEND <ul style="list-style-type: none"> ● AXON Core Network Switch ● AXON Air Wi-Fi Access Point ● Composite Cable Junction Box ● PoE Extender ● Existing Power Supply ● Existing NS50 	 MST GLOBAL 66 MONTPELIER ROAD BOWEN HILLS QLD 4006 +61 2 9491 6500 enquiries@mstglobal.com	PRODUCT: AXON DIGITAL PLATFORM ASPECT: LAYOUT SHOWING: MAINS VM-FI 1-33 CT DRAWING/CAD REFERENCE: REV: D DATE: 20/08/2021 SHEET 2 of 11
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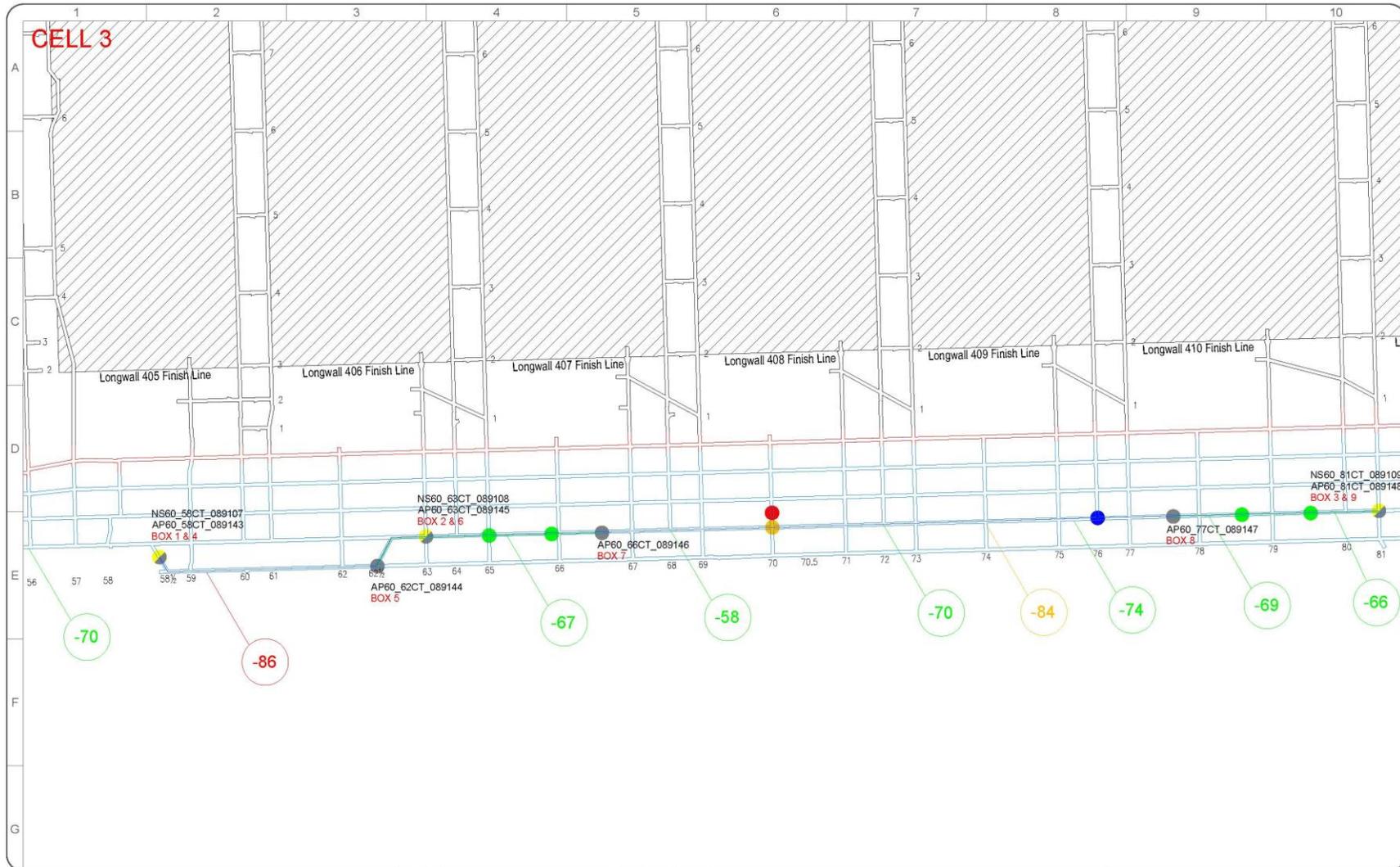
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LEGEND <ul style="list-style-type: none"> ● AXON Core Network Switch ● AXON Air Wi-Fi Access Point ● Composite Cable Junction Box ● PoE Extender ● Existing Power Supply ● Existing NS50 	MST GLOBAL 66 MONTPELIER ROAD BOWEN HILLS QLD 4006 +61 2 9491 6500 enquiries@mstglobal.com	PRODUCT: AXON DIGITAL PLATFORM ASPECT: LAYOUT SHOWING: MAINS WI-FI 34-56 CT DRAWING/CAD REFERENCE: REV: D DATE: 20/08/2021 SHEET 3 of 11
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LEGEND

- AXON Core Network Switch
- Existing Power Supply
- AXON Air Wi-Fi Access Point
- Existing NS50
- Composite Cable Junction Box
- PoE Extender

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D		ADDED DEVICE NAMES	CN	DK	20/08/21
E					
F					
G					



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PRODUCT AXON DIGITAL PLATFORM
ASPECT LAYOUT
SHOWING MAINS WI-FI 57-82 CT

DRAWING/CAD REFERENCE	REV	DATE
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LEGEND

- AXON Core Network Switch
- Existing Power Supply
- AXON Air Wi-Fi Access Point
- Existing NS50
- Composite Cable Junction Box
- PoE Extender

REV	ECO	REVISION NOTE	DRN	APP	DATE
A		ORIGINAL	CN	DK	22/03/21
B		DESIGN ADJUSTED	CN	DK	08/05/21
C		ADDED MP MARKUP	CN	DK	29/05/21
D		ADDED DEVICE NAMES	CN	DK	20/08/21
E					
F					
G					



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PRODUCT: AXON DIGITAL PLATFORM
 ASPECT: LAYOUT
 SHOWING: MAINS WI-FI 83-104 CT

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6.5 Appendix E

Proof of Concept for JSEA

page1



JOB SAFETY ANALYSIS



paul.berryman, 2/6/2023, 10:47:47 AM



1. Job Safety Analysis

A. Item #	B. Job Step - Break the job down into steps	C. Potential Hazard - What can harm you ?	D. Controls - What are you going to do to make the job as safe as possible ?	E. Person who will ensure this happens.
1	Complete a visual inspection of the Road Roller	Slip, Trip, Falls, unplanned movement, crush injuries	Situational awareness, PPE, Competent operators, Roller stops, NO GO zones	Joe
2	Reverse LHD to Road Roller and attach tow hitch	Manual handling, pinch points, crush zones, poor instruction/communication, unplanned movement	Situational awareness, skilled operators, fit for purpose equipment, NO GO zones, clear instruction, supervision, communication, roller stops installed.	Joe
3	Tow roller and remediate/level roadways	Unplanned movement, collision points, uneven ground, infrastructure in immediate work area, release of uncontrolled energy	Fit for purpose equipment, designated work areas with signage, trained and competent operators, situational awareness, NO GO zones, safe operating zones, clear instruction, communication and supervision	Joe



SAFE WORK PROCEDURE



SV-FM-3305

GENERIC LIFTING, SLINGING, TOWING PLAN & PERMIT

1. Details

1a. Time



1b. Shift



2a. Date



2b. Location



11. Select the slinging method. Use Sling Rating Chart below.



A. Comment

SLING-RATING-CHART—Circle-applicable-arrangements								
Sling Colour								
	Vertical	Choke	Basket	30°	60°	90°	120°	
	Tonne	Tonne						
Violet	1	0.8	2	1.9	1.7	1.4	1	
Green	2	1.6	4	3.8	3.4	2.8	2	
Yellow	3	2.4	6	5.7	5.1	4.2	3	
Red	5	4.0	10	9.5	8.5	7.0	5	
Orange	10	8.0	20	19	17	14	10	

3. Sling Configuration

Page 1 of 4

Next >

LIFTING, SLINGING & TOWING QUALIFICATIONS REQUIREMENTS

	SIMPLE LIFT	COMPLEX LIFT
DEFINITION	<p>The operator is <u>not</u> required to make a judgment of the items;</p> <ul style="list-style-type: none"> • Mass • Balance • Integrity of the lifting attachments or equipment. • The lift is a straight lift. <p>If a Safe Work Procedure exists which provides the mass, centre of balance, lifting points and lifting equipment to be used, then this is classified as a simple lift.</p>	<ul style="list-style-type: none"> • Using multiple lifting plant or adjustable lifting beams • Load mass or centre of gravity estimation • Applying slinging techniques or where there are no designated lifting points • Calculating the loading factors of the selected slinging techniques • Selecting lifting equipment • Lifting, towing or slinging operations where no procedure is available
QUALIFICATION	<p>As a minimum, all Springvale personnel who intend to perform lifting tasks must have completed the following assessments;</p> <ul style="list-style-type: none"> • Lifting, Slinging and Towing SV-TA-2949 <p>Personnel can perform a Simple Lift with the above training competency.</p>	<p>To perform a Complex lift, the following qualifications are required;</p> <ul style="list-style-type: none"> • Lifting, Slinging and Towing SV-TA-2949 training competency • License to performing Dogging CPCCLDG3001A

The following table from SafeWork Australia provides conditions where a dogger is required.

Activity	A Dogger is Required where;	Dogger is <i>not</i> required if ALL the conditions below are met
Selecting the slinging method	Judgement is required	<p>No judgement is required because the:</p> <ul style="list-style-type: none"> • Selection of the slinging method is predetermined by a Certified Dogger, and • Lifting points are pre-determined by a certified dogger and



4. Permit Checklist

14. Permit Checklist



	A. Response
A. Is the work area clear of hazards ?	<input type="radio"/> YES <input type="radio"/> NO
B. Do you have a procedure or JSA ?	<input type="radio"/> YES <input type="radio"/> NO
C. Are all required isolations in place	<input type="radio"/> YES <input type="radio"/> NO
D. Has communication been established?	<input type="radio"/> YES <input type="radio"/> NO
E. Have you completed the Generic Lift Plan?	<input type="radio"/> YES <input type="radio"/> NO