

ROYAL HOSPITAL FOR SICK CHILDREN, EDINBURGH

Lothian Health Board / HIS Lothian Limited

Independent Tester's Report Nr. 28

JULY 2017

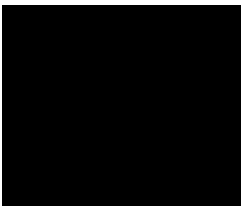
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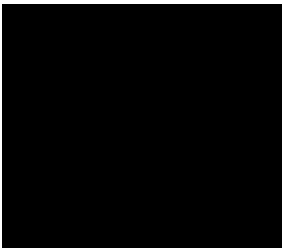
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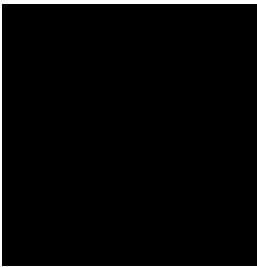
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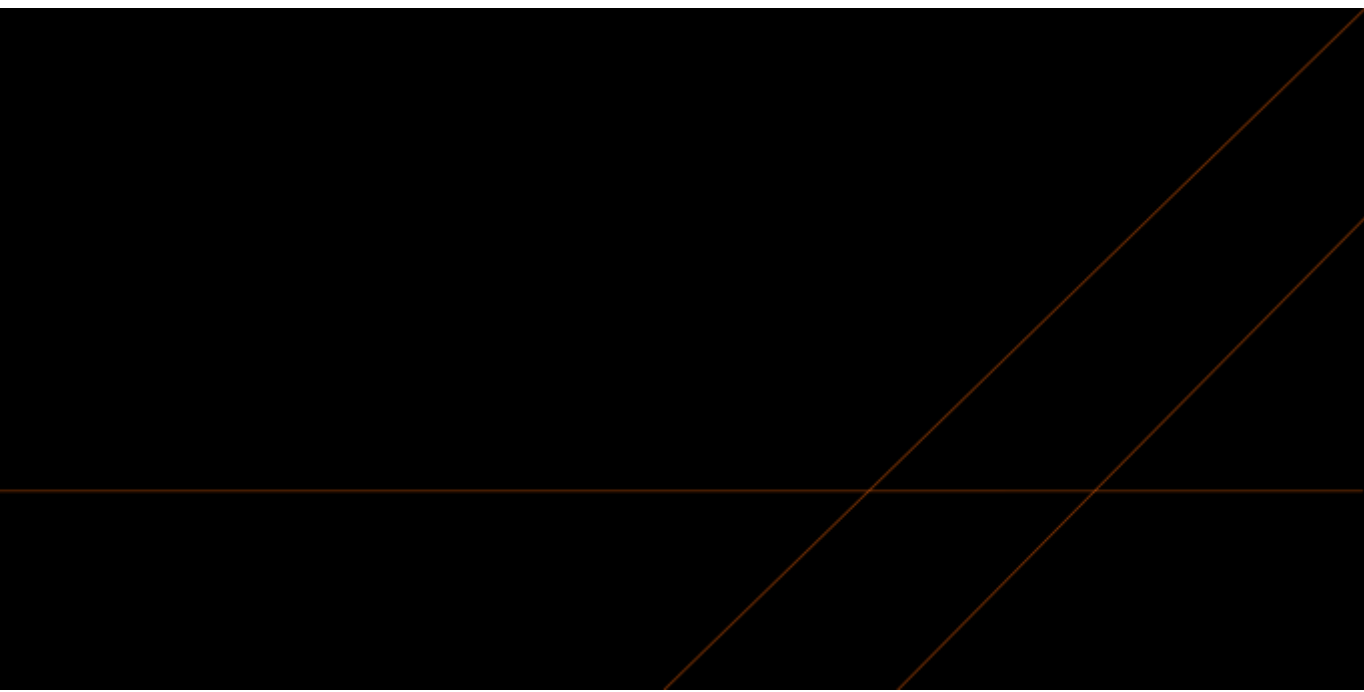
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1. Executive Summary

1.1. Reporting Period

23rd May 2017 – 5th July 2017

1.2. New Key Issues

The IT has identified a possible issue relating to the diversity provided by the basement HV substations as a result of the barrier provided between the paired substations and is discussing the matter with Multiplex.

1.3. Design Review

General Progress

The IT has been in discussion with Multiplex in respect of the evidence of compliance required as detailed on the Compliance Matrix previously issued.

There are some significant items raised by the IT in 2016, which the IT is in discussion with Multiplex to confirm compliance. These include:

- Fire Compartmentation – A number of issues have been reviewed with Multiplex. Compliance has confirmed in respect of some items raised however further information is required to close all items. A further review is planned for 15th May 2017,
- The IT has reviewed the medical gas provision and raised queries with the number and type of outlet provided in some locations as they do not conform to SHTM 02: Medical Gases. Following discussion with Colin Grindlay the IT understands the provision has been designed to meet the requirements requested by the Board. The IT has been informed that derogation is being prepared to confirm the divergence from SHTM 02 which is due for submission to the Board in May 2017.
- The IT understands that Multiplex are preparing derogations to confirm the divergences from SHTM 03 in respect to a number of ventilation systems which is due for submission to the Board in May 2017.
- The IT understands that Multiplex are preparing derogations to confirm the divergences from other Board requirements which is due for submission to the Board in May 2017.
- The request for information (RFI) schedule in respect of acoustic properties of partitions, doors etc. is in discussion with Multiplex.

1.4. Procedure Review

Period:

Up to June 2017:

- Substructure

November 2015 to date (23rd May 2017):

- Envelope, SFS and Window Design and Interface
- Waterproofing and Drainage
- Core formation (Stairs, Landings and Half Landings)
- Internal fit out (Walls and Partitioning)
- Internal Services Installation
- Statutory Utilities
- Basement and Service Tunnel
- Concrete Structure with pours
- Offsite mechanical Pipework Fabrication

- Steel Frame erection, metal deck and concrete works to Energy Centre
- External façade cladding
- Horizontal Fire protection inspected and QA review.
- Hot melt roofing works
- ETFE roofing works
- Cladding works to Zones A and C
- Finishes works including flooring, wall, ceiling
- FF&E installation
- Lift installation works
- Steel Frame erection and metal deck
- Radiological lead lining
- Hot Melt Roof Treatment
- Screed & Vinyl Flooring
- External Render
- Curtain Walling
- Drainage
- Acoustic Panels
- Emergency Vehicle Access
- Cycle Route
- Domestic Hot Water
- Chilled Water System
- CHP
- Lifts
- Thermal Analysis

The IT carried out an interim review of the contractors QA systems and construction documentation and processes interfaced with the management of the site installation. See section 7.7 for more detail.

1.5. Construction Review

Current activities reviewed during **June 2017** by the IT include:

- External envelope including cladding and windows
- Partitions, Pod cladding and door openings
- Roofing
- Ductwork
- Air Handling Units
- Pipework connections to outlets and terminal devices
- Drainage
- Roofs
- Mains services from energy centre
- Incoming mains services
- Vinyl flooring
- Roof Steelwork
- Helipad Steelwork
- Energy Centre Plant (Boilers, Generators, CHP and Switchgear)
- Fire Safety Systems
- Steel Frame erection and metal deck

- Radiological lead lining
- Hard Landscaping and external works
- Air Permeability Test

May/June 2017

- Core and Stairs
- General External Works
- Steel Framing System & Cladding
- Roof structure

A summary of the construction reviews undertaken during April 2017 are outlined in section 8.0. Unless specifically noted the IT was satisfied with the works inspected.

1.6. Testing and Commissioning

The IT was present for the air permeability test conducted in Zone B, OR-00-01 & 02 on 6th July 2017. The IT confirms that the test complied with the required methodology with all access and egress being sealed off, toilets and sinks trapped and ceiling voids sealed off. The parameters of test are outlined below:

- Air Pressure: 65 pascals, working in descending order
- Working area: 2,126m² (envelope)
- Benchmark: 5.0m³/(h.m²) @50Pa or less
- Result from witnessed test: 2.59m³/(h.m²)

The It was therefore satisfied that the test was carried out in accordance with the method statement and is compliant.

1.7. Certification Matters

No Certificates have been issued to date.

1.8. Variations

Initiator	Nr of Changes logged	Completed in change process	IT Input
Board	116 logged (133 Rows) (2 withdrawn, 2 Rejection Approval)	91	None to Date
IHSL	22 logged (1 withdrawn)	15	None to Date

NB: As at Board Tracker issued 4th July 2017 and ISHL Tracker issued 25th May 2017.

1.9. Contract Project Construction Programme

The IT has received a copy of the high level revised programme with a completion date of 12th October 2017 from IHS. The IT is aware of the status of this programme within the contractual process and its relationship to contractual documents such as the Joint Final Commissioning Plan and in the interests of clarity will monitor progress against this programme.

The IT has reviewed progress of key areas against the revised programme and has identified some items such as steel structure and the external envelope are currently behind programme. To quantify the implications in respect of these and other items currently behind programme the IT arranged reviews with Multiplex during the April 2017. The reviews indicated that completion of elements was 3-4 weeks behind the revised programme targeted at a completion of construction activities by the End of August 2017.

A review of the envelope completion in the courtyard areas and roofs was undertaken on 12th April 2017. The information from this review is detailed in section 7.7.

2. Introduction

2.1 General

This report advises Lothian Health Board (The Authority) and IHS Lothian Limited (IHS), of the activities carried out by the Independent Tester in accordance with the Independent Tester Contract throughout the construction stage up to the issue of a Completion Certificate.

It has been prepared to summarise the reviews and processes undertaken by Arcadis Design and Consultancy in that period, recording matters arising from those reviews on a reporting by exception basis only, processes and any associated meetings, detail of information required and comment on the status of the project delivery.

For the avoidance of doubt, the tasks undertaken by the Independent Tester and described in this report relate to compliance with the stated requirements and RDD content on a sampling basis and do not imply that the Independent Tester has undertaken technical checking of the design calculations or provides a detailed quality inspection service for all elements of the project.

2.2 List of Abbreviations

The table below summarises the abbreviations used in our report:

Abbreviation	Definition
The Board	Lothian Health Board
Arcadis	Arcadis Design and Consultancy
IT	Independent Tester
HIS	IHS Lothian Limited
BC	Building Control
M	Multiplex

3. IT Meetings Held in Reporting Period

The table below indicates the meetings attended during the period of this report:

Construction Progress Meeting	11th April 2017
Joint Commissioning Meeting	19th April 2017
Joint Commissioning Meeting	10th May 2017

4. Site Inspections

In the period, the IT has completed the following site inspections:

Review visit No. 47	10 th May 201
Review visit No. 48	16 th May 201

5. Design Review

5.1 Progress

The IT has been in discussion with Multiplex in respect of the evidence of compliance required as detailed on the Compliance Matrix previously issued.

There are some significant items raised by the IT in 2016, which the IT is in discussion with Multiplex to confirm compliance. These include:

- Fire Compartmentation – A number of issues have been reviewed with Multiplex. Compliance has confirmed in respect of the provision of an appropriate barrier at the junctions between the internal barriers and external walls, however further information has been requested in respect of glazing and doors within the protected element of the external wall. however further information is required to close all items. A further review is planned for **15th May 2017**.
- The IT has reviewed the medical gas provision and raised queries with the number and type of outlet provided in some locations as they do not conform to SHTM 02: Medical Gases. Following discussion with Colin Grindlay the IT understands the provision has been designed to meet the requirements requested by the Board. The IT has been informed that derogation is being prepared to confirm the divergence from SHTM 02 which is due for submission to the Board in May 2017.
- The IT understands that Multiplex are preparing derogations to confirm the divergences from SHTM 03 in respect to a number of ventilation systems which is due for submission to the Board in May 2017.
- The IT understands that Multiplex are preparing derogations to confirm the divergences from other Board requirements which is due for submission to the Board in May 2017.
- The request for information (RFI) schedule in respect of acoustic properties of partitions, doors etc. is in discussion with Multiplex.

6. Variations

Changes fall under two headings determined by the initiator, either the Board which are further categorised by value, or any initiated by IHSL.

The IT can report that there are currently twenty-two logged IHSL initiated changes that are being progressed; the IT notes:

- 15 of those 22 being given permission to proceed and have completed the change process
- 5 items await Board approval of which the IT will monitor.
- 1 item has been withdrawn

The IT will comment at the appropriate juncture on any compliance issues and will review these in line with the design information for review.

The IT reports that there are currently one hundred and sixteen logged or registered Board initiated notices of change with two withdrawn and two with rejection approval; in terms of completion it is understood that target dates were set as an estimation of time and owing to complexity and communications some target dates have not been achieved. The IT notes:

- 12 items are at status of Board to Action
- 8 being for Multiplex action
- 1 left blank
- 1 awaiting dialogue to move forward

The IT will comment on any compliance issues at the appropriate juncture and in conjunction with the design review information once issued. The IT will continue to track, monitor and comment on the change controls on a monthly basis.

IHS Ltd has alerted the IT to variations that will require IT input with regard to compliance. The IT has agreed with all parties that variation details will be checked for compliance only once the variation has completed the RDD process.

The IT will arrange to review the change control trackers at a subsequent visit to be confirmed.

7. Procedure Review

7.1 Drainage

The IT is monitoring the completion of the drainage works including the pressure testing.

The IT reported previously a number of instances where small diameter drainage pipes have been jointed within the thickness of the slab. The IT understands in discussions with Multiplex that these items are to be modified before final pressure testing is completed.

The IT can confirm the relocation of the drainage pipework originally installed above the basement switchgear has been completed.

Pressure testing is continuing.

To date Building Control have not raised any comments regarding drainage.

7.2 Concrete Cores, Core Bases and Tunnel

These works are physically complete. The IT has reviewed the close out of outstanding NCRs prior to confirming compliance and is currently awaiting the final close out of two items.

7.3 Non-Conformance Report

The IT reviewed the current position in respect of NCR's Tracker during the March visits and is pleased to advise that good progress has been made in closing out historic NCRs. Currently 154 NCRs have been raised with 22 currently outstanding.

The IT is targeting the close out of completed construction elements and will undertake a detailed review on 15th May 2017.

The IT will continue to closely monitor the position and management of all NCR's and carry out further reviews as appropriate.

7.4 RDD Reviews

The IT has issued a Compliance Matrix identifying the evidence required to confirm compliance both in relation to design and overall compliance together with the IT's methodology for testing that evidence. Layout drawings approved under RDD have been provided to the IT and these have been reviewed against the contract requirements.

The IT understands that the M&E RDD schedule is up to date and agreed with Mott MacDonald. The document is issued monthly to ensure that all amended drawings are picked up and resubmitted, with the latest version being issued on 10th May 2017.

The IT has requested the Fabric RDD schedule on a number of occasions with no response. Once received we will review and update.

7.5 Statutory Authorities

The IT is continuing to monitor the Building Warrant Tracker as issued by MULTIPLEX, and will continue to cross reference with the City of Edinburgh Building standards website <https://citydev-portal.edinburgh.gov.uk>.

7.6 QA Procedure Review

The IT carried out a review and discussion sessions with the MULTIPLEX QA manager John Wales and the package managers. The IT looked at a number of areas looking at the methodology, processes and site installation methodology checking for Alignment and compliance.

The IT was pleased with the QA processes embedded within the structure and will continue to monitor.

For reference the items inspected are set out below:

Site Walk:

- External envelope including cladding and windows
- Partitions, Pod cladding and door openings
- Roofing
- Ductwork
- Air Handling Units
- Pipework connections to outlets and terminal devices
- Drainage
- Roofs
- Mains services from energy centre
- Incoming mains services
- Vinyl flooring
- Roof Steelwork
- Helipad Steelwork
- Energy Centre Plant (Boilers, Generators, CHP and Switchgear)
- Fire Safety Systems
- Steel Frame erection and metal deck
- Radiological lead lining
- Hot Melt Roof Treatment
- Screed & Vinyl Flooring
- External Render
- Curtain Walling
- Drainage
- Acoustic Panels

QA:

- Hot Melt Roof Treatment
- Screed & Vinyl Flooring
- External Render
- Curtain Walling
- Drainage
- Acoustic Panels
- Emergency Vehicle Access

- Cycle Route
- Domestic Hot Water
- Chilled Water System
- CHP
- Lifts (beneficial use)
- Thermal Analysis

7.7 Contract Project Construction Programme Review

The IT has received a copy of the high level revised programme with a completion date of 12th October 2017 from IHS. The IT is aware of the status of this programme within the contractual process and its relationship to contractual documents such as the Joint Final Commissioning Plan and in the interests of clarity will monitor progress against this programme.

The IT has reviewed progress of key areas against the revised programme and has identified some items such as steel structure and the external envelope are currently behind programme. To quantify the implications in respect of these and other items currently behind programme the IT arranged reviews with Multiplex during the April 2017. The reviews indicated that completion of elements was 3-4 weeks behind the revised programme targeted at a completion of construction activities by the End of August 2017.

A review of the envelope completion in the courtyard areas undertaken on 12th April identified the following:

Courtyard	Item	Completion %
A	Brick Ground to Level 1	85-90%
B	Brick	90-93%
C	Brick Ground to Level 1	100%
C	Insulation Levels 1 to 4	10%
D	Brick	0%
D	Render Insulation	90%
D	Render Base Coat	65%
D	Curtain wall	100%
D	Rainscreen - Preparation works	100%
D	Rainscreen – Panels	0%
D	Zinc	Insulation Commenced
E	Curtain wall	100%
E	Render Insulation	80%
E	Render Base Coat	70%

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F	Render Top coat	60%
F	Screen	To complete
F	Louvres	To complete
H	SFS Board	100%
H	Windows	100%
Energy Centre	Ground Level	75%
Energy Centre	Level 1	50%
Energy Centre	Louvres	50%

A review of the roof completion identified the following:

Roof	Type	Completion %
Courtyard A	Landscaped	Preparation (drainage)
Courtyard B	Landscaped	Preparation (drainage)
Courtyard C	Hot Melt	100%
Courtyard D	Hot Melt	100%
Courtyard E	Hot Melt	100%
Courtyard F	Hot Melt	100%
Courtyard G	Complete with slabs	100%
Courtyard H	Landscaped	Preparation (drainage)
Blue Zone Level 3	Minor items outstanding	98%
Blue Zone Level 4	Minor items outstanding	95%
Blue Zone Level 5	Complete	100%
Orange Level 1 Zone	Hot Melt	100%
Orange Level 2 Zone	Hot Melt	100%
Orange Level 2 Zone	Insulation	100%
Orange Level 3 Zone	Hot Melt	100%

Orange Level 3	Zone	Insulation	100%
Orange Level 4	Zone	Hot Melt	100%
Orange Level 4	Zone	Insulation	100%
Orange Level 4	Zone	Slabs	90%
Purple/Orange Zone Level 5		Steel	50%
Purple/Orange Zone Level 5		Liner	25%
Purple/Orange Zone Level 5		Standing Seam	40%
Purple/Orange Zone Level 5		Liner	25%
Energy Centre		Hot Melt	100%
Energy Centre		Slab (Part)	100%
Energy Centre		Green Roof	To commence

8. Construction Review

8.1 Core and Stair Progress

- The IT team have continued to review the completion of the core and stairs. The structural and precast concrete elements are now complete. The fit out of the staircases is progressing with some areas in the Blue and Orange Zones complete.
- Core 5 stairwell now has vinyl and final doors/architraves
- Core 3 stairwell has skirting boards
- Approximately 65 -70% of the works are now complete across the site.
- The IT is satisfied with the quality of works reviewed on site and the alignment with QA processes and specifications with no non-compliances identified in the sample reviewed.

8.2 Floor Slab formation

- All internal floor slabs have now complete excepting areas where underfloor heating is to be installed and some loading bay areas.
- The underfloor heating (Pod area) and subsequent concrete pour should be complete by the end of June 2017
- The IT is satisfied with the quality of works reviewed on site and the alignment with QA processes and specifications with no non-compliances identified in the sample reviewed.

8.3 General External Works

- External surface works in progress particularly;

- The External Service Road is now open and in use as of 10/05/17 with the temporary access road being broken up and returned to soft landscape
- The Energy Centre – continuation of enclosing services and establishing hard core levels
- Hard landscaping and making good the area around the interceptor tank North West area of site is 95 % complete (to be disabled parking when complete).

8.4 Drainage

All drainage installation and testing is complete. A QA session was held with Multiplex and the IT awaits provision of the test sheets. Results were due to be available in May but this is deferred to June 2017. Multiplex awaiting record transfer from Aconex to Zutec

8.5 Waterproofing to slab base

- Waterproofing completed with the exception of local loading bay hoists and tower crane areas - No QA documents available for review during the IT visits – Snagging to be reviewed.
- The IT will review supporting documentation when available. Multiplex (Ian Hamilton) explained they are awaiting the return of data/result sheets from Stephensons.
- This is still outstanding (May 2017) and feedback has also sought on the recent ingress of water that tripped electrical distribution boards at lower levels. Has this been resolved and future risk evaluated.
- Multiplex state: TC3 Crane base – Information still awaited from Structural Seal. Still pursuing.

8.6 Window Installation

- The window and glass elevations are 85% complete with an emphasis on making the building wind and weathertight as soon as possible. Multiplex are awaiting details of the “Art Strategy” to be featured in one of the main entrance window elevations.
- The IT will continue to sample window installations across all zones. To date the installation methodology is compliant meeting all design standards.

8.7 Vinyl Flooring

- 85% of the screed is completed allowing more areas of vinyl to be laid
- Temporary space heaters continue to provide a suitable internal environment which supports the laying of vinyl.
- Core 5 stairwell now has vinyl laid

8.8 Envelope and Steel Framing system (SFS)/Cladding

- Currently 98% of the curtain walling is completed
- The majority of boarding and sealing is completed where it is fixed to the concrete frame. Some windows have yet to be fixed in these areas but temporary protection has been applied to allow internal trades to continue.
- The ECL Cladding (Render) is now 75% complete.

8.9 Internal Partitioning

- Partitioning continues to be progressed across the project. With door and internal screen frames continuing in the Blue and Orange Zones
- 85% of partitions are completed or in progress
- Code 3 lead lining is being installed to the required Theatres.

8.10 Steel Frame

- All primary steelwork complete except for Core 2 and Core 3 Plant Deck plus the M1 Plant Deck (Corridor/Riser).
- All secondary steelwork is complete except for the Energy Centre

9. Roof

- A schedule of the monitored position in respect of roofs and cladding is provided in Appendix D.
- The 4th floor roof area is progressing with ballast being added to areas beneath the external chiller units. The top roof and associated walls are not yet wind or water proof.
- The internal lower roof areas are progressing with completion of base elements prior to waterproofing.

10. Mechanical Services

Blue and Orange Zones are close to completion subject to testing and commissioning with taps and basins. Installation is progressing in the Green and Purple Zones.

10.1 Ventilation

- The majority of Air Handling Units (Roof top and internal) have been installed. Ductwork and pipework connections are in progress.
- Chiller Units are now installed on the open roof area
- Ducting and terminal equipment has been installed in the Blue and Orange Zones with progress in all other areas.
- Distribution ductwork continues to be installed in plantrooms and clinical areas with theatre ventilation ducting and ultra-clean hoods installed.

10.2 Domestic Hot Water

- Domestic H&C Water/ LTHW and Chilled WS (Pipework) distribution and connections continue.
- 75% of pipework and services are installed but there is no water within internal pipework.

10.3 Boilers

The fabrication and installation of the headers and connections to the boilers with control and isolating valves is in progress.

11. Electrical Services

Installation work progresses across the site but a permanent supply is currently on live for an element of the building. This has delayed live testing and has restrict site inspections where lighting is not yet powered. The intermittent failure of the generator supply has also introduced delays to other works packages.

12. Nurse Call

The installation of the Nurse Call system is complete subject to testing and commissioning in the Blue and Orange Zones.

13. Data Comms/Control Cabling

The construction of the main server room on level 2 is in progress

14. Fire Safety systems

Fire alarm cabling progressing across all zones.

All loops have been completed in Blue and Orange Zones

Testing and Commissioning has commenced with loop impedance witnessed by the IT

Fire alarm – Fire Strategy remains under consultation

Cause and effect remains in discussion and progressing. Multiplex continue to update the IT with progress.

15. Lifts

- Beneficial use is established for two lifts in Core 3 and two in Core 2. Once beneficial use is no longer required and before PC/handover the lifts will be re-commissioned.
- During the beneficial use period the lifts being used are boarded out to protect the lift interior.
- The finished lift architraves remain absent until beneficial use finishes.
- Through the beneficial use period the lifts have no external communications and are manned 24/7 by operators with radios.
- Cable ways and smoke vents are located at the top of the lift shaft.

16. External Service Road

The external Service Road is approximately 80% complete with the majority of block paving installed. The Interceptor tank was being covered and manholes being installed. (North) is approximately 95% complete and in use

17. 2nd Floor Offices

A number of offices exist on the second floor and these now have vinyl or carpet floors. The main open office has a series of bench type desks installed. Data and Power terminations are in progress.

APPENDIX A

Key Issue Report Nr 26 – May 2017

Confirmation of the total GIA for A1 emergency department compartmentalisation.

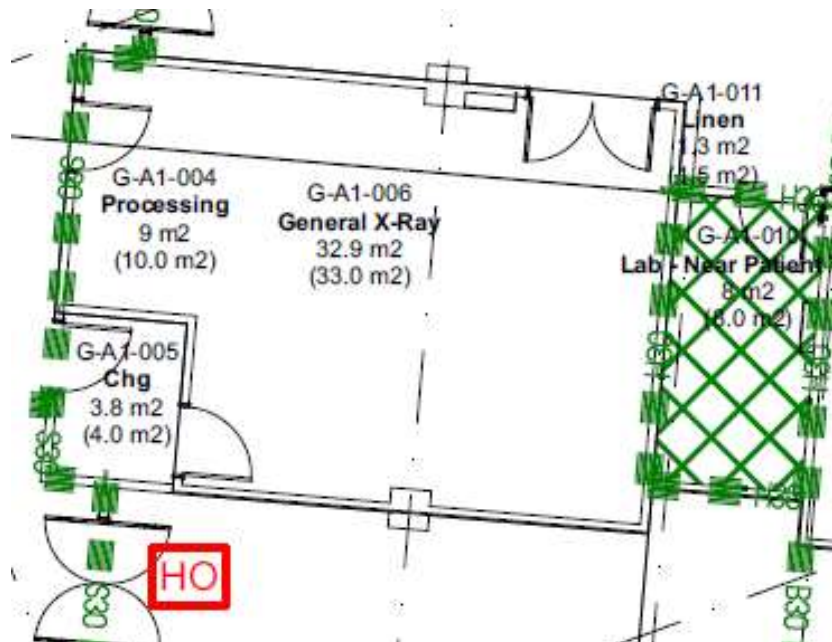


Confirmation of the total GIA for the two sub compartments located within A1 emergency department, separation provided by the continuous 30 min fire rated wall highlighted in yellow.

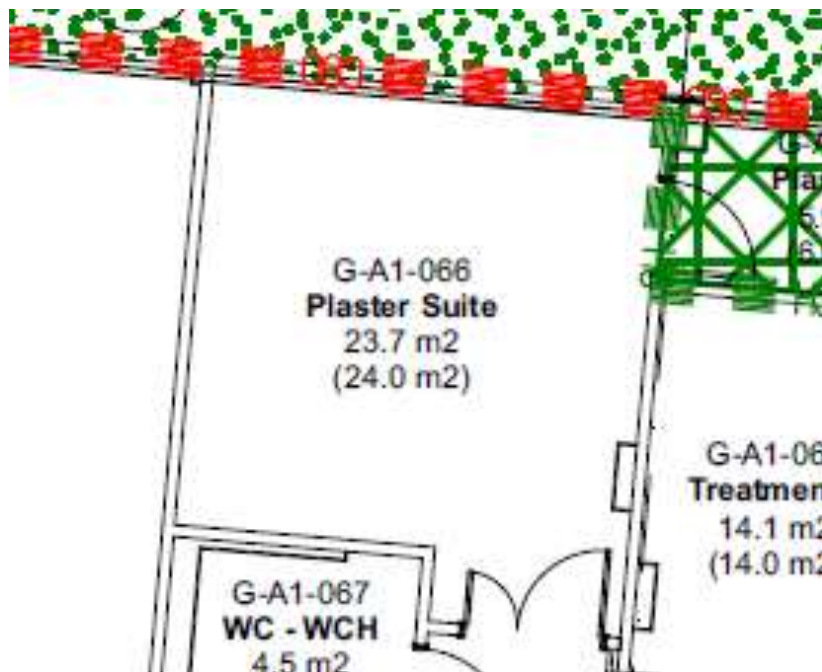


Confirmation of the use of the General X Ray Room.

As stipulated within the Technical Handbook: Non-Domestic – Fire annex 2.B additional guidance for hospitals – Fire Hazard rooms including X ray film & record stores require to be enclosed by 30 min fire rated walls.

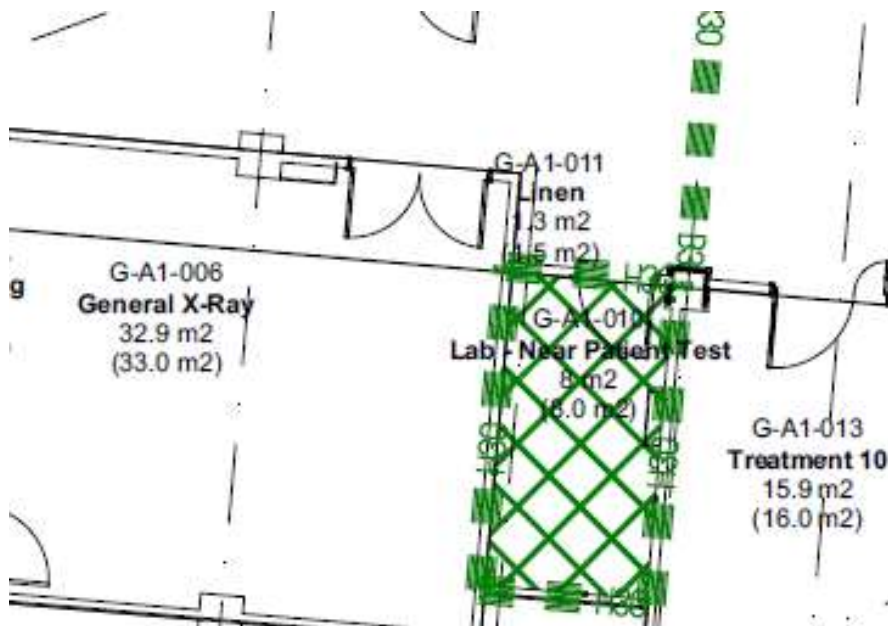


Confirmation of the use of the plaster suite.

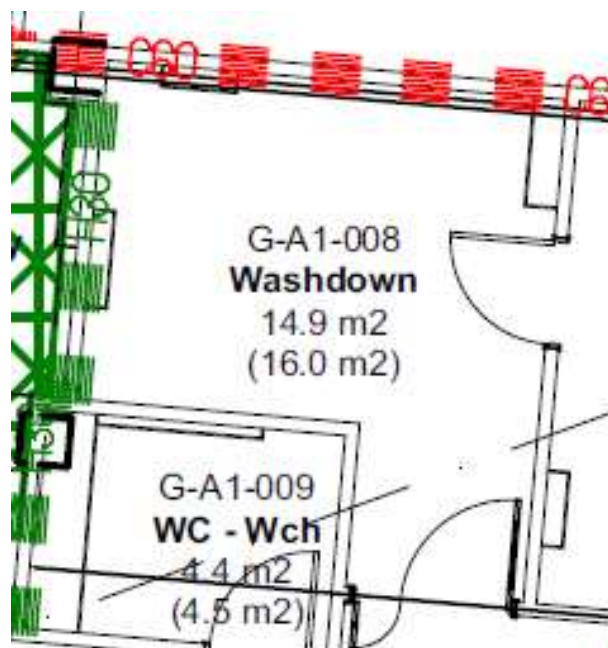


Confirmation of the use of the room entitled linen.

As stipulated within the Technical Handbook: Non-Domestic – Fire annex 2.B additional guidance for hospitals – Fire Hazard rooms including Linen stores require to be enclosed by 30 min fire rated walls.



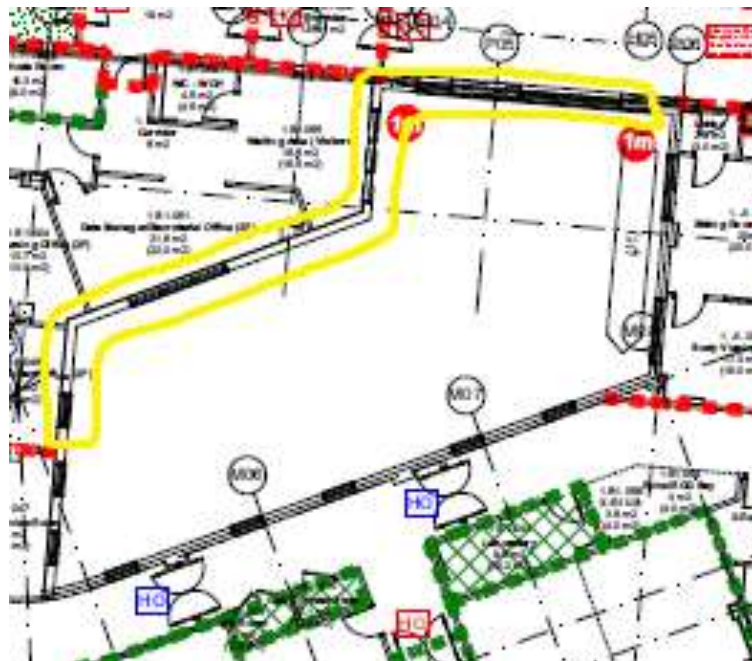
Confirmation of the use of the room entitled wash-down.



B1

HLM-SZ-01-PL-572-003

Confirmation of the material and fire rating of the wall highlighted in yellow, which is forming part of the B1 PICU & HDU's fire compartmentalisation.



HLM-SZ-01-PL-572-003

Confirmation of the total area GIA for B1 PICU & HDU's.



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