

Royal Hospital for Sick Children Building Services Commissioning Plan

Multiplex Construction Europe Ltd.
Royal Hospital for Sick Children
Edinburgh
Building Services Commissioning Plan



MULTIPLEX



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1.0 Introduction

This document provides an outline to procedures and processes for the testing and commissioning of the building services at the Royal Hospital for Sick Children and relates to the testing, pre-commissioning, commissioning, and handover process for the group 1 and group 2A equipment completed in accordance with the requirements of the Project Agreement.

It is the responsibility of the trade contractors (TC) to ensure that the testing, pre-commissioning, commissioning and certification of systems is completed in line with the Commissioning Programme. The Commissioning Manager (CM) shall lead, co-ordinate and manage the commissioning process throughout the construction, commissioning and handover phases of the project.

The process described shall ensure that a logical and methodical approach is taken to the commissioning process, which shall in turn ensure that all installed services are tested, verified and certified in line with the project programme, design requirements and relevant codes of practice (BS EN ISO, CIBSE, BSRIA, SHTM etc.)

The NHS Lothian Head of Commissioning will ensure that the group 2b and 3 equipment is specified, procured, commissioned and tested and the building cleaned, prepared and ready for the transfer of patients from the existing sites.

The Independent Tester will undertake all work necessary to permit the issue of certificate(s) of practical completion, commissioning completion certificate(s) and snagging notice(s) in accordance with and as required by the Project Agreement.

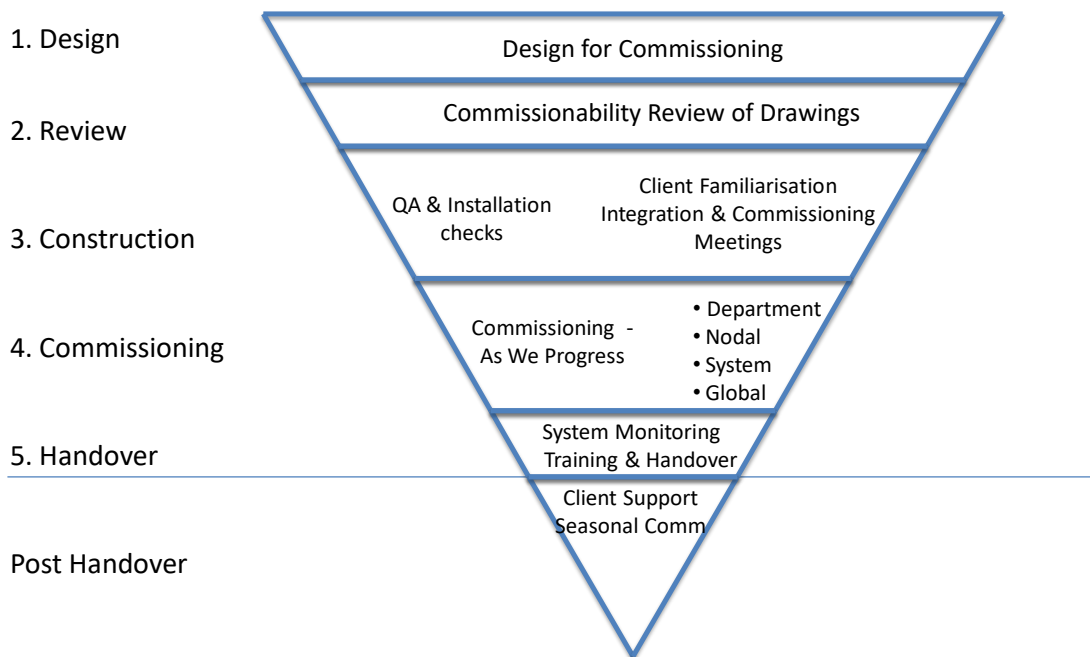
2.0 Commissioning & Completion Process

The diagram below sets out the various stages of the process followed to commissioning of the new facilities. The principles for commissioning commence with the design and a review of the design drawings to ensure the facilities are appropriately formed taking into account commissioning requirements.

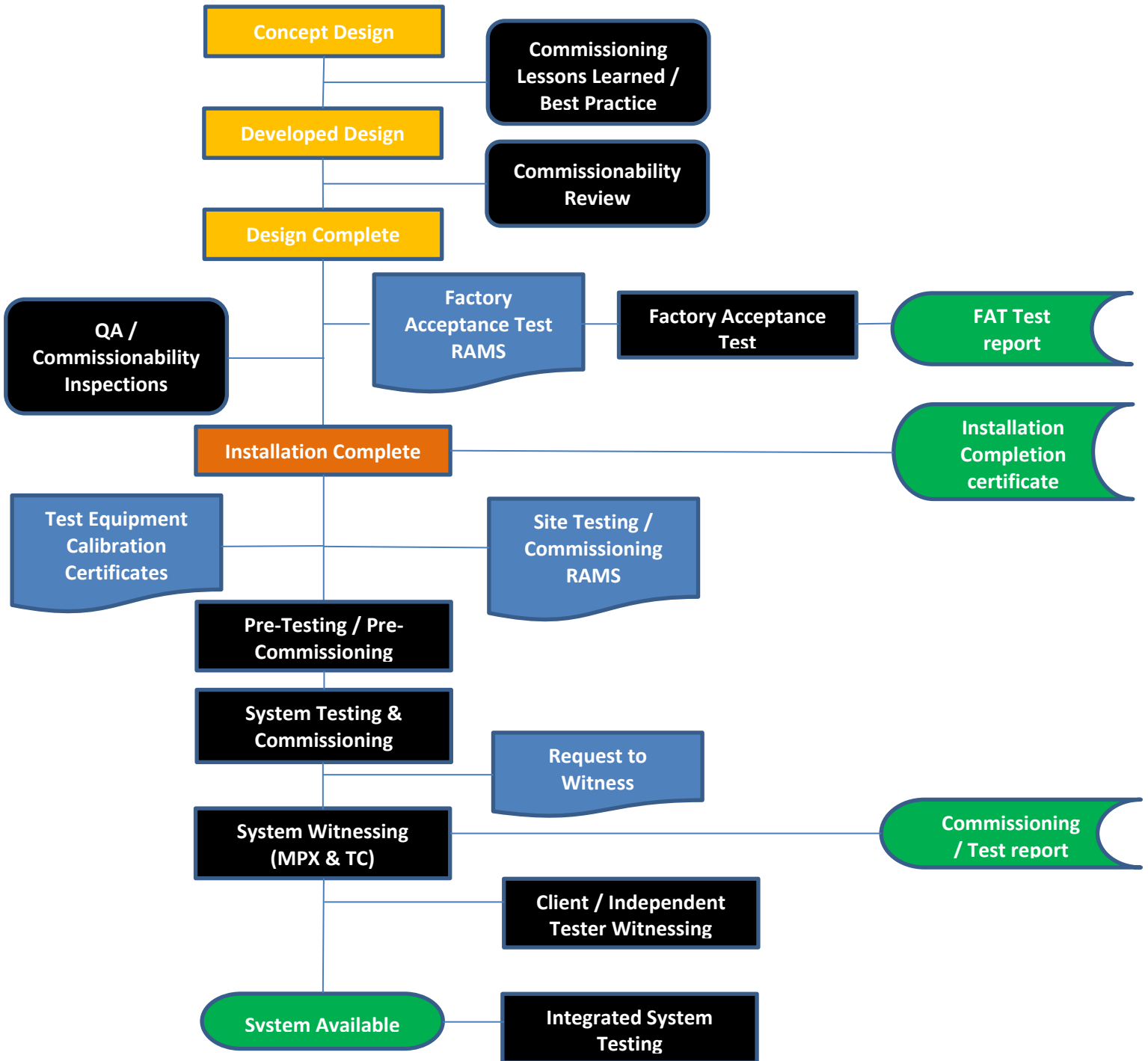
During the construction phase, quality checks and familiarisation meetings shall be held to ensure the design has been properly translated into the construction and installation. In addition, it will ensure all stakeholders have adequate knowledge and orientation to navigate around the facilities and where authorised, the systems. During the construction phase the systems will be tested sequentially starting locally (departments) and migrating towards global commissioning of the facilities.

Prior to handover, suitable training and monitoring will be provided to allow a smooth transition from the construction phase to the operational phase.

Further support is also provided post completion through seasonal commissioning and overall compliance with the Services requirements in the Project Agreement.



The following diagram outlines the process to be followed from design through to completed testing /commissioning for each system (Factory Acceptance Testing on specified systems / equipment only).



3.0 Commissioning Scope

The scope of the building services, which will include but is not limited to the following mechanical and electrical and public health systems, shall be considered under the commissioning scope:

Building Services

- Heating Installations
- Combined Heat and Power System
- Cooling Installation
- Computer Room Cooling Systems
- Domestic Water Services
- Laboratory Water services
- Drainage
- Natural Gas
- Fuel Oil
- Medical Gases
- Building Management System
- Pneumatic Tube System – PTS
- Fire Detection & Alarm
- Gaseous Extinguishing Systems
- Sprinkler System
- Dry Risers
- Mains and Standby Power – High Voltage
- LV Distribution – Low Voltage
- Generators – Standby
- UPS
- Isolated Power Supplies for Areas of Medical Use
- Lighting & Emergency Lighting
- Nurse Call Installation and Disabled Call Installation
- Patient Entertainment
- Access Control
- CCTV
- Panic Alarms
- Lifts
- Helipad Services
- Induction Loops
- ICT Network
- Wireless Network

Other items/services to be included are:

Project Co. Group 1 and Board Group 2A Equipment

Group 1 Board Specified Equipment including items such as

- Theatre lights, pendants and control panels
- UCV canopies
- Autoclave and specialist laboratory sinks
- Patient hoist

All commissionable systems shall be commissioned in accordance with the design principles and parameters set out by the Consultant Engineer or specialist contractor and be in accordance with all relevant codes of practice (BS EN ISO, HTM, SHTM, CIBSE, BSRIA etc. where applicable)

4.0 Commissioning Team

The Trade Contractor shall appoint a member of their management team as their Commissioning Lead. The appointed person shall co-ordinate the commissioning activities and specialist teams as required.

The Multiplex Commissioning Manager shall lead the testing and commissioning activities and shall work closely with the Trade Contractors commissioning lead & teams and co-ordinate with other parties such as the Consultant Engineer (TUV-Sud WW) FM Service Provider team (Bouygues), the NHS Estates Team, the Independent Tester and Statutory authorities.

The Trade Contractors (Mercury Building Services Ltd for Mechanical, Electrical and Public Health services and Schindler for the lifts) shall ensure that testing and commissioning activities are carried out by competent and suitably qualified personnel who are fully conversant with the applicable legislation, codes of practice and specific Risk Assessments and Method Statements to carry out the testing and commissioning activities.

5.0 Commissioning Programme

The extent of the systems testing and commissioning activities shall be laid out within the Commissioning Programme. The programme shall be jointly produced by Commissioning Manager and the Trade Contractors and complement the Construction Programme.

The testing and commissioning programme shall include tasks for the testing and commissioning activities for each installed mechanical, electrical, public health and specialist system (as detailed in section 3.0 Commissioning Scope). NHS Equipment commissioning dates shall be reviewed and incorporated into the programme as required.

The development and monitoring (including progress monitoring) of the commissioning programme shall continue through the construction, commissioning and handover phases of the project and be updated

6.0 Tracking & Reporting

The trade contractors shall issue testing and commissioning trackers on a regular basis to the Commissioning Manager. A master tracker detailing all the testing and commissioning activities shall be kept by the Commissioning Manager. The commissioning tracker system shall detail all commissionable systems with tracking columns for Method Statements, Calibration Certificates, Witnessing dates, Completed Certification. The tracker shall assist with ensuring that all systems are commissioned and witnessed and the relevant test reports have been completed.

The trade package contractor shall assist the Commissioning Manager in producing a fortnightly testing and commissioning look ahead tracker that shall details of the up and coming activities and witnessing.

During the commissioning phase of the project a monthly commissioning report shall be produced by the Commissioning Manager detailing commissioning progress and up and coming commissioning activities

7.0 Procedures, Risk Assessments and Method Statements

A detailed system / project specific Risk Assessment and Method Statement (RAMS) shall be produced for each testing and commissioning activity by the installation contractor. The RAMS shall be reviewed by the Commissioning Manager (or their appointed person) in line with the Multiplex procedures and comments issued accordingly. Testing and commissioning shall not commence until the RAMS is given a “B” status as a minimum

The Testing and Commissioning RAMS shall contain (as a minimum):

1. A full sequential description of the activities to be carried out.
2. Details of any interface with other systems.
3. Reference to relevant project requirements, codes of practice or other recognised standards.
4. Details of test/ commissioning equipment to be used.
5. PPE required.
6. Relevant Health & Safety information
7. Task specific Risk Assessments.
8. Sample test certificates / reports

The testing and commissioning RAMS shall be uploaded to the Zutec O&M platform as a record of the testing and commissioning process.

8.0 Test & Commissioning Instruments

The installation testing / commissioning engineer shall provide all instrumentation and equipment required for testing and commissioning.

The instrumentation and equipment required for testing and commissioning shall require a calibration certificate (to be issued prior to commencement of testing and commissioning) by a recognised governing body, i.e. UKAS, NAMAS or equally approved, and be issued to the Commissioning Manager.

The installation contractor shall ensure that all personnel engaged in testing and commissioning are adequately trained in the use of instruments and have previous experience in the use and method of testing.

The commissioning manager shall keep a record of the test equipment.

The instrument / equipment calibration certificates shall be uploaded to the Zutec O&M platform.

9.0 System Commissioning & Witnessing

The process for the testing, commissioning and witnessing activities shall be as follows:

1. A systems specific commissioning/ testing Risk Assessment and Method Statement shall be produced by the Trade Contractors (Mercury & Schindler) and/or their appointed commissioning specialist and issued to the Commissioning Manager for review prior to the particular testing and Commissioning activity taking place. Testing and commissioning activities shall only take place once the RAMS has been reviewed and agreed by the Commissioning Manager.
2. The Trade Contractors shall issue any relevant commissioning and testing equipment calibration certificates to the Commissioning Manager prior to the commencement of testing and commissioning activities.
3. The trade contractor shall ensure that prior to the commencement of pre-commissioning activities that the installation is complete and that a QA inspection has been carried out and defects / snags rectified. A installation completion certificate shall be issued to the Commissioning Manager.
4. The Trade Contractor shall carry out pre-commissioning, testing and commissioning activities in line with the Commissioning Programme and the relevant RAMS and applicable specifications and standards.
5. Prior to any commissioning activities being carried out the relevant static testing and pre-commissioning activities shall be carried (and where required witnessed by the Commissioning Manager or his appointed representative). Commissioning shall not proceed until the static testing/pre-commissioning activities have been completed and checklists / certificates have been issued
6. When the system has been tested / commissioned successfully, the Trade Contractor shall notify the Commissioning Manager at least 48 hours prior to witnessing being required. As part of the notification the Trade Contractor shall issue a copy of the test/ commissioning certificate / report which shall include marked up drawing or calculation sheets where relevant.
7. The extent of the system witnessing will be dependent on the system. Generally a sampling approach to witnessing will be carried out where approximately 10% of the system will be witnessed (i.e. 10 grilles from a 100 grille system, 3 circuits from a 24 way Distribution Board). This percentage will increase on critical system such as Fire Alarm, Smoke Clearance, Theatre Ventilation, BMS, IST etc.
8. Further to the successful witnessing the certificate / report will be signed off by the Commissioning Manager (or an appointed representative).
9. Where the system or parts of the system fail during witnessing activities, the witnessing will immediately cease and remedial work carried out by the trade contractor before any further witnessing takes place.
10. The Commissioning Manager will notify the other interested parties (NHS Estates, Bouygues, Independent Certifier) for any testing / commissioning they require to witness giving 5 days notice.
11. For certain systems that testing should only be performed once (for technical reasons) such as High Voltage Cable and Switchgear, Gas pipework testing & purging etc. all interested parties will be invited together to witness the testing / commissioning.
12. A copy of the completed test certificate / report shall be retained by the Commissioning Manager or issued no later than 5 days after the test for upload to the Zutec O&M Platform.

10.0 Test & Commissioning Certification

A test / commissioning report / certificate shall be required for all equipment / systems within the Building Services scope. The certification shall include as a minimum:

1. Project Name
2. Date of Test / Commissioning
3. System Reference / Details
4. Commissioning Engineers Name & Signature
5. Test / Commissioning Parameters
6. Test / Commissioning Results
7. Test Equipment used and Calibration dates
8. Reference to RAMS and / or applicable codes of practice
9. Marked up drawing showing the extent of the test / commissioning (where applicable)
10. Space for witnessing party name & signature

The trade contractor shall ensure that a copy of the certificate / report is available for system witnessing.

A copy of the completed test certificate / report shall be retained by the Commissioning Manager or issued no later than 5 days after the test for upload to the Zutec O&M Platform by the trade contractor.

11.0 Client Familiarisation & Training

Client familiarisation and training of the building services systems installed shall be carried out by the Trade Contractors and assisted by the Commissioning Manager, BM Construction Team and Consultant Engineer where required.

The Commissioning Manager in consultation with the trade contractor, Client and the FM team shall produce a familiarisation and training schedule detailing the training to be carried out and suitable dates and times. The training and familiarisation shall be provided for two groups – The Facilities Management team and where applicable the key building users.

The client familiarisation and training shall be split into two distinctive elements. The first being Familiarisation that shall take place during the construction phase of the project which shall be geared particularly to the FM team. These sessions shall be a high level overview of the building and the services installed within. The training element shall take place during the commissioning and handover phase shall be a detailed session specific to each system or equipment and shall have equipment manufactures input where required.

The trade contractor shall produce a client training pack and presentation for each training element that will provide and aide memoir for the participants. The training pack / presentation shall be issued to the Commissioning Manager at least 4 weeks prior to the training activities for review and acceptance.

The Client training sessions shall include (as a minimum)

- Description of the equipment / system
- How the system operates and interfaces with other building or services elements
- Any safety precautions or emergency procedures
- Specific Maintenance activities and fault finding
- Suitable drawings
- Demonstration of operation, maintenance, fault finding etc.

Each familiarisation and training session shall include:

- Classroom presentation (and training pack/notes)
- On site session and demonstration
- Question & answer session

During the question and answering session each participant shall sign the Client Familiarisation & Training register and also complete a feedback form

A copy of the client training pack, training register and associated feedback forms shall be upload to the Zutec system by the Commissioning Manager.

It is the responsibility for the Client and the FM Team to ensure that they have the correct and suitably qualified personnel in place to receive the training and that they have received the required Site Induction prior to the training date.

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12.0 Commissioning Responsibility Matrix

The commissioning responsibility matrix sets out the roles and responsibilities of the Commissioning Team

CM	Commissioning Manager						
MEPC	MEP Consultant Engineer –TUV Sud WW						
TC	Trade Contractor (Mercury / Schindler)						
IT	Independent Tester						
Board	Board Team						
NHS E	NHS Estates						
FM	Bouygues Facilities Management						
Activity	CM	MEPC	TC	IT	Board	FM	NHS E
DESIGN & REVIEW PHASE							
Develop commissioning & Witnessing strategy document outlining the commissioning process and procedures	Produce and implement	Review	Implement	Review	Review and Comment	Review and Comment	Review and Comment
Desktop commissioning review	Produce	Review and Comment	Produce	-	Review and Comment	-	-
Development of Testing & Commissioning Trackers	Produce	-	Assist	-	-	-	-



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Activity	CM	MEPC	TC	IT	Board	FM	NHS E
Develop O&M Scheme & Format	Produce	-	Review and Comment	-	Review and Comment	Review and Comment	-
Prepare Commissioning & testing programme in line with construction programme	Produce	Review	Assist	Review	-	-	-
Preparation of Testing & Commissioning Method Statements	Co-ordinate Review and Comment	Review	Produce	Review	Review	-	-
IT / IP Network Integration (for installed IP systems)	Co-ordinate Review and Comment	Review	Co-ordinate Review and Comment	-	Implement	-	-
CONSTRUCTION PHASE							
Off-site testing (FAT)	Co-ordinate, Witness & report & Validate Test reports	Witness & report	Arrange & manage	Witness as required	-	Witness as required	Witness as required
Monitor Commissioning & Testing Programme	Implement & Update Progress	-	Implement	Review	Review	-	-
Installation & Commissionability Inspections	Review and Comment	-	Coordinate and implement	-	-	-	-

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Activity	CM	MEPC	TC	IT	Board	FM	NHS E
Interface & Commissioning Meetings	Co-ordinate & Lead	Attend as required	Attend	-	Attend as required	Attend as required	Attend as required
Testing & Pre-Commissioning Works	Co-ordinate , Review, Witness / validate tests and report	Witness as required	Co-ordinate, Implement & report	Witness as required	Witness as required (AP/AE)	Witness as required (AP/AE)	Attend as required
Client familerisation (Building & System overviews)	Programme, Manage	Attend as required	Coordinate & implement	-	Attend	Attend	Attend
COMMISSIONING PHASE							
Monitor Commissioning & Testing Programme	Implement & Update Progress	-	Implement	Review	Review and monitor	-	-
Maintain Commissioning & testing Tracker	Implement & Update	-	-	-	-	-	-
Maintain register of calibration certificates	Implement & Update	-	-	-	-	-	-

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Activity	CM	MEPC	TC	IT	Board	FM	NHS E
Commissioning Works	Co-ordinate , Review, Witness / validate tests and report	Witness as required	Co-ordinate, Implement & report	Witness as required	Witness as required (AP/AE for HV/MV systems, and Medical Gas)	Witness as required (AP/AE for HV/MV systems, and Medical Gas)	Witness as required
Statutory Authority testing	Manage and co-ordinate. Witness testing activities, Report	Witness as required	Co-ordinate, Implement & report	Witness as required	-	Witness as required	Witness as required
Integrated System Testing	Manage and co-ordinate. Witness testing activities, Report	Witness as required	Co-ordinate, Implement & report	Witness as required	-	Witness as required	Witness as required

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Activity	CM	MEPC	TC	IT	Board	FM	NHS E
HANDOVER PHASE							
System Monitoring & Adjustments (Environmental Proving etc.)	Programme Manage and Co-ordinate	Witness as required	Co-ordinate & Implement	Witness as required	-	Witness as required	Witness as required
Develop the completion Strategy	Programme Manage and Co-ordinate	-	Assist	-	Review and Comment	Review and Comment	-
O&M and AF Drawing Activity	Programme Manage, Review	Review and Comment	Co-ordinate & Implement	-	-	Review and Comment	Review and Comment
Client Familiarisation & Training (Including User Groups)	Programme Manage, Review	-	Co-ordinate & Implement	-	Attend	Attend	Attend
Clinical / Client Equipment Commissioning	Co-ordinate, Facilitate	-	Assist	-	Programme, Manage, Implement	Assist	-
POST HANDOVER							
Client Migration	Assist	-	Assist	-	Programme, Manage, Implement	Programme, Manage, Implement	-
Seasonal Commissioning and post occupancy survey	Programme Manage and Co-ordinate Report	Review & Comment	Co-ordinate & Implement	Witness as required	Input as required	Input as required Witness as required	Input as required