NHS Scotland Assure
Quality in the healthcare environment

NHS National Services Scotland

NHS Forth Valley
Modular Wards
Key Stage Assurance Review

Full Business Case
KSAR Report

V2.0 May 2022

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Document Overview

NHS Forth Valley Modular Wards | Key Stage Assurance Review Report | Full Business Case Stage

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Document Control Sheet

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1. Executive Summary

1.1 Executive Summary

As a result of the Full Business Case (FBC) Key Stage Assurance Review (KSAR) and based on the information presented to NHS Scotland Assure (NHS SA), we are unable to support the project progressing to the construction phase at this time. There are a number of key elements that NHS Forth Valley (NHS FV) should address as part of their action plan prior to moving to the next phase of the project. These elements include (but are not limited to):

- The documents reviewed did not adequately demonstrate compliance with the current healthcare guidance on water, ventilation or medical gas.
- The design information submitted is incomplete and not to RIBA Stage 4 level of detail, as expected at FBC Stage in accordance with the Scottish Capital Investment Manual (SCIM).
- A fire strategy has been provided by the contractor to NHS FV. This report references the 'Technical Handbook Non Domestic', however, there is no reference to NHS 'Firecode' SHTMs.
- There are variations from 'SHTM 81' and 'Technical Handbook Non Domestic' with no evidence that fire safety compliance has been met with an alternative means.
- There are no fire engineering solutions proposed for this project. Some areas of the fire strategy do not offer sufficient detail to make an appraisal of the fire safety measures.
- No evidence of Fire Engineer competency checks has been provided.
- There is insufficient evidence to confirm that a plant access and replacement strategy has been developed, and from the documentation provided there are concerns that safe, adequate access to plant and equipment for maintenance, cleaning and replacement has not been considered in some areas.
- A lack of evidence provided on the proposals for connecting to the existing hospital system and whether appropriate risk assessments have been undertaken.
- A lack of documented Infection Prevention and Control input into the design process.
- A lack of documented evidence of Authorising Engineers and NHS FV Estates input into the design process.
- A lack of evidenced competencies of the organisation or individuals carrying out the works.
- A lack of detail in the derogation review and approval process, as well as a number of derogations which have yet to be approved by NHS FV.
- NHS Scotland Assure also note that inconsistencies exist between the environmental matrix and the room data sheets.

The evidence suggests that a significant number of comments raised during the stakeholder consultation process have not yet been addressed within the design. The process for capturing comments and for ensuring that stakeholders are aware of their responsibilities is not clear.

The design information contains a number of assumptions by the designer that may impact on the proposed strategies for interfacing to existing equipment and systems, for example final heat load requirements. Whilst it is evident that an engineering analysis of anticipated requirements with respect to the existing Forth Valley Royal Infirmary (FVRI) utilities has been carried out (by the Special Purpose Vehicle (SPV) Hard Facilities Management (FM) provider), there appears to be a lack of co-ordination with the modular facility design information (i.e. it is not clear upon what the final design has been based on and whether this aligns with the work engineering assessment which has been undertaken).

The KSAR also identified inconsistencies in the design information and how that relates back to the project briefing information. One example of this is the Board's requirements for ventilation air change rates and hierarchy of cleanliness, which differ between the environmental matrix and the room data sheets submitted for review.

The current design proposals contain a number of Contractor Design Portions (CDPs) items that have not yet been developed to a RIBA Stage 4 level of detail. It is acknowledged that the MEP designers responsible for writing the performance specification have been engaged by the Modular Build Contractor to monitor the CDP packages. There is no auditable evidence, however, as to how the development of the CDP items will be monitored by NHS FV nor how the overall co-ordination of services will be managed.

Whilst there is evidence of wide-ranging stakeholder input, a significant number of stakeholder comments still need to be formally closed out, as evidenced in the various design tracker documents submitted as part of the NHS FV KSAR response.

There is a lack of evidence to support risk assessments that should be utilised to inform design solutions, including an electrical resilience assessment in accordance with SHTM 06-01, emergency lighting risk assessments in accordance with BS 5266-1, medical locations classification in accordance with BS7671 and water risk assessment in accordance with SHTM 04-01.

The NHS FV team indicated some of this information was available in documents such as the environmental matrix, however there was no demonstrable evidence to indicate that appropriately competent individuals had undertaken the respective risk assessments, nor if wider stakeholders had been consulted.

We note further concerns over the wider engagement of technical and clinical stakeholders with respect to input to the design process, including recorded sign-off of the FBC proposals. Whilst stakeholder input was demonstrated to an extent, a number of gaps were identified through the KSAR workshops, such as Infection Prevention & Control colleagues not being fully briefed on the technical solutions (with respect to how these may impact upon infection control matters or the clinical space) and NHS FV Authorising Engineers (AEs) expressing a number of technical concerns that had not been addressed by the designer (and in the case of the Electrical AE hadn't received or reviewed the documentation).

The Mechanical Electrical and Plumbing (MEP) Design Consultants have noted within the FBC project documentation that there is no requirement to use Building Information Modelling (BIM) on the project and that BIM has been utilised for co-ordination purposes only. It is unclear from the evidence provided if NHS FV have considered the requirement to comply with Scottish Government policy with respect to BIM for new projects introduced in

April 2017, nor if the Scottish Government BIM grading tool has been used to support this assessment.

Whilst the NHS FV project team have produced a design tracker to record the findings from consultation with various stakeholders, there is a lack of supporting evidence around the response to their comments and a number of these items on the tracker remain open. Examples include; the concerns raised by the AE (medical gas) over the level of detail demonstrated on drawings (not to RIBA Stage 4 and not sufficiently detailed to assess compliance with SHTM 02-01) and the comments raised by the AE (ventilation) on the location of intake and discharge points for the AHU. This extends to the derogations process, where several derogations remain open and have not been approved by the Project Board. The derogation schedule itself lacks technical detail or evidence of mitigation measures to be employed to maintain an equivalent level of safety and / or technical performance to that outlined in the respective guidance.

There is also no confirmation that NHS FV has fully engaged with their own Water Safety Group beyond an initial meeting where the project was discussed along with other projects. There is no evidence of a medical gas committee or ventilation safety group being involved in the design process, or being consulted as part of the stakeholder review process.

From a fire engineering perspective, there are a number of unresolved items that we recommend be addressed prior to progressing to the construction phase. These include preparing a documented assessment of the progressive horizontal evacuation strategy (including review of compartmentation and escape strategy) and validation of assumptions in respect to the properties of the existing facility, with respect to fire protection measures (e.g. glazing, etc.). There are also a number of proposed fire derogations/variations to guidance that have not been fully detailed or lack evidence with respect to supporting risk assessments or mitigation measures.

1.2 Summary of Findings

The findings of this report have been collated based on information provided by NHS FV.

The following table outlines the status of key findings as derived from the KSAR and identified within the NHS SA Recommended Action Plan issued to NHS FV under separate cover:

Review	No. of Issues per category				
	1	2	3	4	5
Project Governance and General Arrangements	3	3	13	1	0
Water and Internal Plumbing / Drainage Systems	4	6	21	2	4
Ventilation	1	6	13	13	7
Electrical	1	7	3	1	0
Medical Gases	2	4	2	1	0
Fire	0	3	8	3	0
Infection Prevention & Control Built Environment	0	2	6	2	0

The following categories were used in relation to the findings:

Category	Definition
1	Significant – Concerns requiring immediate attention, no adherence with guidance.
2	Major – Absence of key controls, major deviations from guidance.
3	Moderate – Not all control procedures working effectively, elements of noncompliance with guidance.
4	Minor – Minor control procedures lacking or improvement identified based on emerging practice.
5	Observation and improvement activity.

1.3 Project Overview

NHS FV is seeking to develop a sustainable model for the provision of orthopaedic surgery for the residents of Forth Valley and reduce overall waiting times for this service. At present there is limited capacity to provide all the services required locally and a heavy reliance upon sending patients to the Golden Jubilee National Hospital (GJNH) for treatment and elective surgery.

NHS FV has identified the ability to repatriate orthopaedics services back from GJNH through the provision of a 30-bed elective care ward which aligns with the wider Scottish Pathway Standards of care. The project also falls under the wider Scottish Government Elective Care / National Treatment Centre Programme (NTC) of Works.

The patient cohort group has been confirmed as elective orthopaedic patients. The proposed site for the elective care ward is NHS Forth Valley Royal Hospital (FVRH) which is operated under a not for profit operating model (NPD) with a Special Purpose Vehicle company (SPV) and a separate Facilities Management company. The hospital was officially opened in July 2011. Under the SPV arrangement, they will design and construct the new modular ward and maintain in line with the current service agreement for the site. An existing car park has been identified for the location of the modular ward, with displaced car parking being provided elsewhere on the FVRH campus.

A schedule of accommodation has been prepared by NHS FV and forms part of the Variation Enquiry approval process with the SPV. The schedule identifies the requirement for thirty single bed patient bedrooms with associated en-suite and showering facilities (100%) along with the standard support accommodation for staff and patients, including staff bases, waiting rooms, offices, domestics, kitchen and waste disposal etc. The single storey accommodation is wrapped round a central courtyard space, with patient rooms externally facing giving access to nature light.

The MEP Consultants, appointed by the Modular Build Contractor, have not been appointed to deliver full professional design services to RIBA Stage 4 and into construction, they have only been appointed to develop the Performance Design Specification for the Mechanical, Electrical, Public Health and Medical Gas systems for the modular wards.

The Modular Build Contractor confirmed during the Technical Workshops that separate Contractors had been appointed to develop these as Contractor Design Packages (CDP). The following CDP were advised:

- the development and production of the RIBA Stage 4 Mechanical and Public Health services design solutions.
- the development and production of the RIBA Stage 4 Electrical services design solutions.
- the development and production of the RIBA Stage 4 Medical Gas Pipeline System design solutions.

The design contractor’s information has been submitted by for the KSAR. The design information includes layout drawings, plant equipment technical submittals and various schematic drawings (at various levels of detail). A limited number of design calculations were

submitted for review. The design information submitted, however, is incomplete and not to RIBA Stage 4 level of detail, as expected at FBC Stage.

2. Review Methodology

2.1 Overview of NHS Scotland Assure & The KSAR Process

Good management and effective control of projects is an essential element to the successful delivery and maintenance of healthcare facilities across NHS Scotland estates.

The NHS Scotland Assure (NHS SA) – Assurance Service was launched on 1 June 2021 following a letter issued by Scottish Government to Health Board Chief Executives, Directors of Finance, Nursing Directors and Directors of Estates. This letter outlined the purpose of NHS Scotland Assure, with an overarching aim to deliver a co-ordinated approach to the improvement of risk management in new builds and refurbishment projects across NHS Scotland. The new service will underpin a transformation in the approach to minimising risk in our healthcare buildings and environments, protecting patients from the risk of infection and supporting better outcomes for patients in Scotland.

From 1 June 2021, all NHS Board projects that require review and approval from the NHS Capital Investment Group (CIG), will need to engage with NHS SA to undertake key stage assurance reviews (KSARs). Approval from the CIG will only follow once the KSAR has been satisfactorily completed. The KSARs have been designed to provide assurance to the Scottish Government that guidance has been followed. The Scottish Government may also commission NHS to undertake reviews on other healthcare built environment projects. This does not change accountability for the projects; NHS Boards remain accountable for their delivery. NHS Scotland Assure will be accountable for the services it provides that support delivery of the projects.

NHS Scotland Assure will also work closely with Health Boards to identify where a KSAR may be required for projects under their Delegated Authority, utilising a triage system to assess risk and complexity of projects.

The KSARs will assess if Health Boards Project Management teams (inclusive of clinicians, appointed construction consultants, and contractors) are briefed and following best practice procedures in the provision of facilities. We will review if projects are compliant in all aspects of safety, if specific engineering systems are designed, installed and commissioned, and for ongoing safety maintenance including Infection Prevention and Control (IPC).

The KSAR focuses on key topics, specifically – IPC, water, ventilation, electrical, plumbing, medical gases installations and fire. This ensures they are designed, installed and functioning from initial commissioning of a new facility and throughout its lifetime. Health Boards are required to have appropriate governance in place at all stages of the construction procurement journey.

The purpose of the KSAR at Full Business Case (FBC) stage is to confirm there is a good and comprehensive understanding of the category of patient who will use the proposed facility and that the project team consider how appropriate quality and safety standards will influence the design. It looks to provide assurance that the project can proceed to the Construction phase.

Additionally, the KSAR at FBC will carry out an appropriate level of checking of the design calculations and solutions adopted.

Whilst the KSAR focusses on actions to improve the end product, it is not intended to detract from the merits of a development that will add significant benefit for the healthcare of the population served, and which has many exemplary elements. Rather, it is a reflection of the complexity of healthcare construction projects and the stage of development at which it was reviewed. Some conflicts and changes are to be expected as complex projects develop and project teams have in place mechanisms to identify and address these. This report adds a layer of scrutiny and assurance to that process to address the above requirement from government.

2.2 KSAR Process

2.2.1 The FBC KSAR for NHS FV Modular Wards project took place between November 2021 and February 2022.

2.2.2 To inform the findings of the KSAR, the Health Board were issued with key documents outlining the assurance question set and expected level of evidence and supporting documents in accordance with relevant legislation and guidance. This included the FBC KSAR Workbook and FBC Deliverables list.

The KSAR report includes an overview of the main findings of the review, with a further itemised list of detailed observations provided under separate cover to NHS FV. The detailed observations are recorded in an action plan that should be adopted by NHS FV Valley following the review and subsequently monitored by them to ensure appropriate actions are completed in a timeous manner.

2.2.3 As part of the KSAR process, NHS FV issued a document transmittal log which details the evidence provided in response to the KSAR Workbook and NHS SA recommended deliverables list. As part of an initial gap analysis, NHS SA reviewed the transmittal log to ensure all documents had been successfully received. The transmittal log provides a version history and audit trail of information reviewed.

2.3 Application of Standards & Legislation

2.3.1 Health Facilities Scotland (HFS) currently provides a range of advisory and delivery services across a wide variety of topics from a portfolio which covers the built estate, engineering and environment and facilities management. With some exceptions these services are largely advisory in nature, identifying best practice and developing national guidance and standards. This includes, amongst others, specific healthcare engineering guidance.

2.3.2 Antimicrobial Resistance and Healthcare Associated Infection (ARHAI) Scotland currently provides advice and guidance on all aspects of infection protection and control

nationally in Scotland, inclusive of expert advice and guidance on the topic of Healthcare Associated Infections (HAI) and antimicrobial resistance. It maintains and continues to develop a practice guide (National Infection Prevention and Control Manual – NIPCM) as well as a HAI Compendium of all extant guidance and policy appropriate for use in NHS Scotland.

Like HFS, these services are largely advisory in nature, identifying best practice and developing national guidance and standards. The NHS Scotland NIPCM was first published on 13 January 2012 as mandatory guidance, by the Chief Nursing Officer (CNO (2012)1), and updated by a second edition on 17 May 2012 (CNO(2012)01-update). The NIPCM provides guidance for all those involved in care provision and should be adopted for infection, prevention and control practices and procedures. The NIPCM is mandatory policy for NHS Scotland.

The authority of guidance produced by National Services Scotland (NSS) and other national organisations e.g. Healthcare Improvement Scotland is best described by the definitions outlined below (SHTM 00 – Best practice guidelines for healthcare engineering):

Regulations are law, approved by Parliament. These are usually made under the Health and Safety at Work etc Act following proposals from the Health & Safety Commission. Regulations identify certain risks and set out specific actions which must be taken.

Approved Codes of Practice give advice on how to comply with the law by offering practical examples of best practice. If employers follow the advice, they will be doing enough to comply with the law.

Approved Codes of Practice have a special legal status. If employers are prosecuted for a breach of health and safety law, and it is proved that they did not follow the relevant provisions of an Approved Code of Practice, they will need to show that they have complied with the law in some other way, or a court will find them at fault.

Standards (British or European), institutional guides and industry best practice play a large part in how things should be done. They have no direct legal status (unless specified by Regulations). However, should there be an accident; the applied safety practices at the place of work would be examined against existing British or European Standards. It would be difficult to argue in favour of an organisation where safety was not to the described level.

Guidance is issued in some cases to indicate the best way to comply with Regulations, but the guidance has no legal enforcement status.

2.3.3 Whilst guidance is deemed not compulsory by the Health and Safety Executive (HSE), where compliance with guidance is specified in a contract, as is the case here, it becomes a contractual requirement. Therefore, any permitted deviation from it would be expected to follow a formal process with input from all relevant parties, with clarity around how the outcome was reached, including risk assessments where appropriate and sign off by all those authorised to approve it.

2.4 Project Technical Outline Summary

2.4.1 Water and Internal Drainage Systems

The modular wards will be served via a Boosted Cold Water metered supply from the existing NHS FVRH Boosted Cold Water network. The modular wards will not contain any

raw cold water storage tanks, emergency water supplies, water filtration plant, filtered cold water storage tanks nor any cold-water booster pumps. The modular wards will be reliant upon the existing systems with an assessment of existing plant capacity still to be completed.

Domestic hot water to serve the various appliances within the modular wards will be generated by a dedicated Plate Heat Exchanger and associated storage vessels. It was confirmed at the Water Technical Workshop that these plant items have been sized to serve the hot water requirements for the new facility only, however no supporting calculations are evidenced.

The domestic cold-water system within the new facility has not demonstrated any passive nor active measures to maintain the cold-water temperature at the outlets at a temperature no greater than 2^{o}C above the temperature in the cold-water storage tanks. There remains a risk that if this is not considered during the design process, there is potential for legionella and biofilm growth within the system.

The above ground drainage system has been designed to serve all sanitary ware appliances and condensate drain requirements from the hub room cooling systems and the AHU drain pans. The above ground drainage system utilises air admittance valves to ventilate stacks rather than ventilating the stack to atmosphere.

2.4.2 Ventilation

The ventilation strategy for the modular wards is a combination of Mechanical Supply and Extract and Dirty Extract. The mechanical ventilation systems have been designed to provide sufficient air change rates to satisfy the requirements of SHTM 03-01, infection control, occupancy and thermal comfort. The Mechanical Supply and Extract ventilation air is provided via a single Air Handling Unit (AHU) located within the ground floor plant room. The AHU incorporates filtration devices, LTHW frost coil, run around heat recovery coils, plate heat exchanger, Supply and Extract fans, Direct Expansion (DX) cooling coil, LTHW Heater battery and final filters. The AHU includes a 200mm high steel base. Duct mounted attenuators are included within the appropriate ductwork distribution.

Ductwork for supply, clean extract and dirty extract air is located within the ceiling voids. The Dirty Extract system serves all Toilets, Showers and Dirty Exhaust areas via a twin fan assembly incorporating a run around heat recovery coil. The dirty extract fan is in the ground floor plant room near the AHU. The ground floor ventilation plant room submitted for review does not contain sufficient information to determine if the fresh air intake and exhaust air discharge louvres have been provided in accordance with the requirements of SHTM 03-01.

The ground floor plant room requires further design development to provide sufficient detail in relation to the required plant access / egress strategy and compliance with SHTM 03-01.

Supply make-up air to rooms with clean / dirty extract air provisions is via door transfer grilles/ducts from adjacent areas. The drawings currently indicate standard intumescent blocks on door transfer grilles located within fire rated doors. It was recognised by the Modular Build Contractor during the Ventilation Technical Workshop that this design solution does not comply with the fire/smoke control strategy for the facility and that an alternative compliant design solution will need to be developed.

Low Temperature Hot Water (LTHW) from the existing NHS FVRH network will supply the modular wards. As noted in the Risk Register (v5), it is acknowledged that there may be a risk that the existing hospital systems have insufficient capacity. The SPV's Hard FM Provider's MEP Consultant confirmed at a Technical Workshop that whilst it is expected that there is sufficient capacity within the existing heating network this cannot be confirmed until a final assessment has been completed.

Constant Temperature (CT) LTHW is provided from the existing NHS FV LTHW network to serve the new AHU Frost and Reheat batteries, 2 No. Plate Heat Exchanger Storage Vessels are to serve the new LTHW distribution Pumps P1 and P2. Pumps P1 and P2 distribute Constant Temperature (CT) LTHW through the facility to serve ceiling mounted radiant panels.

Dedicated cooling is provided to the Hub Room only via a single wall mounted Direct Expansion (DX) cooling unit. The DX unit is linked to an external condensing unit via refrigerant pipework located in the ceiling void. There was no evidence to suggest that the noise impact from the DX system has been considered to either the existing or new wards.

The pipework passes directly above the clean utility, dirty utility, kitchen and general store areas. There is no evidence of whether a risk assessment was undertaken to determine if a back-up cooling system is required to this room.

2.4.3 Electrical

The LV distribution electrical power services includes both essential and non-essential power services taken from the existing FVRH power infrastructure, with changeover switches in position at each of the Distribution Boards (DB), except for the server DB. There is no evidence of a risk assessment to support this strategy. The current design allows for a new Main Switch Board (MSB) and DB's (plus associated internal switchgear), sub main cabling and containment throughout the modular wards.

Small power sockets will be installed throughout the modular wards. Final circuits will be supplied from DBs' Outgoing circuits will be protected by either a miniature circuit breaker (MCB) (lighting circuit) or residual current circuit breaker with overcurrent protection RCBO (small power circuit), depending on the equipment requiring protection. The general power system is noted within the project documentation as requiring to be sized to incorporate a growth margin or additional capacity increase of 25%.

It is noted that a general 25% figure has been applied to all services. Regardless of anticipated future capacity. We would recommend a realistic figure is applied here as over sizing of cables, ductwork pipework etc. will not only have a cost premium but will introduce risk into water system pipework.

Mechanical power supplies are provided through DBs serving the air handling unit, external condenser and mechanical control panel.

Internal and external LED light fittings are specified and linked on a digital control system. Lighting occupancy detection is specified to all toilets, stores and escape routes for energy efficiency. No dimmable lighting is evidenced. A standalone emergency lighting system (with integral battery packs) plus exit signs is specified.

Electrical sub-metering is provided at the main LV switchboard, as part of the main Hospital infrastructure, as well as both the essential and non-essential switchboards within the new modular ward.

A nurse call system has been specified to include bedhead call points, reset buttons and indicator panels. Alert and annunciation are provided by tone units and lamp indicators located throughout the new modular ward.

2.4.4 Medical Gases

The Medical Gas Pipeline Systems (MGPS) are limited to Oxygen and Medical Vacuum systems only. Medical Air provision has been excluded with associated derogation and an SBAR has been formally approved by NHS FV IPC in September 2021 and the Project Board in October 2021. The MGPS is a CDP item with the design still to be completed, reviewed and submitted to the AE (MGPS) for comment.

The Oxygen and Medical Vacuum supplies to the new modular ward will be extended from the existing Hospital systems. An assessment of the capacity of the existing network to support the modular wards has still to be undertaken, therefore, there remains a risk that the existing system may not have the capacity to support the new building.

Oxygen and medical terminal units have been evidenced within the Treatment Rooms and each bedroom. The final locations of the terminal units have not been fully detailed at this stage.

2.4.5 Fire

A fire strategy has been provided by the Modular Build Contractor to NHS FV. This report references the ‘Technical Handbook Non Domestic’, however, there is no reference to NHS ‘Firecode’ SHTMs.

There are variations from ‘SHTM 81’ and ‘Technical Handbook Non Domestic’ with no evidence that fire safety compliance has been met with an alternative means.

Some areas of the fire strategy do not offer sufficient detail to make an appraisal of the fire safety measures.

There are no fire engineering solutions proposed for this project.

No evidence of Fire Engineer competency checks has been provided.

3 KSAR Review Summary

The following narrative relates directly to the FBC KSAR workbook and the evidence indicated therein. The comments associated with the points are because of the evidence presented by the Board and their advisors during the review process.

Reference to the folder structure throughout Section 3 relates to the location of evidence uploaded by NHS FV in the NHS SA Microsoft Teams folder.

3.1 Project Governance and General Arrangements

3.1.1 Project Governance and General Arrangements KSAR Observations

Workbook Ref No.	Areas to probe	Evidence expected
1.1	Evaluation of changes detailed from previous KSAR.	Assessment of any substantive changes in highlighted areas from previous review stage and all actions have been implemented.
NHS Scotland Assure Observations: Not applicable as the project is entering the KSAR review at FBC Stage.		

Workbook Ref No.	Areas to probe	Evidence expected
1.2	Verification that CIG recommendations have been implemented with respect to prescribed in scope areas.	Review of the implementation of all CIG recommendations. Evaluation of any deviation from previous submissions or reviews.
NHS Scotland Assure Observations: Not applicable as there are no previous CIG recommendations.		

Workbook Ref No.	Areas to probe	Evidence expected
1.3	Has cross-referencing with NDAP and AEDET recommendations been implemented?	An assessment if there is full compliance with the applicable recommendations and actions from the preceding step.
NHS Scotland Assure Observations: Not applicable as no previous NDAP or AEDET has been completed for the project.		

Workbook Ref No.	Areas to probe	Evidence expected
1.4	Does the Health Board continue to demonstrate service / clinical input into design decisions based on a current and comprehensive knowledge of patient cohorts?	Recorded and updated input taken from service lead(s) / clinician(s) about relevant patient cohort characteristics and their typical needs in terms of the accommodation's environment, safety and infection control standards. Demonstrable expertise of service lead(s) / clinician(s) in providing this advice.

NHS Scotland Assure Observations:

Whilst service and clinical inputs are evident in the overall design consultation process, a number of potential gaps were identified with respect to the applied governance, including inconsistencies in information noted across documents and in some cases a lack of documented approvals. Patient cohorts have been identified, albeit conflicting documentation was initially provided, with subsequent clarification provided by NHS FV as part of the KSAR process. NHS FV should look to 'close the loop' with respect to the service/clinical input prior to progressing to the next stage of the project and ensure consistency across all project documentation. Examples of themes identified as part of the KSAR process include:

- The patient cohort review document within *Folder 1.4A* contains reference to general guidance (SHTM's and HTM's) but no specific SHTMs (e.g. SHTM 03-01) noted. The document contains statements from the clinical team confirming the patient cohort group as Class IV Type 4 high risk. NHS FV provided an email response (30 November 2021), following the weekly KSAR meeting, confirming that the patient cohort was "*low risk orthopaedic patients"* and that *"class 4 was appropriate"*.
- The patient cohort review document within *Folder 1.4A* contains a footnote reference that the document has been approved at the meeting and is to be followed up via email communication. No subsequent email has been evidenced.
- The project team core group terms of reference (TOR) document within *Folder 1.4A - 4.7 Project Team Meetings* contains individuals no longer involved in the project, namely the NHS Project Manager and an NHS Technical Advisor. Roles for project assurance, independent tester, lender technical advisor and consultant engineer are noted as TBC.
- Within *Folder 1.5A*, the Environmental Matrix legend confirms an update has been made following IPC and clinical team input; however, there is no detail outlining the changes made to the document. No evidence of IPC Environmental Matrix comments were found in *Folder 1.6C - 4.5 HAI-SCRIBE - Workshop* meeting minutes from May, July and September 2021. NHS Scotland Assure also note that inconsistencies exist between the environmental matrix and the room data sheets.

Workbook Ref No.	Areas to probe	Evidence expected
1.5	Project team continues to demonstrate a unified and recorded understanding of needs of main users and patient cohorts of the proposed accommodation and how this has influenced the design of critical building, engineering and infection prevention and control quality and safety standards.	Updated and current list available of all stakeholders, service users and patient cohorts impacted by this project, plus the identification of any high risk groups and their specialist needs. Updated and recorded engagement on these designs issues having taken place between the project team and service lead(s) / clinician(s), infection prevention and control team, and other key stakeholders (e.g. Estates, Medical Physics, IPC, the AEDET, NDAP or other design briefing workshops). Details available of how service users / patient cohort needs and their expected use of the accommodation are influencing the design brief, including critical building, engineering and infection prevention and control quality and safety standards.

NHS Scotland Assure Observations:

NHS FV have demonstrated that they have attempted to capture and maintain stakeholder input to the development of the design, however, a number of gaps have been identified within the process, that ultimately do not provide assurance that all the Health Board requirements have been suitably captured in the FBC documents.

In NHS SA's opinion, there is an overreliance on the design tracker document (v30) to evidence and control comments raised on the design by stakeholders, including NHS FV IPC and Estates representatives. A number of the comments contained within the tracker remain open, with stakeholders and AE's confirming during the Technical Workshops that recent comments had not been incorporated within v30 or an updated version of the tracker issued. There is no evidence to support how this document demonstrates a cohesive understanding of the end user needs, or the governance process demonstrating how the actions are closed out. It is also unclear as to how NHS FV ensure that all stakeholders have contributed to the process – for example, there is no evidence of Electrical AE comments within the design tracker.

There is a revision note within the Environmental Matrix identifying an update following changes by the clinical and IPC teams. The changes requested are not clearly identified within the matrix and the supporting governance process surrounding the changes has not been evidenced. NHS Scotland Assure also note that inconsistencies exist between the environmental matrix and the room data sheets.

The KSAR process identified that the level of detail within the design information submitted for review was not at RIBA Stage 4 maturity, as expected at FBC Stage.

- *Folder 1.7 - 4.7 Project Team Meetings* contains copies of the Project Directory and Terms of Reference (TOR) documents identifying relevant stakeholder groups. IPC leads are noted within both documents.
- Within *Folder 1.5B,* a design tracker (v30) contains comments received from a variety of clinical, technical and stakeholder groups on the design documents and associated Room Data Sheets. The document was noted as a benefit to the project to centralise comments received; however, a significant number of the items on the tracker remain open with no target date established for closing actions. There is potential for confusion and/or conflict between this design tracker and the Modular Build Contractor's design tracker (v6) evidenced in *Folder 1.11 - 4.1 NTD Design Workshops.*
- *Folder 1.5B* contains design meeting minutes evidencing recent engagement between the project team and IPC, however Estates were not represented at every meeting.
- The dirty extract system was reviewed at a design meeting held on 2 August 2021 where Option B, centralised dirty extract system, was agreed at the meeting; however, no clinical representation was noted at the meeting.
- A series of generic construction quality management plans are provided in *Folder 1.5C*. No evidence has been provided of input from service lead(s) / clinician(s) or a pre-construction quality plan being provided for review.

Workbook Ref No.	Areas to probe	Evidence expected
1.6	Planned approach towards determining the necessary standards for this accommodation.	Updated and current list of the relevant NHS and non-NHS guidance that is being used and adopted (see previous section of workbook FBC KSAR (Page 9) for examples of appropriate guidance). Updated and current list of all proposed derogations from NHS guidance with a detailed technical narrative on each derogation and/or list of known gaps in guidance that will need to be resolved in order to meet the needs of the patient / user cohort. Knowledge of the role of infection prevention and control advisors (IPCN and ICD) to be used throughout the final design stages, and details of the resource plan in place to ensure continuity into the construction phase.

NHS Scotland Assure Observations:

There is a lack of detailed requirements noted in the client briefing documentation provided beyond generic references to SHTM's, with no specific sub clauses noted. There is, however, evidence of Room Data Sheets and Schedule of Accommodation processes being implemented during the design process. Discrepancies were identified as part of the KSAR process between the environmental matrix and room data sheets, with respect to the ventilation requirements in the patient bedrooms and surrounding areas.

Several derogations have been identified but remain open and are still to be formally approved (or otherwise) by the Project Board. No evidence of AE engagement within the derogation process was provided and no derogations are noted in relation to the connection of existing services to the adjacent building. The KSAR process has identified several potential derogations that are not recorded within the derogations schedule. With respect to the derogations that are noted as being open, no evidence of a formal review process was evidenced as part of the KSAR response, therefore it is unclear as to how NHS FV will assure themselves that all appropriate stakeholders, including technical, clinical and infection control colleagues, will be engaged in the review/sign-off process.

No ongoing IPC resource plan is evidenced to ensure that the current IPC resource is maintained to oversee the update and formal approval of key documents, such as the Environmental Matrix and Derogations Schedule and the completion of the Stage 3 HAI-SCRIBE, prior to construction works commencing on site.

- The patient cohort review document within *Folder 1.4A* contains reference to general guidance (SHTM's and HTM's) deemed applicable to the project, however there is no evidence of any tailoring of appropriate guidance specific to the building's function and use.
- Email response received from NHS FV (30 November 2021) following a project weekly meeting confirmed that *Folder 1A ACR's* contained a new document upload called 'variation request' detailing the NHS FV requirements. The document highlighted discrepancies between the Treatment Room and Clean Utility sizes noted on the Room Data Sheets (RDS) and Schedule of Accommodation (SoA). The document provides a general statement that compliance is based on building regulations, health and safety legislation and general SHTM, HTM requirements etc., again with no specific tailoring to the project.
- *Folder 1.6A* contains a derogation schedule with 9 No. derogations identified with only 3 no. being noted as formally approved at a Project Board meeting held on 4 October 2021. Greater detail on the approved derogations is contained within *Folder 1AY FBC Derogation Schedule* which contains minutes and an updated paper from the Project Board meeting on 4 October 2021. Project board meeting minutes remains in draft form. NHS FV advised at the Kick-off Meeting on 19 November 2021 that the remaining 6 no. derogations were in the process of being approved by the Project Board, however there is no evidence of this beyond the statement provided at the meeting.
- The derogation schedule contains reference to specific SHTMs and/or sub clauses which the design is seeking to deviate from. A series of technical details are provided in *Folder 1.6B* to support some of the derogations proposed, including reference to

respective drawings and a statement demonstrating the impact on the end user. It is not evident how these derogations will be approved by the project board or if supporting risk assessments have been undertaken.

- A Stage 2 HAI- SCRIBE has been evidenced with a Stage 3 HAI-SCRIBE still to be completed prior to construction works commencing.

Workbook Ref No.	Areas to probe	Evidence expected
1.7	How does the Health Board demonstrate that there is an effective infection prevention and control management structure in place and how does it relate to the development of the project? How does the Health Board demonstrate leadership and commitment to infection prevention and control to ensure a culture of continuous quality improvement throughout the organisation and that there is an effective IPC structure in place and how does it relate to the design development?	Evidence IPC and clinical teams have been integrated into all decisions regarding any derogations through the design process and are satisfied this will not impact on patient safety such as, specific sign off, supporting meeting minutes, risk assessments, risk registers relating to IPC with evidence of escalation through the agreed NHS board governance process.

NHS Scotland Assure Observations:

There is evidence of Stage 1 and Stage 2 HAI-SCRIBEs being completed as well as HAI-SCRIBE workshops being undertaken with the wider project team, and IPC and clinical lead representation at meetings. There is an IPC structure in place for the project as evidenced in the Project Directory and Terms of Reference documents. Whilst HAI-SCRIBEs are in place, the KSAR workshops identified that NHS FV clinical colleagues were not always fully appraised of the potential implications on IPC measures as a result of the proposed technical solutions – for example, maintenance requirements associated with the use of Air Admittance Valves as part of the patient bedroom en-suite drainage systems. Therefore, whilst NHS FV have attempted to capture the requirements, there has not been an appropriate level of “technical/clinical translation” to ensure that all stakeholders can make informed decisions relating to the proposed strategies.

The project risk register contains a number of IPC related risks which remain open, with no evidence provided on the formal sign off process no evidence of IPC specific risk assessments being undertaken. Some of the open risks are in relation to pest control and water sampling, which are of note for IPC.

Evidence has been provided of the project being discussed at the general NHS FV Water Safety Group. There is no evidence of a project specific Water Safety Group being established.

It is noted in Section 1.5, that the design information submitted for review was not at RIBA Stage 4 maturity as expected at FBC Stage.

- *Folder 1.7 - 4.5 HAI SCRIBE* contains a further copy of the 3 No. HAI-SCRIBE workshops meeting minutes from May, July and September 2021.
- *Folder 1.7 - 4.7 Project Team Meetings* contains further copies of the Project Directory and TOR documents identifying relevant stakeholder groups. IPC leads are noted within both documents.
- *Folder 1.7 - 4.7 Project Team Meetings* contains a series of Project Team meeting minutes covering the period March to October 2021, albeit it is not evident if there was specific input IPC in these meetings.
- *Folder 1.5B* contains design meeting minutes evidencing engagement with IPC during the design process.
- *Folder 1AY FBC Derogation Schedule* contains a derogation schedule which evidences IPC and clinical team approval of 3 No. derogations which were subsequently approved by the project board. As detailed in Section 1.6, the project board meeting minutes remains in draft form. An Area Infection Control Manager was noted in attendance at the project board meeting.
- No IPC specific risk assessments have been evidenced. The risk register contained in *Folder 1BA Project Risk Register* identifies 12 No. risks under the category of *"Compliance / Health & Safety / Infection Control"* which have an ongoing or open status noted against them. The majority of these open risks have been allocated to the Modular Build Contractor as the risk owner. Risk No.48 Pest Control and No.73 Water sampling are of significance to IPC and are noted as open. There is no evidence of IPC engagement during the risk register review or clarity on the process of IPC approval of mitigation actions.
- Evidence was provided in *Folder 1.7 - 4.14 Water Safety Group* (by way of a PDF email exchange between NHS FV and the SPV) of a water safety group meeting held on 22 July 2021 where the project was discussed amongst other NHS FV projects. The requirement for Pseudomonas and Legionella testing prior to the new ward being brought into use was highlighted at the meeting. No NHS FV commissioning document has been provided in order to verify the requirement for water testing. A review of the offsite factory manufacture process relative to water safety was also discussed at the meeting, which is important given the modular nature of the building. The date of the next meeting was noted as "TBC" with no further meeting minutes provided post 22 July 2021.
- *Folder 1.7 - 4.14 Water Safety Group* contains an embedded Water Safety Policy PDF within the water governance arrangement document, which was unable to be opened. An email response received from NHS FV (30 November 2021), following the project

weekly meeting, confirmed the document is corrupted and would be re-uploaded. The document was subsequently uploaded but was not considered as part of the KSAR.

Workbook Ref No.	Areas to probe	Evidence expected
1.8	Integration with Authority Policies and Operation How does the Board demonstrate implementation of evidence based infection prevention and control measures?	The Health Board can demonstrate the current version of the National Infection Prevention and Control Manual has been adopted by the organisation and all staff are aware of how and where to access this. (Ask staff) IPC are fully embedded in the project team and the FBC programme-taking cognisance of any actual or perceived risks identified provided.

NHS Scotland Assure Observations:

The HAI-SCRIBE Operating Procedures provided noted a statement confirming that staff have access to all IPC related information, including the NIPCM. HAI-SCRIBE workshop meetings and Stage 1 and Stage 2 HAI-SCRIBE have been evidenced outlining control measures.

There is no evidence demonstrating how IPC related actions identified in the design tracker (v30) and the risk register will be closed out and approved. The design has not been developed to RIBA Stage 4 and there are no specific IPC risk assessments evidenced.

As noted within KSAR workbook question 1.7, whilst the IPC team have been engaged during the development of the FBC proposals, there have been instances where they have not been fully appraised of the potential impact that design solutions may have on the HAI-SCRIBE and IPC measures. NHS SA recommend that a consolidated review of proposed design solutions is undertaken by the NHS FV IPC team, supported by technical colleagues, prior to commencing to the construction stage of the project. This will enable NHS FV to assure themselves that their required infection prevention and control measures are incorporated within the new facility.

- *Folder 1.8A* contains an email from IPC Area Manager confirming how staff can access relevant IPC information and NIPCM via the internal intranet and noting no concerns raised by HEI with this approach during the last inspection in February 2021.
- NHS FV HAI-SCRIBE Operational Procedures document have been provided in *Folder 1.8A*. This document has been approved by the area IPC Committee on 10 November 2020, with a standard review date set of November 2022.
- SHFN 30 Stage 1 and Stage 2 HAI-SCRIBE question set provided in *Folder 1.8B* noted IPC representation and subsequent review input via embedded minutes from HAI-

SCRIBE workshops held during May, July and September 2021 (provided in *Folder 1.6C*).

- An extensive list of names is noted in attendance at the Stage 2 HAI-SCRIBE review meeting on 20 May 2021, albeit the signing page only contains reference to the NHS FV Project Manager.

Workbook Ref No.	Areas to probe	Evidence expected
1.9	The Health Boards Infection Prevention and Control Strategy	Assessment of the Health Boards approach to all IPC related matters in relation to the development of the design, HAISCRIBE etc.

NHS Scotland Assure Observations:

Evidence has been provided on the IPC strategy by way of HAI-SCRIBE Operating Procedures and Stage 1 and Stage 2 HAI-SCRIBE documents. The design trackers evidenced comments made on the design by IPC, although not all comments are closed out, with updates to RDS's noted which will require further IPC review and approval. It was noted at the KSAR Technical Workshops that although IPC had been consulted on the design, some of the technical design issues were not fully explained to the IPC team. This was evident in discussions relating to the Air Admittance Valves in patient bedrooms and the potential impact on the clinical space as a result of failure and any maintenance access required.

NHS Scotland Assure recommend that a consolidated review of proposed design solutions is undertaken by the NHS FV IPC team supported by technical colleagues prior to commencing to the construction stage of the project. This will enable NHS FV to assure themselves that their required infection prevention and control measures are incorporated within the new facility.

- *Folder 1.9 Boards IPC Strategy* contains a further copy of the NHS FV HAI- SCRIBE Operational Procedures document provided in *Folder 1.8A.*
- A design tracker is provided in *Folder 1.11 Planned Approach Design Process* dated 3 November 2021 (V 30) which contains 21 no. design related comments raised by NHS FV IPC team. 6 No. items are noted as open on the tracker. Items 208 and 445 on the tracker relate to outstanding comments on RDSs which are noted as still to be closed out by means of updated RDSs.

Workbook Ref No.	Areas to probe	Evidence expected
1.10	The Health Boards Monitoring and Records	Evidence that the Health Board integrating this project with wider IPC requirements within the context of the FBC. For example,

		evidence that the proposals for equipping incorporate IPC requirements?

NHS Scotland Assure Observations:

NHS FV Valley were able to partially evidence the integration of IPC requirements within the context of the project at FBC Stage.

The IPC requirements are recorded in HAI-SCRIBE meeting minutes and through IPC finishes and cleaning notes. There are IPC comments on RDSs contained within the design tracker (v30), with specific comments made on items such as the removal of barrier cream, laundry sink specification, linen cages, kitchen usage and the provision of sloping tops to wall units. Item 206 in the design tracker notes that the proposal for roller blinds is not supported by IPC and the action remains open, with a note for Modular Build Contractor to review internal / integrated blinds.

As noted previously in this report and further evidenced during the KSAR Technical Workshops, although IPC had been consulted on the design, some of the technical design issues were not fully explained to the IPC team. NHS Scotland Assure recommend a further review of proposed technical solutions to ensure that the NHS FV IPC team are supportive of the proposals.

- *Folder 1.10 Board's Monitoring Records* contains a monitoring and records document with embedded SHFN documents 30 Part A v4 October 2014 and 01-02 v5 July 2016 noted. General statements have been provided confirming finishes will be specified in accordance with SHFN 30 Part A and domestics cleaning in accordance with Clause 4.3 Part 14 of the cleaning specification.
- *Folder 1.10 - 4.5 HAI-SCRIBE* contains a further copy of the 3 No. HAI-SCRIBE meeting minutes from May, July and September 2021.

Workbook Ref No.	Areas to probe	Evidence expected
1.11	Planned approach for managing the design process to ensure successful compliance with agreed and approved standards	The project governance arrangements and resource plan in place to ensure that the necessary decision-making authority and technical expertise is available to take responsibility for and deliver the project as planned and agreed. Details of how gaps in expertise are being filled. Details of how compliance with the appropriate guidance, design brief and other standards are being agreed, signed off,

		monitored, reported against and if necessary escalated / adjudicated throughout the design, construction and commissioning stages. Details of how all stakeholders' interests are being agreed, signed off, monitored, reported against and if necessary escalated / adjudicated throughout the design, construction and commissioning stages.

NHS Scotland Assure Observations:

Detailed roles and responsibilities have been outlined in various documents provided, in particular the roles and responsibilities and terms of reference documents. These documents are out of date and contain details of individuals no longer involved in the project and roles still to be filled. There is no evidence on how these roles will be filled.

With respect to design responsibilities, the Modular Build Contractor confirmed during the Technical Workshops that the RIBA Stage 4 design of the Mechanical, Electrical, Public Health and Medical Gas systems are being undertaken by a number of separate Contractors as Contractor Design Packages (CDP). The following CDP were advised:

- The development and production of the RIBA Stage 4 Mechanical and Public Health services design solutions.
- The development and production of the RIBA Stage 4 Electrical services design solutions.
- The development and production of the RIBA Stage 4 Medical Gas Pipeline System design solutions.

The evidence provided as part of the KSAR response indicated that not all elements of the design are to RIBA Stage 4 as would expected at FBC. As a result, assurance around spatial fit and co-ordination of services, in our opinion, was not demonstrated within the KSAR response.

It was not always evident that design coordination was taking place between all parties involved (for example the SPV Hard FM Provider have looked to validate a number of technical elements with respect to the existing facility, that have not been incorporated within the Modular Build Contractor's design and the SPV Hard FM Provider has made assumptions with respect to the existing facility, due to a lack of information being provided by Modular Build Contractor). There were also examples of the sub-contracted companies not engaging fully with the stakeholder group when making design decisions – for example the emergency lighting risk assessments was noted during the KSAR workshops as being the designer's interpretation, as opposed to a fully consultative process involving relevant stakeholders and duty holders.

It is noted that both NHS FV and the SPV have both appointed technical advisor teams, to support them with the project.

The document titled 'Commissioning Plan' (within *Folder 1AD Detailed Commissioning Plan*) is a generic commissioning programme still be fully populated and stakeholder names

assigned. The commissioning statement evidenced covers Modular Build Contractor's supply chain commissioning and not that of the wider project team.

As detailed in Section 1.5, there is an overreliance on the design tracker (v30) document to evidence and control comments raised by stakeholders. A number the comments contained within the tracker remain open and there is no evidence of a governance process demonstrating how the actions are closed out.

The derogation schedule provided identifies several areas of non-compliance which remains open and are still to be formally approved by the Project Board.

- *Folder 1.11 Planned Approach Design Process* contains further copies of the project organogram incorporating roles and responsibilities. The organogram is helpful to understand the overall reporting process for the project, however the governance process between NHS FV and the SPV could be defined more clearly beyond Elective Care Project Board level. NHS FV confirmed via email on 30 November 2021 that they would provide an updated organogram outlining the PFI variation process between NHS FV and the SPV. No update has been provided and therefore has not been captured within the KSAR.
- *Folder 1.11 - 4.1 NTC Design Workshops* contains Modular Build Contractor's meeting notes No.1-7 from March to July 2021 (Minutes) demonstrating clinical and design team engagement at the various workshops.
- *Folder 1.11 - 4.1 NTC Design Workshops* contains revision 5 and 6 of a design review tracker (in addition to V30 highlighted previously). The comments are primarily from the Modular Build Contractor and their design team as well as designers appointed on behalf of the SPV. Several items remain noted as open. There is the potential for confusion between this tracker and the wider design tracker (v30) noted previously.
- *Folder 1.11 - 4.1 NTC Design Workshops* contains a Modular Build Contractor RFI Log with all 13 No. RFI's noted as ongoing. There is no evidence on how these will be closed out.

Workbook Ref No.	Areas to probe	Evidence expected
1.12	The Health Boards approach on the procurement journey with evidence of the plans on how the Board will provide assurance, particularly emphasis on the critical system identified earlier.	Evidence on how this requirement is being managed and how it fits with the project governance arrangements Plans to identify any gaps in the procurement approach that may require to be addressed. Evidence on how Infection Prevention and Control are involved with the conceptual procurement approach to the design stage and future plans for project.

		Evidence that the Health Boards selected procurement route has gone through the Board's Governance channels.

NHS Scotland Assure Observations:

Board papers and meeting minutes contain evidence of the procurement journey, however the tender report provided refers to another contractor.

Evidence of roles and responsibilities defined for the various stakeholders including technical and professional advisors appointed by NHS FV, the SPV, the SPV's Hard FM Provider and the Modular Build Contractor has been provided for review. NHS FV has appointed a Lead Advisor to provide multi discipline professional services, including project management, cost management and NEC3 supervisor. The most recent Project Board minutes evidenced are from 4 November 2021. No actions are identified within the minutes and the accompanying Rolling Action Log containing no outstanding actions. The November Project Board Meeting were also presented with a note outlining further programme slippage due to the availability of a manufacturing slot by the Modular Build Contractor. An interim commercial summary is referred to within the meeting note which the NHS FV Lead Advisor and SPV / SPV Hard FM Provider's Cost Advisor are currently reviewing. The process is noted as requiring conclusion by 13 December 2021 to enable the project to progress. The Legal Advisor comments are also noted within the meeting note which require to be addressed prior to contracting between the parties. At time of review, there is only evidence of a pre-construction appointment with the Modular Build Contractor in place.

- *Folder 1.12D* contains project board meeting minutes covering the period April to November 2021. All meeting minutes are still noted as "draft". Minutes from the November meeting note that further text is required from a representative of the National Treatment Centre.
- *Folder 1.12D* contains an NHS FV procurement paper, detailing the overall procurement journey, Central Legal Office input, an overview of the modular design in relation to SHTMs, governance arrangements and award process via NHS FV Board and the SPV. The NHS FV Lead Advisor tender report was also provided recommending the appointment of an alternative contractor. No evidence has been provided detailing why the Modular Build Contractor has been engaged instead of the alternative.
- *Folder 1.12D* contains NHS FV project board paper (1.12D.3. NHS Board Elective Care Ward update for Board seminar. v2) documenting the agreement to increase from 26 to 30 elective care beds in the modular ward. This document also details the requirement to cancel the initial procurement exercise due to the requirement for a variation enquiry approval by the SPV prior to progressing.
- *Folder 1.12D* contains a series of SBAR reports from February, March and April 2021 providing general project updates to the NHS FV project board. No evidence has been provided to confirm the SBARs have been approved by the Project Board.
- *Folder 1B* contains a SPV signed variation document for the Phase 1 car park enabling works with corresponding signed Variation Enquiry.

- A copy of the signed SPV / Modular Build Contractor pre-construction appointment document dated 19 February 2021 was provided by NHS FV on 8 December 2021 with a corresponding scanned copy of the Purchase Order. NHS Scotland Assure note the Collateral Warranties appendix was unsigned. No construction appointment document has been provided.
- *Folder 1B* contains a signed copy of the NHS FV Lead Advisor Form of Interim Agreement for Lead Advisor appointment by NHS FV**.** A full copy of the Lead Advisor contract was provided on 3 December 2021. Appendix C HAI-SCRIBE SHFN 30 remains unsigned.
- *Folder 1B* contains copies of signed appointment documents by NHS FV for the appointment of ventilation, electrical, medical gas and water Authorising Engineers.
- *Folder 1B* contains a signed appointment document by NHS FV for the appointment of the Modular Build Contractor as Principal Designer under CDM Regulations 2015.
- Appointment documents from the SPV for the appointment of their Project Management and MEP Consultant, as professional advisors were not provided.

Workbook Ref No.	Areas to probe	Evidence expected
1.13	The Health Boards approach on those areas of design that the procurement route has provided identification as possibly being Contractors Designed Portions (CDP's).	Evidence that the procurement of the lead designer will encompass these areas in their oversight and sign off of the complete design. Evidence that a clear demarcation of design responsibility is being developed.

NHS Scotland Assure Observations:

The KSAR identified the level of detail within the design information submitted for review was not at RIBA Stage 4 maturity as expected at FBC Stage. The modular build contractor, are heavily reliant on external subcontracted design consultants to provide the technical design required for the project.

The modular ward design is based upon the extension of a number of existing M&E services from the adjacent hospital. It is acknowledged that an MEP Consultant has been appointed as Technical Advisor on behalf of the SPV to oversee the infrastructure alterations to connect the new ward to the existing hospital. It has been evidenced that there are outstanding delineation design queries between new and existing building services. There is no auditable evidence as to how the development of the CDP items will be monitored by NHS FV or by the Modular Build Contractor as principal contractor, nor how the overall co-ordination of services will be managed.

As detailed in Section 1.5, there is an overreliance on the design tracker (v30) document to evidence and control comments raised by stakeholders. A number the comments contained within the tracker remain open and there is no evidence of a governance process demonstrating how the actions are closed out.

- *Folder 1.13B* contained a list of CDP elements in the form of a Modular Build Contractor sub-contractor responsibilities matrix. The list provided is primarily focused on builders-work related packages with only a single line item identified for mechanical and electrical design. Concerns over the maturity of the mechanical and electrical design are noted in sections 3.2 to 3.5 of this report.
- *Folder 1.13A* and *1.13B* contain a document entitled "evidence of clear demarcation". The document notes that the MEP consultants appointed on behalf of the SPV's Hard FM provider, as Technical Advisor are to prepare an interface strategy document as of 4 November 2021. The document was subsequently provided on 10 December 2021.
- A further copy of the design tracker (v30) is contained within *Folder 1.13A*. Refer to KSAR Workbook Ref No. 1.5 regarding potential conflict between v30 and the Modular Build Contractor's design tracker (v6) evidenced in *Folder 1.11 - 4.1 NTC Design Workshops*.

Workbook Ref No.	Areas to probe	Evidence expected
1.14	Evaluation of the Health Boards commissioning plan.	Evidence that the Health Board has recorded plans that are comprehensive and adequate to address the needs of the project and that they are fully resourced.

NHS Scotland Assure Observations:

No NHS FV commissioning plan has been evidenced. A commissioning statement has been provided by the Modular Build Contractor's sub consultant designer. There is no evidence of a wider commissioning programme or plan.

Based on the information provided is it not evident that the Modular Build Contractor or the SPV with their Hard FM Provider has a comprehensive commissioning plan in place or supporting resource.

- *Folder 1.14* contains a commissioning plan incorporating 2 No. excel commissioning programmes, the author of both documents is unverified. The programmes are both noted in draft with further fields still to be populated.
- *Folder 1.14* contains a mechanical and electrical commissioning statement prepared on behalf of the Modular Build Contractor by their MEP Consulting Engineers. Reference is made to the appointment of the commissioning engineer via the mechanical and electrical sub-contractor.

Workbook Ref No.	Areas to probe	Evidence expected
1.15	Evaluation of the Health Boards duty holder matrix.	Evidence that the Health Board have a fully recorded matrix of the required roles and responsibilities and have a clear governance

		structure that is fully resourced together with plans in place for the implementation. Evidence that Health Boards have appropriate number of competent, qualified staff to carry out specific duties throughout the life cycle of the project e.g., IPC, Engineers, Estates staff etc. The number of competent, qualified staff will depend on the type and size of the Build Project.

NHS Scotland Assure Observations:

Roles and responsibilities are defined in the evidence provided, along with the governance structure. Each contracting party (NHS FV, the SPV, the SPV's Hard FM Provider and the Modular Build Contractor) have also appointed a variety of technical professionals to support the project. There is no evidence of a strategy document outlining how the NHS FV appointed AEs will align with those AEs appointed direct by the Modular Build Contractor. The Technical Workshops highlighted that although appointed to the project, Water and Electrical AEs were not provided with the most up to date design information. Given the complex contractual structure of the project, it is not evident how all stakeholder duties are being carried out to ensure safe systems of work are implemented. The competency of the wider technical team is referred to in sections 3.2 to 3.6 of this report. There is, however, no evidence to confirm that NHS FV have fully concluded their competency checks on the designers.

There is no NHS FV resource plan evidenced to ensure that the current resource allocated to the project is maintained, to oversee the project through to completion.

- *Folder 1.15* contains a further copy of the project organogram (v7) identifying the roles, responsibilities and governance reporting structure. A clinical working group, clinical lead, finance, estates, e-health, soft landings, medical equipment, microbiology and infection control roles are all noted along with the appointed external advisors (Lead Advisor, Cost Advisor, Technical Advisor, NEC Supervisor / Clerk of Works, Authorising Engineers etc.) to support NHS FV. Refer to additional comments on the organogram and TOR in KSAR Workbook Ref No. 1.4.
- *Folder 1B* contains the appointment letters for various parties including the Authorising Engineers. There is no further evidence provided in *Folder 1.15* to support that competency assessments have been undertaken.
- *Folder 1C* contains a Modular Build Contractor sub-contractor competency matrix along with a supporting information.
- *Folder 1C* contains a tender evaluation report supporting the procurement and appointment of the NHS FV Lead Advisors via the HFS Lead Advisor PSC framework.

3.1.2 Project Governance and General Arrangements: Further Observations

In addition to the points raised via the KSAR workbook above, we also include the following observations as a result of the review, all of which relate to the evidence presented during the appraisal.

3.1.2.1	No Project Execution Plan has been evidenced.

3.2 Water and Internal Plumbing / Drainage Systems

3.2.1 Water and Internal Plumbing / Drainage Systems: KSAR Observations

Workbook Ref No.	Areas to probe	Evidence expected
2.1	Has the Health Board completed competency checks on the water and drainage consultant designers?	Recorded evidence that the design team are experienced and have a comprehensive knowledge of the relevant design standards. Where anyone does not have a record of extensive health care experience what recorded plans are to be put in place by the Consultant Designers? Recorded evidence that input from the Health Authorising Engineer for Water (AE(W)) has been requested. Evidence that all contractors and sub-contractor competency checks have been completed and signed off.

NHS Scotland Assure Observations:

Whilst NHS FV have provided examples of competency based information, such as CVs for the water and drainage consultants, there is no evidence to confirm that NHS FV have fully concluded their own competency checks on the designers or contractors. It is also unclear as to whether the AE (Water) was consulted as part of any competency checks undertaken. The party with final responsibility for detailed design of the water and drainage systems is noted as one of the Modular Build Contractor's sub-contractors, with their MEP Consultants having developed initial performance design strategies.

- *Folder 1C Board Competency Checks* include a company CV for the Modular Build Contractor's MEP Consultants, in addition to the company CV, 2 no. personal CVs were submitted for their employees. The documents submitted confirm that the MEP Consultants (Manchester based) are conversant with HTMs and technical requirements for healthcare buildings. The submitted information does not confirm their competency in relation to other relevant guidance or standards such as SHTM 04-01 nor BS EN 12056.
- It was confirmed during the KSAR Drainage and Domestic Water Service Technical Workshop on 15 December 2021, that the Modular Build Contractor's MEP Consultants developed the strategy for these installations and that one of the Modular Build Contractor's sub-contractors would be responsible for the development and production of the RIBA Stage 4 Mechanical and Public Health services design solutions.
- *Folder 1C Board Competency Checks*, includes a letter from the sub-contractor responsible for the detailed design of the mechanical and public health systems which confirms that they have in-house qualified design engineers and that they are fully conversant with all SHTM / SHBN requirements for mechanical and electrical services.

Whilst this letter states that the company now "encompassed full in house mechanical building services", it does not specifically mention their competencies with respect to water and internal plumbing / drainage systems.

- *Folder 1B* contains an appointment letter from NHS FV and an acceptance letter as evidence relating to the appointment of an Authorising Engineer for Water Services (AE(Water)).
- Version 30 of the Design Review Tracker demonstrates that the AE(Water) provided comments on the MEP Performance Specification, Room Data Sheets (Rev C) and the Environmental Matrix. Ten of the eighteen comments made by the AE(Water) have not been resolved and they have an "Open" Status on the Design Review Tracker. The "Open" status comments remaining include comments relating to the prevention of overheating to cold water systems, SHTM 04-01 water outlet temperatures and plant item specifications. All these comments should be resolved prior to commencing on site.

There is no evidence that Competency Checks, associated with the Domestic Water installations, have been completed and signed off by the Health Board.

Workbook Ref No.	Areas to probe	Evidence expected
2.2	How does the Health Board ensure that water services are designed in a fashion, which will retain space for minor additions and modifications to services in the future?	Evidence that the engineers are presented their co-ordination drawings (BIM model), with space for future flexibility identified, to the Board. Evidence that the Design Consultant has considered and agreed with the Board, space for future flexibility in the service installations. Evidence that the designers have presented each of the main service runs plus plant rooms to the Board's FM team, to highlight space for future flexibility. Evidence that the Board has agreed a strategy (percentage) for spare capacity and a documented allowance to be incorporated into the design. Are plant/tank rooms, IPS sections, horizontal distribution runs and risers appropriately sized for the equipment being installed and facilitate safe adequate maintenance.

NHS Scotland Assure Observations:

The design information submitted for review identifies domestic water pipework located within the corridor ceiling voids. From the ceiling void sections submitted, the corridor ceiling void is congested and access to water services pipework has not been adequately demonstrated. As the Design Contractor has not submitted any design calculations, it is not possible to assess if the design proposals include for spare capacity to facilitate additions to the water services system in the future.

- *Folder 5.3A* includes the "Revit Model Coordination Report, OPP1180824 PTK-A1-RP-A-003 Rev P01". The report states that there is no requirement for any level of Building Information Modelling (BIM) for this project. It is unclear from the evidence provided as to what this statement is based upon, nor if NHS Forth Valley have considered the requirements to comply with Scottish Government policy with respect to BIM requirements for new projects commencing procurement procedures from April 2017, nor if the Scottish Government BIM grading tool has been used to support this assessment. There is no evidence which indicates the Board's acceptance nor agreement with the Modular Build Contractor 's position in relation to the use of BIM. The report contains 5 No. screen shots indicating sections at various points through the building. Whilst this report confirms that a level of coordination has been undertaken using BIM, the sections only provide a snapshot of the services coordination in these areas and as the report does not include a clash detection report, it is not possible to assess full coordination of all the services.
- *Folder 1AK Technical Design Drawings* includes an MEP section drawing, this drawing indicates and notates the domestic water pipework in 4 No. areas. The ceiling void above the main corridor routes has been utilised as the primary services distribution routes, and whilst the sections indicate that a level of coordination has been undertaken, future flexibility space has not been identified on the drawings.
- There is evidence that the water services drawings have been reviewed and commented upon by undefined parties, as the drawing revision boxes indicate that the drawings have been updated to incorporate comments received on 4 No. occasions. There is no specific evidence, however, to suggest that the water services runs and plant room drawings have been issued to Board's FM team.
- *Folder 2.2D* contains a document (author unknown), which states that the Board's Construction Requirements for the building infrastructure of the existing facility to have 25% spare capacity (for all services) at the time of design. There is no evidence to suggest that the spare capacity allowances have been incorporated within the current design proposals for the elective ward building.
- *Folder PSCP - OPP1180824 - M&E* contains a Plant room Layout drawing which indicates the positions of the DHWS Plate Heat Exchangers and associated storage vessels only. No other domestic water plant nor domestic water services pipe routes/sizes are indicated on this drawing. The plant room drawing does not indicate any access /maintenance zones.
- No evidence has been submitted to confirm the access provisions to or the coordination of the water and drainage services within any IPS system.

- *Folder 1AT Plant Access Maintenance and Replacement Strategy* contains the Building Access and Maintenance Strategy. Chapter 4 relates to Building Services; however, it is silent in relation to the domestic water installations. It does state that services are distributed throughout the building within the corridor suspended ceiling void and that lay in ceiling tiles have been provided for access, maintenance and inspection purposes, however, it is unclear how maintenance to domestic water installations will be undertaken.

Workbook Ref No.	Areas to probe	Evidence expected
2.3	How does the Health Board assure itself that all variations / derogations, which may be required to water systems, are investigated and agreed by all parties before they are incorporated in the design?	Evidence that each variation / derogation has a detailed technical analysis, has been referred to the Board, and agreed with their water management group clinical, engineering, Estates, infection prevention, control, and FM teams.

NHS Scotland Assure Observations:

The Contractor has not sought any derogations in relation to SHTM 04-01. However, the water services designs for the modular building rely upon central plant provided and operated by a third party e.g. sources of supply, water treatment plant, water softening, filtration plant, water storage tanks etc. It is not clear from the evidence provided as to whether any derogations exist or have been considered with respect to the existing infrastructure. The KSAR has also identified a number of potential derogations from guidance which have not been recorded. Refer to section 3.2.2 for further details of NHS SA observations.

- *Folder 1AY FBC Derogations Schedule* contains Revision 5 of the Project Derogation Schedule.

Workbook Ref No.	Areas to probe	Evidence expected
2.4	Water Management Strategy	Assessment of Board proposed water management strategy and how this relates to the specification, guidance and project requirements. What involvement has there been from the water management group?

NHS Scotland Assure Observations:

NHS FV have stated that as the new elective ward project is being considered as an extension to the existing hospital, it is currently on the agenda for the existing Water Safety Group and that a Water Safety Group will be formed for the project in due course. No other supplementary evidence has been provided to confirm if this group has been formed, nor how the interface between both groups will operate. Whilst there is a water safety policy document for the existing facility, there is no evidence of a water management strategy for the Modular building.

- *Folder 2.4A* contains the Water Management Strategy statement (author unknown). The statement refers to an existing Water Risk Assessment and Written Scheme for the existing Hospital building and a water safety policy document. The statement confirms that both documents will be reviewed (reviewers unknown), to incorporate the new ward prior to handover for clinical commissioning. There is no evidence of a water management strategy for the modular building, therefore the impact of this document on the water services designs cannot be confirmed.
- It was confirmed by the Modular Build Contractor during the Drainage and Domestic Water Service Technical Workshop on 15 December 2021, that the Designer's Risk Assessments for the proposed domestic water installations and the connection into the existing cold water distribution network have not been completed. There is, therefore, a possibility that risks associated with the existing and proposed systems have not been identified, recorded and mitigated, which may result in potential risks to the water quality and subsequently to those using the facility.
- In addition to the Designer's Risk Assessment, the legionella risk assessment submitted for review identifies a number of design provisions that will be incorporated to prevent legionella; however, these are not evidenced on the drawings. No additional mitigation measures were evidenced; it is therefore unclear as to whether the items identified in the legionella risk assessment have been safely mitigated.
- *Folder 2.4B* contains the minutes of the water safety group meeting held on 22nd July 2021. The minutes do not appear to be project specific to the modular building. It should also be noted that the date of this meeting predates the preliminary issue of the proposed water services drawings, by 5 weeks. There is no evidence to indicate that the water safety group have had sight of the proposed domestic water services drawings. There remains a risk that if the design proceeds without the required engagement from the group on important aspects of water safety (IPC, clinical and Estates) that site-specific operational requirements for the systems, may be missed. This engagement is particularly important when connecting into the existing hospital systems. The Water governance statement states that the new elective ward project is on the agenda of the water safety group and that a water safety group will be formed for this project. No other supplementary evidence has been provided to confirm if this group has been formed, nor how the interface between both groups will operate.
- From the minutes of the Water Safety Group, it is unclear if this group would have been quorate based on attendance i.e. no AE (W) in attendance and it is unclear if all stakeholders were represented as no designations given for Responsible Person (RP), AP, CP etc.

Workbook Ref No.	Areas to probe	Evidence expected
2.5	Water governance arrangements	Has the Board commenced its planning and recorded how it will ensure appropriate numbers of trained staff (AP and CP) and AE(W) will be appointed, is there an established project water management group that ensures the water management strategy is adhered to for the Board and is it clear how this project will interface with this existing group?

NHS Scotland Assure Observations:

The evidence submitted refers to a water safety policy document associated with the existing hospital. There is no evidence of water governance arrangements specifically for the modular building.

- *Folder 2.5 Water Governance Arrangements* contains a statement in relation to the Water governance arrangements. The Water governance statement confirms that the Authorising Engineer, Authorised Persons (AP) and Competent Persons (CP) are already in place for the existing facility. Specific individuals have not been identified for the AP and CP roles. The statement does not confirm the level of staff training to be provided, nor does it confirm the number of AP and CP staff to be committed to this project. Therefore, a meaningful review of the numbers of trained staff cannot be undertaken at this stage. This creates a risk that appropriate considerations around training (time, cost, resource) are not put in place, and there is the potential for insufficient levels of training to the provided to the correct individuals.
- The Water governance statement states that the new elective ward project is on the agenda of the Water Safety Group and that a Water Safety Group will be formed for this project. No other supplementary evidence has been provided to confirm if this group has been formed, nor how the interface between both groups will operate.

Workbook Ref No.	Areas to probe	Evidence expected
2.6	Evidence that the Health Board is developing commissioning proposals.	Evaluation of the suitability of the proposed plans in the context of the FBC, are these sufficient to meet the requirements of the project, guidance and the design of the system. Evidence that the design has considered the commissioning of the water system including: • Safe storage of materials

		• Agreed type of chemical (to avoid warranty and corrosion issues) • Adequate time scale • Competency checks on all contractors • Water sampling scope Water sampling test results and approval process.

NHS Scotland Assure Observations:

From the evidence submitted, the commissioning proposals remain in development. The commissioning plan does not clearly define the various commissioning activities associated with both the existing NHS FV water network and the new network within the modular building. It also remains unpopulated in relation to timescales and dependencies both of which are critical to a successful commissioning process.

- *Folder 1.14 Evaluation of Board Commissioning Plan* contains documents, namely 1AD – Commissioning Plan and secondly the FV M&E Commissioning Statement**.**
- The document "1AD – Commissioning Plan" is an NHS FV document which appears to be still under development. The current iteration of this document does not contain any specific mention of the SHTM 04-01 commissioning requirements, nor does it clearly define the commissioning activities outlined in the Commissioning Statement and in particular the activities associated with forming a new connection into the existing NHS FV network.
- The "Forth Valley M&E Commissioning Statement" has been prepared by the Modular Build Contractor's MEP Consultant. Revision A of this document is dated 26th October 2021 and identified as "Prelim Issue". This document whilst referencing test samples from the existing systems and the testing, flushing and disinfection process, does not refer to the commissioning requirements contained within SHTM 04-01 parts A and C.
- *Folder 1AC Specs Final Commission Handover* contains the NHS FV Performance Specification Rev E, dated 24th September 2021, produced by the Modular Build Contractor's MEP Consultant. This document indicates that the new domestic water services installations shall comply with SHTM 04-01, however it does not provide any additional comment / reference to the testing and commissioning requirements of SHTM 04-01 Part A Chapter 16 and 18.

Workbook Ref No.	Areas to probe	Evidence expected
2.7	Evaluation of the Health Boards planned preventative maintenance (PPM) proposals.	Has the Health Board commenced its planning and recorded the PPM requirements and approach to ensure appropriate levels of maintenance, comprehensive statutory

		compliance and robust management processes, including: • Adequate numbers of staff • Water management PPM including all outlets, TMT & TMV, plumbing and Drainage systems, etc.?

NHS Scotland Assure Observations:

The Planned Preventive Maintenance (PPM) proposals submitted include an embedded PPM plan. It is understood that the PPM plan is associated with the existing FM Contract provisions and that the same provisions will also be applied to the modular building. The embedded document could not be opened therefore a full assessment and review of its content could not be undertaken.

- *Folder 2.7 Boards PPM Proposals* contains evidence which confirms that the new ward is an extension to the existing facility and will be subject to the same PPM regime as applied to the existing hospital under the current FM Contract Provisions. Embedded within the response is a PDF copy of the PPM plan, however this document could not be opened to enable a full review to be undertaken. A further copy was not requested from NHS FV as this was after the cut off for document receipt.
- No other evidence detailing the appropriate numbers of staff or water management PPM details has been submitted.

3.1.1 Water and Internal Plumbing / Drainage Systems: Further Observations

In addition to the points raised via the KSAR workbook above, we also include the following observations as a result of the review, all of which relate to the evidence presented during the appraisal.

3.2.2.1	A drawing which clearly indicates the location of all drainage ventilating pipework penetrations through the roof has not been produced for review. Therefore, compliance with BS EN 12506 could not be assessed.
3.2.2.2	Air Admittance Valves have been indicated on 15 No. foul drainage pipework stacks located within patient ensuite facilities. No evidence has been provided to demonstrate that the NHS FV Estates and IPCT teams have been involved in the agreement of this design solution, nor the wider above ground drainage proposals.
3.2.2.3	The shower detail submitted indicates that the showers are provided with flexible hoses and moveable shower outlets. There is no evidence to confirm that the risk of backflow from the shower outlet being immersed into a WC, drain or other source of contamination has been mitigated through the design. The designer must ensure that design of the shower outlet is such that it remains out with the zone of backflow risk at all time.

3.2.2.4	The Elective Ward has not been provided with dedicated cold water storage provisions. Water storage is via the existing infrastructure cold water storage tank provisions. There is no evidence to confirm that an assessment has been undertaken to assess the risks associated with ensuring the availability of the supply and for any risks associated with the interfaces between the new system connecting into the existing system. It is also unclear whether any impact on the NPD Project Agreement has been considered where existing systems are being modified.
3.2.2.5	A fully detailed plant room drawing indicating all the domestic water plant, equipment, pipework and associated ancillaries has not been provided for review.
3.2.2.6	The Overheating Risk Assessment provided indicates that the ceiling void temperatures range from between 28-30^{o}C. The domestic cold-water system within the new facility does not contain any passive nor active measures to maintain the cold water temperature at the outlets at a temperature no greater than 2^{o}C above the temperature measured in the cold water storage tanks. Cold water at each outlet should comply with clause 8.7 of SHTM 04-01. The cold-water pipework routes indicated on the layout drawings are non-compliant with the NHS FV Performance Specification, and Clause 8.5 of SHTM 04-01. The hot and cold water pipework is run horizontally together. The cold water pipe should be located beneath the hot water pipe to minimise local warming by means of convection There is no evidence of a risk assessment being undertaken to assess the cold-water temperature within the pipework in the ceiling voids and to assess if the temperature is within a range where microbial bacteria will grow. The risk assessment should also address if there is a risk of the new elective wards water systems contaminating the existing NHS FV cold water infrastructure or vice versa.
3.2.2.7	The schematic and layout drawings submitted do not accurately reflect bedroom / ensuite pipework connection configuration indicated in figure 3 of SHTM 04-01 Part A.
3.2.2.8	The grade of the Stainless Steel domestic water pipework to be used in the new facility has not been identified. NHS Scotland Assure note that the grade must be aligned with the existing water pipework specification used in the main hospital.
3.2.2.9	The derogation schedule does not accurately reflect the extent and level of derogations that should be identified, discussed and agreed with the Board. For example, derogations should be sought to clearly identify that water storage tanks, filtration plant etc. are not being provided for this project.

3.3 Ventilation

3.3.1 Ventilation: KSAR Observations

Workbook Ref No.	Areas to probe	Evidence expected
3.1	Has the Health Board completed competency checks on the ventilation consultant designers?	Recorded evidence that the design team are experienced and have a comprehensive knowledge of the relevant design standards. Where anyone does not have a record of extensive health care experience what recorded plans are to be put in place by the Consultant Designers? Recorded evidence that input from the Health Boards Authorising Engineer for Ventilation (AE(V)) has been requested. Evidence that all contractors and sub-contractor competency checks have been completed and signed off.

NHS Scotland Assure Observations:

Whilst NHS FV provided examples of competency based information such as CVs for the ventilation consultants, there is no evidence to confirm that NHS FV have fully concluded their own competency checks on the designers or contractors. It is also unclear as to whether the AE (Ventilation) was consulted as part of any competency checks undertaken. The party with final responsibility for detailed design of the ventilation systems is noted as one of the Modular Build Contractor's sub-contractors, with their MEP Consultants having developed initial performance design strategies.

- *Folder 1C Board Competency Checks* includes a company CV for the Modular Build Contractor's MEP Consultants, in addition to the company CV, 2 no. personal CVs were submitted for their employees. The documents submitted confirm that they are conversant with HTMs and technical requirements for healthcare buildings. The submitted information does not confirm their competency in relation to SHTMs in particular SHTM 03-01.
- It was confirmed during the KSAR ventilation Technical Workshop on 15 December 2021, that the modular build contractor's MEP consultants developed the strategy for these installations and that one of the Modular Build Contractor's sub-contractors would be responsible for the development and production of the RIBA Stage 4 Mechanical and Public Health services design solutions.
- *Folder 1C Board Competency Checks*, includes a letter from the Modular Build Contractor's Sub-contractors, responsible for the mechanical and public health design,

which confirms that they have in-house qualified design engineers and that they are fully conversant with all SHTM / SHBN requirements for mechanical and electrical services.

- *Folder 1B PSCP Design Team Contracts Appointments* contains an appointment letter from NHS FV as evidence relating to the appointment of an Authorising Engineer for Ventilation (AE(V)). *Folder 1G Responsibility Matrix* confirms and names the AE(V).
- Whilst the sub-contractor competency checks have been undertaken by the Modular Build Contractor, there is no evidence of them being formally signed off.

Workbook Ref No.	Areas to probe	Evidence expected
3.2	How does the Health Board ensure that ventilation services are designed in a fashion, which will retain space for minor additions and modifications to services in the future, and there is an appropriate plant access strategy?	Evidence that the design engineers have presented their co-ordination drawings (BIM model), with space for future flexibility identified, to the Board. Evidence that the design consultant has considered and agreed with the Board, space for future flexibility in the service installations. Evidence that the design engineers have presented each of the main service runs plus plant rooms to the Board's Estates team and / or FM team, to highlight space for future flexibility. Evidence that the ventilation solution has been agreed with clinical and IPC colleagues. Evidence that the Board has agreed a strategy (percentage) for spare capacity and a documented allowance to be incorporated into the design. Are plant rooms, horizontal distribution runs and risers appropriately sized for the equipment being installed and facilitate safe adequate maintenance? Evidence that a plant access strategy for the entire ventilation system has been provided to ensure safe, adequate access, including access for cleaning.

NHS Scotland Assure Observations:

The design information submitted for review identifies the ventilation located within the corridor ceiling voids. From the sections submitted, the corridor ceiling void appears congested and access to ventilation ductwork and automatic fire smoke dampers has not been adequately demonstrated. As the contractor has not submitted any design calculations, it is not possible to assess if the design proposals include sufficient capacity to facilitate minor additions to the ventilation services system in the future. With reference to the plant access strategy, there is no evidence to suggest that this strategy has been fully developed, discussed and agreed with NHS FV and the SPV's Hard FM Provider.

- *Folder 5.3A* includes the "Revit Model Coordination Report, OPP1180824 PTK-A1-RP-A-003 Rev P01". The report states that there is no requirement for any level of Building Information Modelling (BIM) for this project. It is unclear from the evidence provided as to what this statement is based upon, nor if NHS FV have considered the requirement to comply with Scottish Government policy with respect to BIM for new projects from April 2017, nor if the Scottish Government BIM grading tool has been used to support this assessment. The report contains 5 No. screen shots indicating sections at various points through the building. Whilst this report confirms that a level of coordination has been undertaken using BIM, the sections only provide a snapshot of the services coordination in these areas and as the report does not include a clash detection report, it is not possible to assess full coordination of all the MEP services.
- *Folder 1AK Technical Design Drawings* includes ventilation system layouts and associated schematic, plant room layout drawings and an MEP Section drawing. The latter indicates the spatial coordination of the ventilation systems with the other MEP service installations. The ceiling void above the main corridor routes has been utilised as the primary services distribution routes, and whilst the sections indicate that a level of coordination has been undertaken, future flexibility space has not been identified on the drawings.
- The plant room layout submitted does not provide sufficient ventilation ductwork detail to establish if any space for future flexibility has been included.
- *Folder 3.2B* does not contain any information in relation to the future proofing of ventilation. Upon review of the other folders, we can find no evidence of the design consultant considering and agreeing with the Board any space for future flexibility.
- Whilst *folder 3.2C* of the KSAR response does not contain evidence of a formal process for the designers presenting main service run information to NHS FV, Folder 1AK 'Technical Design Drawings' indicates that the Board were provided with all the ventilation system layouts and associated schematic and plant room layout drawings by the Modular Build Contractor for review. The drawings appear to indicate that they have subsequently updated drawings to reflect comments received (based on revision notes on drawings), but the originator of the comments is not identified. It is therefore unclear as to what extent the Board have reviewed the information provided, or who was involved in this process.
- *Folder 3.2D* does not contain any evidence of the ventilation solutions being agreed with the NHS FV clinical or IPC teams. *Folder 1BI Client Stakeholder Approve FBC* contains

a set of minutes relating to a ventilation strategy meeting. NHS FV were represented by the Project Manager, Project Support Officer and the Authorising Engineer for Ventilation. A further meeting was held on 26 May 2021 to review data/overheating analysis and to decide on the strategy. These minutes identify that NHS FV required further discussion with Health Facilities Scotland to understand the best way forward and that the decision strategy will need to be submitted to Board for approval as "there is conflicting advice". The minutes also identify that the Authorising Engineer (Ventilation) was of the opinion that the data received was sufficient and supported the ventilation strategy for the proposed ward.

- No Board Construction Requirements documents for ventilation have been evidenced. In the absence of this, reliance is made on SHTM 03-01 Part A Table 4 for guidance on the provision of spare capacity within the ventilation systems. Table 4 of SHTM 03-01 Part A identifies that a 5% margin should be added to the ventilation system volume flow rate and 10% margin applied to the system total static pressure. The information submitted for review does not include an Air Handling Unit (AHU) or Dirty Extract fan schedules or calculations. *Folder 1AL Technical Design Schematics* does include a ventilation schematic, however it is not possible due to the lack of detailed design calculations to confirm if the current design solutions include any spare capacity or if compliance with SHTM 03-01 Part A Table 4 is achieved.
- *Folder 3.2F* does not contain any evidence to confirm if plant rooms, horizontal runs and risers are appropriately sized for the equipment being installed and to facilitate safe access. The submitted plant room drawing does not indicate access routes in and around the proposed plant. Concern was also noted at the KSAR Technical Workshop in relation to the indicative AHU position fouling the intake and extract louvre positions. The ventilation schematic indicates that horizontal ductwork runs above corridors have been sized on air velocities ranging from 4.5 - 6.8m/s. At these velocities the ductwork sizes appear to be at the maximum width/height aspect ratios. The MEP section drawings provided, would suggest that motorised fire smoke dampers are located at circa 2700mm AFFL, however access to same will be impeded due to the presence of water services and LTHW pipework and electrical distribution containment.
- *Folder 3.2G* does not contain any evidence to confirm that a plant access and replacement strategy has been developed for the entire ventilation system to ensure safe, adequate access, including access for cleaning. From a review of the plant room drawing, access to AHU 01 is from one side only. AHU 01a and EF01 are both suspended from the roof.

Workbook Ref No.	Areas to probe	Evidence expected
3.3	How does the Health Board assure itself that all variations / derogations, which may be required to the ventilation systems, are investigated and agreed by	Evidence that each variation / derogation has a detailed technical analysis, has been referred to the Board, and agreed with their ventilation safety group, clinical, engineering, Estates, infection control and FM teams.

	all parties before they are incorporated in the design?	

NHS Scotland Assure Observations:

The Contractor has sought 1 no. derogation in relation to SHTM 03-01 (see below). The design information presented for review is incomplete in some areas (e.g. plant room), therefore a full review of compliance with SHTM 03-01 could not be completed as part of the KSAR. Based on the reviewed documentation, there are elements of the ventilation designs that are currently non-compliant with SHTM 03-01. It is noted that the proposed Air Handling Unit, louvre locations, circular volume control damper (VCD) and transfer grille specifications are non-compliant with SHTM 03-01. There are no associated derogations recorded or mitigation measures identified, therefore it is unclear whether NHS FV have considered risks associated with the ventilation system, such as; the safe removal of condensate from the AHU, safe access for maintenance, cleaning and replacement, potential for contamination of supply air through discharge louvre location, adequate control of airflow to rooms, and transfer grilles compromising the fire / smoke strategy for the facility.

It is not clear from the evidence provided as to whether any derogations exist or have been considered with respect to the existing infrastructure.

- *Folder 1AY FBC Derogations Schedule* contains Revision 5 of the Project Derogation Schedule. 1 no. derogation has been sought in relation to SHTM 03-01 Part A in relation to the removal of insulation on Extract ductwork conveying air from which heat recovery will be derived. The Derogation schedule does not identify any form of agreement with the Ventilation Safety Group, Clinical, Engineering, Estates, Infection Control nor FM teams on this derogation. It was noted during the Ventilation workshop held on 15th December 2021, that the Authorising Engineer (Ventilation) had not been consulted on this derogation and that this derogation is being presented to National Treatment Centre Project Board for approval.
- No other derogations have been evidenced for the ventilation systems; however, the final derogation schedule cannot be completed until such times as the ventilation systems are fully designed and subsequently appraised for further derogations.

Workbook Ref No.	Areas to probe	Evidence expected
3.4	Does the Health Board have a strategy for ventilation (for rooms where this is permitted within the SHTM/SHPN guidance)?	Evidence of agreed environmental matrix. Evidence that the Dynamic thermal modelling confirms what the design must include (e.g. structure, solar shading/protection, orientation, equipment optimisation, etc.) to ensure that room temperatures comply with SHTM guidance, in naturally ventilated rooms.

		Floor plans with associated plant locations highlighted plus simple schematic of strategy. This must also identify the air intake and exhaust strategy / locations.

NHS Scotland Assure Observations:

From the information submitted for review, there is evidence relating to NHS FV having a strategy with regards to establishing the ventilation criteria for each room type in the facility, this is evidenced by the Room Data Sheets (RDS) and the Environmental Matrix (EM). There are discrepancies within the information contained in the RDS and EM which would suggest that the EM is not wholly agreed.

In addition, there is supporting evidence to suggest that the ventilation strategies have been assessed by means of the thermal comfort models and that the models have been peer reviewed by an independent party. There was a lack of supporting evidence provided as part of the KSAR response to demonstrate that the findings of the peer review had been fully addressed as part of the FBC design. There remains a risk that overheating may occur in the wards, resulting in a detrimental impact on patient and staff comfort, if this is not fully addressed during the design process. If the risk of overheating cannot be fully addressed through the current design of the ventilation system and additional airflows are required, this may also have an impact on the spatial fit of the services within the ceiling void.

The final ventilation strategies are defined on the ventilation schematic, however supporting design information is yet to be developed to demonstrate the strategy associated with the final plant and ventilation louvre locations.

- *Folder 1AA Environmental Matrix* contains “NHS FV Environmental Matrix 30 Sept 21”. This document would appear to be updated on at least six occasions to reflect comments received from the PSCP, HFS, Infection Control/Clinicians and from the Modular Build Contractor’s MEP Consultants. The ventilation provisions within the environmental matrix reflect the requirements of SHTM 03-01.
- *Folder PSCP – OPP1180824 – RDS’s & RLD’s* contains a file reference 6856-JMA-01-00-A-Room Data Sheets_P07. The RDS are dated 14 October 2021. This file contains room data sheets (RDS) extracted from the Activity Database. These RDS include Room Environmental Data. There are discrepancies between the environmental data indicated in the “NHS FV Environmental Matrix 30 Sept 21” and the RDS dated 14 October 2021.
- *Folder 1AE Dynamic Thermal Modelling Outputs* includes 2 no. reports associated with thermal modelling. The Modular Build Contractor’s MEP consultants have prepared a Mechanical Ventilation Overheating Risk Assessment report. A consultant working on behalf of NHS FV have produced a Thermal Comfort Modelling Review Report, which is intended to be a peer review of the Modular Build Contractor’s MEP Consultants’ report.
- The Modular Build Contractor’s MEP Consultants’ report has utilised the Charted Institution of Building Service Engineers (CIBSE) 2020DSY3 and 2050DSY3 weather which are the severest weather files available. This report confirms that the bedrooms and corridors comply with the overheating criteria contained in SHTM clause 2.11. However, the peer review of this report raises doubt on the validity of the overheating

temperature results associated with the corridors due to the air volumes assumed in the calculations.

- *Folder 1AK Technical Design Drawings* includes ventilation system layouts and associated schematic, plant room layout drawings and an MEP Section drawing. These drawings clearly indicate that a full mechanical ventilation strategy is being proposed throughout the facility.
- The submitted plant room drawing does not provide sufficient detail relating to the locations and design of the fresh air intake, exhaust and dirty exhaust louvres. NHS FV and the Modular Build Contractor should produce a fully coordinated plant room detailing the louvre locations, ensuring that the separation distances between same are compliant with SHTM 03-01 Part A Clause 3.66 and that the method of draining and cleaning the louvres is also compliant.
- It is noted from the site plan that there are areas of vegetation close to the plant room, NHS FV and the Modular Build Contractor should develop a strategy that ensures compliance with SHTM 03-01 Part A Clause 3.65.

Workbook Ref No.	Areas to probe	Evidence expected
3.5	Is there evidence of stakeholder input to ventilation strategies?	Addition to or supplement to the Environmental Matrix which confirms the following, on a room by room basis: a) The type of ventilation (to SHTM 03-01) b) Patient group and / or function related to the space. c) Name of the Consultant, Clinical Lead or Department Lead who has agreed to the room requirements. d) Name of the Infection Prevention and Control Doctor or equivalent who has agreed to the room requirements. e) Name of the Infection Prevention and Control Nurse who has agreed to the room requirements. f) Name of the Estates / FM team representative who has agreed to the room requirements. g) Name of the NHS Project Manager who has agreed to the room requirements.

		Name of the Decontamination Manager who has agreed to the room requirements (where this is part of the project).

NHS Scotland Assure Observations:

The design information submitted for review would suggest that there is evidence of NHS FV and their Authorising Engineer (Ventilation) appointed by NHS FV to support the project, being involved in ventilation strategy meetings, commenting upon the environmental data and the environmental matrices and the MEP performance specifications. In addition it is noted that the Infection Control personnel have also made comment on the Environmental Matrix. The final version of the Environmental Matrix is dated 30 Sept 2021. There is no evidence which indicates this document has been signed off by NHS FV and as noted previously, discrepancies exist between the environmental matrix and the room data sheets.

- *Folder 3.5 Stakeholder Input to Ventilation Strategy* does not contain any evidence of stakeholder input to ventilation strategies. *Folder 1BI Client Stakeholder Approve FBC* contains a set of minutes relating to a ventilation strategy meeting. NHS FV were represented by the Project Manager, Project Support Officer and the Authorising Engineer for Ventilation. A further meeting was held on 26 May 2021 to review data/overheating analysis and to decide on the strategy. These minutes identify that NHS FV required further discussion with Health Facilities Scotland to understand the best way forward and that the decision strategy will need to be submitted to the Board for approval as “there is conflicting advice”. The minutes also identify that the Authorising Engineer (Ventilation) was of the opinion that the data received was sufficient and supported the ventilation strategy for the proposed ward
- It is noted that the room data sheets, and environmental matrix indicate that each bedroom is to be maintained at a positive pressure to the adjoining spaces. The corridor and ensuite rooms are considered adjoining spaces. The current design solution indicates that whilst the bedroom is at positive pressure to the Ensuite; it is at balanced pressure to the corridor. This design solution is not compliant with the RDS nor the EM and requires further discussion with NHS FV IPC / clinical teams to ensure all parties are in agreement with the proposed strategies.
- No evidence has been submitted to confirm or otherwise, the names and roles of NHS FV personnel involved in establishing and agreeing the ventilation strategies. Notwithstanding this, it should be noted that the Environmental Matrix “NHS FV Environmental Matrix 30 Sept 21” records that NHS FV personnel including Infection Control/Clinicians participated in the development of the environmental data.

Workbook Ref No.	Areas to probe	Evidence expected
3.6	Is there evidence of the Health Board developing Ventilation Commissioning Proposals?	Evaluation of the suitability of the proposed plans in the context of the FBC, are these sufficient do the meet the requirements of the

		project, guidance and the design of the system? What plans have been made for independent validation of the ventilation systems? What plans have been made for independent verification of the ventilation system? What plant and ductwork cleaning has been specified? What safe adequate access has been allowed for access to dampers?

NHS Scotland Assure Observations:

There is no evidence to suggest that NHS FV have developed Ventilation Commissioning proposals for the new facility.

- *Folder 1.14 Evaluation of Board Commissioning Plan* contains documents, namely 1AD – Commissioning Plan and secondly the Forth Valley M&E Commissioning Statement. The document "1AD – Commissioning Plan" is an NHS FV document which appears to be still under development. The current iteration of this document does not contain any specific mention of the ventilation systems. The "Forth Valley M&E Commissioning Statement" has been prepared by the Modular Build Contractor's MEP Consultants. Revision A of this document is dated 26 October 2021 and identified as "Prelim Issue". Notwithstanding this, the document does not refer to the pre commissioning and final commissioning checks identified within SHTM 03-01 Part A Chapter 8.0.
- Further reference has been made to the NHS FV Performance Specification Rev E, dated 24 September 2021, produced by the Modular Build Contractor's MEP Consultants. Whilst this document refers to the CIBSE Commissioning Codes, it does not refer to the commissioning requirements indicated within SHTM 03-01 Part A.
- No evidence has been identified in relation to the plans for an independent verification of the ventilation system, other than the Authorising Engineer (Ventilation) undertaking a ventilation compliance audit.
- The NHS FV Performance Specification Rev E identifies that ductwork shall be manufactured, delivered, installed and protected to prevent the ingress of dust/dirt and cleaned if required in accordance with TR/19 PDI level 2 for general ductwork TR/19 PDI level 3 for clinical areas ductwork. SHTM 03-01 Part A requires ductwork to be cleaned to "advanced level" as defined in the 2005 edition of TR19. In addition, there is no evidence to indicate that any Post Clean Verification testing and associated completion report is a requirement.
- The MEP section drawings provided, would suggest that motorised fire smoke dampers are located at circa 2700mm AFFL, however access to same will be impeded due to the presence of water services and LTHW pipework and electrical distribution containment. The floor plans indicate that volume control dampers are near the ventilation grilles and access to same is through the adjacent 600x600 ceiling tiles.

- The ventilation layout drawings include a manufacturers installation detail associated with the Motorised Fire Smoke Dampers.

Workbook Ref No.	Areas to probe	Evidence expected
3.7	Has the Health Board started developing its ventilation governance arrangements?	Has the Health Board commenced its planning and recorded how it will ensure appropriate numbers of trained staff (AP and CP) staff and appointment of AE(V) for the project and is it clear how this project will interface with the Health Boards existing arrangements for management of the ventilation installations?

NHS Scotland Assure Observations:

From the information submitted for review, there is no evidence to suggest that NHS FV have developed specific ventilation governance arrangements for this facility.

- *Folder 3.7 Board Ventilation Governance Arrangements* does not contain any evidence to suggest that NHS FV have commenced their ventilation governance arrangements.
- Appendix A of the NHS FV Performance Specification stipulates that full client training will be provided to appropriate client staff members on all M&E systems installed, however there is no specific evidence to identify the numbers of Authorised Person(s) (AP) and Competent Person(s) (CP) who will be trained.
- NHS FV have appointed an Authorising Engineer (Ventilation) with a clearly defined scope of service. In addition, there is evidence in the form of meeting minutes that the AE(V) has been involved in discussions relating to the ventilation strategy deployed within the facility.
- There is no evidence to indicate how this project will interface with the existing arrangements for the management of the ventilation installations.

Workbook Ref No.	Areas to probe	Evidence expected
3.8	Evaluation of the Health Boards planned preventative maintenance (PPM) proposals.	Has the Health Board commenced its planning and recorded the PPM requirements and approach to ensure appropriate levels of maintenance, comprehensive statutory compliance and robust management processes?

NHS Scotland Assure Observations:

The PPM proposal submitted for review relates to the existing NHS FV Hospital and not specifically for this new facility.

- *Folder 3.8 Evaluation Boards PPM Proposals* contains a document, which appears to have originated from the SPV's Hard FM Provider, which confirms that the New Ward is an extension to the existing facility and will be subject to the same PPM regime as applied to the existing hospital under the current FM Contract Provisions. No evidence has been submitted to suggest that the PPM strategy complies with SHTM 03-01 Part B Chapter 5 and Appendices 1 and 2.

3.3.1 Ventilation: Further Observations

In addition to the points raised via the KSAR workbook above, we also include the following observations as a result of the review, all of which relate to the evidence presented during the appraisal.

3.3.2.1	It is noted that there are discrepancies in the environmental information contained within the Room Data Sheets and the Environmental Matrix.
3.3.2.2	Designer's risk assessments associated with the ventilation systems have not been provided.
3.3.2.3	The plant room drawing submitted for review does not contain sufficient design detail to demonstrate compliance with SHTM 03-01 and the CDM regulations.
3.3.2.4	The supply air ventilation system has been designed as a single zone system. There was no evidence of a controls algorithm to identify how this is intended to operate to meet the requirements of the Environmental Matrix. There is no evidence that the level of control (turn down ratio) for the AHU DX cooling coil matrix has been arranged to avoid large temperature swings.
3.3.2.5	The AHU technical details submitted for review indicate that the proposed unit is not SHTM 03-01 Part A compliant (with particular reference to Chapter 4). For example (the list not exhaustive);, 1. the AHU is significantly wider than 1 metre, SHTM 03-01 Part A section 4.4 requires split coils. 2. Access doors are not identified either side of each coil, 3. 2 Nr light switches identified, should be 1 Nr. 4. No drip tray for Plate Heat Exchanger. 5. No fixed ladders or evidence of pulpit ladders identified. 6. No evidence to identify if the fan total static pressures are established on clean, mean or dirty filter conditions. 7. Eliminator section not indicated. 8. Baffle missing on cooling coil drip tray. There is no evidence to confirm that NHS FV have fully considered the risks associated with the ventilation system, including; safe removal of moisture

	and condensate from the air and the AHU, safe and adequate access to the AHU for maintenance, cleaning and replacement, consideration that sufficient airflow is available during a dirty filter condition.
3.3.2.6	Ductwork layouts do not indicate balancing dampers on branches. Reliance is solely upon balancing dampers at grilles/diffusers. In a number of instances ductwork branch connections serve single grilles/diffusers. It is unclear whether the designer has fully considered the pressure drop across the damper in these instances and whether it will be too large and it will make commissioning difficult.
3.3.2.7	Circular volume control damper specification is non-compliant with SHTM 03-01.
3.3.2.8	Flexible ducting has been used to form bends which is non-compliant with SHTM 03-01 clause 5.55.

3.4 Electrical

3.4.1 Electrical: KSAR Observations

Workbook Ref No.	Areas to probe	Evidence expected
4.1	Has the Health Board completed competency checks on the electrical consultant designers?	Recorded evidence that the design team are experienced and have a comprehensive knowledge of the relevant design standards. Where anyone does not have a record of extensive health care experience what recorded plans are to be put in place by the Consultant Designers? Recorded evidence that input from the Health Boards Authorising Engineer for Electrical (AE(E)) has been requested. Evidence that all contractors and sub-contractor competency checks have been completed and signed off.

NHS Scotland Assure Observations:

Evidence of competency check information on the Modular Build Contractor's MEP Consultants has been submitted. It should be noted that the designer of the electrical systems is a sub-contractor to the modular build contractor, as a CDP element. *Folder 1C Board Competency Checks* includes a company CV for the Modular Build Contractor's MEP Consultants plus 2 no. personal CVs for the Consulting M&E engineers. The documents submitted confirm that the Modular Build Contractor's MEP Consultants are conversant with HTMs and technical requirements for healthcare buildings. The submitted information does not confirm their competency in relation to SHTM 06-01, SHTM 06-02 or SHTM 06-03. There is no evidence to confirm that NHS FV have fully concluded their own competency checks on the designers or contractors.

- *Folder 1C Board Competency Checks*, also includes information associated with the modular build contractor's sub-contractors responsible for the electrical design and it includes 1 no. case study where the Modular Build Contractor's MEP Consultants and the sub-contractors responsible for the mechanical, public health and electrical designs have designed and built an Emergency Care Ward at Frimley Park Hospital.
- It is acknowledged that training competencies are provided for individual team members, however, none of these relate to the electrical designers involved in the project.
- *Folder 1B PSCP Design Team Contracts Appointments* contains an appointment letter from NHS FV as evidence relating to the appointment of an Authorising Engineer for LV and HV systems (AE(LV)). It was acknowledged at the KSAR Electrical Technical Workshop that the AE had not reviewed any project information to date.

- Whilst the sub-contractor competency checks have been undertaken by the Modular Build Contractor, there is no evidence of them being formally signed off.

Workbook Ref No.	Areas to probe	Evidence expected
4.2	How does the Health Board ensure that electrical services are being designed in a fashion which will provide ease of access for future maintenance and which will retain space for minor additions and modifications to services in the future?	Evidence that the designers have presented their co-ordination drawings (BIM model) to the Board. Evidence that the designers have presented each of the main service runs plus plant rooms to the Health Board's FM team. Evidence that the Board has agreed a strategy (percentage) for spare capacity and a documented allowance has been incorporated into the design. Are sub stations, switch rooms, distribution board cupboards, horizontal distribution runs and risers appropriately sized for the equipment being installed and facilitate safe, adequate maintenance.

NHS Scotland Assure Observations:

The design information submitted for review identifies that the primary containment routes are located within the corridor ceiling voids. From the sections submitted, the corridor ceiling void appears congested and access to containment systems is not clearly demonstrated. As the contractor has not submitted any design calculations, it is not possible to assess if the design proposals include sufficient capacity to facilitate minor additions within the containment in the future.

- *Folder 5.3A* includes the “Revit Model Coordination Report, OPP1180824 PTK-A1-RP-A-003 Rev P01”. The report states that there is no requirement for any level of Building Information Modelling (BIM) for this project. It is unclear from the evidence provided as to what this statement is based upon, nor if NHS FV have considered the requirements to comply with Scottish Government policy with respect to BIM for new projects commencing for procurement procedures from April 2017, nor if the Scottish Government BIM grading tool has been used to support this assessment. The report contains 5 No. screen shots indicating sections at various points through the building. Whilst this report confirms that a level of coordination has been undertaken using BIM, it does not identify any space for future flexibility, nor does it identify the electrical zones and crossovers.

- *Folder 1AK Technical Design Drawings* includes electrical system layouts and associated schematic, plant room layout drawings and an MEP Section drawing. The latter indicates the spatial coordination of the electrical containment systems with the other MEP service installations. The ceiling voids above the main circulation corridors, whilst coordinated, do not appear to indicate any zones for future flexibility.
- The plant room layout submitted does not provide sufficient electrical detail to establish if any space for future flexibility has been included.
- *Folder 1AK Technical Design Drawings* includes electrical containment systems, which identify the main runs for electrical services. The corridors form the main runs and use a 700mm wide cable basket, sub divided into 300mm LV, 200mm data, 100mm fire alarm and 100mm Security and Nurse Call. The requirements of SHTM06-01A clause 11.20 requires to be satisfied.
- *Folder 4.2C* includes a document entitled "2.2D-Spare capacity v0" but relates exclusively to water and internal plumbing and drainage systems only.
- Through discussion at the Electrical Technical Workshop, it was advised that the required spare capacity expectation was 25%, however this is not evidenced within the folder. Through this discussion it was apparent that the actual spare capacity is slightly less than the anticipated 25% and this should be reviewed with the Board.
- Identified on the Technical Design Drawings in *Folder 1AK Technical Design Drawings*, the main LV switchboard appears to be located within an area of suitable size for the system installed. The DBs (2 no. locations) within the footprint of the modular extension building appear to be located within an electrical cupboard with sufficient size, space and access availability.

Workbook Ref No.	Areas to probe	Evidence expected
4.3	How does the Health Board assure itself that all variations / derogations, which may be required to electrical systems, are investigated and agreed by all parties before they are instigated?	Evidence that each variation / derogation has a detailed technical analysis, has been referred to the Board, and agreed with their electrical safety group, clinical, Estates, infection prevention and control and FM teams.

NHS Scotland Assure Observations:

The contractor has not sought any derogations associated with the electrical systems. Based upon the reviewed documentation, there are elements of the design that do not comply with SHTM 06-01. Examples include the proposed common tray solution which accommodates signal, power and communications as defined in section 11.34 of SHTM 06-01A and requires separation. From discussions with the design team at the KSAR electrical systems technical workshop, the provision of 25% spare capacity as required under section 14.37 of SHTM 06-01A is not being achieved. This guidance of 25% in guidance is

indicative. An assessed actual anticipated demand should be established to avoid over design and additional costs.

It is not clear from the evidence provided as to whether any derogations exist or have been considered with respect to the existing infrastructure.

- *Folder 1AY FBC Derogations Schedule* contains Revision 5 of the Project Derogation Schedule.
- Within the project board update note, dated 04.10.21 found in *Folder 1AY FBC Derogations Schedule*, derogations are referred to and it appears that the process of approval sits with the board's advisors. There are no specific advisor responsibilities noted on the derogation schedules and no records of clinical/estates/IPC input or other stakeholders that may require to be consulted on proposed derogations.

As the electrical systems are not yet fully designed, a further review of the proposed derogation schedule by the NHS FV team will be required.

Workbook Ref No.	Areas to probe	Evidence expected
4.4	Has the Health Board assured itself of availability of adequate supply from the local utility infrastructure?	Confirmation from the Regional Electricity Company as to how the supply will be provided from their network and if single or dual supplies are being made available. What is the Health Board's resilience strategy for the electrical infrastructure (including dual supplies, renewables, generators, UPS, etc.)?

NHS Scotland Assure Observations:

The Board have engaged with the existing Special Purpose Vehicle company (SPV) to deliver the project, who in turn through their Hard FM Provider have engaged MEP Consultants to prepare an enabling works package specification, which includes points of connection for electrical, water, fire and medical gases. Drawings and specifications have been prepared.

- On the modular extension building project, there is no requirement for the REC to be involved as the essential and non-essential power supplies are derived from the existing main hospital infrastructure. The MEP Consultants appointed by the SPV's Hard FM Provider, as Technical Advisors have been appointed to carry out an enabling works package, which includes the points of connection for essential and non-essential power supplies. This MEP Consultant has extensive experience of the NHS FV installations, being the original electrical system designers. Through discussions at the Technical Workshops, they confirmed that they have assessed the availability of adequate power supplies. It was confirmed that they have based all calculations on the maximum loads

presented by the Modular Build Contractor's team. A risk exists that the electrical protection characteristics of the main infrastructure have not been incorporated into the extension design and vice versa.

- Within *Folder 4.4 Availability Adequate Supply*, the board have prepared an adequate supply and resilience statement confirming that dual supplies are provided to the main hospital and detailing the general resilience provisions to the main hospital, which includes generators. There is no evidence to identify the resilience provisions provided within the modular extension building specifically. The technical drawings provided in *Folder 1AK Technical Design Drawings* shows the automatic changeovers to each DB, however, this does not show any specific UPS or generators associated with the modular extension building. There is no evidence of a risk assessment having been undertaken regarding local power services within the modular extension building, therefore it is not possible to understand if any such requirements should be included.

Workbook Ref No.	Areas to probe	Evidence expected
4.5	Evidence of provisions for emergency supplies during loss of the utility incoming supply.	Floor plans with standby generator locations highlighted plus simple schematic.

NHS Scotland Assure Observations:

There has been no evidence within the design layout drawings of any standby power equipment locations or strategy. A single line diagram referenced C2659-AQC-M1-XX-DR-E-6000 (P04) is provided which indicates the provision of essential and non-essential power supplies. Whilst the schematic indicates diverse supplies to each composite distribution board position with integral changeover, the containment drawings indicate that the supplies pass through the same fire compartment with no additional requirements for cable (fire) protection noted. As there is limited information available with respect to electrical infrastructure risk assessments, including the requirement for any life safety, fire-fighting or other critical supplies, we are unable to determine if the design is compliant with BS8519, BS999, BS7671 or SHTM 06-01. The server room power supply is currently noted as being served exclusively from the essential power supply. Therefore, NHS Scotland Assure have not been provided with suitable assurance that the electrical infrastructure provides the required level of resilience.

- The technical drawings provided in *Folder 1AK Technical Design Drawings* show the automatic changeovers to each DB however it does not show any specific UPS or generators associated with the modular extension building.
- *Folder 4.4 Availability Adequate Supply* includes a response document that confirmed the presence of 4No. 11kV diesel synchronous generator sets which are designed to run in parallel with each other and serves the whole electrical distribution system for the Hospital.
- There is no documented evidence to confirm that an appraisal of the existing emergency power service has been undertaken to ensure that it can accommodate the requirements

of the modular extension building. This point is made equally for the availability of load and suitability of the physical infrastructure. Compliance with the requirements of BS7671 and SHTM 06-01 could therefore not be reviewed.

- There is no documented risk assessment provided that confirms that the load of the modular extension building can be accommodated without impact and also how the contractor will make the applicable connection without impacting the resilience strategy of the existing hospital.

Workbook Ref No.	Areas to probe	Evidence expected
4.6	Is there a strategy for locating substations?	Floor plans with substation locations highlighted plus simple schematic of strategy.

NHS Scotland Assure Observations:

There are no new substations within this project as the main power to the modular extension building comes from existing substations within the main Hospital.

- There is no documented risk assessment provided that confirms that the load of the modular extension building can be accommodated without impact and also how the contractor will make the applicable connection without impacting the resilience strategy or ongoing operation of the existing hospital.

Workbook Ref No.	Areas to probe	Evidence expected
4.7	Is there a strategy for locating switch rooms?	Floor plans with switch room locations highlighted plus simple schematic.

NHS Scotland Assure Observations:

On review of the Modular Build Contractor's Electrical Sub-contractor drawing C2659-AQC-M1-00-DR-E-6101_1 Rev P03, there are three locations within the modular extension building that contain electrical switchgear. These include two distribution cupboards located immediately off of the corridors, at either end of the building, and the external plant room, which also contains DB-MECH. Whilst a hub room is located on the drawing layout, there is no DB-S located within it.

- There is no evidence to suggest that a documented strategy is in place for identifying the most appropriate location of the switch rooms.
- The technical drawings provided in *Folder 1AK Technical Design Drawings* show the positions of the DBs and indicates a subdivision strategy on a North/South basis on the containment and power services drawings.

- The schematic is also located within *Folder 1AK Technical Design Drawings*, identifying the proposed switchgear.

Workbook Ref No.	Areas to probe	Evidence expected
4.8	Is there a strategy for locating Medical IT distribution equipment?	Floor plans with Medical IT board locations highlighted plus simple schematic. Compliance with BS7671 section 710 Compliance with SHTM 06-01

NHS Scotland Assure Observations:

There is no strategy for the location of Medical IT distribution equipment as the design has been prepared on the basis of no need for such a system. There is no specific evidence to confirm that the risk classifications and medical locations have been agreed by the board and that those identified on the environmental matrix are correct and agreed with the clinical leads.

- *Folder 1AA Environmental Matrix* contains the environmental matrix which includes two specific columns named “Clinical Risk” and “Medical Grouping”, which identifies the clinical risk classifications as noted in SHTM06-01, section 4.0 and also the medical locations groupings as noted in BS7671 table A710. *Folder PSCP-OPP1180824-RDS’s & RLD’s* contains the ADB room data sheets for the modular extension, where each room’s clinical risk category is left blank. There is no specific evidence to confirm that the risk classifications and medical locations have been agreed by the board and that those identified on the environmental matrix are correct and agreed with the clinical leads.

Workbook Ref No.	Areas to probe	Evidence expected
4.9	Is there a strategy for distribution?	Floor plans with containment distribution routing (horizontal and vertical).

NHS Scotland Assure Observations:

On review of the Modular Build Contractor’s Electrical Sub-contractor drawing C2659-AQC-M1-00-DR-E-6101_1 Rev P03, there are 3 locations within the modular extension building that contain electrical switchgear. These include 2 distribution cupboards located immediately off of the corridors at either end of the building and the external plant room, which also contains DB-MECH. Whilst a hub room is located on the drawing layout, there is no DB-S located within it.

- The technical drawings provided in *Folder 1AK Technical Design Drawings* show the positions of the DBs and indicates a subdivision strategy on a North/South basis on the containment and power services drawings.
- The modular extension is over a single level and therefore no requirement for vertical sub main distribution.
- The distribution containment systems, as shown on drawing C2659-AQC-M1-00-DR-E-6101_1 Rev P03, note a single containment route throughout the modular extension which can offer diverse routings along corridors, but not at distribution board cupboards.
- Based upon the proposed basket solution there is no obvious evidence of a strategy for future works, or for ensuring that maintainers can access the containment systems or compartments during the operational phase of the building.
- The Modular Build Contractor and their designers have not provided any evidence of electrical calculations associated with the design of the modular extension building. These calculations should extend to discrimination and selectivity, alongside containment calculations. Lighting calculations have been provided as part of the Electrical Sub-contractor technical submittal.

Workbook Ref No.	Areas to probe	Evidence expected
4.10	Is there evidence of the Health Board developing electrical commissioning proposals?	Evaluation of the suitability of the proposed plans in the context of the FBC, are these sufficient do the meet the requirements of the project, guidance and the design of the system? Has sufficient time been allocated for a full commissioning program?

NHS Scotland Assure Observations:

During the KSAR technical workshops it was noted that the existing SPV's Hard FM Provider contract obligations would be extended to suit the modular ward. This includes existing duty holders who would be included in all testing, commissioning and handover processes. Whilst this was discussed, no evidence exists within the project folders of named responsible people and their duties in relation to commissioning.

- *Folder 1.14 Evaluation of Board Commissioning Plan* contains documents, namely 1AD – Commissioning Plan and secondly the NHS FV M&E Commissioning Statement. The document "1AD – Commissioning Plan" is an NHS FV document which appears to be still under development. The current iteration of this document does not contain any specific mention of the electrical systems. The "Forth Valley M&E Commissioning Statement" has been prepared by the Modular Build Contractor's MEP Consultants. Revision A of this document is dated 26 October 2021 and identified as "Prelim Issue". Notwithstanding this, the document does not refer to the pre commissioning and final commissioning checks identified within SHTM 06-01, chapter 17.0 in relation to factory

acceptance tests or logbooks for example. This document does confirm that an M&E specialist commissioning manager will be appointed.

- No evidence has been identified in relation to the plans for an independent verification of the electrical system, other than the Authorising Engineer (Electrical) undertaking an electrical compliance audit.
- Whilst there is no documentation provided within the KSAR folder to record the approach to numerous elements of the integration of procedures and commissioning acceptances. Discussions during the Technical Workshop confirmed that the existing SPV's Hard FM Provider policies and obligations are passed on to the contractor and their Electrical Sub-contractor, and that the SPV's Hard FM Provider duty holder has not been confirmed at this stage. The response to question 4.11 in the submitted information, however, confirms that the duty holders are currently provided as part of the current FM contract.

Workbook Ref No.	Areas to probe	Evidence expected
4.11	Has the Health Board starting on its early thinking for the electrical governance arrangements for the operational phase?	Has the Health Board commenced its planning and recorded how it will ensure appropriate trained staff and appointment of AE for the project and is it clear how this project will interface with the Health Board existing arrangements for management of the electrical installations, inclusive of third party providers?

NHS Scotland Assure Observations:

From the information submitted for review, there is no evidence to suggest that NHS FV have developed specific electrical governance arrangements for this facility.

- *Folder 4.11 Electrical Governance Operational Phase* contains a statement to confirm that the obligations of the Board's service provider will extend to incorporate the new facility.
- There is no detail provided about the scope of these services applicable to the modular building extension.
- Appendix A of the NHS FV Performance Specification stipulates that full client training will be provided on all M&E systems installed to appropriate client staff members, however, there is no specific evidence to identify the numbers of Authorised Person(s) (AP) and Competent Person(s) (CP) who will be trained.
- NHS FV have appointed an Authorising Engineer (Electrical) with a clearly defined scope of service. In addition, there is no evidence in the form of meeting minutes that the AE(E) has been involved in discussions relating to the electrical strategy deployed within the facility.

- No detail is provided on the number of AE, AP and CP to be made available by the FM contractor.
- There is no evidence to indicate how this project will interface with the existing arrangements for the management of the electrical installations.

Workbook Ref No.	Areas to probe	Evidence expected
4.12	Evaluation of the Health Boards planned preventative maintenance (PPM) proposals.	Has the Health Board commenced its planning and recorded the PPM requirements and approach to ensure appropriate levels of maintenance, comprehensive statutory compliance and robust management processes, inclusive of third party providers?

NHS Scotland Assure Observations:

The PPM proposal submitted for review relates to the existing NHS FV Hospital and not specifically for this new facility.

- *Folder 4.12 Evaluation PPM Proposals* contains a statement to confirm that the PPM obligations of the Board's service provider will extend to incorporate the new facility.
- There is no detail provided about the scope of these services applicable to the modular building extension.
- No evidence is provided to confirm compliance with SHTM 06-01 Part B as part of the ongoing PPM works of the Board's service provider.

3.4.2 Electrical: Further Observations

In addition to the points raised via the KSAR workbook above, we also include the following observations as a result of the review, all of which relate to the evidence presented during the appraisal.

3.4.2.1	It is noted that there are discrepancies in the environmental information contained within the Room Data Sheets and the Environmental Matrix, for example required illumination levels (lighting).
3.4.2.2	Designer's risk assessments associated with the electrical systems have not been provided.
3.4.2.3	There is no evidence to confirm whether a clinical risk assessment review has been undertaken inclusive of the designers and the clinical representatives. This is required as directed in SHTM 06-01 to include a number of items that require input of the clinicians and users such that they can understand the implications of the design for topics such as resilience, future proofing, fire, etc. The requirements for the

	specific clinician engagement is noted in section 710.3 of BS7671-2018.
3.4.2.4	As discussed at the KSAR technical workshop, the board have provided no evidence to confirm whether a high hazard area emergency lighting risk assessment review has been undertaken inclusive of the designers and the clinical representatives.
3.4.2.5	There is no evidence to suggest that a coordinated surge protection strategy has been developed and agreed that would protect the electrical installations.
3.4.2.6	The existing system electrical characteristics such as fault levels have not been included in the design calculations associated with the modular building extension.
3.4.2.7	The impact of the new modular building extension electrical characteristics has not been included in the design calculations associated with the main hospital infrastructure.
3.4.2.8	There are a significant number of electrical related items still noted as “open” on the design tracker document.
3.4.2.9	There are a significant number of electrical related items still noted as “open” on the Modular Build Contractor’s RFI document.
3.4.2.10	The provision of the combined cable basket requires to be reviewed in relation to clause 11.34 of SHTM 06-01 Part A and separation distances between power and signal cables.

3.5 Medical Gases

3.5.1 Medical Gases: KSAR Observations

Workbook Ref No.	Areas to probe	Evidence expected
5.1	Has the Health Board completed competency checks on the medical gases consultant designers?	Recorded evidence that the design team are experienced and have a comprehensive knowledge of the relevant design standards. Where anyone does not have a record of extensive health care experience what recorded plans are to be put in place by the consultant designers? Recorded evidence that input from the Health Boards Authorising Engineer for Medical Gases (AE(MG)) has been requested. Evidence that all contractors and sub-contractor competency checks have been completed and signed off.

NHS Scotland Assure Observations:

There is no evidence of competency check information for the medical gas consultants or contractors. It should be noted that the designer of the medical gas systems is via a specialist sub-contractor. There is no evidence to confirm that NHS FV have fully concluded their competency checks on the designers or contractors.

- *Folder 1C Board Competency Checks* include a company CV for the Modular Build Contractor's MEP Consultants, in addition to the company CV, 2 no. personal CVs were submitted for their employees. The documents submitted confirm that the company (Manchester based) are conversant with HTMs and technical requirements for healthcare buildings. The submitted information does not confirm their competency in relation to SHTM 02-01.
- It was confirmed during the KSAR MGPS Technical Workshop on 16th December 2021, that whilst that the Modular Build Contractor's MEP Consultants developed the strategy for these installations the MGPS final design is not complete. A sub-contractor to the Modular Build Contractor, will be responsible for the development and production of the RIBA Stage 4 Medical Gas Pipeline Systems design solutions.
- Competency check information has not been submitted for the sub-contractor responsible for the design of the medical gas pipeline systems.
- *Folder 1B PSCP Design Team Contracts Appointments* contains an appointment and acceptance letter as evidence relating to the appointment of a Medical Gases (AE(MG)). Version 30 of the Design Review Tracker demonstrates that the AE(MG) has provided comments on the Room Data Sheets, Environmental Matrix, Performance Specification

and the Contractors Proposals. None of the comments made by the AE(MG) have been resolved and they have an “Open” Status on the Design Review Tracker. This was highlighted during the Medical Gas Technical Workshop where the AE(MG) raised concerns about the lack of progress on the resolution of comments and a concern as to the validity of the medical gas design proposals.

- There is no evidence that Competency Checks, associated with the MGPS installations, have been completed and signed off by the Health Board.

Workbook Ref No.	Areas to probe	Evidence expected
5.2	How does the Health Board assure itself that all variations / derogations' which may be required to medical gas systems are being investigated and agreed by all parties before they are instigated?	Evidence that each variation / derogation has a detailed technical analysis and has been referred to the Board and agreed with their medical gases management group, clinical, Estates, infection control and FM teams.

NHS Scotland Assure Observations:

It was confirmed by the Modular Build Contractor during the Medical Gas Technical Workshop that the MGPS design information submitted for review was not the final RIBA Stage 4 design information. The final design information would be prepared by their sub-contractor. The design needs to be verified by the relevant stakeholders and validated by NHS FV. Until this final design review process has been completed, the proposed derogation schedule cannot be confirmed.

- 1 no. derogation has been sought in relation to SHTM 02-01 Part A in relation to the removal of Medical Air from the Elective Ward extension.
- The Derogation schedule identifies a number of NHS FV clinical personnel involved in the decision-making process in relation to the removal of the Medical Air supply. The Derogation schedule also records the provisions should medical air be required by a patient.
- This derogation was submitted to and agreed by the National Treatment Centre Project Board on 4th October 2021.

Workbook Ref No.	Areas to probe	Evidence expected
5.3	How does the Health Board ensure that medical gas services are designed in a fashion, which will provide ease of access for future	Evidence that the designers have presented their co-ordination drawings (BIM model) to the Board.

	maintenance and which will retain space for minor additions and modifications to services in the future	Evidence that the designer has presented each of the main service runs to the Board's FM team.

NHS Scotland Assure Observations:

The design information submitted for review identifies the medical gas pipework located within the corridor ceiling voids. From the sections submitted, the corridor ceiling void is congested and access to the medical gas pipework could be problematic in some areas. As the contractor has not submitted any design calculations, it is not possible to assess if the design proposals include sufficient capacity to facilitate minor additions to the medical gas systems in the future.

- *Folder 5.3A* includes the "Revit Model Coordination Report, OPP1180824 PTK-A1-RP-A-003 Rev P01". The report contains 5 no. screen shots indicating sections are various points through the building. Whilst this report confirms that a level of coordination has been undertaken using BIM, it does not specifically identify the medical gas pipework.
- *Folder 1AK Technical Design Drawings* includes an MEP section drawing**.** This drawing does not clearly define or indicate the medical gas pipework. On this basis it cannot be confirmed, or otherwise, that ease of access for maintenance, nor the retention of space for minor modifications has been incorporated within the current design proposals.
- *Folder 1.5 Project Team Demonstrate Understanding of Need* contains Version 30 of the Design Review Tracker. This document demonstrates that the Contractors Proposals (which include the main service runs) have been submitted to NHS FV. It was established during the Medical Gas Technical Workshop that the MGPS information that had been submitted to NHS FV was not the final design information. Notwithstanding this, the AE(MG) submitted comments on these drawings to the Contractor. None of the comments made by the AE(MG) have been resolved and they have an "Open" Status on the Design Review Tracker. The final design information therefore remains as a point of action by the Contractor and more importantly, the design should be presented to NHS FV upon completion for the relevant stakeholder approval and validation by NHS FV.

Workbook Ref No.	Areas to probe	Evidence expected
5.4	Is there evidence of the Health Board developing medical gases commissioning proposals?	Evaluation of the suitability of the proposed plans in the context of the FBC are these sufficient do the meet the requirements of the project, guidance and the design of the system?

NHS Scotland Assure Observations:

There is no evidence contained with the information submitted to suggest that NHS FV have developed the Medical Gas Commissioning proposals for the new facility.

- *Folder 1.14 Evaluation of Board Commissioning Plan* contains documents, namely 1AD – Commissioning Plan and secondly the Forth Valley M&E Commissioning Statement**.** The document "1AD – Commissioning Plan" is an NHS FV document which appears to be still under development. The current iteration of this document does not contain any specific mention of the Medical Gas Pipeline systems**.** The "Forth Valley M&E Commissioning Statement" has been prepared by the Modular Build Contractor's MEP Consultants. Revision A of this document is dated 26 October 2021 and identified as "Prelim Issue". Notwithstanding this, the document does not refer to the pre commissioning and final commissioning checks identified within SHTM 02-01 Chapter 15.
- *Folder 1AC Specs Final Commission Handover* contains the NHS FV Performance Specification Rev E, dated 24 September 2021, produced by the Modular Build Contractor's MEP Consultants. This document indicates that the new MGPS system shall comply with SHTM 02-01, however it does not provide any additional comment / reference to the validation and verification requirements of SHTM 02-01 Chapter 15.

Workbook Ref No.	Areas to probe	Evidence expected
5.5	Has the Health Board started developing its medical gases governance arrangements for the operational phase?	Is the Health Board considering how it will ensure appropriate numbers of trained staff (AP and CP) and AE(V) for the project? And is it clear how this project will interface with the Board existing arrangements for management of the medical gases installations?

NHS Scotland Assure Observations:

From the information submitted for review, there is limited evidence to suggest that NHS FV have developed specific medical gas governance arrangements for this facility.

- NHS FV have only submitted the details of the Authorising Engineer (MGPS). No other evidence has been provided which identifies the persons responsible for the other functional responsibilities associated with the MGPS installations.
- No evidence has been submitted to identify staff training.
- No evidence has been submitted which details the interface between the NHS FV new elective ward team and the wider NHS FV SPV provider relating to the management of the medical gas installations.

Workbook Ref No.	Areas to probe	Evidence expected
5.6	Is there recorded evidence of a strategy for bulk gas and bottle gas storage?	Floor plans with vacuum insulated evaporator (VIE) locations highlighted plus simple schematic of strategy. Confirmation that the medical gas strategy is adequate. Floor plans with pipework distribution routing and manifold locations.

NHS Scotland Assure Observations:

The design strateg**y** for the facility is to rely upon the existing duty / standby VIE plant, medical vacuum plant and associated infrastructure which serves the existing hospital.

- The Oxygen and Medical Vacuum supplies to the new elective ward facility will be derived from the existing Oxygen and Medical Vacuum infrastructures.
- It was confirmed, by the Modular Build Contractor, during the MGPS workshop on 16 December 2021 that local Oxygen bottle gas storage is not required for this facility.
- Risk assessments associated with the security of supply and resilience of the existing medical gas infrastructure have not been submitted for review.
- The Medical Gas layout draft plans have been submitted for review do not represent the final MGPS design proposals. The drawings submitted have been commented upon by the SPV' Hard FM Provider's Technical Advisor and NHS FV's AE(MGPS), however there is no evidence to suggest that other stakeholders have reviewed the information. The comments are clearly defined in Version 30 of the Design Tracker Document. The tracker indicates that none of the comments made have been closed out.

Workbook Ref No.	Areas to probe	Evidence expected
5.7	Evaluation of the Health Boards planned preventative maintenance (PPM) proposals	Has the Health Board commenced its planning and recorded the PPM requirements and approach to ensure appropriate levels of maintenance, comprehensive statutory compliance and robust management processes?

NHS Scotland Assure Observations:

The PPM proposal submitted for review relates to the existing NHS FV hospital and not specifically for this new facility.

- *Folder 5.7 Boards PPM Proposals* contains evidence which confirms that the New Ward is an extension to the existing facility and will be subject to the same PPM regime as applied to the existing hospital under the current FM Contract Provisions. Embedded within the response is a PDF copy of the PPM plan, however this document cannot be opened.

3.5.2 Medical Gases: Further Observations

In addition to the points raised via the KSAR workbook above, we also include the following observations as a result of the review, all of which relate to the evidence presented during the appraisal.

3.5.2.1	The medical gas design information submitted for KSAR is not at the required RIBA Stage 4 level in accordance with Scottish Capital Investment Manual Full Business Case requirements.

3.6 Fire

3.6.1 Fire: KSAR Observations

Workbook Ref No.	Areas to probe	Evidence expected
6.1	Has the Health Board completed competency checks on the Fire Engineering consultant designers?	Recorded evidence that the design team are experienced and have a comprehensive knowledge of the relevant design standards applicable to healthcare premises. Recorded evidence that input from the Health Boards Fire Advisors has been requested. Evidence that all contractors and sub-contractor competency checks have been completed and signed off.
NHS Scotland Assure Observations: • No fire consultant appointment document or competency check has been provided in *Folder 6.1 Fire Engineer Competency Checks* therefore the competency of the author of the Fire Strategy is unverified by NHS FV. • *Folder 6.2 Fire Strategy* contains the Modular Build Contractor's Fire Strategy Report (Rev P03). A revision has been made to the document (P02) following comments received from the NHS Board Fire Officer; however, the nature of those comments is not detailed in report. • *Folder 1.5B* Design Tracker (v30) contains 3 no. comments (521/522/523) from the Fire Officer with a note confirming these will be captured in the updated fire strategy. Comments remain open on tracker.		

Workbook Ref No.	Areas to probe	Evidence expected
6.2	Has a written fire strategy been completed and does it provide evidence, where there is a variance from statutory and mandatory guidance, that an equivalent level of safety has been achieved by alternative means?	Is there documented evidence that fire suppression systems have been considered for life safety and property protection? Is progressive horizontal evacuation available for all patient areas that continuously moves away from the fire area? Does the design considerations of the fire and detection system, for in-patient facilities, provide L1 coverage including voids?

		Does the design provide for a compliant emergency lighting system? Are free swing arm self-closers fitted to all leafs of doors serving sleeping accommodation? Have escape lifts been considered for the evacuation of patients and others with mobility issues? Are multi sensor fire detectors installed to reduce the occurrence of unwanted fire alarm signals? Are there adequate storage facilities to ensure escape routes are not used for this purpose? Are measures in place to provide safe charging of electrical and personal electronic equipment? In addition to the prescribed list in the Building Standards Technical Handbook, have fire hazard rooms been designated based on fire load? Where there is a mechanical ventilation system - have all compartments, sub-compartments and corridors serving sleeping accommodation been designed to be fitted with fire and smoke dampers?

NHS Scotland Assure Observations:

A fire strategy has been provided, however, there are variations from ‘SHTM 81’ and ‘Technical Handbook Non Domestic’ with no evidence that fire safety compliance has been met with an alternative means.

Some areas of the fire strategy do not offer sufficient detail to make an appraisal of the fire safety measures.

The areas of variation identified are:

- The fire strategy details ‘In some instances a self-closing fire door with a reduced fire resistance duration may be Installed’.
- There is no evidence to show the fire resistance of the ‘bedroom’ half leaf doors, there is no detail to indicate that these will have self-closing devices fitted.
- SHTM ‘Firecode’ recommends ‘free swing arm’ self-closing devices on bedroom doors. The type of self-closing device has not been identified within the fire strategy.

- The technical drawings provided in *Folder 1AK Technical Design Drawings* show the positions of intumescent blocks to door transfer grilles on smoke control doors. Refer to ventilation section. SHTM 81 01 (section 6.6) states they must be provided with remotely resettable fire and smoke shutters operated by the fire detection and alarm system; however, these have not been incorporated.
- The corridors serving bedrooms are not fully enclosed by short duration fire resistance construction at 'Reception Room 002'.
- There is no evidence to show fire protection at the junction of floors and compartment/sub compartment walls.
- For the purpose of evacuation, the fire strategy details two fire compartments, this does not facilitate 'Progressive Horizontal Evacuation'.
- Hazard Rooms (Hoist 080, Linen 095) are not enclosed by fire resistance.
- As per the M&E drawings in *Folder 1AK Technical Design Drawings*, motorised fire and smoke dampers have been provided throughout the building; however, these elements require to be addressed for accessibility and maintenance.

Workbook Ref No.	Areas to probe	Evidence expected
6.3	How does the Health Board assure itself that all variations / derogations, which may be required to fire systems, are investigated and agreed by all parties before they are instigated?	Evidence that each variation / derogation and any fire engineering proposals are being referred to the Board and agreed with their fire safety advisors, NDAP group, clinical, engineering, Infection Prevention and Control, FM teams and regulatory authorities.
NHS Scotland Assure Observations: The KSAR has identified a number of variations from 'SHTM 81' and 'Technical Handbook Non Domestic' with no evidence that fire safety compliance has been met with an alternative means. There is no evidence to show that the Health Board have documented, investigated and agreed any variations to fire safety systems.		

Workbook Ref No.	Areas to probe	Evidence expected
6.4	How does the Health Board assure itself that all fire dampers and fire/smoke dampers are designed to allow for inspection, resetting and maintenance?	Safe and adequate access has been allocated on both sides of all fire dampers for maintenance.

NHS Scotland Assure Observations:

Whilst fire dampers and fire/smoke dampers are indicated on the project drawings, the ceiling void sections provided indicate that the services within the voids are congested in places, with access to the respective dampers for inspection, resetting and maintenance not clearly demonstrated. It is unclear from the evidence provided whether this has been reviewed by the NHS FV team.

Workbook Ref No.	Areas to probe	Evidence expected
6.5	How does the Health Board assure itself that any smoke control and/or clearance systems are fit for purpose?	Evidence that the smoke system is being designed by an accredited Fire Engineer. Evidence that Building Control are being consulted. Confirmation that the Health Boards fire advisors and NDAP team are satisfied with the design proposal.

NHS Scotland Assure Observations:

NHS FV have confirmed there is no smoke control system required for the building.

Workbook Ref No.	Areas to probe	Evidence expected
6.6	Has the Health Board started the development of the fire system outline commissioning proposals?	Is there an established fire management group that will ensure the fire strategy is adhered to?

NHS Scotland Assure Observations:

There is evidence that the commissioning proposal has been started, however the information is lacking detail with respect to project specific requirements or protocols.

- *Folder 1.14 Evaluation of Board Commissioning Plan* contains the commissioning plan with a general line item in the commissioning plan for fire strategy and equipment (item 23).
- *Folder 1.14 Evaluation of Board Commissioning Plan* contains the Modular Build Contractor's MEP Consultants' commissioning statement with section 3.02 notes connection into the existing hospital fire alarm network.

Workbook Ref No.	Areas to probe	Evidence expected
6.7	Has the Health Board started its early thinking for the Fire Safety arrangements for the operational phase?	Has the Health Board commenced its planning and recorded how it will ensure appropriate trained staff and appointment of Fire Officers for the project in the operational phase and is it clear how this project will interface with the Health Boards existing arrangements for management of the Fire Safety?
NHS Scotland Assure Observations: The Health Board have verbally informed NHS Assure that they have appointed a fire safety advisor to this project, to ensure interface with the Health Boards existing arrangements for management of the Fire Safety. There is no recorded evidence to support the above process.		

3.6.2 Fire: Further Observations

In addition to the points raised via the KSAR workbook above, we also include the following observations as a result of the review, all of which relate to the evidence presented during the appraisal.

3.6.2.1	The Electrical technical submittal notes a 7-day soak test period associated with the fire alarm system and this is not reflected in any programme provided.
3.6.2.2	The electrical specification notes that the existing hospital fire alarm panel network requires upgrading to accommodate the modular ward fire alarm system. The works are to be undertaken by SPV's Hard FM Provider as part of their operational maintenance works. No item is contained on the risk register.

3.7 Infection Prevention & Control Built Environment

3.7.1 Infection Prevention & Control Built Environment: KSAR Observations

Workbook Ref No.	Areas to probe	Evidence expected
7.1	How does the Health Board demonstrate that there is an effective infection prevention and control management structure in place? How does the Board demonstrate leadership and commitment to infection prevention and control to ensure a culture of continuous quality improvement throughout the organisation and that there is an effective IPC structure in place; inputting into the design process?	The Health Board provides evidence that there is an IPC Management Structure with the necessary expertise and leadership skills to support the design work The Health Board provides evidence that there is an IPC Management Team with the necessary expertise and leadership skills to support the project. Executive board reports or minutes. Risk registers or equivalent, Minutes from operational and governance groups, (and action points). Structure of infection prevention and control team (IPCT) and qualifications held, previous experience supporting new build projects. Evidence IPC and clinical teams have been involved with any derogation through the design process and are satisfied this will not impact on patient safety. This can be meeting minutes, risk assessments, and risk registers. There is IPC evidence of escalation through the agreed NHS board governance process. Evidence the Executive Board Member assigned to lead on IPCT has been kept informed of IPC risks identified and associated with the project this can be demonstrated by the board. Evidence that fixtures fitting and equipment have not been proposed for the project that would represent an identified IPC risk. Evidence that all contractors and sub-contractor competency checks have been completed and signed off.

NHS Scotland Assure Observations:

Whilst there is an IPC structure in place for the project, as evidenced in the Project Directory and Terms of Reference documents, limited evidence has been provided as to the expertise and skills of the personnel available to support the project.

There is evidence of Stage 1 and Stage 2 HAI-SCRIBEs being completed as well as HAI-SCRIBE workshops being undertaken with the wider project team, including IPC and clinical lead representation at meetings. This includes clinical and IPC involvement in the derogation process.

The KSAR workshops, however, identified that clinical and IPC staff had not been fully briefed on the potential HAI impacts of proposed design solutions, for example automatic air vents (AAVs) are proposed for a number of foul drainage pipework stacks within patient en-suite facilities. Whilst evidence was provided that IPC had been involved in discussions around the developed solutions, the extent of maintenance required for the AAVs, including access through the patient area, had not been fully explained to them.

No evidence was provided to indicate that the Executive Board Member responsible for IPC has been briefed on potential IPC risks (e.g. minutes of Infection Prevention and Control Committee meetings at which the Exec is present) and relevant issues being discussed (e.g. water safety; food hygiene; hand hygiene; pest control; risks to other patients during construction).

Verbal assurance was provided to confirm that procurement will be via established procurement routes and thus IPC risks associated with fixtures, fittings and equipment minimised. Documentary evidence was not provided for review.

No evidence of contractor or sub-contractor competency with respect to experience of understanding IPC risks was provided for review.

Workbook Ref No.	Areas to probe	Evidence expected
7.2	How does the Health Board demonstrate implementation of evidence based infection prevention and control measures during the design process?	The Health Board provides evidence • The board can demonstrate the current version of the National Infection Prevention and Control Manual has been adopted by the organisation and all staff are aware of how and where to access this and it is being referred to during the design process. The board can demonstrate IPC advisors have been

		included within the design phase and development of HAISCRIBE.

NHS Scotland Assure Observations:

The HAI-SCRIBE Operating Procedures provided noted a statement confirming that staff have access to all IPC related information, including the NIPCM. HAI-SCRIBE workshop meetings and Stage 1 and Stage 2 HAI-SCRIBE have been evidenced outlining control measures.

There is no evidence demonstrating how IPC related actions identified in the design tracker (v30) and risk register will be closed out and approved. The design has not been developed to RIBA Stage 4 and there are no specific IPC risk assessments evidenced.

As noted within KSAR workbook question 1.7, whilst the relevant personnel have been included in the HAI-SCRIBE process and the IPC team have been engaged during the development of the FBC proposals, there have been instances where they have not been fully appraised of the potential impact design solutions may have on the HAI-SCRIBE and IPC measures. NHS Scotland Assure recommend that a consolidated review of proposed design solutions is undertaken by the NHS FV IPC team supported by technical colleagues prior to commencing to the construction stage of the project. This will enable NHS FV to assure themselves that their required infection prevention and control measures are incorporated within the new facility.

Workbook Ref No.	Areas to probe	Evidence expected
7.3	How does the Health Board assure itself that the designers have a proper understanding of the infection prevention and control procedures required?	The Health Board evidences that: • All relevant staff within the designers' organisation are provided with clear guidance on roles and responsibilities in relation to infection prevention and control. The contractors' organisation will provide evidence of education in relation to infection prevention in the built environment for all staff involved in the project.

NHS Scotland Assure Observations:

No evidence was seen to demonstrate that relevant staff within the designer's or contractor's organisations have been provided with clear guidance with respect to roles and responsibilities or with relevant education in IPC.

Workbook Ref No.	Areas to probe	Evidence expected
7.4	How does the Health Board assure itself that equipment being proposed meets the required IPC standards?	The IPC Team are involved and IPC advice followed in all procurement decisions for new equipment prior to purchase. IPCT are satisfied that all equipment purchased can be decontaminated safely in line with National Guidance and manufacturers' instructions.
NHS Scotland Assure Observations: Verbal assurance was given that fixtures and fittings will be procured through national processes; however, no documentary evidence was provided for review.		

Workbook Ref No.	Areas to probe	Evidence expected
7.5	Evaluation of the Health Boards planned preventative maintenance (PPM) proposals for equipment issues and the Built Environment in relation to IPC issues.	• Has the Health Board considered how they will undertake assessment of and report cleanliness of the proposed facility and equipment within the healthcare environment, this is inclusive of planned programmes of maintenance? • Does the Health Board plan to seek feedback from patients, staff and visitors for their views? • Is it clear how the work for this project will interface with the Health Board existing arrangements for management of the IPC in the Built Environment in the wider estate?
NHS Scotland Assure Observations: No evidence has been provided for review on the planned preventative maintenance strategy for water and drainage systems. There was no evidence that any access requirements in patient areas has been discussed or coordinated with the IPC or clinical teams. No evidence has been provided on the strategy or process for gaining feedback from staff, service users or others. Although some verbal assurance was received regarding incorporation of the new unit into the IPCT work plan; no documentary evidence was provided for review.		

3.7.2 Infection Prevention & Control Built Environment: Further Observations

In addition to the points raised via the KSAR workbook above, we also include the following observations as a result of the review, all of which relate to the evidence presented during the appraisal.

3.7.2.1	The HAI-SCRIBE documents refer to the room data sheets, which do not fully align with other documents such as the environmental matrix.

4. Appendices

Appendix 1: Glossary

Please refer to NHS Scotland Assure – Assurance Service Master Glossary document available to download from NHS National Services Scotland website

[redacted]